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# EVACUATION PLANNING in the TMI ACCIDENT

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# **EVACUATION PLANNING in the TMI ACCIDENT**

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This report has been reviewed in the Federal Emergency Management Agency and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Federal Emergency Management Agency.

80 1 28 032

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Evacuation Planning in the TMI Accident	5. TYPE OF REPORT & PERIOD COVERED Final Report	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) William W. Chenault, Gary D. Hilbert, Seth D. Reichlin	8. CONTRACT OR GRANT NUMBER(s) DCPA 91-78-C-0193/64	
9. PERFORMING ORGANIZATION NAME AND ADDRESS Human Sciences Research, Inc. 7710 Old Springhouse Road McLean, Virginia 22102	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS Work Unit 4821G	
11. CONTROLLING OFFICE NAME AND ADDRESS Federal Emergency Management Agency, Washington, D.C. 20301	12. REPORT DATE September 1979	13. NUMBER OF PAGES [iv] + xii + 199
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) 11 Jan 84 / 12 205	15. SECURITY CLASS. (of this report) Unclassified	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for Public Release; Distribution Unlimited 14 HSR-RS-2-8-34		Accession For NTIS GAO&I DDC TAB Unannounced Justification By Distribution Availability Codes Dist / and/or, special A I
17. DISTRIBUTION STATEMENT (of the Abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Evacuation Three Mile Island Civil Defense Preparedness Planning Emergency Management Disaster Operations		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Based on on-site observation, interview and debriefing materials, and agency after-action reports, as well as pre- and post-accident emergency response plans, the report explores and discusses the various factors that went into mass evacuation planning in the TMI accident. Activities of emergency management organizations at the Federal, State, and county levels are examined to generate a set of implications for future evacuation planning.		

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## Acknowledgments

Within a few hours after the announcement of an "uncontrolled release" at Three Mile Island, the Defense Civil Preparedness Agency had approved our request to observe, describe, study, and (if necessary) support the emergency management effort that was beginning. For this prompt response, we are especially grateful to Ralph L. Garrett, our technical monitor, James O. Buchanan, DCPA's Research Director, and Clifford E. McLain, the Agency's Acting Director during the TMI emergency. After a briefing at the Federal Regional Center in Olney, Maryland, we were received in Harrisburg by John W. McConnell, already on the scene and directing the effort in support of State and local evacuation planning. Throughout the critical week in Harrisburg, Mr. McConnell and the DCPA personnel on-site facilitated our efforts to collect information without interfering with the rapidly evolving emergency planning effort. As DCPA's field assignees returned from Pennsylvania, we interviewed them as members of a debriefing team led by Samuel Wilson, who also helped us develop the initial report on preparedness activities during the incident. Following the emergency, DCPA personnel, without exception, have quickly and candidly responded to our needs for information, background material, and assessments of technical issues. Special thanks are due Mr. Garrett, who coordinated our work with that of many other interested agencies, who offered invaluable guidance, support, and patience as we sought to assemble the pieces of a complex picture in a brief period.

No less cooperative were the supervisors and staff of the Pennsylvania Emergency Management Agency. Colonel Oran K. Henderson, PEMA's Director, Craig A. Williamson, the Deputy Director, and Kenneth R. Lamison, Operations Officer, allowed us complete freedom to observe and record events, sharing essential internal documents without reservation. Donald F. Taylor and his staff, who are assembling much more detailed accounts of PEMA's activities during the emergency, have graciously provided us with their extensive notes, logs, and draft copies of research materials.

In the risk counties, and especially in Dauphin County, we were often included in the decision-making sessions that carried evacuation planning through the tense days and nights of the emergency. Then, and in subsequent contacts, we were received in a spirit of cooperation. Indeed, preparedness staff at all levels of government have exhibited a remarkably professional attitude toward their TMI activities; while recognizing their own occasional disagreements and differing perspectives, they have overwhelmingly endorsed the principle that the TMI operation should be studied for the lessons it offers, letting the chips fall where they may.

My colleagues at Human Sciences Research have been, as always, insightful contributors. Dale K. Brown, Robert L. Blanton, David J. Fein, and Gary D. Hilbert joined the research team that rushed to Pennsylvania on 30 March. Cecil H. Davis provided a valuable critique of the overall emergency management effort. Seth D. Reichlin joined the team in June. He and Mr. Hilbert slogged through the rapidly accumulated mass of data, producing

much of the draft that has been reduced and honed to create this report. Patricia J. Fink and Barbara Colvin-Kerr have patiently endured our less-than-artful handwriting and endless edits to produce the finished product.

My personal thanks to these contributors and the many others acknowledged in the appendix on sources. They have allowed us to prepare, rapidly, an account of a preparedness activity which deserves further analysis. The authors apologize that only a limited amount of the material provided to us could be incorporated in the present account. We believe this selection, for which we of course are solely responsible, will suggest the complexity of large-scale evacuations and the need for more concerted efforts to prepare for them.

William W. Chenault  
Principal Investigator

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## Executive Summary

Over 600,000 people live within twenty miles of the Three Mile Island (TMI) nuclear power plant near Harrisburg, Pennsylvania. Plans to evacuate that large population were developed *during* the TMI accident.

This report describes the crash effort to prepare evacuation plans while scientists and technicians worked to assess and mitigate the potential hazard from the damaged reactor. Performed in an atmosphere of intense pressure, preparedness planning focused on the essentials of a large-scale evacuation. Lessons learned at TMI are applicable both to quick-response and to more deliberate evacuation planning efforts.

### SCOPE AND COVERAGE

The report describes the detailed evacuation planning effort in the "risk" counties, the coordinating and support roles of State and Federal emergency management agencies, and the preparations of "host" counties to receive evacuees. The report is primarily concerned with preparedness planning under crisis conditions, and with the emergency management agencies that participated heavily in this phase of evacuation planning. Those agencies were, essentially, the County Emergency Management Agencies, supported by the Pennsylvania Emergency Management Agency (PEMA) and the Defense Civil Preparedness Agency which, with the Federal Disaster Assistance Administration (FDAA), has recently been incorporated in the new Federal Emergency Management Agency.

Since this report concentrates on the problems of preparation of State/County evacuation plans, only incidentally does it consider the more major role of the Federal Disaster Assistance Administration (FDAA), which was designated the lead Federal Agency for the overall disaster-response operation, and which was prepared to coordinate the evacuation effort had it occurred. FDAA's activities as described in a June 1979 public release are included in the Appendix to this report (pages 189-193).

Activities of the Nuclear Regulatory Commission and Pennsylvania's Bureau of Radiation Protection are discussed briefly. Based largely on public testimony, these chapters are not intended to be authoritative; they are included to help describe the "notification" and "definition of hazard" problems faced by preparedness agencies in planning for an evacuation.



## SOURCES

On-site observation, interviewing, and document collection began on Friday evening, 30 March, and continued through much of the following week. Other primary sources included debriefings of virtually all DCPA staff assigned to the planning effort; interviews with numerous participants; PEMA logs, working documents, and debriefings of their staff and local Emergency Management Coordinators; public testimony by key participants; and a large collection of local planning documents generated during the emergency. Important background documents included DCPA Crisis Relocation Planning guidance, Red Cross accounts of their extensive efforts during the crisis, and the important set of volumes on emergency management prepared by the Center for Policy Research of the National Governors' Association. A detailed listing of sources appears in the appendix.

## SUMMARY

**Part One: Overview and Chronology of the Accident** establishes the principal phases of the emergency and of preparedness planning for a possible evacuation.

**Part Two: Federal Agency Involvement** presents separate chapters on NRC and DCPA. The NRC chapter highlights the Agency's problems in defining the hazard and communicating that definition to preparedness agencies. The DCPA chapter emphasizes that Agency's experience in working with disaster operations and its use of DCPA personnel to augment State- and county-level planning for an evacuation.

**Part Three: State Agency Involvement** summarizes the activities of Pennsylvania's Bureau of Radiation Protection (BRP) and the Pennsylvania Emergency Management Agency (PEMA). The brief chapter on BRP contrasts the organization's technical competence with its difficulties in securing access to key decision makers, emphasizing a more general problem of translating scientific information into clear-cut guidance for preparedness planners. The PEMA chapter chronicles its key supporting and coordination activities with respect to county-level planning, its organizational shifts to make additional trained personnel available to risk counties, and its role in responding to numerous special problems and requirements while preparing to orchestrate a massive evacuation operation.

**Part Four: Risk County Involvement** is the longest and most detailed chapter, reflecting the heavy concentration of planning activities in the six risk counties that would have been at least partially evacuated. The first part of the chapter describes the counties' differing problems, planning approaches, and orientations toward an evacuation. Later sections describe the similarities and differences in their handling of seven major evacuation problems: (1) development of hosting arrangements for evacuees, (2) route planning, (3) transportation resources, (4) special and institutionalized populations, especially the aged and those with medical problems, (5) communications, (6) public information and

warning, and (7) the handling of pets and livestock. The chapter's conclusions stress needs for both precast plans and the planning aids needed in a crisis, as well as better methods for assessing spontaneous evacuation and other aspects of public behavior.

**Part Five: Host County Involvement** characterizes the varying responses to the problem in the thirty-odd counties which might have received evacuees from the Harrisburg area. The approaches to reception, registration, traffic control, medical problems, mass care, use of private homes, communications, and other areas of concern are noted. The chapter is briefer, reflecting the less concerted and detailed planning found in host areas. Its conclusions emphasize the needs for an integration of host and risk planning, and include a listing of minimum-essential planning components and resources which should be available before a disaster operation is under way.

## CONCLUSIONS

The individual chapters suggest conclusions and implications based on the TMI experience. This section attempts to generalize from that experience to broader considerations of preparedness planning.

Rather than build all the necessary caveats and hedges into the explication of each "finding" or "implication," we here remind the reader that (1) this examination has been conducted quickly, (2) it has focused on the preparedness planning elements of the TMI situation, and (3) TMI represented one of many possible "scenarios" for a reactor hazard, a hazardous materials problem, or a nuclear threat.

Certain dimensions of the TMI case, however, appear broadly significant. The hazard was potentially widespread. The threat was not thoroughly understood by technical experts. Information about the threat required "translation" from scientific terms to the implications for population-protection measures. Most important, TMI illustrated the complex emergency management requirement that a large-scale evacuation imposes on officials responsible for the safety of urban or concentrated populations.

**Potential hazards of a highly technical nature must be defined in terms that describe implications for population-protection measures.**

Preparedness planning begins with a definition of the hazard, the area potentially affected, and some estimate of the possible variations in these factors. For highly technical man-made hazards, emergency managers must often rely on scientific expertise available from other organizations—in this case, Pennsylvania's Bureau of Radiation Protection and the Nuclear Regulatory Commission. The TMI accident illustrated many possible

shortcomings of such arrangements, including the numerous factors which operate to impede the translation of technical/scientific assessments into meaningful guidance for preparedness planning and operations.

Industrial organizations, governmental regulatory bodies, and their scientists and engineers are necessarily oriented toward the routine functioning of potentially hazardous processes or facilities. Their typically conscientious concern for safety is directed, by and large, at prevention. They seek to identify potential (even low probability) hazards, then design safeguards against them. Neither psychological nor organizational forces encourage them to speculate on the "unpredictable" event. If a possible failure is detected, they act to head it off.

Preparedness planners and emergency managers, on the other hand, *begin* their thinking and activities at the point of the unexpected event. "Accidents" do happen. Even the most expensive (per capita) fail-safe systems did not prevent the loss of three astronauts. Assuming that threats will appear, emergency managers look mainly at the potential victims—how many people, how to reach them, what to tell them, how to organize and support them. Public officials in responsible positions, it might be added, generally share the preparedness, not the scientific, perspective.

Preparedness agencies and officials, however, remain dependent on the scientist for risk assessments throughout an emergency operation. This dependence was dramatically illustrated in the TMI accident. Emergency management agencies entered the crisis with contingency plans to evacuate a 5-mile circle around TMI—a radius that conservatively reflected the complex guidelines for assessing potential reactor hazards. Two days into the accident, the same scientific authorities (now faced with a novel and unexpected situation) suddenly recommended a 10-mile, then a 20-mile contingency evacuation plan. Under emergency conditions, local and State officials were forced to scrap a relatively undemanding 5-mile evacuation and plan for a large, complex population movement on short notice. The following figures indicate the dramatically greater scope of the newly required plan.

	5-Mile Radius	20-Mile Radius
residents	30 - 40,000	600,000
square miles	79	1,257
risk counties involved	3	6
host counties for evacuees	0	30
evacuated subdivisions	10 - 12	over 100
hospitals	0	14
nursing homes	2	62
jails/prisons	6	6

Such shifts cannot always be avoided, of course, but both preparedness agencies and their scientific counterparts (for a particular hazard) can arrange planned and systematic procedures for handling the "translation" of a technical hazard into its preparedness implications. Such procedures should take account of the following tendencies:

- (a) **When a major emergency occurs, and when ranking public officials become concerned and involved, even a very-low-probability hazard may become the dominant concern.** Scientists and technicians involved with TMI often differed among themselves in their assessments of the threat. Faced with these differences, both senior technical managers and ranking officials often chose the more cautious alternatives. A desire to be conservative in risk assessments appeared to have a substantial effect on the definition of potential evacuation zones during the emergency—estimates that essentially determined the scope of the emergency management task.
- (b) **Under the press of events in an emergency, technical agencies almost automatically are accorded a significant role which reaches beyond their expertise in emergency management.** As the event becomes a matter of public concern, leaders turn first to expertise that promises better definitions of the hazard. How much radiation was leaking into the environment? What was the danger to public health? How likely was a major disaster? Such questions lead public officials back to the source of the hazard—to the scientific agencies closest to the problem. Furthermore, they tend to focus on the ranking agency (NRC, not BRP), thereby encouraging the tendency for scientific assessments rather than preparedness concepts to dominate. Regardless of who is legally assigned the responsibility for a disaster-response, the agency in a position to define the threat will be influential.
- (c) **The greater the perceived hazard and the public attention accorded it, the greater the tendency to "kick decisions upstairs." by-passing agencies or departments normally charged with scientific analyses or preparedness assessments.** At TMI, this process rapidly evolved to a point at which authority for key decisions (affecting preparedness planning) was concentrated in the Governor and NRC, with a direct line to the White House.

- (d) Both interagency relations and intra-agency organizational shifts affect the response to large-scale disasters. Over 150 Federal, State, and local agencies were involved in the TMI emergency and the communications about it. Many of them evidenced the kinds of centralizing and authority-concentrating tendencies noted above. This undoubtedly contributed to the common complaint that "the government" didn't know what was happening.
- (e) All of the above factors suggest why the management and interpretation of technical information poses one of the most difficult problems faced by officials and emergency managers. TMI presented a complex threat. There were numerous communicators, each reflecting a particular background and viewpoint, and few translators versed in the scientific areas of concern. Poor communication resulted. One example: On Wednesday, 28 March, an operator at the plant told PEMA the reactor had "failed fuel"—*i.e.*, damaged fuel rods (Floyd's testimony to Kemeny Commission, 31 May 1979). This appears in the PEMA Log as "failed to fuel." Such mistakes reflected not only the varying fields of expertise of diverse officials, but also the sheer numbers and actual differences of opinion of those involved. Compounding the communication problem was a lack of sophistication in presenting information to the media and public—phrases such as "hydrogen explosion" may have carried quite different implications for nuclear engineers than they did for residents of the area around the plant.

These problems clearly indicate the need for better mechanisms for defining technical hazards and for translating scientific information into its implications for emergency management. The creation of the Federal Emergency Management Agency, and the comprehensive State-level management agencies recommended by the National Governors' Association, could provide better organizational umbrellas for controlling this process. They would also facilitate the development of communications processes and systems with built-in safeguards against the distortion of technical information. Finally, emergency managers clearly require closer involvement in the process of defining technological hazards—a result that should follow from efforts undertaken in concert with responsible scientific organizations.

**Communities should approach complex disaster operations with well-defined emergency plans, supplemented by inventories of needs and resources.**

The TMI crisis-planning effort suggested the strengths and illustrated the weaknesses of established plans for coping with emergencies. Such plans may be too abstract or general for emergency-response staffs to use. Worse, like the "5-mile" plans at TMI,

they may reflect inadequate definitions of the threat, encourage a false sense of readiness, and delay preparations for a more suitable response to a crisis. On the other hand, comprehensive plans serve to facilitate the inter-jurisdictional coordination required for complex emergency operations. Certainly, the planning groups in this situation devoted a significant amount of their "crash" effort to the collections of information and the development of procedures which could have been available before they started.

TMI reflected the difficulties of securing clear-cut definitions of technological hazards, projecting the scope of potential evacuation efforts, and providing the resources necessary to develop, maintain, and exercise comprehensive plans for such contingencies. This experience also suggested a number of fundamental preparedness measures that would allow a more rapid, crisis-triggered planning effort. Such measures should be undertaken at the county (or equivalent) level, where a familiarity with local conditions is combined with a limited number of jurisdictions which can be integrated in a state-wide or large area disaster-response operation. These measures would include:

- a. plans for expanding small emergency management agencies and professional staffs in time of emergency;
- b. notification procedures for key officials who would join the crisis-planning effort;
- c. planned, redundant communications links with sub-county disaster-relevant agencies, as well as organizations and institutions posing special evacuation problems or offering specialized evacuation resources;
- d. prepared procedures and materials for reaching and warning the public via the media;
- e. listings of institutions and populations requiring special assistance or provisions in an evacuation;
- f. similar listings of medical, nursing home, and other institutions offering special care accommodations for evacuees;
- g. listings of available spaces for mass care and reception of evacuees (from elsewhere in the county or outside it);
- h. listings of transportation resources for those without private automobiles;

- i. checklists and instructions for those personnel who would be charged with specific crisis-planning or operational areas;
- j. adequate, expandable crisis-planning and operations centers—preferably based on a well-equipped Emergency Operations Center.

Depending on funds and public support, such minimum-essential steps could be taken as part of a formal planning (and exercising) effort—*i.e.*, developing a comprehensive, all-hazards plan. Or they could be viewed as supporting elements for a “crisis-expectant” approach which uses these reference and source materials to develop a plan under crisis conditions.

**State and Federal disaster-preparedness agencies should work with county-level emergency managers to plan for and to perfect the “augmentation” process, which worked well at TMI.**

Both PEMA and DCPA assignees were integrated smoothly into a number of local planning efforts, providing added professional expertise and often playing key decision-making roles in conjunction with county officials. Such augmentations should be planned jointly with county officials and the plans for effecting them should be exercised periodically.

**State and Federal agencies should take the lead in designing adequate redundant communications networks to support multi-county emergency operations.**

Such plans should include not only the expansion of communications available locally but also their augmentation by mobile radio units and other additions which can be varied to meet the needs of particular crisis situations. At TMI, new telephone “hot lines,” the civil defense CDNARS radio units, and amateur radio nets were used to supplement communications systems.

**The problems of spontaneous evacuation and anticipating public behavior and response should be further analyzed.**

Emergency organizations and officials are least secure when anticipating public responses to messages and how effectively the public will “meet” and use the supporting services provided for them. In particular, State and local agencies need methods for estimating the flow and extent of spontaneous evacuation movements from the time a crisis begins.

**Volunteers can be highly effective as supporting members of professional emergency management staffs, but they cannot be relied upon over extended periods of threat.**

At both the county and local levels, volunteer activities by individual citizens and organizations made valuable contributions at TMI. Volunteers with appropriate knowledge and skills served in various planning and operations capacities (health, communications, rumor control), bringing with them a range of resources that no county-level emergency management organization could hope to have available on a day-to-day basis. The initial "surge" of effort put forward by these people, and by the professionals on emergency management teams, made possible the rapid developments of capability described in Parts Four and Five of this report. As the situation stabilized and the operation became protracted, however, the "nervous energy" that sustained them began to wane and role conflicts (family and job obligations) intruded themselves. The strengths and weaknesses of reliance on volunteers should be recognized in planning emergency activities. Volunteers can bring a small emergency organization a quality and variety of expertise far beyond its own; they can also vastly expand certain operational capabilities (like rumor control). They cannot, however, be regarded as a substitute for regular staff or as a mainstay of a crucial operating area like communications. Furthermore, they should not be expected to perform on the same basis as professionals over a prolonged, standby period.

**The content and methods of Crisis Relocation Planning (CRP) should be adapted to include the needs for comprehensive evacuation planning in nonmilitary disasters.**

The CRPs being prepared for wartime or crisis-period evacuation of American cities are based on guidance which spells out the intricacies of large-scale evacuation planning. These plans, where completed, should be adapted to accommodate and encompass the relatively smaller problems and requirements posed by reactor or hazardous materials accidents and other emergencies. Though CRP is substantially different in nature from even the largest single-area evacuation problem, the wartime contingency planning includes a large body of knowledge and potential training material for emergency managers concerned with health, mass transportation, mass care, and other major aspects of evacuation planning.

**Radiation hazards, representing a significant constraint on evacuation planning, require further study in the context of reactor emergencies.**

The nature of the "gaseous" radiation expected at TMI requires further definition, particularly in light of authorities' suggestions to "remain indoors" during the first stage of the emergency. Adequate protective measures, including the use of potassium iodide as a "blocking agent," should be examined further. Public information materials are badly needed to explain both the hazard and effective countermeasures—and to manage the psychological response to this "mysterious" threat.



**Unanswered questions about TMI require further assessment.**

How great was the potential hazard (exclusive of the probability estimates which proved poor sources of security after the initial release)? How long would an evacuation have lasted? What supports would the public and special populations have needed during and after the evacuation? Emergency management agencies need answers to these questions in order to refine their approaches to evacuation operations, *per se*. For example, the possible duration of the dislocation should be reflected in the pattern of distribution of evacuees to areas where they would be supported until the emergency ended.

**An all-hazards emergency management capability should include at least the minimum-essential preparations to support large, multi-jurisdictional evacuations.**

Jurisdictions around TMI demonstrated a substantial crash-planning capability. But the accident gave them several days to produce plans—and never required them to use them. Given our society's vulnerability to a number of potential hazards which can threaten large populations, the nation's existing civil defense capabilities clearly should be strengthened to provide better in-place and back-up resources for handling emergency population movements in a rapid and professional manner.

Part One

**OVERVIEW AND CHRONOLOGY  
OF THE ACCIDENT**

## INTRODUCTION TO PART ONE

The single chapter in Part One describes the evolution of the TMI accident and the response of emergency management organizations. This chapter was prepared from published testimony and documents concerning events at the TMI plant, supplemented by materials in the logs of the various agencies that became involved. It is not intended to be used for analytical purposes, since some of the technical matters are still being discussed by participants, and additional communications may still come to light.

Rather, the overview and chronology are included to provide a frame of reference for the subsequent discussions of preparedness planning activities at the Federal, State, and County levels.

## Principal Events in the TMI Emergency

### The Accident Begins

At 4:00 in the morning of 28 March 1979, several lumps of resin broke loose from a demineralizer and were sucked into the pneumatic control system of Three Mile Island's Unit 2 reactor. The debris caused a feedwater valve to close. The turbine stopped, and the control rods dropped into the reactor core to stop the chain reaction; but decay heat from the core continued to raise the temperature and pressure in the reactor's primary cooling loop. When pressure reached 2255 psi, a relief valve on the pressurizer opened, spilling steam and water into the reactor containment building and lowering the pressure in the primary loop. The relief valve was supposed to close when the pressure dropped to 2205 psi; instead, it stuck open, allowing the pressure and the water level to drop further.

When the primary loop pressure reached 1600 psi, the emergency core cooling system started automatically, pumping fresh water into the reactor core. As a result, water levels in the pressurizer—but not in the reactor core—began to rise, eventually causing the pressurizer to fill completely ("go solid"). The operators had been trained to avoid this condition, so they turned off the emergency core cooling system two minutes after it was turned on.

Meanwhile, water continued to pour from the pressurizer relief valve, which was still stuck open. The top of the core was uncovered at this time, allowing extensive fuel damage. Finally, at 6:20 a.m., an operator noticed this fact and isolated the valve. By this time, however, hundreds of thousands of gallons of radioactive water had spilled into the containment building. Because the containment was not yet isolated, sump pumps automatically picked up the water and swept it to an auxiliary building, where it quickly filled the available waste tanks and backed up onto the floor. In the fuel handling and auxiliary buildings, highly radioactive gases leaking from the "make-up" water

system were sucked out of the building by the ventilation system and sent into the environment through the vent stack. At about 6:50 a.m., radiation alarms began sounding in the reactor machine shop, and operators declared a Site Emergency.

#### **Notification and Response**

The Shift Supervisor called the Dauphin County Emergency Management Agency and the Pennsylvania Emergency Management Agency (PEMA). PEMA notified the State Bureau of Radiation Protection (BRP) and the three counties within five miles of the plant: Dauphin, York, and Lancaster. BRP suggested a contingency plan for partial evacuation southwest of TMI, and PEMA advised York and other counties of a possible need for evacuation. Other State agencies and the Governor were swiftly notified, as well as the NRC regional office in King of Prussia. At 8:00 a.m., the utility told BRP that releases had been controlled. The Bureau called PEMA to lift the recommendation for a limited evacuation; and PEMA called the risk counties to relay this information.

#### **Chronology of Events on Wednesday Morning 28 March 1979**

- 4:00-37 Loss of feedwater; turbine shuts off.
- 4:00-42 Pressure relief valve opens at 2255 psi.
- 4:00-45 Reactor shuts down.
- 4:02-00 Emergency Core Cooling System (ECCS) cuts in at 1600 psi.
- 4:02-30 One ECSS high pressure injection pump (HPI) turned off by operator.
- 4:07-30 Reactor building sump pump turns on.
- 4:10-30 Second ECCS HPI pump turned off.
- 4:11 ECCS HPI flow restarted.
- 4:15 Waste water tank in auxiliary building ruptures.
- 6:19 Pressurizer relief valve isolated.
- 6:55 Site Emergency declared.

- 7:02 TMI notifies PEMA and Dauphin County.
- 7:03 Bureau of Radiation Protection (BRP) notified by PEMA.
- 7:08 PEMA notifies Dauphin EOC.
- 7:10 PEMA notifies Lancaster EOC.
- 7:25 BRP notified of General Emergency at TMI.
- 7:35 TMI calls PEMA to report off-site release.
- 7:45 BRP calls PEMA to suggest planning a limited evacuation to the southwest of the plant.
- 7:52 PEMA calls York EOC to advise of possible evacuation.
- 8:00 TMI calls BRP to say that releases have stopped.
- 8:15 BRP calls PEMA to say that no radiation is being released.
- 8:18-8:35 PEMA calls counties and lifts evacuation alert.

#### **Standby Readiness**

From 8:30 a.m. on 28 March to 8:30 a.m. on 30 March, information coming from reactor technicians suggested that the machine was under control and slowly returning to normal.\* State and county agencies settled into a "readiness posture", reviewing emergency evacuation plans and monitoring potential threats at the reactor. Several Federal agencies became involved: FDAA activated its Operations Centers in Washington and Philadelphia to affect coordination between the State and the Federal regional and national levels; NRC sent investigators to the site; DCPA increased its preparedness efforts; and EPA, DOE, and FDA sent radiation monitoring teams to the area. Congressional committees appeared on the scene, and summoned NRC and the plant operators to hearings in Washington. The national press corps descended on Middletown, near TMI, and a fair number of local residents began to leave the area.

\*Later testimony by NRC Chairman Hendrie suggested that until 2:00 p.m. Wednesday, the reactor was essentially out of control.

### **The Friday Emergency**

Friday, 30 March, was the worst day of the emergency. A release of radiation at 8:01 a.m., was measured at 1200 mr/hr by a device aboard a helicopter over the reactor building.\* News of this release triggered a volley of phone calls between TMI, Harrisburg, and Washington. NRC's emergency Executive Management Team in Bethesda heard of the reading and recommended a 10-mile evacuation to PEMA, which passed this recommendation through Lieutenant Governor Scranton to Governor Thornburgh. At the same time, NRC's Region I inspectors at the reactor told the Governor that the releases had stopped and that no evacuation was needed. The State Bureau of Radiation Protection concurred. Faced with these conflicting reports, Governor Thornburgh called the Chairman of NRC and President Carter. Chairman Hendrie recommended a "precautionary" evacuation of pregnant women and pre-school children from a quadrant extending 5 miles northwest of the plant, and suggested that people within 10 miles of the plant stay indoors until noon. (Hendrie later said that since the radiation plume had already been released, staying inside had limited effectiveness.) At 10:30 a.m., Governor Thornburgh went on the air to advise that pregnant women and pre-school children leave a 5-mile circle around TMI, and to repeat Chairman Hendrie's "stay-inside" advisory. Mass care centers were set up in Hershey and two other cities to receive the evacuees.

The confusing reports and recommendations prompted President Carter to organize, early Friday afternoon, a meeting of representatives of the principal Federal agencies that would be involved. NRC was assigned as the lead technical agency, with Harold Denton the single technical spokesman at the reactor; the Federal Disaster Assistance Administration (FDAA) was designated the lead Federal Agency for the organization and coordination of the Federal response to support an evacuation should one be ordered. The Defense Civil Preparedness Agency (DCPA) was asked to evaluate the State's evacuation plan for Governor Thornburgh.

\*It is still unclear whether this release was intentional or not. According to the PEMA log, MetEd operator Jim Floyd claimed the release was "uncontrolled". In testimony before the Kemeny Commission, however, Mr. Floyd maintained that the release was "planned" in order to conserve the reactor's supply of cooling water.

**Chronology of Events on Friday Morning  
30 March**

- 8:01 Large release of radiation; helicopter measures 1200 mr/hr 130 feet above the Unit 2 reactor building. General Emergency declared at site.
- 8:35 PEMA learns of General Emergency.
- 8:40 TMI control room informs PEMA of release in progress (since 8:32).
- 8:40 Second (simultaneous) call from TMI; shift supervisor describes "uncontrolled release" and possible need to evacuate downwind.
- 8:42 PEMA relays this information to DER.
- 8:43 PEMA notifies Dauphin, York, and Cumberland Counties.
- 9:15 Harold Collins, NRC headquarters, calls PEMA to recommend a 10-mile evacuation.
- 9:17 PEMA relays recommendation to Lieutenant Governor.
- 9:22 DER informed of recommendation.
- 9:35 DER calls PEMA to say that no evacuation is warranted because releases have stopped.
- 9:35 NRC headquarters calls PEMA to reaffirm recommendation to evacuate.
- 9:40 DER recommends no evacuation to PEMA and Governor.
- 9:45 Governor calls PEMA to check Collins' credibility; PEMA reaffirms recommendation to evacuate.
- 10:00 NRC Commissioners decide that no general evacuation is needed.
- 10:12 Governor calls Chairman Hendrie; Hendrie recommends staying indoors within 10 miles, and evacuating pregnant women and preschool children from a 5-mile quadrant.
- 10:35 Governor announces stay-inside recommendation, and advises pregnant women and preschool children to leave 5-mile ring.
- 12:30 Governor reiterates earlier 10-mile and 5-mile advisories.



Meanwhile, technicians had discovered the hydrogen bubble in the reactor vessel, provoking a frenzy of analysis in the nuclear science community, and raising questions about the effectiveness of even a 10-mile evacuation. Harold Denton arrived at TMI shortly after 2:00 p.m., and concluded during the evening that Pennsylvania ought to prepare for the possibility of a 20-mile evacuation. Such an evacuation would require moving over 600,000 people including almost 90 percent of the population of Dauphin and York Counties.

### **The Evacuation Planning Effort**

The six risk counties began learning of this new requirement around midnight Friday and immediately stepped up their planning efforts. Some counties were still expanding the 5-mile evacuation plan they had pulled off the shelf Wednesday morning, but the 20-mile limit finally forced them to scrap that plan and begin from scratch. Aided by DCPA and PEMA, the counties spent Friday night and all of Saturday reviewing the needs of the population within the 5-, 10-, and 20-mile rings; planning evacuation routes; arranging mass care space in host counties; and handling the problems of medical and institutional populations. Working around the clock through the weekend, risk county planners raced to produce and then refine evacuation plans for the threatened areas.

The events of Friday morning and the perceived danger of the hydrogen bubble probably provoked a substantial spontaneous evacuation from the Harrisburg area. Estimates made at the time of the accident suggested that between 20 and 35 percent of the population may have left the area.

Conditions at the reactor had improved slightly by the time President Carter visited the site at noon Sunday. The bubble appeared slightly smaller—though NRC emphasized that it still had neither direct measurements of its size nor sure means to reduce it. Risk county planners were continuing their crash efforts to come up with and improve evacuation plans. The host counties, meanwhile, were developing their own plans for dealing with the possible influx of evacuees.

April 2 was still tense. Schools in the area remained closed; information from the reactor was sketchy; and NRC was suggesting that an evacuation might still be necessary if current methods to remove the bubble did not succeed. The risk counties continued to revise their plans and the host counties to develop theirs.

### **The Crisis Subsides**

The hydrogen bubble diminished dramatically on Tuesday, 3 April, greatly reducing the chance that an evacuation would be ordered. The risk and host counties concentrated on formalizing their plans, and spontaneous evacuees evidently started returning to their homes. Schools in the risk zone reopened on Wednesday, 4 April, and on 9 April Governor Thornburgh advised pregnant women and pre-school children to return home. As the crisis wound down, emergency planning slowly gave way to the long process of recovery and investigation—a process which is far from completion at this writing.

**Part Two**  
**FEDERAL AGENCY INVOLVEMENT**

## INTRODUCTION TO PART TWO

Representatives of at least seven major Federal agencies played a role in the emergency response to the TMI accident. Those agencies were: Nuclear Regulatory Commission, Federal Disaster Assistance Administration, Defense Civil Preparedness Agency, Department of Energy, Food and Drug Administration, Federal Preparedness Agency and Environmental Protection Agency.

This part concentrates on just two of these agencies, DCPA and NRC. As the lead Federal technical agency, NRC defined the nature of the threat for which the emergency management community had to prepare. DCPA fielded a large organization in Pennsylvania, and had very close working relationships with State and county evacuation planners. DOE, FDA, and EPA concentrated on radiation monitoring and studies of the radiological health impacts. DCPA's sister agency, the Federal Disaster Assistance Administration (FDAA), as the lead Federal agency for coordination of the Federal response, was heavily involved in the TMI effort. The activities of these two agencies dovetailed, with most of DCPA's attention going to evacuation planning and technical assistance, while FDAA concerned itself with preparations for Federal assistance in support of an actual evacuation, the hosting of evacuees, post-evacuation operations, and disaster relief. Because this report focuses on the effort to plan the evacuation of risk areas, FDAA's role is not considered in detail. A brief account of FDAA activities, as described in a public release by certain of its own personnel, appears in the Appendix (pages 189-193).

This part of the report therefore highlights those Federal agencies most involved in the detailed work of emergency management and evacuation planning at TMI. It should not be read as a comprehensive description of the Federal response to the accident -- a task which is being addressed by other investigators.

## II

### The Nuclear Regulatory Commission

The Nuclear Regulatory Commission (NRC) was the lead Federal technical agency responding to the Three Mile Island accident. NRC's lead role was partly pre-planned: the Federal Preparedness Agency's "Federal Radiological Response Plan for Peacetime Nuclear Emergencies" (FRRPPNE) assigns NRC the role of coordinating other Federal agencies' emergency response planning. But NRC also seems to have become the lead Federal technical agency at TMI for informal reasons: (1) because it had the closest continuing connections with and greatest power over the utility; and (2) because NRC's top officials had the technical expertise to understand and judge the events at the reactor.

#### FORMAL ORGANIZATION AND FORMAL RESPONSIBILITIES IN THE CIVIL PREPAREDNESS AREA

According to NRC's Regulatory Guide 1.101, "Emergency Planning for Nuclear Power Plants" (March 1977), NRC aids State and local planning for reactor accidents, and is to "support" State, local, and utility company (licensee) actions during a real emergency. "This policy," says the Guide, "is based on the recognition that State and local governments have the necessary authority to implement protective measures for the public in their jurisdictions. Although Federal agencies can and will respond to emergencies arising from nuclear power plant emergencies if necessary, such response should be regarded primarily as supportive of, and not as a substitute for, responsible action by licensees and State and local governments" (1.101-2).

In accord with this general policy, NRC provides information to utilities, States, and municipalities on how to plan for nuclear accidents. NRC regulations (Part 50, Appendix E) set out the requirement for such plans, while several related documents

give more detailed information about what to include in emergency plans.\* These supplementary reports are offered to states and local governments as guidelines rather than requirements. Although NRC mandates some emergency planning for each reactor, the details of the plan are left to local authorities. In practice, licensee company, State, and local emergency plans conform quite closely to NRC's suggestions.

NRC is not primarily an emergency management agency. It is required by law to investigate nuclear reactor accidents; but it is not required to coordinate civil preparedness responses to those accidents.

#### **NRC Permanent Preparedness Organizations and their Formal Responsibilities**

The five NRC Commissioners are appointed by the President. In theory, four of the Commissioners report to the Chairman, but in practice the relations among the current Commissioners are "collegial".\*\* Each Commissioner has a personal staff of up to six people, including secretaries and legal assistants. In addition, several staff offices report directly to the Commissioners: Policy Evaluation, General Counsel, Public Affairs, Congressional Affairs, the Secretary, and the Inspector/Auditor.

Most of the daily work of NRC is carried out by the operating staff of the agency. The operating staff is administered by the Executive Director of Operations (EDO), who reports to the Office of the Chairman. The EDO oversees several staff offices, including the Office of Administration, the Office of the Executive Legal Director, the Controller, the Office of Equal Employment Opportunity, Management and Program Analysis, International Programs, and State Programs. Finally, the EDO supervises the line divisions of NRC: Standards Development, Nuclear Material Safety and Safeguards, Nuclear Reactor Regulation (NRR), Nuclear Regulatory Research, and Inspection and Enforcement (IE). The five Regional Offices of NRC are under the jurisdiction of IE. The Commission had about 2,700 employees at the time of the TMI accident.

\*For instance, Regulatory Guide 1.101, 'Emergency Planning for Nuclear Power Plants'; "Guide and Checklist for Development of State and Local Government Radiological Emergency Response Plans in Support of Fixed Nuclear Facilities"; and 'Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants.'

\*\*According to Chairman Hendrie's testimony before the House Interior Committee and the President's Commission on the Accident at Three Mile Island.

The Emergency Preparedness Branch is a small office in the Office of State Programs, itself a relatively small staff division under the Executive Director for Operations. The responsibility of the Emergency Preparedness Branch is to assist State and local governments in planning for radiological emergencies, a role which is consistent with NRC's policy that civil preparedness is a State and local responsibility. In recent years the Emergency Preparedness Branch has helped the Office of State Programs develop and disseminate such preparedness guidelines as the "Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants". This office also reviews State and local plans for responding to nuclear accidents.

#### **NRC Standby Emergency Management Organizations**

NRC has established procedures for several standby organizations to function only during emergencies. Foremost among these is the "Incident Response" organization at NRC headquarters in Bethesda, Maryland, which is designed to "compress" top NRC staff to help them cope with emergencies. The basic premise of the Incident Response Program is that executives will be pulled from their usual jobs during an emergency\* and assembled in an Operations Center for more efficient decisionmaking.

The Incident Response organization at NRC headquarters had two main components at the time of the TMI accident: an Executive Management Team (EMT) and the Incident Response Action Coordination Team (IRACT). The Executive Management Team (EMT) is composed of four top-level NRC officials: the Executive Director for Operations, the Director of Inspection and Enforcement (IE), the Director of Nuclear Material Safety and Safeguards, and the Director of Nuclear Reactor Regulation (NRR). The IRACT is made up of middle-level division directors; its assigned responsibility is to identify problems during emergencies, develop alternative solutions, and present these alternatives to the Executive Management Team (EMT).

According to the NRC Manual, the Division of Inspection and Enforcement (IE) is in charge of the initial NRC response to accidents—that is, until the EMT can

\*Emergency conditions include reactor accidents, natural disasters, theft of weapons-grade nuclear material, and nuclear terrorism.

assemble. As soon as the EMT members are together, they take over from the Division of Inspection and Enforcement, and manage NRC response through the IRACT group. IRACT, in turn, manages a support staff and an operations staff. These are ad hoc groups, composed of any members of NRC who have expertise concerning the problem at hand.

Each of the five Regional Offices of NRC has its own emergency planning system which goes into operation whenever a serious incident occurs in its region. Like the headquarters Incident Response group, the Regional emergency planning organizations exist on a standby basis—i.e., on paper. In addition to their everyday duties, certain employees of the Regional Offices are assigned to be "Emergency Planning Officers" or "alternate" Emergency Planning Officers. According to testimony before the President's Commission on the Accident at TMI, the "alternate" EPOs are assigned to active duty by rotation: on certain days, certain EPOs are alerted if an emergency occurs.

Each NRC Regional Office has an Emergency Center, parallel in theory to the headquarters Operations Center. However, the facilities at the Regional Emergency Centers seem to be rather limited: one Region I inspector testified that their Emergency Center was "simply a set-up in the back part of a conference room with extra phone communications."\*

The emergency responsibilities of Regional officials are fairly close to their normal responsibilities. When a serious accident occurs, according to the IE Manual, the Regional offices must immediately notify headquarters and dispatch an inspector or incident response team to the scene of the accident. The mission of the incident response team is, broadly, to assess the problem and inform Headquarters and the Regional Office. If the accident involves an operating reactor (as opposed, say, to a spill of radioactive material in transit), the Regional Office must gather information and notify specific State and Federal agencies: EPA and the State if there is release of radioactivity off-site; OSHA if there are injuries to workers; a medical consultant if contamination has occurred; and DOE if help is needed in evaluating the hazards.

\*Grier to the President's Commission on the Accident at TMI, 31 May 1979, transcript page 298.



## NRC ACTIVITIES DURING THE TMI ACCIDENT

NRC's principal concern during the TMI accident was to find ways to shut the reactor down quickly and safely. The agency concentrated on radiation problems and monitored Metropolitan Edison's activities from Wednesday morning until Friday. After the large radiation release and the discovery of the hydrogen bubble on Friday morning, NRC increasingly took direct control of the operations of the plant, and became increasingly active in decisions about evacuation. From Friday morning until Tuesday, 3 April, NRC essentially defined the threat and set the parameters for emergency planning. As the chance of a serious disaster lessened after 3 April, NRC returned to its technical role of guiding the reactor to a cold shutdown.

### Chronology

The following chronology is based on testimony by NRC officials before the House Interior Committee and to the President's Commission on the Accident at TMI, on transcripts of NRC Commission meetings, and on after-action summaries prepared by NRC.

#### Wednesday, 28 March

- 4:00 a.m. Accident begins.
- 6:50 a.m. Site Emergency declared.
- 7:45 a.m. NRC Region I notified; message received by answering service.
- 8:00 a.m. NRC Division of Inspection and Enforcement (IE) notified. NRC Division of Nuclear Reactor Regulation (NRR--Denton) notified by IE.
- 8:10 a.m. Region I Emergency Management Officer (Gallina) notified by Region I Duty Officer. Activates Region I Emergency Management Center at King of Prussia, Pennsylvania.
- 8:15 a.m. NRC Headquarters Executive Management Team notified by IE. Incident Response Program activated in Bethesda.
- 8:45 a.m. Four inspectors leave Region I office for TMI.

- 8:50 a.m. Executive Management Team arrives at incident response Operations Center in Bethesda.
- 9:00 a.m. Commissioners Ahearne, Kennedy, and Gilinsky notified about accident; they go to incident response Operations Center.
- 10:05 a.m. NRC investigators from Region I arrive at TMI. Gallina briefed by station superintendent in Unit I control room. Calls NRC and Region I headquarters. Notifies Pennsylvania Department of Environmental Resources, Bureau of Radiation Protection.
- 10:15 a.m. NRC Commissioners briefed in Bethesda by Division of Inspection and Enforcement.
- 11:00 a.m. One additional investigator and one inspector arrive at TMI from NRC Region I.
- 12:00 Noon Chairman Hendrie learns of accident.
- 2:30 p.m. Monitoring aircraft and support team from Brookhaven National Laboratory arrive at TMI to begin radiation sampling.
- 5:00 p.m. Denton (NRR) goes to incident response Operations Center at NRC headquarters in Bethesda.
- 7:15 p.m. NRC mobile lab arrives at TMI, boosting NRC Region I staff to 11 on site.
- Evening Top NRC officials remain in the incident response Operations Center over night.

**Thursday, 29 March**

- 9:00 a.m. Chairman Hendrie briefed by staff.
- 12:00 Noon Team from Office of Nuclear Reactor Regulation (NRR) arrives at TMI.
- Afternoon Hendrie, Denton, and other NRC officials testify before House Interior Committee.
- 2:30 p.m. More NRC officials arrive at TMI from Region I, boosting total NRC staff on site to 29 people.

Afternoon Gallina (Region I) briefs Governor Thornburgh.

Afternoon Executive Management Team orders MetEd not to discharge radioactive waste water into Susquehanna River.

Evening Gallina learns of core damage.

**Friday, 30 March**

8:00 a.m. Gallina arrives at TMI.

8:01 a.m. Gas vented to atmosphere; aerial monitor registers 1200 mr/hr over the Unit 2 reactor building.

8:35 (about) Denton recommends evacuation to Emergency Management Team in Bethesda incident response Operations Center. EMT recommends to Commissioners that they recommend evacuation. EMT orders Collins (in Office of State Programs) to call Pennsylvania officials and recommend evacuation.

9:15 a.m. Collins calls PEMA and recommends 10-mile evacuation.

9:18 a.m. (about) Gallina learns that "someone" at NRC headquarters had recommended evacuation. Calls Region I and NRC headquarters and recommends against evacuation. Learns of hydrogen bubble.

9:30 a.m. Governor's office calls TMI; Gallina recommends no evacuation.

10:00 a.m. (about) NRC Commissioners decide to recommend no general evacuation.

10:12 a.m. Hendrie recommends to Governor Thornburgh that people within 5 miles NW of plant stay indoors, and that pregnant women and children leave the 5-mile radius.

10:35 a.m. Governor Thornburgh advises publicly that people within 10 miles of plant should stay indoors, and that pregnant women and pre-school children should leave the 5-mile circle.

10:47 a.m. President Carter calls Hendrie; Denton ordered to site.

12:00 Noon Thornburgh lifts stay-indoors advisory.

- 1:35 p.m. Hendrie meets at the White House with Brzezinski, Powell, Watson, other White House staff, and representatives of FDAA, DCPA, and FPA.
- 2:00 p.m. Denton arrives at TMI.
- Evening Denton briefs Governor Thornburgh on Rasmussen Report, including evacuation scenarios. Proposes planning for a 20-mile evacuation circle.

**Saturday, 31 March**

- 8:30 p.m. Commissioner Gilinsky begins work on "decision document" for NRC decision on evacuation. Completed 6:00 a.m., 1 April.
- 11:00 p.m. (about) Chairman Hendrie discloses in a press conference that measures to eliminate the hydrogen bubble pose the "possibility" of evacuating 10-20 miles downwind of TMI.

**Sunday, 1 April**

- Morning Denton publicly re-affirms potential for evacuation if measures to reduce the bubble do not succeed.
- Late Morning Chairman Hendrie arrives at TMI.
- 12:30 p.m. President Carter arrives at TMI.

**Monday, 2 April**

- 11:30 a.m. Denton announces reduction in size of bubble.

**Monday, 9 April**

Governor announces that any pregnant women or pre-school children who had evacuated should return home.

## **NRC'S INTERAGENCY RELATIONS DURING THE TMI ACCIDENT**

NRC's interagency network expanded rapidly as the crisis developed. As might be expected, the Commission's contacts on the first day were restricted to those specified in the Incident Response Plan—i.e., the Bethesda Headquarters was linked to NRC's Region I office, which was in contact with Metropolitan Edison and the Bureau of Radiation Protection (BRP). By the second day (29 March), the Region I NRC officials, including those at TMI, were also linked with the Governor's Office.

Friday, 30 March, saw a rapid proliferation of interagency contact and communications traffic. Region I (NRC) was in contact with the Governor's Office, the Company, BRP, DOE, and EPA, while NRC's Washington area officials were in contact with the White House, the Governor's Office, and PEMA, as well as the Region I office.

By Saturday, the centralization of information functions under Denton was reflected in extensive communications between his on-site NRC staff and the White House, the Governor, NRC Headquarters, BRP, the Company's officials and staff, DOE, and EPA. This pattern (which represents only the principal linkages) remained fairly constant until the crisis subsided. Most of NRC's important decisions during the crisis were communicated through the channels indicated above.

### **28 March**

In accordance with MetEd's emergency plan for the TMI plant, NRC Region I was contacted shortly after a Site Emergency was declared. NRC Region I in turn contacted the Bureau of Radiation Protection in Pennsylvania's Department of Environmental Resources, and NRC's headquarters in Bethesda, Maryland. During the day, NRC Region I officials worked closely with the utility to bring the plant under control, and somewhat less closely with BRP to monitor radiation released off site. In general, NRC's communication with other agencies on the 28th was about technical operational subjects.

### **29 March**

NRC Region I officials continued to work with the plant operators to cool the reactor, and with BRP on radiation sampling. The Governor was briefed by Region I

officials at the plant—not by officials at NRC headquarters—since on the 29th the plant was judged to pose no major hazard to the public. NRC's senior officials were called before a House subcommittee to testify about the accident, essentially in retrospect, since the danger was believed to be over.

#### **30 March**

NRC's interactions with other agencies expanded rapidly as the radiation emissions increased and when the hydrogen bubble was discovered. To some extent, communications channels crossed. For example, NRC's incident response Operations Center (Bethesda) told the Pennsylvania Emergency Management Agency (PEMA) that a 10-mile evacuation was warranted at the same time that NRC Region I officials told the Governor that it was not. The White House stepped in at mid-morning to help alleviate the problems caused by such conflicting information.

On the operating level, NRC officials at the plant continued to work with utility officials, and with BRP on radiation measurements. Representatives of the Department of Energy (DOE) also began to help with radiation samples, and the Environmental Protection Agency (EPA) was contacted for guidance on permissible radiation exposure.

#### **31 March**

NRC's basic interagency network began to stabilize as Harold Denton became the sole NRC spokesman on technical matters. Denton communicated regularly with Governor Thornburgh and President Carter, who also conferred frequently with each other. As large numbers of NRC officials appeared at TMI (a peak of 101), the distinction between headquarters and Regional staff became blurred, and NRC replaced the utility as the channel for relaying information from the plant to State and Federal authorities. NRC on-site personnel continued to work with BRP, DOE, and EPA, but their links with PEMA appeared to weaken.

#### **1 April to 4 April**

As the crisis-response effort stabilized, NRC officials assumed a more limited, technical role. As Harold Denton described it in testimony before the House Interior Committee, his role was to "communicate the technical conditions" at the plant, and

the Governor's was to "evaluate the social cost to the people of Pennsylvania." This policy characterized NRC's relations with State agencies for the rest of the accident.

### **NRC'S RELATIONSHIP WITH THE NEWS MEDIA AT TMI**

NRC faced enormous obstacles in communicating effectively with the news media during the TMI accident. The accident was highly technical, the implications were extremely political, and the public was generally uninformed and unaware of the basic issues. NRC did have an established procedure for communication with the public during an incident, but the Washington official in charge of public information was often unaware of developments at the plant. For several days the news media gathered information from sources widely scattered throughout the NRC organization.

NRC also faced difficult decisions in releasing information that might lead to panic or spontaneous evacuation. Since it was the Governor's legal responsibility to order an evacuation, NRC deferred to him, and made statements to the media which were intentionally vague on the subject of evacuation. NRC officials and spokesmen, reflecting their technical background and experience, were prone to use expressions like "hydrogen explosion," which can be disconcerting to a lay public already stressed by stories of potential disaster at a nearby nuclear facility.

NRC's relations with the media were made more difficult by the media's lack of experience in reporting reactor accidents. Reporters had great difficulty interpreting the highly technical language of NRC and utility spokesmen. Also, the media were frequently unclear about the details of NRC's formal organization, which sometimes led to sources being misidentified and statements misattributed.

NRC's relationship with the local press can be traced by examining reports attributed to Commission officials in local newspaper stories. NRC's profile in the local press can be summarized as follows:

**28 March:** NRC officials, primarily from Region I office, talk to the Harrisburg press; rapid changes in the situation and interpretation of it result in widely differing statements over time.

- 29 March:** NRC's top officials try to "set the record straight" in response to questions from Congress. Stories in the local papers emphasize the stability of the reactor.
- 30 March:** Brian Grimes, an Assistant Director in the Office of Nuclear Reactor Regulation, alerts the papers to the possibility of a meltdown. The hydrogen bubble is discovered and reported. Hendrie appears to support Grimes' conclusion. Stories in the local papers emphasize the uncertainty of the situation.
- 31 March:** Denton takes over as the sole NRC spokesman on technical matters. He is calm, but explicit about the risks. Hendrie contradicts the industry analysis of the accident. Statements in the local press emphasize no present danger, but the possibility of future precautionary evacuation.
- 1 April:** Denton continues as sole NRC representative to the press. Reports emphasize continuing uncertainty and the need for a decision on evacuation "in a few days".
- 2 April:** Denton continues as sole NRC representative, but begins to speak more on technical matters and less on the need for evacuation. Stories in the local press emphasize gradual improvement.

NRC's profile in network television was somewhat different. The networks gave more time to NRC's top officials (Hendrie and Denton) and less to the inspectors on the site or to the middle-level officials at NRC headquarters.\* Harold Denton in particular received the lion's share of TV coverage. Also, the editorial slant of TV coverage of NRC was somewhat different than local press coverage. In reporting statements by NRC officials, the local press emphasized the technical description of events, while the national TV networks emphasized the potential hazards—meltdown, in particular. The difference is probably due to the fact that the local papers, whose staff and readers were part of the population at risk, had an incentive to describe events precisely, avoiding speculation. The national networks were freer to consider a wide range of potential hazards.

\*This may be due to the fact that the networks have better access to senior officials than do the local papers.



## CONCLUSIONS

**NRC's technical understanding of the accident thrust the agency into decisions outside its normal experience.**

In particular, NRC's role in recommending evacuation was unclear. It is legally the Governor's responsibility to decide, but the Governor and his staff lacked the technical capability and the access to information needed to evaluate conditions at the reactor and to judge whether—and how wide—an evacuation was necessary. So, between 30 March and 2 April, NRC was left with the job of making decisions about whether and when to evacuate. However, the top decisionmakers at NRC were, they admit, often isolated from events at the plant, and did not have much experience in evacuation planning. For example, their "quadrant" evacuation scheme was overly theoretical. It ignored the problem of shifting winds, and the social and public relations problem of laying arbitrary boundaries across the risk zone.

**The commission structure of the NRC is not well adapted to emergency management.**

By design, the NRC Incident Response Program does not include the Commissioners. According to the testimony of Chairman Hendrie,\* this was because NRC thought that decisions about loss-of-coolant accidents would have to be made so quickly that the five Commissioners would not have time to vote on a course of action. Yet, in the TMI accident the Commissioners became involved almost immediately, since officials outside the NRC preferred to deal with the "men at the top". The Commission structure was designed to spread responsibility for decisionmaking rather than to concentrate it; in practice, the Commission's decisionmaking process was sometimes at odds with that of the Executive Management Team and the agency's operating staff.

**The operating responsibilities of both NRC Headquarters and Regional emergency organizations were broadly defined, leading to some confusion in Federal-State agency responses to the TMI accident.**

The policy of the people who designed the Incident Response Programs was to make them "incident-specific"—that is, flexible enough to respond differently to each

\*President's Commission on the Accident at TMI, June 1, 1979, transcript page 174.

problem. As a result of this policy, the NRC Incident Response Programs offer only general guidance about who should do what in specific emergencies. The staff of the Office of State Programs, for example, is merely supposed to (1) "Identify affected State and local authorities and State capabilities"; and (2) "Evaluate State action and advise IRACT of alternatives available based on the performance levels of State and local authorities" (NRC Manual 0502IIE3c). In fact, the Incident Response Plans of NRC are more explicit about coordination with the licensees and with other Federal agencies than about coordination with State and local governments. The Director of the Office of State Programs is neither a member of the Executive Management Team nor of IRACT. The lack of specific guidance for NRC coordination with State and local governments seems to have been responsible for much of the administrative confusion during the TMI incident. On Friday morning, it was noted above, various NRC officials were offering uncoordinated and conflicting advice to the Governor, PEMA, and BRP.

**NRC did not expect accidents as serious as TMI to occur.**

This attitude is amply documented both in testimony before various investigative bodies and in internal NRC reports released before the accident. A set of guidelines prepared by an NRC/EPA Task Force, for example, stated that "it has been, and continues to be the Federal position that it is possible (but exceedingly improbable) that accidents could occur calling for additional resources beyond those that are identified in specific emergency plans developed to support specific individual nuclear facilities.\* The Director of NRC's Division of Systems Safety testified that because there had been no serious accidents in commercial reactors prior to TMI, NRC had gotten "complacent".\*\* Commissioner Gilinsky explained that priorities inherited from AEC had "not stressed reactor safety as a major issue".\*\*\*

\*NUREG-0396, "Planning basis for the development of State and local government radiological emergency response plans in support of light water nuclear reactors", III-4. This report was released in draft in December 1978 and was due for final approval on 30 March 1979, but the report was delayed because of the TMI accident.

\*\*Dr. Mattson to Kemeny Commission, 1 June 1979, transcript page 110.

\*\*\*To Kemeny Commission, 1 June 1979, transcript page 142.

From the standpoint of emergency management, alone, NRC's essential functions were to identify and define the potential hazard, translating a technically defined threat into its implications for the protection of the general public. During the initial period of the accident, NRC officials communicated uncertainty and confusion about the severity of the threat. Their fluctuating recommendations ranged from no action, to a 10-mile evacuation, to a precautionary movement of pregnant women and young children, to precautionary planning for a 20-mile evacuation. Without necessarily faulting the Commission for its uncertainty about a novel situation, it must be noted that the appropriate State officials and the responsible emergency management agencies were never given a clear-cut definition of the threat. As a result, preparedness planning for an evacuation was seriously delayed.

### III

## The Defense Civil Preparedness Agency

The Defense Civil Preparedness Agency provided extensive technical assistance and support to State and local preparedness agencies, deploying some 50 of its personnel in the Pennsylvania risk and host areas during the week following 28 March. Planning expertise, communications support, and radiological monitoring teams and equipment were the principal resources provided by the Agency, which coordinated its operations through its Federal Regional Center (Region Two) near Olney, Maryland.

In addition to their supporting role in Pennsylvania, the DCPA national and Region Two personnel were involved in the development of technical information on radiation hazards and monitoring procedures. The Agency furnished data on the status of preparedness activities and operational readiness to the White House, the Federal Disaster Assistance Administration (FDAA), the Nuclear Regulatory Commission (NRC), and diverse other Federal and State agencies. DCPA's Region Two Center in Olney also provided information on the status of the incident in twice-daily situation reports to the other seven DCPA Regional Centers. Both the national and Region Two offices handled requests from individual State emergency management offices for information about potential radiation hazards in neighboring states.

During the TMI incident, however, the national and Region Two offices were clearly not in the mainstream of communications concerning the reactor problem or its implications—a matter which fell primarily in the domain of the NRC.

### FORMAL ORGANIZATION AND RESPONSIBILITIES

The Defense Civil Preparedness Agency has long been the Federal organization responsible for developing and coordinating Federal, State, and local preparedness for a nuclear attack on the United States. In addition to this (legislated) primary mission, the civil defense "dual use" doctrine allows military preparedness resources to be used for

non-military preparedness functions whose performance supports or "exercises" (and does not conflict with) military preparedness. With the recent shift of DCPA from the Defense Department into the new Federal Emergency Management Agency (FEMA), this multiple-hazards preparedness doctrine may receive additional emphasis. At the time of the TMI accident, however, DCPA functioned in accordance with its routine doctrine and procedures.

Through its Regional Centers, DCPA is in routine contact with State EOCs, and the Agency has typically been the principal Federal communications link with local and State personnel who are actually conducting disaster operations (as opposed to post-disaster assistance, when FEMA and other agencies typically become involved). Furthermore, by virtue of its nuclear preparedness mission, DCPA is familiar with radiation hazards, radiological monitoring, and the implications of these hazards for disaster operations.

Finally, the Agency's Crisis Relocation Planning (CRP) program—geared to the gradual development of wartime contingency evacuation plans for American cities—is excellent background for a comprehensive approach to more limited evacuation problems. A number of the DCPA personnel involved in the TMI effort had previous experience in the CRP program.

Both in its planning and its emergency-response roles, DCPA customarily works closely in support of State and local operating agencies. That experience, too, was to prove valuable when DCPA assigned its personnel to local jurisdictions around TMI.

#### **Formal Responsibilities**

Among its numerous specific functions, DCPA is charged with supporting Federal, State, and local government efforts to develop:

- A shelter program, including evacuation and movement to shelter;
- A radiological fallout (warfare) defense program;

- Steps to warn the population of enemy attack upon the United States;
- Use of a civil defense communications system for warning the affected population of impending disasters;
- Planning assistance to State and local governments in connection with adaptation and use of preparedness plans and capabilities for other than enemy-caused disasters; and
- Protection and emergency operational capability of State and local government agencies in keeping with plans for the continuity of government.

DCPA is also responsible for supporting programs including training and education, research and development, emergency public information, participation by industry and national organizations, and foreign civil defense liaison. In actual emergencies DCPA provides a communications conduit from State and local governments to the Federal establishment for reporting on the disaster and requesting assistance. DCPA also provides staff to assist State and local governments in disaster operations when needed.

#### **Formal Organization**

At the time of the TMI accident, DCPA's organization revolved around the National Office, eight Regional Offices, and two Regional Field Offices, as shown in Figures III-1 and III-2 on the following pages. (For the National Office, only the Plans and Operations Directorate is charted in detail.) Though staffed only at the Federal and Regional levels, the Agency is a principal conduit for Federal funds provided to State emergency management agencies, and its personnel often work closely with those State and local offices involved in preparedness planning and disaster-response operations.

Since the TMI accident, DCPA has been merged into the Federal Emergency Management Agency (FEMA), and this organizational structure has been altered.

Figure III-1

DCPA ORGANIZATION IN MARCH 1979

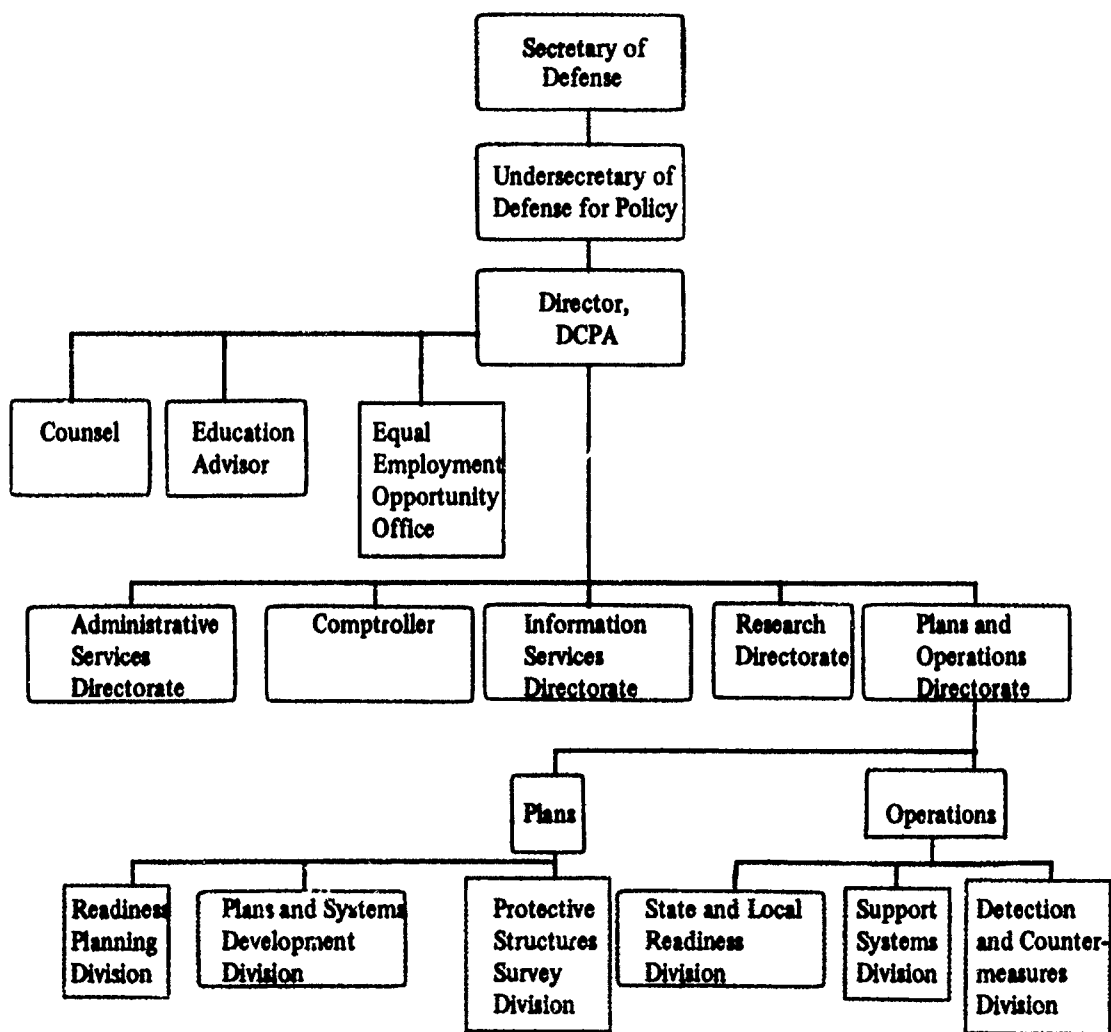
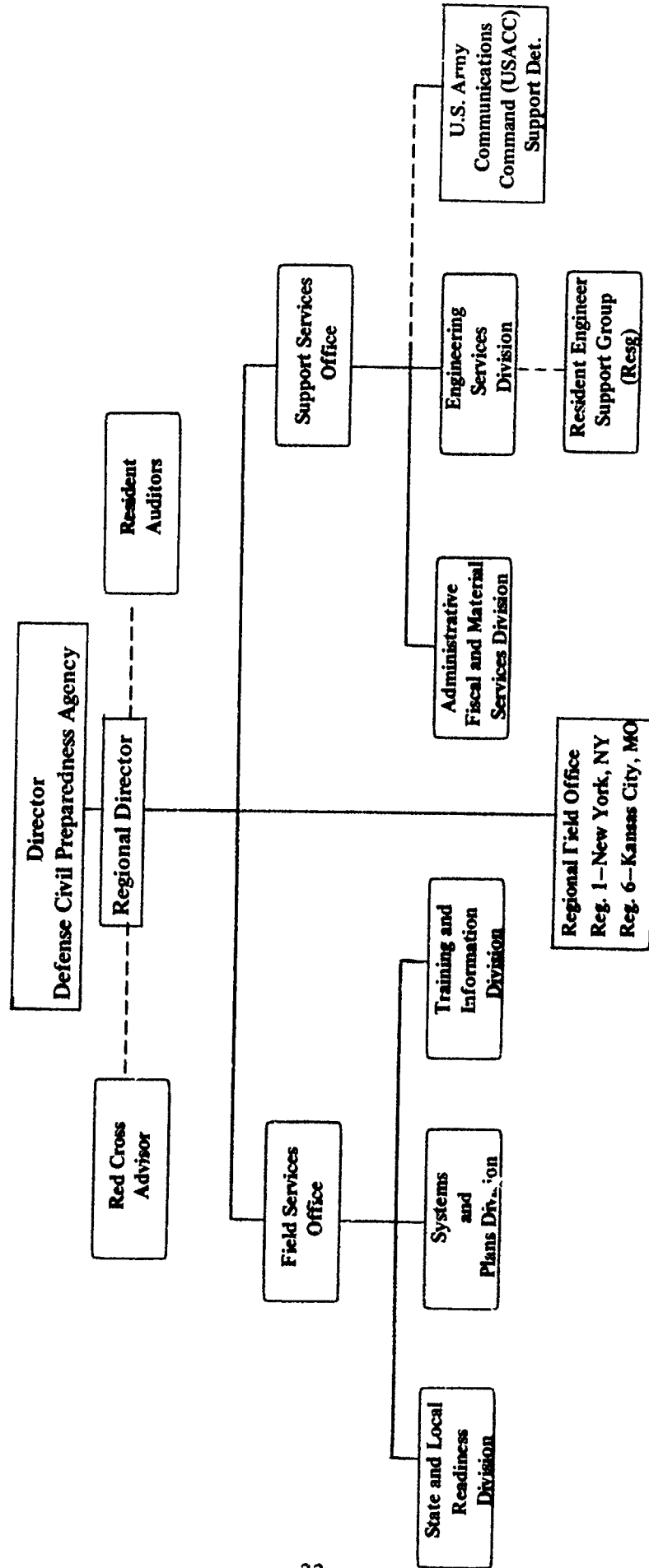


Figure III-2

DEFENSE CIVIL PREPAREDNESS AGENCY :  
ORGANIZATION OF REGIONAL OFFICES





## Chronology

The following description outlines DCPA's major activities during the TMI emergency; it should be treated as a summary rather than a complete chronology of DCPA's involvement.

### Wednesday, 28 March—Morning of Friday, 30 March Monitoring Diverse Communications Sources

Prior to the uncontrolled release on Friday morning, 30 March, the Agency and its Region Two Center monitored the Pennsylvania incident round-the-clock but assumed—from information provided, primarily, by NRC sources—that the situation was under control. Principal events and activities during this period are outlined below.

- The Region Two Center was notified of the initial emergency at TMI by the Pennsylvania Emergency Management Agency (PEMA) at 8:45 a.m. Wednesday, 28 March. The phone call from PEMA's Operations Officer indicated there had been a problem at the plant, that York County had gone on alert, but that the situation appeared under control. This analysis reflected PEMA's information obtained from Pennsylvania's Bureau of Radiation Protection (BRP) which was in contact with the plant and the NRC.
- The DCPA Regional Field Officer for Pennsylvania, who was participating in a preparedness conference at the PEMA Area Headquarters in Selinsgrove, Pennsylvania, was directed (about 10 a.m.) to go to the State Emergency Operations Center in Harrisburg to monitor the emergency and to support PEMA activities.
- Region Two activated a Disaster Operations Center and DCPA's national office provided an additional health physicist to help staff it.
- The Region Two office received requests for briefings and information on the incident from the Federal Preparedness Agency (FPA), the national and Philadelphia Regional offices of the Federal Disaster Assistance Administration (FDAA), and Congressional offices, as well as from DCPA's national office and the Emergency Management Agencies of nearby states.

- Region Two staff obtained technical information about the reactor problem, radiation readings, and related matters from separate contact points in NRC's Bethesda, Maryland (national) office and from NRC personnel at the Regional facility in King of Prussia, Pennsylvania. This information was assessed and compared with various media accounts and press releases in an effort to develop a comprehensive picture of the potential radiation hazards involved. Major studies of potential reactor malfunctions were also reviewed.
- Certain types of technical information (for example—the amount of radiation in various types of x-rays) were provided in response to requests from PEMA and other agencies.
- In response to a request from DCPA's national office, the Region Two Center requested and received from PEMA an update on the status of local (county) Reactor Emergency Response Plans for TMI.

**Friday, 30 March**  
**The Uncontrolled Release**

A White House meeting (1:35 p.m. Friday) on the incident was chaired by the President's National Security Advisor and attended by other White House staff members (including Presidential Assistants Powell and Watson), the Directors of FDAA and FPA, the Chairman of the NRC, and others. DCPA was represented by its Acting Director and the Assistant Director for Plans and Operations (hereafter, the DCPA Director of Operations). The discussion included an NRC appraisal that the TMI situation was stable but might become very serious, that evacuation had been recommended to Pennsylvania at one point, though the recommendations had then been retracted, and that evacuation contingency planning should be initiated for a radius of 10–20 miles around TMI. (The last communication may have been directed to DCPA personnel following the meeting.)

Decisions reached at the meeting included the following. At the Federal level, Jack Watson would be responsible for operations and Joseph Powell for public information. Harold Denton of NRC would become the single government spokesman on technical matters at TMI. FDAA would be the lead agency for emergency response operations, and the Director of FDAA's Regional Office in Philadelphia would go to Harrisburg as the lead representative for Federal Government personnel. DCPA's Director of Operations would accompany the FDAA Regional Director and

would serve as the Federal advisor to the State for its evacuation planning. Governor Thornburgh was immediately advised by phone of these decisions.

After the Friday afternoon meeting, DCPA's Director of Operations assumed direct control of the Agency's support effort for PEMA, including the Olney Center's activities, reporting back to the DCPA Acting Director. Also on Friday, in consultation with PEMA, the Agency took the following steps:

- A second Region Two Field Officer was dispatched to the State EOC in Harrisburg, affording 24-hour coverage in two shifts.
- Eight Region Two staff were dispatched to the principal risk counties to support their planning effort—two each to Dauphin, York, Lancaster, and Cumberland Counties.
- Region Two dispatched two U.S. Army Communications Command (USACC) personnel with HF radio sets to York and Lancaster Counties, where they established a communications net (later shifted to PEMA control) between those counties, the State EOC, and the Olney Regional Center.
- DCPA's Director of Operations drove to Harrisburg Friday evening, attended the first of numerous (daily) briefing sessions with the Governor, Lieutenant Governor, FDAA Regional Director, PEMA Director, and other State personnel, then was briefed in the EOC on the status of the "crash" planning effort that had just begun.

**Saturday, 31 March—Thursday, 5 April**  
**DCPA Support and Resources**

Through the weekend, as evacuation plans took shape in the six risk counties around the plant, the emphasis shifted gradually to the planning efforts of counties that would receive evacuees. Additional DCPA personnel were assigned to support PEMA and participate in State and local radiological monitoring, communications, and planning activities. Two additional health physicist/radiological defense (RADEF) officers joined the staff at the State EOC, while a total of 19 staffers were dispatched to host counties. These personnel—3 from DCPA Headquarters, 4 from Region One, 3 from Region Two, 5 from Region Three, and 4 from Region Four—arrived on site by Tuesday, 5 April. On Monday, 4 additional HF radio operators and sets were dispatched to Dauphin,

Cumberland, Lebanon, and Perry Counties (the remaining risk counties), allowing establishment of an independent radio net linking all risk counties, PEMA, and DCPA's Region Two Center. These operators and their radios were drawn from Regions One, Three, Four, and Five.

In Harrisburg, the Director of Operations and other DCPA staff interacted closely with PEMA's Director in assessing the progress of planning the lead times required to evacuate, and additional needs which might be filled by the DCPA personnel in the field. These activities included:

- Daily (or frequent) interaction with the Governor's Office on the status of planning, resources available, and particular contingencies—for example, the provision of extra gasoline stocks along evacuation routes; and extensive consideration of the possible risks and methods of deploying the incoming stocks of stable iodine (which could have been used to reduce ingestion of radioactive iodine had a major release occurred).
- Daily participation, beginning 11 a.m. Sunday, 1 April, in meetings of the FDAA-led interagency Federal team. This group, which would formally have come into existence only with a presidential declaration of an emergency, was composed of representatives from the national and regional offices of numerous Federal agencies. The meetings included reviews of status and were used by some agencies to describe the resources they could make available in an evacuation—for example, Red Cross coordination of some thirty voluntary organizations; HEW's expediting of the mailing of social security checks; and the use of several hundred Post Office vehicles during an evacuation.
- Roving supervision and observation of planning activities in each risk county by senior DCPA personnel headquartered in the State EOC.
- Instruction, by phone, of the DCPA personnel assigned to 19 host counties, emphasizing the supportive nature of their roles and the information and written plans required from each county.
- Administrative support of the extensive field contingent deployed in Pennsylvania during the crisis (primarily, from the Region Two Center).

Figure III-3

**SUMMARY LIST OF DCPA PERSONNEL  
ASSIGNED TO THE HARRISBURG OPERATION**

Region Two Center	20
Pennsylvania--PEMA EOC	
DCPA Director, Operations	1
Region Two Director	1
Regional Field Officers	2
RADEF Officers	2
Pennsylvania--Risk Counties	
Planning Assistance	10
HF Radio Operators	6
Pennsylvania--Host Counties	
Planning Assistance	19
Pennsylvania--PEMA, Risk Area	
Ancillary Personnel (research, technical assistance)	5

These personnel, and a liaison officer provided to the Maryland EOC by the Region Two Center, worked under the supervision of DCPA's Director of Operations but maintained a purely supportive stance *vis a vis* the State and local teams whom they assisted. By about 10 May, most of the DCPA complement had been called in from their assignments and debriefed at the State EOC and the Olney Center. By and large, this low-profile augmentation of State and local staffs appears to have been well received, and the experiences of those involved produced an extremely useful body of material for future use by Agency planners.

**PRINCIPAL TECHNICAL FUNCTIONS**

During the emergency, the major technical functions performed by DCPA staff included support for radiation monitoring, the communication of technical information, and establishment of a radio communications network.

## Radiation Monitoring

DCPA assisted NRC, DOE and FDA in monitoring radiological hazards by making available various detection instruments as well as a three-man team of health physicists and radiological instrument engineers, who performed sophisticated monitoring tasks and an evaluation of the presence of various radioisotopes found in minute quantities in the air and in samples of the soil and water. This work was facilitated by use of a DCPA-developed portable scintillation counter. In response to PEMA requests, DCPA made available on 2 - 3 April a total of 6,000 low-range personnel dosimeters. These were issued by PEMA to Federal, State, and local personnel operating in the potentially hazardous area. In addition to civil defense personnel, these included State Police, local police and firemen, BRP personnel, ambulance crews, NRC staff, DOE staff and others. The removal of 6,000 dosimeters severely depleted the Region's inventory, and during the weekend DCPA staff surveyed other Regional Centers and various states to locate remaining stocks.

Two types of dosimeters--CDV 138s and CDV 730s--are in the inventory. The 138s are millirem dosimeters and are readily usable even with relatively low radiation levels. The 730s are higher range instruments which register radiation in rems rather than millirems. CDV 138s were issued to a wide variety of emergency workers in the Harrisburg incident. CDV 730s, on the other hand, were issued to only a very few people involved with activities at the TMI plant. However, a reserve supply was identified and could have been deployed quickly had they been needed.

## Communicating Technical Information

The Agency acted as a source of technical information for numerous requestors throughout the emergency. The study of reactor radiation hazards--initiated during the earlier (28 - 29 March) period when reliable information was not always available--proved useful when responding to these requests and inquiries. Staff of the Region Two Center also continued to monitor media releases concerning the crisis, and continued to interact with the other Federal agencies concerned with these events.

At DCPA's national headquarters in the Pentagon, the Deputy Director (the Acting Director during the crisis) received communications from the Director of

Operations and the Region Two Center as well as from other DCPA staff offices in the headquarters facilities. Communicating through the Director of FDAA, he acted throughout the crisis to keep the White House informed of Federal, State, and local civil preparedness activities. The Deputy Director also provided this information to NRC and other Federal agencies, and responded to requests for information from a broad range of Congressional and Executive offices.

### **Radio Communications**

On 3 April DCPA provided the State and risk county EOCs with a high frequency CDNARS radio communication system. Two had been provided on 31 March to aid communications between PEMA headquarters and the York and Lancaster County EOCs. Four were added on 3 April. The network, operating at 4780 KHz, was designed to link the State EOC with each of the risk counties, with DCPA Region 2 in Olney, Maryland, and with the Pennsylvania National Guard high frequency network (which operated at 4840 KHz). Through the National Guard net, the State and risk county EOCs would be able to communicate with all host counties if the commercial telephone system failed or overloaded.

Most of the CDNARS system was operational late Tuesday (3 April); however, some units experienced delays caused by damage in transit and a shortage of spare parts. CDNARS remained in operation throughout the week of 1 April, but because a mass evacuation was not ordered, it served primarily as a backup system for other forms of communication. Some technical problems did surface in the course of setting up and testing CDNARS. At the State EOC, for example, radio waves apparently interfered with signals in a nearby computer. If constant use of the CDNARS unit had become necessary, as in a mass evacuation, it would have been necessary to shut down the computer. Also, because CDNARS operates at the low end of the HF band, the signal-to-noise ratio was low, which would have made communication more difficult in a mass evacuation. According to operators of the system, CDNARS is based on obsolete technology which increases the weight, creates maintenance problems, and may limit operational effectiveness..

## INTERAGENCY RELATIONS AND ORGANIZATIONAL ADJUSTMENTS

As one of the involved Federal agencies with experience in the planning and conduct of disaster-response operations, DCPA had extensive contacts with other Federal and especially State and local emergency management authorities. Like most of the other organizations at TMI, DCPA's interagency network and internal organization also evolved through several phases.

**The planned response (28-29 March).** In accordance with planned procedures, DCPA established a round-the-clock monitoring operation, established contact with other involved agencies, and sent a representative to the State EOC in Harrisburg. During these first two days, the Regional Center was essentially processing information obtained from other agencies. Distinctly a secondary actor during this period, DCPA largely observed from the sidelines. Its information from NRC sources was often sketchy, reflecting NRC's own difficulties in obtaining a good picture of the reactor's condition. Indeed, some of the Agency's information came through more or less informal contacts with NRC personnel in the Bethesda headquarters and King of Prussia. When NRC adapted its organization to the developing crisis, DCPA was left with few sources of definitive information.

**The crisis response (30 March-2 April).** When conditions reported from the reactor deteriorated, beginning with Friday's "uncontrolled release," DCPA rapidly adjusted its organizational and communications arrangements to support a potential disaster-response operation. At the top of the organization, as previously noted, the Deputy Director assumed responsibility for reporting to FDAA and the White House. The Director of Operations moved to the State EOC in Harrisburg, while assuming essential operational control of the Region Two Center, which supported the DCPA personnel deployed in the field in Pennsylvania. Notably, as the potential for an actual disaster operation was recognized, DCPA was recognized as a major source of relevant expertise and backup for PEMA, and the Agency's organizational shifts were designed to facilitate this role.

Over the next few days, this crisis-response mode stabilized into a set of more or less routine interactions with State and county evacuation planners. These



contacts included the Director of Operations' interaction with the PEMA Director, including participation in meetings with the Governor and Lieutenant Governor, and his participation in the FDAA-run task force which was standing by in case an emergency was formally declared. At the local level, DCPA assignees functioned primarily as members of risk county planning teams, often helped with the formalization of host county plans, and offered knowledgeable "hands-on" assistance if an evacuation operation had been necessary.

As the crisis waned, DCPA's interagency relations and organizational pattern returned to their pre-crisis states. These involve only limited contact with NRC, and include little interaction below the "coordinating committee" level. Pending legislation would encourage closer NRC-FEMA coordination in the future, but the mechanics of effecting such a closer working relationship remain to be defined.

## CONCLUSIONS

DCPA's familiarity with preparedness operations allowed the Agency to integrate its personnel rapidly into State and especially local planning efforts. The Agency largely overcame the resistance frequently encountered when Federal Agencies intervene in local areas of responsibility. This success is attributable to (1) the individual skills and experience of many of the DCPA assignees, (2) the fact that some assignees had previously been in contact with local emergency management officials and were "known quantities" to them, and (3) the fact that the assignees appeared on the scene when the perceived need for help was great (in the risk and most host county EOCs). In a few host counties, by contrast, the evacuation never seemed highly probable to local officials, and some assignees were viewed as outsiders overly concerned with "paper" plans.

This capability to augment local resources effectively is virtually a *sine qua non* of a good, large-scale response to a localized disaster, and should be developed in a more carefully planned fashion by FEMA. Regardless of the extent of pre-disaster planning, there are predictable needs for augmentation. Administrative procedures could better support such efforts, and might include procedures for rapidly familiarizing assignees with the disaster operation, the Agency's orientation toward providing assistance in the particular case, assignees' tasks, and feedback loops for reporting the status and problems

of local augmentation efforts. (Many assignees received detailed instructions by phone after their arrival in host counties—a procedure which worked well in this case, but which might benefit from further study.)

Communications equipment (CDNARS sets) furnished by DCPA to the risk counties filled a gap in the communications net linking the various Emergency Management Agencies in Pennsylvania. However, the particular type of equipment employed in this case proved to be:

- Awkward because the sets are large, consist of more than one unit, and proved difficult for a single operator to transport.
- Unreliable, because the sets are easily damaged in shipment and parts are not easily located.
- Subject to “noise,” which may result in garbled communications.
- Troublesome due to their disruptive effect of their transmissions on some kinds of computer equipment.

Altogether, this suggests a need for a type of equipment which is durable and easily portable, yet has long-distance capability—equipment which is *designed* for the kind of use the CDNARS sets received.

DCPA's experience in Crisis Relocation Planning (CRP) was applicable to the situation at TMI—potentially offering extensive guidance for the mechanics of evacuation planning. But the material has not been adapted to this more limited evacuation circumstance. To cite an obvious example: The dense risk-to-host population ratio that would be required in a wartime multi-city evacuation is not necessary in reactor accidents. Given that civil defense is developing these evacuation plans, they should include components or “modules” for more limited emergencies—allowing local jurisdictions to develop multi-purpose variants of evacuation plans.

DCPA's guidance, by and large, reflected comprehensive approaches to planning. Only now is the Agency (*i.e.*, FEMA), developing the types of “quick” guidance which could be used in evacuation planning on a “crash” basis. A number of readily defined checklists, references, and “bare fundamentals” guides could be made available for crash efforts, yet still be compatible with the more comprehensive planning desired in all jurisdictions.

DCPA's material on nuclear radiation hazards was not extensively utilized in planning or operations, including public information activities. Such materials should be restudied and made to encompass the gaseous radiation hazards which were of concern at TMI. Materials readily adaptable to a range of nuclear-type hazards should be available for immediate use.

DCPA's supply of radiological monitoring instruments was severely taxed by this one incident; Agency officials were also concerned that certain types of instruments—those sensitive to very low amounts of radiation—might be misread by inexperienced personnel. More study should be directed to the types and numbers of instruments required for the inventory. Finally, DCPA's very rapid distribution of large numbers of radiation detection instruments to PEMA and others did not reflect any established procedure. Translating what happened in this case into a normal procedure should allow this rapid distribution to be duplicated in the future.

DCPA's response, like those of disaster-response agencies at other levels, suffered by virtue of the delay and imprecision in defining the potential hazard. Little was done—or expected—to prepare for evacuation during the first two days of the accident. This suggests a need for the closer involvement of preparedness agencies in the “translation of threat” function described at the end of the last chapter. Those charged with the “scientific” analysis of a hazard will frequently not take account of the lead times required to execute population protection measures. That is, they will tend to decide when a causal agent has become dangerous to people—without allowing for the time required to react to the threat and protect people. In the case of nuclear plants, preparedness agencies need a sound definition of potential hazards in terms that prescribe the magnitude of the preparedness operation that may be required. At TMI, such information would have included the probability of the need for evacuation, the size of the area that might require evacuation, or the fact that the responsible officials and agencies *did not know* the extent of the potential hazard.

**Part Three**  
**STATE AGENCY INVOLVEMENT**

## INTRODUCTION TO PART THREE

The two chapters that follow describe the roles in the TMI accident of the Pennsylvania Emergency Management Agency (PEMA) and the State's Bureau of Radiation Protection (BRP), a part of the Pennsylvania Department of Environmental Resources. PEMA had specific statutory authority to respond to nuclear accidents and was heavily involved in detailed evacuation planning. BRP was the State's lead technical advisor on nuclear hazards. The discussion of BRP's activities, like that of NRC above, is included because of the Bureau's role in emergency-related communications. It also serves as background to the description of evacuation planning by PEMA and the affected counties—the principal concern of this report.

Many State agencies became involved in the response to TMI. The Offices of the Governor and Lieutenant Governor were critical participants in the communications and high-level decisions about TMI. The Commonwealth's Departments of Health, Transportation, Military Affairs, Corrections, and other parts of the Department of Environmental Resources were only a few of the agencies whose activities affected the emergency-response and evacuation-planning efforts. These agencies' activities—many of them the subject of other inquiries—are considered here only as they relate to the discussion of the evacuation planning efforts, *per se*.

## IV

# The Pennsylvania Bureau of Radiation Protection

The Bureau of Radiation Protection, a part of Pennsylvania's Department of Environmental Resources, is the State Agency responsible for monitoring radiation in the environment and interpreting the results for other State officials. During the Three Mile Island accident, the Bureau's staff collected and analyzed samples of air, water, and milk. Its personnel gathered information from Metropolitan Edison's personnel at the plant, from the NRC, and from other Federal and State agencies. And BRP advised the Governor's office and PEMA on the implications for evacuation of the reported releases at TMI.

### FORMAL ORGANIZATION AND RESPONSIBILITIES

#### Legal Responsibilities

According to the 1978 Pennsylvania Disaster Operations Plan, PEMA's basic guidance document, the Bureau of Radiation Protection (formerly called Bureau of Radiological Health) is responsible for "technical advice in emergency protection and operational activities associated with nuclear accidents." In a nuclear accident, according to this plan, the Bureau is specifically responsible for:

- Assessing the accident, including the interpretation of radiological monitoring measurements.
- Identifying protective actions and notifying (1) the involved counties and (2) PEMA and other State agencies.
- Serving as the lead State agency for technical assistance on radiological health and accident assessment.
- Coordinating assistance from Federal radiation protection agencies.

These responsibilities, assigned by the 1977 Pennsylvania Plan for the Implementation of Protective Action Guidelines (PIPAG), BRP's basic guidance document, were also incorporated into the emergency plans prepared by Metropolitan Edison and Dauphin County before the TMI accident.

#### **Formal Organization at the time of the TMI Accident**

At the time of the TMI accident, BRP reported to the Deputy Secretary for Environmental Protection, who in turn reports to the Secretary of Environmental Resources. The Bureau itself was organized into two Divisions, one covering Environmental Radiation, the other Radiation Control. The Bureau maintains a laboratory in Harrisburg and field offices in Harrisburg, Pittsburgh, and Reading. BRP had 22 full-time employees in February 1979, the month before the TMI accident.

#### **BRP ACTIVITIES DURING THE TMI ACCIDENT**

##### **Major Functions**

BRP's principal functions during the TMI emergency were to provide:

- Radiation monitoring. The Bureau collected air, water, and milk samples from the area around the plant to determine radiation exposures.
- Technical advice to the Governor's Office and other State agencies. The Bureau interpreted technical information supplied by MetEd, NRC, and its own survey teams, and offered recommendations to State officials.
- Public information. The Bureau devoted much of its time during the TMI accident to informing the public and the press about conditions at the plant and their public health implications.

##### **Chronology**

The following chronology is based largely on information supplied by the Bureau to the President's Commission on the Accident at TMI, supplemented by chronologies supplied by PEMA and the Dauphin County Emergency Preparedness Office.

**28 March**

- 7:03 a.m. BRP Duty Officer notified by PEMA Duty Officer of the accident.
- 7:04 a.m. BRP Duty Officer notifies Chief, Division of Environmental Radiation.
- 7:06 a.m. BRP Duty Officer briefed by TMI operators.
- 7:07 a.m. Chief of Environmental Radiation calls Dauphin County Emergency Management Director and Director of BRP.
- 7:25 a.m. Bureau Director arrives at office, learns of General Emergency from TMI staff. An open line is established with the Unit 2 Control Room at the plant.
- 7:45 a.m. Chief of Environmental Radiation calls PEMA to suggest that an evacuation of an area southwest of the plant might be considered.
- 8:00 a.m. BRP learns from TMI operators that releases have been controlled.
- 8:15 a.m. Chief of Environmental Radiation calls PEMA to say that no radiation levels above background have been detected.
- 8:30 a.m. BRP notifies State Department of Agriculture.  
(approx.)
- 9:00 a.m. Nuclear Engineer from Bureau briefs Lieutenant Governor.
- 10:45 a.m. MetEd calls, reports that off-site radiation is being detected. Bureau sends team to the field to verify MetEd readings.
- 11:00 a.m. Bureau calls Brookhaven National Laboratory (DOE) to request help in monitoring radiation.
- 12 Noon Bureau asks Agriculture Department to begin sampling milk the  
(approx.) evening of 28 March.
- 12 Noon— BRP teams continue to sample radiation near the plant.  
Midnight



**Thursday, 29 March**

BRP continues to monitor radiation near the plant.

**Friday, 30 March**

- 8:01 a.m. Release at TMI; helicopter above Unit 2 reactor building measures 1200 mr/hr.
- 8:42 a.m. PEMA advises BRP of release.
- 9:15 a.m. Harold Collins of NRC recommends to PEMA that an evacuation of 10 miles should be considered.
- 9:22 a.m. PEMA relays Collins' recommendation to BRP.
- 9:30 a.m. BRP calls Collins at NRC headquarters to learn who issued the 10-mile (about) evacuation recommendation.
- 9:35 a.m. Gerusky of BRP calls PEMA to say that release has been stopped and that no evacuation is warranted.
- 9:40 a.m. Gerusky walks to Governor's Office to recommend against evacuation; (about) BRP's nuclear engineer (Dornsife) walks to PEMA with same recommendation.
- 9:45 a.m.— BRP continues to monitor releases of radiation at and near the reactor.  
Midnight

Bureau's Nuclear Engineer is assigned to the reactor to keep the Bureau and the Governor's Office informed. "Hot lines" are established between BRP and the NRC Region I trailer, NRC headquarters, DOE, and FDA Bureau of Radiological Health.

**Saturday, 31 March**

Bureau continues to monitor releases of radiation, reporting to PEMA and the Governor's Office.

**Sunday, 1 April**

Bureau continues to monitor radiation, and organizes water sampling program together with EPA and DER's Bureau of Water Quality Management.

**Monday, 2 April to Sunday, 15 April**

BRP remains on 24-hour alert.

**Monday, 16 April–Sunday, 22 April**

BRP on 12-hour schedule.

**Monday, 29 April**

Bureau returns to normal schedule.

### **RELATIONS WITH OTHER AGENCIES**

From Wednesday morning until Friday morning, BRP's contacts with other agencies took place within previously planned channels. The Bureau received technical information from NRC, DOE, and MetEd, as well as its own surveys, and communicated this information to PEMA and the Lieutenant Governor. The Bureau also activated its standing agreement with the Department of Agriculture to collect milk samples.

BRP's relations with other agencies changed dramatically on Friday, 30 March. Information coming from the reactor through the Bureau's normal channels (NRC's Region I and MetEd) contradicted information arriving at the Governor's Office via NRC headquarters and PEMA. BRP decided to trust its regular sources, and began to deal directly with the Governor and PEMA in an effort to stop a premature evacuation. Forced to decide between the advice of the State Bureau of Radiation Protection and the NRC Commissioner, the Governor apparently chose to follow NRC (though he complained about the lack of a single Federal technical spokesman). The arrival of Harold Denton at 2:00 p.m. Friday consolidated NRC's role as advisor to the Governor, and BRP was relegated to the less sensitive job of testing air, water, and milk, and advising PEMA on the implications of these measurements.

The Bureau coordinated its radiation sampling program with those of several Federal agencies, including NRC, EPA, and FDA. The Bureau had dedicated telephone

links to these agencies and after 1 April, representatives of the agencies moved into BRP's Harrisburg offices. BRP continued to sample radiation for the rest of April.

It is interesting that BRP had little direct contact with the risk counties, who sometimes complained bitterly about lack of help in interpreting radiation readings. BRP could have provided such assistance directly to the counties, but was inhibited by several factors:

- The Bureau had a relatively small technical staff.
- The counties were accustomed to dealing with PEMA.
- The insertion of another new agency and communications link into county affairs, during the stress of the crisis, could also have exacerbated the planning and communications problems at that level.

Some provision for assisting the counties, working through PEMA channels, could be incorporated into BRP's plans for future nuclear accidents.

## CONCLUSIONS

The history of BRP's involvement at TMI illustrates one of the general conclusions of this report. Agencies tended to view the accident through the filters of their own interests and expertise. Not surprisingly, BRP staff saw TMI principally as a radiological health problem. By radiological health standards, the TMI accident was not viewed as particularly serious. In a memorandum to the President's Commission on the Accident at TMI, the Director of the Bureau commented that:

Based on the monitoring information that we received throughout the accident, we felt assured that the maximum accumulated off-site dosage to any individual would not have exceeded 100 mr. This was a factor of ten below the EPA protective action guidelines upon which our plan was based, and where we were prepared to take protective actions to limit further off-site doses.

This strictly "scientific" conclusion, reflecting the substantial technical expertise of BRP personnel, appeared accurate with respect to the actual releases. And if the judgment were extended to include the *potential* releases or dangers, the BRP staff were presumably fully competent to make that judgment as well. The State's technological

"advisor" was, apparently, doing its job (though such a judgment goes beyond the expertise of this report's authors).

But TMI had psychological and political dimensions as well—and so would other such incidents. As long as there existed any doubt about the plant's safety, actors other than BRP (the Governor, NRC, etc.) would surely take substantial responsibility for managing the overall response. This very fact would tend to exclude BRP from close access to continuing information on developments at the reactor site. Given the need for a technical "translator" of the threat, the lesson would seem to be that only the "ranking" agency with such potential can remain in the decisionmaking process.

## V

### The Pennsylvania Emergency Management Agency

PEMA is a well-staffed emergency preparedness agency which operates from a well-designed EOC in Harrisburg. The Agency entered the TMI emergency with experienced senior staff, and a standard procedure for transmitting emergency warnings and supporting information to the 67 Pennsylvania counties, to PEMA's three Area headquarters, and to State and Federal agencies.

At the time of the TMI accident, PEMA staff were familiar with the Reactor Emergency Response Plan (RERP), with procedures for managing a number of natural disasters, and with the DCPA Crisis Relocation Planning program (CRP). Though the CRP effort had only recently begun in Pennsylvania, CRP staff handled much of the evacuation planning load, putting to use some of the materials and experience gained through work on the CRP evacuation program. PEMA staff had also participated in modest efforts to exercise the RERP but had not received detailed guidance from NRC concerning the problem of reactor accidents.

The discussion of PEMA activities in this chapter presents a general overview of the Agency's planning activities, then focuses on PEMA operations through successive phases of the emergency. The description draws heavily on materials prepared by the PEMA staff, who have been most cooperative both during and after the emergency.

#### FORMAL ORGANIZATION AND RESPONSIBILITIES

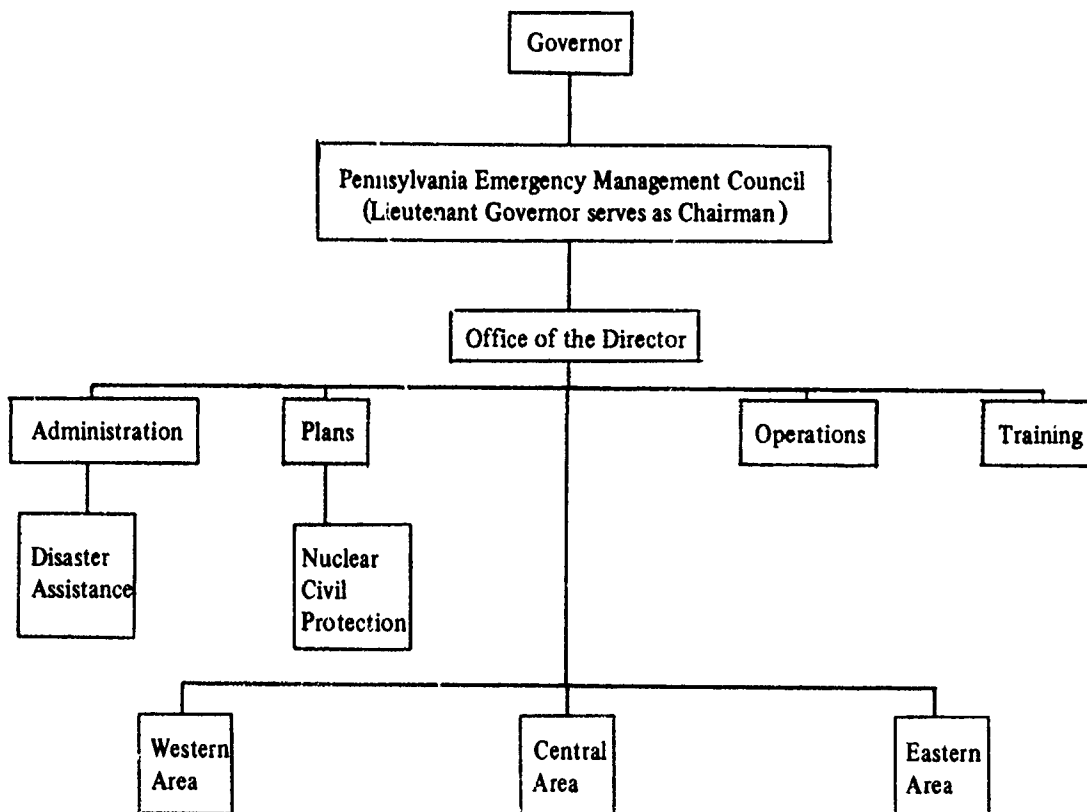
The Constitution of the Commonwealth of Pennsylvania assigns the Governor the legal responsibility for protecting the lives and property of people in the State. To assist him in emergencies, State law provides for the establishment of a Pennsylvania

Emergency Management Council, composed of ten statutory and four appointed members.\* The Pennsylvania Emergency Management Agency (PEMA) is the operating arm of the PEMA Council.

At the time of the TMI accident, PEMA was organized as shown in Figure V-1. The Office of the Director supervises the divisions of Administration, Plans, Operations, and Training, as well as the three Area Offices. PEMA staff from all divisions were heavily involved in the TMI emergency.

Figure V-1

STATE-LEVEL EMERGENCY MANAGEMENT STRUCTURE  
IN MARCH 1979



\*The statutory members of the PEMA Council are the Governor, the Lieutenant Governor, the President Pro Tempore of the Senate, the Minority Leader of the Senate, the Speaker of the House, the Minority Leader of the House, the Adjutant General, the Secretary of Community Affairs, the Auditor General, and the Secretary of Health. Other members include the Secretaries of Environmental Resources, Public Welfare, and Transportation, plus the Commissioner of State Police.

According to the Three Mile Island Site Emergency Plan, prepared by Metropolitan Edison before Unit 2 was licensed, PEMA is responsible for the "initial communications link from the Station to the Pennsylvania agencies; transporting, housing, and managing workers in the affected area; and providing 'special communications resources' and interstate notifications." The MetEd plan, however, also assigned the Bureau of Radiation Protection the lead role in coordinating State agency responses to a nuclear accident—an assignment which overlapped the one allocated to PEMA in the Pennsylvania Disaster Operations Plan.

According to the 1978 Pennsylvania Disaster Operations Plan (PDOP), the Pennsylvania Emergency Management Council (then called the State Council of Civil Defense) assigned to PEMA the broad responsibility of "coordinating all State departments and various Federal agencies in efforts to reduce the threat of a nuclear incident." The plan does not state whether this lead role belongs to the PEMA Council or to the operating staff, but presumably the Council is referred to here. Neither is the plan very specific in defining PEMA's operational role in nuclear accidents. It states only that PEMA is to:

- Coordinate the State response in emergency operations involving nuclear incidents.
- Coordinate the State's planning for emergency operations to support nuclear incidents.
- Notify the Bureau of Radiation Health (now called the Bureau of Radiation Protection, in the Department of Environmental Resources) and appropriate State agencies of reported nuclear incidents.
- Notify appropriate neighboring states.

The generality of this plan reflects PEMA's guiding philosophy for responding to nuclear accidents: "Offsite operations in response to emergencies at fixed nuclear facilities are distinct from other emergencies *only in the technical aspects of the materials involved.*" (PDOP, Annex E; emphasis added.) PEMA's planners evidently saw enough reason to define a distinct category of *nuclear* emergencies as opposed to other forms of hazardous material accidents, but had not gone on to elaborate the definition enough to allow planning of specific responses. PEMA officials recognized the need for better guidance, and were involved in interagency communications concerning the coordination of such an effort.

## PEMA ACTIVITIES DURING THE TMI ACCIDENT

Operators in the TMI Unit 2 control room contacted the Dauphin County Emergency Operations Center, then PEMA, shortly after 7:00 a.m. on 28 March. PEMA contacted the Bureau of Radiation Protection (BRP), then the three immediately affected counties, then the Governor's Office and other State and Federal agencies. PEMA's three Area Headquarters and all 67 of the State's counties were also notified of the accident.

Until Friday morning, 30 March, PEMA acted mainly on the basis of its existing 5-mile plan for nuclear accidents, while remaining in a 24-hour standby readiness posture. At least part of the Agency's preparedness efforts during this period were sidetracked by inquiries and media attention resulting from news of events at TMI.

From midday Friday (30 March) through Saturday morning, PEMA staff engaged in crash planning to prepare for the new 10- and 20-mile evacuation problems. These expanded evacuation requirements enlarged the population at-risk from roughly 30,000 to 200,000 and 635,000 people, respectively; drew Cumberland County into the risk area along with portions of Perry and Lebanon Counties; and shifted much of Dauphin, York and Lancaster Counties from host to risk areas. Furthermore, the new risk areas contained numerous hospitals, nursing homes, and other facilities requiring special attention.

PEMA's principal activities Friday and Friday night included preparing new listings of potential evacuees from the 10- and 20-mile circles; the initial listing of evacuation arteries; and preparing to support risk county planning for the enlarged evacuation. By Saturday morning, 31 March, PEMA staff had spread out to the principal risk counties with at least a rough description of the new plan. The Area Office professional staffs played especially important roles in preparing risk counties for their massive effort on Saturday and Sunday.

On Saturday evening and Sunday morning, PEMA and DCPA personnel continued to assist the risk counties to produce workable evacuation plans. They also worked to merge these six separate plans into an overall coordinated plan for evacuating the entire risk area. By Sunday, PEMA's planning effort had expanded to include the host counties. PEMA, DCPA, Red Cross, and other organizations



augmented their staffs in the host counties, helping to identify mass care space and prepare reception and care plans.

By Tuesday, 3 April, PEMA was concentrating on formalizing State and county evacuation plans. The Agency remained in a state of readiness for the next three weeks, ready to implement the plans if required.

### Chronology

The following detailed chronology is based largely on (1) the log of phone messages received and sent by PEMA during the TMI accident; (2) the after-action summary prepared by the Agency on 11 May; and (3) logs prepared by other State agencies and county emergency management teams.

#### Wednesday, 28 March

- 7:02 a.m. PEMA's Duty Officer receives a phone call from TMI indicating a problem in Reactor No. 2. Radiation had leaked into the containment, but there was no off-site release.
- 7:03 a.m. PEMA calls DER's Bureau of Radiation Protection (BRP), reaching the Duty Officer at home.
- 7:08 a.m. PEMA notifies Dauphin County EOC.
- 7:10 a.m. PEMA notifies Lancaster EOC, and requests that they notify York County.
- 7:20 a.m. PEMA Operations Officer arrives at State EOC.
- 7:35 a.m. TMI called again, indicating that the reactor had "failed to fuel"—and caused an off-site release reported in the direction of 30° north—northwest.
- 7:36 a.m. Operations Officer notifies the PEMA Director, Dauphin, York, and Lebanon Counties.
- 7:38 a.m. PEMA notifies BRP and asks for instructions.
- 7:40 a.m. PEMA Director calls Lieutenant Governor, but he was on the way to his office and could not be reached.

- 7:45 a.m. PEMA Director calls the Governor at home; was told to work through the Lieutenant Governor.
- 7:45 a.m. BRP calls to confirm radiation release and advises PEMA to plan (but not execute) an evacuation of Brunner Island and Goldsboro.
- By this time, the following other actions had been taken:
- A Radiological Engineer from BRP had been sent to the plant, and BRP personnel were on-site and monitoring radiation levels.
  - The PEMA operations staff was expanded to handle the emergency from the State EOC.
- 7:52 a.m. PEMA calls York EOC to advise of the possibility that Brunner Island and Goldsboro might have to be evacuated.
- 7:53 a.m.–  
8:05 a.m. PEMA notifies other State agencies of TMI situation.
- 8:15 a.m. BRP calls to say that releases have been stopped and that there is no need to evacuate anyone.
- 8:18 a.m. PEMA calls York EOC to lift evacuation advisory.
- 8:20 a.m.–  
8:35 a.m. PEMA calls Dauphin and Lancaster Counties and all State agencies to inform them of current TMI situation.
- 8:45 a.m. PEMA calls DCPA Region 2, saying no outside help was needed.
- 8:50 a.m. PEMA notifies Lebanon and Cumberland Counties of the TMI situation.
- 1:30 p.m. PEMA Director meets with Governor Thornburgh, assuring him that a 5-mile evacuation can be executed on short notice with little trouble.
- 4:00 p.m. PEMA Director is briefed by NRC and MetEd officials at meeting in Lieutenant Governor's office.

Throughout the day, the Operations division of PEMA continued a dialogue with State agencies about the status of the reactor. Numerous calls were received from

the media and others requesting information, and handling these calls was a full-time job for three people for the entire day. BRP continued to provide PEMA with information that suggested that some venting was anticipated, but that it would be controlled; and that things were slowly returning to normal. As calls continued unabated—some from as far as California and Australia—the decision was made to put the EOC on a round-the-clock operating schedule.

#### **29 March**

The situation at the reactor remained relatively stable on Thursday, and PEMA's information suggested that the threat, if any, was diminishing. During this time:

- A portion of the PEMA staff remained on 24-hour duty.
- Information provided by BRP representatives at the plant varied considerably in estimating the time it would take to return the reactor to normal.
- Radiological monitoring of milk samples from the 5-mile zone showed five samples with no radioactive iodine, and one sample with a slight trace.
- Beaver Valley Nuclear Power Plant conducted a previously planned drill, including notifying PEMA of off-site releases. The Peach Bottom nuclear facility cancelled a previously scheduled drill.
- PEMA continued to receive calls from all over the world, and devoted a great deal of effort to answering them.

#### **Friday, 30 March**

- 8:01 a.m. Release of radioactive gas; helicopter-borne monitoring device measures 1200 mr/hr above the Unit 2 reactor building.
- 8:35 a.m. Dauphin County Emergency Management Coordinator (EMC) calls PEMA to say that MetEd was trying to reach the Agency and having trouble.
- 8:35 a.m. PEMA Operations Officer tells Director that TMI has issued a "general emergency" alert, and recommended that PEMA prepare for evacuation.

8:40 a.m. PEMA Director relays this information to Lieutenant Governor.

8:40 a.m. TMI Shift Supervisor Jim Floyd calls PEMA with the following information:

- An uncontrolled release had started at 8:34 a.m.
- A General Emergency had been declared.
- Readings 600 feet above the vent stack indicated 1.2R and there was a reading of 14 mr/hr at the fence.
- Evacuation of the plant was being considered.
- PEMA should consider evacuating areas downwind of the plant.

8:42 a.m. PEMA calls BRP to relay this information.

8:43 a.m. PEMA calls Dauphin, York Cumberland, and Lancaster Counties to relay information about TMI.

8:45 a.m. DOE calls to confirm radiation readings.

9:15 a.m. Collins of NRC Headquarters in Bethesda calls PEMA's director to recommend a 10-mile evacuation.

9:17 a.m. Lieutenant Governor informed of NRC recommendation.

9:22 a.m. Gerusky (BRP) informed of recommendation.

9:35 a.m. Gerusky calls to say that release has been stopped and no evacuation is warranted.

9:35 a.m. Collins (NRC) calls PEMA to reaffirm need for evacuation. He says that he represents ranking officials at NRC.

9:45 a.m. Governor calls PEMA to check Collins' credibility and ask for a recommendation. Henderson suggests that an evacuation is probably advisable, given his present (but limited) information.

10:02 a.m. Governor calls NRC Headquarters. Hendrie recommends that people within five miles northwest of the plant stay indoors, and that pregnant women and pre-school children leave the 5-mile area.

- 10:20 a.m. National Weather Service (NWS) calls with latest wind projections.
- 10:35 a.m. Thornburgh announces that people within 10 miles of the plant should stay indoors, and advises that pregnant women and pre-school children leave the 5-mile zone.
- 10:46 a.m. PEMA calls risk counties to relay message.
- 12:00 Noon Governor lifts stay-inside order. PEMA relays information to risk counties.
- 1:53 p.m. PEMA Council meets to discuss situation.
- 3:40 p.m. Dauphin County EMC requests cots for Hershey Arena, which was being used to house those evacuating in response to the Governor's advisory.
- 5:00 p.m. PEMA Director meets with Governor and other ranking State officials.
- 8:15 p.m. Harold Denton (NRC) meets with Governor and recommends planning for a 20-mile evacuation.
- 10:00 p.m. NRC retracts news release mentioning meltdown.
- 11:30 p.m.– Risk counties advised to begin planning for 20-mile evacuation.  
2:00 a.m.

**Saturday, 31 March**

PEMA continued to receive information on TMI from BRP and MetEd representatives. Initial plans were developed by each of the six risk counties. Routes were established; host areas were indicated; and appropriate authorities alerted. This crash planning effort continued through Sunday and Monday as refinements were made and formal versions of plans were prepared. On Saturday morning, the PEMA Operations Officer met with Local Emergency Management Coordinators at the Dauphin County EOC to answer their questions—and to aid them in planning for the 20-mile evacuation.

The following actions also took place on 31 March:

- PEMA Area Office personnel arrived in the six risk county EOCs to aid in the crash planning effort, joining DCPA staff who were already in Lancaster, York, Cumberland, and Dauphin Counties.

- DCPA's Director of Operations, who had arrived Friday night, worked with the PEMA Director to coordinate multi-county planning.
- Governor Thornburgh arranged with President Carter to obtain Federal disaster assistance without issuing a declaration of emergency. Thornburgh felt such a declaration might produce panic.
- DCPA set up a CDNARS radio net linking PEMA with at first two (later, six) risk counties. Telephone hot lines were installed in each of the six EOCs to enable direct contact between the counties and PEMA.
- Hendrie of NRC reported on NRC's efforts to reduce the size of the hydrogen bubble in the reactor, and suggested that a 20-mile "precautionary" evacuation might still be needed.

**Sunday, 1 April—Monday, 2 April**

PEMA continued to receive information from BRP, NRC, and MetEd, and relay it to the host and risk counties via periodic Situation Reports. The PEMA representatives in the risk counties helped prepare evacuation routes and acted as liaison persons with host counties. PEMA staff in the State EOC worked to coordinate the county plans for evacuation, transportation, reception, and care. PEMA also received requests for information and offers of help from dozens of State agencies, private organizations, and individuals.

**PEMA'S INTERAGENCY RELATIONS DURING  
THE TMI ACCIDENT**

Because PEMA is responsible for "coordinating" State agency responses to emergencies—and for "supporting" county and local governments in planning and managing emergency responses—the Agency interacted with literally hundreds of other organizations during the TMI emergency. On Friday, 30 March, for example, PEMA was in contact with representatives of eight Federal and ten State agencies, three State Senators and Representatives, six counties, one municipality, and about a dozen different news organizations, businesses, and voluntary groups.

Like most other organizations involved at TMI, PEMA's basic interagency network evolved in four distinct phases:

**(1) Preplanned Response  
(28-29 March)**

According to the State Disaster Operations Plan for Nuclear Accidents, PEMA is supposed to notify the BRP, the county emergency preparedness organizations, selected State agencies, the Department of Energy, and contiguous states. In fact, PEMA quickly notified each of these agencies except DOE and the State of Maryland. PEMA also notified NRC, DCPA, and the Governor of Pennsylvania.

As the danger appeared to decrease on 29 March, PEMA continued to receive information from the reactor via BRP and NRC, and to relay it to the four counties nearest to Three Mile Island. PEMA also received regular wind reports from the National Weather Service (NWS) and from DCPA's Regional Office in Olney.

**(2) The Crisis Response Phase  
(30-31 March)**

PEMA's contacts with other agencies expanded rapidly after the release of radiation on Friday morning. PEMA learned of the release from Dauphin County (PEMA lines had been busy when the plant called earlier). BRP was notified and began providing information on TMI radiation levels. NRC headquarters called PEMA directly to recommend evacuation—advice which PEMA relayed to the Governor. Meanwhile, the Governor was receiving contrary advice from BRP, from NRC Region 1 officials at the scene of the accident, and later from the NRC Commissioners. These conflicting recommendations resulted in a limited evacuation advisory, and prompted PEMA to support planning for a 10-mile instead of a 5-mile risk zone.

The new planning requirements brought PEMA into close contact with dozens of other government agencies. PEMA itself sent representatives to the major risk counties, and received assistance in turn from the DCPA national and regional offices. As host counties were identified, PEMA began to coordinate their requests for resources and to help iron out planning problems. All 67 Pennsylvania counties were kept alert by periodic Situation Reports, issued over the State's Civil Defense Teletypewriter Warning Network.

On Friday, 30 March, the Agency began a series of meetings and phone calls with other State departments to locate resources for evacuation and resolve special problems. PEMA worked especially closely with the State Police and PennDOT on transportation planning. The Agency also coordinated with the Departments of Health, Labor, Administration, Transportation, and Agriculture. Finally, PEMA continued to receive information from MetEd and the National Weather Service, and to confer with the Federal Science Advisory Office for interpretations of technical data.

**(3) Crystallizing the New Organization  
(1-2 April)**

PEMA's interagency relationships stabilized somewhat as the "crash" planning effort became routine and after Harold Denton arrived to take charge of technical information from the reactor. (PEMA stopped receiving information from MetEd and began to rely on BRP and NRC instead.) PEMA representatives in the risk counties were working actively on county plans, while DCPA officials were helping PEMA to identify resources and integrate the several county plans. PEMA continued to coordinate with the Pennsylvania State Police on transportation, and with other State agencies on specific problems. The Agency continued regular meetings with the Lieutenant Governor, and provided information to FDAA. The National Weather Service's wind and weather forecasts were of particular interest throughout the emergency.

**(4) The Cool-Down Phase  
(3-29 April)**

PEMA's contacts with other agencies gradually returned to normal as the emergency abated. After 3 April, PEMA no longer received reports from BRP, and relied increasingly on NRC for technical data concerning the reactor. Daily meetings with the Lieutenant Governor continued for about a week, and though PEMA continued to deal with other State agencies, most of its efforts were concentrated in the counties that were formalizing the risk area evacuation plans and the host area reception and care plans.

## **RELATIONS WITH THE PRESS AND THE PUBLIC**

Providing public information occupied a great deal of PEMA's attention during the TMI emergency. The flood of inquiries on 28 March, for instance, prompted



the decision to keep the EOC open all night. When the Governor's Press Secretary set up a rumor control center, PEMA's workload decreased somewhat, but PEMA continued to receive hundreds of information requests from all over the world during the weeks following the accident.

PEMA's relations with the news media were especially complex. PEMA and the risk counties relied heavily on the local press, radio, and TV to broadcast updates of the situation at the reactor, and to inform the public of evacuation routes. To a large extent, the local news media were an integral part of the emergency planning effort, and were generally treated as part of the "team" by PEMA and other State agencies.

PEMA perceived the national news media as more of a hindrance than a help. Perhaps because neither their executives nor most of their viewers were part of the risk population, the national media were freer than the local press in speculating about the potential dangers of the reactor. For example, in a 30 March CBS News Special ("Danger at Three Mile Island"), Walter Cronkite explained that there was a "remote but real chance of a meltdown," adding "that's what happens when man tampers with nature." Some State and local officials expressed an opinion that such reports may have frightened the local people unnecessarily.

In general, the attitudes of PEMA and other State agencies toward the national media appeared to parallel often-expressed opinions about Federal Government "interference" in local affairs. The national media, like the Federal Government, are extremely powerful; unfavorable coverage can easily interfere with the operations of a small agency like PEMA. Furthermore, the national media often had better access to information about the reactor than did State agencies, partly because the national media had the power and the freedom to interview nearly anybody in the government. But PEMA suggested that the national media were insensitive to local needs and complicated a job that they were perfectly capable of handling locally.

From the point of view of the national media, PEMA was simply another "official" information source, whose reports sometimes contradicted those of other government agencies. National editors, and local ones as well, complained on television and in print of conflicting stories about events at the reactor and the danger to public safety.

To some extent, therefore, PEMA's goals and the incentives of the national media were in conflict. According to PEMA, media reporting on 30 March created high levels of public anxiety, and may well have led to the impression that "experts" themselves were confused about the possibilities of a disaster. PEMA staff felt that multiple-source public information and reporting were already triggering a substantial spontaneous evacuation. Because of this perception, they cooperated with other agencies in a series of actions designed to preserve a calm and controlled public atmosphere in order to prevent disruption of any subsequent emergency actions. On the other hand, PEMA and risk county officials agreed that the high levels of spontaneous evacuation (on the order of 30-35 percent) made their jobs somewhat easier, by decreasing the number of people who had to be notified, transported, and cared for in a planned evacuation.

## CONCLUSIONS

PEMA's principal function during the TMI emergency was to coordinate the emergency responses of State and local governments. This is in keeping with the Pennsylvania Disaster Operations Plan (IX, A-1), which assigns principal emergency operations responsibilities to the "lowest level of government affected". Thus, PEMA acted mainly as an "information broker", obtaining information from one source and passing it on to the "consumers". This role was essential in evacuation planning, and would have been even more important had a mass evacuation been ordered. For example, PEMA learned while compiling the evacuation route map that two counties had both planned to use the same section of the Pennsylvania Turnpike. Uncovering and resolving such conflicts occupied a great deal of PEMA's attention during the emergency.

PEMA also acted as the main source of technical information for the risk and host counties. County EMCs did not have direct access either to the Governor or the Lieutenant Governor during the emergency. They depended on PEMA and, to a lesser extent, on BRP for information on developments at the reactor. Further, the counties depended on PEMA to interpret this technical information and offer guidance on protective actions. But because PEMA itself was often receiving secondhand

## VI

### Risk County Evacuation Planning

This chapter focuses on the efforts of risk counties to produce evacuation plans—the planning process—and the characteristics of the plans that were developed during the crisis. The concluding section considers implications and lessons applicable to general problems of evacuation planning.

The following discussion focuses on Dauphin County because that jurisdiction faced a broader range of problems than any other single risk county. Dauphin County's population concentrations were nearer the plant than those of the other risk counties. It also had a larger number of medical facilities, and a larger percentage of its population required special transportation arrangements. Dauphin includes the State Capital complex, a major airport, and a variety of other facilities of special interest in an evacuation.

Information about the other risk counties is included to point out significant differences in evacuation problems and responses. For example: York planned to keep evacuees within county lines, if possible, while Dauphin planned a wide dispersal of its population. York handled the problem of medical evacuation through a bilateral arrangement with the State of Maryland, while Dauphin used a central planning approach and direct contact with host hospitals.

#### **OVERVIEW OF CRISIS RESPONSE IN THE RISK COUNTIES**

This section summarizes the principal planning events in the several risk counties, providing background material for the subsequent discussion of particular planning elements.

Part Four  
**RISK COUNTY INVOLVEMENT**

## INTRODUCTION TO PART FOUR

This relatively more lengthy treatment of risk county planning efforts reflects the fact that the actual work of planning an evacuation was carried out largely in those jurisdictions. The chapter's major sections briefly describe the "notification" and initial period of the crisis, the characteristics of the "crash" planning effort through the weekend, and some of the principal problems and considerations which affected planning in the several counties.

The treatment reflects the principal sources of data. These included on-the-spot observations from Saturday morning, 31 March, through Sunday night, 1 April, and again on Wednesday and Thursday, 4 - 5 April, at the County EOCs for Dauphin, Cumberland, Lancaster, and York Counties, as well as the State EOC in Harrisburg. The observations in Dauphin were nearly continuous through those days and nights. The other counties received several lengthy visits, timed to coincide with key meetings or events. Key participants in the four counties were interviewed as the situation allowed. Follow-up interviews with certain officials were conducted in June. (Names of those interviewed appear in the Appendix, pages 179-183.)

Other primary sources were the extensive debriefings of DCPA assignees to these counties—debriefings conducted immediately after the TMI accident—plus county emergency plans and other materials provided by many of these assignees. The research staff also reviewed the subsequent testimony of some county and local officials, and of course utilized relevant portions of materials provided in the course of interviews and discussions with other State and Federal offices involved in the accident.

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#### **OVERVIEW OF CRISIS RESPONSE IN THE RISK COUNTIES**

This section summarizes the principal planning events in the several risk counties, providing background material for the subsequent discussion of particular planning elements.

## Dauphin County

Dauphin County learned of the "General Emergency" at TMI shortly before 8 a.m. on Wednesday, 28 March, and prepared to implement its existing 5-mile evacuation plan.

Dauphin's 5-mile plan, which had last been reviewed and updated in 1978, anticipated the evacuation of about 21,000 people from two townships and two boroughs near the power plant. By noon on 28 March, county and local authorities were ready to carry out the evacuation.

The existing 5-mile plan remained the basis of activity in Dauphin County until about 10 a.m. Friday, 30 March, when emergency management officials learned that NRC was suggesting an evacuation zone with a 10-mile radius. At the same time, Governor Thornburgh advised that pregnant women and pre-school children be evacuated from the 5-mile zone. Dauphin County immediately alerted local jurisdictions within the 10-mile ring and began work on expanding the 5-mile plan to cover the larger area. The standby alert for evacuation of the 5-mile area remained in effect.

Sometime between midnight and 2 a.m. Saturday, 31 March,\* PEMA informed Dauphin County that it would be necessary to develop plans for evacuating an area within a 20-mile radius of the plant. County planners continued the effort to expand the 5-mile plan to include the 10- and now the 20-mile zones until about noon Saturday, when they concluded that the existing plan could not be expanded to incorporate the two larger areas. They decided, instead, to concentrate on developing a single 20-mile plan which could be cut down to 10 miles if necessary. Though this meant abandoning some of the work already done, planners felt that this loss was more than offset by other advantages:

A single, comprehensive plan could be worked out much more quickly than three separate ones.

A single, comprehensive plan would eliminate the possibility of conflict between plans—e.g., if a 5-mile evacuation were ordered one day and a 20-mile evacuation were ordered the next, population assignments might conflict.

\*According to PEMA logs.

A single plan would be less prone to error—i.e., even if a local jurisdiction or part of a local jurisdiction used the wrong plan (10-mile instead of 5-mile, perhaps) their actions would still be consistent with those of other jurisdictions.

By about midnight Saturday, 31 March, Dauphin County planners had what they considered to be a rough but potentially usable 20-mile evacuation plan. During the 24 hours that followed, the plan was refined and formalized; public instructions drawn from the plan were released to local newspapers by midnight Sunday, 1 April, and appeared in Monday morning editions on 2 April. (Dauphin County's plan is discussed in detail in a later section.)

### York County

Shortly before 8:00 a.m. Wednesday, the County Emergency Management Director was advised that a "10 m<sup>3</sup>/hr, off-site release" had occurred at TMI and that he should prepare for possible evacuation of Brunner Island and the community of Goldsboro. At 8:18, PEMA informed York County that the situation appeared to be in hand and that the alert should be cancelled. The Director decided to maintain alert status for an additional half hour as a precautionary measure.

The plan available at that time had been prepared in connection with the licensing of the TMI plant. The 5-mile risk zone designated by the plan contained about 10,000 people. Since York County's overall population is somewhat more than 300,000, an evacuee population of the size covered by the 5-mile zone could easily be accommodated in mass care facilities.

The original York plan consisted primarily of hazard definitions and descriptions, notification lists, and warning guidance. The plan was general in nature, and designed to be used for both TMI and the Peach Bottom nuclear plant in the southern part of York County. Under this plan, risk zone populations would first be advised to "remain indoors" with doors and windows closed and fans and air conditioners off. They would remain in this mode until ordered to evacuate or until the advisory was lifted. Mass care centers and evacuation procedures were not delineated.



York County returned to normal operations later on 28 March. They remained in this mode until Friday, 30 March, when PEMA notified them (about 8:40 a.m.) of the "uncontrolled release". (The County Director then issued instructions for people to remain indoors.)

Shortly after 10:15 a.m. Friday (30 March), PEMA Operations directed York County to begin work on a 10-mile evacuation plan. Work began with an assessment of the size of the population of the new 10-mile zone. County projections for 1980 indicated that an additional 28,000 people would have to be considered, bringing the total at-risk population to slightly under 40,000. This number could still be accommodated within York County.

Efforts to work out a 10-mile evacuation plan continued into the morning of Saturday, 31 March. Two DCPA Region II assignees arrived during this period and went to work on the 10-mile plan.

Late Saturday morning, 31 March, the PEMA official assigned to support York's planning effort arrived with guidance documents to be used in preparing a 20-mile evacuation plan. The new requirement increased the size of the risk area population from the 40,000 designated under the 10-mile limit to a new total of 235,000. This sharp increase necessitated a "crash" planning effort. The planning group was expanded by adding volunteers to the core group of County emergency staff and DCPA and PEMA assignees.

By the estimates of York County planners, a usable skeleton plan existed by the afternoon of Sunday, 1 April, and draft versions of the main components of the final plan were ready on the morning of 2 April. At this stage, the plan components were available for use as working documents. They could, in other words, be used by those who had written them, but possibly not by others. Later in the week, a formalized, self-explanatory version of the plan was prepared for distribution and reference.

The York County Evacuation Plan, in its final form, is a voluminous document whose components include:

- A description of the "Basic Plan". Included here is a definition of purpose; assignments of responsibility; definitions of operational concepts (e.g. evacuation zones, risk area population, and mass care).

- Nine "Supporting Annexes" giving guidance and reference information on the following topics:
  - Control procedures
  - Warning and communications guides
  - Mass care centers (descriptions and resources)
  - Health and medical information
  - Traffic control and post-evacuation security plans
  - Fire protection plans
  - Transportation resource and assignments lists
  - Guidance and sample message for Emergency Public Information
  - Military support (Pennsylvania National Guard)

A formalized version of this plan was furnished to PEMA on 3 April, replacing plan components that had been filed with PEMA over the preceding two days.

#### Lancaster County

Lancaster County's EOC was put on 24-hour alert status after receipt of notification of a "General Emergency" at TMI; the notification reached the County Emergency Operations Director at about 8 a.m. Wednesday, 28 March. A plan for a 5-mile evacuation was ready for implementation at that time. This plan, if implemented, would have affected approximately 7,000 people in two townships.

At approximately 10:15 a.m. Friday (30 March), Lancaster County received word from PEMA to develop a 10-mile evacuation plan. The increased radius would involve an additional two townships and one borough, thereby increasing the total affected population to about 20,000. By 2 a.m. 31 March, the evacuation area was once again expanded, this time to a 20-mile radius with a total affected population of some 110,000 persons. This rapid expansion of the area of concern from 5 to 20 miles created innumerable questions and problems for the planning staff. Areas originally designated as host areas within the county had now become risk areas, and a number of hospitals and extended care facilities now had to be accounted for.\*

\*The situation in Lancaster County was further complicated by the fact that officials in the City of Lancaster, which lies within a 20- to 25-mile radius of TMI, also decided (about noon on Sunday, 1 April) that they should be included in the evacuation plan. County officials considered this possibility, but the final Lancaster County plan adheres to the 20-mile requirement.

The PEMA Eastern Area Coordinator, assigned to Lancaster County by PEMA and working in conjunction with the County Director, made the decision on the afternoon of 31 March to concentrate on a single 20-mile evacuation plan. By 8 a.m. on 2 April, Lancaster County was able to inform PEMA that a workable, if not fully refined, 20-mile evacuation plan was available in writing. Additional refinements were made over the ensuing several days.

Emergency planners in Lancaster County estimated that a 20-mile evacuation could have been completed relatively uneventfully if the evacuation directive were received no sooner than about 4 p.m. Sunday, 1 April.

The Lancaster County Evacuation Plan, though less detailed than York's in many respects, addressed most of the same basic problems, including medical evacuation, individuals without private transportation, fire and police security, and mass care. The plans developed in each of these areas were drawn together late in the day on Sunday, 1 April. During the planning process, local operational personnel were kept informed of their roles and responsibilities. Very little of the actual planning activity, other than coordinating meetings, took place in the EOC, which offered only limited space and rapidly became overcrowded.

### Cumberland County

First notice of the situation at the TMI plant was received by the Cumberland County EOC on the morning of 28 March 1979. The message was advisory in nature since no part of Cumberland County falls within a 5-mile radius of the power plant.

On Thursday, 29 March, viewing the situation as potentially serious, the County Emergency Management Coordinator had the EOC's physical facilities put in an emergency operations configuration. Movable partitions were taken out, auxiliary telephones plugged in, etc.

On Friday, 30 March, between 10:30 and 11 a.m., Cumberland County was notified of its status as a risk county under the new 10-mile zone suggested by NRC. The EOC then became fully operational and a team of planners was assembled to begin work on an evacuation scheme. The 10-mile risk zone population was judged to be

somewhat more than 23,000, a number that could be accommodated within Cumberland County itself.

A skeleton emergency plan was prepared during the evening of Friday, 30 March.

Major subject areas were:

- General and specific guidance concepts covering such areas as: authority for ordering an evacuation; population segments which would receive priority treatment; forms of conveyance to be used; different requirements of long- vs. short-term evacuations; etc.
- A general information file that included listings of emergency phone numbers and definitions of terms used in the plan.
- "Area of Evacuation"—describing the risk zone as defined by State authorities.
- Movement of population. Cumberland County planned, initially, to use an assembly point and auto convoy system for evacuating the 10-mile risk zone. Schools were to be used as assembly areas for persons using private autos as well as those who could not provide their own transportation. For the latter group, the county's school buses would be dispatched to the assembly points and all vehicles would move together. (The portion of this guideline referring to the conveying of private vehicles was deleted from later versions of the plan.)
- Mass care centers—general guidance for setting up mass care centers.
- "Traffic Control" procedures for evacuation routes.
- "Rear Area Security Teams". Local jurisdictions were authorized to request volunteers who would remain in evacuated areas. Radio equipment would be furnished to them.
- Communications (official)—designated radio frequencies to be used for various emergency functions.
- "Destination Points"—a system for designating host areas, setting departure schedules, and establishing evacuation-route checkpoints.
- Warning guidance, which defined four different emergency states (with respect to the TMI plant) and outlined the appropriate instructions to be given the public.

- A sample Emergency Public Information sheet, which gave instructions on such topics as: emergency radio frequencies, things to take along when evacuating, and what to do before leaving home.

The guidance described above was prepared prior to the issuance by PEMA of a 20-mile evacuation requirement. This initial format proved flexible and comprehensive. Subsequent versions of the County Plan followed this format and expanded on it where necessary.

Between Friday midnight and 2 a.m. on Saturday, the county was instructed to begin planning for a 20-mile evacuation. Cumberland County planners began work on a second draft of the evacuation plan. The larger risk zone encompassed half the county and more than half of the county's population. It was no longer judged possible to arrange for care of all evacuees within the county itself. Consequently, Franklin County was contacted and asked to provide mass care space. The Deputy Emergency Management Coordinator for Cumberland was dispatched to the newly enlisted host area to give a briefing on the situation and review preparations there.

Expansion of the first evacuation plan had progressed far enough by the afternoon of Saturday, 31 March, to allow a briefing and feedback meeting with local authorities. Following a general briefing on the plan, the meeting broke up into task-oriented groups that expanded on specific portions of the plan. As a result of these sessions, additional planning considerations (primarily relating to economic factors) were added to the list of subjects addressed in the evacuation plan.

During the afternoon of 31 March, a conflict developed due to a lack of communication with Dauphin County. That jurisdiction, unable to route all of its evacuees out of the risk zone on northbound roads (as previously agreed), sought an evacuation route through Cumberland County. A break in the communications chain led to a delay in notification of the appropriate planner in Cumberland County. Once discovered, the situation was quickly remedied.

Planning activities continued in the Cumberland County EOC through the week of 2 April. Though county planners felt they had a usable product on Saturday, 31 March, they continued efforts to expand and improve it until the situation at the plant was in hand.

## Perry and Lebanon Counties

Like Cumberland, these counties had no 5-mile plans. The 10-mile directive left Perry County unaffected and took in a narrow and sparsely populated strip of Lebanon County. However, when the 20-mile requirement was issued by PEMA on 31 March, significant areas of both counties fell into the risk zone. Perry now had some 4,000 people at risk out of a total population of about 29,000; Lebanon's at-risk population was slightly more than 35,000 out of a total of 100,000. Both counties received assignees from PEMA to aid in planning, and both counties' Emergency Management Agency personnel were at work on evacuation plans when the assignees arrived on 31 March.

Both Perry and Lebanon Counties planned to assign evacuees within their own boundaries. Schools and public buildings were designated as the principal mass care facilities. Traffic planning in both counties required direct contact and cooperation with Dauphin County, which had to route evacuees through Perry and Lebanon.

## STAGES OF EVACUATION PLANNING

Risk county planning evolved through stages which reflected, primarily, the changes in the risk zone from 5 miles, to 10, to 20. This section illustrates the results of these shifts at the county level, and is based largely on the Dauphin County experience.

### The Five-Mile Plan

On 28 March, when the problem at TMI began, Dauphin County emergency management personnel acted in accordance with the guidance set forth in an existing emergency response plan. This plan had been prepared more than two years before in connection with Metropolitan Edison's license application for the TMI facility. Dauphin County emergency managers had updated their plan in April of 1978 and had held meetings with local officials to discuss its provisions. The last such meeting, before the accident, took place in late 1978.\*

\*According to one attendee, the Emergency Management Coordinator of a Dauphin community, the participation of local directors in these sessions was far from uniform. Some local coordinators attended regularly, others came seldom or not at all. This was partly due, he felt, to the fact that such positions are voluntary—and because local administrators often appoint people to these positions simply 'to have a name in the slot'.

The emergency plan in effect in Dauphin County had been prepared in accordance with PEMA requirements. It had been included in a package of such plans—covering State government and other risk counties—which had been submitted to the NRC.

The requirements for county government reactor emergency plans, including the 5-mile risk zone radius, were set by PEMA not by NRC. NRC guidance, for instance, did not prescribe the size of risk zones. In fact, the NRC had no formal requirement that county plans even exist. The Commission played an advisory role, reviewing plans submitted to it, but the only binding NPC requirements were those placed on the utility itself.

A "Site Emergency Plan" was part of the license application for the TMI plant but its off-site components related only to such things as the agencies and personnel to be notified in the event of an accident; off-site radiation monitoring; fire and police services for the plant; and arrangements with area hospitals to care for any plant personnel who might become contaminated with radioactive material.

Dauphin County's 5-mile plan was basically a policy and reference document. It contained lists of possible resource suppliers (bus companies, ambulance services, etc.), phone listings for people and agencies to be contacted in case of an accident at TMI, and policy/guidance statements. It did not contain listings of evacuation routes, mass care centers beyond the 5-mile ring, or any of several other specific topics that would receive detailed attention in the plans produced during the TMI emergency. This brief county plan was descriptive rather than prescriptive, more a planning document than a working plan. Unlike the plan produced after 30 March, it was not written in response to a clearly stated threat. It was, however, an attempt to anticipate the requirements of a situation which had never occurred.

### **Overload and Transition**

Between the morning of Wednesday, 28 March, and the morning Friday, 30 March, Dauphin County emergency staff acted according to the provisions of their original 5-mile plan. The County Emergency Operations Center went on a 24-hour operating schedule. Some emergency volunteer staff were alerted. Several briefing/planning sessions were held with representatives of communities within the 5-mile risk

zone. Some refinements were made in the existing emergency plan, and communications were opened with individuals and officials of organizations whose services might be needed.

As late as 8:00 a.m. on Friday, 30 March, Dauphin County was still receiving word from PEMA that the situation at TMI was improving. Then, at 8:34 a.m., a call came in from an official at the power plant informing Dauphin County personnel that a release had occurred and asking for assistance in contacting PEMA. Within one hour, the County Emergency Management Coordinator (EMC) had delivered an evacuation alert message over local radio. Within two hours, PEMA had issued fresh instructions for counties to begin planning for the evacuation of people within a 10-mile radius of the power plant. In Dauphin County, this meant that the at-risk population had increased fivefold.

Operational and planning efforts began simultaneously. Local governments and especially local EMCs inside the 10-mile zone were notified. Fire companies were put on standby; schools were first alerted, then closed. The Red Cross was notified, and a mass care shelter was opened at the Hershey Park Arena.

A planning effort geared to the 10-mile risk zone was begun, but it proceeded slowly because critical data, maps and supplies, and reference materials had to be assembled. For instance, planners did not have detailed figures on the distribution of people within the expanded risk zone--information needed to produce an internally consistent plan for allocating evacuees to routes and host areas. The information existed but it was not available in the EOC, either as a single reference volume or as raw data. County personnel were able to generate a population distribution for the new risk zone, but the time required to produce such basic reference materials delayed the start of some aspects of the crash planning effort.

The unanticipated expansion of the risk zone meant that county planners had to repeat, in a matter of hours, what they had previously done over a period of months. It also meant that the scope of the problem had, like the size of the at-risk population, increased geometrically. Emergency management personnel at the State and county levels had to begin almost from scratch, first to build a data base, then to produce an evacuation plan, and, finally, to develop an infrastructure to carry it out.

When PEMA issued its order to prepare for evacuation of a 10-mile zone, Dauphin County's emergency management system was in an "operations mode". It



was not structured for planning. The new requirement led to a period of severe overload. Suddenly, the County's Emergency Management Agency had to:

- (1) assemble an emergency planning team with the appropriate knowledge and experience,
- (2) assemble background information for planners' use,
- (3) expand existing operations capabilities to cover all areas affected by the 10-mile order, and
- (4) assess the new problems and develop appropriate responses.

At first, the emergency management staff worked on an expanded version of the original 5-mile plan. This approach was eventually abandoned, however, because the existing plan did not allow the level of precision needed to organize the larger effort needed for the 10-mile evacuation.

The more or less informal organization that would have guided county and local interaction under the 5-mile plan would not support the level of coordination needed to move 127,000 people. Nonetheless, the 5-mile plan was the only guidance document available; it had to be used until a new plan was drawn. Until this could be done, Dauphin County necessarily maintained the option of simply putting the at-risk population on major outbound roads if an evacuation were ordered soon.

Most of the people who eventually made up Dauphin County's emergency planning team were assembled in the County EOC by the evening of Friday, 30 March. It was not until the following morning, however, that they abandoned efforts to "expand" the 5-mile plan and began work on a completely new plan covering the enlarged risk zone. Efforts to adapt the original plan, therefore, effectively delayed the start and completion of the plan that was eventually produced.\*

\*Cumberland County lies entirely outside the 5-mile risk zone and therefore had no plan for coping with an emergency at the TMI plant. Yet this jurisdiction produced an evacuation plan before any of the three counties that did have such plans. When taken in conjunction with the delay caused by the original 5-mile plan in Dauphin County, this suggests that the existence of the original plans hindered rather than helped the crash planning effort.

The decision to cease efforts to expand the original plan also came after technical advisors from DCPA, PEMA and the Pennsylvania National Guard had arrived in the County EOC.\*

Between midnight and 2 a.m. on Saturday, 31 March, (according to PEMA logs), risk counties were informed that it would be necessary to develop plans for evacuating an area within a 20-mile radius of the plant. Through Saturday morning, county planners continued the effort to expand the 5-mile plan to include the 10- and now the 20-mile zones. By about noon, they had concluded that the existing plan could not be expanded to incorporate the two larger areas. The decision was made to abandon efforts in that direction and to concentrate on developing a single 20-mile plan which could be adjusted to cover a 10-mile radius, if necessary. Freed of the constraints imposed by the original plan, the Dauphin County staff were now able to organize their efforts around a single set of criteria applicable to all three risk zones. Thereafter the pace of work picked up considerably.

#### The Crash Planning Effort

The task assigned to county emergency management staff on Saturday morning was to devise, as quickly as possible, a workable evacuation plan for the more than 600,000 people who lived within 20 miles of TMI. For the next two days, roughly, the staffs in county EOCs were essentially operating in three different modes simultaneously.

First and foremost, they were developing a detailed evacuation plan, virtually from scratch.

Secondly, they were in a standby or pre-operational mode—conceivably, the order to execute an evacuation could have replaced further development of the plan at any stage.

\*The most seriously affected risk counties were assigned technical assistance teams from DCPA and from PEMA. Cumberland, Dauphin, Lancaster, and York Counties were each assigned two professional staff members from DCPA's Region II Headquarters. These personnel, who were to serve in technical advisory and liaison roles, began arriving in risk county EOCs on the evening of 30 March. The following morning, PEMA sent additional support in the form of professional staff from its three Area Headquarters (each responsible for about one-third of the State). One such individual was assigned to each of the principal risk counties (Dauphin, Lancaster, York, Cumberland). Thus, by noon of 31 March, a full range of emergency planning expertise (Federal and State in addition to county) was available to the Emergency Management Coordinators of the risk counties.

Finally, they were in a crisis-response mode--responding for example, to phone calls and inquiries from people who viewed the existing situation as a crisis and the EOC as the appropriate management focus for that crisis.

This chapter addresses the first mode, primarily, but it must be remembered that the officials, planners, and volunteers assembled in the crowded EOC and Courthouse facilities were constantly dealing with the interaction of the three modes. For example, the planner phoning another office for data on available buses was also discussing how those buses might be deployed if an operation commenced immediately. And the official on the other end of the line was likely to be inquiring about "how bad is it?" and preparing to pass any assessment along to other officials and citizens.

Given these distractions and interactions, the first requirement of the planning effort was to assemble and organize the planning team and delegate areas of functional responsibility. The people who would eventually create a plan had begun assembling at the EOC on Friday morning, 30 March, and all were available by Saturday morning. (Regular staff of the County Emergency Management Agency had of course been alerted at the beginning of the crisis.)

Outside assistance was available in the form of the two DCPA assignees to Dauphin County, who arrived at the EOC about 8 p.m. Friday evening. The PEMA assignee (normally, the Deputy Director of the Central Area Headquarters) arrived Saturday morning, bringing a package of guidance materials prepared at the State EOC the preceding night.\*

By late Saturday morning, then, the organizational components needed for a systematic planning effort were assembled at the County EOC. Both the county's emergency management staff and the assignees from outside brought experience and relevant knowledge to the task, which was now defined as developing a single 20-mile plan which would be adaptable to smaller zones. A communications link (telephone hot line) with the PEMA Operations Center was installed, and an assortment of reference materials and data was now available.

\*This guidance packet contained: a risk zone map; population figures on political subdivisions within the risk zones; possible evacuation routes; and sample material for use in preparing public information packages. Prepared by PEMA's Nuclear Civil Preparedness Planner, this material was drawn primarily from a larger body of information compiled for the State's Crisis Relocation Plan.

The next major step was to divide the planning problem into functional areas or components. In Dauphin County, the initial set of functions included (1) the location of hosting spaces, (2) the delineation of evacuation routes, (3) transportation planning (including the identification of resources to move people without private means), and (4) arrangements for disabled, institutionalized, ill, or other special populations. As the following section will indicate, these components and others were variously grouped and subdivided in the several counties. They were then assigned to particular members of the planning teams.

Note that a number of the functions are interdependent and logically sequential. That is, host areas would normally be located before routes are selected, some route planning should be completed before transportation resources are assigned, etc. Given the conditions imposed by a "crash" effort, such functions were often, and necessarily, pursued simultaneously, requiring almost constant interaction and even negotiation among planners addressing the several functions. A crash planning effort, by its nature, precludes the orderly, preferred sequence of planning activities. Many of the shortcomings of the TMI response are thereby traceable to the absence of pre-established plans and the delay in determining the risk zone to be evacuated.

#### **PRINCIPAL ELEMENTS OF RISK COUNTY PLANNING**

Evacuation planning was conducted largely at the county level, and the bulk of the activity occurred in the risk counties. PEMA specified the general requirement and performed a critical coordination and support function, while dispersing its Area Office personnel to work closely with county EMCs. Local communities, by and large, acted in accordance with direction from the county level.

This assignment of primary planning responsibility to the counties represented a compromise between the need for technical expertise and the need for accurate local knowledge. The county was the lowest level of government with a professional emergency management staff. At the same time, it was the highest level of government where personnel had the sort of detailed local knowledge needed for rapid evacuation planning. The

arrival of PEMA Area personnel and DCPA technical advisors added depth to county-level planning teams and gave them a still broader base of knowledge and experience.

All six risk counties had to work almost from scratch to develop evacuation plans geared to the TMI facility. This was true of the three that already had plans (Dauphin, York, Lancaster) and of the three that did not (Cumberland, Perry, Lebanon). Each county assembled a planning team to work out a response to the problem, but these varied in composition, size, and style of operation to such an extent that no "typical" planning approach existed. Although each of the risk county planning teams was different from all the others, and each approached its task in a different way, all proceeded on the same legal basis\* and dealt with the same fundamental planning elements:

- **Hosting.** While the foremost consideration of county-level planners was to lay plans for movement of people out of the risk zones, they also needed to locate destinations with sufficient mass care space.
- **Route Planning.** Movement out of the designated risk zones (5, 10, and 20 miles) entailed plotting evacuation routes, assessing their capacities, forecasting traffic patterns and traffic control needs, and coordinating movement plans with other risk counties. Relevant State, county, and local authorities (National Guard, State Patrol, etc.) had to be consulted.
- **Transportation Resources.** To meet special transportation needs, planners were required to assess and quantify needs, identify locally available resources, locate added resources and, in some cases, people with vehicles.
- **Special Populations.** Hospitals, nursing homes, prisons, other institutions, and people requiring special assistance represented a separate planning area. These needs paralleled those of the general population, but required responses tailored to the particular disabilities or other characteristics of each population.

\*In the absence of a State-declared emergency, the legal authority for action continued to reside with elected officials at the county and local levels. Arrangements had to be made for securing the cooperation of citizens and organizations. County Commissioners were available in risk county EOCs during much of the crisis, giving support to planning staff as needed.

- **Communications.** Concerned with an over-reliance on telephone communications, planners sought other means for linking the components of the emergency management systems devised for a TMI evacuation.
- **Public Information and Warning.** What should people be told about the threat, the still-emerging plans, and the actions which might be required of the public? How should they be told?
- **Pets and Livestock.** Domestic and farm animals posed special problems for all planners concerned with the health and safety, the morale, and the motivation of people who might be asked to evacuate.

This listing indicates many, but not all, of the factors considered important by risk county planners. Of course, the six counties differed substantially in their personnel, facilities, demography, resources, and the nature of the evacuation problems they faced. The following brief discussions of these planning concerns, however, should indicate both the commonalities and differences among the several approaches to risk county planning.

### **Hosting**

Allocation of evacuees to host areas was done primarily by planners in the risk county EOCs. Efforts to avoid conflict among their allocation patterns involved direct contact between the risk counties and coordination with the State EOC. PEMA's estimates of the numbers of evacuees in each risk county were derived primarily from 1970 Census figures. Using this material, planners at the State EOC compiled a guidance document giving the at-risk population for boroughs, townships, and municipalities in each risk county. Each of the PEMA Area officials carried a copy of this guidance with him when he took up his risk-county assignment. (In several cases, risk county planners modified these figures using more recent material of their own )

Dauphin and Lancaster Counties (both of which had to rely heavily on other counties for hosting their evacuees) approached the evacuation problem by: (1) contacting County EMCs and obtaining provisional assessments of mass care capabilities; (2) describing provisional evacuation routes; (3) adjusting population assignments as host counties furnished more accurate figures on mass care capability (revisions led to a higher hosting figure in all cases); (4) adjusting the initial routes to accommodate changes in population allocation

suggested by State-level planners. Risk zone population was divided into groups according to geographic location. Each geographic group was assigned a route that funnelled people onto a major roadway that had an exit control point at or near the group's destination. In this way, whole communities were to be evacuated *en masse*, would travel the same route together, and would be received and cared for in the same host area.

Cumberland County used the same approach to allocation and routing as Dauphin and Lancaster. However, because Cumberland had a smaller at-risk population, planners did not need to interact with jurisdictions far beyond their own borders in allocating evacuees. A single neighboring county, Franklin, was judged able to provide sufficient extra (reserve) mass care space.

The situation of Perry and Lebanon Counties was similar to that of Cumberland but of a smaller scale. Perry had a risk zone population of about 3,600 as compared with a total county population of 29,000. Estimates of mass care spaces available within the county itself yielded a figure of 5,000. Lebanon County's at-risk population numbered about 37,000 out of a total of 100,000. As a percentage of population, this is nearly three times the size of the problem faced by Perry County but was far lower than that of Dauphin, York, and Cumberland. The limited size of the at-risk population in Perry and Lebanon Counties allowed planners to avoid going outside their own jurisdictions to seek host areas.

**Percent of County Population  
Within the 20-Mile Risk Zone  
(Using 1970 Census Figures)**

County	Percent
Dauphin	89.5%
York	86.2%
Lancaster	34.4%
Cumberland	55.6%
Lebanon	37.0%
Perry	12.4%

Planners in all of the risk counties knew that a certain number of people had left or were leaving the area but their responses to this behavior differed in the extreme. Dauphin and York Counties, which had both the largest number of people and the largest percentage

of their populations at risk, chose approaches almost exactly opposite to one another. Dauphin County planners took the view that they could not rely on spontaneous evacuation to diminish the size of the at-risk population. Therefore, they sought mass care space sufficient to house the entire population of the 20-mile risk zone. Planners in York County, on the other hand, relied heavily on spontaneous evacuation and on the expectation that evacuees would prefer to rely on their own resources (friends, relatives, hotels, etc.) to adjust the number of mass care spaces needed. This approach reflected York County's geographic location. The closest areas to York County that offered the prospect of adequate mass care space were all to the south, across the State line in Maryland. All other directions were closed either by the risk zone itself or by the evacuation plans of other counties. Perceived problems of jurisdictional lines, financial liability, and communications involved in a large-scale interstate evacuation prompted political leaders and planners in York County to try to avoid this option.

All four major risk counties attempted to estimate the number of spontaneous evacuees and all but Dauphin County made some adjustment to their estimates of their mass care needs. But only York County attempted to use this phenomenon as a major alternative to the location of mass care space.

In an effort to reduce the size of the estimated at-risk population, York County assigned its planning commission the task of assessing the extent of spontaneous evacuation. Estimates of local officials, figures on employee absenteeism from risk area businesses and some sampling of households were used to produce adjustment formulae. These were applied to the original risk zone population figures and a lower estimate was derived. (This resulted in reductions of more than 90 percent in some cases.) York County's attempt to incorporate these figures was valid in theory but the lack of procedures for accurate assessment of the phenomenon made the figures for large populations questionable in their precision and risky to use. Use of this approach also crippled York County's Evacuation Route Plan (see below, pp. 99-100).

York County was unable to adhere to the policy of hosting all evacuees in the non-risk portions of the county. Mass care space outside the 20-mile risk zone (31,000 spaces) would probably have been more than adequate to house the population of a 10-mile evacuation (38,000 people) but a 20-mile evacuation would have resulted in an at-risk population nearly eight times the size of the number of mass care spaces available. Thus, even if 75



percent of the evacuees from a 20-mile evacuation chose to rely on their own resources, there would still be almost twice as many people in need of mass care space as there were spaces available.

Dauphin County's planning for the allocation of evacuees, by contrast, made no allowance for spontaneous evacuation—even though it was known to be occurring. Dauphin's original 5-mile plan anticipated hosting 21,000 evacuees within Dauphin County, and arrangements had been made to use Lebanon County if necessary. Designation of a 20-mile evacuation planning radius not only increased the number of evacuees to be allocated, it also eliminated both Perry and Lebanon Counties (as well as much of Dauphin County) from consideration as host areas. Furthermore, it cut off or restricted access to several potential evacuation routes. The TMI facility is at the south end of Dauphin County and the expansion of the risk zone to a 20-mile radius meant that counties to the east and west had potential evacuees of their own. This meant that the only conflict-free direction for Dauphin County's evacuation was to the north.

The sharp increase in the number of potential evacuees meant that a prodigious amount of mass care space had to be found immediately. The individual who assumed primary responsibility for locating this space was the Assistant Director of PEMA's Central Area Headquarters, who had been assigned to Dauphin County.

The Area assignee used his familiarity with central Pennsylvania to select likely host areas. He then contacted EMCs in those counties, informed them of the situation, and asked for a preliminary assessment of the number of evacuees each county could absorb.

Most of the possible host areas immediately available for use by Dauphin County have mountainous terrain and small populations—factors which limited their absorptive potential. This forced county planners to go progressively farther afield to locate sufficient space for their evacuees. By early Saturday evening (31 March), it had become clear that estimates of mass-care space from the set of host counties then available for use by Dauphin County would not meet its need. On instructions from PEMA, the Area assignee then began contacting counties in the eastern portion of the State—an area which had previously been earmarked for use by Lancaster County. By about 11 p.m. on Saturday, enough space for all of Dauphin County's at-risk population had been found.

Five separate categories of hosting information were used by Dauphin County planners during the actual planning activity.

1. Needs—mainly an assesment of space needed for evacuees. This included listings of the number of people for whom space had been located, the number of spaces still needed, and estimates of the number of people who had voluntarily evacuated.
2. Resources—with special reference to host areas. This included as much information as could be obtained on the sheltering facilities and plans of host areas, as well as the kinds of support they would need (cots, food, specially trained personnel, etc.).
3. Evacuation Routes—with special attention to routing people directly to host area facilities having ample parking space. These would be used as staging areas from which evacuees would disperse to specific mass-care centers.
4. Current plans—the plan as it would be employed at the moment.
5. Earlier plans—a file of earlier versions, maintained for reference.

All of the above files contained relevant reference material (background information on host counties, phone lists for relevant host county officials, etc.) and all were continuously reviewed and updated.

Map 1 (next page) depicts the total host area eventually included in TMI evacuation plans, and the following tables describe the estimates of mass care spaces which were utilized in planning the evacuation of the four principal risk counties.

#### **Evacuation Route Planning**

The selection of evacuation routes depended on where risk populations were concentrated, their host area destinations, and possible conflicts with other groups of evacuees. The materials distributed by PEMA on Saturday morning suggested evacuation routes for political subdivisions within the risk counties. Planners in the various county EOCs interacted by telephone to prevent conflicts in the use of routes. By and large, the previously-described search for host spaces determined where and how far the evacuees would move,



**Dauphin County: Estimates of Available Mass Care  
Space Supplied by Host Counties**

Host County	5-Mile Evacuation	10-Mile Evacuation	20-Mile Evacuation
Dauphin (outside 20-Mile Zone)	6,000	6,000	6,000
Lackawana	9,000	9,000	9,000
Bedford	5,000	5,000	5,000
Carbon	3,000	3,000	3,000
Somerset	10,000	10,000	10,000
Luzerne		100,000	100,000
Schuylkill		600	600
Huntingdon		10,000	10,000
Blair		5,000	5,000
Columbia		2,000	2,000
Cambria		17,200	17,200
Lycoming		15,500	15,000
Union		10,000	10,000
Mifflin			10,000
Centre			6,000
Juniata			
Philadelphia			2,500
Northumberland			10,000
Clinton			5,000
<b>Totals</b>	<b>33,000</b>	<b>197,800</b>	<b>224,900</b>
Dauphin County risk zone Popuations	25,000 ("final") (21,000 initially)	127,000	200,339

**York County: Estimates of Available Mass Care  
Space Supplied by Host Counties**

Host County	5/10/20-Mile	Overflow
York (outside 20-Mile Zone)	31,000+	
Frederick (MD)		15,400
Harford (MD)		31,100
Baltimore (MD)		53,000
Carroll (MD)		32,000
<u>Totals</u>	<u>31,000+</u>	<u>131,500</u>
Total, York County plus overflow		162,800+
York County risk zone populations:	5-mile	10,000
	10-mile	38,000
	20-mile	235,000

**Lancaster County: Estimates of Available Mass Care  
Space Supplied by Host Counties**

Host County	Mass Care Spaces	
Lancaster (outside 20-Mile Zone)	12,000	
Berks	10,000	
Montgomery	10,000	
Chester	10,000	
Bucks	5,000	
Delaware	5,000	
Philadelphia	**	
Cecil (MD)	2,000	
<u>Total</u>	<u>54,000</u>	
Lancaster County risk zone populations:	5-mile	7,000
	10-mile	20,000
	20-mile	110,000

**Cumberland County: Estimates of Available Mass Care  
Space Supplied by Host Counties**

Host County	Mass Care Spaces	
Cumberland (outside 20-Mile Zone)	20,759*	
Franklin	24,670	
<u>Total</u>	<u>45,429</u>	
Cumberland County risk zone populations:	5-mile	-0-
	10-mile	23,500
	20-mile	88,000

\*Includes 5,000 overflow spaces at Shippensburg State College.

hence the complexity of the route planning task. During Sunday, 1 April, officials of the Pennsylvania Department of Transportation (PennDOT) in Harrisburg, working through PEMA, reviewed the county plans to identify potential bottlenecks. Shortly thereafter, a comprehensive route map was prepared to exhibit the combination of the individual risk county plans.

One source of concern, in several risk counties, was their uncertainty about how long an evacuation might last. At least one jurisdiction, York County, planned to accommodate evacuees for a short-term stay at staging areas within the county, but would "wave them through" to more distant host locations if the evacuation order indicated a longer-term stay. Most risk county planners did not seek to resolve this issue.

The first step in evacuation route planning was to work out a set of provisional routes. This route structure was then subjected to a review and alteration process during which the following factors were considered:

- assessment of the carrying capacity of the various evacuation routes
- examination of routes for possible conflict with other routes of the same county
- coordination with other risk counties to avoid route conflict
- planning for control of access/entry to evacuation routes by the at-risk population
- plotting traffic flow where routes intersected
- laying out locations for route markers and traffic control points and arranging for the latter to be manned
- scheduling the sequence in which various areas or groups would evacuate
- reaching agreement with host counties (if evacuation was across county lines) on a termination point for each evacuation route
- arranging to monitor traffic flow and spot bottlenecks
- planning routes and staging areas for incoming traffic (emergency vehicles, buses, etc.)

- planning pickup and evacuation routes for mass transit evacuation
- producing drafts of route lists and route maps (to be reproduced for traffic control, emergency vehicles, bus drivers and for inclusion in public information packets)

The following discussion outlines different approaches taken by four risk counties in responding to this problem.

#### Dauphin County

The limited size of the mass care estimates received from host counties forced Dauphin to disperse its population over a broader area than any other risk county. This created a need for complex and extensive route planning.

As initial mass-care assessments from host counties became available, they were matched with population blocs of similar size from the risk zone. Routes were then laid out to connect the two areas. This was done by a county employee from another department and by an individual from the State Department of Transportation. Both of these people had previously worked on emergency planning in Dauphin County. One of the DCPA assignees also worked on this task, cross-checking routes and hosting figures to provide "quality control".

The technique of matching individual risk subdivisions with individual host counties gave planners the option of moving the at-risk population in groups. It also allowed them to estimate the numbers of evacuees who would use various routes. As totals for routes became available, they were compiled into a single list, providing an overall view of the traffic outflow that might be expected if evacuation were ordered. This material was given to PEMA and the Pennsylvania Department of Transportation for review. The review, in turn, led to estimates of the length of time it would take the *total* population of any given jurisdiction to evacuate over the assigned route. (It was, in short, a 'worse case' estimate of evacuation time.)

Route information noted down in this way was used by planners in other functional areas and at other levels of operation (State and local police, National Guard) to prepare their own evacuation arrangements since it allowed them to anticipate possible bottlenecks and traffic control points.

Provisional route maps, based on the host/risk area matching, were prepared by midnight on Saturday, 31 March. During the 24 hours that followed, they were reviewed by PEMA/PennDOT authorities and altered, though not greatly, to improve traffic flow.

Route planning in Dauphin County required coordination with the efforts of Cumberland, Perry and Lebanon Counties, since all but one of the major roads available for Dauphin's use ran through one or another of these jurisdictions. This was done on a county-to-county basis rather than through PEMA. Direct contact, it was felt, was less time consuming and less subject to misunderstanding. PEMA was, however, kept abreast of developments in route planning so that an overall route map and traffic assessment could be developed.

#### York County

As mentioned above in the discussion of hosting, York and Dauphin Counties chose nearly opposite approaches to the problem of where to put those who might be forced to evacuate. The same can be said of their approaches to the problem of evacuation route planning. While Dauphin County developed a plan for dispersing its population, York's approach anticipated the concentration of evacuees. In opting for an allocation plan that avoided, to the extent possible, the use of mass care space in other counties, York also committed itself to concentrating much of its at-risk population in the portion of the county outside the 20-mile risk zone.

York County's routing plan divided the jurisdiction into three zones. Within each of these, an assembly area was selected and routes were laid down which would funnel the zone's evacuees into its assembly area. Once in the assembly areas, evacuees would be counted and assigned to mass care shelters. If the shelters filled up and/or if it appeared that the evacuation would last for more than a few hours, people would be sent on to host counties in Maryland.

The route plan adopted by York County did include an option for simply waving traffic through the assembly points but this procedure would require that congestion develop first. An examination of population figures for the 5- and 10-mile risk zones suggests that an evacuation that used either of those figures as its basis would not lead to



a major congestion problem.\* However, the addition of the large volume of traffic that would result from a 20-mile evacuation, when coupled with a route plan that channelled all evacuees into three assembly areas, strongly suggests that a major traffic problem would have resulted. In other words, while the York County route plan appears sufficient for 5- and 10-mile evacuations, its application to a 20-mile evacuation entailed a risk of traffic congestion.

The use of assembly areas and the concentration on intra-county evacuation resulted in a plan that routed evacuees from the northern part of the county south, toward the TMI plant. The route would have taken these evacuees inside the 5-mile ring for a significant portion (several miles) of their trip. In a precautionary evacuation, this would not pose a problem. Had a release occurred, however, this plan could have resulted in people from one part of the county moving toward the hazard before moving away from it. Moreover, because this group of evacuees would be following those who lived within the 5-mile zone, it is conceivable that they could have found themselves at the end of a traffic jam that would slow their movement away from the plant.

Reliance on an intra-county approach to evacuation may not have been the only reason why York's main north/south evacuation route took evacuees closer to TMI. Cumberland County, which lies north of York, had plans on 31 March to block the main northbound highway (I-83) at the county line. This foreclosed York County's option for using that route to move the at-risk population in the northern part of the jurisdiction.

#### Lancaster County

Like York County, Lancaster had comparatively small populations inside its 5- and 10-mile risk zones (7,000 and 20,000 respectively) and a large increase when a

\*York County's risk area populations:

5-mile radius	-	10,000
10-mile radius	-	38,000
20-mile radius	-	235,000

PennDOT estimates for Interstate 83, the main north/south route in eastern York County, suggest that at the height of evacuation about 9,500 cars/hour would pass a point 10 miles from the TMI plant. This is below the saturation level of that highway.

20-mile zone was added (110,000). Lancaster County also planned for internal evacuation under the 5- and 10-mile limits. Unlike York County, however, it adopted three separate route plans. Under the 5- and 10-mile plans, evacuees would be given routes to an assembly area beyond the risk zone. Once at the assembly area they would be assigned to mass care space elsewhere in the county. (The assembly area for a 10-mile evacuation was not the same one that would be used for a 5-mile evacuation.) In the event of a 20-mile evacuation order, people in the risk zones were to be routed directly to host areas both inside and outside Lancaster County.

Under the 5- and 10-mile plans, evacuees were to be given a specific destination; under the 20-mile plan they were not. Rather, they were to be assigned routes that would carry them to host areas, but the problem of directing traffic to specific locations in those areas was left to the host jurisdiction. Route planning in Lancaster County was treated as a part of the Traffic Control and Security problem and was carried out under the guidance of representatives of the Pennsylvania State Police.

#### Cumberland County

In Cumberland County, routing was done by geographic area, and a tightly controlled evacuation was planned. The risk area was divided into "priority zones," each of which was assigned a rank according to its distance from the TMI plant. Only three major roads were to be used as evacuation routes, but congestion was to be avoided by moving people in phases with the "priority zones" nearest TMI evacuating first.

Under the provisions of the plan, people in each of the zones would begin by moving to a staging area inside the zone itself. They would wait there until word was received that that zone was to begin moving. Evacuees would then move onto the road designated as their evacuation route and travel to a specified "emergency exit". Access to and egress from evacuation routes were to be limited and closely controlled by sheriffs' deputies and officers of the Pennsylvania State Police.

Each of the priority zones was matched with the closest available host area. Those from the priority zone nearest TMI were to move in convoys to host areas just outside the 20-mile ring, those from the next zone to the next host area, and so in a sort of leap-frog pattern.

The tight control required for this operation meant that Cumberland County would also have to impose controls on through traffic from Dauphin and York Counties. The simplest way to accomplish this was to barricade major roadways and eliminate such traffic altogether. Thus, Cumberland County planned to block five entry points into its territory. Had this approach been strictly adhered to, it would have created serious problems for Dauphin County, since that jurisdiction had access to only one route that did not cross other risk counties. The problem was resolved through direct, county-to-county coordination.

The tightly controlled evacuation planned by Cumberland County solved that jurisdiction's problems at the cost of creating new ones for York and Dauphin. As a result of Cumberland's decision to block certain roads, those jurisdictions had to lengthen some of their evacuation routes. It is difficult to say whether the plan could have been strictly followed, or what the result might have been if it had. Neither is it possible to say with certainty that any problem would have resulted. However, the situation faced by Dauphin, York, and Cumberland Counties together demonstrates the need for early coordination and agreement on area-wide route planning criteria.

### Transportation Resources

Planning in this area revolved around (1) the characteristics of the people who could not provide their own transportation—their numbers, locations, and needs—and (2) the availability of various forms of transportation resources. Evacuation planners in all of the risk counties relied heavily on private automobiles as the primary means of moving people out of the area. All recognized, however, that a certain portion of the general population did not have private autos.

The voluntary sharing of private vehicles (car pooling) held some promise as a way of providing transportation to those without their own means. Planners did not regard it as a substitute for mass transportation, however, because it was both unpredictable and unreliable.

Buses were regarded as the primary resource, but figures on their numbers and capacities had to be compiled before their use could be planned. Major sources of buses for evacuation were:

- Local publicly-owned mass transit fleets
- Local school bus fleets
- Local private bus companies
- Buses owned by private schools, churches, etc.
- Interstate carriers whose buses could be chartered.

Since most of the available publicly-owned buses belonged to local governments, the inventory and allocation of these resources had to be carried out jointly by county emergency management personnel and their counterparts in local government.

Risk county planners left the task of compiling information on the characteristics of those needing transportation to local officials. Until these estimates came in, the number of people needing mass transportation was unknown. The second element of planning for mass transit evacuation (assessing, locating, and allocating resources) was handled at the county level.

#### Dauphin County

County-level planners oversaw both the assessment and the allocation of transportation resources. On the morning of 31 March, each local jurisdiction was assigned the task of assessing its own capabilities and needs for support. At the same time, county-level resources were inventoried and certain others added to the total as their availability became known—*e.g.*, the U.S. Postal Service offered its fleet of vehicles but could not furnish drivers. Each local jurisdiction was expected to fill as much of its need as possible with its own resources. Any excess demand was then reported to the County EOC Transportation Desk where it was either (1) met from county resources or (2) forwarded to PEMA for action.

School and municipal buses provided the core of the transportation resources inventory. Local fleets were not sufficient to meet the need, however, so other sources and modes of transportation were explored. Church buses and government vehicles (from all levels of government) were added to the pool. Private bus companies were contacted.

Amtrak trains, furnished through PEMA, were readied and standing by. Municipal and school buses were made available by jurisdictions outside the risk zone; Philadelphia, for instance, was reported to have both city and school buses available.

The City of Harrisburg offers an example of the way in which transportation resources were assessed and allocated. On the morning of 31 March, Harrisburg was instructed by county planners to furnish the county with an estimate of resources it needed but did not have. City planners estimated their own resources as:

43 city buses, 43 passengers each	—	1,849
40 school buses, 40 passengers each	—	1,720
20 buses chartered from Continental Trailways*		
48 passengers each	—	960
Total bus capacity available to Harrisburg for evacuation	—	4,529

\*More were available on 24 hours' notice.

Dauphin County was able to furnish Harrisburg with the following:

95 buses, approximately 40 passengers each*	—	3,800
1 train, approximate capacity	—	4,000
Total assistance available through Dauphin County	—	7,800

\*Supplied by Commonwealth of Pennsylvania and Federal agencies.

The total mass evacuation capacity of 12,000-plus gave the city the capability of evacuating more than 20 percent of its population in one trip. This may or may not have been adequate since, according to 1970 census data, fewer than 63 percent of the households in the city have private autos. However, the county had a number of buses in reserve, and commitments for at least one more 4,000-passenger train.

Dauphin County's interaction with the City of Harrisburg differs from that with other localities only in degree. All local jurisdictions within the risk zone were instructed, on 31 March, to prepare estimates of their mass transportation capability and any additional resources they would need. Most communities responded with estimates of capabilities and needs within a few hours, and near-final assessments were available by the morning of Sunday, 1 April. These were compiled by Dauphin County personnel that same morning and forwarded to PEMA for action. (Transportation needs assessments were reviewed every 6 to 8 hours and revisions sent on to PEMA headquarters.)

On the afternoon of Saturday, 31 March, Dauphin County set up two transportation staging areas and established a set of dispatching procedures for the county's pool of vehicles. Those coming from outside the area were to report, first, to one of these staging/dispatch areas. There, they were to be provided (1) fuel; (2) a guide who could furnish directions; (3) a local map showing pickup points, and (4) a route map and instructions on how to reach their assigned host areas. This procedure was established on 31 March but some of the information could not be furnished until 1 April.

The Transportation Desk handled a number of functions beyond those just mentioned, including such matters as:

- Liaison with and assistance to planners on the Medical Desk.
- Setting up heliports for helicopters that would monitor traffic.
- With guidance and assistance from PEMA, arranging fuel supplies for evacuees. (By Sunday, 1 April, a fuel shortage had begun to develop due to heavy demand and the closing of filling stations whose owners and/or employees had spontaneously evacuated.)
- Arranging special transportation for inmates at the Dauphin County Prison.

#### **York County**

Planning for the use of mass transit in evacuation was handled differently in York County than it was in Dauphin. In York, transit buses were set aside, and some were modified, for use in the evacuation of hospitals and nursing homes. General mass

transit evacuation was to be handled by about 260 school buses, with additional municipal buses from Baltimore, Maryland, available if needed. Unlike Dauphin, which left route assignments for buses to the localities, York County used a centrally-directed approach: school buses were simply to follow their normal routes. This gave the county almost complete bus coverage of the risk zone with little time lost in route planning. Residents of the risk area who would need mass transit would be told to call the school nearest them for information on routes. (School switchboards were staffed and had this information available.) A variant of this approach was worked out for use in case rapid evacuation (5 hours or less of advance warning) became necessary. This procedure called for buses to report to schools at central locations and for people needing transportation to walk there. Under this plan, it was felt, time could be saved by not having people call in and not having buses run their routes. County officials were convinced, however, that the latter approach was unworkable if schools remained open.

#### **Lancaster County**

Lancaster County did not engage in detailed planning for use of mass transit equipment in evacuation. If schools were in session, school buses were to take children home, then run their routes again to pick up people who lacked private transportation. Private and municipal buses were to be dispatched to risk zone communities on a demand basis, once evacuation had begun. Lancaster County's formal evacuation plan does not contain a section on mass transit evacuation, nor does it include lists of resources or requirements in this area.

#### **Cumberland County**

Planners in Cumberland County determined, on the basis of an inventory of school buses available within the county, that they had enough or nearly enough mass transit capacity to meet their own needs. The school bus fleet was estimated to have a one-trip evacuation capacity of 11,667 as against a total risk zone population of slightly more than 99,000. As insurance, Cumberland County had from fifty to sixty passenger buses (capacity 66) on standby status and PEMA had arranged for an additional eighty buses (capacity unknown). This gave the county the capability, in theory at least, to

transport perhaps as much as 20 percent of its at-risk population by means of mass transit. Bus transportation was to be allocated to the risk zone assembly areas (see above routing section) on a demand basis.

### **Perry and Lebanon Counties**

Perry County, being a largely rural area, has a large school bus fleet. County emergency management personnel estimated that it was more than adequate to meet the needs of the risk area population, even if 20 percent of evacuees needed transportation. (Some work was even done on contingency plans for evacuating the *entire* risk zone population by bus.) For the first three days of the crisis, bus drivers were instructed to remain near their vehicles, which were kept fueled and ready in staging areas. Had an evacuation been ordered, buses would have been assigned radio-equipped guides from fire or police departments and would have traveled to pre-arranged pickup points inside the risk area. Assignment would be on demand.

Lebanon County's mass transportation plan was similar to that of Perry County, though less detailed. School buses were to be the means of mass transit evacuation and were to be centrally dispatched in accordance with the needs assessments of local EMCs.

### **Evacuation Planning for Special Populations**

Certain segments of the population of the risk zones around TMI required special treatment with respect to evacuation planning. People in institutions—hospitals, nursing homes, correctional facilities—had a different and larger catalogue of needs than the population at large. So, too, did certain non-institutional populations—the physically disabled, people in drug treatment programs or on hemodialysis, the home-bound elderly, etc. Within these groups, sub-categories existed, each with its own particular needs. The special populations were often as different from one another as they were from the general population. Thus, they required separate, if often parallel, sets of evacuation preparations.

There were a few elements common to planning for all special populations. (1) the need for personnel and equipment to transport and/or care for these people; (2) the question of whether or not to evacuate them at the same time as the rest of the risk area



population; (3) the question of whether they would need special communications. Each group, however, had its own distinctive needs in any or all of the following areas:

- special transportation
- special notification (e.g., deaf people)
- special equipment or services (e.g., portable oxygen units)
- trained personnel (guards, nurses, etc.)
- special host facilities
- time-limited evacuation (some categories, like intensive care patients, would require quick evacuation)

These items are a synthesis of elements of the plans of the four major risk counties. No county defined the problem of planning for special populations in the terms just outlined, but all four addressed all or most of these points.

### Medical Planning

All four of the major risk counties established medical planning as a separate function for their planning teams. The primary concern in all cases was to work out plans for evacuation of hospital and nursing home patients. The final versions of plans for all four counties reflect this concern, as well as the realization that these two categories of people had to be treated differently from one another.

#### Risk County Health Care Facilities

County	Hospitals		Nursing Homes	
	Number	Number of Beds	Number	Number of Beds
Dauphin	4	1,560	15	1,500+
York	3	988	17	2,194
Lancaster	2	57	21	1,400+
Cumberland	1	75+	9+	750+
Totals	10	2,680	62	5,844+

As the table above indicates, Dauphin and York Counties had by far the largest medical evacuation problems. Though facing similar problems, however, their approaches were quite different. Dauphin County's health planners were professionals in Emergency Medical Services; York County relied on Public Health Nurses. The differences in training and orientation of these two occupations may explain some of the differences between the two county plans.

Both sets of planners drew on the services of physicians and health administrators from their respective jurisdictions, and both arrived at a three-tiered breakdown of the special populations for which they had to make evacuation plans. However, the Dauphin County group worked primarily on the transportation aspect of the problem, leaving identification of the population to others. York's planners concentrated on locating people with special health needs, and left much of the work of planning their movement to others. These approaches took advantage of the planners' skills and knowledge, and both methods were effective.

#### **Medical and Special Group Evacuation: Dauphin County**

Dauphin County, as previously mentioned, has several major hospitals inside the 20-mile risk zone. These, as well as a number of nursing homes, constituted a special problem with respect to evacuation planning. Four persons worked on health or medical planning—two from the state Emergency Health Services Council (a quasi-governmental organization), the County Medical Director, and a hospital administrator who normally handles liaison between hospitals and the County Emergency Management Agency.

Planning for evacuation of hospital and nursing home patients and those with special health problems began on Friday, 30 March. The first issues to which the health care team devoted its attention were the identification of relocation hospitals and obtaining reports from institutions on the kinds and numbers of people to be relocated. There was a delay at one hospital in the release of this information, with the result that a full assessment of needs could not be made immediately. (When the information was finally furnished, it was quite thorough.)

Most patients could be assigned to hospitals in the host counties, but specialty patients like neo-natals had to be allocated to hospitals as far away as Philadelphia.

Furthermore, special transportation arrangements had to be made for some of these patients—e.g., those needing special life-support equipment. It should be noted that Dauphin County is the center of the health care network for central Pennsylvania. Hospitals in the risk zone deliver specialized services not found in most host area hospitals. Several categories of patients, therefore, would need special transportation and/or long-distance evacuation. This meant that the distribution of medical evacuees was different from that of the general population.

On Saturday, 31 March, Dauphin County hospitals began voluntarily holding down patient censuses, taking emergency admissions only, and generally scaling down operations. By Sunday afternoon, hospitals in the county had reduced patient censuses to between 45 percent and 48 percent of capacity—a fact which aided evacuation planning.

The medical planning team established a set of information files to organize material needed for the effective evacuation of hospitals, nursing homes and other health care facilities. The main categories of information were:

1. *Current Hospital Census* for Dauphin County hospitals. This file was updated about every eight hours, probably using internal change-of-shift reports from each of the hospitals. Only the most recent figures were kept in this file; old material was moved to the Information File (see below). The information in this file was intended for use in allocating transportation and other resources should evacuation be necessary. Patient information was broken down by categories according to potential transportation status, seriousness of illness, special needs, etc., but some of this material was transferred immediately to the Information File.
2. *Current Nursing Home Census* for Dauphin County. This file contained much the same sort of information as the file for the hospital census and was handled in the same way, except that greater attention/emphasis was given to the possibility of nursing home residents using normal mass evacuation procedures and routes wherever possible.
3. *Relocation Area Hospitals*. These data reflected the most recent estimates of hospitals in the host counties as to the number of patient evacuees they could absorb. Detailed information on the special capabilities of host hospitals was kept in the Information File (see below). As with previous categories, the information in this file was constantly being updated.

4. *Problems--Medical Desk.* Initially, most special problems were assigned to this area and were moved to the Information File as solutions were found. Dauphin County is the locus of specialized medical services for the surrounding area, including most of the host counties. Therefore, special arrangements had to be made for categories of patients like those in newborn and adult intensive care units, patients on hemodialysis, and others for whom there were no suitable facilities in the assigned host counties.
5. *Assistance Available--Medical (volunteers).* A file was kept on volunteers with medical skills and/or resources who were available if needed.
6. *Information.* This was the central reference file. It contained such materials as: the master plan for medical evacuation, lists of names, phone numbers, addresses of relevant facilities and people; reference information on host-area hospitals, special information such as the names and locations of hemodialysis patients.
7. *Transportation Resources--Medical.* Both special transportation (ambulances) and general types of transport earmarked for medical use (e.g., buses) were recorded in this category. Samples. PFMA at one point said it could furnish 397 ambulances and 36 buses for transporting medical category evacuees. The U.S. Postal Service in Dauphin County volunteered its fleet of vehicles for medical transport but could not supply drivers. (Arrangements were made with the National Guard to do this.) A firm specializing in transportation of the handicapped volunteered its services and facilities, including several vans equipped for handling wheelchair patients.
8. *Medical Mass Care Facilities.* This special category included host facilities that were earmarked for special contingencies. They were held in reserve for such uses as decontamination centers or centers for care of the ambulatory elderly. Several facilities were filed in this category--a Boy Scout camp, a Girl Scout camp, several religious camps. Consideration was also given to the use of Packaged Disaster Hospital Units at these sites. Hershey Medical Center, which could be sealed and pressurized, was to continue in operation even after evacuation. (This facility has the capability to care for contamination casualties and had previously arranged with FEMA to handle such cases in the event of an incident at the plant.)

Using the information organized under this system, Dauphin County medical planners worked out a complex, detailed plan for evacuation of the plant.

The plan's strongest point was its thoroughness in dealing with institutional and especially hospital populations. Its primary vulnerability was in its reliance on local jurisdictions and community organizations to compile and forward accurate information on the locations and problems of those potential medical evacuees who were not in institutions—*e.g.*, shut-ins, people with home oxygen units, etc.

**Medical and Special Group Evacuation:  
York County**

York County's health planning effort, in contrast to that of Dauphin, dealt heavily in the assessment and provision of services for specific risk area groups with special health-related needs. Hospital evacuation was handled through a bilateral arrangement with the Maryland Department of Health. An inventory of the patient loads of York County hospitals was compiled and transferred to the Deputy Secretary of Health of the State of Maryland. The listing, by mutual agreement between York County and Maryland health specialists, was broken down into the following categories:

- neo-natal intensive care
- psychiatric
- intensive care
- general acute
- general chronic
- dialysis (in- and out-patient)

Within these categories, individual patients' needs were identified and listings of numbers and requirements were prepared for transmittal to the Maryland Department of Health. The latter had agreed to find space appropriate to patients' needs and to furnish some transportation (including aircraft for air evacuation). Other sources of transportation were local resources and ambulances from Dover Air Force Base in Delaware. The detailed breakdown also allowed ambulances to be pre-assigned to individual patients and pickup points and to come specially equipped to handle those they would transport.

The bilateral arrangement allowed York County planners to take advantage of outside assistance in allocating risk zone hospital patients to host area facilities. This gave the planning team the freedom to employ their operations personnel (most of whom were

nursing professionals) in ways that made best use of the knowledge and skills these workers brought with them.

A phone bank, staffed by nurses and coordinated by the County Coroner, was set up to gather information on portions of the population with special health-related needs. Some of the areas addressed were:

- Homebound patients needing portable oxygen supplies
- Senior citizens in high rise buildings
- Handicapped persons
- Invalids
- Persons in special treatment programs (e.g., methadone)

Some of the sources of information used were:

- York County Visiting Nurses Association
- Lutheran Social Service
- Fire department invalid files
- Churches
- A special call-in number for people with special problems
- County rumor control and information lines

Listings of basic information on risk area residents with special problems were compiled and matched with the requisite resources (special transportation, physical assistance for moving, special supplies, etc.). Attention was given, however, to avoidance of breaches of confidentiality: the information that was amassed could only be used with the permission of the individuals involved.

Certain aspects of the York County Health-Medical Evacuation Plan may prove instructive for future planning activities of this sort:

- Nursing home evacuation plans were especially elaborate. Staff and some equipment were to be relocated along with patients. A portion of the fleet of buses available to York County was modified to transport nursing home patients. Modifications included: (1) removal of seats to make way for mattresses and wheelchairs; (2) construction of

loading ramps; (3) special tie-down hooks that were made and installed to secure wheelchairs and medication carts. Patients were to be accompanied by their charts and by enough supplies to meet their needs for 24 hours.

- A special evacuation plan and shelter were prepared for persons in methadone treatment. The shelter was to be staffed by personnel from the treatment program, and supplies of the drug were arranged.
- A special shelter was set up for a particular group of about 180 handicapped individuals—employees of a “sheltered workshop”.
- York County’s rumor control center was divided into several functional areas including: (1) health—staffed by a physician; (2) environmental; (3) information-taking—compiling lists of people with special needs.
- A “Nurse Manpower Bank”, set up in advance of the TMI emergency, provided a potential source of staffing both for Red Cross operations and for health care institutions that ran critically short of personnel. (The bank was not used for the latter purpose but it was available.)

York County’s medical evacuation plan gave particular attention to locating potential medical evacuees who were not in institutions—a problem other risk counties found especially difficult. This was made possible, in part, by the bilateral arrangement with the Maryland Department of Health; the Department agreed to take care of the transportation and distribution of hospital patients, freeing York’s personnel to devote greater attention to non-institutional people with health-related problems.

**Prison Evacuation Plan:  
Dauphin County**

Expansion of the risk area radius to 20 miles put several correctional institutions inside the evacuation planning zone. This discussion considers only one—the Dauphin County Prison (county jail).

The Prison was alerted for possible evacuation at around noon on Friday, 30 March. The prison’s inmate population, at the time, was about 200 men and women. A full range of offenses was represented, ranging from non-support and traffic violations to serious and violent crimes. By the Warden’s assessment, his institution could not have evacuated all of its population on 30 March. The prison had not been inside the original

5-mile planning zone, so it had no evacuation plan. Prison officials lacked:

- enough vehicles to transport the whole population,
- authority to release prisoners who were being held for minor offenses,
- enough handcuffs to secure all prisoners who would be moved,
- destinations (host facilities) for the inmate population.

A contingency plan was worked out for use until a full-scale evacuation plan was completed. Under this interim plan, the Warden was given discretionary authority to release prisoners who could not be transported because of a lack of vehicles. Only those being held for serious crimes would be taken out in this evacuation. (Transportation resources were limited to the prison van and the personal autos of prison staff.) Those inmates not being evacuated were to be released with instructions to report to the District Attorney's Office within 10 days of the end of the emergency.

#### **Development of a Prison Evacuation Plan**

Dauphin County Prison officials met with County Emergency Management officials early on Saturday, 31 March. They received a briefing on what would be required of them, gave planners a provisional estimate of their needs, and returned to the prison to continue work on evacuation plans. Problems that had to be addressed included:

- Arranging sufficient transportation. Initially, prison officials approached the Pennsylvania Bureau of Corrections and requested that agency to furnish buses. They were informed that the Bureau's buses had already been allocated to the State Correctional Institution in Camp Hill for prisoner evacuation. They then contacted the County EOC and were assigned 5 National Guard buses.
- Locating host facilities. This was handled through the Bureau of Corrections. Prisoners were to be housed at two state correctional institutions (men's and women's).
- Staffing. Prison authorities experienced no problems in this area except for over-enthusiasm on the part of staff. Far more members of the staff volunteered to work extra hours and to assist with evacuation than could be used. This was true despite the fact that the evacuation, had



it been carried out, could have resulted in hardship for staff who accompanied prisoners. Dauphin County personnel would be responsible for prisoners only until they reached the host facilities. Families of staff, however, would leave the risk zone in the general evacuation and travel to areas some distance from the host prisons. In other words, staff who accompanied prisoners ran the risk of losing contact with their families.

- Securing inmate cooperation. Prison planners felt that the cooperation of the inmate population was essential if evacuation were to work. Consequently, they took certain steps to promote this cooperation:
  - recruiting representatives from the inmate population,
  - briefing inmate representatives on the evacuation plan (and having them brief the inmate population),
  - giving inmates special telephone privileges so that they could contact their families, assure them that prisoners were to be cared for, and receive assurance in return. The normal time limit on telephone calls was suspended, and inmates themselves policed their use of the single telephone,
  - using inmate representatives to help control the movement of prisoners from the building to buses.

Had the evacuation actually occurred, movement would have been triggered by the arrival of buses rather than through a specific warning message. (The prison has radio communications with the County EOC, but use of this system was not considered necessary by prison authorities.) Upon arrival of the buses, prisoners were to be released from their cells in small groups, and would move to the front of the prison to be counted and handcuffed and to board the buses. At the same time, those not being transported would be released to join the general public evacuation. The final step in the plan involved a search of the prison, after which the facility would be locked and all staff and inmates would evacuate.

This plan for evacuation of the Dauphin County Prison is not complicated, nor did it take long to complete. The only apparent problems are (1) the possibility that buses might not arrive—because of heavy traffic or some other cause—and (2) the absence

of any provision for prisoners held on minor charges, who would be released at the time of evacuation but who were not included in any formal movement plan for prisoners or any part of the public.

### Communications

Transmission of information and instructions both between and within the various levels of the emergency management system proved to be a continuous source of problems. Communication was by direct, face-to-face meeting, and by various systems linking one location to another. This section focuses on the means of communications linking PEMA with the risk counties, the risk counties with one another, and risk counties with their local subunits.

Links between risk county EOCs and PEMA headquarters consisted of a mixture of telephone, teletype, and radio systems with a built-in degree of redundancy. When the incident began on 28 March, the three counties then involved had to rely on telephones and on the State Civil Defense Teletypewriter Warning Network. Though there were two radio networks established for emergency management agencies, one of these was shared with the Pennsylvania Game Commission and its use required prior coordination with that agency. The other was the Radio Amateur Civil Emergency Services (RACES) net, which relied on volunteers to man communications equipment. Neither of these systems was immediately usable on the morning of 28 March.

Several other communications systems connected PEMA with the risk counties (though not necessarily with the county EOCs). Among these were: National Oceanic and Atmospheric Administration Teletype (for weather-related information); the State Police radio system; the Pennsylvania Department of Transportation radio system; and the Pennsylvania National Guard radio systems. None of these was immediately available for use by emergency management personnel on the morning of 28 March. Thus, when the accident began, communications systems linking the PEMA headquarters and the risk county EOCs were limited to teletype and telephone systems.

Communications systems linking risk county EOCs with localities were even more tenuous. In most of the risk counties, the EOC is co-located with the county dispatch center. Where this was the case, county emergency management officials had radio links

to most local jurisdictions inside the risk area through fire and police radios. This does not mean, however, that they had radio communications with local EOCs since: (1) local EOCs are not always co-located with either fire or police departments; and (2) the equipment is mostly vehicle-mounted and is committed to other functions beyond emergency management. Consequently, the only means of communication between county and local EOCs was by telephone, in some cases depending on a single line into the local center.

All of the risk counties received their initial notification of the TMI accident by telephone. Over the next two days, little was done to upgrade communications at the county level, primarily because the threat was not clearly defined. For instance, Dauphin County, of the three that were initially notified, staffed its EOC on a round-the-clock basis between 28 March and the morning of 30 March. This action was taken solely on the initiative of the County EMC and was seen only as a precautionary measure. The mood, in other words, seems to have been one of static or decreasing rather than increasing readiness. Thus, when the situation appeared to worsen on the morning of 30 March, communications at the county and local levels were in much the same state as they had been before the incident began.

#### **Dauphin County**

When the initial accident occurred at TMI, Dauphin County's plan for such an eventuality called for the use of telephones as the primary means of notifying county and local officials. In most cases, the individuals on the 5-mile plan's notification list did not have access to two-way radio. During the morning of 30 March, as public awareness of the new releases of radiation from the power plant increased, the volume of traffic on phone lines in the county swelled. Trunk lines were subject to such heavy traffic that personnel attempting to make calls from telephones in the county EOC experienced delays of as much as five minutes before getting a dial tone. There were, moreover, only one or two lines into EOCs in some of the county's smaller communities, so that county personnel often found those lines busy. This clearly posed a threat to the county's ability to carry out an orderly evacuation.

Between the morning of 30 March and midday of 31 March, Dauphin County worked on improving communications:

- five extra telephone lines with unlisted numbers were installed;
- "hot lines" were installed linking the EOC with the county's two Emergency Broadcast System stations;
- a "hot line" was installed, on orders of PEMA, linking the County EOC with PEMA headquarters;
- HAM radio operators (volunteers) set up five radio communications stations at various locations in the county;
- a rumor control center was set up and staffed in order to ease the pressure on emergency management staff and dispatchers;
- the county's RACES net was alerted for communications with host areas;
- an alternate communications site (actually an alternate EOC) duplicating the capability of the County EOC, was established outside the 20-mile risk zone; two local jurisdictions, Derry Township and the Borough of Middletown, had radio communications capabilities similar to those of the County, but both were within the 20-mile risk zone.

All of these preparations supplemented the County's existing capabilities, which included teletypewriter links to PEMA headquarters, direct radio links to Lancaster, York, and Lebanon Counties, and "cross talk" radio links to Cumberland and Perry Counties, which used different frequencies from the others. As the incident wore on, additional communications systems were brought in to further enhance the County's contact with other agencies and jurisdictions. Among these were:

- "Hot lines" to the City of Harrisburg's EOC and the Dauphin County Prison.
- Additional radio equipment and operators from the Pennsylvania National Guard, (Dauphin County's EOC had some such equipment at the beginning of the incident).
- Arrangements, through the National Guard, for monitoring Citizens' Band radio traffic.

- A high-frequency radio transmitter/receiver and an operator furnished through DCPA. This afforded the county a reliable radio link to PEMA and the other risk counties, as well as the capability for long distance communication through the Civil Defense National Radio System (CDNARS).
- Designation of certain radio frequencies for use in medical evacuation.

Though the means of communication available to the County's Emergency Management Agency improved, this improvement was neither problem-free nor entirely successful. For instance, transmission on the CDNARS high frequency radio disrupted the operation of the county's computer, which was located in the same building. Another problem which resulted directly from the use of radio for emergency-related communication was the triggering of rumors. By the morning of 1 April, emergency management personnel in Dauphin County had surmised that private citizens with short-wave radio scanners were listening in on frequencies used by various government agencies. County personnel also reported that citizens were monitoring NRC's internal communications at the plant site.

The discovery that citizens were listening in eventually forced planners to abandon the idea of evacuating hospital and nursing home patients ahead of the general population. They were concerned that any attempt to give this portion of the population a head start would be doomed to failure, since the advance warning it would require would be overheard and might trigger a spontaneous evacuation. This would defeat the purpose of starting the medical evacuation first.

The problem of achieving reliable communications with local EMCs was never completely resolved. It was assumed that any evacuation order would be accompanied by an overload of the telephone system at least as bad as that experienced on the morning of 30 March. Thus, extra unlisted phones and "hot lines" would be of little more use than the service which was normally available. A radio communications capability was needed but none was easily available. EMCs in most of the at-risk localities had access to fire or police radios, but these were either non-portable or were already installed on emergency equipment which would not be available for the local coordinator's use if an evacuation were ordered. County emergency planners worked out arrangements for purchase of certain equipment that would give local EMCs portable radios that could reach the County

EOC. Funds were sought from the Federal Disaster Assistance Administration for the purchase, but the request was denied. A request was then submitted to DCPA for matching funds (the County Commission had approved funding for the purchase). The application is now being acted upon, but could not be expedited in time to help with the TMI emergency.

#### **York County**

Where communications were concerned, York County, at the time the accident occurred, had roughly the same systems available as did Dauphin. The county dispatch center for emergency services is located in the EOC and has a total staff of 48 people, more than twice as many as Dauphin County.

Additions and modifications to the communications net available to emergency management personnel largely paralleled those already discussed. The County's RACES net was assigned the role of furnishing both inter- and intra-county communications capabilities. However, in the event of an evacuation, the County Sheriff's Department was assigned the task of establishing radio communications with the assembly areas called for in the county's evacuation plan. Plans were also made for upgrading communications capabilities at York County's alternate EOC, a borough hall located outside the 20-mile risk zone.

#### **Lancaster County**

Lancaster County experienced a number of communications problems, most of them of a technical nature. During the initial stages of the incident, the telephone system was nearly useless due to severe overload. County personnel were inclined to use the RACES system as a means of reaching PEMA headquarters, but were unable to do this because the latter agency was not using the RACES frequency (399.35 KHz) for communications. Furthermore, while Lancaster County had enough volunteer radio operators to staff a RACES net, it did not have enough equipment. This prevented the use of this system for intra-county communications.

Police and fire radio systems were designated for use in alerting officials in the County's political subdivisions, but they were not suitable for the sort of lengthy, conversational exchanges needed for planning. Moreover, use of police and fire radio for this purpose would be inappropriate, since it would tie up portions of the County's emergency communications network for long periods.

It was the judgment of Lancaster County's EMC that telephones were too unreliable for use as the primary means of communication within the emergency management structure. But there was no radio system available to fill the gap, so he adopted face-to-face meetings as the means of exchanging information and instructions with local jurisdictions. This may have made for effective communications, but it did so at the expense of speed and flexibility. It may also have had a braking effect on the pace of planning in Lancaster County.

### Cumberland County

Of the six risk counties, Cumberland produced the most comprehensive communications plan. Allocation of communications was done systematically. Resources and needs were initially evaluated, and were matched according to which of the resources could best fill each area of need. At first, planners used communications resource lists that had been prepared prior to the accident. Later, however, as additional communications systems became available, they were integrated into the existing structure, sometimes filling a gap, sometimes supplementing a weak portion of the system. An example of the former was an arrangement whereby National Guard units assigned to traffic control and security could communicate directly with the County Sheriff's Department and the EOC: unit commanders were issued portable radios that operated on the Sheriff's frequency. An example of the latter was the use of the REACT network (certain CB radio amateurs) as a standby system. Eight separate communications nets were eventually set up:

- "Warning and Activation", which used fire and police channels to issue instructions to those personnel.
- "Assembly Areas", which supported coordination of activities at these points.
- "Group Convoy Coordination", to be used in managing traffic flow.
- "Hospital Coordination", which was intended for use in evacuation of medical facilities.
- "EMRC Communications"--the emergency medical frequency.
- "Local EOC Communication", linking the County EOC to all local EOCs within the County through the RACES system. (Though

RACES was not formally activated, these volunteer operators were available in the various local EOCs.)

- "Public Works", which was designated for use in communicating with local governments.
- "EOC", which consisted of all of the systems mentioned above plus the CDNARS high-frequency radio furnished by DCPA, a National Guard high-frequency radio, and a MARS set, all of which were to be used in communicating with areas and authorities outside Cumberland County.

Recognizing that radio would probably not be reliable in the event of an evacuation, those planning Cumberland County's evacuation systems decided to designate radio as the primary means of communication in the event their plans had to be carried out. Telephones were to be used as a secondary system.

Like Dauphin County, Cumberland anticipated a problem in keeping in touch with local EMCs. A partial solution was worked out under which local EMCs were furnished with personal "pagers" that could be activated by means of a transmitter in the County EOC. While this still did not guarantee immediate accessibility to the local Coordinators, it did improve communications to the extent that they could be given a signal to contact the County.

#### **Lebanon and Perry Counties**

Communications developments in these two jurisdictions did not differ substantially from those in use in the other risk counties. However, there were some different approaches and problems:

- In Lebanon County, the RACES and REACT systems were assigned the function of furnishing communications support to mass care centers. Included here was a "locator system" for evacuees, which would be run in cooperation with Red Cross personnel.
- Lebanon County planned to assign auxiliary police with radios to the Sheriff's Department for use in traffic control.
- Perry County planned to assign at least one piece of radio-equipped fire apparatus to each mass care center to supplement telephones.



- The CDNARS radio furnished to Perry County did not work when it arrived (it had not been serviced in some time, according to the EMC) and required parts which were not available locally. Consequently, it took two days before the operator who brought the set was able to get the needed part and put the radio into service. Other risk counties shared this problem, but for a different reason: at least two sets were damaged in transit, one of these by rough handling incurred when the set was included with regular baggage on a commercial airline.

### **Public Information and Warning**

Several of the risk counties had someone designated to fill the role of Public Information Officer (PIO) among the members of their volunteer staffs. There is little to suggest, however, that the PIO position was an especially prominent one in the activities in any county. The media-contact aspect of the public information task was taken up by the Governor's and Lieutenant Governor's offices, by the PIO of PEMA, and by County Commissioners and the County EMCs.

Other aspects of the task of communicating with the public—rumor control, information gathering, issuance of evacuation instructions, emergency public information, and warning—were typically treated as separate functions rather than different aspects of a single job. The approaches used by the six risk counties in dealing with these needs differed from one another except where warning and emergency public information were concerned.

Each of the risk counties except Perry had an Emergency Broadcast System (EBS) radio station; Dauphin County had two. Had a warning been given, this system would have been activated, along with EBS television stations, warning sirens, loudspeaker trucks, and door-to-door warning procedures.

Other common features of risk county public information activities were the sorts of instructions people would be given with respect to:

- **Securing homes.** People were told to turn off appliances (except refrigerators and freezers) but not to turn off utilities. Thermostats were to be turned to low (heating) settings and windows and doors locked.

- **Articles to take along when evacuating.** These lists generally included: glasses, prescription medicines, bedding, clothing (for a specified number of days), and personal hygiene items.
- **Route instructions.**
- **Instructions for people needing transportation.** Announcements included instructions on where to go for mass transportation and/or a telephone number to call.

In addition to these common public information and warning activities, each of the risk counties experienced some problems and undertook to do some things that the others did not.

#### **Dauphin County**

Rumor control in the Dauphin County EOC went through three phases. Initially, it was handled by EOC staff, primarily those working in the County Dispatch Center. Later it was given a separate location within the EOC and a group of volunteers was organized to staff it. Still, later, the rumor control desk was moved to a location elsewhere in the County Courthouse. The last move was taken to solve problems of space and noise (Dauphin's EOC is quite small), and was so successful that the EMC has decided to use this approach exclusively in future operations.

In addition to its primary job of combatting rumors, this desk gave the EMC and his staff information on public reaction to this very tense situation. A log of the times and content of these calls was prepared for the EMC on a daily basis and the raw information was reviewed every few hours for new themes. It was through this log and review procedure that Dauphin County's emergency management staff discovered that people with "scanners" were listening to inter- and intra-agency radio communications.

Rumor control logs were also used as a basis for preparing public statements and as a means of gathering information on special populations. For example, some callers reported the locations of elderly people or shut-ins who would need special attention in an evacuation.

Dauphin County's EMC retained the option of telling people to prepare to be away from their homes for 7-10 days. He felt that this would prevent people from

becoming restive if they had to stay out more than 2 or 3 days and that they would be happy if told they could return home "early". This limit was proposed because it was felt that an open-ended evacuation order might prove frightening to the population, while too short a limit could cause problems for host county authorities and might result in some people returning too soon.

A set of procedures was worked out for using the EBS radio to issue an evacuation order. EBS stations were furnished sealed packets of information—one for each of the three possible evacuation orders (5, 10, 20-mile). In the event the Governor issued instructions to evacuate, his message over EBS was to be followed by one from either the Chairman of the County Board of Commissioners or by the EMC, using the telephone "hot lines" that had been installed in the EOC. The announcer would then open the appropriate packet and read the enclosed evacuation instructions *verbatim*.

Dauphin County had available a basic information packet which described, in layman's terms, what had happened at the TMI plant, what might possibly happen, and a glossary of technical terms that were appearing in TMI-related news stories. This packet, though not available at the beginning of the incident, proved useful in rumor control operations.

#### **York County**

Nine extra telephone lines were installed in the office space (near but outside the EOC) that was used as a rumor control center. This was probably the most ambitious rumor control effort in any of the risk counties; some specialization of functions was attempted, most notably that of having a physician on hand to answer health-related questions.

Like Dauphin's, York County's rumor control center was used to gather information on public reactions. Review of phone logs convinced the EMC that sensational stories in the media were the source of many rumors. One such story stated that if "the worst" happened, 50,000 acres of York County would be contaminated and that residents could never return to that area. This type of story, it was felt, played a significant role not only in triggering rumors but also in causing a run on banks.

At first, York County granted the media full access to the EOC. This did not work. The operations room in the York County EOC is very small; when reporters were

allowed to observe planning sessions, problems of space and conflict of interest developed. Reporters would interrupt briefings and attempt to interview planners, thereby interfering with the planning process. (Incidents in other jurisdictions involved the surreptitious recording of a briefing session, the rifling of an official's working papers, and the taking of certain working and reference material.) Eventually the press had to be barred from the EOC and assigned a pressroom elsewhere in the Courthouse. This resulted in some protest initially, probably because it involved the withdrawal of an existing privilege.

York County supplemented the use of newspapers for publishing evacuation instructions by printing instruction sheets and posting them in public places.

#### **Lancaster County**

In Lancaster County, as in York, the press were given free access to the EOC. Unlike York, however, the Lancaster EMC did not report any serious problems resulting from this policy.

Warning, as described in Lancaster County's evacuation plan, would have involved four stages. In each stage, the population of the County would receive instructions and information via EBS radio. Phase I involved simultaneous notification of the public, local subdivisions, law enforcement offices, hospitals, and host counties that an evacuation would take place. Phase II called for the mobilization and deployment of resources but also involved public announcements over EBS. Phase III was set aside for "evacuation of invalids" but here again, some public announcements over EBS were anticipated. Phase IV, the final stage of the warning plan, referred to the time at which the general population would be told to evacuate. The plan does not say how people would be persuaded not to start evacuating once they were told that they would soon do so.

#### **Cumberland County**

The PIO for the Cumberland County Emergency Management Agency was a working journalist. As the accident evolved, he was sometimes forced to decide whether to fill his professional or his volunteer role.

Cumberland County planners concluded that the warning systems available, even if all were used, could not guarantee full coverage of the risk area. EBS was regarded as the primary warning and information system, but its effectiveness would be low at

night. Sirens, too, would be less effective at night; furthermore, the EMC believed that they had become harder to hear in recent years as people added insulation to their homes for energy conservation. Sound trucks and door-to-door warnings were seen as slow and able to cover only limited areas at any one time. While these problems were foreseen, no remedy was available.

Cumberland County developed a statement of purpose for public information operations which were "to provide the residents of Cumberland County with accurate and timely information on evacuation operations that will:

- Minimize injury and save lives of the residents of the county.
- Minimize damage to private and public property.
- Alert the public in ample time of a potential disaster.
- Ensure a calm public response through the authoritative and clear release of public information and instructions.
- Instruct the public to follow predetermined evacuations to designated mass care centers.
- Dispel rumors, hearsay and half truths that may cause panic.
- Inform the populace of what actions are being taken to restore the area to a state of normalcy."

#### **Lebanon County**

Fire companies were used to distribute to risk area residents instruction sheets containing information on what to take, what to do, and where to go if an evacuation were ordered. One local EMC also used Boy Scouts and Girl Scouts to go door-to-door, passing out evacuation instruction sheets.

Review of rumor control logs showed a high level of public interest in the effects of radiation. Arrangements were made with a local television station to have a camera crew come to the EOC and videotape a program on this subject. The program, which featured the County RADEF Officer, was also used as a vehicle for presenting information on evacuation plans. The Lebanon County EMC reported a decrease in the volume of radiation-related calls after the program was aired.

### **Perry County**

The Perry County EMC preferred to keep a low profile with respect to the general population. A strong concern about causing "panic" led him to work behind the scenes, using elected officials and emergency service workers from risk area localities. These would be briefed at the County EOC, then return to their own jurisdictions and spread the word through personal contact.

Rumor control in Perry County was handled through the County Dispatch Center. No extra personnel were added and the volume of local calls did not pose a problem. There was, however, a large number of calls from outside the County and even from outside the State. Media reports on the reactor accident apparently led people from outside the area to try to check on the safety of friends and relatives.

Initial notification of the risk zone population was done by firemen and policemen, who went door-to-door distributing instructions. Virtually all of the risk area had been covered by late Saturday, 31 March. This procedure would have been repeated, time and circumstances permitting, as a final check after the evacuation. The intention was to guarantee that all those who might wish to leave were notified. A door-to-door check was feasible in Perry County largely because of the small size of the at-risk population.

### **Pets and Livestock**

One of the most troublesome issues faced by risk county planning teams involved their counties' non-human populations. Domestic pets and farm animals posed a variety of problems in the TMI situation—problems which, in many cases, were never resolved. All of the risk counties worked out some sort of guidelines for risk area residents to follow with respect to their pets and livestock. It is far from certain that people would have complied, however, or that the plans would have worked even if compliance were uniform. Planners had to choose between a strategy that called for leaving animals in the risk area if an evacuation were ordered, and one that called for taking them along. Adoption of either strategy entailed problems.

## Pets

Family pets were largely beyond the control of those planning evacuation. The public could be told that they should not take pets when they evacuated but compliance with such a directive could be enforced only in mass transit vehicles or mass care centers. In these cases, however, health and safety considerations required that pets not be allowed to share the space occupied by people. Thus, if pet owners were allowed to take their animals with them, special evacuation and hosting arrangements would have to be made. This consideration led planners in four of the six risk counties to instruct people to leave pets behind. Because most people were expected to evacuate in their own cars, however, there was no way to enforce the requirement. Furthermore, planners could not tell evacuees when they might be able to return home, thereby discouraging them from leaving pets behind. When one considers that the instructions, in most cases, told people to confine the animals indoors, the drawbacks become obvious, especially if the evacuation order had remained in effect for more than a few days. A related planning concern was the possibility that some pet owners would simply abandon their animals, perhaps letting them run free in evacuated areas. This was regarded as a special problem with respect to dogs.

Two risk counties were prepared to tell evacuees to take their pets with them. They assumed that many people would take their animals regardless of what they were told to do, and that it would be easier to plan for this eventuality than to fight it. Certain issues remained unresolved, however: What preparations should be made for animals on buses? Would or could host areas respond to this problem? Would some evacuees abandon their pets in the evacuated area regardless of instructions?

Risk county planning teams typically felt they must plan for the human population and that pets could be regarded as a separate problem. They felt that they had enough to do without dealing with the problem of arranging for dogs, cats, birds or more exotic pets. Approaches to the problem and the level of planning range from Perry County's plan, which strongly discouraged people from taking pets, to Cumberland County's, where people would be instructed to take animals along when evacuating.

No final resolution to the problem of pets was reached. However, SPCA representatives interacted with Red Cross staff in an attempt to work out arrangements for

improvised kennels at mass care centers. PEMA so advised the risk counties, but apparently did not declare a specific policy.

### **Livestock**

Unlike pets, livestock could not be easily transported by evacuees. Most counties gave some consideration to the possibility of moving livestock out of the risk zone, but such activities would be attempted only after the general population had been evacuated. Thus, provision had to be made to care for these animals within the risk zone even if they were to be moved later.

Risk county plans generally took account of the livestock problem. It was assumed that farmers as a group would be the least likely component of the risk zone population to comply with an evacuation order. All of the risk counties tried to make some provision for this possibility, advising farmers on what sorts of measures could be improvised to protect both the animals and those who would stay behind to care for them.

Problems with livestock were not uniform; some animals required little care and could be left alone much of the time. Farmers possessing such stock could evacuate with the general population and be given special passes to allow periodic travel into the evacuated area. Other animals needed almost constant attention. Foremost among the latter were dairy cattle, which represented a large financial investment. Moreover, they require regular milking. In an effort to avoid having anyone stay in the risk area, one firm with a large dairy herd attempted to buy sucking calves. Not enough could be found, so plans were made for improvised protection for volunteers who would stay to care for the cattle.

The six risk counties approached the problems of pets and livestock as follows.

#### **Dauphin County**

The EMC felt that people had to be the focal point of his attention. Evacuees would be told to leave pets at home with plenty of food and water. The problem of planning for commercial animals was turned over to the County Extension Agent, who developed plans for moving at least some of the county's 18,000 cattle to a fairground outside the 20-mile risk zone. (The plan is not available at this writing.)



### **York County**

Planners felt that pets would have created added evacuation problems and so instructed people not to take them along. The County Extension Agent met with farmers to give them instructions on what to do in the event of an evacuation order. Farmers were advised to keep animals under cover, provide processed feed, and leave the risk zone. It was felt, however, that farmers would probably have stayed with their farms despite instructions to evacuate.

### **Lancaster County**

- Evacuees were instructed to bring pets, since it was assumed that they would do so anyway.
- Farmers were instructed to keep farm animals inside, evacuate their families, and leave someone behind to care for animals.

### **Cumberland County**

Planners took the view that allowing people to bring pets would improve cooperation and compliance with an evacuation order. Pets were regarded as contributing to the welfare of evacuees. The EMC felt that many people would not have evacuated if pets were left in the houses. Each mass care center would have been required to set aside an area for pet care.

The farmers were formed into teams that would have been located in a common mass care center immediately outside the 20-mile limit. These teams would have entered the evacuated area, periodically, to perform minimum maintenance functions for livestock. This system was designed to minimize radiation exposure to farmers. Some work was also done on a plan for evacuation of livestock to non-risk portions of the county.

### **Lebanon County**

The Red Cross, which was in charge of mass care shelters, asked people to leave their animals at home with plenty of food and water. If they brought pets to the shelter, they would have had to keep the animals in their cars. Planners did contact the humane society, but that organization's shelter was almost full and could have taken only about 75 dogs for a short period. The Red Cross contacted volunteers who would have stretched plastic over wire fencing to make shelters for animals outside the mass care centers.

A representative from the Pennsylvania State University Extension Service was present in the EOC to answer calls concerning farm animals. People were advised to put their animals into barns with plenty of food and water and then evacuate. Some farmers questioned why, if animals could be sheltered in barns, people could not do the same thing in their homes.

Under Lebanon County's plan, farmers would have been allowed to commute into the evacuated area to care for their animals. They would also have been among the first people brought back into the area when the need for evacuation ended.

#### **Perry County**

People would not have been allowed to bring pets to the mass care shelters. Evacuees would have been instructed to leave pets at home, tied up and with ample food and water. Pets would be taken away from evacuees who brought them to mass care centers, and people would not be allowed to keep pets in cars and tend them there. Evacuees with commercial animals (mainly cattle) would have been told to turn their animals out to pasture where they would have water. Perry County planners checked with health physicians and found that the meat would have been safe even if animals were exposed to radiation. Under a standby plan, these cattle could have been used to feed the evacuees. Most of the cattle involved were beef cattle and there were no problems as with milk herds. Perry started on plans for evacuating cattle, but this would have been carried out only after the general population evacuation, if at all.

### **CONCLUSIONS**

The preceding text should suggest a broad range of preparedness measures which would substantially improve, and speed response to a major evacuation problem such as TMI exemplified. The list below summarizes only the principal or more general of the lessons which TMI offers to local preparedness officials.

These conclusions and implications should also be considered in relation to those concerning preparedness activities at the Federal and State levels and in the host counties. In a major disaster, management options at one level are frequently constrained by the performance of related functions at other levels.

Local Emergency Management Agencies obviously need established plans for such a complex operation as a large-scale evacuation. Where resources preclude extensive planning, local officials could utilize the "crisis expectant" planning mode—i.e., they could have available the reference materials and guidelines required to develop a plan under crisis conditions.

Both detailed plans and "crash" efforts offer certain advantages and disadvantages. The full-scale plan offers, ideally, a "cookbook" for the crisis-response effort. But this ideal is seldom realized. Such plans are expensive, require updating, must be adjusted to a particular emergency, may lull one into complacency, and may prove too abstract or ponderous when managers are coping with an oncoming disaster. Detailed, standby plans generally reflect the routine organizational relationships and perceptions of diverse interests, whereas disasters often evoke short-cut arrangements that are more responsive to immediate threats.

"Crash" planning and operational efforts, on the other hand, offer fewer advantages and encounter more dangerous problems. They draw on the "adrenalin" and altruistic "coping" behavior found in emergencies. They also revolve around the specific threat of the moment, provided that competent managers are present to orchestrate the energies available. However, they almost automatically sacrifice the coordination and in-depth knowledge required to cope with large disasters or unusual hazards.

TMI illustrated the strengths and weaknesses of both approaches. Established plans were found wanting: The general State plan was not sufficiently detailed, and most components of the local five-mile plans were scrapped. The counties had to rely on PEMA, DCPA, and their own inter-county communications to effect the sort of coordination that could have been established better and quicker under a good, pre-existing evacuation plan. In the four hard-pressed risk counties, local leadership was largely competent, committed, and able to assemble emergency workers. But much of the time devoted to planning would have been saved had the counties possessed better data on their populations, needs, and resources.

Given that full-scale plans cannot often be funded, maintained, exercised, and tailored to all potential hazards, preparedness agencies might devote more attention to the step-wise development of plans and "crisis-expectant" planning contingencies.

Minimally, county or local preparedness organizations could be encouraged to maintain:

1. current population data
2. data or estimates on the institutionalized and special populations requiring particular supports in an evacuation
3. notification procedures for key agencies and officials
4. resource listings of facilities, transportation resources, etc.
5. standby plans for creating redundant communications systems and for rapid expansion of communications capabilities
6. adequate crisis-planning and operations centers—preferably, a well-equipped EOC
7. planned measures for reaching and warning the public
8. checklists and instructions for those who may be charged with specific crisis-planning or operational functions

Such resources could readily be built into emerging plans, and would in the meantime afford important time-savers for communities lacking the wherewithal to support more comprehensive and professional planning efforts.

**Official doctrine and guidance for emergency operations should anticipate the organizational relationships during an evacuation planning or operational effort.**

This point may not be so obvious as it first appears, since a standard disaster-response policy is normally applied to all disaster circumstances. In Pennsylvania, the State Disaster Operations Plan (Section IX, Part A) sets forth "General Principles" which include:

**"Direction of emergency operations and administration of disaster relief will be exercised by the lowest level of government affected."**

**"When two or more political subdivisions are affected, the next higher level in the Civil Defense organization (County, Area) will exercise responsibility for coordination and priority support to the area of operations."**

“Direction and control of State emergency operations will be exercised by the State Director of Civil Defense under policy guidance of the State Council of Civil Defense, in order to assure maximum emergency response capability.”

In TMI crisis-planning, only two layers were heavily involved: PEMA served as the overall coordinator for the operation, and the County Emergency Management Agencies coordinated and planned activities below the county level. Area Headquarters staff were pulled into the State EOC, then assigned to work in the counties. Local jurisdictions were brought into the county-level planning process as their operational responsibilities began to take shape. In sum, the general doctrine for emergencies, which fits well in the context of the “normal” disaster, was not applied (or applicable) to such a complex operation as that in the TMI emergency.

**The County, or perhaps a city equivalent in size and public functions, appears to be the logical local-level management unit for emergency responses to large disasters.**

Of the many factors which enter into this conclusion, the most significant is the combination of (1) familiarity with the local setting and (2) a limited number of jurisdictions which can be integrated in a large multi-jurisdictional operation involving both risk and host areas. (These conditions might sometimes be met, of course, by other types of jurisdictions such as planning districts, cities, boroughs, townships, etc.)

**Guidance is needed for use in assessing the extent and projecting the effects of spontaneous evacuation.**

The risk counties varied widely in their use of population data, their assumptions relating to spontaneous evacuation, and their resulting policies for allocating evacuees to host spaces. Dauphin and York Counties, for example, each had some 85–90 percent of their populations at risk; yet Dauphin actively sought outside space while York did so only reluctantly. Dauphin sought space for all its evacuees, while York used estimates of spontaneous evacuation to reduce its projected need. Such variances indicated a large area of uncertainty about the extent and effects of spontaneous evacuation—a phenomenon which has a direct impact on both the populations’ needs for emergency services and the resources available to meet those needs.

The most troublesome factor in planning mass transit evacuation was not the availability of resources but matching them up with the people who would use them.

Risk counties readily identified resources (almost exclusively buses), but no county was able to confidently predict where they would be needed or how many would be needed. Dauphin County attempted to obtain estimates of need from local jurisdictions; York, Lancaster, Perry, and Lebanon planned to dispatch vehicles from a central pool on demand; Cumberland estimated the percentage of population needing bus transportation. All of these procedures relied on very rough estimates of total need.

All counties were faced with the speed-vs-capacity dilemma: buses could run at advertised times on scheduled routes, but would often run below capacity; whereas dispatching vehicles on request would slow down the process and risk traffic tie-ups. Several counties planned to combine these approaches, maintaining a reserve fleet to meet special demands, but there were no formal procedures for using such reserved vehicles across jurisdictional lines.

The risk counties also entertained the car-pooling concept. That is, people would have been encouraged to share automobile space with neighbors. York County even contemplated a ride-sharing telephone bank to match people with cars. Such concepts, of course, are inherently unpredictable in their effectiveness, subject to timing and traffic problems, and influenced over time by the extent of spontaneous evacuation.

Several of the approaches to evacuation at TMI deserve further analysis and study—for example, the use of trains in Dauphin County; evacuation by air for high-risk hospital patients or “last-minute” emergency workers; the planned assignment of “guides” to buses, and one county’s plan to register evacuees while they were on buses.

**Emergency Management Agencies needed comprehensive communications plans and systems, including a dedicated radio net.**

Telephones tended to become overloaded at the very times when clear communications within the emergency management structure were most needed. The

communications systems in the risk counties did not provide a reliable radio link between the county EOCs and local EMCs. This problem looms especially large if one considers that overload of the telephone system would probably have accompanied an evacuation order. Risk counties did not have a separate emergency management radio system for communicating either with each other or with PEMA. They relied on volunteer radio operations, fire and police networks, the systems of other agencies (CDNARS and National Guard), and the land-line teletypewriter link to PEMA. The last system was the only one dedicated for the use of county-level Emergency Management Agencies. It is slow (60 words per minute) and not always reliable (Dauphin County's teletypewriter broke down on Friday, 30 March, the third day of the incident).

Radio communications were also being overheard by the general public in the risk area. This could have caused problems for the emergency management effort. Plans called for PEMA to give the counties advance notice of an evacuation order, and for county EMCs to alert key elements within their jurisdictions (fire and police personnel, hospitals, etc.) and do such things as set up traffic control points. These and other such messages sent by radio would very likely have been overheard by citizens with "scanners."

Several lessons can be drawn from the emergency management communications structure in the TMI emergency. Prominent among these are the need for:

- dedicated radio communications between the State and county, county and county, and the county and local levels;
- a capability for secure communications in sensitive areas where public eavesdropping on official channels might give rise to rumors.

**A comprehensive, integrated system is needed for issuing warning and emergency information to the public.**

EMCs, typically, were not confident of their ability to alert their populations for evacuation. Of particular concern was the problem of quickly reaching people indoors during nighttime hours. As the emergency progressed, greater public awareness of the evacuation possibility would have been reflected in attentiveness to the media, enhancing the effectiveness of the EBS radio-television system.

Strong points in the risk county approaches to this problem included their close cooperation with local media personnel and the involvement of County Commissioners in public information efforts in most counties. This role of the Commissioners allowed EOC staff more time for planning, and their visibility and authority would have increased the salience of warning messages.

Most of the counties used their rumor control centers to *obtain* as well as disseminate information. Personnel were trained quickly to log the calls and categorize information requests, producing a useful indicator of public attitudes and information requests at particular points in time. The counties also found that such centers (1) should be near but not in the planning staff's work area, (2) needed multiple lines and trained operators, (3) needed appropriate reference materials, and (4) received calls of direct interest to planners—for example, calls from shut-ins seeking transportation assistance.

**Institutions, particularly medical facilities, pose special evacuation problems which may interact with other planning elements in complex ways.**

The following points are illustrative of the variety of interactions between institutional planning and other aspects of an evacuation.

- The allocation of institutional evacuees to host areas must often meet special requirements for facilities or supports—for example, neo-natal intensive care units—and both the required mode and route of travel may conflict with those of the general population.
- Spontaneous evacuation of hospital, nursing home, or other staffs (many of whose employees are mothers, and who are in any event affected by decisions involving the whole family) may lead administrators to seek to evacuate early—out of fear that their staffing level will be inadequate when the time comes.
- Early or premature evacuation of institutions can serve to trigger larger movements by the general public, or were so perceived.
- Reducing institutional censuses (by postponing elective surgery, releasing harmless offenders, etc.) can reduce the need for staff and the problems encountered during a later evacuation.



- Using institutionalized people—for example, by pairing the more able-bodied with the more dependent—can augment staff capabilities during an evacuation.
- Home care patients, shut-ins, and others among the “dispersed disabled” pose difficult problems which might sometimes be addressed by linking them with the planned movements of institutionalized groups.

**The problem of what to do with pets and livestock must be taken seriously and addressed early and in detail.**

Arrangements for pets and livestock were among the weakest areas of risk county planning. While it was recognized as a factor affecting the performance of evacuation plans, the task of planning for animals was regarded as separate from that of planning for people. The potential impact on the public's morale and willingness to cooperate received relatively little attention.

Planning for pets and livestock should: (1) address pets as extensions of their owners and plan for them together, (2) take account of the possibility that measures which are stringent, like telling farmers to leave livestock unattended, may make them unwilling to comply with an evacuation order. Cooperative planning efforts by County Extension Agents, Humane Society chapters, animal control officials, and veterinarians should be explored.

In concluding this section on the risk county planning effort, one observation deserves special mention. Preparedness officials and planners are comfortable when dealing with official agencies and organizations—“the police will do this,” etc.—and materials—“200 buses,” etc. They are uncomfortable with matters involving public behavior—“will people comply? . . . bring pets? . . . leave early? . . . follow instructions? . . . respond to evacuation orders?” A very few officials expressed fear of “panic”—there was no evidence of it, and seldom is. Preparedness operations, in fact, represent a combination of public behavior and the official systems' activities; as potential hazards give rise to more complex emergency responses, preparedness agencies should devote more attention to methods of assessing, predicting, and guiding public behavior in relation to disaster-response planning.

Part Five  
HOST COUNTY INVOLVEMENT

## INTRODUCTION TO PART FIVE

A total of 36 counties in Pennsylvania and Maryland became involved to some extent in planning for the reception and care of evacuees from the Harrisburg area. Six of these counties lay partly in the risk zone; at least one was a borderline area that was held in reserve to handle an "overflow" of evacuees from a neighboring county; and fully 29 counties addressed the problem of receiving evacuees from outside their borders.

None of these 29 counties had any formal reason to expect Harrisburg evacuees before Friday's "uncontrolled release" and the subsequent expansion of the risk zone. All 36 host counties had responded to a variety of natural disasters in the past, but most were unfamiliar with nuclear threats and the problem of hosting large numbers of evacuees.

The hosting plans developed for the TMI evacuation varied widely. Host counties themselves ranged from large cities, to metropolitan suburbs, to forested areas in the Allegheny Mountains. Planning styles also varied enormously. The purpose of this discussion is not to praise or condemn individual host counties, which are not identified by name. Rather, this part of the report is designed to suggest specific planning issues which could be addressed more thoroughly in preparing for future mass evacuations.

## VII

### Host County Evacuation Planning

The following sections present (1) an overview of host county planning activities, (2) profiles of good, average, and poor planning efforts, (3) a description of major planning functions, and (4) conclusions.

#### OVERVIEW

On Wednesday, 28 March, all counties in Pennsylvania learned of the TMI accident through PEMA's communication system and through the news media. Most, however, entered the weekend not anticipating the expanded evacuation, and therefore had no reason to prepare hosting plans.

The first detailed discussion between host and risk counties typically took place on Saturday afternoon and evening (31 March). Contacts were usually made by the PEMA Area Headquarters staff, who had been assigned to work in the risk counties on Saturday morning. The standard procedure was for the risk county to ask how many evacuees a host county could absorb, and for the host county to provide an initial estimate. Risk county planners worked with these initial estimates while host counties studied their resources, informing the risk counties as they identified additional spaces.

On Sunday, 1 April, host county officials were briefed on planned evacuation routes and procedures. Lancaster County convened a face-to-face meeting with its host counties for this purpose, while Dauphin County coordinated with host counties over the phone. Allocations of evacuees were discussed at this stage and generally adjusted upward.

Later on Sunday, and early Monday morning, the host county preparedness staffs briefed their local officials and began detailed planning for reception centers, congregate care facilities, traffic control, security, and other hosting functions. By Monday evening, 2 April, almost all host areas had developed reasonably specific (but often unwritten) plans for receiving and hosting evacuees.

By Tuesday evening, 3 April, all host areas claimed they were reasonably prepared to respond to any evacuation. They continued to refine their plans, but had generally gone to a "standby" readiness posture by the time DCPA personnel arrived on 3 and 4 April. Typically, DCPA assignees reviewed the local plans and—most importantly—assisted local planners in drafting the formal, written plans requested by PEMA. Most written plans were completed by Thursday, 5 April.

### HOST COUNTY PROFILES

The host counties varied widely in the style and effectiveness of their reception/care planning. The following three profiles are offered to show the range of county planning activities.

These profiles are based on three principal sources of information: host county plans, debriefings of DCPA assignees to host counties, and interviews conducted by PEMA staff with County Emergency Management Coordinators. A list of these sources appears at the end of this report.

It should be noted that, while all of the counties had prepared for a variety of natural disasters, none was experienced in handling the relocation, hosting, and care of people on a massive scale. Furthermore, these host counties were preparing for a complex and poorly understood threat, on short notice, with a relatively tiny core of full-time emergency preparedness professionals.

#### County X A "Good" Plan

The County Emergency Management Coordinator (EMC) was called about 12:10 p.m. on Sunday and asked how many evacuees the county could host should it become necessary to evacuate the area around TMI. The EMC returned the call around 1:00 p.m. to say that the county could handle 1,500 to 2,000 persons. By about 4:30 p.m., this number was raised to roughly 4,000. All contact with the risk county was by phone.

### Reception

The county fairgrounds, offering ample parking space, was chosen as the reception area. The security office was opened and extra telephone lines were installed. A Reception Center Manager was appointed to control operations. RACES volunteers were standing by, and commercial and police communications were available if needed. There was an enclosed space for registration. Doctors and a psychiatrist would be on hand. The plan provided for radiological inspection, and for the disposal of contaminated clothing in concrete vaults. A local church agreed to provide clothing for people whose whole wardrobe was contaminated.

The Red Cross was to handle registration. They would use two-part forms to register people at the reception center, sending one copy with each individual to the mass care center, and noting on the other copy where the individual had been assigned.

### Mass Care

Cars were to be left at the fairgrounds, and people moved to mass care centers by school bus, or in the buses that brought them. Shelters were listed in order of priority. The first two were at a nearby college and could have accommodated up to 900 evacuees. After that, in order, came the larger high schools, the smaller elementary schools, a Catholic school, the YMCA, and the Salvation Army. Planners assumed that the schools would be kept in session, and that evacuees would use only the auditoriums and gymnasiums. The county had no trouble meeting its quota of evacuees using only the college and the larger public schools: according to Red Cross and school officials, the county could have hosted at least twice its quota, assuming 40 square feet per person. Churches were not considered as potential shelters because there were ample spaces without them.

A RACES operator would be stationed at each mass care center, supplemented by fire and auxiliary police communications. Pets would be housed at the fairgrounds where several hundred cages were available. Medical care at the shelters would be under the supervision of the Red Cross, while school cooks and janitors would feed the people and maintain the premises. Schools had a 3-10 day supply of food.

There were no prior written agreements for the use of schools as shelters, but the superintendents were called and readily agreed. Schools were selected from a resource list which has been employed in previous emergencies.

### **Planning Process**

The County EMC called a meeting at 2:30 p.m. on Sunday. Attending were the police coordinator, the communications officer, Red Cross staff, the county commissioners, representatives of the press, two local EMCs, and a RACES coordinator. The EMC presented a tentative handwritten plan which was based on past experience with floods in the county and reflected a multi-county disaster plan. Officials felt that the multi-county plan was weak with respect to command and control, however, so a new communications center was chosen for the TMI plan. Red Cross staff were involved in the planning and, according to the EMC, were "the most cooperative bunch of people I've ever met in my life."

By 9:30 p.m. on Sunday, County X was ready to receive evacuees. The DCPA representative arrived in the county on Tuesday, looked at the plan, and concluded that everything was under control.

### **Problems Perceived by County Planners**

People with short-wave 'scanners' were picking up radio conversations among emergency managers, and some of this information found its way into media broadcasts. The mass care centers were not suitable for the handicapped. And the plans for housing pets were imprecise: the fairgrounds could have held several hundred, but the EMC worried about the psychological problem of separating people from their pets.

### **County Y An "Average" Plan**

In reality, there were no 'average' host county plans. Different demands were placed on each host county, and each addressed hosting functions at different levels of detail. County Y was typical only because, like many counties, it planned very well for certain hosting functions and less well for others.

The risk county notified County Y's EMC on Saturday morning, 31 March, and asked him to host a number of evacuees equal to about 13 percent of County Y's permanent population. A meeting was called for Saturday afternoon to develop hosting plans.

### Reception

The planners assumed that only about half of the evacuees assigned to the county would actually arrive and require housing. They identified a well-known site with ample parking as a reception center, and developed the following procedure for processing those who did arrive from the risk zone.

Each car would be stopped on entering the reception complex, and a card would be filled out giving the number of persons and pets in the vehicle. The driver would get a numbered ticket stub, plus a registration card for each of the car's occupants. (County Y actually printed these tickets and cards.) People would then park their cars and walk to another point where they would be assigned to a mass care facility in groups based on their registration numbers. Pets might have been registered separately and taken by Game Commission officers to the county fairgrounds. Volunteers would then convoy cars in groups to different mass care facilities. If possible, people arriving by bus would continue on to their mass care facilities; otherwise, buses from the host county were available.

Evacuees arriving in their own recreational vehicles would be met by a person from the Bureau of Forestry and directed to a separate area of the reception center, with space and facilities for a large number of RVs. Extra phones were to be installed at the reception center, and RACES operators would be available.

### Hosting and Mass Care

The facilities used would have depended on the number of people needing shelter. If there had been only 100 or so, the Red Cross might have put them up in hotels. If they had arrived in the few hundreds, they might have been placed in churches. If they had come by the thousands, the first choice was to use the schools, with churches and fire halls providing backup spaces. No sites with fewer than 25 spaces would be used. There were signed contracts for the use of the schools as mass care centers, and the schools were alerted. The Red Cross would provide medical care, a locator system, and facilities for pets. (If people refused to be separated from their pets, they would have to keep them in their cars.) Evacuees would be housed in school gymnasiums and auditoriums, since classes would be kept in session. In determining available spaces, planners assumed 40 square feet per person.



### **Private Residences**

The churches would arrange hosting in private residences. County officials believed they could handle a substantial number of people in this manner, and would have used private housing if they needed to host evacuees for longer than two weeks.

### **Planning Process**

The first planning meeting, called for Saturday afternoon, included the so-called "nucleus" people who would be involved in providing mass care for evacuees: the County EMC, his deputy, two county commissioners, and representatives of the Red Cross; State Police; fire departments; United Churches; the planning commission, the court administrator, the director of emergency medical services, and a local EMC. Also included were Mental Health and Mental Retardation staff, the Bureau of Forestry, the Game Commission, and the County Department of Children and Youth. This group determined how people were to be arriving, where they were to be housed, and how they could provide a master locator system for them.

Another meeting was held Monday evening, 2 April, and attended by local elected officials, school officials, local EMCs, fire chiefs, and police chiefs. At this meeting, plans were explained in detail to those who would implement them.

### **Problems Perceived by County Planners**

The county had trouble reaching PEMA by phone, and may have been short of radios and cots.

## **County Z A "Below Average" Plan**

County Z was contacted by the risk county on Saturday evening and asked how many people could be hosted if an evacuation were ordered.\* The EMC's original, informal estimate equalled only about 0.4 percent of the county's 1970 population, well below

\*According to the DCPA representative assigned to the county, a MOBDES volunteer made the initial contact; according to the County EMC, it was the risk County EMC. There is also some question about the time of initial contact.

the average of all host county estimates (8.8 percent). Later estimates doubled the original figure, but the County Z's large number of potential spaces remained essentially untapped.\*

### Reception

To reach the major shopping center identified as the reception area would have required evacuees from the risk county to make a substantial detour from the most direct route. Since no definite arrangements were made for traffic control, many people may have followed the more direct route and caused traffic problems.

At the reception area, local EMCs, police, and ambulance crews would meet the evacuees and escort them in groups of cars to mass care centers through the county. People would not be registered at the reception center. Pets were to be sent to the county animal shelter. These reception procedures would have made it nearly impossible to locate a particular evacuee within the county. Spreading the evacuees would also have dispersed the County's emergency management personnel, while creating additional communications problems. The plan would have forced some evacuees to travel 80 miles to reach a mass care center only 34 miles from where they started.

### Hosting

The Red Cross was responsible for organizing the mass care program. Centers were ranked according to the following priorities: (1) schools, (2) churches, (3) Salvation Army centers, and (4) fire halls. According to the DCPA representative assigned to the county, specific centers were not identified until Wednesday, 4 April, and then only at the request of the Red Cross. Existing (pre-crisis) written agreements provided for the use of the schools and churches as mass care centers. These agreements were confirmed verbally during the week of 2 April, as each school indicated how many people it could handle.

County officials intended to wait and see how many people arrived in the county—there was some question about this—and to fill the mass care centers, beginning with those in the county seat and working outward. If the very limited number of evacuees assigned to the county had all arrived at the scheduled reception center, this

\*A 1978 DCPA list identified about 100,000 potential fallout shelter spaces in the county.

plan probably would have worked. In fact, given the ratio of planned evacuees to host county population, there was probably no reason to organize mass care at all, since the county's hotels and motels could have absorbed the influx. However, if more people had come into the county than were anticipated, or if evacuees had failed to follow directions to the reception center, the county would have experienced great difficulty in organizing the hosting operation.

#### **Planning Process**

There was no formal county emergency plan at the time of initial notification, and no standard procedures for activating the County EOC. The original hosting plan—in the form of handwritten notes—was presented to Red Cross and local authorities either Monday or Wednesday (2 or 4 April). \* The locations of mass care centers were decided at this meeting, though no formal procedures were written out. At the urging of the DCPA representative, the County EMC agreed to let DCPA formalize the plan and put it in writing. A draft of the hosting plan was completed by Thursday, 5 April.

#### **Problems**

The relationship between emergency staff and the local press was very poor. The EMC was accused by a local newspaper of withholding information. This sort of hostility created an atmosphere in which emergency managers were sometimes portrayed as lying about the risks of radiation in the county. Without the support of the local press, the EMC had difficulty in convincing the public that County Z was a host county and not itself at risk. These concerns were reflected in hundreds of calls to the EOC.

The EMC and the Public Information Officer were often absent from the EOC and were perceived to be unavailable for consultation at many points during the crisis planning period. These circumstances clearly did nothing to promote an image of competence or concern.

County Z—like only a handful of others which approached its low level of performance—illustrates the consequences of an unprofessional and unorganized approach to host county functions. Given the very few evacuees eventually ticketed

\*Sources disagree.

for Z, it is possible that county or local officials could have improvised some mass care arrangements if evacuees had begun to arrive. However, the county's low estimate of capacity, and its poor response during the planning stage served to deny large numbers of hosting spaces to risk county planners.

### PLANNING FOR SPECIFIC HOSTING FUNCTIONS

Pennsylvania counties varied widely in planning for specific hosting functions, such as reception, registration, communications, and mass care. This section summarizes the responses of the host counties to these problems. The data are drawn from host county plans prepared in April 1979, PEMA interviews with County EMCs conducted in June and July, and debriefings of DCPA personnel assigned to the host counties. A comparison of these sources, it should be noted, suggests that host county officials often knew a great deal more about emergency planning than was reflected in the written plans, which were prepared on short notice.

Listed below are planning concerns which would be expected to occupy the attention of host county planners facing a major evacuation.

- Organization for emergency planning and operations.
- Reception of evacuees.
  - Designation and staffing of a reception center or staging area.
  - Registration.
  - Traffic control.
  - Medical concerns.
- Mass care.
  - Selecting and staffing facilities.
  - Consideration of private homes.
  - Management of mass care centers.
  - Communications.
  - Security.
  - Pets.

The following discussion briefly compares the various approaches of host county planners to these basic concerns.

### **Organization for Emergency Planning and Operations**

Emergency management organizations were as diverse as the counties themselves, ranging from well-staffed, experienced emergency management groups to *ad hoc* clusters of officials and volunteers. Some possessed reasonably elaborate operational plans, including pre-designated assignments of officials to emergency functions, listings of relevant resources and personnel, and stipulated lines of authority. Others approached the problem as an extension of routine governmental and police operations, often relying on the Red Cross for expertise in handling the special requirements of a major hosting effort.

The fact that host counties became involved on a weekend led to special problems of mobilizing staff and resources—particularly in those counties which approached the TMI evacuation as an extension of routine operations. For example, in some counties without formal notification procedures, the appropriate officials could not quickly be reached.

### **Reception of Evacuees**

Almost all Pennsylvania counties identified a reception center for incoming evacuees. Centers ranged from the county fairgrounds to shopping centers, stadiums, race-tracks, and universities. All centers appeared to have adequate parking, and room for processing the evacuees. The general approach taken by host county planners was to register the evacuees at the reception center, to separate those requiring medical or special attention, and to assign the remainder to mass care centers throughout the county. A minority of the Pennsylvania host counties, however, viewed the reception centers merely as staging areas, from which people would be convoyed directly to shelters.

A number of problems surfaced in identifying reception centers. Shopping malls were closed on Sunday (1 April) when many host county plans were being developed. They, therefore, offered readily usable parking and registration space. If the evacuation had taken place on Monday, however, local traffic would have conflicted with emergency

needs. Some counties initially chose one center, then changed it later without coordinating with the risk county. These changes might have caused confusion and traffic control problems in an evacuation.

After designating a reception center, host county planners proceeded to consider several related activities, including registration, traffic control, and provisions for medical (first aid) support.

### **Registration**

Many counties apparently depended on the Red Cross to provide a standard locator system for evacuees, since few counties have described their registration procedures in detail. At least five Pennsylvania counties planned to register people on arrival at the reception center, using two-part forms to keep track of each person's location. Other counties planned to register people at the mass care centers; this procedure would have made it difficult to locate a specific evacuee within the county. Still other counties appear to have made no specific plans for registration.

### **Traffic Control**

Plans for traffic control to and from the reception centers varied widely. Local police or volunteer escorts were typically assigned the job. Only one or two counties planned as far as assigning people to particular traffic control points, and only two or three of the counties would have distributed maps showing routes from the reception center to the mass care facilities. A few counties were unsure whether evacuees were arriving in cars or buses, complicating the task of traffic control planning.

Counties in the inner ring of the host zone faced the most difficult traffic control problem, since they would need to separate those people assigned to their own county from the stream of evacuees passing through the county toward more distant host areas. Most of these intermediate counties assumed that vehicles assigned to them would carry identification cards, so that others could be turned away before arriving at the reception center. These assumptions were not realistic.

### **Medical Concerns**

In nearly all counties, plans assigned to the Red Cross the responsibility for medical care at the reception centers. According to most plans, patients who could not

be treated at the centers were to be transferred by ambulance to nearby hospitals. Medical care would have been a problem in the few small counties without hospitals. However, the risk county planners generally made their own arrangements for moving the hospital population, thereby reducing the burden on host county planners. The plans for hosting the sick are discussed in detail in Chapter VI above.

### Mass Care

All Pennsylvania host counties made some provision for mass care in public buildings, though the plans varied widely. With few exceptions, the schools were the first choice as mass care centers; churches were a close second. County planners gave several reasons for this choice. Schools have better facilities and staff for mass feeding than other public buildings; they have adequate water supplies and sewer systems; and many counties had standing arrangements with school officials to use their buildings during an emergency.

Host county planners generally used the DCPA standard of 40 square feet per person in estimating the capacity of schools and other facilities. A few assumed only 20 square feet per person, and one, 10. These differing standards contributed to the wide variation in the counties' estimates of the number of evacuees they could host.

Typically, host counties selected a group of large schools from an existing resource list, contacted the school administrator to confirm the use of the buildings, and arranged with the local Red Cross chapter to organize the mass care program. The Red Cross helped to select a manager for each shelter. School, church, or volunteer personnel were to staff the operation. The following sections describe variations on this pattern.

#### Selecting Facilities

Some host counties evidently preferred to use colleges and universities instead of schools. Because colleges are centrally administered, host county officials apparently reasoned that they could arrange more mass care space by contacting fewer people. The colleges also had better facilities for mass care and feeding, especially if most of their students normally lived on campus. Of course, the amount of space actually available varied with such factors as whether classes were in session, the size of the school's physical plant, and the willingness of college officials.

Other counties preferred churches over local schools as mass care centers. Most of these counties later told PEMA that they wanted to organize mass care with the "least disruption" to the local residents. Under that policy, churches were ideal because they are used only one or two days a week. Furthermore, many counties were uncertain whether the schools would remain open during an evacuation—a factor which prompted some counties to look elsewhere for mass care space. Alternatives included fire halls, armories, and large public buildings; one resort county planned to send evacuees to hotels and motels, where business was slack during this particular period.

#### **Consideration of Private Homes**

Half a dozen counties planned to use private homes as shelters. One county EMC thought the TMI accident similar to a wartime threat. He assumed that people might be staying away from their homes for several weeks or even months. Under these assumptions, he viewed private residences as the best hosting arrangement, and the mass care centers merely as temporary staging areas from which people would be assigned to live with local families. In another county, the EMC initiated planning for the assignment of evacuees to private homes, defending the approach on the grounds that mass care situations can become highly undesirable. (Substantial numbers of private residences were in fact volunteered.) At the other extreme, one mountain county explicitly rejected private residences, citing bad experiences with private hosting during blizzards. Most counties fell somewhere in between: they considered the use of private residences, but developed no specific plans for assigning people to them, or dealing with the problems that might arise from this arrangement.

#### **Management of Mass Care Centers**

Most host counties assigned the Red Cross the responsibility for managing the mass care program. The Red Cross volunteers generally had the training in congregational care and the most experience in previous disasters. In those few counties where Red Cross chapters were weak, or had poor relationships with the local EMC, the plans called for mass care centers to be managed by school or church employees.

All counties arranged for the same basic services: a bed, food, and simple medical care. A few made explicit provisions for entertaining the evacuees, assigning social service workers to this task. One county even contemplated organizing bus trips to parks



and monuments near the mass care centers, using students as tour guides; but most counties made no specific written plans for recreation.

Plans for staffing the centers varied more widely. Some counties assumed that regular school staff could take care of the extra work of managing the hosting operation, while other counties planned to use volunteers exclusively. Both options presented problems that most plans left unresolved. If school staff were used, someone would have to call them at home (perhaps on Sunday) and assign them this task. Without a declaration of emergency, many counties wondered who would pay for staff overtime. This issue is still unresolved, since even host planning strained some counties' budgets. Finally, paid school staff would have to be supplemented by volunteers for second and third shifts. To depend entirely on volunteers to run the shelters was equally risky, because not all volunteers had the necessary experience in mass care, and because volunteers might not be available for service at all times.

#### **Communications**

All Pennsylvania host county plans relied heavily on volunteer radio operators (particularly, RACES and REACT) to maintain communications with the mass care centers. About a third of the counties also planned to install extra phones at the centers, and those few counties without RACES organizations would have depended entirely on the telephone system. (Communications problems are more extensively considered in Chapter VI above.)

#### **Security**

Very few Pennsylvania host counties made any definite plans for security at the centers—a problem which certainly would have worried a large number of the evacuees. Some counties lacked adequate security forces. Most evidently did not develop their plans in sufficient detail to encompass this issue. There is no reason to believe, however, that security would have posed an insuperable problem.

#### **Pets**

The handling of pets is recognized by professional planners as a major problem that relates to the psychological as well as the logistical aspects of an evacuation. Few county planners had seriously considered this problem, and there was an evident reluctance

to deal with it. All counties agreed that pets were not permitted in the mass care centers, but very few developed workable plans for housing them. The most precisely stated arrangement was to put them in cages at a county fairgrounds—an arrangement which provided for only a few hundred cats and dogs. Several counties assumed that the Red Cross would take care of pets, but provided no further details. Half a dozen counties had apparently not even considered the care of pets—not surprisingly, since the risk counties also disagreed about whether evacuees would bring them. In short, most plans for pets were limited to 'ideas', such as the following:

- keeping them in tennis courts
- putting them in Humane Society pens near mass care facilities
- asking a local farmer to take care of them
- tying them to trees outside churches
- keeping them in the cars of evacuees
- sending them to the county animal shelter
- putting them in semi-trailers parked on school grounds
- chaining them to posts at appropriate distances, using chain volunteered by a local hardware store.

Many of these schemes would not have worked well in an actual evacuation.

## CONCLUSIONS

With little forewarning and limited time, the host counties quickly planned to allocate, house, and feed over 600,000 evacuees from the Harrisburg area. It was no small accomplishment.

The experience also indicates, however, a number of problems and constraints which should be taken into account by planners and officials anticipating such a massive relocation effort in the future.

### **Host Counties used potential space inefficiently.**

Twenty-two Pennsylvania counties planned to host about 255,000 evacuees from Dauphin and Lancaster Counties.\* This figure equalled only 6.4 percent of these host counties' population. Individual counties agreed to host from 0.8 percent to over 30 percent of their resident population. Less than a year earlier, these same counties had identified over 3 million 'fallout shelter' spaces in reports submitted to PEMA. Without assuming the quality of space that might be appropriate under wartime conditions, it is nevertheless apparent that the planned allocation of TMI evacuees did not begin to tax the capacities of most host counties.

Why? First, the host counties had very little time to prepare their estimates of capacity. In many cases, the County EMC gave a rough estimate during the initial phone call from the risk county. Because at least half of these Pennsylvania host counties lacked a readily available list of mass care facilities and spaces, the original hosting estimates were often based on insufficient data.

Host counties may also have been reluctant to commit large amounts of space because of the uncertain status of the emergency. Many of the host counties were even less aware of the nature of the threat than were the risk counties. They were unsure whether the evacuation would be precautionary or not, how long the evacuation would last, whether a state of emergency would be declared, and who would pay for hosting services. Without a declaration of an emergency, the host counties were essentially doing the risk counties a "favor".

As a result, the host counties' estimates of their capacity were very conservative, and the risk county planners took this conservatism into account. Dauphin County, for example, planned to spread its 200,000 evacuees throughout 19 separate host counties, 10 of which offered fewer than 6,000 spaces apiece. Assuming more hosting spaces could

\*Most of the remaining 350,000 evacuees would have been hosted in the non-risk portions of York, Cumberland, and other risk counties (Chapter VI above). Some of these evacuees, in turn, were tentatively allocated to other Pennsylvania and several Maryland counties. This discussion focuses on planning in the "pure" host counties—those receiving evacuees from outside their borders.

have been identified, planners would have been forced to consider the trade-offs between clustering evacuees in a few nearby counties and sending them to smaller hosting centers over a much wider area.

**Poor communications between risk and host counties hindered planning and would have posed additional problems in an actual evacuation.**

Coordinated risk-host planning is vital to a successful evacuation effort. Lancaster County organized a meeting on Sunday, 1 April, with representatives of its host counties. The effect was to reduce the hosts' uncertainties about Lancaster's evacuation plans. Such a meeting would have been impractical for Dauphin County, since its host counties were spread over a very large area. Most host counties had surprisingly little contact with Dauphin County after the initial phone calls, and their communications with PEMA were not much concerned with specific planning functions.\*

Under these circumstances, Dauphin and its host counties pursued their own planning efforts more or less independently, communicating mainly about the number of evacuees that could be hosted. As a result, many of Dauphin's host counties were confused about significant details of the evacuation. Several were unsure whether evacuees would arrive by bus or by private car; many did not know how many evacuees would actually arrive, or when; two counties never learned definitely whether they were host or "overflow" areas. Dozens of smaller points of confusion developed because of poor communication: Would cars carry identification stickers? Would people bring pets? The lack of sustained communications between Dauphin and its host counties would have caused serious problems in an actual evacuation.

**Host county plans neglected potential problems of inter-county movement.**

For various reasons, thousands of people would probably have moved from one host county to another following an evacuation order. Some people may not have gone where they were told; some routes might have become clogged; some reception centers could have become overburdened. With a few notable exceptions,\*\* host county plans

\*Several counties were accustomed to dealing with PEMA Area Headquarters, which were essentially closed during the TMI emergency when Area staff were moved to the State EOC and the risk counties.

\*\* G., plans for routing the overflow from Chester County to Delaware County.

gave little attention to the problem of inter-host-county movement. In an actual evacuation, such problems would have posed needs for coordination among host counties. As in the preceding discussion of host-risk communication, there would be substantial needs for additional communications capabilities.

**Planning for pets was given insufficient attention.**

Both risk and host county planners assumed that their primary responsibility was to care for people, not pets. Risk county planners did not develop a coordinated policy concerning pets, although they recognized that plans for pets would influence compliance with an evacuation order. Risk county planners generally assumed that, regardless of any policy statement, people would often take their pets with them. Under the worst of circumstances, evacuees would arrive in the host counties with cats, dogs, gerbils, mice, guinea pigs, and rabbits, as well as exotic pets like chimpanzees. (A Harrisburg paper ran a story about a Lancaster County man who owned two hundred snakes.) Failure to consider such contingencies would have led to numerous administrative, public health, and morale problems.

**Host counties had no basis for estimating the percentage of the affected population that would actually arrive and need public mass care facilities.**

Some host counties assumed that as few as one-half of their allocated evacuees would in fact utilize public facilities. And many participants in the planning effort made the logical assumption that many evacuees would make their own lodging arrangements—staying with relatives or friends, using summer homes or recreational vehicles, scheduling vacations to coincide with a limited evacuation period, etc. But no basis for quantifying this factor was available.

There was some evidence that evacuation policies could substantially affect this percentage. With the announcement that a TMI insurance company was distributing payments to spontaneous evacuees, for example, use of the Hershey reception center reportedly increased substantially. (Red Cross certification of actual dislocation was a condition of payment.) And officials of several outlying jurisdictions deduced from gasoline sales that many Harrisburg residents had moved into 'summer' cottages and were commuting to work in the potential risk area around TMI. No defensible 'rule of thumb' was

available, however, to help risk or host planners estimate either the extent of spontaneous evacuation or the percent of allocated evacuees who would utilize host county mass care centers.

(It is known that in more "routine" emergencies, such as Gulf Coast hurricanes, only a small fraction of evacuees use such public facilities. Presumably, a reactor-accident evacuation would benefit from the same phenomenon, to a degree dependent on such factors as the duration of the evacuation, the economic and social characteristics of evacuees, and Federal or State policies concerning reimbursement and liability.)

**The slow pace of host county planning, reflecting uncertainty about the nature and urgency of the threat, precluded any effective integration of host and risk planning.**

Risk jurisdictions hastily planned to get their people out, devoting but limited attention to the problems of caring for people later. Host county planners, whose essential mission thus coincided with only a secondary concern of risk area planners, addressed their problem with less of a sense of urgency. Host county planning, therefore, lagged behind that of risk areas.

The slower pace of host area planning is traceable to several causes, but most immediately to their uncertainty about the nature of the threat. Host county officials were even less clear about the hazards of the reactor than were the risk county officials. The information they obtained from PEMA situation reports was not very detailed or convincing, reflecting PEMA's own sources, and reports in the commercial media were often sensational or unrealistic. Many host counties were confused about such basic issues as whether any evacuation would be merely precautionary, whether the evacuees might be contaminated, and how long an evacuation might last.

Host counties responded to the uncertainty of the threat in various ways. A few county EMCs spent a great deal of time reassuring their local public, who often thought that they also might be at risk. Other EMCs apparently assumed that the threat was probably not very serious, since, as one director put it, "the Governor would have ordered an evacuation if there were a real danger to public safety." Under such an assumption, host planning would not be expected to match the "crash planning" effort which characterized the risk counties.

The implication is clear. If host areas respond more slowly to crisis planning requirements, as they normally will, the achievement of integrated risk-host planning depends heavily on pre-crisis planning efforts.

**The quality and probable effectiveness of the host county planning efforts directly reflected the sizes of professional emergency planning staffs and the availability of written operating procedures, resource lists, and supporting materials.**

None of the hosting plans was implemented, and plans that looked good on paper might have worked poorly, or *vice versa*. But the weight of the evidence is to the contrary. Had an evacuation occurred, its complexity and the demands it placed on emergency managers could have overwhelmed the less sophisticated organizations.

The crisis planning efforts naturally reflected the general character, social make-up, and customary ways of conducting public activity in the diverse counties. The more urbanized counties produced the more formally structured plans, while many rural counties left much to unwritten, informal arrangements. Only the infusion of DCPA staff and PEMA's prodding, in many cases, led some counties to produce the kind of standardized written plans which would have been needed to support an integrated evacuation and hosting operation.

The population size and urbanization of the several counties were reflected in their professional staffing and the formality of their plans. Montgomery County, with a 1970 aggregate family income of over \$2 billion, had eight paid emergency management staff in 1978. Juniata County, on the other hand, had an aggregate family income of \$33 million and one paid preparedness official, the EMC. With few exceptions, the larger the host county's paid emergency management staff, the more detailed and complete was the plan it developed for the TMI evacuation.

Even more important to the crisis planning effort, however, were the (pre-crisis) operating procedures, lists of officials and facilities, and other standard preparedness procedures—often correlated with professional staffing and population size—which allowed many counties to readily produce TMI evacuation plans when this crisis developed. Other counties had to assemble resource lists and totally improvise their plans only after they were notified—a factor which could have severely limited their participation and contributions in an actual evacuation.

**All of the above-noted shortcomings of the reception/hosting effort reflect the unique and uncertain quality of the threat, and especially the absence of a coordinated risk-host area plan to cope with it.**

Clearly, host area planning should be integrated with risk area preparedness, and potential host jurisdictions should enter such a crisis equipped with a plan which describes:

- A formal organizational structure.
- "Internal" and "external" communications linkages.
- Pre-designated listings of emergency managers and their areas of responsibility.
- Notification procedures for key emergency managers.
- A pre-designated reception center.
- A prioritized listing of host county mass care and shelter facilities.
- An inventory of other hosting resources, including facilities usable for hosting special populations.
- Standard operating procedures for receiving evacuees and organizing mass care.



Part Six  
**CONCLUSIONS**

## CONCLUSIONS

The individual chapters suggest conclusions and implications based on the TMI experience. This section attempts to generalize from that experience to broader considerations of preparedness planning.

Rather than build all the necessary caveats and hedges into the explication of each "finding" or "implication," we here remind the reader that (1) this examination has been conducted quickly, (2) it has focused on the preparedness planning elements of the TMI situation, and (3) TMI represented one of many possible "scenarios" for a reactor hazard, a hazardous materials problem, or a nuclear threat.

Certain dimensions of the TMI case, however, appear broadly significant. The hazard was potentially widespread. The threat was not thoroughly understood by technical experts. Information about the threat required "translation" from scientific terms to the implications for population-protection measures. Most important, TMI illustrated the complex emergency management requirement that a large-scale evacuation imposes on officials responsible for the safety of urban or concentrated populations.

**Potential hazards of a highly technical nature must be defined in terms that describe implications for population-protection measures.**

Preparedness planning begins with a definition of the hazard, the area potentially affected, and some estimate of the possible variations in these factors. For highly technical man-made hazards, emergency managers must often rely on scientific expertise available from other organizations—in this case, Pennsylvania's Bureau of Radiation Protection and the Nuclear Regulatory Commission. The TMI accident illustrated many possible shortcomings of such arrangements, including the numerous factors which operate to impede the translation of technical/scientific assessments into meaningful guidance for preparedness planning and operations.

Industrial organizations, governmental regulatory bodies, and their scientists and engineers are necessarily oriented toward the routine functioning of potentially hazardous processes or facilities. Their typically conscientious concern for safety is

directed, by and large, at prevention. They seek to identify potential (even low probability) hazards, then design safeguards against them. Neither psychological nor organizational forces encourage them to speculate on the "unpredictable" event. If a possible failure is detected, they act to head it off.

Preparedness planners and emergency managers, on the other hand, *begin* their thinking and activities at the point of the unexpected event. "Accidents" do happen. Even the most expensive (per capita) fail-safe systems did not prevent the loss of three astronauts. Assuming that threats will appear, emergency managers look mainly at the potential victims—how many people, how to reach them, what to tell them, how to organize and support them. Public officials in responsible positions, it might be added, generally share the preparedness, not the scientific, perspective.

Preparedness agencies and officials, however, remain dependent on the scientist for risk assessments throughout an emergency operation. This dependence was dramatically illustrated in the TMI accident. Emergency management agencies entered the crisis with contingency plans to evacuate a 5-mile circle around TMI—a radius that conservatively reflected the complex guidelines for assessing potential reactor hazards. Two days into the accident, the same scientific authorities (now faced with a novel and unexpected situation) suddenly recommended a 10-mile, then a 20-mile contingency evacuation plan. Under emergency conditions, local and State officials were forced to scrap a relatively undemanding 5-mile evacuation and plan for a large, complex population movement on short notice. The following figures indicate the dramatically greater scope of the newly required plan.

	5-Mile Radius	20-Mile Radius
residents	30 - 40,000	600,000
square miles	79	1,257
risk counties involved	3	6
host counties for evacuees	0	30
evacuated subdivisions	10 - 12	over 100
hospitals	0	14
nursing homes	2	62
jails/prisons	0	6

Such shifts cannot always be avoided, of course, but both preparedness agencies and their scientific counterparts (for a particular hazard) can arrange planned and systematic procedures for handling the "translation" of a technical hazard into its preparedness implications. Such procedures should take account of the following tendencies:

- (a) **When a major emergency occurs, and when ranking public officials become concerned and involved, even a very-low-probability hazard may become the dominant concern.** Scientists and technicians involved with TMI often differed among themselves in their assessments of the threat. Faced with these differences, both senior technical managers and ranking officials often chose the more cautious alternatives. A desire to be conservative in risk assessments appeared to have a substantial effect on the definition of potential evacuation zones during the emergency—estimates that essentially determined the scope of the emergency management task.
- (b) **Under the press of events in an emergency, technical agencies almost automatically are accorded a significant role which reaches beyond their expertise in emergency management.** As the event becomes a matter of public concern, leaders turn first to expertise that promises better definitions of the hazard. How much radiation was leaking into the environment? What was the danger to public health? How likely was a major disaster? Such questions lead public officials back to the source of the hazard—to the scientific agencies closest to the problem. Furthermore, they tend to focus on the ranking agency (NRC, not BRP), thereby encouraging the tendency for scientific assessments rather than preparedness concepts to dominate. Regardless of who is legally assigned the responsibility for a disaster-response, the agency in a position to define the threat will be influential.
- (c) **The greater the perceived hazard and the public attention accorded it, the greater the tendency to "kick decisions upstairs," by-passing agencies or departments normally charged with scientific analyses or preparedness assessments.** At TMI, this process rapidly evolved to a point at which authority for key decisions (affecting preparedness planning) was concentrated in the Governor and NRC, with a direct line to the White House.

- (d) Both interagency relations and intra-agency organizational shifts affect the response to large-scale disasters. Over 150 Federal, State, and local agencies were involved in the TMI emergency and the communications about it. Many of them evidenced the kinds of centralizing and authority-concentrating tendencies noted above. This undoubtedly contributed to the common complaint that "the government" didn't know what was happening.
- (e) All of the above factors suggest why the management and interpretation of technical information poses one of the most difficult problems faced by officials and emergency managers. TMI presented a complex threat. There were numerous communicators, each reflecting a particular background and viewpoint, and few translators versed in the scientific areas of concern. Poor communication resulted. One example: On Wednesday, 28 March, an operator at the plant told PEMA the reactor had "failed fuel"—*i.e.*, damaged fuel rods (Floyd's testimony to Kemeny Commission, 31 May 1979). This appears in the PEMA Log as "failed to fuel." Such mistakes reflected not only the varying fields of expertise of diverse officials, but also the sheer numbers and actual differences of opinion of those involved. Compounding the communication problem was a lack of sophistication in presenting information to the media and public—phrases such as "hydrogen explosion" may have carried quite different implications for nuclear engineers than they did for residents of the area around the plant.

These problems clearly indicate the need for better mechanisms for defining technical hazards and for translating scientific information into its implications for emergency management. The creation of the Federal Emergency Management Agency, and the comprehensive State-level management agencies recommended by the National Governors' Association, could provide better organizational umbrellas for controlling this process. They would also facilitate the development of communications processes and systems with built-in safeguards against the distortion of technical information. Finally, emergency managers clearly require closer involvement in the process of defining technological hazards—a result that should follow from efforts undertaken in concert with responsible scientific organizations.

**Communities should approach complex disaster operations with well-defined emergency plans, supplemented by inventories of needs and resources.**

The TMI crisis-planning effort suggested the strengths and illustrated the weaknesses of established plans for coping with emergencies. Such plans may be too abstract or general for emergency-response staffs to use. Worse, like the "5-mile" plans at TMI, they may reflect inadequate definitions of the threat, encourage a false sense of readiness, and delay preparations for a more suitable response to a crisis. On the other hand, comprehensive plans serve to facilitate the inter-jurisdictional coordination required for complex emergency operations. Certainly, the planning groups in this situation devoted a significant amount of their "crash" effort to the collections of information and the development of procedures which could have been available before they started.

TMI reflected the difficulties of securing clear-cut definitions of technological hazards, projecting the scope of potential evacuation efforts, and providing the resources necessary to develop, maintain, and exercise comprehensive plans for such contingencies. This experience also suggested a number of fundamental preparedness measures that would allow a more rapid, crisis-triggered planning effort. Such measures should be undertaken at the county (or equivalent) level, where a familiarity with local conditions is combined with a limited number of jurisdictions which can be integrated in a state-wide or large area disaster-response operation. These measures would include:

- a. plans for expanding small emergency management agencies and professional staffs in time of emergency;
- b. notification procedures for key officials who would join the crisis-planning effort;
- c. planned, redundant communications links with sub-county disaster-relevant agencies, as well as organizations and institutions posing special evacuation problems or offering specialized evacuation resources;
- d. prepared procedures and materials for reaching and warning the public via the media;
- e. listings of institutions and populations requiring special assistance or provisions in an evacuation;

- f. similar listings of medical, nursing home, and other institutions offering special care accommodations for evacuees;
- g. listings of available spaces for mass care and reception of evacuees (from elsewhere in the county or outside it);
- h. listings of transportation resources for those without private automobiles;
- i. checklists and instructions for those personnel who would be charged with specific crisis-planning or operational areas;
- j. adequate, expandable crisis-planning and operations centers—preferably based on a well-equipped Emergency Operations Center.

Depending on funds and public support, such minimum-essential steps could be taken as part of a formal planning (and exercising) effort—*i.e.*, developing a comprehensive, all-hazards plan. Or they could be viewed as supporting elements for a “crisis-expectant” approach which uses these reference and source materials to develop a plan under crisis conditions.

**State and Federal disaster-preparedness agencies should work with county-level emergency managers to plan for and to perfect the “augmentation” process, which worked well at TMI.**

Both PEMA and DCPA assignees were integrated smoothly into a number of local planning efforts, providing added professional expertise and often playing key decision-making roles in conjunction with county officials. Such augmentations should be planned jointly with county officials and the plans for effecting them should be exercised periodically.

**State and Federal agencies should take the lead in designing adequate redundant communications networks to support multi-county emergency operations.**

Such plans should include not only the expansion of communications available locally but also their augmentation by mobile radio units and other additions which can be varied to meet the needs of particular crisis situations. At TMI, new telephone “hot

lines," the civil defense CDNARS radio units, and amateur radio nets were used to supplement communications systems.

**The problems of spontaneous evacuation and anticipating public behavior and response should be further analyzed.**

Emergency organizations and officials are least secure when anticipating public responses to messages and how effectively the public will "meet" and use the supporting services provided for them. In particular, State and local agencies need methods for estimating the flow and extent of spontaneous evacuation movements from the time a crisis begins.

**Volunteers can be highly effective as supporting members of professional emergency management staffs, but they cannot be relied upon over extended periods of threat.**

At both the county and local levels, volunteer activities by individual citizens and organizations made valuable contributions at TMI. Volunteers with appropriate knowledge and skills served in various planning and operations capacities (health, communications, rumor control), bringing with them a range of resources that no county-level emergency management organization could hope to have available on a day-to-day basis. The initial "surge" of effort put forward by these people, and by the professionals on emergency management teams, made possible the rapid developments of capability described in Parts Four and Five of this report. As the situation stabilized and the operation became protracted, however, the "nervous energy" that sustained them began to wane and role conflicts (family and job obligations) intruded themselves. The strengths and weaknesses of reliance on volunteers should be recognized in planning emergency activities. Volunteers can bring a small emergency organization a quality and variety of expertise far beyond its own; they can also vastly expand certain operational capabilities (like rumor control). They cannot, however, be regarded as a substitute for regular staff or as a mainstay of a crucial operating area like communications. Furthermore, they should not be expected to perform on the same basis as professionals over a prolonged, standby period.



**The content and methods of Crisis Relocation Planning (CRP) should be adapted to include the needs for comprehensive evacuation planning in nonmilitary disasters.**

The CRPs being prepared for wartime or crisis-period evacuation of American cities are based on guidance which spells out the intricacies of large-scale evacuation planning. These plans, where completed, should be adapted to accommodate and encompass the relatively smaller problems and requirements posed by reactor or hazardous materials accidents and other emergencies. Though CRP is substantially different in nature from even the largest single-area evacuation problem, the wartime contingency planning includes a large body of knowledge and potential training material for emergency managers concerned with health, mass transportation, mass care, and other major aspects of evacuation planning.

**Radiation hazards, representing a significant constraint on evacuation planning, require further study in the context of reactor emergencies.**

The nature of the "gaseous" radiation expected at TMI requires further definition, particularly in light of authorities' suggestions to "remain indoors" during the first stage of the emergency. Adequate protective measures, including the use of potassium iodide as a "blocking agent," should be examined further. Public information materials are badly needed to explain both the hazard and effective countermeasures—and to manage the psychological response to this "mystericus" threat.

**Unanswered questions about TMI require further assessment.**

How great was the potential hazard (exclusive of the probability estimates which proved poor sources of security after the initial release)? How long would an evacuation have lasted? What supports would the public and special populations have needed during and after the evacuation? Emergency management agencies need answers to these questions in order to refine their approaches to evacuation operations, *per se*. For example, the possible duration of the dislocation should be reflected in the pattern of distribution of evacuees to areas where they would be supported until the emergency ended.

An all-hazards emergency management capability should include at least the minimum-essential preparations to support large, multi-jurisdictional evacuations.

Jurisdictions around TMI demonstrated a substantial crash-planning capability. But the accident gave them several days to produce plans—and never required them to use them. Given our society's vulnerability to a number of potential hazards which can threaten large populations, the nation's existing civil defense capabilities clearly should be strengthened to provide better in-place and back-up resources for handling emergency population movements in a rapid and professional manner.

APPENDIX

## SELECTED SOURCE LIST

### DCPA Sources

#### Internal Agency Material

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*Civil Preparedness Activities in the Harrisburg Crisis* (Interim Report No. 2). Prepared for the Defense Civil Preparedness Agency by Human Sciences Research Inc., May 1979.

Defense Civil Preparedness Agency, Information Services Directorate. *Public Information Actions During the Pennsylvania Nuclear Power Plant Incident* (internal Agency report). April 1979.

Defense Civil Preparedness Agency "Message File on Three Mile Island Nuclear Reactor," 28 March - 16 April 1979.

Defense Civil Preparedness Agency Region 2, TMI related Situation Reports, 30 March through 10 April 1979.

Selected material submitted and/or circulated by the following DCPA personnel:

McConnell, John W.—DCPA Assistant Director for Plans and Operations

Buchanan, James O.—DCPA Assistant Director for Research

Chipman, William K.—DCPA Deputy Assistant Director for Plans

Siebentritt, Carl R.—DCPA Staff Director, Detection and Countermeasures Division

Woodward, Van D.—DCPA National Headquarters, Staff Director, Audio Visual Planning Division

Clanahan, Russell B.—DCPA National Headquarters, Public Information Services Directorate

Stangler, Marlow—DCPA National Headquarters, Health Physicist, Detection and Countermeasures Division

Faltot, Clovis—Chief, Resident Engineering Support Group, U.S. Army Corps of Engineers, DCPA Region 2

Mealy, Joseph—Assistant Regional Director, DCPA Region 2

Pawlowski, Michel—Health Physicist, DCPA Region 2

**Debriefing Materials from Selected DCPA  
and DCPA-directed Personnel**

**Personnel working with PEMA and DCPA Region 2 Headquarters:**

McConnell, John—DCPA Assistant Director for Plans and Operations  
Bex, John—DCPA Region 2, Director  
Mealy, Joseph—DCPA Region 2, Assistant Director  
Beebe, Harley—Mobilization Designee (MOBDES)  
Durnell, Mary Ann—DCPA Region 2, Regional Field Officer for Pennsylvania  
Faltot, Clovis—Chief, Resident Engineering Support Group, U.S. Army Corps  
of Engineers, DCPA Region 2  
Halpin, Myra—Red Cross Liaison to DCPA Region 2  
Held, Robert—DCPA Region 2, Operations Officer  
Jackson, Thom—DCPA Region 2  
Pawlowski, Michel—DCPA Region 2, Health Physicist  
Zimmerman, Harry—MOBDES

**Those working with County Emergency Management Agencies:**

Beatty, Gregg—DCPA Region 2, Regional Field Officer (RFO)  
Bement, Daniel—DCPA Region 4, Regional Field Specialist (RFS)  
Bevans, Martin—DCPA Region 3, RFO  
Brian, Jack—DCPA Region 3, RFO  
Devlin, John—DCPA National Headquarters, Staff Director, State and  
Local Readiness Division  
Fay, Paul—DCPA Region 3  
Fredricksen, Peter—DCPA Region 2, Director of Field Services  
Gantt, Robert—DCPA Region 3  
Harrin, Robert—DCPA Region 1, RFS  
Hensley, James—DCPA Region 2, Chief, State and Local Readiness Division

Kanady, Edwin--DCPA National Headquarters, Program Analyst, State  
and Local Readiness Division

Kellogg, Raymond--DCPA Region 4

King, Donald--DCPA Region 4

Lynch, Dennis--DCPA Region 1

Maxwell, Bruce--DCPA Region 1

Noland, William--DCPA Region 2

Parrish, James--DCPA Region 2, RFO

Poe, Dwight--DCPA National Headquarters, Program Analyst, State and  
Local Readiness Division

Rametta, Thomas--Metropolitan Washington, Council of Governments,  
DCPA Region 2, NCP Planner

Rapp, Glenn--DCPA Region 4, Red Cross Advisor

Rouleau, Dorothy--DCPA Region 1

Turner, Charles--DCPA Region 3, Regional Plans Officer

**Field Interviews by DCPA-  
sponsored Research Team**

**Personnel interviewed and the positions they filled during the TMI Accident:**

Beatty, Gregg--DCPA Assignee, York County

Blosser, Thomas--EMC, Cumberland County

Brabits, John--Assistant EMC, Dauphin County

Comey, John--PEMA Public Information Officer

Crowe, Charles--PEMA NCP Planning Officer

Fisher, James--planning team member (health) Dauphin County

Frizell, Joseph--DCPA Assignee, Lancaster County

Gerottenthaler, Joel--planning team member (health) Dauphin County

Gerusky, Thomas--Director, Bureau of Radiation Protection, Pennsylvania  
Department of Environmental Resources

Gonder, Jere--EMC, Franklin County

Heckman, Lloyd—EMC, Borough of Highspire, Pennsylvania

Henderson, Oran—Director, Pennsylvania Emergency Management Agency

Hensley, James—DCPA Assignee, Lancaster County

Herr, Robert—EMC, Derry Township, Pennsylvania

Hetz, Robert—PEMA Eastern Area Office, Assignee to Lancaster County

Jackson, Leslie—EMC, York County

Knause, Mark—Administrative Assistant to Lieutenant Governor Scranton

Kuehn, Carl—PEMA Warning and Communications Officer

Lamison, Kenneth—PEMA Operations Officer

Lauer, Dennis—PennDOT

Laur, Henry—planning team member (transportation), Dauphin County

Leese, Paul—EMC, Lancaster County

Molloy, Kevin—EMC, Dauphin County

Murray, John—Warden, Dauphin County Prison

Parrish, James—DCPA Assignee, Dauphin County

Perkins, Roger—CDNARS radio operator, Dauphin County (assigned from DCPA Region 1)

Riley, Margaret—Chief of Division of Environmental Radiation, Bureau of Radiation Protection, Pennsylvania Department of Environmental Resources

Snyder, June—planning team member (health), York County

Taylor, Donald—Training Officer, Pennsylvania Emergency Management Agency

Towsey, Lawrence (Ben)—PEMA Central Area Office, Assignee to Dauphin County

## PEMA Sources

### Selected Agency Material

*Commonwealth of Pennsylvania Disaster Operations Plan.* State Council of Civil Defense, as revised, August 1978.

Taylor, Donald F. *A Study of In-Place Protection in the Commonwealth of Pennsylvania.* State Council of Civil Defense, Commonwealth of Pennsylvania, August 1978.

*The Three Mile Island Incident: A Compilation of Risk/Host County Interviews.* Pennsylvania Emergency Management Agency, July 1979.

PEMA "Action Log" 27 March--30 April 1979.

PEMA sample planning guidance and Emergency Public Information packet prepared by NCP Planning Officer and issued to PEMA Area Office personnel assigned to risk counties on 31 March 1979.

"Summary of Available Information as of April 16, 1979 Concerning: Reception Centers; Central Supply Areas; Mass Care Centers".

### PEMA Debriefing Interviews

Personnel interviewed and their home offices:

Aldrich, Harold--DCPA Region 2

Beatty, Gregg- DCPA Region 2

Daugherty, Joseph--PEMA, Western Area Office

Frizell, Joseph DCPA Region 2

Hensley, James- DCPA Region 2

Hetz, Robert - PEMA, Eastern Area Office

Noland, William-- DCPA Region 2

Parrish, James DCPA Region 2

Stimel, Robert- PEMA, Central Area Office

Towsey, Lawrence --PEMA, Central Area Office

Zelinsky, John--DCPA Region 2



## Selected Risk and Host County Sources

### Risk Counties

Pre-TMI evacuation/emergency plans for the following Pennsylvania counties:

Dauphin  
York  
Lancaster

Post-TMI evacuation plans for the following Pennsylvania counties:

Dauphin  
York  
Lancaster  
Cumberland

### Host Counties

Emergency plans, including some reception/care plans, for the following Pennsylvania counties:

Bedford	Luzerne
Bucks	Mifflin
Chester	Montgomery
Clinton	Northumberland
Columbia	Somerset
Franklin	Union

### NRC Sources

U.S. Nuclear Regulatory Commission. *Domestic Licensing of Production and Utilization Facilities* (Title 10, Chapter 1, Code of Federal Regulations--Energy, Part 50). U.S. Nuclear Regulatory Commission, November 10, 1978.

U.S. Nuclear Regulatory Commission. *Emergency Planning for Nuclear Power Plants*, Regulatory Guide 1.101, Revision No. 1. U.S. Nuclear Regulatory Commission, March 1977.

U.S. Nuclear Regulatory Commission, Office of International and State Programs. *Guide and Checklist for the Development of State and Local Government Radiological Emergency Response Plans in Support of Fixed Nuclear Facilities*, Nureg-75/111. Washington: U.S. Nuclear Regulatory Commission, March 1977. (Reprint of. U.S. Atomic Energy Commission. WASH-1293, Revision No. 1, December 1974.)

U.S. Nuclear Regulatory Commission. *Reactor Site Criteria* (Title 10, Chapter 1, Code of Federal Regulations-Energy, Part 100). U.S. Nuclear Regulatory Commission, April 30, 1975.

U.S. Nuclear Regulatory Commission, Office of Inspection and Enforcement. *Investigation into the March 28, 1979 Three Mile Island Accident by the Office of Inspection and Enforcement*, Nureg-0600. Washington: U.S. Nuclear Regulatory Commission, August 1979.

U.S. Nuclear Regulatory Commission and U.S. Environmental Protection Agency Task Force on Emergency Planning. *Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants*, Nureg-0396/EPA 520/1-78-016. Washington: U.S. Nuclear Regulatory Commission, Office of State Programs and U.S. Environmental Protection Agency, Office of Radiation Programs, December 1978.

#### Other Sources

##### Books and Published Reports

Comptroller General of the United States. *Report to the Congress: Areas Around Nuclear Facilities Should be Better Prepared for Radiological Emergencies*, EMD-78-110. United States General Accounting Office, March 30, 1979.

Congressional Budget Office. *Delays in Reactor Licensing and Construction: The Possibilities of Reform*, Background paper. Congress of the United States, Congressional Budget Office, March 1979.

National Governors' Association. *Comprehensive Emergency Management: A Governor's Guide*. Washington: National Governors' Association, March 1979.

National Governors' Association. *1978 Emergency Preparedness Project: Final Report*. Washington: National Governors' Association, December 1978.

Nuclear Energy Policy Study Group. *Nuclear Power Issues and Choices*. Cambridge, Massachusetts: Ballinger Publishing Co. for the Ford Foundation, 1977.

Rosenthal, Murray, *The Role of Citizens Band Radio Service and Travellers Information Stations in Civil Preparedness Emergencies*. Santa Monica, California: System Development Corporation, May 15, 1978.

U.S. Atomic Energy Commission. *The Safety of Nuclear Power Reactors (Light Water Cooled) and Related Facilities (Draft)* WASH-1250. U.S. Atomic Energy Commission, December 1972.

U.S. Bureau of the Census. *Census of Population: 1970, General Population Characteristics*, Final Report PC (1)-B40, Pennsylvania. Washington: U.S. Government Printing Office, 1971.

U.S. Bureau of the Census. *Census of Population: 1970, General Social and Economic Characteristics*, Final Report PC (1)-C22, Maryland. Washington: U.S. Government Printing Office, 1972.

U.S. Bureau of the Census. *Census of Population: 1970, General Social and Economic Characteristics*, Final Report PC (1)-C40, Pennsylvania. Washington: U.S. Government Printing Office, 1972.

U.S. Congress, House, Committee on Government Operations. *Emergency Planning Around U.S. Nuclear Powerplants: Nuclear Regulatory Commission Oversight*, Fourth Report by the Committee on Government Operations, House of Representatives, 96th Congress, 1st Session, Submitted: August 8, 1979. Washington: U.S. Government Printing Office, 1979.

U.S. Congress, House, Committee on Interior and Insular Affairs, Subcommittee on Energy and the Environment. *Accident at the Three Mile Island Nuclear Powerplant*, oversight hearings before a task force of the Subcommittee on Energy and the Environment of the Committee on Interior and Insular Affairs, House of Representatives, 96th Congress, 1st Session, May 9, 10, 11 and 15, 1979. Washington: U.S. Government Printing Office, 1979.

#### **Newspapers**

The following Harrisburg newspapers were reviewed for TMI related stories:

*The Patriot* 28 March to 15 August 1979

*The Evening News* 28 March to 15 August 1979

*The Saturday Patriot News* 2 April to 12 August 1979

**Miscellaneous**

American Red Cross, "Initial Action Narrative: Pennsylvania Nuclear Accident (DR-014)."

American Red Cross, "Mass Care Report (DR-014), 10 April 1979".

American Red Cross, packet of sample organizational material used in the TMI incident.

American Red Cross, After Action Reports of Red Cross personnel assigned to the TMI incident.

Metropolitan Edison Company, "Three Mile Island Site Emergency Plan," Appendix 13A to Metropolitan Edison Company's Operating License application for Three Mile Island, Unit 2 as submitted to the NRC Division of Reactor Regulation; Amendment No. 65, 11 May 1978.

President's Commission on the Accident at Three Mile Island: Selected testimony.

## ACTIVITIES OF THE FEDERAL DISASTER ASSISTANCE ADMINISTRATION IN THE TMI ACCIDENT

[This account of FDAA's role in the TMI Accident appeared as: U.S. Department of Housing and Urban Development, Federal Disaster Assistance Administration, *Disaster Information*, HUD499-11-FDAA, June 1979.]

### **Nuclear Reactor Disaster: A Peril Which Can Happen - and Nearly Did at Three Mile Island, Pennsylvania**

Presently, 70 nuclear-power electric generators operate at 48 sites around the country. An additional 92 such generators are under construction - some at existing sites, others at new ones.

Since the beginning, a debate has flickered with greater and lesser intensity: There is a danger to public safety if a reactor malfunctions, versus a reassuring attitude that the danger of serious malfunction is extremely remote. The trouble at the Three Mile Island reactor in Pennsylvania during the spring of 1979 caused the safety debate to flare with renewed intensity.

It became intense because a million people live within 30 miles of the facility, nearly 2 million live within 50 miles. Nationwide, 20 million Americans live within 30 miles of a reactor; 10 million live within 20 miles. As new reactors begin to operate, those population levels are likely to increase.

The problem at the Three Mile Island reactor was solved initially, however, when not much was known about the peril to nearby population, evacuation was a seriously considered option. That raised questions of staggering magnitude: Where would people go? How? What would happen when they reached their destination?

This issue of *Disaster Information* does not deal with the scientific and technological matters which may - and should - be considered carefully. Its purpose is to assess the civil response to the event. The Federal Disaster Assistance Administration (FDAA), along with the Pennsylvania Emergency Management Agency (PEMA), was involved in the Three Mile Island situation from its beginning. As FDAA Administrator William H. Wilcox told the President's Commission on the Accident at Three Mile Island on April 26, "... some preparedness lessons, perhaps also applicable to other places and times, now appear evident from the TMI emergency."

Other parts of this bulletin will sketch in some detail:

- Administrator Wilcox's recommendations to the Commission
- A report by Robert J. Adamcik, Director, FDAA Region III, designated by the White House as Lead Federal Official at Three Mile Island, who worked in the field to organize and operate the Federal emergency-management response
- The recollections of William B. Belford, who was in charge of

the FDAA Washington Operations Center during the Three Mile Island crisis.

- A brief overview of the nature of current State disaster legislation which might apply in situations similar to those at Three Mile Island.

"Because of the potential seriousness of these events," Administrator Wilcox said, "we at FDAA believe that each State, region and locality which might be called upon to deal with the aftermath of a nuclear accident should review carefully its authority and planning readiness now." Wilcox added, "Should the worst occur, and we pray it will not, prompt, effective State regional and local response may well be the key to saving many lives."

### **FDAA Lead Federal Official At The Scene Remembers Events at Three Mile Island**

By Robert J. Adamcik  
Director, FDAA Region III

The Federal Disaster Assistance Administration (FDAA) Region III office in Philadelphia was notified on Wednesday, March 28, 1979 by FDAA headquarters in Washington, D.C. that a nuclear reactor at the Three Mile Island electric generating plant near Harrisburg, Pennsylvania had developed problems and was leaking radioactive material.

A member of my staff asked the Pennsylvania Emergency Management Agency (PEMA) for a report on the situation. Specific details were scarce, but PEMA replied there was no immediate need for alarm. We continued to monitor the situation with the State on March 28 and 29.

PEMA officials did not expect that a request for a major-disaster or an emergency declaration would be forthcoming from the Governor and he did not request our presence at the scene.

An unexpected radioactive release occurred on Friday, March 30, at approximately 9:10 a.m., which changed the complexion of the situation. A meeting was convened immediately at the White House to discuss the situation.

At that meeting, several decisions were made. One involved my appointment by the White House as the Lead Federal Official at the scene, and I was ordered to go immediately to Harrisburg.

All FDAA Regional Directors were briefed by Administrator Wilcox on the situation that day and informed of my appointment. I convened subsequently a Regional staff meeting on March 30 in Philadelphia to organize a Federal response team and then left immediately for Harrisburg, arriving at about 11 p.m. on Friday night. I carried a memorandum from the Administrator and approval by the White House setting out my primary responsibilities and covering a number of specific assignments.

My primary responsibility was to organize the Federal emergency-management response to support an emergency evacuation should the situation deteriorate to a point making that necessary. My assignment was extremely sensitive, since the consequences of an unnecessary, hasty evacuation could have resulted in needless threats to health and safety. Consequently, I maintained a low profile.

The White House had given me all the authority which would have vested normally in a Federal Coordinating Officer (FCO) in a declared disaster situation. I was to report directly to the White House through the FDAA Operations Center in Washington.

In Harrisburg, I established a field office at the same location as the PEMA office. My staff included 10 FDAA personnel plus technical advisors from the Defense Civil Preparedness Agency (DCPA), the Federal Preparedness Agency (FPA), the General Service Administration (GSA), the Department of Defense (DOD) and the American National Red Cross (ANRC). I also established liaison with some 25 other Federal agencies which would be called upon to provide assistance to an evacuation operation.

I met first with Col. Oran K. Henderson, Director of PEMA, and members of his office staff. I met next with Governor Richard L. Thornburgh, who explained that he had given three members of his staff responsibility for coordinating all State relief efforts. They were Lt. Gov. William W. Scranton, III, Secretary of Budget and Administration Robert C. Wilburn and Maj. Gen. Richard M. Scott, Adjutant General. I established quickly a close working relationship with these people. I talked also with Harold E. Denton, representing the Nuclear Regulatory Commission (NRC) on the scene, and he assigned a staff member as his liaison with my office.

Three Mile Island was a unique situation, and many of the traditional roles of FDAA staff in a disaster situation had to be modified considerably. Normally, an FCO maintains high visibility, but in this case my Public Information Officer (PIO), Robert H. Blair, Jr., head of the FDAA Office of Emergency Information, turned out to be more of a media consultant. Many of the questions we received had to do with technical problems at the plant. We had to be very careful not to deal with these matters, because Mr. Denton was the authorized spokesman where technical problems were concerned. My PIO set up a working relationship with the Governor's press secretary, Mr. Denton's public affairs officer and the White House, so that all media inquiries could be directed to the proper source. This was true to a degree where Congressional inquiries and reports as well were concerned. However, everything relating to emergency management - press releases, Congressional inquiries and reports - was coordinated by my office.

There were two Federal teams at the scene: Team "A," headed by NRC, which was responsible for technical coordination at the plant and environmental monitoring around the plant, and Team "B," headed by FDAA, whose task was to coordinate all emergency-management support agencies. The teams had to work together closely, because evacuation planning depended upon conditions at the plant at any given time. Thus, technical data affecting the health and safety of the surrounding population had to be reworded into understandable language.

I attended daily briefings with the Governor and Mr. Denton. At no time did we assume a Federal takeover of the evacuation planning. The plan remained at all times within the control of local and State officials. The Federal role was to address unmet needs, which were furnished and explained to us daily by the State as planning continued to be refined. Representatives of DCPA were available in each of the six affected counties, however, and furnished technical help to county planners. John W. McConnell, Assistant Director, Plans and Operations, DCPA, was given authority by the White House to help with evacuation planning. He went with me to briefings with the Governor and was invaluable in his role.

The State had a five-miles-radius evacuation plan "on the books." On March 30, it began to develop 10-miles- and 20-miles-contingency plans, as the situation at the plant grew more critical. The 20-miles plan would have involved the evacuation of some 700,000 people.

The "unmet needs" identified by the State for Federal assistance involved requirements such as doctors, nurses, ambulances, aircraft, cots and blankets. These resources were identified and made available within reasonable time from the military, the Department of Health, Education and Welfare and the Red Cross. Other Federal agencies, such as the Federal Aviation Administration and the Federal Highway Administration, assisted with advice on air-traffic control and evacuation routes.

My office also coordinated requests from Team "A," the technicians at the plant, for equipment and material. I was supported in this by the FDAA Operations Center in Washington, which worked with the military and others. Help included fast delivery of equipment and material to the plant at Three Mile Island.

I held daily coordination meetings with representatives of other Federal agencies to make sure they were aware of the current situation. I also asked for daily reports on their activities and the results of their research to identify Federal resources to support an evacuation. An NRC representative also attended my meetings. I reminded the group that daily questions regarding nuclear matters, environmental testing at the plant and the health sciences should be directed to the appropriate agencies, not to me. I did not establish a relationship with the operator of the plant, Metropolitan Edison Company, because the NRC had already done that.

In my daily meetings with the Governor and his staff, a variety of concerns was discussed. Among them was the possible need for fallback-headquarters locations if a 20-miles-radius evacuation had to be ordered. We agreed that my operation and the Governor's office would relocate in Philadelphia. Most NRC

scientists were to move probably to Emmitsburg, Maryland. PEMA officials would have to remain nearer the scene. I continued to impress upon the Governor that while the operation might be in its planning phase, we were ready to provide quick operations support that became necessary.

By far, the bulk of total funds were being spent by Team "A." Team "B" operated on a much more modest scale.

A general evacuation never was ordered. However, the Governor did urge children five years old and under and pregnant women within a five-mile radius of the plant to leave the area. Additional voluntary evacuations also took place. Estimates are that up to 50 percent of the population left the area.

The situation at the plant was critical during the first few days. A hydrogen bubble formed inside the reactor, delaying its cooling down and bringing threats of explosion, meltdown and radioactive-gas emissions. Hourly monitoring led the Governor to believe by April 9 that the need for mass evacuation had become increasingly remote. Therefore, he withdrew publicly his advisory to children and pregnant women, which allowed them to return home. Schools were reopened at the same time.

State and Federal management agencies continued to maintain a high level of evacuation readiness, however, and refined their plans. I assured the Governor that a Federal presence would remain until a cold shutdown of the plant had occurred. The Governor did not have to request a major disaster or emergency declaration.

NRC reported the equivalent of a cold shutdown on April 28. I closed my field office and continued to monitor the situation from Philadelphia. The FDAO Operations Center in Washington continued to handle requests from NRC for technical equipment. The Environmental Protection Agency (EPA) was assigned the responsibility for long-term monitoring of environmental conditions around the plant. I arranged a meeting between the Governor and the chairman of the Federal Regional Council to begin working on long-term economic recovery.

The FDAO agreed to help the Governor's office devise and carry out a critique of the Three Mile Island exercise as it related to emergency management. NRC, FDAO, DCPA and other concerned Federal agencies also are engaged in long-term planning reassessments for response to nuclear incidents in the wake of Three Mile Island. Scientific studies likewise are underway at the plant, a Presidential commission is conducting hearings and Congressional committees are investigating the matter.

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#### **FDAO Administrator Wilcox Tells Presidential Commission Major Policy Findings Needed on Radiological Accidents**

In his testimony before the President's Commission on the Accident at Three Mile Island on April 26, FDAO Administrator William H. Wilcox said:

"A Presidential commission has an opportunity to . . . review the overall policy perspective. I hope you will present to President Carter no more than a half dozen clear and simple major policy

findings and recommendations, supported by such extensive documentation as may be required.

"In fact, the six functions assigned to the commission by President Carter provide primarily the foundation needed for addressing the broad issues the March-April radiological incident at Three Mile Island raises. This testimony deals largely with the issue of preparedness raised by . . . the commission's charter. . . .

" . . . I respectfully suggest the following initial findings which can be subject to later verification. I certainly would be prepared to defend them here under questioning:

"1. The Nuclear Regulatory Commission lacks both the carrot (dollars) and the stick (authority) to encourage adequate State and local preparedness for radiological accidents.

"2. Many of the assurances provided by public agencies to Metropolitan Edison as to available resources in the case of a radiological incident at TMI were so much bureaucratic boilerplate and were not always relevant to actual capability.

"3. Annex E, Nuclear Incidents (Fixed Facility), of the Commonwealth of Pennsylvania Disaster Operations Plan is so vague as to be of little value.

"4. The pre-emergency coordination between county civil defense organizations was weak and inadequate.

"5. The area and population contemplated for evacuation was much greater in actuality than that provided for in the pre-emergency plans.

"6. Responsible Federal agencies have not given sufficient priority to the prompt review of State Radiological Emergency Response Plans.

"I respectfully suggest that pre-emergency planning and readiness require coordination, cooperation and communication. The need for these three C's in other types of community and area planning, such as highway planning, economic development and health and hospital planning, has been demonstrated by experience decades ago, and TMI may well have demonstrated the need for this type of planning and readiness structure in emergency operations, too. While the Federal Government must be sensitive to State and local laws and customs, it should, in my view, set the framework requirements for a specialized, regionalized, coordinated, emergency-response structure, designed in detail by the State's Governor or legislature.

"The creation and effective planning by such a governmental or quasi-governmental agency should be a prerequisite for a licensee to operate a new nuclear power plant and should be required, after a reasonable time span, of existing plants as a condition of continued operation. . . .

"With respect to either emergency planning or operations, no advisory commission can compel effective plans and readiness. The commission, however, can suggest a structure that will encourage coordination, cooperation and communication. What I have proposed here will, in my view, do just that."

## **FDA Washington Operations Center Was Vital Link During Crisis Period**

Information about the Federal Disaster Assistance Administration (FDAA) "normal" disaster activities flows through its Operation Center in Washington, D.C. Work at the Operations Center took on a new urgency during the Three Mile Island nuclear accident.

The Operations Center, which functions routinely on an around-the-clock basis, was the link between preparedness activity in the field, the coordination efforts of FDAA headquarters staff and the White House, which was involved intimately as events near Harrisburg unfolded.

William B. Belford, Chief of the FDAA Reports and Evaluation Staff, was in day-to-day charge of the Center. In this interview, he recalls one of the Center's more tension-filled periods:

**What, exactly, was the Operation Center's function during the trouble at Three Mile Island?**

Administrator Wilcox had been asked to be the White House's eyes and ears. So we kept a very close watch on what was going on. One of the most important things we could do at the Operations Center was intercede with the Department of Defense (DOD) and other Federal agencies whose resources or technical experts were required.

**What were some specific things you did?**

We decided to install a liaison operation with the Nuclear Regulatory Commission (NRC) at its headquarters in Bethesda, Maryland. The NRC staff would develop their requirements from other agencies - principally transportation. Samples from the TMI plant had to be flown elsewhere to be analyzed, for instance. NRC had no relationship with DOD, so we served as intermediary setting up flights.

One day we were looking for respirators of a certain type for people who had to enter the contaminated area. We finally found them at the Bureau of Mines and had them flown in from Pittsburgh.

**Anything else come to mind?**

For ten days, daily reports on the situation went to Jack Watson, Assistant to the President for Intergovernmental Affairs, who was handling this at the White House for the President, and others concerned. That was another responsibility of the Operations Center - pulling those reports together.

**Did you put together any kind of contingency evacuation plan?**

No. That was a State responsibility.

**Were there any plans for temporary housing on a standby basis?**

Those matters were developed by the State, working with the Defense Civil Preparedness Agency (DCPA). Had the thing escalated and a 20-miles-radius evacuation been ordered, we

might have been in the temporary-housing business. Initially, the State and DCPA were concerning themselves with evacuation to armories, civic centers, schools, motels.

We did look at our own problem, the evacuation of Federal people - technicians and so forth. Where would we put them if they had to back away from Three Mile Island? We made contingency arrangements with Carlisle Barracks in Pennsylvania and with the National Fire Academy at Emmitsburg, Maryland. Our man near the site, Bob Adamcik, was going to move his operation to Philadelphia with the State government if necessary.

**Did you try to predict how far the leakage from the plant might spread?**

At the beginning, we looked for a fallout "footprint." Administrator Wilcox and I went out to the National Weather Service and discovered you really can't do that too well. It's an hourly proposition. It got a little sticky in there for a while. We couldn't answer the question. They have meteorologists on the staff, and were working with a couple of universities around the country. There are models - simulation models - which can give you projections and data of that kind, but none is too accurate because of all the variables involved. So, who knows? We got more education on the subject in that short time than I ever care to have again.

**How many people were working directly with Three Mile Island at the FDAA Operations Center?**

At all times at least two, and one out at NRC in Bethesda. Between 9 o'clock in the morning and 9 o'clock in the evening, we had at least four. We kept an extensive log of our phone calls and other transactions.

The Acting Director of the Federal Emergency Management Agency (FEMA) and other agency heads were briefed in a conference phone call each afternoon. At the same time, we discussed missions laid on during the night - or canceled.

**When did you pull out of it?**

Our last direct involvement was on April 26, but Bob Adamcik was monitoring the situation to some extent from Philadelphia after that date. We're getting all our logs and reports together. We have a pretty good idea we'll be involved for a year or more.

Incidentally, during the latter days of the Three Mile Island crisis, FDAA also was conducting a dozen natural-disaster operations in various part of the Nation as the result of floods and tornadoes.

**What State Evacuation Preparations Exist For Possible Future Nuclear Incidents?**

Currently, Congress is considering an amendment to the Nuclear Regulatory Commission (NRC) 1980 budget authorization, (S.562), which would prohibit the operation of any nuclear-power plant in a State which cannot come up with an approved emergency evacuation plan within six months. As this issue of *Disaster Information* goes to press, passage of the amendment and its final provisions are not yet certain.



Sen. Gary Hart (D-Colo.), a supporter of the amendment, made a case for it, saying, "We simply should not have a nuclear plant operation in this country without a sufficient evacuation plan. This seems to me elementary, and I'm ashamed we haven't had it long ago."

The *New York Times* reported early in May that NRC officials had said that since the beginning of the nuclear-generator age the possibility of a Class 9 accident - one in which the reactor's uranium-fuel rods melt down, releasing large amounts of dangerous radiation - has not been considered seriously. The old Atomic Energy Commission (AEC) felt such concern would endanger public acceptance of nuclear energy. As time passed without serious nuclear accidents, both the AEC and its successor agency, the NRC, came to feel that a Class 9 accident was so unlikely there was no need to plan seriously for such an event. Although the Three Mile Island accident was contained before it reached Class 9, there were no guarantees during its early stages that it would be contained.

This raises a much-broader question of State preparedness generally to cope with serious nuclear accidents. A preliminary Federal Disaster Assistance Administration (FDAA) survey indicates relatively few States are in a comfortable position. A brief review of State disaster legislation generally will help set the stage for an explanation:

Before the 1970's, all States operated under some adaptation of the model Civil Defense Act, enacted during the 1950's and 1960's. These acts emphasized nuclear attack, and, according to accepted thinking, evacuation scarcely was considered among responses to such an event. Some acts gave Governors authority to compel evacuation, however, and such authority was implied perhaps in all of them, in clauses which gave a State's executive broad discretionary power in emergency situations.

Beginning about 1970, States began to adopt the Council of State Governments' model act. As of 1979, about half have done so. Despite modification in details, most versions of this act in force give the Governor power to order evacuation, through three provisions:

1. A Governor may compel evacuation of all or part of a threatened area if he deems that necessary.
2. In the process, he may prescribe routes, modes of transportation and destinations.
3. After evacuation, a Governor may control entry to and exit from a disaster area, movement within it and occupancy of premises within it.

Although a Governor's authority under the Council of State Governments act is about the same as that implied under the earlier Civil Defense Acts, the later authority is full and clear. This reduces the risk of subsequent lawsuits and makes public acceptance of an evacuation order more likely.

FDAA preparedness grants have funded virtually all State Emergency Plans (SEPs). Most of those plans contain an annex on evacuation, consisting of task assignments to State agencies. In some States, especially those exposed to hurricanes, State plans have been fleshed out with local and county plans providing in greater and lesser detail for evacuation, especially of coastal areas. SEP evacuation

annexes must be read in conjunction with other functions, such as warning, public information, shelter, feeding and welfare. The following States are among those with evacuation plans worth noting, developed under the FDAA preparedness grants:

**Virginia:** There is a State Radiological Emergency Response Plan - the only such State plan in existence. It is backed by county plans for the two counties in which nuclear reactors are located. Despite its pioneering nature, the Virginia plan may not serve as the best model for every State, however, as the two affected counties are rural, with small populations.

**Georgia:** The evacuation annex in Georgia's Natural Disaster Operations Plan is brief. However, it is backed up by an extraordinarily thorough Hurricane Evacuation Plan for coastal Georgia, which sets out in elaborate detail an evacuation system based upon multicounty units. Each coastal community has designated evacuation routes. Considerable planning has been done for reception of evacuees by host communities.

**Florida:** The State's evacuation annex is one of the most thorough. Hurricane-threatened counties are being encouraged to develop their own plans, modeled on the detailed Bay County Evacuation plan. In addition, the Corps of Engineers is helping L. Le County develop its own plan, based upon Corps experience in Barboursville, Kentucky, a community with a history of frequent flooding.

**Louisiana:** This SEP is the only one with a full-length evacuation plan. The Louisiana Division of State Police has produced a Mass Coastal Evacuation Plan, which sets out routes northward for each group of parishes on the Gulf Coast. However, the plan does not indicate whether there are local warning systems, whether there is a method for informing evacuees of which route to take, or what shelter is available in host communities. In addition, the plan appears to ignore the possibility of massive traffic congestion in the New Orleans area.

**Other States:** North Carolina, Mississippi and Alabama have coastal-county evacuation plans of varying thoroughness as backups to their State SEP's. Texas, with FDAA assistance, has prepared evacuation brochures with complete road maps for each of the seven sectors of its 375 miles of Gulf Coast and distributed more than a million during the past two hurricane seasons. California has had a Nuclear Blackmail Emergency Response Plan since 1976. It deals with a variety of nuclear threats, including detonation of nuclear devices and dispersal of radioactive material. Evacuation of large and small areas is among the responses envisaged. The Barboursville, Kentucky Evacuation Plan is one of the most meticulously designed anywhere. It provides for step-by-step action as a flood threat increases, designated evacuation routes and shelter areas, informing the community about the plan (which already has been done) and detailed job sheets for each involved public official so the plan can be put instantly into effect.

Obviously, none of those State and community evacuation plans can be transposed intact to meet the threat of nuclear accident. For better or worse, however, they represent the state of the art of evacuation planning in this country at present. Experience in designing them and in using them where they have been used is the best foundation for devising badly needed plans for evacuation in the event of serious nuclear accident.

As responses develop to the might-have-been peril which could have occurred at Three Mile Island, there are literally no other points from which to start.

**FEDERAL AGENCIES SUPPORTING THE COMMONWEALTH  
OF PENNSYLVANIA DURING THE TMI ACCIDENT**

(listed alphabetically)

Defense Civil Preparedness Agency

Department of Agriculture

Department of Defense

Department of Energy

Department of Health, Education and Welfare

Department of Housing and Urban Development

Department of Transportation

Department of the Treasury

Environmental Protection Agency

Federal Aviation Administration

Federal Disaster Assistance Administration

Federal Highway Administration

Federal Preparedness Agency

General Services Administration

Internal Revenue Service

Nuclear Regulatory Commission

Postal Service

Veterans Administration

## ABBREVIATIONS AND ACRONYMS

AEC	(U.S.) Atomic Energy Commission
BRH	(Pennsylvania) Bureau of Radiological Health
BRP	(Pennsylvania) Bureau of Radiation Protection
CDNARS	Civil Defense National Radio System
CDNATS	Civil Defense National Teletype System
CRP	Crisis Relocation Planning
DCPA	Defense Civil Preparedness Agency
DER	(Pennsylvania) Department of Environmental Resources
DOE	(U.S.) Department of Energy
EBS	Emergency Broadcast System
ECCS	Emergency Core Cooling System
EDO	(NRC) Executive Director of Operations
EMC	(county or local level) Emergency Management Coordinator
EMT	(NRC) Emergency Management Team
EOC	Emergency Operations Center
EPA	(U.S.) Environmental Protection Agency
EPO	(NRC) Emergency Planning Officer
FDA	(U.S.) Food and Drug Administration
FDAA	Federal Disaster Assistance Administration

**Abbreviations and Acronyms**  
(continued)

<b>FEMA</b>	<b>Federal Emergency Management Agency</b>
<b>FPA</b>	<b>Federal Preparedness Agency</b>
<b>FRRPPNE</b>	<b>Federal Radiological Response Plan for Peacetime Nuclear Emergencies</b>
<b>HEW</b>	<b>(U.S. Department of) Health, Education and Welfare</b>
<b>HF</b>	<b>High-frequency (radio)</b>
<b>HPI</b>	<b>High Pressure Injection</b>
<b>IE</b>	<b>(NRC Office of) Inspection and Enforcement</b>
<b>IRACT</b>	<b>(NRC) Incident Response Action Coordination Team</b>
<b>MARS</b>	<b>Military Amateur Radio System</b>
<b>MetEd</b>	<b>Metropolitan Edison (Company)</b>
<b>MOBDES</b>	<b>(military reserve) Mobilization Designee</b>
<b>mr</b>	<b>millirem</b>
<b>NAWAS</b>	<b>National Warning System</b>
<b>NCP</b>	<b>Nuclear Civil Protection</b>
<b>NRC</b>	<b>(U.S.) Nuclear Regulatory Commission</b>
<b>NRR</b>	<b>(NRC Office of) Nuclear Reactor Regulation</b>
<b>NWS</b>	<b>National Weather Service</b>
<b>OSHA</b>	<b>(U.S.) Occupational Safety and Health Administration</b>
<b>PAARNG</b>	<b>Pennsylvania Army National Guard</b>

**Abbreviations and Acronyms**  
(continued)

<b>PAPIPAG</b>	<b>Pennsylvania Plan for the Implementation of Protective Action Guides (same as PIPAG)</b>
<b>PDOP</b>	<b>Pennsylvania Disaster Operations Plan</b>
<b>PEMA</b>	<b>Pennsylvania Emergency Management Agency</b>
<b>PennDOT</b>	<b>Pennsylvania Department of Transportation</b>
<b>PIPAG</b>	<b>Plan for the Implementation of Protective Action Guides (same as PAPIPAG)</b>
<b>psi</b>	<b>pounds per square inch</b>
<b>PSP</b>	<b>Pennsylvania State Police</b>
<b>RACES</b>	<b>Radio Amateur Civil Emergency Service</b>
<b>RADEF</b>	<b>Radiological Defense</b>
<b>R/C</b>	<b>Reception/Care</b>
<b>REACT</b>	<b>REACT International Incorporated (an organization of CB radio amateurs)</b>
<b>RERP</b>	<b>Reactor Emergency Response Plan</b>
<b>SITREP</b>	<b>Situation Report</b>
<b>TMI</b>	<b>Three Mile Island Nuclear Station (power plant)</b>
<b>USACC</b>	<b>U.S. Army Communications Command</b>

U.S. GOVERNMENT PRINTING OFFICE : 1980 O-634-819/689