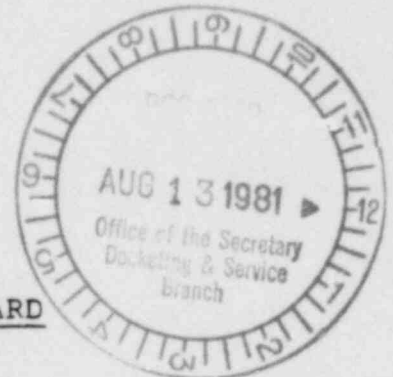


Lic 8/13/81

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD



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

VOLUME ONE OF:

LICENSEE'S PROPOSED FINDINGS OF FACT
AND CONCLUSIONS OF LAW ON
EMERGENCY PREPAREDNESS ISSUES

SHAW, PITTMAN, POTTS & TROWBRIDGE

George F. Trowbridge
Robert E. Zahler
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Counsel for Licensee

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I. INTRODUCTION

A. Preliminary Statement

1. "Recognized deficiencies in emergency plans" was one of the bases underlying the Commission's decision to suspend Licensee's operating authority for TMI-1. CLI-79-8, 10 N.R.C. 141, 143 (1979). Accordingly, the Commission directed this Board to consider the necessity and sufficiency of both the short-term and long-term emergency preparedness actions it was requiring of Licensee. 10 N.R.C. at 144, 145. The nature of our inquiry has had to be altered on occasion in order to

reflect properly ongoing Commission changes in emergency preparedness regulation and policy.¹ Despite some early uncertainties and dispute among the parties as to the correct scope of inquiry into emergency preparedness issues, the Board is confident from its review of the extensive record created in this area that it has conducted a comprehensive and plenary review of both onsite and offsite emergency preparedness at TMI.²

2. Intervenor contentions on emergency preparedness issues were due initially on October 22, 1979. Both in its written response to those contentions and at the first special prehearing conference, Licensee took the position that the initial set of contentions should be made more specific and

1 We believe this part of our Recommended Decision constitutes the initial consideration any of the Commission's licensing boards has given to emergency preparedness under the Commission's new regulations. To our knowledge, the only other pronouncement by a licensing board on emergency preparedness issues under the new rule is that included in the recently issued partial initial decision in Pacific Gas & Electric Co. (Diablo Canyon Nuclear Plant, Units 1 & 2), Docket Nos. 50-275 and -323, on July 17, 1981. Due to the factual setting of the Diablo Canyon decision, the licensing board there found no need to address all aspects of the new emergency preparedness regulations.

2 We invite the Commission to review both the prehearing and hearing phases of this proceeding relating to emergency preparedness because the Board believes that there may be methods other than traditional adjudication better suited to dealing with the emergency preparedness concerns raised in this proceeding. Memorandum and Order on Revised Emergency Planning Contentions, November 12, 1980, at 16-20; see, e.g., Tr. at 4495-97, 4499, 4511-17, 22697-98 (Chairman Smith).

revised following service of the upgraded emergency plans. The Board adopted this approach and set December 19, 1979, as the date for filing revised contentions on emergency preparedness issues. See Tr. at 864; First Special Prehearing Conference Order, December 18, 1979, at 18, 10 N.R.C. 828, 835. Board rulings on the admission of emergency preparedness contentions are contained in our Third and Fourth Special Prehearing Conference Orders, January 25 and February 29, 1980.

3. On June 10, 1980, Licensee served revised versions of its emergency plan, and those of the Commonwealth and the five risk counties of Dauphin, York, Lancaster, Cumberland and Lebanon. Because we viewed the revised plans as constituting a substantial change, the Board sua sponte issued an Order temporarily suspending intervenors' obligations to file new contentions on the revised emergency plans. Order of June 19, 1980.

4. On July 11, 1980, Licensee conducted a meeting among the parties for the purpose of reviewing the revisions to the emergency plans, answering questions about the plans, and otherwise assisting in the contention framing process. See Licensee's Report on Emergency Planning Meeting, July 14, 1980. Subsequently, the Board resumed activities on emergency preparedness matters. Order of July 15, 1981. Revised contentions were due on September 8, 1980, and a two-day prehearing conference was held on November 30-31, 1980. The Board ruled

orally on the admissibility of all emergency preparedness contentions at this prehearing conference and later issued an order confirming our rulings. Order of November 12, 1980.

5. At our request, see Tr. at 5113-14, Licensee compiled a listing of all admitted contentions, which was served on the parties on January 30, 1981. The Board adopted this listing during the hearing session on February 25, 1981. Tr. at 13674-76.

6. As part of the prehearing phase on emergency preparedness issues, the Board directed all parties to meet for the purpose of simplifying the issues. As we observed at the time, this is a traditional aspect of litigation and the Board was concerned that the large number of emergency preparedness contentions might frustrate a complete adjudication of the significant issues. Order of November 12, 1980, at 18-19; see also Orders of November 14 and 25, and December 11, 1980. While meetings were held, no significant progress was made in simplifying the issues or eliminating some of the complex and overlapping contentions. In this regard, the Board found that intervenors were, to a large extent, in default, and accordingly ordered that with respect to offsite emergency preparedness issues there be a limited consolidation among the intervenors. Tr. at 13691-92 (Chairman Smith); Order of March 4, 1981.

7. At no time during the proceeding did intervenors ever present the Board with a workable organization of their

contentions. Given that there were over 100 such contentions, many of which overlapped or were internally inconsistent, the Board finds it inexcusable that intervenors did not further assist in organizing their concerns about emergency preparedness. The situation was made even more difficult, because in many cases the numerous contentions did not even identify the true concerns of the intervenors. On occasion the Board permitted inquiry into areas not identified by the contentions. The Board is, of course, cognizant that such flexibility prejudices Licensee's right to notice of the issues to be litigated. We have attempted to strike an appropriate balance by not requiring a highly detailed or specific response to litigated issues not fully specified by contentions. This approach is consistent with our early admonition to the parties that where contentions were not specified fully, the Board could not, and would not, hold the responding parties to a high degree of proof. E.g., First Special Prehearing Conference Order, December 18, 1979, at 22-23, 10 N.R.C. 828, 837; Memorandum and Order on Licensee's Motion for Sanctions Against Environmental Coalition on Nuclear Power, June 12, 1980, at 8-9, 21, 11 N.R.C. 893, 897, 904.

8. The other preliminary matter that bears mention is the standard adopted by the Board in assessing the adequacy of emergency preparedness around TMI. While there was much debate on this issue, Commission regulatory action eventually

clarified the appropriate standard. As of April 1, 1981, the Commission's new emergency preparedness regulations became effective (except for the prompt alerting requirements which became effective on July 1, 1981). 10 C.F.R. § 50.54(s)(2). The Board therefore has used the new rule in determining the adequacy of the onsite and offsite emergency plans. That rule requires Licensee to "follow and maintain in effect emergency plans which meet the standards in § 50.47(b) and the requirements in Appendix E of this Part [50]." 10 C.F.R. § 50.54(q). In conducting its review of the emergency plans, the Board is instructed specifically by the new rule as follows (10 C.F.R. § 50.54(s)(3)):

The NRC will base its findings on a review of the FEMA findings and determinations as to whether State and local emergency plans are adequate and capable of being implemented, and on the NRC assessment as to whether the licensee's emergency plans are adequate and capable of being implemented.

In preparing this part of our Recommended Decision, we have, of course, followed this rule.

9. Two of the contentions advanced by intervenor ANGRY relate to the standards for assessing the adequacy of emergency plans.³ To the extent Contentions EP-3(A) and EP-3(B) assert that standards other than those specified in 10 C.F.R.

3 ANGRY Contentions EP-3(A) and EP-3(B) are as follows:

The conditions set forth in the NRC's August 9 Order (44 F.R. 47821-25) for TMI-1's resumption of operation are insufficient to provide reasonable
(footnote continued next page)

§ 50.47(b) and Part 50, Appendix E, be used in evaluating the emergency plans, the Board rejects the contention.⁴ However,

(continued)

assurance that such resumption can occur without endangering the public health and safety for the reason that they fail to require the development and effectuation of adequate and effective Radiological Emergency Response Plans to protect the population surrounding TMI-1 from the consequences of any future nuclear accident. Such insufficiency is in particular demonstrated by the following flaws:

3(A) There is no requirement that restart be conditioned on the Radiological Emergency Response Plan of the Commonwealth of Pennsylvania being brought into compliance with reasonable standards of adequacy and effectiveness for such plans which include but are not limited to standards promulgated by the NRC itself (e.g., NUREGs 75/111 and 0396; GAO EMD-78-110; H.R. Rept. 96-413);

3(B) There is no requirement that restart be conditioned on the Radiological Emergency Response Plans of local governmental units (counties) surrounding the reactor site being brought into compliance with reasonable standards of adequacy and effectiveness for such plans which include but are not limited to standards promulgated by the NRC itself. (See paragraph (A)).

4 The NRC and FEMA have developed a joint guidance document to assist nuclear facility operators, state and local governments in developing emergency plans consistent with the regulatory standards. See "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants", NUREG-0654/FEMA-REP-1 (Rev. 1, November 1980), Staff Ex. 7.

construed as suggesting that the Commonwealth and five risk county plans be "brought into compliance with reasonable standards of adequacy and effectiveness," the Board agrees with the thrust of the contentions. The reasonable standards of adequacy and effectiveness are by force of law the Commission's new emergency preparedness regulations.

10. The record of the hearing on emergency preparedness issues includes the written and oral testimony of witnesses presented by Licensee, the NRC Staff (including officials from the Federal Emergency Management Agency ("FEMA")), the Commonwealth of Pennsylvania, and intervenors ANGRY, ECNP and Mrs. Aamodt. In addition, at the request of ANGRY, and to ensure a complete record, the Board called as its own witnesses the emergency management coordinators from York and Dauphin Counties. Among the exhibits received which are relevant to emergency preparedness issues are: (a) GEN Nuclear Emergency Plan for TMI-1, Rev. 3, January 1981 ("Licensee's Emergency Plan"), Lic. Ex. 30; (b) Licensee's "Evacuation Time Estimates for the Plume Exposure Pathway EPZ of Three Mile Island Nuclear Generating Facility", Lic. Ex. 52; (c) Commonwealth of Pennsylvania Disaster Operations Plan, Annex E, Fixed Nuclear Facility Incidents, February 23, 1981 ("Commonwealth Emergency Response Plan"), Pa. Ex. 2(a) and 2(b); (d) radiological emergency response plans for the counties of York, Dauphin, Cumberland, Lancaster and Lebanon, Board Ex. 5-9; (e)

twenty-five municipal-level emergency response plans, Board Ex. 13; (f) the NRC Staff's Restart SER, Staff Ex. 1; (g) the NRC Staff's Emergency Preparedness Evaluation for TMI-1, NUREG-0746 ("EPE"), Staff Ex. 6, and Supplement No. 1 thereto, Staff Ex. 23; (h) FEMA's Interim Findings and Determinations with Attachments, Staff Ex. 18, 20 and 21; (i) NUREG-0654 and NUREG-0696, Staff Ex. 7-8; and (j) five United States Geological Survey maps depicting various demographic data about the area around TMI, Board Physical Ex. A-E. All told, 49 witnesses testified before the Board on emergency preparedness issues, two additional pieces of testimony were stipulated into evidence without cross-examination, and the whole or part of 36 hearing sessions, covering about 6,000 transcript pages, were devoted to the subject.

11. The record compiled is indeed extensive. We have organized our findings into two parts. In Sections I.B and I.C, which follow immediately, the Board considers Licensee's compliance with the short- and long-term emergency preparedness order items and with the Commission's new emergency preparedness regulations, respectively. Because the issues litigated pursuant to the intervenors' contentions cannot easily be organized in terms of either the order items or the new rule, these two sections are general and summary in nature. In Sections II.A. through II.H, infra, the Board considers each of the emergency preparedness contentions admitted in this

proceeding. We have set forth the language of each contention, or part thereof, immediately preceding our consideration of the contention or group of related contentions. As already indicated, see ¶ 7, supra, where the quoted contention does not properly frame the issue litigated by the parties, the Board has, as a matter of discretion, nonetheless proceeded to resolve the issue actually put into dispute. The material in Section II is generally organized along subject matter areas.

B. Short- and Long-Term Emergency Preparedness Order Items

12. The Commission directed that the Board consider the necessity and sufficiency of five short-term order items (10 N.R.C. at 144):

3. The licensee shall improve his emergency preparedness in accordance with the following:

- (a) Upgrade emergency plans to satisfy Regulatory Guide 1.101 with special attention to action level criteria based on plant parameters.
- (b) Establish an Emergency Operations Center for Federal, State and Local Officials and designate a location and an alternate location and provide communications to plant.
- (c) Upgrade offsite monitoring capability, including additional thermoluminescent dosimeters or equivalent.
- (d) Assess the relationship of State/Local plans to the licensee plans so as to assure the capability to take emergency actions.
- (e) Conduct a test exercise of its emergency plan.

13. The NRC Staff reviewed Licensee's Emergency Plan against these items in its initial Restart SER. Staff Ex. 1, at C3-1 to C3-5. The conclusion of the NRC Staff was that, with respect to order items 3(a) through 3(d), Licensee's Emergency Plan satisfactorily complied with the Commission's requirements. Id. As to order item 3(e), the NRC Staff indicated that it would require a test exercise of the Emergency Plan prior to restart. Id. at C3-5. That test exercise was conducted on June 2, 1981, and the NRC Staff's favorable evaluation was reported to the Board. Donaldson and Chesnut, ff. Tr. 22236. While no party to the proceeding directly challenged the NRC Staff's short-term order item findings, the Board identifies below those parts of this Recommended Decision which address the order items in greater detail.

14. Order Item 3(a) is somewhat moot in that the Commission subsequently withdrew Regulatory Guide 1.101. See 45 Fed. Reg. 69610 (October 21, 1980). Current emergency preparedness requirements are set forth in 10 C.F.R. § 50.47(b) and Part 50, Appendix E; guidance on complying with these requirements is included in NUREG-0654. The Board has undertaken a general review of Licensee's compliance with the new regulations in Section I.C, infra. Specific issues relating to the new rule are addressed throughout Section II, infra. In particular, a detailed discussion of the "attention to action level criteria

based on plant parameters" is included in Section II.B, infra. The Board finds that Licensee has complied with short-term order item 3(a).

15. As required by order item 3(b), Licensee has established a Near-site Emergency Operations Facility ("EOF"). Lic. Ex. 30, at § 4.7.2.1, p. 7-3; Rogan, et al., ff. Tr. 13756, at 21-22, 56.⁵ An alternate EOF -- the Crawford Station -- has been designated. Lic. Ex. 30, at § 4.7.2.2, p. 7-3; Rogan, et al., ff. Tr. 13756, at 22, 56. The Commonwealth of Pennsylvania, the five risk counties of Dauphin, York, Lancaster, Cumberland and Lebanon, and the various federal response organizations also have designated emergency operations centers ("EOC's"). See Lic. Ex. 30, at § 4.7.3, pp. 7-4 to 7-5; Rogan, et al., ff. Tr. 13756, at Figure 4. Adequate communications between these facilities, the plant and offsite response groups have been installed. Lic. Ex. 30, at § 4.7.5, pp. 7-6 to 7-8; Rogan, et al., ff. Tr. 13756, at 59-61, Figures 5(a)-(b). The Board finds that Licensee has complied with short-term order item 3(b). See Staff Ex. 1, at C3-3.

16. Licensee has substantially upgraded its offsite radiation monitoring capability. This includes not only the addition of new thermoluminescent dosimeter locations, but also

5 We address a dispute among Licensee, the NRC Staff, and the Commonwealth of Pennsylvania over the division of responsibilities between the EOF and the control room in Section II.A, infra.

a set of 16 real-time, remote readout monitoring devices. See Section II.B, infra. Licensee also has provided sufficient numbers of on-shift personnel, who could commence offsite radiation monitoring immediately after declaration of an emergency, and sufficient staff reporting to the site within one hour, who could augment the offsite radiation monitoring effort. See Section II.A, infra. For these reasons, the Board finds that Licensee has complied with short-term order item 3(c).

17. Short-term order item 3(d) directs Licensee to assess the relationship between its Emergency Plan and those of the state and local level "to assure the capability to take emergency actions." Licensee's Emergency Plan properly identifies the relevant state and local emergency response organizations and describes the response roles that Licensee anticipates these offsite agencies will fulfill. Lic. Ex. 30, at § 4.5.3, pp. 5-24 to 5-30. In addition, Licensee and its consultants have participated with state, county and municipal organizations in developing offsite response plans and coordinating them with Licensee's onsite plan. See generally Rogan, et al., ff. Tr. 13756, at 9-11; Tr. at 13855-58, 14712-14, 14719-20 (Rogan); Knopf, et al., ff. Tr. 21816, at 1-10, 13-14; Section II.G.14, infra. This effort has included, among other matters, agreement on the means Licensee will use to communicate with offsite agencies, see Section II.C, infra, a

uniform system of classifying accidents, see Section II.B, infra, a common set of criteria for making protective action recommendations, see Section II.F, infra, and a joint public education effort, see Section II.D, infra. These actions demonstrate compliance with short-term order item 3(d).

18. Licensee, the Commonwealth of Pennsylvania, and four of the five risk counties conducted a test exercise of their emergency plans on June 2, 1981. See Section II.H, infra. A group of NRC Staff observers evaluated Licensee's performance, while a federal interagency group under the direction of FEMA observed the state and county performance. Both groups concluded that performance during the test exercise was adequate and sufficient to demonstrate a capability to implement the emergency response plans. Donaldson and Chesnut, ff. Tr. 22236; Staff Ex. 20. Because York County did not participate in the June 2 exercise, the Board will require prior to restart that the NRC Staff certify that an adequate exercise of the York County emergency response plan has been conducted. Such an exercise is currently scheduled for August 29, 1981. Subject to this condition, the Board finds that Licensee has complied with short-term order item 3(e).

19. The Commission also directed that the Board consider the necessity and sufficiency of two long-term order items (10 N.R.C. at 145):

4. Improve emergency preparedness in accordance with the following:

- (a) Modify emergency plans to address changing capabilities of plant instrumentation.
- (b) Extend the capability to take appropriate emergency actions for the population around the site to a distance of ten miles.

20. The NRC Staff reviewed Licensee's Emergency Plan against these two long-term items in its initial Restart SEP Staff Ex. 1, at D4-1. The conclusion of the NRC Staff was that Licensee had demonstrated reasonable progress towards completion of these order items. The NRC Staff also indicated that the draft version of NUREG-0654 (for interim use and comment) had recently been issued and Licensee's Emergency Plan would be reviewed against the planning objectives of NUREG-0654. It was anticipated that this review would be reported in an Emergency Plan Evaluation. Id. This has in fact occurred. See Staff Ex. 6 and 23. The results of this review are described in Section I.C, infra.

21. With respect to long-term order item 4(a), the indicator parameters used by Licensee to trigger the emergency action levels reflect a broad and diverse set of present plant instrumentation. See Lic. Ex. 30, at Tables 21-24; Tr. at 13780-87 (Giangi). As new instrumentation is installed, Licensee has committed to modify the Emergency Plan and Emergency Plan Implementing Procedures to reflect the enhanced capabilities of this instrumentation. Lic. Ex. 30, at § 4.7.6.1.7, p. 7-18. Licensee's emergency action level tables indicate with an asterisk where such changes are contemplated.

See Lic. Ex. 30, at Tables 21-24. The Board finds that Licensee has complied with long-term order item 4(a).

22. Pursuant to the new emergency preparedness rule, plume exposure and ingestion exposure pathway emergency planning zones ("EPZ's") are defined. 10 C.F.R. § 50.54 (s)(1). For the TMI site, the plume exposure pathway EPZ, which is to be "about 10 miles (16 km) in radius" has been defined by the Pennsylvania Emergency Management Agency ("PEMA"). See Section II.E, infra. The Commonwealth of Pennsylvania and the five risk counties within the plume exposure pathway EPZ have developed emergency response plans. See Pa. Ex. 2(a) and 2(b); Board Ex. 5-9. We evaluate the adequacy of these plans in Section I.C, infra, and throughout various parts of Section II, infra. On the basis of this evaluation, the Board finds that Licensee has complied with long-term order item 4(b).

C. Compliance with Emergency Preparedness Regulations

23. The Commission's emergency preparedness regulations in 10 C.F.R. § 50.47(b) set forth 16 planning standards applicable to onsite and offsite emergency plans. The Emergency Preparedness Evaluation for TMI-1 ("EPE"), and Supplement 1 thereto, evaluate the onsite and offsite emergency plans against each of the 16 planning standards. Staff Ex. 6 and 23. With respect to the onsite emergency plan, the NRC Staff conclusion is that, with one exception,⁶ the plan

⁶ Supplement 1 to the NRC Staff EPE originally identified a second exception: the need to modify the reactor coolant (footnote continued next page)

provides an adequate planning basis for an acceptable state of Licensee's emergency preparedness and meets the planning standards of 10 C.F.R. § 50.47(b) and the criteria of NUREG-0654. Staff Ex. 23, at §§ II.K and IV, pp. II-16 and IV-1; NRC Staff Position on Emergency Preparedness for TMI-1, ff. Tr. 22881; Tr. at 22880 (Chesnut). The one exception relates to the staffing of, and decisionmaking authority residing at, Licensee's EOF. We address that matter in Section II.A, infra. In addition, while the prompt alerting system being installed by Licensee is acceptable to the NRC Staff, see Section II.D, infra, installation was not complete at the time the hearing record was closed, and the NRC Staff therefore indicated that installation should be completed prior to restart. NRC Staff Position on Emergency Preparedness for TMI-1, ff. Tr. 22881.

24. None of the intervenors' contentions explicitly alleges that Licensee has failed to comply with any of the 16 planning standards set forth in 10 C.F.R. § 50.47(b). However, if some of the allegations in the contentions were true, that might indicate that Licensee had not complied with a particular

(continued)

activity level used to declare an Alert. See Staff Ex. 23, at § II.K, p. II-6. However, the Licensee previously had committed to make this revision, Tr. at 13767-68, 14252-53 (Giangi), which apparently was overlooked by the NRC Staff. In any event, the NRC Staff has received a letter from Licensee confirming that the requested modification will in fact be made. Tr. at 22880 (Chesnut).

planning standard. In Section II, infra, we address each of the contentions relating to the adequacy of the onsite emergency plan and find none of them valid. In Section II.A, infra, we also conclude, contrary to the position urged by the NRC Staff, that the provisions made by Licensee to staff its EOF are in accord with the applicable regulations and are adequate to provide reasonable assurance that the public health and safety will be protected. Therefore, we find that the onsite emergency plan complies with each of the planning standards of 10 C.F.R. § 50.47(b).

25. In accordance with the directive of 10 C.F.R. § 50.54(s)(3), the NRC Staff based its conclusion as to the adequacy of offsite emergency preparedness on findings and determinations provided to it by FEMA. Tr. at 22883 (Chesnut). NRC Staff witness Chesnut also participated in the reviews of the offsite plans. Tr. at 22924 (Chesnut). In this proceeding the FEMA findings and determinations were provided to the NRC Staff in a document entitled "Interim Findings and Determinations". Staff Ex. 18. The "interim" label connotes only that the findings and determinations were based on the current state and county plans (which may not yet be in final form) and were rendered to the NRC Staff pursuant to a Memorandum of Understanding between FEMA and the NRC, and not pursuant to FEMA's proposed rule 44 C.F.R. Part 350.⁷ Tr. at 22527-28 (Dickey).

⁷ Proposed rule 44 C.F.R. Part 350 was published in the Federal Register at 45 Fed. Reg. 42341 (June 24, 1980). The

(footnote continued next page)

Notwithstanding that the findings and determinations were based on draft plans and were made pursuant to the Memorandum of Understanding, FEMA found that it had sufficient data with which it could make its findings. Similar procedures have been followed in other licensing dockets. In some cases FEMA made positive findings, while in other cases it made negative findings. In those cases where FEMA made positive findings, the Commission issued operating licenses on the basis of such

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Board took official notice of the proposed rule and marked it as Board Ex. 11. See Tr. at 22639. The Memorandum of Understanding between the NRC and FEMA became effective as of November 1, 1980, and was published in the Federal Register at 45 Fed. Reg. 82713 (December 16, 1980). The Board took official notice of the Memorandum of Understanding and marked it as Board Ex. 12. See Tr. at 22643-44.

In relevant part, the Memorandum of Understanding provides:

Notwithstanding the procedures which may be set forth in 44 CFR 350 for requesting and reaching a FEMA administrative approval of State and local plans, findings and determinations on the current status of emergency preparedness around particular sites may be requested by the NRC through the NRC/FEMA Steering Committee and provided by FEMA for use as needed in the NRC licensing process. These findings and determinations may be based upon plans currently available to FEMA or furnished to FEMA by the NRC.

The FEMA interim findings and determinations presented in this proceeding, Staff Ex. 18, were provided pursuant to this provision of the Memorandum of Understanding.

"interim" findings and determinations. Tr. at 22528, 22536 (Dickey).

26. In developing its findings and determinations, FEMA makes two separate but related inquiries. First, FEMA evaluates the adequacy of the written plans. In making this evaluation, FEMA considers the guidelines and standards set forth in NUREG-0654. Second, FEMA also evaluates the capability of the response organizations to implement the written plans. This evaluation is based on performance during a test exercise. The findings and determinations rendered by FEMA represent a judgment on overall preparedness based on both factors. Tr. at 22531 (Dickey).

27. The initial evaluation of the written plans is performed at the regional level in connection with an inter-agency Regional Assistance Committee. Tr. at 19387-88 (Bath). This group is charged with making an element-by-element comparison, both favorable and unfavorable, between the written plans and the guidance provided in NUREG-0654. At the headquarters level, FEMA has no precise or mathematical scheme for scoring the adequacy of the written plans. Instead, professional judgment is applied to determine whether on an overall basis the written plans are adequate. Tr. at 22542-43, 22690-92 (Dickey). This approach is almost identical to that which Licensee's expert witness, Dr. Russell Dynes, also urged on the Board.⁸ Dynes, ff. Tr. 17120, at 2-3.

⁸ Dr. Dynes is a recognized expert on emergency planning. He holds a Ph.D in sociology from The Ohio State University, (footnote continued next page)

28. With respect to the state and county emergency response plans site specific to TMI, FEMA found those plans adequate. Staff Ex. 18, at 2; Tr. at 22538, 22541, 22644 (Dickey). FEMA reached this conclusion notwithstanding that the plans contained some elements which in FEMA's view were still deficient. FEMA characterizes these deficiencies as "administrative," meaning that they are generally minor in nature and easily correctable. Tr. at 22537-38 (Dickey). Even with these deficiencies, FEMA's view is that, if there was an emergency at TMI, the offsite response would be adequate to protect the health and safety of the public. Tr. at 22546 (Dickey).

29. Turning from the adequacy of the written plans to the capability of the offsite emergency response organizations to implement those plans, FEMA found on the basis of the June 2, 1981 exercise that "the overall capability of the participating

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taught at the university level for 24 years, and was co-director of the Disaster Research Center at The Ohio State University from 1964 to 1977. Dr. Dynes has been a member of various National Academy of Sciences/National Research Council (NAS/NRC) committees dealing with emergency planning and disaster assistance. He has acted as a consultant to the Federal Disaster Assistance Administration of the Department of Housing and Urban Development and to FEMA. In 1979 he headed the Kemeny Commission Task Force on Emergency Response and Preparedness. His publications in the field of emergency preparedness are extensive. See Dynes, ff. Tr. 13756, at 1-2 and Statement of Professional Qualifications; see also ¶ 71, infra.

governments was shown to exceed the minimum standards." Staff Ex. 18, at 1; see also Staff Ex. 20, at 1. FEMA did identify 72 recommendations for improvement, but nonetheless concluded that an adequate capability to implement the emergency response plans had been demonstrated. Id. FEMA further recognizes that the present evacuation plans of PEMA and the five risk counties are implementable.⁹ Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, item 13. However, since

9 One of the Newberry contentions alleges that York County will be unable to implement its emergency response plan because no "set emergency fund" has been established to pay for costs incurred in responding to an actual emergency. Contention EP-14(GG) states:

The York County Plan does not contain any treasury or source of financing in the event that an emergency is declared and payment to be made. It is a general assumption, apparently on behalf of the Plan, that the county treasury can be invaded by the Commissioners for use during an emergency; however, it is Intervenor's position that a set emergency fund should be in place and stated within the Plan so that there would have to be no indecision as to the legality of withdrawing funds in the event of an emergency situation for ad hoc expenses.

We reject this contention for various reasons. This Board has no authority to direct a local political subdivision, like York County, to appropriate a special fund for use during an emergency. Such considerations are a matter of local and state law. In this regard, the Board is aware that the Pennsylvania Emergency Management Services Code contains specific provisions authorizing political subdivisions to contract for services and incur other obligations, and if necessary to suspend the formal requirements associated with such emergency actions. 35 Pa. Cons. Stat. §§ 7501(c) and (d). Other provision of the law authorize PEMA to arrange for needed services and make payment for such services. 35 Pa. Cons. Stat §7313(10). There also are a number of

(footnote continued next page)

York County did not participate in the exercise, FEMA did not evaluate York County's response capability. Staff Ex. 20, at 1. An exercise has been scheduled for August 29, 1981, at which time the York County response capability will be demonstrated. Tr. at 22874-75 (Hippert). As previously indicated, see ¶ 18, supra, the Board will require prior to restart that the NRC Staff certify that an adequate exercise of the York County emergency response plan has been conducted.

30. FEMA intends to work with the Commonwealth of Pennsylvania and the risk counties to resolve all identified deficiencies. Tr. at 22546-47, 22692 (Dickey), 22867-69 (Adler). For its part, the Commonwealth of Pennsylvania has indicated that it intends to correct the deficiencies noted by FEMA, including providing as much assistance as possible to county and municipal organizations to correct deficiencies at those levels of government. Tr. at 22751, 22796-97, 22834-35 (Straube). If in the future FEMA perceives a significant deficiency in the adequacy of emergency preparedness around TMI, it will advise the NRC of that fact. Tr. at 22547-48 (Dickey). And, if by January 1, 1982, the offsite emergency response

(continued)

provisions dealing generally with the payment of expenses during an emergency. 35 Pa. Cons. Stat. §§ 7511-15. Moreover, FEMA informs us that they are unaware of any situation where the unavailability of funds resulted in serious injury, suffering or death during a disaster. Adler and Bath-2, ff. Tr. 18975, at 65.

plans site specific to TMI have not received FEMA approval pursuant to the process identified in proposed rule 44 C.F.R. Part 350, FEMA will provide the NRC Staff with a progress report on the items which remain open. Tr. at 22924 (Chesnut).

31. The Board finds that the process contemplated for resolving the deficiencies identified by FEMA is appropriate and adequate to provide reasonable assurance that the public health and safety will be protected. It is an accepted truism that emergency planning is an ongoing, continuous process. Dynes ff. Tr. 17120, at 4; Tr. at 22546-47 (Dickey). FEMA's interim findings and determinations establish that the current state of emergency preparedness around TMI is adequate. That fact, together with an acceptable process for removing the noted deficiencies, is sufficient for the Board to conclude that the offsite emergency plans comply with the planning standards of 10 C.F.R. § 50.47(b).

32. The Commission's emergency preparedness regulations state: "In any NRC licensing proceeding, a FEMA finding will constitute a rebuttable presumption on a question of adequacy." 10 C.F.R. § 50.47(a)(2). In this case, FEMA has made a finding and determination that the offsite emergency response plans site specific to TMI are adequate. Staff Ex. 18. Accordingly, the Board concludes that the FEMA finding is presumptively valid and we will require substantial, convincing and probative evidence to rebut such a finding.

33. On the basis of the FEMA interim findings and determinations and its own assessment of emergency preparedness around TMI, the NRC Staff concluded (ff. Tr. 22881):

The overall emergency preparedness for TMI-1 is adequate subject to exceptions listed below and provides reasonable assurance that appropriate protective measures can and will be taken in the event of a radiological emergency at TMI Unit 1.

The three exceptions identified by the NRC Staff are (ff. Tr. 22881):

(1) Demonstrate the ability to implement the York County Emergency Plan.

(2) Complete the prompt alerting system for the TMI plume exposure Emergency Planning Zone.

(3) Modify the TMI-1 Emergency Plan to reflect the commitment that the Licensee's Emergency Operations Facility (EOF) will be staffed and functional within about one hour of the declaration of an emergency of a classification of Site Area Emergency or higher.

The Board agrees that items (1) and (2) above should be completed prior to restart. For the reasons we describe in Section II.A, supra, the Board finds that Licensee's current commitments with respect to staffing the EOF are adequate. Therefore, subject to items (1) and (2) above, the Board finds that the overall level of emergency preparedness around TMI is adequate and as required by the Commission's emergency preparedness regulations.

II. FINDINGS OF FACT ON INTERVENOR CONTENTIONS

A. Organization and Staffing

34. A range of issues dealing with emergency response organization and staffing were put into controversy by the parties. The issues raised included concerns relating to the numbers of response personnel available, the qualifications of those response personnel,¹⁰ and whether they could be relied upon to perform their duties during a radiological emergency at TMI. We deal first with those contentions relating to Licensee's emergency response organization. Contentions relating to state, county and municipal staffing are considered next, and we conclude this section by resolving the concerns over whether emergency workers will report to their posts.

ANGRY Contention EP-4(J): The licensee's Onsite Emergency Organization staffing provisions as set forth in Table 8 of its EP fail to conform to the standards of N. 0654 Sec. B5 in the following respects:

1. Under said standards two control room operators are assigned the function of "plant operations and assessment of operational aspects." Another shift employee is given the exclusive task of providing communications liaison with

10 The Board addresses a broader based inquiry into the general adequacy of emergency response personnel training in Section II.H, infra.

offsite officials. Under the licensee's staffing provisions, by contrast, the two control room operators are assigned to "operate equipment in control room and act as communicator" (emphasis added). This divided responsibility compromises the licensee's ability to provide prompt offsite notification of emergency conditions. The inadequacy of these staffing provisions is aggravated by the absence of any provision for the addition of three more persons with communications responsibilities within 30 minutes, as required by the aforementioned acceptability standard.

2. A similar confusion of assignments exists with regard to the shift supervisor and shift foreman, who are expected to fill three roles between them.
3. Although N. 0654 requires the emergency operations facility director to assume his assignment within 30 minutes, under the licensee's plan this will not occur for as long as four hours.
4. Two radiological analysis support engineers, who are the only employees identified as having the training and primary responsibility for performing "dose projection calculations and source term calculations" (EP, p. 5-10) will not be available for as long as 60 minutes.

ANGRY Contention EP-4(D):

The licensee's "Onsite Emergency Organization" (Sec. 4.5.1.3) contains insufficient personnel and expertise in the area of Health Physics to discharge adequately the responsibilities of dose assessment and projection in the event of a rapidly developing accident sequence. The time required for the mobilization of offsite health physics support (2-4 hours - see Table 8), which is given responsibility for "overall assessment of the impact of liquid and gaseous effluents with respect to . . . protective action guides" (p. 5-12), is inconsistent with adequate radiological assessment capability.

35. These two contentions challenge the adequacy of Licensee's onsite emergency response organization. For the most part, the concerns raised in Contentions EP-4(J) and EP-4(D) are based either on a misunderstanding of Licensee's Emergency Plan or a misunderstanding of the current NRC Staff guidance with respect to emergency organization and staffing. In one case, EP-4(J)(3), the contention deals with a subject that was a source of disagreement between Licensee and the NRC Staff, and we resolve that disagreement below. Both Licensee and the NRC Staff presented testimony on the issues raised by these contentions. See Kogan, et al., ff. Tr. 13756, at 26-39; Chesnut, ff. Tr. 15007, at 18-25; Donaldson, ff. Tr. 17354, at 5-8; Chesnut, ff. Tr. 22235, at 2-7; NRC Staff Ex. 17 (Chesnut

Affidavit and Inspection Report). No other party to the proceeding presented testimony on this issue.

36. The organization of Licensee's emergency response groups is described in Chapter 5 and Figures 9-14 of its Emergency Plan. Lic. Ex. 30. A three-section duty roster has been developed to ensure that all positions in the onsite emergency organization are fully staffed; one section of the duty roster is always on call. Duty roster personnel are responsible for maintaining a working knowledge of the Emergency Plan, its implementing procedures, and other related materials. Particular emergency response assignments are based on predefined selection criteria, Lic. Ex. 30, at Table 8, general background and training, and driving distance to the site. Rogan, et al., ff. Tr. 13756, at 30-31.

37. During plant operation and at the time of initial accident declaration, Licensee will have on-shift a minimum staff complement of 20 personnel to respond to the emergency. This will include a minimum of 4 licensed operators (both SRO's and RO's), one shift technical advisor, 5 auxiliary operators, 4 personnel trained in radiological controls, one chemistry technician and 5 maintenance personnel. Rogan, et al., ff. Tr. 13756, at 31 and Table 2; Lic. Ex. 59. By comparison, NRC Staff guidance in NUREG-0654 specifies a minimum shift complement of only 10, and the ability to augment that shift staffing with 11 additional people 30 minutes after declaration of an

emergency. See Tr. at 22290 (Chesnut); compare Staff Ex. 7, at Table B-1. Thus, during plant operation Licensee has twice the minimum staffing acceptable to the NRC Staff; indeed, Licensee's on-shift staffing almost complies with what is recommended 30 minutes after declaration of an emergency. And, in the area of radiological controls, Licensee's on-shift staffing is 4 times greater than that acceptable to the NRC Staff. This level of on-shift staffing is one of the largest, if not the largest, encountered by the NRC Staff at any nuclear power plant. Tr. at 22291-92 (Chesnut).

38. As a result of this high level of staffing, Licensee's organization has special emergency response capabilities beyond those specified by the NRC Staff. This would include additional personnel who could make the necessary notifications to offsite agencies, monitor radiation releases and calculate offsite doses, and conduct prompt offsite radiological surveys. Tr. at 15436 (Chesnut). In addition, since Licensee maintains a three-section duty roster for all emergency response organization positions, there is an increased likelihood that Licensee will have available at the time of any emergency a complete complement of fully trained personnel to fill all positions. Tr. at 15436-39 (Chesnut).

39. The NRC Staff has reviewed the adequacy of Licensee's onsite emergency response organization and its favorable conclusions are reported in the EPE and Supplement 1 thereto.

Staff Ex. 6, at 2-7; Staff Ex. 23, at II-15. The Board finds that Licensee has developed an adequate emergency response organization and has predesignated an adequate number of its personnel to properly staff that organization. We next address each of the concerns raised in Contentions EP-4(J) and EP-4(D).

40. Subparagraph 1 of Contention EP-4(J) alleges that Licensee has provided an inadequate number of people to communicate with offsite officials, and as a result control room operators responsible for operating the plant will, in addition to their other duties, be required to perform the initial offsite notification. This claim does not reflect Licensee's current Emergency Plan. Table 8 of the Emergency Plan indicates that there are two control room operators and five auxiliary operators available on-shift. Lic. Ex. 30, at Table 8; see also Rogan, et al., ff. Tr. 13756, at Table 2. This provides sufficient personnel so that the Emergency Director (shift supervisor) may assign two control room operators to monitor the plant and a third operator (chosen from the five available auxiliary operators) to initiate calls to Dauphin County, PEMA, NRC and the unaffected control room. Rogan, et al., ff. Tr. 13756, at 31. This capability exceeds that recommended in NUREG-0654. Compare Staff Ex. 7, at Table B-1.

41. Moreover, contrary to the claim of this contention, Licensee's emergency organization also provides for the timely augmentation of communications staff. Current NRC Staff

guidance in this area calls for one on-shift person, one additional person available within 30 minutes, and two further persons available within 60 minutes to perform the communications functions. As indicated above (see ¶ 40, supra), Licensee's organization dedicates an on-shift auxiliary operator to perform the initial offsite notifications. Since that on-shift organization also includes 10 persons beyond the minimum staffing recommended by the NRC Staff, there are personnel immediately available to fill the communications slot that is to be provided within 30 minutes. And, within 60 minutes, Licensee will have available three additional communications personnel (a Communicator and two Communications Assistants) rather than just the two additional communicators recommended in NUREG-0654. Compare Lic. Ex. 30, at Table 8 with Staff Ex. 7, at Table B-1; see also Rogan, et al., ff. Tr. 13756, at 29-30; Chesnut, ff. Tr. 15007, at 21. The Board finds that these staffing provisions are adequate to reasonably assure that Licensee will be able to perform all necessary communication functions during an accident.

42. Subparagraph 2 of Contention EP-4(J) alleges that there is a confusion of assignments between the shift supervisor and shift foreman, who it is asserted are expected to fill three roles between them. This is not true. Once an emergency is declared the shift supervisor becomes the Emergency Director; that is the only function of the shift

supervisor during the first hour of the emergency. After the first hour, the shift supervisor is relieved of his responsibility as Emergency Director and he returns to his duties as a shift supervisor. See Lic. Ex. 30, at 5-10 and Table 8; Rogan, et al., ff. Tr. 13756, at 18, 26-27, 94 and Table 2.

Throughout the emergency, the shift foreman retains his duties as a shift foreman, except that, if during the first hour of the emergency the shift supervisor is unavailable or becomes incapacitated for any reason, the shift foreman would assume the position of Emergency Director. In that case, primary responsibility for operating the plant would rest with the two control room operators, the shift technical advisor, and the available auxiliary operators. See Lic. Ex. 30, at 5-10 to 5-11 and Table 8; Rogan, et al., ff. Tr. 13756, at 27 and Table 2.

43. Neither the shift supervisor nor the shift foreman would perform the functions of the Radiological Assessment Coordinator ("RAC") or the Operations Coordinator. The on-shift radiological controls foreman initially performs the functions of the RAC. Within one hour he is relieved by a senior radiological controls engineer and two Radiological Analysis Support Engineers. See Rogan, et al., ff. Tr. 13756, at 32, 94 and Table 2; see also ¶¶ 57-61, infra. The functions of the Operations Coordinator are not performed until the designated duty section person arrives within one hour to fill

that post. Rogan, et al., ff. Tr. 13756, at 95. This is acceptable since the function of the Operations Coordinator is to coordinate plant operations among the augmented onsite emergency response personnel. Lic. Ex. 30, at Table 8. This position is not one suggested by NUREG-0654, but rather represents Licensee's view that there is a need for this increased coordination function as more personnel arrive at the site. Tr. at 22342, 22942 (Chesnut). Given that this increase in personnel does not occur until the first hour after the accident, the Board concludes that there is no need for an Operations Coordinator until that time. In summary, the Board finds that, contrary to the claim of Contention EP-4(J)(2), duties between the shift supervisor and shift foreman have been unambiguously defined and that the assigned duties can be performed adequately by two people.¹¹

44. Subparagraph 3 of Contention EP-4(J) alleges that Licensee's Emergency Support Director will not report to the Near-site Emergency Operations Facility ("EOF") within the time recommended by the NRC Staff in NUREG-0654. Although the contention incorrectly asserts that the suggested time is 30 minutes -- when in fact NUREG-0654 recommends one hour (see

¹¹ An issue was also raised whether it was necessary to have 2 SRO's on-shift in order for Licensee to properly staff its emergency response organization. The Board has addressed this matter in that part of its Recommended Decision relating to management issues.

Staff Ex. 7, at Table B-1) -- the contention is correct since Licensee only commits to stationing its Emergency Support Director in the EOF within four hours after declaration of a Site Emergency. While ANGRY did not actually pursue this contention, either by presenting testimony or through cross-examination, there is an extensive record on the matter because the availability of the Emergency Support Director was the only item of dispute between Licensee and the NRC Staff in the emergency preparedness area. Thus, the Board must resolve this dispute. We begin by setting forth Licensee's commitments with respect to staffing the EOF and the reasons offered by Licensee in support of its position. We then describe the NRC Staff position and the reasons offered in support of that position. Our conclusion is that Licensee's commitments provide an adequate functional equivalent to that which is recommended by Staff and the Board is therefore unwilling to override what we perceive to be a well-considered and very intimate management decision by Licensee.

45. Currently, Licensee's EOF is the TMI Observation Center fronting on Highway 441, east of the TMI site. The EOF will house key technical groups of Licensee's offsite emergency support organization. The Pennsylvania Bureau of Radiation Protection ("BRP") will send its nuclear engineer to this facility and the NRC will locate its senior site emergency team at this location. Rogan, et al., ff. Tr. 13756, at 56.

Licensee will activate the EOF within one hour after declaration of a Site Emergency. This will be accomplished by making all EOF communication and data links operational within one hour and by staffing the EOF with at least six key personnel: representatives from the Emergency Support Staff, Emergency Preparedness Department, Environmental Command Center, Technical Functions Group, Communications Department, and a primary communicator.¹² In addition, Licensee will station its Emergency Support Director at the EOF within four hours after declaration of a Site Emergency. During the three-hour span between activation of the EOF and arrival of the Emergency Support Director, the Emergency Director in the control room will retain decisionmaking authority and will function as the senior corporate management spokesman for Licensee. Lic. Ex. 58.

46. Licensee's commitments generally comply with NRC Staff guidance in this area. NUREG-0654 contains no evaluation criteria specifying when the EOF must be activated¹³ or how it should be staffed, although it does include a somewhat confusing reference to NUREG-0696, Revision 1.¹⁴ Staff Ex. 7,

12 This commitment to staff the EOF with six people within one hour represents the bulk of the personnel Licensee intends to station at the EOF. According to Table 8 and Figure 13 of Licensee's Emergency Plan, these six people will represent all functional areas stationed at the EOF except for two Chemistry Department personnel. See Lic. Ex. 30.

13 NUREG-0654 does, however, recommend that the Emergency Support Director be stationed at the EOF within one hour. See Staff Ex. 7, at Table B-1.

14 At the time NUREG-0654 was published in November, 1980, NUREG-0696 had not yet been published. Thus, it is not clear (footnote continued next page)

§§ II.H.2 and II.H.4, at p. 52. NUREG-0696 does recommend that the EOF be activated within one hour after declaration of a Site Emergency, but it too contains no criteria relating to staffing. Staff Ex. 8, at 16-24. Counsel for the NRC Staff indicated that, with respect to staffing the EOF, the only difference between the NRC Staff and Licensee related to the stationing of the Emergency Support Director at the EOF within one hour. Tr. at 22984 (Tourtellotte). Based on Licensee's large onsite emergency response organization (see ¶¶ 37-39, supra), the additional offsite staffing at the Alternate EOF, the Environmental Assessment Command Center, and the Parsippany Technical Functions Center (see Rogan, et al., ff. Tr. 13756, at 33-36; Lic. Ex. 30, § 4.3.1.4, at pp. 5-16 to 5-21 and Figure 13), and the functions to be performed by the offsite emergency support organization (see Rogan, et al., ff. Tr. 13756, at 38-39), the Board finds that the staffing at the EOF (but for the question of the Emergency Support Director) is adequate.

47. With respect to the time of arrival and location of the Emergency Support Director all parties have identified the function of making protective action recommendations to the

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how the NRC Staff intended licensees to follow guidance not yet available. NUREG-0696 was not published until February, 1981, and not sent to Licensee's until March 5, 1981. See Staff Ex. 8. Even then, the published document is not marked as Revision 1 to NUREG-0696.

state as the crucial issue. Under Licensee's concept of operations this function would remain with the Emergency Director in the control room during the first four hours of an emergency, while the NRC Staff would prefer for this function to be transferred out of the control room to an offsite location within one hour. In resolving this dispute, Licensee suggests that there are two conflicting lessons learned from the TMI-2 accident that must be considered. The first lesson is that one should neither place too many people in the control room nor overburden control room personnel with too many functions, especially ones that could be performed as well from remote locations. The second lesson is that the accuracy of information available to people making protective action recommendations is very important, especially during the early hours of an accident when the likelihood for confusion is greatest.¹⁵ Thus, while the first lesson of the TMI-2 accident moves one towards placing the individual responsible for making protective action recommendations outside the control room, the second lesson pushes one towards stationing that individual in a location where misunderstandings about plant operations or

15 During both the accident at TMI-2 and a subsequent incident at Crystal River there was confusion and misunderstandings about important information transmitted offsite during the early hours following the emergency. Tr. at 15481 (Grimes).

radioactive releases are minimized. Tr. at 23091-96 (Rogan), 15030-31, 22987-88 (Zahler).

48. We find that Licensee has struck the balance between these two conflicting concerns in a reasonable manner. To ensure that the Emergency Director located in the control room is not overburdened, Licensee has provided him with three primary lieutenants in the areas of plant operations (Operations Coordinator), technical and engineering support (Technical Support Center Coordinator), and radiological assessment (Radiological Assessment Coordinator). Reporting to the Operations Coordinator in the area of plant operations is the normal shift operating crew (responsible for actual plant control) and the Operations Support Center Coordinator (responsible for in-plant maintenance and repair, in-plant radiological surveys and controls, and search and rescue missions). In this manner the Emergency Director, as the senior corporate manager, can exercise oversight in all important emergency response areas (including making protective action recommendations) without getting drawn into the minute-by-minute response in any single area. Tr. at 23091-92 (Rogan); Lic. Ex. 30, at § 4.5.1.3.2, pp. 5-9 to 5-16 and Figure 12. The Board finds that, given the supporting personnel provided in Licensee's Emergency Plan, a single individual can in fact exercise the responsibilities assigned to the Emergency Director. To guard against misunderstandings as to important

plant and radiological data, Licensee has placed the Emergency Director in the control room. We agree with Licensee that, during the early hours of the accident, placing the Emergency Director in the control room is likely to reduce the potential for factual misunderstandings. We therefore have no reason to require that the Emergency Director be located somewhere else.

49. Licensee's two primary choices for the Emergency Support Director are Messrs. Arnold and Clark. Tr. at 13766 (Giangi). Both gentlemen testified before this Board and we were impressed by their capabilities. See Licensee's Proposed Findings of Fact and Conclusions of Law on Management Issues, at ¶¶ 19-20. Since Licensee's corporate headquarters are in Parsippany it is likely that on some occasions neither Mr. Arnold nor Mr. Clark could be at the TMI site much before four hours. Tr. at 23081-82 (Rogan). Thus, as a practical matter, a requirement that the Emergency Support Director be at the EOF within one hour means that Licensee's top two choices might not be available to fill that position during the early hours of an emergency. While the NRC Staff appeared to be of the view that second best was acceptable, see Tr. at 22968-70 (Chesnut), that is not Licensee's view, see Tr. at 23046-50, 23074-75 (Rogan), 23037-38 (Zahler), nor does the Board believe that it is appropriate. Licensee's preference, with which we agree, is that protective action recommendations should be made by the most senior, corporate official at the site and not by

someone simply designated as the Emergency Support Director. Once Licensee's onsite emergency organization reports, the most senior corporate official at the site will be the Emergency Director in the control room (most probably M. Hukill or Mr. Toole). Licensee therefore believes these individuals should make protective action recommendations until properly relieved by Licensee's choices for the Emergency Support Director position. Id.

50. In response, the NRC Staff argues that there is a need at the one-hour point in the emergency to firmly divide the protective action decisionmaking function from the Emergency Director's other functions and move that decisionmaker out of the control room and out of the plant to the EOF. Tr. at 22976-81 (Tourtellette). While we do not doubt that such a concept of operations might be appropriate for the minimum staffing levels suggested in NUREG-0654, we are not convinced that it is an appropriate approach with respect to Licensee's organizational concepts. Indeed, the NRC Staff conceded that it had not published any study evaluating where this decisionmaker should be located. Tr. at 22933 (Chesnut). While we were referred to NUREG-0696 for an explanation supporting the NRC Staff position, Tr. at 22930 (Chesnut), our review of that document fails to disclose the logic supporting the NRC Staff position. See generally Staff Ex. 8. In any event, NUREG-0696 is a generic criteria document, and its

authors had no knowledge of the TMI site specific emergency plan, including the staffing levels therein or the concept of operations. Tr. at 22931 (Chesnut).

51. In the final analysis, it appears to this Board that the NRC Staff position with respect to the Emergency Support Director is based more on an inflexible position that the Emergency Support Director must be at the EOF within one hour than a reasoned evaluation of this Licensee's specific Emergency Plan. The NRC Staff witness admitted that in framing its position the NRC Staff gave no weight to the fact that Licensee in developing its Emergency Plan decided that, during the early hours of an emergency, it would prefer to station the senior corporate official responsible for making protective action recommendations in the control room rather than the EOF. Tr. at 22953 (Chesnut). This inflexible approach is inconsistent with the NRC Staff's own position that guidance documents like NUREG-0654 and -0696 are not substitutes for regulation and literal compliance is thus not required. E.g., Staff Ex. 8, at iii.¹⁶ The appropriate test is whether Licensee's approach provides functional equivalence to the guidance suggested by the NRC Staff. In this case the Board finds that Licensee has established the necessary functional equivalent.

¹⁶ No regulation issued by the Commission requires that the Emergency Support Director be stationed at the EOF within one hour. See 10 C.F.R. § 50.47(b) and 10 C.F.R. Part 50, Appendix E; Tr. at 22930 (Chesnut).

52. On this issue the position of the Commonwealth appears to have changed. Initially it was our understanding that Licensee had informed the Commonwealth of its position that protective action recommendations would originate from the Emergency Director in the control room during the early hours of an emergency. This approach was acceptable to the Commonwealth. Tr. at 18238-39 (Reilly). Moreover, it appeared to the Board from the Commonwealth's cross-examination of the NRC Staff witnesses that Licensee's approach was favored by the Commonwealth for precisely the same reasons offered by Licensee -- i.e., that during the early hours of an accident the person making protective action recommendations should be in as close proximity to the actual plant data as is possible. See generally Tr. at 15033-35, 15037, 15040 (Grimes/Chesnut).

53. Apparently, the Commonwealth has altered its position because of a perceived inadequacy of the Radiological Line to function as a means for communicating both radiological release data and dose projections (its primary function) and plant operating information that would be useful in assessing Licensee's protective action recommendations. Tr. at 23013 (Dornsife). The Commonwealth's response to this problem is to send its nuclear engineer to Licensee's EOF more quickly than originally anticipated. Tr. at 23013-14 (Dornsife). This is an acceptable resolution of the problem.

54. However, the Commonwealth is concerned that all necessary information be available to its nuclear engineer in the EOF. The Board believes that Licensee's EOF staffing commitments, see Lic. Ex. 58, are adequate to assure that the needed information will be available in the EOF. The Commonwealth argues that if the Emergency Support Director is not present in the EOF during hours one to three after declaration of a Site Emergency, there is no assurance that Licensee will in fact transmit the needed information to the EOF. Tr. at 23014-15 (Dornsife). This concern is wholly speculative and without any factual basis. Given that Licensee intends to make all EOF communication and data links operational and staff the EOF with six key members of its offsite emergency support organization within one hour, see ¶ 45, supra, the Board can perceive no reason why Licensee would not transmit all necessary information to the EOF, regardless of whether the Emergency Support Director is present.¹⁷

55. In addition, the Board is somewhat surprised that the Commonwealth would seek to have Licensee station its Emergency

¹⁷ Moreover, while Licensee commits to having the Emergency Support Director at the EOF within four hours after declaration of a Site Emergency, this does not mean that, if possible, he would not show up at the EOF sooner. Since the Emergency Support Director expects to find a fully functional EOF when he arrives, in order for the personnel stationed at the EOF to assure this status, Licensee will have to transmit all necessary information to the EOF in a prompt and timely manner.

Support Director at the EOF within one hour, without itself committing to have its nuclear engineer arrive at the EOF within one hour. Tr. at 23017-19 (Dornsife).¹⁸ This is especially troubling to the Board since a requirement that the Emergency Support Director be at the EOF within one hour would mean that Licensee most probably would have to assign its third or fourth choice to fill that position during the early hours of the accident. See ¶ 49, supra. The Board does not understand why the Commonwealth would have us require such action from Licensee when the Commonwealth is not even willing to assure us that its representative will be present within one hour.¹⁹ We therefore reject the reasons offered by the Commonwealth for requiring that Licensee station its Emergency Support Director at the EOF within one hour after declaration of a Site Emergency.

18 Nor does BRP's nuclear engineer carry a beeper or other similar device that would permit him to be notified of an emergency at TMI if he were away from his phone. By comparison, Licensee personnel serving on the emergency organization do carry beepers. Tr. at 23019 (Dornsife).

19 Obviously, at nuclear power plant sites in Pennsylvania other than TMI it would be difficult if not impossible for BRP to send its nuclear engineer to the site within one hour. In such situations we assume telephone communications will be adequate for BRP's purposes. The situation at TMI is better since Licensee's EOF is relatively close to BRP headquarters. But, if telephone communications is adequate at other sites the Board does not understand why telephone communications from the EOF to the Emergency Director in the control room is unacceptable to the Commonwealth at TMI. See generally Tr. at 23031-32 (Dornsife).

56. It is uncontroverted on this record that the only factor entering Licensee's consideration in this matter is what it perceived to be the most effective means for protecting the public health and safety. There are no resource constraints, either in terms of finances or personnel availability, which influenced Licensee's decision. Tr. at 23097 (Rogan). Rather, it was Licensee's considered judgment that the best means of utilizing the technical and management talent available to it was by placing the senior corporate official in the control room during the first four hours of the accident. Tr. at 23091-93 (Rogan). The Board views the contrary NRC Staff position as an unwarranted, and to our knowledge totally unique, invasion of Licensee's management prerogatives. It is especially difficult for the Board to reconcile the approach adopted here by the NRC Staff with the Commission's recent statement that "the regulated industry (i.e., the licensees and their suppliers and consultants) bears the primary responsibility for the proper construction and safe operation of licensed nuclear facilities." Federal Tort Claim of General Public Utilities Corp., et al., docketed June 8, 1981, slip op. at 4-5. Counsel for the NRC Staff has candidly stated that the issue "is a very, very close question and it really is one that is quite judgmental. There are advantages and disadvantages on either side." Tr. at 23081; see also Tr. at 23059-60, 23062 (Tourtellotte). The Board appreciates the forthrightness of

the NRC Staff on this issue and agrees with counsel's assessment. For the reasons indicated, we exercise our judgment and find that Licensee's staffing commitments, as expressed in Lic. Ex. 58, are adequate to provide reasonable assurance that the public health and safety will be protected. See Tr. at 22950 (Chesnut).

57. Since both Contentions EP-4(J)(4) and EP-4(D) address the adequacy of Licensee's staffing in the radiological controls and dose projection areas, we discuss them together. This was an area of special interest to the Board and apparently at our suggestion the NRC Staff expedited various inspections so that it could report the results to the parties and this Board. As a result we are confident that a full and complete record was developed in this area.

58. As previously noted (see ¶ 43, supra), Licensee's on-shift radiological controls staffing consists of a radiological controls foreman and three radiological controls technicians. NRC guidance calls for only one person trained in radiological controls to be on-shift. Tr. at 15436 (Chesnut); Compare Rogan, et al., ff. Tr. 13756, at 32 and Table 2 with Staff Ex. 7, at Table B-1. Upon declaration of an emergency, the radiological controls foreman reports immediately to the control room to perform dose calculations. Tr. at 14223 (Giangi). This individual is fully trained to perform this

function, Tr. at 14225 (Giangi), and the Board finds this an adequate means to assure timely dose projection calculations.²⁰ See Chesnut, ff. Tr. 22235, at 3 and 6-7. The description of the Radiological Analysis Support Engineers in Contention EP-4(J)(4) does not properly reflect Licensee's current Emergency Plan. See Lic. Ex. 30, § 4.5.1.3.2.e.1, at p. 5-15. While it is true that two radiological controls engineers will report within one hour to perform dose calculations, other members of Licensee's on-shift emergency response organization are trained to perform the necessary dose calculations prior to the arrival of the Radiological Analysis Support Engineers. The two additional engineers merely provide an appropriate augmentation of resources in this important area. See Rogan, et al., ff. Tr. 13756, at 32; Chesnut, ff. Tr. 22235, at 4-5 and 6-7. The Board concludes that there is no reason for these personnel to report to the control room earlier than one hour after declaration of the emergency.

59. Contention EP-4(D) makes essentially the same point as the previous contention, although it alleges that, in the absence of Licensee's offsite emergency support organization,

20 In addition, all shift supervisors and shift foremen (i.e., those personnel that could be Emergency Directors) receive specialized training in dose assessment and projection techniques and procedures. Chesnut, ff. Tr. 22235, at 5. This provides an added measure of assurance that properly trained individuals will be available immediately to perform these functions.

the onsite staff has insufficient personnel and expertise to properly discharge its dose assessment responsibilities. We also reject this claim. As explained by Licensee, the purpose of the offsite emergency support organization is to provide overall corporate management and direction of emergency response, to provide additional technical assistance to the onsite organization, and to coordinate long-term logistical and administrative support for the onsite organization. These functions need not be accomplished immediately after declaration of an emergency. Rather, they are supplementary to, and in support of, the functions being performed by the onsite organization. Rogan, et al., ff. Tr. 13756, at 38-39; see also Donaldson, ff. Tr. 17354, at 6-8. The fact that the offsite organization may not be fully mobilized as quickly as the onsite organization does not imply that Licensee is incapable of promptly performing all necessary functions. Indeed, we already have found that the on-shift radiological staffing, as supplemented by the onsite emergency response personnel reporting within one hour, is adequate to perform the necessary dose calculations (see ¶ 58, supra). Thus, the Board finds that Licensee's provisions for providing additional offsite support for the dose assessment function are adequate.

60. All of our findings as to the adequacy of Licensee's radiological controls staffing for emergencies are confirmed by onsite NRC Staff inspections, the results of which were

reported in this proceeding. As part of the NRC Health Physics Appraisal Program, a two-week inspection, evaluating the status of Licensee's implementation of its revised Emergency Plan, was conducted between July 28 and August 8, 1980. Donaldson, ff. Tr. 17354, at 4. At the time of review, the Commission had not yet published its new emergency preparedness regulations and Revision 1 to NUREG-0654 had not yet been issued. Rogan, et al., ff. Tr. 13756, and 5-9. Licensee had only recently submitted Revision 2 of its Emergency Plan, and Revision 3 -- which is the version reviewed by this Board -- would not be submitted for another five months. Id. Consequently, at the time of inspection, Licensee was still finalizing many aspects of Emergency Plan implementation. Donaldson, ff. Tr. 17354, at 4. The results of that inspection are reported in Inspection Report 50-289/80-22, dated November 25, 1980. See Staff Ex. 4, Appendix B, at 25-28. Thirty areas were identified where additional action from Licensee was required. Id.

61. On May 4-7, 1981, a further onsite inspection was conducted. The purpose of this review was to determine what actions Licensee had taken to rectify the problems identified in the earlier inspection. The results of this review are reported in Inspection Report 50-289/81-12, dated May 27, 1981. See Staff Ex. 17, attachment. The NRC Staff inspection team found that of the 30 items reviewed, 26 had been satisfactorily resolved and 4 remained open. Of the 4 remaining items, the

inspection team found that Licensee's actions underway were consistent with formal commitments to the NRC and the "dates for final resolution had not yet passed. Staff Ex. 17, at 6-7 and attachment, p. 1. In addition, during the June 2, 1981 exercise, NRC inspectors reported that "Licensee demonstrated an adequate capability to assess and project radiation doses onsite and offsite based on in-plant parameters, meteorology and field measurements." Chesnut, ff. Tr. 22235, at 7.

Newberry Contention EP-16(B): Appendix 2 of Annex E of the Dauphin County Plan lists Dauphin County Local Emergency Preparedness Directors and Coordinators; however, those coordinators do not list any substitutes in the event of an emergency. If these individuals cannot be reached at the telephone numbers listed, it would lead to confusion within their particular areas of responsibility. Therefore, until and unless substitutes are listed as local emergency coordinators, it is Intervenor's position that the Plan is deficient.

Newberry Contention EP-14(LL): The York County Plan contains a thin staffing of all emergency coordinators and does not list any substitutes in the event that an emergency coordinator is ill, on vacation or otherwise indisposed. Without substitutes or standby emergency coordinators, the Plan is defective.

62. These two contentions challenge the adequacy of back-up or substitute staffing for local (i.e., municipal)

emergency management coordinators. The FEMA witnesses who presented testimony on these two contentions initially were of the view that the county plans should be modified to identify substitute emergency management coordinators at the local level. Adler and Bath-2, ff. Tr. 18975, at 48-49.²¹ The Board neither understands nor agrees with the reasoning behind this conclusion. NUREG-0654, § II.A.1.d, specifies that "[e]ach organization shall identify a specific individual by title who shall be in charge of the emergency response." Staff Ex. 7, at 31 (emphasis added). Assuming without so ruling that, with respect to this evaluation criterion, "local" includes both county and municipal governments, we believe the criterion is properly satisfied by identifying a single emergency management coordinator at the municipal level. Similarly, while NUREG-0654, § II.A.1.e, specifies that "[e]ach organization shall provide for 24-hour per day emergency response * * *", Staff Ex. 7, at 31, our understanding is that this criterion is met by a 24-hour per day staffing of the county emergency operation center ("EOC"), which includes 24-hour per day communication links with municipal police and fire departments. See Adler and Bath-2, ff. Tr. 18975, at 18-19; e.g., Board Ex. 5, at B-4, C-1, D-4 to D-6; Board Ex. 6, at B-1 to B-2, B-5;

21 Testimony of FEMA's Vernon E. Adler and Frederick J. Bath on Contentions Related to Offsite Emergency Preparedness dated March 16, 1981 ("Adler and Bath-2").

see also Section II.G.2, infra. Moreover, since the police and fire departments have representatives at the county EOC's, if for some reason the local emergency management coordinator could not be contacted, county officials could coordinate municipal response through these police and fire representatives. Tr. at 19444-48 (Adler/Bath). The FEMA witness was of the view that this type of coordination was a satisfactory functional equivalent for substitute municipal emergency management coordinators. Tr. at 19447-48 (Bath).

63. In addition, when Messrs. Curry and Wertz, the emergency management coordinators for York and Dauphin Counties respectively, appeared before us, they both testified that if the municipal coordinators could not be reached they would contact the municipalities' elected officials who have the ultimate responsibility for emergency response within each municipality. Tr. at 20818-19 (Curry); Belser, et al., ff. Tr. 20787, at 7; Tr. at 20944-45 (Wertz). Moreover, as Mr. Curry noted, many of the municipalities have designated a deputy or substitute emergency management coordinators in their municipal plans which are on file at the county EOC's. Tr. at 20818 (Curry); see Board Ex. 13 (e.g., Royalton, Lower Swatara, Manchester, Lewisberry and Goldsboro municipal plans).

64. FEMA subsequently modified its position in this area and informed the Board that the county level plans, with the existing municipal plans, provide adequate information to

ensure that the county will be able to communicate with the municipality and coordinate emergency response. Attachment 3 to FEMA Interim Findings and Determinations, ff. Tr. 22350, at 7; Tr. at 22408-09 (Bath). The Board therefore concludes that, contrary to the position of Contentions EP-16(B) and EP-14(LL), there is no further need to revise the county plans to include a telephone list of substitute municipal emergency management coordinators.

Newberry Contention EP-14(F): Appendix 2, Section I, Subsection B of the York County Plan provides that the Emergency Management Coordinator will insure that briefings are presented to the Commissioner and he will interpret displays and technical reports for the Commissioners. There is no statement in the Plan that the person occupying the position of Emergency Management Coordinator will have educational requirements sufficient to insure that he will be able to interpret any displays of technical reports for the Commissioners. It is Intervenor's contention that unless the Emergency Management Coordinator is required to have an expertise in the area of nuclear science, he will be unable to sufficiently and accurately interpret the displays and technical reports for the Commissioners and thus may leave the Commissioners who ultimately are responsible for the safety and welfare of the people of York County uninformed or misinformed of actual events taking place at TMI.

Newberry Contention EP-14(G): Appendix 2, Section II, of the York County Plan provides that

the Situation Analysis Group will receive reports of plant safety degradation, potential/actual radioactive release and radiation intensity. Again, there are no job requirements for persons who sit on a Situation Analysis Group to qualify them to make such reviews and, therefore, again, without qualified people to sit on such a group, their advice to the county's commissioners may be misinformed and unenlightened which could again then lead to chaos and confusion.

65. These two contentions no longer refer to the current York County emergency response plan. Board Ex. 5. In the current plan there is no "Situation Analysis Group", nor an indication that the county emergency management coordinator will "interpret displays and technical reports for the Commissioners." Id. Even had such functions continued to exist in the current York County emergency response plan, Contentions EP-14(F) and EP-14(G) misstate the need for a technical radiological assessment capability at the county level. NUREG-0654 recommends that an adequate radiological assessment capability should exist offsite. In the Commonwealth of Pennsylvania this capability is ably discharged by BRP. Thus, neither York County nor any other risk county need have the technical assessment capability sought by these contentions. Bath and Adler-1, ff. Tr. 18975, at 14-16.²²

22 Testimony of Frederick J. Bath and Vernon E. Adler of the Federal Emergency Management Agency on Certain Offsite Emer- (footnote continued next page)

66. However, the Board does not limit the thrust of these contentions to the specific situation described therein. Rather, the Board treats these contentions as claims that the county emergency management coordinators, and in particular the York County Coordinator, are unqualified to perform their assigned responsibilities. We reject this allegation. Both Messrs. Curry and Wertz testified before this Board. We observed their demeanor and during the hearing specifically noted that the Board was impressed with their competence, attitude, energy, depth of consideration of the problems, and overall command of the information. Tr. at 20980-81 (Chairman Smith); see, e.g., Tr. at 20801-02 (Curry); Statements of Professional Qualifications for Randy L. Curry and Michael E. Wertz, ff. Tr. 20787. We address in a later section of this Recommended Decision, see Section II.H, infra, our general findings with respect to training, including that at the county level. For now, we conclude that these gentlemen are fully qualified to perform their responsibilities as county emergency management coordinators.

ANGRY Contention EP-5(C):	In order to assure proper execution by emergency response personnel of duties assigned to them the Commonwealth should adopt and apply to all levels of the
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(continued)
gency Planning Contentions, dated February 23, 1981 ("Bath and Adler-1").

emergency response network the principle that such personnel should "not have more important commitments to families within the immediate area of TMI" (Dept. of Health Plan, App. I, p. 5).

67. As drafted, the Board is not sure either of the precise position being alleged in the contention or the relief being sought by ANGRY. In particular, we perceive no benefit if the Commonwealth were to adopt the principle that emergency workers should "not have more important commitments to families within the immediate area of TMI." The actual issue that was litigated in this proceeding, and the matter which we believe is at the heart of Contention EP-5(C), is whether emergency response personnel will in fact perform their duties during a radiological emergency at TMI. It is this issue which we resolve below.

68. In one respect this contention is totally at odds with the concept of emergency planning. Assume for the purposes of discussion that ANGRY was right and emergency workers could not be relied upon to perform their responsibilities during an accident at TMI. Obviously, no amount of preplanning, training or exercising could alter that result. In such circumstances, no purpose would be served by preparing emergency plans. In short, the Commission's regulations directing that such plans be developed would be an idle

gesture. We do not believe that the Commission intended this Board to pass, as a policy matter, on the wisdom or utility of emergency plans; that matter already has been resolved in the Commission's new emergency preparedness regulations. Rather, the Board believes that its charge is to examine carefully the emergency plans prepared by Licensee and by state and local governments to determine whether those plans satisfy applicable Commission regulations. It is true that such regulations speak in terms of plans that are "capable of being implemented", but we believe that authorizes an inquiry only into whether the predesignated manpower, communication systems and other equipment are adequate to implement the written plan, and not whether the emergency workers will in fact perform their jobs.²³

69. We therefore recommend to the Commission that, in reviewing this decision, it make clear that it does not intend its licensing boards to determine whether emergency workers will perform their jobs. This issue is essentially a generic inquiry. A considerable amount of time was spent in this proceeding litigating this particular issue. Since resolution

23 If an emergency plan designated as a response group an organization not usually relied upon during emergencies, then we might have reason to inquire further and determine whether the organization could be relied upon in an emergency. However, we do not reach that issue in this case since only traditional response groups are identified in the state and county emergency plans. These include: police, fire, ambulance and medical, bus drivers and RACES members.

of this matter raises various policy questions to which this Board can bring no special or particular expertise, we believe little purpose would be served by routinely litigating the matter in licensing proceedings.

70. The Board is mindful that the Commission may not agree with this recommendation. Since a full record was developed on the issue, we provide our views on the evidence below.

71. As part of its case on the adequacy of offsite emergency planning around TMI, Licensee presented the testimony of Dr. Russell R. Dynes, ff. Tr. 17120. Dr. Dynes is an acknowledged expert with respect to the general principles of emergency planning. Erikson, ff. Tr. 21686, at 2; see also Dynes, ff. Tr. 17120, at 1-2 and Statement of Professional Qualifications; note 8, supra. Although Dr. Dynes' testimony dealt generally with principles of emergency planning, oral examination did inquire into whether emergency workers could be expected to perform their duties. Based on the review of disasters with which he was familiar, Dr. Dynes stated that he had "really never run into anybody who abandoned an important emergency job -- who left because of family conflict." Tr. at 17196 (Dynes). Dr. Dynes explained that this was not meant to imply that emergency workers were unconcerned about their families. Rather, his experience was that emergency workers took compensating actions that enabled them to continue with

their response duties while knowing that their families were safe. These actions include making prior arrangements to ensure the safety of their families or using ad hoc means to check on their families' condition. Tr. at 17196-97 (Dynes). As a result, Dr. Dynes was unaware of a single failure in emergency response due to a failure of emergency workers to stay and fulfill their responsibilities, including the response during the TMI-2 accident. Tr. at 17197-98 (Dynes).

72. During the examination of Dr. Dynes, it became apparent to the Board that there are various types of people that have emergency response duties and we inquired into whether Dr. Dynes' observations were true across the board. For example, at one level there are well-trained professionals, like police and firemen, whose jobs are to stay and respond to an emergency. For such people it could be expected that they would perform their duties. However, at the next level are professionals, like doctors and nurses, who have important functions but normally do not carry those duties out under emergency conditions where there may be some threat to themselves or their families. Even in this case Dr. Dynes stated that the historical experience has been that such institutional staffs stay and perform their duties. Dr. Dynes observed that, if some people leave, adequate staffing can be maintained by slightly increasing the length of shifts. Thus, he did not see a problem of understaffing in this situation. Tr. at 17202-03

(Dynes). Another level of emergency response personnel would include people not typically referred to as emergency workers. This would include, for example, housewives who drive school buses part-time, but who would be expected to stay during an emergency and transport school children or others without their own transportation. In this case too, Dr. Dynes testified that the experience is that such people stay and perform their jobs. Dr. Dynes explained this conclusion by referring to "an exhilarating experience" that takes place during emergencies Tr. at 17204-07 (Dynes). The Board recalls that during this testimony there was a sense that Dr. Dynes was somewhat insensitive and uninformed about the situation at TMI. On that basis we earlier indicated that the Board was inclined to view Dr. Dynes' credibility on this issue as "rather low." Tr. at 20989 (Chairman Smith). We have rethought that position, and for reasons that we explain below, the Board is no longer of that view. In particular, we have reviewed again Dr. Dynes' further explanation of his remarks. In part he stated (Tr. at 17206):

Well, I think in large part maybe we are quibbling on words here. I think the point is that people get in situations in which they have an opportunity to help other people. And in our normal jobs very often that does not happen. The general experience is people feel very positive to that.

We believe that observation was appropriate and does characterize the feeling of emergency response personnel during

the TMI-2 accident. This conclusion is based in part on testimony that we heard later in the proceeding that confirms Dr. Dynes' position (see §§ 73-77, infra). It also is based on the Board's perception that the only contrary testimony by an expert, that presented by Dr. Erikson, was addressed to a situation different than that being described by Dr. Dynes (see §§ 84-87, infra).

73. There is a broad range of testimony that confirms Dr. Dynes' observations. Licensee's witnesses testified that during 1979 there were more than a dozen incidents at TMI where offsite medical assistance (ambulance service) was requested and provided by the local volunteer fire companies. And, in response to a fire at TMI on November 6, 1980, five different fire companies responded promptly. Rogan, et al., ff. Tr. 13756, at 49-50. It should be stressed that these incidents were not drills and the responding personnel did not know the severity of the problem at the time of response.

74. Mr. Curry, the York County emergency management coordinator, confirmed Dr. Dynes' position that emergency workers do make prior arrangements to ensure the protection of their families. Mr. Curry has done so personally, and he has instructed other emergency workers to do likewise. Mr. Curry referred to such preplanning as "the old common sense scenario." Tr. at 20875-77 (Curry). Moreover, the York County emergency response plan contains explicit instructions for the

evacuation and care of the families of emergency workers. See Board Ex. 5, at Annex G, §§ II.E and IV.A, pp. G-1 to G-2; see also id. at Annex D, § III.A, p. D-1, and Annex T, p. T-3, ¶ 1.

75. With respect to the availability of school bus drivers, the Board is aware that Mr. Warner of the Red Lion Bus Company told representatives from the League of Women Voters ("LWV") that he had 110 bus drivers, that 108 of them showed up for work during the last emergency, and that he feels sure that these people would be reliable during any future emergency. Tr. at 21540 (Miller). In addition, Dr. Jenkins of the Eastern School District told LWV representatives that he had polled his school bus drivers and 80 percent stated that they would respond in an emergency. Tr. at 21544, 21562-63 (Miller).

76. As to Dr. Dynes' conclusion that emergency response had never been inadequate due to a failure of emergency workers to report, this was confirmed by the testimony of witnesses from the Commonwealth of Pennsylvania and FEMA. Kenneth Lamison, FEMA's operations officer, testified to the broad range of emergency conditions experienced by the Commonwealth. These vary from minor incidents occurring almost daily to major evacuations, such as the flood in 1972 where 80,000 people were successfully evacuated from an area around Wilkes-Barre. Tr. at 17865-66 (Lamison). Mr. Lamison also was familiar with the successful evacuation of 214,000 people from the city of Mississauga, Ontario, Canada. Tr. at 17866-67 (Lamison).

Based on this experience it was Mr. Lamison's testimony that the Commonwealth had never had a problem with emergency workers not performing their functions. This included emergency response to hazardous material spills where there was risk to the personal lives of workers and potentially to their families. Tr. at 17867-68 (Lamison).

77. The FEMA witnesses, testifying from an even broader base of emergency response during disasters, concluded that emergency workers will perform their functions even in situations where their families may be endangered by the emergency. This conclusion is based on the recognition by emergency workers that in performing their mission they reduce the risk to their own families as well as to others,²⁴ and is documented in the FEMA library by Technical Report No. 77, "Perspective on Disaster Planning" (December 1972). Adler and Bath-2, ff. Tr. 18975, at 52.

78. In the face of this evidence, intervenors presented testimony and a study by the LWV and the testimony of Dr. Kai T. Erikson to demonstrate that emergency workers could not be relied upon to perform their duties. See Ryscavage, et al., ff. Tr. 21508; Erikson, ff. Tr. 21686. As we explain below,

24 This view seems especially relevant for the part-time school bus drivers. The Board recognizes that such drivers may well feel that by staying and performing their job they will ensure the safety of their own children and those of their neighbors.

the Board finds significant defects in this testimony and is unpersuaded that emergency workers will fail to perform their duties.

79. The testimony presented by the LWV in this proceeding is based on two survey reports that were issued on November 19, 1980 and April 17, 1981. Tr. at 21518 (Ryscavage). The November 19 study apparently was not prepared specifically for this proceeding; however, it is clear from the timing that the April 17 study was prepared for submittal in this proceeding. While the Board is encouraged to see local groups like the LWV involved in the emergency planning issue, we must state in all candor that the studies suffer from a lack of professionalism. None of the LWV witnesses has experience in emergency planning, Tr. at 21509, and, except for Dr. Ryscavage's training as a physician, none has experience in actual emergency response. Tr. at 21509, 21516. Also, none of the LWV witnesses has experience in communication systems, traffic engineering, or demography. Tr. at 21516. Nor had any of the LWV witnesses received training or instruction in interview methodology. Tr. at 21517-18.

80. This lack of background had a clear and adverse influence on the methodology used by the LWV to prepare its study. Some of the interviews were conducted prior to the establishment of the rough question format used in most of the interviews. Tr. at 21519-20 (Ryscavage). Some of those

interviewed prior to the development of the questions were not later re-interviewed. Tr. at 21521 (Ryscavage). Not all interviewees were asked the same questions. Tr. at 21627 (Ryscavage). In at least one instance the interviewees did not understand the terminology being used by the interviewers, and so gave responses indicating that they could not perform a particular function, though in fact they were able to do that task. See Tr. at 21572-74 (Wentzel), 21649-51 (Hilliard/Miller).

81. Moreover, the Board finds that the interview process itself was undisciplined, more in the nature of an open-ended discussion rather than a neutral interview conducted in a professional and businesslike manner. In one instance, the LWV witness did not know who had raised a particular issue in the conversation -- the interviewee or the interviewer. Tr. at 21553 (Hilliard). In other cases the questions were unduly suggestive -- e.g., "[w]hat other communication problems do you see" and "[w]hat problems do you see in drawing up a workable plan." Tr. at 21557 (Miller). Not all information which the interviewer deemed significant was recorded in the notes, forcing the interviewers to recall from memory the substance of their numerous interviews. Tr. at 21549, 21553-55 (Hilliard). There was no specific format for the interview notes, Tr. at 21529 (Ryscavage), even though a number of individuals actually did the interviewing. As a result, some interviewers did not

note the date of the interview in their notes, and could only estimate when the interviews occurred. Tr. at 21524-27 (Ryscavage/Hilliard). We note this last fact not to be overly critical of the LWV, but only as evidence that the interviews were not conducted as rigorously as might be the case for a trained interviewer. In at least one instance, the person preparing the study report was working from "interview" notes of her conversation with another LWV individual who actually did the interview. Tr. at 21527 (Ryscavage). In another case, the interview notes included material both from the interviewee and from another LWV interviewer who had spoken with the interviewee earlier. Tr. at 21555-57 (Miller).

82. Finally, the Board questions the methodology used by the LWV in taking the raw information from their interview notes to prepare the study report. Apparently the LWV had no established criteria which they applied in deciding what information to extract from their notes for inclusion in the study report. Tr. at 21529, 21531 (Ryscavage), 21531 (Hilliard). It became clear during cross-examination that there was extensive information in the interview notes, indicating a favorable or adequate state of emergency preparedness, that was not included in the LWV's study report. This included information about the overall adequacy of particular municipal and school evacuation plans, Tr. at 21557 (Miller), 21583-84, 21585 (Ryscavage); the existence of

radiation monitoring equipment, Tr. at 21565, 21566 (Ryscavage), and training received in its use, Tr. at 21565, 21566, 21576, 21577, 21584-85 (Ryscavage); the availability of towing and wrecking services, Tr. at 21563-64, 21566, 21576 (Ryscavage); and arrangements made for the transportation of invalids and homebounds. Tr. at 21577 (Ryscavage). We already have noted that the interview notes included unreported information indicating that bus drivers could be expected to perform their duties during an emergency at TM. See ¶ 75, supra.

83. Because of these defects in the study conducted by the LWV, and the general hearsay character of the entire study process, see Tr. at 21578-83, the Board does not accept the conclusions presented in the study. See also Section II.G.7, infra. We find that, on balance, the conclusions of the study are not based on reliable, probative evidence sufficient to support a finding of fact.

84. With respect to Dr. Erikson's testimony our concerns are somewhat different. Dr. Erikson is a well-known and well-respected sociologist. In recent years his professional work has increasingly focused on human crises and emergencies, including his research of the Buffalo Creek disaster. Erikson, ff. Tr. 21686, at 1 and Statement of Professional Qualifications. However, it is the Board's observation that this work has tended to focus on the long-term impacts of

disasters on communities, rather than on the response of the community during the disaster. For example, with respect to Dr. Erikson's work on the Buffalo Creek disaster, he began the study one year after the event and ended the study about three and a half years after the event. Tr. at 21803-04 (Erikson). He has taken no formal classwork in emergency planning or emergency response. Tr. at 21779 (Erikson). None of his professional work has involved the logistics of emergency planning, the development or review of an emergency plan, or participation in an evacuation, either as a participant or an emergency worker. Tr. at 21779-80 (Erikson). Dr. Erikson has not studied, evaluated or researched emergency response to a nuclear incident of any sort, Tr. at 21780 (Erikson), including of course the response during the TMI-2 accident. Tr. at 21697 (Erikson).

85. The Board makes these observations not to belittle Dr. Erikson's general qualifications but to indicate that Dr. Erikson's testimony before the Board may have been beyond the areas with which he feels comfortable. As a result, the Board believes that, at least with respect to his testimony on whether emergency workers would stay and perform the jobs, see Erikson. ff. Tr. 21686, at 6-8, Dr. Erikson's testimony did not focus on the precise concerns which were before the Board. The primary distinction that Dr. Erikson draws between incidents involving the risk of radiation or other types of

contamination, on the one hand, and natural disasters, on the other hand, is that the latter group of emergencies "have a clear beginning and a clear ending," while in Dr. Erikson's view, the former group of emergencies are "never quite over" because "an invisible threat hangs in the air (or in the tissues of the body) for an indeterminate amount of time and survivors have no sure way of knowing how much damage has been done or is yet to be done."²⁵ Erikson, ff. Tr. 21686, at 3. As to the significance of this distinction, Dr. Erikson further testified that when the emergency is not quite over "the people who are being called upon to take a part in those [emergency] plans may themselves be in a position of not knowing whether they as particular individuals are still in a threat situation, or whether members of their families are." Tr. at 21782 (Erikson). This should be contrasted, Dr. Erikson argues, with the situation presented in a natural disaster where "people respond to the job of cleaning up and of helping neighbors with great care and concern once they have reason to suppose that the damage resulting from the event itself has ceased, the threat has ceased." Tr. at 21781-82 (Erikson).

²⁵ By restating Dr. Erikson's position, the Board is not adopting Dr. Erickson's characterization of a nuclear power plant accident. We do not think it true that such accidents are "never quite over." In any event, it is clear that not ever having studied health physics, radiation effects, radiation control, or nuclear reactor operations, Tr. at 21779, Dr. Erickson is testifying as a layman and not an expert.

86. It is thus apparent that the primary thrust of Dr. Erikson's observations about the availability of emergency workers relate to what is sometimes called the "recovery" phase of the disaster and not the "crisis" phase where timely action by emergency workers may be necessary to effectuate the emergency plan. This emphasis by Dr. Erikson on the "recovery" phase of the incident is of course consistent with the central area of Dr. Erikson's research work. See generally Tr. at 21780-81 (Erikson). That Dr. Erikson was in fact focusing on the "recovery" phase is confirmed by his own testimony (Tr. at 21784):

Q [By Mr. Gray]: But non-nuclear disasters could nevertheless provide us with useful information on the response of emergency workers in this regard; isn't that true?

A [By Dr. Erikson]: If you are asking me, would I expect that the initial response to the nuclear disaster would be different than to other disasters, I would have no reason to suppose that that would be so.

This, of course, is a logical response, since it is clear that during the actual emergency, i.e., the "crisis" phase, emergency workers face threats to their own lives and that of their families, regardless of whether it is a nuclear incident, or a hurricane or flood. See Tr. at 21783-84 (Erikson).

87. Thus, even if this Board accepts Dr. Erikson's testimony on emergency worker availability at face value, when considered in the context presented by him, the Board has no reason to discount the testimony presented by Dr. Dynes, the

Commonwealth of Pennsylvania and FEMA, which we already have summarized, that response during an emergency has never been jeopardized due to a failure of emergency workers to stay and perform their duties. In addition, since the only "factual" evidence relied upon by Dr. Erikson to support his conclusions about emergency worker availability was the LWV's study, see Erikson, ff. Tr. 21686, at 7, the Board would have great difficulties accepting conclusions grounded on that study. See ¶¶ 79-83, supra. This is especially so since Dr. Erikson admitted that he knew nothing of the circumstances under which the survey was done, Tr. at 21730 (Erikson), that he would be reluctant to generalize the LWV findings even to the whole of the TMI area, Tr. at 21732-3 (Erikson), and that he would put "somewhat less credence" in the study after he was informed about the study methodology. Tr. at 21740 (Erikson). Nor does the Board know how Dr. Erikson would evaluate the statements made to the LWV interviewers that bus drivers could be counted on to respond during an emergency, see ¶ 75, supra, but not reported by the LWV in their study.

88. The Board therefore finds reasonable assurance that an adequate number of emergency workers in the TMI area will stay and perform their jobs. We further find that all emergency response groups, including those of the Licensee, the Commonwealth, and county and municipal governments, have identified and organized an appropriate number of people to

assure that adequate protective actions can and will be taken in the event of a radiological emergency at TMI.

B. Accident Assessment

89. The accident assessment issues put into controversy by the parties relate generally to two primary matters: the adequacy of Licensee's accident classification scheme and Licensee's ability to monitor and analyze offsite releases of radioactivity. We deal with both concerns below.

ECNP Contention EP-7: The fractions of EPA PAGs listed on p. 4-1 of the plan, with their associated action levels, do not take into account the total accumulated dose and dose commitment. As a result, the total exposures may exceed by large margins the listed PAG fractions prior to the advancement to a higher emergency category.

ECNP Contention EP-8: The various emergency categories (p. 4-2 to 4-8) each list a number of triggering events or conditions. Many of these are questionable indicators. For instance, on p. 4-3, "Valid" alarms are referred to. But there is no mention of the definition of a "valid" alarm, or what would be an invalid alarm. A number of reactor coolant activities (50, 130, and 300 ci/ml) are referred to, but no mention is made of how much fuel damage it takes to produce these readings. In addition, there is no indication of how or how rapidly these coolant activities will be determined.

ECNP Contention EP-9: Reliance on "adverse meteorology" (p. 4-5, 4-6), can prove to provide little or no "built-in conservatism" (p. 4-7, 4-8) since, for instance, such conditions were not at all uncommon

during the nighttime in the nights following the TMI-2 accident (for instance, the night of March 29, from 10 p.m. to 8 a.m., March 30; night of March 31, about 8:00 p.m. to 8:00 a.m., April 1).

90. These three contentions attack the adequacy of the methods Licensee uses to declare and classify accidents. Licensee's accident classification system is described in Chapter 4 and Tables 21-24 of its Emergency Plan. Lic. Ex. 30. The NRC Staff has reviewed the adequacy of this classification scheme and its favorable conclusions are reported in the EPE and Supplement 1 thereto. Staff Ex. 6, at 8-10; Staff Ex. 23, at II-11 to II-12. In addition, both Licensee and the NRC Staff presented testimony on Licensee's accident classification system and ECNP Contentions EP-7, EP-8 and EP-9. See Rogan, et al., ff. Tr. 13756, at 66-76; Chesnut, ff. Tr. 15007, at 4-14, 26-29 and 84; Levine, ff. Tr. 17298, at 6-9. Oral examination of these witnesses relevant to this subject matter appears throughout the March 3-6, 10-12, 17 and 24, 1981 hearing transcripts. Intervenor ECNP presented the testimony of one witness on this subject matter, see Molholt, ff. Tr. 19690, at 1-3 and 10; the oral examination of Dr. Molholt appears in the April 22-23, 1981 hearing transcripts.²⁶ Neither the Commonwealth of Pennsylvania nor any intervenor other than ECNP

26 The bulk of Dr. Molholt's testimony was unrelated to ECNP Contention EP-7. The Board addresses the other aspects of Dr. (footnote continued next page)

presented testimony on this issue, although these other parties did participate in the cross-examination of the witnesses.

91. The Board has organized its consideration of this issue into three parts. We first briefly describe Licensee's accident classification system and the reasons underlying development of the particular classification methods used by Licensee. Next we identify and resolve those minor differences identified by the NRC Staff between Licensee's proposed classification system and one totally acceptable to the NRC Staff. Finally, the Board addresses directly each of the referenced ECNP contentions. The Board has reviewed all matters raised with respect to accident classification, and if the matter is not directly addressed in this portion of our Recommended Decision, it is because the Board found the concern to be without merit.

92. Licensee has adopted the system for classifying accidents specified in 10 C.F.R. Part 50, Appendix E, § IV.C. This system classifies all accidents into four emergency categories: Unusual Event, Alert, Site Emergency and General

(continued)

Molholt's testimony in Section II.F, infra. With respect to his testimony on Contention EP-7, we discount it both because Dr. Molholt misunderstood the use Licensee makes of PAG's in its accident classification system, see Tr. at 19939-42, and because it is obvious from Dr. Molholt's Statement of Professional Qualifications, ff. Tr. 19690, that he has no technical background in reactor operations that could support his testimony in this area.

Emergency. Rogan, et al., ff. Tr. 13756, at 70-71. Staff Ex. 6, at 9. The Emergency Director is responsible for classifying the accident. Two major guides are used in determining the proper classification. The first method relies on Emergency and Abnormal Operating Procedures, which specifically refer the plant operators to the appropriate emergency category when an action level has been exceeded.²⁷ The second method requires the plant operators to compare plant parameters and conditions to a specified list of emergency action levels ("EAL's"). When a given action level has been exceeded, the emergency class associated with that action level is declared. Rogan, et al., ff. Tr. 13756, at 72. EAL's included in Licensee's Emergency Plan are based on guidance contained in NUREG-0654, Appendix 1. Compare Lic. Ex. 30, at Tables 21-24 with Staff Ex. 7, at Appendix 1, pp. 1-5, 1-6, 1-9, 1-10, 1-13, 1-14, 1-17, 1-18 and 1-19; see Rogan, et al., ff. Tr. 13756, at 73; Staff Ex. 23, at II-11 to II-12.

93. The accident classification scheme and EAL's adopted by Licensee are designed to avoid failures in recognizing an accident and to provide for orderly and rapid accident assessment. This system accounts for the possibility of

27 For example, if control room instruments indicated to the operators that a small break loss-of-coolant accident ("LOCA") had occurred, one step in Emergency Operating Procedure 1202-6B would refer the operator to the Emergency Plan Implementing Procedure for a Site Emergency (1004.3). Rogan, et al., ff. Tr. 13756, at 17-18.

worsening accident conditions, added operator error or further equipment failures by specifying the declaration of "emergency conditions" and the initiation of emergency response for minor events that might be indicative of more serious but unrecognized conditions. The gradation in emergency classification assures that a reasonable amount of time is available to evaluate in-plant readings, initiate onsite and offsite assessment actions (if warranted), and allow for anticipatory actions on the part of onsite and offsite response organizations prior to an actual need for implementing protective actions. Chesnut, ff. Tr. 15007, at 4-5, 6-7; Rogan, et al., ff. Tr. 13756, at 73.

94. The Board finds that this approach, which represents a significant change in philosophy from that which prevailed at the time of the TMI-2 accident, provides reasonable assurance that Licensee personnel will be able to recognize and classify emergency conditions, or the precursors to such emergencies, in a timely manner.

95. At the time the NRC Staff's EPE for TMI-1 was prepared, a full review of the specific EAL's chosen by Licensee had not yet been completed. Staff Ex. 6, at 9-10, and 31. The NRC Staff, however, had concluded that certain EAL's were more "conservative" than those specified in NUREG-0654, and suggested that Licensee conform its EAL's more closely to the guidance in NUREG-0654. Id. at 9. When NRC Staff witness

Chesnut testified, the NRC Staff had completed its review of Licensee's specific EAL's and the results of that review are included in the Chesnut testimony. The NRC Staff found Licensee's EAL's acceptable with two exceptions: the EAL's using fractions of the EPA Protective Action Guides ("PAG's") classified a Site or General Emergency at projected radiation levels lower than those recommended in NUREG-0654, and the EAL's using reactor coolant system activity levels also classified accidents at levels lower than recommended in NUREG-0654. Chesnut, ff. Tr. 15007, at 5, 9, 26, 28. Licensee responded to these NRC Staff observations by noting that the Site Emergency EAL's were in fact not more conservative than those recommended in NUREG-0654, Tr. at 13766-67 (Giangi), and by committing to revise the General Emergency and the reactor coolant system activity EAL's to make them consistent with NUREG-0654. Tr. at 13767-68, 14252-53 (Giangi). The NRC Staff has reviewed these commitments and found them to be adequate. Staff Ex. 23, at II-11 to II-12; Tr. at 22880 (Chesnut).

96. The Board inquired as to why the NRC Staff objected to the apparent conservatism of Licensee's EAL's and why Licensee was willing to modify the EAL's in the manner sought by the NRC Staff. Tr. at 13768 (Chairman Smith). Licensee explained that the changes sought by the NRC Staff affected only the category of emergency to which the accident was classified. Neither the protective action recommendations to

be made by Licensee to the Commonwealth nor the ability of onsite and offsite organizations to respond to the emergency would be affected by the changed EAL's. Tr. at 13769-70 (Giangi). Moreover, the NRC Staff hoped to achieve a substantial degree of consistency nationwide in the classification of accidents. This would assist the NRC Staff in judging the relative severity of an accident. Modification of Licensee's EAL's furthers this goal without degrading public health and safety. Id. The Board therefore finds the modified EAL's acceptable.

97. We turn now to the ECNP contentions. Contention EP-7 alleges that, since the EPA PAG's used by Licensee do not take into account the total accumulated dose, total exposure may exceed the listed PAG fractions prior to the advancement to a higher emergency category. While much of the contention is true, it became apparent to the Board during the hearing that ECNP had a substantial misunderstanding of the ways in which Licensee and the Commonwealth use PAG levels and the implications for protecting the public health and safety. See n.26, supra.

98. As defined by EPA, PAG's represent that level of projected dose to the population that warrants the consideration of various protective actions designed to minimize or eliminate the potential dose that the population will receive. Chesnut, ff. Tr. 15007, at 7-8; Rogan, et al. ff. 13756, at 74.

Consistent with this guidance, PAG's do not include the dose that has unavoidably occurred prior to evaluating the need for protective action. Chesnut, ff. Tr. 15007, at 10-14; Rogan, et al., ff. 13756, at 74. This definition, however, does not imply that the unavoidable dose would be ignored in making protective action recommendations. Rogan, et al., ff. Tr. 13756, at 74.

99. As indicated in Contention EP-7, Licensee uses the EPA PAG's as an action level to classify and declare various emergency categories. Tr. at 14529 (Tsaggaris). In order to do this, Licensee converted the PAG levels, which represent a time integrated dose, into dose rates that could be compared to instrument readings in the control room. Tr. at 14530 (Tsaggaris). For purposes of classifying an accident, the Board finds this procedure entirely appropriate. The issue of concern during an accident is the current status of the plant. Releases that may have occurred the previous day, week or month do not provide useful information about current plant status, although such releases may be of significance in making protective action recommendations.

100. However, Licensee has indicated, both in its prepared testimony, Rogan, et al., ff. Tr. 13756, at 74, and during cross-examination, Tr. at 14530 (Tsaggaris), that information about prior, closely-related releases would be considered in making protective action recommendations to the

Commonwealth. This too seems appropriate to the Board and is sufficient to provide reasonable assurance that the public health and safety will be protected.

101. The Board therefore finds that Licensee's Emergency Plan makes appropriate use of the EPA PAG's and that Contention EP-7 provides no basis for revising or in any other way altering the Emergency Plan.

102. ECNP Contention EP-8 raises concerns with respect to two groups of EAL's used by Licensee. The first are those EAL's that refer to "valid" alarms; ECNP questions how alarms would be determined to be "valid" or "invalid". The second group of EAL's are those related to reactor coolant system activity levels. We address each matter in turn.

103. Licensee defines a "valid" alarm as one which is confirmed. Confirmation is accomplished by observing other supporting indicators, by actual sampling, or by ruling out events such as instrument malfunction. Rogan, et al., ff. Tr. 13756, at 75; Chesnut, ff. Tr. 15007, at 27. The purpose of such confirmation is to ensure that an emergency is not declared in situations where invalid or erroneous alarms do not accurately indicate actual plant conditions. Id.

104. The ability of an operator to properly distinguish between "valid" and "invalid" alarms is an essential element of both normal and abnormal plant operation. It is a matter that has been addressed by the Board in earlier parts of this

Recommended Decision, including our discussions relating to operator training, procedure review and revisions, and control room design and human-factors engineering.²⁸ See also Tr. at 14569-70 (Tsaggaris). The Board finds it appropriate that EAL's be limited to "valid" alarms and finds on the basis of the entire record that there is reasonable assurance that operators will properly distinguish between "valid" and "invalid" alarms.

105. The other set of EAL's challenged by ECNP relates to the reactor coolant system activity levels. The Board already has discussed the changes Licensee is committed to make with respect to these EAL's and the appropriateness of those modifications. See ¶¶ 95-96, supra. While the contention might be read to challenge the adequacy of the activity levels chosen as EAL's, there is no evidence that those levels are inappropriate. As modified, Licensee's EAL's for reactor coolant system activity correspond to the guidance in NUREG-0654 and reflect a realistic basis for declaring an emergency. Tr. at 14253 (Giangi); 15085 (Chesnut); 15088 (Grimes).

28 See, e.g., Licensee's Proposed Findings of Fact and Conclusions of Law on Management Issues, at 91-136; Licensee's Proposed Findings of Fact and Conclusions of Law on Plant Design and Procedures Issues in the Form of a Partial Initial Decision, at 30-37, 66-70, 197-222.

106. Rather, the contention appears to challenge the time within which Licensee can determine reactor coolant system activity levels. Licensee has modified its normal coolant sampling procedures so as to be able to take high activity coolant samples within the worker exposure and time guidelines specified in NUREG-0737. Chesnut, ff. Tr. 15007, at 28-29. Using these modified procedures, Licensee can analyze a high activity sample within three hours. Id. In addition, Licensee's Emergency Plan makes use of the letdown monitor (RM-L1) to trigger various emergency classes on the basis of reactor coolant system activity levels. Lic. Ex. 30, at Tables 21-23; Tr. at 15156-59 (Chesnut). There is no time delay in taking in these readings which record real-time activity levels. Id. The Board finds that, with respect to emergency accident classification, adequate provisions have been made for the timely monitoring and sampling of reactor coolant system activity levels. We therefore reject Contention EP-8.

107. The last of the ECNP contentions on accident classification, EP-9, deals with the use of "adverse meteorology" in setting various EAL's. NUREG-0654 recommends that adverse meteorology be used in setting certain EAL's for the Site Emergency while actual meteorology be used in setting certain EAL's for the General Emergency. Staff Ex. 7, at Appendix 1, pp. 1-13, 1-17; Rogan, et al., ff. Tr. 13756, at 76; Tr. at 14579 (Tsaggaris). In developing EAL's consistent

with this guidance, Licensee defined adverse meteorology as the TMI site specific five percent probable meteorology, corresponding to a Pasquill Stability Category F and a wind speed of 1.5 mph. Rogan, et al., ff. Tr. 13756, at 76; Tr. at 14579 (Tsaggaris); Levine, ff. Tr. 17298, at 6-7.

108. Licensee identified two advantages derived from the use of this procedure. First, by setting the adverse meteorology and back calculating it was possible to develop an EAL which uses a specific control room meter reading rather than requiring the operator to perform a calculation based on actual meteorology. Rogan, et al., ff. Tr. 13756, at 76-77. Neither ECNP nor any other party to the proceeding challenged the desirability of this feature. Second, by using the five percent meteorology, Licensee introduced a certain amount of conservatism into its decision to declare a Site Emergency. Id. at 77. ECNP apparently challenges this conclusion by noting that, by definition, the actual meteorology will be worse than that used in the calculation five percent of the time. Accepting that observation, the Board does not find it significant. The worst case meteorology ever measured at the TMI site is different from the five percent meteorology by only a factor of two. Tr. at 14952 (Riethle). Given the uncertainty present in all dose projections, the Board concludes that no useful purpose would be served by using worst case rather than the five percent meteorology. Indeed, the NRC

Staff meteorologist testified that Licensee's definition of adverse meteorology was appropriate and did provide an adequate degree of conservatism. Levine, ff. Tr. 17298, at 9.

Moreover, Licensee uses this definition of adverse meteorology solely for purposes of accident classification and not for making protective action recommendations which are based on projected doses using actual meteorology. In the circumstances, the Board finds no reason to fault either Licensee's definition of adverse meteorology or the manner in which that definition is used to classify and declare accidents.

109. The Board concludes that the accident classification scheme adopted by Licensee complies with the applicable regulations and is consistent with the guidance of NUREG-0654. The Board further finds that this classification scheme is designed to avoid failures in accident recognition and provides for an orderly and rapid assessment of the emergency. The concerns raised by ECNP are rejected.

110. With respect to the adequacy of Licensee's offsite radiation monitoring capabilities, issue was raised as to: the adequacy of Licensee's mobile monitoring teams, the need for offsite, real-time remote readout monitors, Licensee's capabilities to analyze and project offsite doses, and the adequacy of Licensee's Radiological Environmental Monitoring Program ("REMP"). We consider each issue seriatim.

ANGRY Contention EP-4(I):

The time provided in the EP for accident assessment, 1/2 hour (EP, p. 6-7), is in excess of the maximum permissible therefor specified in the Standard Review Plan, NUREG-75/087, Sec. 13.3(ii)(3). (EP fig. 21 shows a thyroid PAG of 5 rems being reached in 12 minutes at 600 meters.) Moreover, the estimate given is unsupportable for monitoring of offsite locations on nearby islands or on the west shore of the Susquehanna River. Such factors may be critical in the event of a general emergency, which produces a "shift in emphasis to greater offsite monitoring efforts" (EP, p. 6-6). (See EP-3(C)(1).)

Sholly Contention EP-18:
(in part)

It is also contended that the Licensee does not possess adequate portable radiation monitors to provide additional information in the event of an offsite radiation release, and that the Licensee does not exercise adequate administrative control over the maintenance of these units, nor the training of personnel in their use. It is contended that the radiation monitoring program of the Licensee must be greatly upgraded prior to restart to ensure adequate protection of the public health and safety.

111. These two contentions challenge the adequacy of Licensee's program to dispatch mobile monitoring teams to measure offsite radiation in the event of an accident at TMI. Contention EP-4(I) questions the time it would take to dispatch such teams, while Contention EP-18 (in part) questions the

adequacy of the mobile monitoring equipment, including the maintenance of such equipment, and the training emergency response personnel receive in using such equipment. The accident assessment actions Licensee takes following declaration of an emergency are described generally in Section 4.6.3 of Licensee's Emergency Plan; Section 4.6.3.5 contains an extended discussion on radiological assessment and offsite monitoring. Lic. Ex. 30. Equipment used for such monitoring, and the procedures to check, calibrate and maintain the equipment, are identified in Sections 4.6.5.3 and 4.8.3, and in Tables 13 and 20 of the Emergency Plan. Lic. Ex. 30. In addition, Licensee has prepared Administrative Procedure 1053, "Emergency Equipment Readiness", which provides detailed guidelines specifying necessary radiation monitoring equipment and the schedule for equipment checks, calibration and maintenance. Lic. Ex. 31. The training received by personnel responsible for offsite radiation monitoring is identified in Section 4.8.1.1 and Table 12 of the Emergency Plan; Section 4.8.1.2.5 provides for an annual radiological monitoring drill. Lic. Ex. 30. The NRC Staff has reviewed the adequacy of Licensee's offsite radiological monitoring capabilities, and its favorable conclusions are reported in the EPE. Staff Ex. 6, at 19, 25, 27. Both Licensee and the NRC Staff presented additional testimony on this subject. See Rogan, et al., ff. Tr. 13756, at 77-81, 120-21; Chesnut, ff. Tr. 15007, at 14-18;

Donaldson, ff. Tr. 17354, at 12-15; Chesnut, ff. Tr. 22235, at 7-10. Oral examination of these witnesses appears throughout the March 4-5 & 10-11, April 3, and June 30, 1981 hearing transcripts. No other parties to the proceeding presented testimony on these issues.

112. Before turning to Contentions EP-4(I) and EP-18 (in part), the Board first summarizes the methods used by Licensee to monitor and project offsite radiation releases. As will become evident from this summary, the actual field measurements by monitoring teams are only a part of the complete assessment process.

113. In projecting offsite doses, Licensee initially factors the radiation monitoring system readings for all monitored gaseous effluent release paths into a combined source term. Offsite whole body dose rates and iodine concentrations are then projected by applying the appropriate meteorological dispersion factor for areas of interest. A procedure has been developed which contains the necessary reference information and step-by-step method necessary to project the offsite dose; this procedure provides for manual calculation or use of a preprogrammed microcomputer. Rogan, et al., ff. Tr. 13756, at 77-78. Personnel trained in the procedure can complete the necessary calculations in about 10-15 minutes. Tr. at 14256-57, 14378-79 (Tsaggaris).

114. The results of this initial calculation provide information indicating the potentially affected areas and the expected radiological impact. Using this information, radiation monitoring teams are dispatched to onsite and offsite locations under the control of the RAC. Concurrently, the RAC begins to set up the dose assessment area in the control room. A large area map of the plume exposure pathway EPZ is utilized to track the radiation plume, determine affected areas, and select future offsite monitoring points. The RAC uses input from the mobile monitoring teams, as well as additional information from the plant radiation monitoring and meteorological systems, in order to update calculations and refine dose projections. Rogan, et al., ff. Tr. 13756, at 78-79.

115. Once the offsite emergency support organization is manned and the Environmental Assessment Coordinator ("EAC") announces his readiness, the responsibility for offsite radiological and environmental assessment is transferred to the EAC, who operates out of dedicated facilities at Olmsted Airport. In this manner Licensee coordinates responsibility for the receipt of all offsite monitoring data and dissemination of that information to applicable state and federal response personnel in a single individual, the EAC. Rogan, et al., ff. Tr. 13756, at 57 & 80.

116. With respect to the offsite mobile monitoring teams, on-shift personnel responsible for that function have been trained to report to the Operations Support Center ("OSC") immediately upon declaration of an emergency. From there the teams would report to the processing center to pick up their radiation monitoring instrument kit. The teams are directed by procedure to ensure that the seal on the kit has not been broken and that all instruments are present and accurately calibrated. From the processing center the teams proceed to their vehicles and under the direction of the RAC proceed to an initial monitoring location. Tr. at 14669-70 (Giangi). Licensee estimates that it might take 5 minutes for the teams to muster at the OSC and report to the processing center, an additional 5 minutes to check out their equipment and proceed to their vehicles, and perhaps 15-20 minutes to drive to the monitoring location and make the initial readings. Tr. at 14670-71 (Giangi). Thus, Licensee believes that within 30 minutes after declaration of an emergency, Licensee could dispatch its mobile monitoring teams and receive back an initial set of readings. Tr. at 14056, 14262, 14670, 14690 (Giangi). This estimate has been confirmed by actual experience during a number of drills designed to test Licensee's methods for offsite radiation monitoring. Id.

117. Licensee has adequate on-shift staffing to immediately dispatch two mobile monitoring teams in the manner

just described. Tr. at 14056, 14690 (Giangi). Within one hour after declaration of an emergency, three additional radiological controls technicians report to augment the onsite emergency organization. Id. If necessary, these technicians could be used to field an additional three teams, although Licensee anticipates retaining some of the technicians for in-plant radiological controls. Tr. at 14056-60 (Giangi/Rogan). Once the EAC has assumed responsibility for offsite monitoring he has the capability to dispatch an additional four teams as well as a mobile monitoring laboratory. Tr. at 14690-91 (Giangi), 14845 (Riethle).

118. Contention EP-4(I) alleges that these capabilities are inadequate to meet the standards specified in the Standard Review Plan. The Board disagrees with this conclusion. The cited section of the Standard Review Plan was never put into evidence.²⁹ Even had it been proffered, the guidance contained therein would not have been helpful or relevant, since current NRC Staff guidance is set forth in NUREG-0654, Staff Ex. 7. In any event, the NRC has not promulgated any guidance for maximum permissible times within which to conduct offsite monitoring. Chesnut, ff. Tr. 15007, at 15.

119. Rather, the applicable NRC guidance directs licensees to develop procedures to make a prompt initial

²⁹ Moreover, the Board was unable to locate a Section 13.3 (ii)(3) in the Standard Review Plan.

assessment of the accident based on in-plant alarms, parameters and monitors. Chesnut, ff. Tr. 15007, at 15; Staff Ex. 7, at §§ II.D.1, II.I.1 & II.I.4. Licensee has in fact developed such procedures. Rogan, et al., ff. Tr. 13756, at 68-69. Licensee relies on in-plant instrumentation in conducting its initial assessment of the accident (including accident classification) and in making protective action recommendations to the Commonwealth. Tr. at 14101 (Tsaggaris). The readings reported by the monitoring teams are used to confirm the estimates projected from the in-plant instrumentation. This confirmation process is actually an ongoing iterative process whereby differences between projected and field measured values are used to adjust and refine source term and meteorology assumptions. Rogan, et al., ff. Tr. 13756, at 81; Tr. at 14101 (Tsaggaris), 14104-05 (Rogan).

120. Within this concept of operations, the Board finds that the ability to dispatch and receive back initial field monitoring data within 30 minutes is adequate to protect the public health and safety. We reach this conclusion mindful that there is testimony of record that, for certain close-in areas (like Goldsboro on the west bank of the Susquehanna River), it might take Licensee from 45 minutes to one hour to receive a field monitoring report. Tr. at 14673 (Tsaggaris). So long as Licensee does not require confirmatory field measurements to classify an accident or make protective action

recommendations -- and the record is very clear that Licensee does not and will not await such field data -- any delay in reaching areas like Goldsboro will not adversely affect emergency response by either the onsite or offsite organizations. Indeed, as NRC Staff witness Chesnut points out: "[I]t is inappropriate to rely on offsite monitoring alone for accident classification, dose projection and protective action recommendations since offsite readings will do nothing more than show what levels of radiation are actually being experienced at the monitoring location at a time when protective actions, if necessary, should already have been initiated." Chesnut, ff. Tr. 15006, at 16; see also id., at 17.

121. As to the concerns about mobile monitoring equipment, maintenance and training raised in Contention EF-18 (in part), the Board finds that Licensee has made adequate provisions in these areas. Licensee has dedicated for emergency response purposes specific monitoring equipment. This equipment includes an RO-2 Geiger-Mueller gamma survey meter, an HD-28 air sampler with charcoal or silver zeolite filters, a SAM-2 sodium iodide detector, and an RM-14 Beta-gamma contamination survey meter, or their equivalents. Tr. at 14805-08 (Giangi); Lic. Ex. 31. This equipment is inspected, checked, calibrated and maintained on a periodic basis pursuant to procedure. Lic. Ex. 31; Tr. at 14811 (Giangi). Personnel responsible for using this equipment receive training in its

use as part of their normal training that prepares them to discharge their daily duties at TMI. Tr. at 14814 (Giangi), 16297 (Knief). Additional Emergency Plan training ensures that the monitoring team members understand their role in the accident assessment process. Id. The individuals responsible for conducting the training are qualified radiological controls training personnel. Tr. at 16298 (Knief).

122. The NRC Staff has recently conducted an onsite inspection to confirm the adequacy of these provisions. That inspection showed that portable monitoring equipment for emergency use had been set aside as specified in Administrative Procedure 1053, Lic. Ex. 31, that the equipment had been inventoried and calibrated in accordance with the schedule specified in the procedure, and that the radiological controls technicians cyclic training has included substantial time covering the use of portable monitoring equipment although not all of the specialized monitoring team training had yet been completed. Chesnut, ff. Tr. 22235, at 8-10. In addition, the NRC Staff observed the performance of Licensee's monitoring teams during the June 2, 1981 exercise and found that performance adequate. Id. at 10.

123. The Board therefore finds that Licensee has made provisions for offsite radiological monitoring during an emergency sufficient to adequately protect the public health and safety.

Board Question 4:
(Tr. at 2393)

A. Has the licensee considered stationing a limited number of dose rate meters near the site, with the data telemetered to the control room or the response center?

B. Has the licensee considered placing meters which publicly measure background radiation levels at a number of public places, thereby enabling the populace to know what the level is?

ANGRY Contention EP-3(C)(1): The NRC's vague instruction to the licensee to "upgrade" in generally unidentified respects its "offsite monitoring capability" is insufficient to assure that such upgrading will result in the ability to obtain and analyze the type and volume of information essential for protection of the public health and safety. ANGRY contends that such capability must at minimum encompass the following elements or their equivalent:

1. Permanent offsite monitoring devices which register all forms of ionizing radiation and which can be remotely read onsite.
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124. Board Question 4 inquires as to whether Licensee has considered installation of real-time, remote readout dose rate meters around the TMI site; ANGRY Contention EP-3(C)(1) raises the same issue. The Board is aware that neither NRC regulations nor current NRC Staff guidance requires the installation of such equipment. Chesnut, ff. Tr. 15007, at 73-74; Staff Ex.

7. Nonetheless, the Board deemed it appropriate to inquire into the matter to determine whether voluntary actions on the part of Licensee might provide capabilities beyond those recommended by the NRC Staff. In response to our question and Contention EP-3(C)(1), both Licensee and the NRC Staff presented testimony. See Rogan, et al., ff. Tr. 13756, at 84-86; Riethle, ff. Tr. 14842, at 9-10; Chesnut, ff. Tr. 13756, at 73-77. No intervenor presented testimony on this issue.

125. Licensee has purchased and is installing a real-time environmental radiation monitoring system around TMI. The system consists of low and high level direct radiation sensors, remote station electronics, remote station transmitters and receivers, and a central processing computer. The system is sensitive to one microrem per hour. Data obtained from the sensors is sent via radio on telephone links to the central computer located in Licensee's Environmental Assessment Command Center at Olmsted Airport. When fully installed the system will consist of 16 remote stations. Site locations were chosen according to population density, site meteorology and local topography. The remote stations are equipped with LCD readout panels to allow public access to instantaneous dose rate information. Riethle, ff. Tr. 14842, at 9; Rogan, et al., ff. Tr. 13756, at 84. The system was expected to be fully operational by the end of April 1981. Tr. at 14849-50 (Riethle). A portable version of this system has been used at TMI since

April 1980, including use during the purge of the Unit 2 reactor building. Rogan, et al., ff. Tr. 13756, at 84.

126. As described by Licensee, the Board finds that this system fully satisfies its concerns as expressed in Board Question 4 and the concerns raised by Contention EP-3(C)(1).

127. What is somewhat unresolved among the parties is the use that should be made of this system during an emergency. Licensee's position is that, while providing useful information that should be considered and evaluated during an emergency, the system is not necessary to properly assess radioactive releases during an accident or to make protective action recommendations. In support of this position, Licensee notes that the goal in assessing radioactive releases is to make such assessments sufficiently far in advance of the actual release so as to permit time for taking protective action if such measures are warranted. Information useful in this analysis, according to Licensee, is that given by plant process instrumentation, knowledge as to the status of the various engineered safety systems, radiation effluent monitors, and meteorological data. As previously described (see ¶¶ 113-15, 119-20, supra), Licensee's Emergency Plan uses such information in the accident assessment process. The accuracy of these projections is checked by sending mobile radiation monitoring teams to onsite and offsite locations. Licensee notes that, by comparison, a real-time, remote readout system would not detect a release

until the plume was in the area of the dose rate meter. Since plant operators are likely to know about such a release well before the offsite monitor registers,³⁰ the real-time monitor cannot provide the initial information needed by Licensee to declare and classify an accident or to make protective action recommendations. Rogan, et al., ff. Tr. 13756, at 85-86; Riethle, ff. Tr. 14842, at 9-10; Tr. at 13999-14000 (Giangi), 14001-03 (Tsaggaris), 14009 (Rogan), 14010-12 (Giangi/Rogan). The NRC Staff agrees with this evaluation by Licensee. Chesnut, ff. Tr. 15007, at 75-76.

Moreover, Licensee contends that even with respect to confirmation, mobile monitoring teams possess advantages over a fixed, real-time system. The primary advantage is that by considering actual site meteorology, the RAC or EAC can dispatch the radiation monitoring team to the precise areas of principal interest and obtain prompt information for refining the dose projection. Obviously, the real-time monitors cannot be so positioned. Rogan, et al., ff. Tr. 13756, at 85-86; Tr. at 14264-65 (Giangi). In addition, due to technical

30 Even if it was assumed that an unmonitored release were occurring, for example, through a breach of the reactor building, the operators would know the concentration of radioactivity in the reactor building and could quickly obtain an onsite monitoring report to assess the significance of the release. Thus, the release, though technically unmonitored, is not unknown to the operators. Tr. at 14003 (Giangi), 14012-13 (Tsaggaris). In such circumstances, it is doubtful whether a real-time remote readout monitoring device would provide information not otherwise available to the operators.

limitations, the real-time monitors are limited to gross gamma detection. They cannot monitor beta radiation nor can they distinguish between isotopes that may be present in the plume. Licensee's mobile monitoring teams, however, have beta detection equipment, and through use of their air samplers and sodium iodide detectors can measure iodine concentrations. Tr. at 14914-15 (Riethle).

129. Based on this analysis, the Board agrees with Licensee that real-time, remote readout dose rate meters are not required in order for Licensee to discharge its accident assessment obligations. Nor do we believe that it would be prudent for Licensee to replace its mobile monitoring teams with the real-time dose rate meters. Apparently, Licensee intends to use its system of 16 dose rate meters as an adjunct to the mobile monitoring teams. Tr. at 14913 (Riethle). This approach seems sensible to the Board. We understand that the NRC Staff is planning additional studies to determine whether there are advantages to using both survey teams and in-place rate meters. Chesnut, ff. Tr. 15007, at 76. Until such studies are completed and a decision has been made as to whether real-time remote readout devices will be required at other nuclear power plant sites, the Board finds no reason to impose such a requirement on this Licensee.

ANGRY Contention EP-3(C)(2): The NRC's vague instruction to the licensee to "upgrade" in generally unidentified respects

its "offsite monitoring capability" is insufficient to assure that such upgrading will result in the ability to obtain and analyze the type and volume of information essential for protection of the public health and safety. ANGRY contends that such capability must at minimum encompass the following elements or their equivalent:

2. Information analysis capability equal to or greater than that provided by the Atmospheric Release Advisory Capability System (ARAC). This contention now challenges the adequacy of licensee's MIDAS radiological assessment system (EP, p. 6-9) to the extent that the information analysis capability it provides does not equal or exceed that provided by the ARAC system.

130. This contention challenges the adequacy of Licensee's Meteorological Information and Dose Acquisition System ("MIDAS"), which is used by Licensee to assess and evaluate actual and potential offsite releases of radioactivity. Testimony on MIDAS, and a comparison of its capabilities with the Atmospheric Release Advisory Capability ("ARAC"), was provided by Licensee and the NRC Staff. See Rogan, et al., ff. Tr. 13756, at 32-33; Tr. at 14843-44, 14866-96 (Riethle); Levine. ff. Tr. 17298, at 10-11. No other party to the proceeding provided testimony on this issue.

131. Licensee's MIDAS programs perform the following functions: (a) collect and store meteorological data, plant

effluent and radiation monitoring data; (b) retrieve and process this data for effluent reports and environmental dose projections; and (c) display the results through remote terminal devices. The programs incorporate the parameters of the NUREG-0654 Class A model (see Staff Ex. 7, at Appendix 2), including actual 15-minute meteorological data, site topographical characteristics, and site-specific local climatological effects such as seasonal, diurnal and terrain-induced flows. Rogan, et al., ff. Tr. 13756, at 82; Tr. at 14843, 14866 (Riethle). The Board finds that MIDAS satisfies the Class A model described in NUREG-0654, Appendix 2. Id.

132. Having made that finding, there is little need for the Board to compare the capabilities of MIDAS and ARAC. Nonetheless, the parties did address this issue and the record shows that for Licensee's purposes MIDAS provides more timely and accurate dose projection information than would ARAC. Rogan, et al., ff. Tr. 13756, at 83; Tr. at 14877 (Riethle). The Board thus concludes that Licensee's use of MIDAS to provide a dose projection and analysis capability provides reasonable assurance that the public health and safety will be protected.

Sholly Contention EP-18:
(in part)

It is contended that the Licensee's environmental radiation monitoring program contains an insufficient number of monitoring sites and an inadequate distribution of monitoring sites within twenty miles of

the Unit 1 site to provide sufficient protection of the public health and safety. It is further contended that there is in the Licensee's environmental radiation monitoring program an unwarranted reliance on the use of thermoluminescent dosimeters (TLDs) for providing information used to calculate radiation exposure data and that this unwarranted reliance on TLDs seriously underestimates radiation doses to the public.

133. The last issue raised as to the adequacy of Licensee's accident assessment capability relates to the TMI REMP. Sholly Contention EP-18 (in part) was addressed in testimony by both Licensee and the NRC Staff. Rogan, et al., ff. Tr. 13756, at 83-84; Riethle, ff. Tr. 14842, at 2-8; Donaldson, ff. Tr. 17354, at 8-12; see also Lic. Ex. 30 at § 4.7.6.2.1. No other party to the proceeding provided testimony on this issue.

134. The REMP is not used during the initial accident assessment process or in making protective action recommendations. Rather, the REMP is used to confirm initial assessments, determine overall impact on the environment, and assist in determining the total integrated radiation exposure received in offsite areas surrounding the site. Rogan, et al., ff. Tr. 13756, at 83; Donaldson, ff. Tr. 17354, at 10. In this regard, the adequacy of Licensee's REMP is not directly related to the adequacy of emergency preparedness around TMI. However,

as part of the short-term action items relating to emergency preparedness, the Commission identified "upgrade [f] offsite monitoring capability, including additional thermoluminescent dosimeters or equivalent" as a matter to be considered in this proceeding. We therefore have evaluated the adequacy of Licensee's REMP and report our conclusions below.

135. The REMP around TMI is designed to monitor the major pathways of exposure to the general populace so as to demonstrate compliance with regulatory guidelines for allowable exposures to unrestricted areas. In November 1979, the NRC Staff amended the criteria for an acceptable REMP. A Branch Technical Position, revising in part Regulatory Guide 4.8, was issued. This revision proposed an increase in the number of direct radiation monitoring stations. In relevant part, the Branch Technical Position recommended the following:

Forty stations with two or more dosimeters or one instrument for measuring and recording dose rate continuously to be placed as follows: (1) an inner ring of stations in the general area of the site boundary and an outer ring in the 4-5 mile range from the site with a station in each sector of each ring (16 sectors x 2 rings = 32 stations). The balance of the stations, 8, should be placed in special interest areas such as population centers, nearby residences, schools, and in 2 or 3 areas to serve as control stations.

Riethle, ff. Tr. 14842, at 3-6.

136. The REMP currently in place at TMI more than satisfies this guidance. TMI has 73 stations with two or more

dosimeters located as follows: 12 stations are located at or near the site boundary, a second ring of 7 stations is located out to a distance of 0.6 miles from the site. Two additional rings comprised of 6 and 2 stations are at distances of 1 to 3 miles, respectively. The 4-5 mile ring suggested by the NRC Staff is composed of 16 stations, ranging in distance from 4.3 to 5.0 miles. The remainder of the 30 stations are located in areas of special interest at distances of 5-10 and 10-20 miles from the site. Riethle, ff. Tr. 14842, at 6, Table 1 and Figure 1. The Board thus finds, contrary to the claim of EP-18 (in part), that Licensee's REMP contains a sufficient number of monitoring sites and an adequate distribution of those sites to provide reasonable assurance that the public health and safety will be protected.

137. Contention EP-18 (in part) also alleges that Licensee places an unwarranted reliance on thermoluminescent dosimeters ("TLD's"), which it is claimed results in a serious underestimate of the radiation dose to the public. There is no evidence of record to support this position. As we previously have indicated, Licensee's accident assessment program relies on numerous different types of indicators, including plant process instruments, in-plant effluent monitors, mobile monitoring teams using a wide array of detection devices, and a set of 16 real-time, remote readout dose rate meters. The REMP provides an additional means of radiation monitoring.

Licensee's witness was totally unaware of any information showing that TLD's underestimate radiation dose to the public. Moreover, the testimony describes in detail the TLD's being used by Licensee, the minimum acceptable performance standards governing those TLD's, and the administrative and quality control checks used by Licensee to assure that proper monitoring and analysis procedures are followed. The Board thus has no reason to believe that TLD's underestimate offsite radiation doses, and we explicitly find to the contrary. Riethle, ff. Tr. 14842, at 6-8; Donaldson, ff. Tr. 17354, at 11-12.

138. In summary, the parties put into controversy a broad range of issues relating to Licensee's accident assessment capabilities, and in each instance the Board finds that Licensee's capabilities in these areas are adequate to provide reasonable assurance that the public health and safety will be protected in the event of an accident at TMI.

C. Initial Notification of Governmental Units

ANGRY Contention EP-4(G):	The licensee's emergency notification procedures (pp. 6-2, 6-3, 6-4; Figure 15) (see also Pa. DOP Appendix 3) are inadequate with respect to certain areas directly at risk in the event of a nuclear accident, namely, York and Lancaster Counties. Although the Dauphin County Emergency Operations Center receives immediate notification of an emergency declaration,
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notification of York and Lancaster Counties must follow an excessively circuitous path:

1. Licensee to Dauphin
2. Licensee to PEMA
3. PEMA to BRP
4. BRP to Licensee
5. Licensee to BRP
6. BRP to PEMA
7. PEMA to Dauphin
8. PEMA to York,
Lancaster, and
Cumberland Counties.

Such a notification sequence is in direct conflict with requirements that "delegations of authority that will permit emergency actions (such as evacuation) to be taken with a minimum of delay should be carefully considered" (NUREG-75/111, § A3), and that "Upon declaration of a 'general emergency' immediate notification shall be made directly to the offsite authorities responsible for implementing protective measures . . ." (EPRG II(A)(5)) (emphasis in original). Also, N. 0654 J7.

139. ANGRY Contention EP-4(G) questions the adequacy of the system that Licensee uses to notify York and Lancaster Counties that an emergency has been declared. Licensee's emergency notification system is described in Sections 4.6.1, 4.6.2.3.2 and 4.6.2.6-8 and in Figure 15 of its Emergency Plan.

Lic. Ex. 30. The NRC Staff has reviewed the adequacy of Licensee's emergency notification system and its favorable conclusions are reported in the EPE and Supplement 1 thereto. Staff Ex. 6, at 11-12; Staff Ex. 23, at II-3. Both Licensee and the NRC Staff presented testimony on Licensee's emergency notification system and ANGRY Contention EP-4(G). See Rogan, et al., ff. Tr. 13756, at 86-93; Chesnut, ff. Tr. 15007, at 36-40. Oral examination of these witnesses on this subject appears in the March 4-5, 11-12 and June 30, 1981 hearing transcripts. Neither the Commonwealth of Pennsylvania nor any intervenor presented testimony on this issue, although these parties did participate in the cross-examination of the witnesses.

140. The Board begins its consideration of this issue by addressing the three major elements of ANGRY Contention EP-4(G). These are, first, the assertion that although Dauphin County receives immediate notification of an emergency declaration, notification of York and Lancaster Counties follows an excessively circuitous path. Next, we examine the allegation that Licensee's notification sequence directly conflicts with the requirements of NUREG-75/111. Finally, we discuss the assertion that Licensee's notification sequence directly conflicts with the requirements of Emergency Planning Review Guideline Number One.

141. Under Licensee's Emergency Plan, when an incident is classified as an Unusual Event, Alert or Site Emergency, Licensee first contacts Dauphin County and then PEMA. When PEMA receives notice of an emergency at TMI, it immediately notifies BRP and the five risk counties, including York and Lancaster Counties. Rogan, et al., ff. Tr. 13756, at 86-87; Chesnut, ff. Tr. 15007, at 37-38; Tr. 15283 (Chesnut); Lic. Ex. 30, at p. 6-5. Thus, the notification sequence alleged in ANGRY Contention EP-4(G) is totally incorrect. The Board finds that, contrary to the assertion of Contention EP-4(a), notification of York and Lancaster Counties does not follow an excessively circuitous path. Moreover, in the event a General Emergency is declared, Licensee's Emergency Plan provides that Licensee will itself directly notify all five risk counties, including York and Lancaster Counties. Rogan, et al., ff. Tr. 13756, at 62-63; Chesnut, ff. Tr. 15007, at 37; Tr. at 14268-69 (Giangi); Lic. Ex. 30, at p. 6-1. This procedure ensures the direct and immediate notification of the areas potentially at risk.³¹

142. The second element of Contention EP-4(G) alleges that Licensee's notification sequence directly conflicts with

31 Pursuant to this method of "parallel" notification, Licensee and PEMA simultaneously notify the five risk counties immediately following declaration of a General Emergency. Tr. at 14266 (Giangi); Tr. at 15283 (Chesnut).

the requirements of NUREG-75/111, Section II.A.3. This document is not in evidence.³² Nonetheless, accepting at face value ANGRY's claim that there should be appropriate delegations of authority to permit timely emergency response, the Board finds that Licensee's Emergency Plan satisfies this objective. Licensee's notification procedures delegate to PEMA the authority to notify the five risk counties in the event of an Unusual Event, Alert or Site Emergency. Lic. Ex. 30, at p. 6-5. As previously noted, this delegation of authority to PEMA allows for the rapid notification of the five risk counties. See ¶ 141, supra. Moreover, the Board notes that the current criteria and guidance for emergency preparedness are

32 In order to assure ourselves that ANGRY's failure to offer NUREG-75/111 into evidence did not prejudice its rights, the Board has itself checked the cited section of the document. In relevant part it states:

Delegations of authority that will permit emergency actions (such as evacuation) to be taken with a minimum of delay should be carefully considered. As an example, the State/local government authorities could agree to allow the nuclear facility operators to recommend evacuation of certain areas around the nuclear facility directly to local law enforcement agencies without requiring a time-consuming approval from a distant governmental official. Provision should be made for resolving any legal liability problems that might arise by virtue of implementing the radiological emergency response plan.

Our decision on Contention EP-4(G) would not have been altered had this paragraph from NUREG-75/111 been offered into evidence.

established by the new emergency preparedness regulations and NUREG-0654, rather than by NUREG-75/111. The current guidance recommends notification of state and local emergency response agencies within 15 minutes of the declaration of an emergency by whatever means are necessary to accomplish such prompt notification. Staff witness Chesnut testified that Licensee has the capability to accomplish this prompt notification in accordance with the current criteria and has provided for such prompt notification in its Emergency Plan. Chesnut, ff. Tr. 15007, at 39-40.

143. The last element of Contention EP-4(G) asserts that Licensee's emergency notification system conflicts with the requirements of Emergency Planning Review Guideline Number One, Section II.A.5. ANGRY did not offer this document into evidence, though we observe that the sentence quoted in the contention is similar to guidance set forth in NUREG-0654. See Staff Ex. 7, at § II.J.7 and Appendix 1, pp. 60 and 1-16. As previously noted, see ¶ 141, supra, Licensee's Emergency Plan provides for the direct and immediate notification of the five risk counties, including York and Lancaster Counties, in the event of a General Emergency. For these reasons, we reject ANGRY Contention EP-4(G) and conclude that the procedures used by Licensee to notify York and Lancaster Counties are adequate.

Aamodt Contention EP-1:

All data and plant operating personnel observations relative to all radioactive releases must be transmitted immediately and

simultaneously to the NRC, Pennsylvania Department of Environmental Resources, the commissioners of Dauphin, York and Lancaster Counties and the licensee's management. It is further contended that licensee must provide this capability before restart of TMI-1.

ANGRY Contention EP-4(E):

The licensee's EP fails to provide for furnishing to the Pennsylvania Bureau of Radiation Protection (BORP) information called for in the latter's plan such as "nature of the failure, the status of safeguards, the condition of consequence mitigating features" (p. VI-1).

144. These two contentions question the adequacy of the information that Licensee transmits to emergency response organizations. Specific messages, developed in conjunction with the Commonwealth of Pennsylvania and local emergency response organizations, are specified in Licensee's Emergency Plan Implementing Procedures ("EPIP"). These messages provide information on the emergency class, type and magnitude of any actual or potential radioactive releases, affected areas, and protective action recommendations. Lic. Ex. 30, at §§ 4.5.1.3.1 and 4.6.1, pp. 5-8 to 5-9, 6-1. Both Licensee and the NRC Staff presented testimony on Aamodt Contention EP-1 and ANGRY Contention EP-4(E). See Rogan, et al., ff. Tr. 13756, at 86-93; Chesnut, ff. Tr. 15007, at 29-36, 43-45. Oral

examination of these witnesses relevant to this subject matter appears throughout the March 3-5, 10, 12 and 17, 1981 hearing transcripts.

145. Aamodt Contention EP-1 asserts that all data and plant operating personnel observations relative to all radioactive releases must be transmitted immediately and simultaneously to various emergency response organizations.³³ As explained below, we find that Licensee does transmit such information to the NRC, BRP and its management. With respect to the Dauphin, York and Lancaster County Commissioners, we find that, pursuant to agreement among all affected parties, necessary radiological information is transmitted by PEMA to the county EOC's. We conclude that this procedure is adequate for the needs of the counties.

146. Licensee's Emergency Plan specifically provides for the transmittal of data on radioactive releases to the NRC. In

33 NRC Staff witness Grimes testified that only those radioactive releases of safety significance or potential safety significance, which fall into one of the four emergency categories, need be reported to offsite authorities. Tr. at 15298 (Grimes). Routine releases from TMI-1 were analyzed during initial licensing of the facility and were found to have no significant impact. Licensee reports all releases of radioactivity, including normal or routine releases, to the NRC as part of its REMP. In addition, all unplanned releases of whatever size are reported to the NRC pursuant to 10 C.F.R. § 50.72. Chesnut, ff. Tr. 15007, at 35-36. Thus, the Board will assess Licensee's ability to transmit to the offsite authorities referred to in Aamodt Contention EP-1 data and observations on those radioactive releases that are of safety significance or potential safety significance.

the event of an emergency declaration, Licensee notifies, among other facilities, NRC headquarters in Bethesda, Maryland.³⁴ This initial notification provides information relative to the emergency class, type and magnitude of any actual or potential release, affected populace and areas, and any recommendations for protective actions. Chesnut, ff. Tr. 15007, at 30-31; Lic. Ex. 30, at p. 6-1. Subsequent to this initial notification, the NRC receives follow-up messages from Licensee, which include such information as: type of actual or projected release and projected affected areas; estimate of quantity of radioactive material released; chemical and physical form of released material, including estimates of the relative quantities and concentration of noble gases, iodines and particulates; prevailing weather; actual or projected dose rates and integrated dose at exclusion area boundary and at about 2, 5

34 This initial notification is accomplished by means of the NRC Emergency Notification System ("ENS"), a dedicated telephone system that connects TMI and all other operating reactors with NRC headquarters in Bethesda, Maryland. ENS hotline phones are located in the ECC (control room and shift supervisor's office, from which the initial notification is made), OSC, TSC and EOF. Rogan, et al., ff. Tr. 13756, at 63. In the event a Site or General Emergency is declared, the NRC Health Physics Network Line ("HPN") is activated by the NRC operations center in Bethesda, Maryland. This system is dedicated to the transmission of radiological information by NRC personnel on site to NRC personnel in Bethesda and at the regional office. HPN phones are located in the ECC, EOF, and the NRC resident site inspector's office. Rogan, et al., ff. Tr. 13756, at 64.

and 10 miles; and estimate of any surface radioactive contamination. Chesnut, ff. Tr. 15007, at 30; Lic. Ex. 30, at pp. 5-8 to 5-9. The Board therefore finds that Licensee has provided for the timely transmission of data and plant operating personnel observations on radioactive releases to the NRC.

147. As specified in Licensee's Emergency Plan, immediately after Licensee notifies PEMA of an emergency at TMI, PEMA notifies BRP. Rogan, et al., ff. Tr. 13756, at 86-87; Lic. Ex. 30, at p. 6-5. After BRP is notified that an emergency condition exists at TMI, BRP contacts the site for technical information.³⁵ The applicable EPIP contains as Attachment II an "Emergency Status Report" checklist. This report, which summarizes all key plant parameters and information necessary to assess the radiological impact of the emergency, is communicated to BRP. The report includes a description of the emergency, the status of emergency safeguards systems, and information on radiological releases -- i.e., source terms, meteorology, anticipated duration of releases, and projected doses. Rogan, et al., ff. Tr. 13756,

35 BRP contacts the site by activating the Radiological Line to the Unit 1 Emergency Control Center (control room). The Radiological Line is a dedicated telephone line with telephones located in the ECC, OSC, EOF, AEOF, and two different areas at BRP. This line is manned to maintain continuous communication with BRP in order to update it on emergency status. Rogan, et al., ff. Tr. 13756, at 19, 60; Tr. at 13777 (Giangi); Lic. Ex. 30, at p. 7-7.

at p. 89. The Board therefore finds that Licensee has provided for the timely transmission of data and plant operating personnel observations on radioactive releases to BRP.

148. Both Licensee's standard operating procedures and its Emergency Plan direct that Licensee's management be notified of radiological releases during an accident. As control room operators become aware of any abnormal situation, including radiological releases, they are instructed to inform the shift foreman and shift supervisor immediately. Rogan, et al., ff. Tr. 13756, at 17. After classifying the accident, the shift supervisor (now the Emergency Director) contacts the duty section superintendent to discuss plant status. Id. at 90. Within one hour, an Emergency Director reports to relieve the shift supervisor. The two primary Emergency Directors are the Vice President TMI-1 and the Operations and Maintenance Director (Messrs. Hukill and Toole). Id. at 26-27; see also ¶ 49, supra. If the emergency escalates to a Site or General Emergency, the offsite support organization is mobilized. In such circumstances, an Emergency Support Director would report to the EOF within four hours. See ¶¶ 45, 49, supra. The two primary choices for that position are Messrs. Arnold and Clark. Id. The Board finds that in this manner Licensee has provided for the timely transmission of data and plant operating personnel observations on radioactive releases to Licensee's senior management.

149. In order to assure that these communications can take place efficiently, Licensee has installed various dedicated communication links, including the Radiological Line and the Environmental Assessment Line. The Radiological Line, a dedicated telephone line with telephones located in the ECC, OSC, EOF and AEOF, permits the immediate transmission of plant radiological dose projections, offsite radiation monitoring results and liquid effluent release data to key emergency response personnel, including Licensee's management personnel located in the control room and the EOF. Rogan, et al., ff. Tr. 13756, at 19, 60; Tr. 13777 (Giangi); Lic. Ex. 30, at p. 7-7. The Environmental Assessment Line, a dedicated telephone line that connects the Radiological Assessment Coordinator ("RAC") in the control room with the Environmental Assessment Coordinator ("EAC") at Olmsted Airport, and the Assistant EAC at the EOF, allows those personnel to discuss radiological release data. Rogan, et al., ff. Tr. 13756, at 61; Tr. 13777-78 (Giangi); Lic. Ex. 30, at p. 7-8.

150. The remaining element of Aamodt Contention EP-1 alleges that radiological release data must be transmitted immediately to the commissioners of Dauphin, York and Lancaster Counties.³⁶ Licensee's Emergency Plan specifically provides for

36 Initial notification of an emergency and an actual or potential radioactive release is made not to the county commissioners, but to the county duty officers, who in turn (footnote continued next page)

the direct and immediate notification of Dauphin County in the event of an emergency declaration.³⁷ This initial notification includes transmitting information on emergency class, type and magnitude of any actual or potential release, affected populace and areas, and any recommendations to take protective actions. Chesnut, ff. Tr. 15007, at 31-32; Lic. Ex. 30, at p. 6-3.

Licensee's Emergency Plan also provides for the direct notification of York and Lancaster Counties in the event a General Emergency is declared. See ¶ 141, supra. This notification would include the information normally transmitted to Dauphin County.

151. In the event of an Unusual Event, Alert or Site Emergency, Licensee does not directly contact York or Lancaster County to provide them with information about radioactive releases. By agreement among all affected parties, this function is performed by PEMA based on technical information it receives from BRP. This approach is the normal operating procedure used by PEMA during all emergencies. It has been

(continued)

mobilize the county emergency response organizations, which includes contacting the county commissioners. Chesnut, ff. Tr. 15007, at 33.

37 Dauphin County is contacted by telephone. If contact cannot be made by this method, the Dauphin County radio system is activated. Rogan, et al., ff. Tr. 13756, at 86; Tr. at 14596-97 (Rogan).

successfully used on numerous occasions and the affected parties determined that a similar system should be used in radiological emergencies. It has the advantage of maintaining a consistent chain of command for all emergencies and of ensuring that a single agency, PEMA, will provide consistent and coordinated information to the county emergency response personnel. Rogan, et al., ff. Tr. 13756, at 88-89; Chesnut, ff. Tr. 15007, at 32. The Board therefore finds that Licensee has provided for the transmission of data and plant operating personnel observations on radioactive releases to Dauphin, York and Lancaster Counties in a timely fashion.³⁸

152. The Board now considers ANGRY Contention EP-4(E), which alleges that Licensee's Emergency Plan fails to provide for furnishing BRP with the information called for in the latter's plan, such as "nature of the failure, the status of safeguards, the condition of consequence mitigating features." At a minimum, Licensee provides BRP with all information specified in Licensee's "Emergency Status Report" checklist. See ¶ 147, supra. This report contains information similar to that called for in the BRP plan. Chesnut, ff. Tr. 15007, at

38 In addition, the Board notes that Licensee's Emergency Plan provides for an auto-dialing system, located in the ECC, which if necessary would permit the rapid communication of information on radioactive releases to the five risk counties, including Dauphin, York and Lancaster Counties. Chesnut, ff. Tr. 15007, at 32; Lic. Ex. 30, at p. 7-9.

44; Lic. Ex. 30 at pp. 5-8 to 5-9. The Board therefore rejects the assertion that Licensee's Emergency Plan fails to provide BRP with information called for in the latter's plan. See also Section II.F, infra. Moreover, as previously noted see n.35, supra, Licensee's Emergency Plan provides for a direct line of communication (the Radiological Line) between Licensee and BRP. Via this dedicated line, Licensee is able to provide BRP with any requested information regarding the nature of the failure, the status of safeguards or the condition of consequence mitigating features. Chesnut, ff. Tr. 15007, at 45.

D. Public Education, Warning and Emergency Instructions

153. The public education, warning and emergency instructions issues litigated by the parties in this proceeding generally concern three closely related subjects -- the emergency preparedness public education program, the prompt notification system (for public notification of an emergency), and emergency instructions to the public (including the Emergency Broadcast System, the 911 system, and news releases). The Board addresses each of these subjects separately below.

ANGRY Contention EP-4(C):	The adoption of the Commonwealth of Pennsylvania Disaster Operations Plan Annex E (DOP) designation of "the 'risk county' as responsible for the preparation and dissemination of information material on protective actions to the general
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public" (p. 6-8) conflicts with the requirements in EPRG II(A)(7) and RG 1.101 § 6.4(2) to

make available on request to occupants in the LPZ information concerning how the emergency plans provide for notification to them and how they can expect to be advised what to do.

Also, N. 0654 G4.

Newberry Contention EP-14(C): The York County Plan in Section IV, Subsection (c) provides that posting of evacuation maps and semi-annual distribution of evacuation routes in local newspapers will be accomplished. It is submitted that there is no set designation of the responsibility for the effecting of this part of the Plan and it is Intervenor's contention that unless the Plan directs and places responsibility upon someone to effect this part of the Plan, the Plan is defective.

Newberry Contention EP-14(Q): Annex E of the York County Plan, Subsection III, provides that the local Emergency Management Directors are responsible for the distribution of printed handout material to the populace within their respective municipalities. The Plan is defective in this area in that there is no set timetable for the distribution of said materials to the local Emergency Management Directors, and, likewise, there are no provisions within the Plan as to how local Emergency Management

Directors are going to distribute the information to the local populace. Again, it is submitted that, in the event of an incident at the TMI nuclear facility, local volunteers will not be able to be counted upon to effect such distribution and that without some other means of distributing the materials, local Emergency Management Directors will be impotent to effect such a Plan. The same problem arises in Section K of this area in that the Public Information Officer is responsible for the posting in all public areas, parks, etc., of public information and evacuation instructions for transient populations.

154. ANGRY Contention EP-4(C) and Newberry Contentions EP-14(Q) and the quoted portion of EP-14(C) generally challenge the sufficiency of the emergency preparedness public education program in the area surrounding TMI. The NRC Staff, with FEMA's assistance, reviewed the TMI emergency preparedness public education program, and reported its conclusions in the EPE and Supplement 1 hereto. Staff Ex. 6, at 13, 14; Staff Ex. 23, at II-4 to II-6, III-16. In addition, Licensee, the NRC Staff and FEMA presented direct testimony on the TMI public education program and ANGRY Contention EP-4(C), Newberry Contention-14(Q), and the relevant part of Newberry Contention-14(C). See Rogan, et al., ff. Tr. 13756, at 99-101; Chesnut, ff. Tr. 15007, at 59-63; Adler and Bath-2, ff. Tr.

18975. at 12-14; Chesnut and Bath, ff. Tr. 19626, at 7-10; Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, item 3. The Commonwealth also presented direct testimony on the subject. See Belser, et al., ff. Tr. 20787, at 5-6 (Curry). In addition, the Commonwealth presented a witness on a related contention who was also cross-examined extensively on the Commonwealth's role in TMI emergency preparedness public education. See Tr. at 18042 et seq. (Comey). Oral examination of witnesses relevant to this subject matter pervades the transcripts of the emergency planning hearings in this proceeding.

155. The Board first briefly discusses the standards governing emergency preparedness public education programs. Next, we describe the TMI public education program. Finally, we address directly each of the referenced contentions. As we have elsewhere noted, the public education issues actually litigated in the proceeding were not strictly confined to the contentions. The litigation aired the subject of public education fully; if a specific related matter is not directly addressed in this portion of our decision, it is because we found the concern to lack merit.

156. 10 C.F.R. § 50.47(b)(7) and Part 50, Appendix E, § IV.D.2 establish the planning standard for emergency preparedness public education. The standard requires, in relevant part, that information be made available to the public on a

periodic basis as to how they will be notified and what their initial actions should be in an emergency (e.g., listening to a local broadcast station and remaining indoors), and that procedures for coordinated dissemination of information to the public be established. NUREG-0654, § II.G provides the detailed criteria used by the Staff and FEMA in evaluating public education programs. Staff Ex. 7, at 49-51. These criteria, in relevant part, essentially state that a coordinated, periodic -- at least annual -- program for dissemination of information to the public (as to how they will be notified and what their actions should be in an emergency, including information on radiation, protective measures, needs of special populations, and contact points for additional information) should be established. The criteria further provide that the program should reach both the permanent and transient adult populations in the plume exposure pathway EPZ. The requirements of the emergency planning rule, with the guidance in NUREG-0654, Revision 1, supersede the guidance of EPRG and Regulatory Guide 1.101. Chesnut, ff. Tr. 15007, at 59-60; Chesnut and Bath, ff. Tr. 19626, at 7-8. The responsibility for the development of an adequate emergency preparedness public education program is shared by the licensee, and the state and local governments; that is, those entities are charged with collectively ensuring that a program meeting the planning standards for public education is developed, that the

information is coordinated and consistent, and that it is made available to the entire permanent and transient population within the plume exposure pathway EPZ. Chesnut, ff. Tr. 15007, at 61; Chesnut and Bath, ff. Tr. 19626, at 9; Staff Ex. 7, at 49-51.

157. The Commonwealth has developed a comprehensive pre-emergency public education program, outlined in Appendix 15 to Annex E of the Pennsylvania Disaster Operations Plan, which includes dissemination through facility mailings of state-developed public education materials dealing with hazards of radiation and protective action information. Additionally, the Commonwealth's plan indicates that telephone directories, radio, television and newspapers will be used to educate the public. The Commonwealth's plan charges risk county emergency management agencies (including York County) with the responsibility for distributing annually within the risk area a public information pamphlet which details potential protective action measures in the event of an incident at TMI. The pamphlets are to include information on sheltering, respiratory protection, evacuation routes, reception centers and contact points for further information or assistance. Pa. Ex. 2(a), at 15-1 to 15-3; Chesnut and Bath, ff. Tr. 19626, at 9-10.

158. The York County Plan provides for the preparation and dissemination of emergency preparedness public education

materials, in coordination with PEMA. The York County Emergency Management Coordinator is responsible for coordinating the preparation and distribution of the printed materials, while the county municipal coordinators are responsible for the actual distribution of the materials to local residents, hotels, motels, campgrounds and other transient-populated areas. Board Ex. 5, at F-1 to F-3; Chesnut and Bath, ff. Tr. 19626, at 10.

159. At the time the NRC Staff's EPE for TMI-1 was prepared, the NRC Staff had not completed its review of the TMI emergency preparedness public education program. However, the NRC Staff had concluded that a framework had been established for making information available to the public on a periodic basis on how it will be notified and what its initial actions should be in the event of an emergency at TMI, and that procedures for coordinated dissemination of information had been established. Staff Ex. 6, at 13-14. In order to complete the evaluation of the adequacy of the public education program, the NRC Staff requested further information about details of the program, such as the methods and frequency of distribution of educational materials, the distribution schedule, and the specific means for education of transients. Chesnut and Bath, ff. Tr. 19626, at 10.

160. After the issuance of the EPE, Licensee provided the NRC Staff with proposed public education pamphlets, prepared by

PEMA and the five risk counties explaining radiation and actions to be taken by the public in the event of an emergency. Staff Ex. 23, at II-4; Pa. Ex. 3 (PEMA brochure); Pa. Ex. 4 (Lancaster County brochure); Pa. Ex. 5 (York County brochure); Pa. Ex. 7 (Dauphin County brochure). Additionally, in a letter to the Staff dated April 30, 1981, Licensee provided information about its commitments and future contributions to the distribution of state and county public education materials. Licensee agreed to assist the state and counties by paying some of the direct postage costs associated with distribution of the pamphlets and to arrange for distribution of public education material through direct mailing to Met Ed and Pennsylvania Power and Light Company customers within the TMI plume exposure pathway EPZ. Licensee committed to assist PEMA and the five risk counties in completing the emergency preparedness public education program by September, 1981. The NRC Staff found that Licensee's efforts constituted an acceptable program, provided that the information included in the PEMA pamphlet as well as that in the appropriate county pamphlets is provided to the residents of each risk county prior to restart. Staff Ex. 23, at II-4 to II-6. By letter to General DeWitt Smith of PEMA, dated June 26, 1981, Licensee further described its commitment to assume responsibility for printing and distributing the emergency preparedness public education brochures to the public within the TMI plume exposure pathway EPZ, at no cost to PEMA

or the counties. The distribution is planned to be complete by September 1, 1981. Tr. at 22878-79 (Chesnut).

161. In addition to the PEMA and county brochures, as another part of the TMI emergency preparedness public education program, Licensee . . . arranging meetings and disseminating information to acquaint public officials and citizens with the siren alert system; providing speakers for local meetings; convening general radiation education seminars and briefings on emergency responsibilities; and distributing emergency information pamphlets and giving tours for media personnel. These public education activities go beyond the NUREG-0654 criteria, and serve to enhance the TMI emergency preparedness public education program. Staff Ex. 23, at II-5.

162. Since the responsibility for the TMI emergency preparedness public education program is a joint one shared by Licensee and the state and local governments, FEMA reviewed the content³⁹ and coordination of the various components of the program. FEMA concluded that neither the PEMA brochure nor the five county brochures independently meet the applicable

39 The content of the PEMA and county brochures was the subject of extensive examination throughout the proceeding. While some material in the brochures might be improved, the information is neither misleading nor untruthful and, in fact, does serve a useful purpose by providing technical information in terms that laypersons can understand. See generally, Tr. at 19413-19.

NUREG-0654 criteria, though the coordinated distribution of the PEMA brochure with the appropriate county brochures (and, in the case of York County, municipal instructions as well⁴⁰) will be adequate.

163. The Board therefore finds that the Licensee, the Commonwealth, and the local governments have developed emergency preparedness public education materials which will adequately inform the public of how they will be notified and what their initial actions should be in the event of an emergency at TMI, including information on radiation, protective measures, needs of special populations, and contact points for additional information. We further find that the TMI emergency preparedness public education program will be adequately implemented by Licensee's publication and coordinated distribution to the public within the plume exposure pathway EPZ -- prior to restart -- of the PEMA brochure with the appropriate county brochures (and, in the case of York County, municipal instructions as well). We further find that

40 The current York County brochure does not include a list of mass transportation pickup points. Instead, York County provides that information through supplemental municipal information sheets. Unless York County incorporates the list of pickup points into the county brochure, both the appropriate information sheets and the county brochure must be provided to assure adequate public information for York County residents within the TMI plume exposure pathway EPZ. T. at 22425-26 (Bath); Pa. Ex. 5.

there are provisions for the annual redistribution of the public education materials, to continue throughout the life of the plant. Adler and Bath-2, ff. Tr. 18975, at 13. See also, Pa. Ex. 2(a), at 15-1 to 15-3.

164. The Board now turns to the ANGRY and Newberry contentions. EP-4(C) alleges that the Commonwealth's designation of the risk counties as "responsible for the preparation and dissemination of information material on protective actions to the general public" conflicts with the provisions of the EPRG and Regulatory Guide 1.101. We initially note that, as we observed in paragraph 156, supra, the requirements of the emergency planning rule, with the guidance in NUREG-0654, supersede the EPRG and Regulatory Guide 1.101. It is therefore moot whether the Commonwealth's designation of the risk counties as responsible for the implementation of the public education program conflicts with the EPRG or Regulatory Guide 1.101. The current regulatory scheme requires the development and dissemination of emergency preparedness public education materials to the public within the plume exposure pathway EPZ,⁴¹ and provides that responsibility for the implementation of the public education program shall be shared by the licensee, and the state and local governments. Chesnut, ff.

⁴¹ The current regulatory scheme is thus more stringent than the guidance quoted in EP-4(C), which provided only that emergency preparedness information should be made available "on request to occupants in the LPZ."

Tr. 15007, at 59-60; 10 C.F.R. § 50.47(b)(7); 10 C.F.R. Part 50, Appendix E, § IV.D.2; Staff Ex. 7, at 49-51.

165. We already have found that the Commonwealth and the local governments have developed adequate emergency preparedness public education materials and that the public education program will be adequately implemented by Licensee's publication and coordinated distribution to the public within the plume exposure EPZ -- prior to restart -- of the prepared materials. See ¶163, supra. We therefore reject ANGRY Contention EP-14(C).

166. Newberry Contention EP-14(C) alleges that, though the York County plan provides for the posting of evacuation maps and for semi-annual publication of evacuation routes in local newspapers, no one is designated as responsible for effecting those provisions of the plan, rendering the plan defective. Since the contention was drafted, the York County plan has been revised. The York County plan now provides that the York County Emergency Management Coordinator and Public Information Officer, in coordination with PEMA, are responsible for the development and distribution of, and annual update of, public education materials to inform the general, transient and handicapped public in the risk area of the county "of how they will be notified, what their actions will be and who to contact for further information in the event of an emergency at TMI." Specifically, the York County Coordinator will coordinate the dissemination of the public education materials, while the risk

municipality emergency management coordinators will be directly responsible for the distribution of the materials. Board Ex. 5, at F-1 to F-3. (Of course, as already noted, see ¶160, supra, Licensee has agreed to assume responsibility for publication and distribution of the emergency preparedness brochures, prior to restart, to the public within the TMI plume exposure pathway EPZ).⁴² The current York County plan thus expressly designates, by position title, those persons who are responsible for implementing the TMI emergency preparedness public education program within the risk area of York County. The Board therefore rejects Newberry Contention EP-14(C).

167. Newberry Contention EP-14(Q) acknowledges that the York County plan assigns responsibility to the local emergency management coordinators for the distribution of printed public education materials within their respective municipalities, but asserts that the plan is defective in that it includes no timetable for the distribution of the materials to the local

⁴² The brochures already have been distributed once in York county, through the York County Emergency Management Agency. Belser, et al., ff. Tr. 20787, at 6 (Curry); Tr. at 20800, 20926-28 (Curry); Adler and Bath-2, ff. Tr. 18975, at 13. An article in the York Daily Record forecast the distribution, and identified the York County Emergency Management Coordinator as the county official responsible for public education on radiological emergency preparedness. In addition, the York Dispatch, in December 1980, published planned evacuation routes and selected essential information from the York County brochure. Belser, et al., ff. Tr. 20787, at 5 (Curry); Adler and Bath-2, ff. Tr. 18975, at 13.

coordinators and no provisions as to how the local coordinators are to distribute the materials to the local populace. The contention further asserts that, in the event of an accident at TMI, local volunteers would be unable to effect such distribution and -- without some other prescribed means of distribution -- the local coordinators will also be unable to effect the distribution. The contention raises the same concern with respect to the Public Information Officers's responsibility, under the York County plan, for the posting of information and evacuation instructions in transient populated areas.

168. To the extent that Contention EP-14(Q) contemplates the distribution of public education materials to the local residents of a risk area during the course of an accident, the contention misconceives the emergency preparedness public education requirements and guidance. The public education program (including the distribution of printed materials, such as brochures) is to be carried out prior to an accident, not after an accident occurs. Chesnut and Bath, ff. Tr. 19626, at 8-9. As previously noted, see n.42, supra, the brochures already have been distributed once in York County, and, as indicated in paragraph 160, supra, they will be distributed again -- prior to restart -- to the public within the TMI plume exposure pathway EPZ. Licensee's commitment to complete a full redistribution of the pamphlets, prior to restart ensures that there need be no reliance on either the York County local

coordinators or volunteers to personally distribute the pamphlets to York County residents in the risk area prior to restart (let alone in the course of an actual accident).

169. The public education effort will have to be repeated periodically in the future, of course. While it is true that the York County plan does not include a timetable for the distribution of pamphlets to the local emergency management coordinators or provisions for how the local coordinators are to distribute pamphlets to the local populace, we do not consider these omissions to be defects in the plan. It is sufficient that both the York County and Commonwealth plans provide for the annual dissemination of updated emergency preparedness information. Compare Board Ex. 5, at F-2 and Pa. Ex. 2(a), at 15-2 and 15-3, with Staff Ex. 7, at 49-50 (Criteria G.1 and G.2). The plans need not set forth every detail of the means of future disseminations of emergency preparedness education materials. FEMA will monitor the TMI emergency preparedness public education program, to ensure that it is carried out. Any significant deficiencies found by FEMA during plant operation will be reported to the NRC. Adler and Bath-2, ff. Tr. 18975, at 14. The Board therefore finds that there is adequate assurance that residents in the York County area at risk will be provided with adequate emergency preparedness information.

170. Under the current York County plan, the local emergency management coordinators -- and not the county Public Information Officer, as Contention EP-14(Q) suggests -- are responsible for the distribution of printed public education materials to hotels, motels, campgrounds and other transient populated areas. Board Ex. 5, at F-1 and F-2. Moreover, contrary to the assertion of Contention EP-14(Q), the current York County plan does not provide for the posting of emergency preparedness information and evacuation instructions in transient populated areas. Rather, appropriate emergency preparedness brochures and information sheets will be supplied to all motels, hotels, park managers and employers in the York County risk area, who will make the transients and employees within their charge aware of the emergency preparedness information (including evacuation routes) should the need arise. The York County Emergency Management Coordinator is working with the York County Chamber of Commerce, to enlist their assistance in making these responsibilities known through, for example, the Chamber of Commerce newsletter, and to ensure a complete distribution of brochures to such establishments. Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, item 3; Tr. at 22372-75 (Bath). This method of dissemination is acceptable to FEMA; in fact, FEMA witness Bath recommended this method to York County, in lieu of posting, since posted signs may or may not be read. Tr. at 22377 (Bath).

171. In addition, the provisions in the emergency plans for the annual dissemination of updated emergency preparedness information include distribution to businesses and industries (including hotels, motels and parks) within the TMI plume exposure EPZ. Tr. 22372-73 (Bath). This -- together with FEMA's monitoring of the entire emergency preparedness public education program, see ¶169, supra -- provides adequate assurance that transients in the York County area at risk will be provided with sufficient emergency preparedness information in the event of an emergency at TMI. The Board therefore rejects in its entirety Newberry Contention EP-14(Q).

172. The Board concludes that the TMI emergency preparedness public education program complies with the applicable regulations and is consistent with the guidance of NUREG-0654. The concerns raised by ANGRY and Newberry are rejected.

173. Numerous contentions in the proceeding contested the adequacy of the system for prompt notification of an emergency at TMI to the public within the plume exposure EPZ. We first discuss the standards governing prompt notification of the public. Next, we briefly describe the TMI notification system. Finally, we specifically address each of the contentions set forth below.

ANGRY Contention EP-5(D):

1. The physical means to provide warning to all persons within the plume EPZ in a manner conforming to the standards set forth in N.

0654 Sec. E6 (and App. 3 referenced therein) and in the Pa. DOP, App. 13, Sec. IIIA(6) should exist before TMI-1 is allowed to restart.

2. The Commonwealth's DOP fails to identify the time required to alert the public within the plume EPZ under present circumstances as required by the aforementioned provision of N. 0654. Such estimates as the Commonwealth has provided elsewhere are founded upon a totally inadequate data base and are thus not credible. Although the Pa. DOP App. 13, Sec. IID states that "the primary means of emergency warning is outdoor siren systems", the York County plan reveals that less than 1/2 of the population in York County within 10 miles of TMI are capable of being warned by sirens (Annex C). Information as to the time required for implementation of "back-up" notification measures of mobile "public address systems" and "knocking on doors" (Annex G, App. 1) is to be provided in local emergency plans which do not as yet exist.

Newberry Contention EP-14(A): Section VI, Concept of Operations, Subsection 7(a) is deficient in that there is an assumption that notification by siren can be heard throughout Newberry Township and surrounding communities. It is questionable at best whether this is, in fact, true in that at least in the York County Plan there is an assumption of one Civil Defense siren being in place in Newberry Township which does not exist. Oversights such as this may still exist within the Emergency Plan

drafted by York County and verification of all sirens must be required in order to ensure at least minimum siren coverage of the county. Therefore, it is Intervenor's position that there are not sufficient numbers of Civil Defense warning sirens in place in the county in order to adequately ensure that all members of the community are within hearing distance of a siren. It is Intervenor's contention that until the Emergency Plan specifically states that a siren alert system is in place and that the warning emitted by the system can be heard at any point in the county surrounding the plant site, that the Emergency Plan as drafted is unacceptable.

Newberry Contention EP-16(E): Appendix 5 of the Dauphin County Plan provides that alert warnings will be initiated through siren activation. Again, this part of the Plan makes a broad base assumption that the populace within the county can hear the sirens at all locations and it is Intervenor's position that this is not true. Therefore, until and unless a sufficient number of sirens are placed throughout the county area at locations that will ensure that the total populace of the county is within hearing distance of the sirens, the Plan will remain deficient.

Newberry Contention EP-14(O): Annex C of the York County Plan is deficient in that its total concept of operations is based upon tone-coded siren control and that nowhere in the Plan is it stated that all individuals are within hearing distance of the sirens located within a 20-mile radius of the TMI nuclear plant.

Moreover, the Plan provides as a backup or supplementary system to the siren system that police and fire vehicles would travel throughout the communities and again it is raised that the townships, boroughs and municipalities located within the 20-mile radius of the TMI nuclear facility do not have the necessary commitments of manpower to effect such a Plan. Therefore, it is Intervenor's position that the York County Plan remains deficient.

Newberry Contention EP-14(T): Appendix I of the York County Plan regarding warning is deficient in that it assumes that local fire companies will be able to alert all members of a rural community by direct notification such as knocking on doors. There is absolutely no conceivable way in which individual direct notification can be made in Newberry Township because of the number of residents versus the number of volunteer firemen and it is submitted that the same conditions exist in all local municipalities located within the 20-mile radius of the TMI nuclear facility. Therefore, until and unless a system is designed that can adequately ensure that a substantial majority of the population can be notified of an incident at TMI, the Plan is deficient.

Newberry Contention EP-14(B): Section VI, Subsection 7(b). The York County Plan as drafted indicates that selective evacuation of pregnant women and pre-school children and their families would be effected upon order of the Governor. Again, the notification would be by a five (5) minute steady siren which cannot

be assured will be heard in all points within the affected areas. Moreover, the Plan assumes that there will be appropriate EBS announcements followed by door-to-door notification which would be conducted by appropriate boroughs and townships. Again, the Intervenor raises the contention that the time factor required in order to recruit volunteers to man vehicles and the many miles of road which are located in the various rural communities which would have to be traveled in order to ensure that notification of all members of the population of the impending emergency conditions would render the Plan as written inoperable. Moreover, it is contended by the Intervenor that the selected evacuation notification is initially effected by the same type of notification that would be required in a general evacuation. Both evacuations are initiated by a five (5) minute steady siren tone, then followed by appropriate EBS announcements. It is Intervenor's contention that similarity and warning evacuation tones may lead to confusion on behalf of the public and that orderly evacuation of the affected areas could not be effected.

Newberry Contention EP-16(M): The Dauphin County Plan does not specifically state a differentiated commonly recognized evacuation signal that could be recognized by the citizenry throughout the county. The Plan does not indicate whether the alarm system that is to be used is to be driven by a regular power system and if the source was terminated, whether the system would still work. The

Plan does not indicate whether all areas within the county are within hearing distances of the sirens. Such deficiencies render the Emergency Plan inadequate.

174. The new emergency planning rule -- specifically 10 C.F.R. § 50.47(b)(5) and Part 50, Appendix E, § IV.D.3 -- sets out the requirements for prompt notification to the public in the area at risk in the event of an emergency. Appendix E to Part 50 provides, in relevant part:

By July 1, 1981, the nuclear power reactor licensee shall demonstrate that administrative and physical means have been established for alerting and providing prompt instructions to the public within the plume exposure pathway EPZ. The design objective shall be to have the capability to essentially complete the initial notification of the public within the plume exposure pathway EPZ within about 15 minutes. * * * The responsibility for activating such a public notification system shall remain with the appropriate government authorities.

Appendix 3 to NUREG-0654 provides the acceptance criteria against which the means for prompt notification of the public are to be evaluated. Staff Ex. 7. The design objective for the prompt notification system is to have the capability to complete the initial notification of the public in the plume exposure pathway EPZ within about 15 minutes of the time that state and local officials are notified that a situation exists requiring urgent action, although the use of the prompt notification system is expected to range from those emergencies

requiring immediate public notification (i.e., within 15 minutes of the time that state and local officials are notified) to events where there is substantial time available for state and local officials to make a judgment on whether or not to activate the public notification system. Chesnut, ff. 15007, at 53.

175. The means for prompt notification of the public within the TMI area in the event of an emergency are discussed in Licensee's Plan at pages 6-23 and 6-24, in Appendix 12 to the Commonwealth's Plan; in Annex B to the York County plan; in Annex C to the Dauphin County plan; in Annex C to the Cumberland County plan; in Annex J to the Lancaster County plan; and in Annex J to the Lebanon County plan. Lic. Ex. 30; Pa. Ex. 2(a); Board Ex. 5-9, respectively. The NRC Staff reviewed the adequacy of the prompt notification system and reported its conclusions in the EPE and Supplement 1 thereto; these conclusions were updated by the oral testimony of NRC Staff witness Chesnut. Staff Ex. 6, at 11-12; Staff Ex. 23, at II-1 to II-3; Tr. at 22877-78 (Chesnut). The NRC Staff, FEMA and Licensee presented direct testimony on the prompt notification system and the listed ANGRY and Newberry contentions. See Rogan, et al., ff. Tr. 13756, at 101-02; Chesnut, ff. Tr. 15007, at 52-58; Bath and Adler-1, ff. Tr. 18975, at 16-19, 21-23; Adler and Bath-2, ff. Tr. 18975, at 14-18; "NRC Staff

Position on Emergency Preparedness for TMI-1", ff. Tr. 22831. The Commonwealth also presented testimony on the subject. See Lamison (Warning)-1, ff. Tr. 17818⁴³; Belser, et al., ff. Tr. 20787, at 4, 7 (Curry/Wertz). The examination of witnesses about the prompt notification system appears throughout the March 3, 5, 10-12 and 17, April 15-17, 21 and 30, May 1, and the July 1, and 7-8 hearing transcripts.

176. The NRC Staff's EPE reported that, in order to satisfy the applicable planning standard, means to provide prompt warning to the public within the plume exposure pathway EPZ needed to be developed in conformance with the acceptance criteria of Appendix 3 to NUREG-0654. Staff Ex. 6, at 12. The NRC Staff further identified the Licensee action necessary to close this open item in its prepared testimony in this proceeding. The NRC Staff indicated that it would require Licensee to:

Provide descriptions of the early warning and notification system including descriptions of the methods for activating such a system, the implementation schedule, and how such a system will satisfy the acceptance criteria of Appendix 3 to NUREG-0654. If restart is after July 1, 1981, demonstrate that the physical and administrative means exist for prompt notification.

Chesnut, ff. Tr. 15007, at 83.

43 Commonwealth of Pennsylvania's Testimony of Kenneth R. Lamison Pertaining to Warning (Contentions EP-5(D) and EP-15(F)) ("Lamison (Warning)-1").

177. Licensee subsequently informed the NRC Staff that Licensee is installing a siren system of approximately 80 sirens throughout the plume exposure pathway EPZ, to provide prompt notification to the public in the event of an emergency at TMI, at a cost of approximately \$1.2 million. The sirens will be radio-activated from the respective county emergency operations centers, which are manned on a 24-hour basis. Licensee is supplying to those county EOC's which need them the radio transmission equipment necessary to activate the new sirens. The control systems are compatible with each county's existing civil defense siren systems. The network of sirens will provide essentially 100 percent coverage of the plume exposure EPZ, with an alerting signal of at least 60 dbc for areas with population densities less than 2000 per square mile [assuming a 50 dba ambient noise level] and 70 dbc for areas with population densities greater than 2000 per square mile [assuming a 60 dba ambient noise level]. The sound level received by any member of the public will be less than 123 dbc, the level which may cause discomfort to individuals. Licensee's assumptions for ambient noise levels and effective siren range are consistent with the guidance in Appendix 3 to NUREG-0654 and Figure 1 of NPG 1-17, "Outdoor Warning Systems Guide." Staff Ex. 23, at II-1 and II-2; Rogan, et al., ff. Tr. 13756, at 102.

178. In a draft of its siren report, Licensee provided the NRC Staff with an acoustical performance evaluation of its siren system using a model which considered local terrain, a range of local meteorology, and area population distribution. A detailed, final technical report, including the final results of laboratory siren tests and graphical and tabular sound level predictions for the siren system, was submitted on June 1, 1981. Staff Ex. 23, at II-1 to II-2. The NRC Staff, and its consultants, reviewed Licensee's final report and compared it to Appendix 3 of NUREG-0654 and CPG 1-17, and concluded that the system design met the applicable criteria. FEMA concurred. Tr. at 22894-95 (Chesnut); Tr. at 22686 (Dickey). Licensee originally indicated that the system would be operational by July, 1981. Though all equipment was onsite and installation well underway on that date, delays in securing necessary rights-of-way required Licensee to revise the operational date; an operational system, however, will be functional prior to restart. Tr. at 22877-78 (Chesnut); Tr. at 22903 (Rogan). Based on the description and implementation schedule for the siren system, the NRC Staff concluded that Licensee had provided an acceptable response to the request in the EPE. Staff Ex. 23, at II-2 to II-3.

179. The implementation of the siren system includes a start-up test program. After each siren is installed, it will be sounded to verify the operability of both the radio control

equipment which operates the siren, and the siren itself. Tr. at 22903-04, 22906 (Rogan). In addition, an acoustical engineer will field sample the approximately 80 siren sites, sound-testing selected sirens for sound dispersion and contour level to confirm the system model.⁴⁴ The engineer will then publish an addendum to Licensee's siren study which will indicate the actual readings of sound levels and contours throughout the TMI plume exposure pathway EPZ, and will include four maps -- summer day, summer night, winter day and winter night, to account for the absorption of foliage in summer and snow in winter, reflectivity, day and night temperatures, and other such factors. The study will verify that 100 percent of the population within the EPZ can, in fact, be notified by the siren system within 15 minutes. A copy of the study will be provided to the NRC Staff. The testing program is expected to be completed by mid-September. Tr. at 22904-08 (Rogan). FEMA also will be reviewing the TMI siren system, as installed, for the NRC Staff, to assess the effectiveness of the system. Moreover, the system will serve as the model for a long-term study, under an NRC/FEMA contract, designed to develop

44 The majority of the sirens sampled will be those for which the location was changed from the projections of the original siren study due to either right-of-way negotiations or foliage and terrain conditions not considered in the original study. Tr. at 22904-07 (Rogan).

evaluation criteria for application to siren systems generally. Tr. at 22888-90 (Chesnut).

180. The Board finds that the siren system being installed by Licensee -- which represents a marked improvement over the notification schemes in place at the time of the TMI-2 accident⁴⁵ -- will, upon completion of the testing program, provide the capability to essentially complete the initial notification of the public within the TMI plume exposure pathway EPZ within about 15 minutes, in compliance with applicable regulations and consistent with the guidance of NUREG-0654.

181. We next address the contentions, albeit briefly, since they have been largely rendered obsolete by Licensee's installation of the siren system. ANGRY Contention EP-5(D)(1) asserts that a physical means to notify all persons within the TMI plume exposure pathway EPZ, meeting the standards set forth in NUREG-0654 and in the Commonwealth's Plan⁴⁶, should be

45 Prior to Licensee's installation of a siren system, the existing siren system was inadequate to give prompt notification to the area at risk in the event of an emergency at TMI. Adler and Bath-2, ff. Tr. 18975, at 15. For example, a large number of persons in York County, and 30 percent of the Dauphin County residents, were not within hearing range of a siren (though the latter figure does not indicate whether those persons were within the TMI plume exposure pathway EPZ). Bath and Adler-1, ff. Tr. 18975, at 18; Adler and Bath-2, ff. Tr. 18975, at 18.

46 The contention, as drafted, refers to Appendix 13 of the Commonwealth's Plan. However, the Commonwealth's Plan has been (footnote continued on next page)

installed prior to restart. The design criteria set forth in the Commonwealth's Plan are substantially the same as the NUREG-0654 criteria. Compare Pa. Ex. 2(a), at 12-2 to 12-3, with Staff Ex. 7, at 45 (criterion E.6). We have just concluded that the siren system being installed by Licensee complies with NUREG-0654, see ¶180, supra, and, accordingly, reject ANGRY Contention EP-5(D)(1).

182. The fundamental thrust of most of the other listed contentions is that specified populations are not within hearing range of sirens and, thus, will not be promptly notified in the event of an emergency at TMI. Specifically, ANGRY Contention EP-5(D)(2) and Newberry Contention EP-14(B) express concern about siren notification of the York County population within the plume exposure pathway EPZ; Newberry Contention EP-14(A) challenges the siren system in York County generally, and in Newberry Township in particular; Newberry Contentions EP-16(E) and EP-16(M) raise the same concern with respect to Dauphin County; and Newberry Contention EP-14(O) questions the adequacy of the siren system to notify all York County residents within a 20-mile radius of TMI.

(continued)
revised (and reorganized, to some extent) since the contention was written. The Board understands the contention to refer to what is now Appendix 12, "Public Alert/Notification," of the Commonwealth's Plan.

183. The basic thrust of these contentions, the lack of adequate siren coverage, has been obviated by Licensee's installation of a siren system which provides the capability for the prompt notification, in the event of an emergency, of all within the TMI plume exposure pathway EPZ -- including those Dauphin County and York County residents living within approximately a 10 mile radius of TMI. See ¶ 180, supra. Accordingly, to the extent that ANGRY Contention EP-5(D)(2) and Newberry Contentions EP-14(A), EP-14(B), EP-14(O), EP-16(E) and EP-16(M) contest the existence of the capability to promptly notify the public within the TMI plume exposure pathway EPZ, those contentions are rejected. To the extent that those contentions can be read to assert that prompt notification must be given to residents beyond the plume exposure EPZ, we reject the contentions as challenges to the Commission's regulations on prompt notification.⁴⁷ See 10 C.F.R. § 50.47(b)(5) and Part 50, Appendix E, § IV.D.3.

184. Other parts of the listed contentions generally allege deficiencies in door-to-door or "route alerting" notification systems. Specifically, ANGRY Contention EP-14(B) asserts that the time necessary to recruit volunteers and to

⁴⁷ The Board notes, however, that there are several areas where siren coverage will extend beyond the established EPZ boundary, due to the physical location and signal strength of the sirens. Rogan, et al., ff. Tr. 13756, at 102.

travel the miles of road necessary to notify the risk population in York County renders the county plan "inoperable." Newberry Contention EP-14(O) asserts that the York County Plan is deficient since local governments lack the manpower to effect prompt notice throughout the risk area of York County through the use of police and fire vehicles. Similarly, Newberry Contention EP-14(T) alleges that the York County plan is deficient to the extent that it relies upon local fire companies to alert residents of rural communities in York by knocking on doors, since there are too few volunteer firemen.

185. These contentions, too, have been generally rendered obsolete by Licensee's installation of a siren system. The siren system is designed to exceed the Commission's standards for prompt notification systems and, as such, obviates the need for reliance on emergency workers to provide supplementary alerting within the TMI plume exposure pathway EPZ. However, after testing the siren system, FEMA will provide the NRC Staff with an evaluation of the system's capabilities. Should a need for minimal supplementary notification appear, procedures for supplementary notification will be required. Adler and Bath-2, ff. Tr. 18975, at 14-16; Tr. at 22793-94 (Hardy/Adler).

186. Several methods of supplementary notification are available, should a need be shown. Indeed, route alerting could supplement the primary means of notification (sirens), if necessary. Tr. at 22793-94 (Adler). Further, the Pennsylvania

State Police have agreed to broadcast warnings, using helicopters (conditions permitting), and the Coast Guard has agreed to assist in the notification of persons on the Susquehanna River, as supplementary means of notification to the general public, if necessary. Tr. at 13927-28 (Rogan).

187. Any such supplemental notification, if necessary, is not required within the period of "about fifteen minutes" specified in Part 50, Appendix E, § IV.D.3 for "essentially complete * * * initial notification of the public within the plume exposure pathway EPZ."⁴⁸ Emphasis added. Rather, the NUREG-0654 guidance provides for 100 percent coverage within 45 minutes of the population who may not have received the initial notification within the entire plume exposure pathway EPZ. Staff Ex. 7, at III-3; Tr. at 22792 (Hardy). Accordingly, to the extent that ANGRY Contention EP-14(B) and Newberry Contentions EP-14(O) and EP-14(T) assert unwarranted reliance on door-to-door notification or "route alerting" as the primary means of notification in the event of an emergency at TMI, we reject those contentions as contrary to the evidence presented on the siren system installed by Licensee. We further find that -- given the extensive coverage of the siren system -- any supplemental public notification (should it prove necessary)

48 The regulations thus do not require notification of the entire population within the plume exposure pathway EPZ within precisely 15 minutes. Rather, those figures are design objectives. Tr. at 15089-90 (Grimes).

could be given within a reasonable period. Thus, to the extent that the listed contentions may be read to challenge door-to-door notification or "route alerting" as inadequate to supplement the siren system installed by Licensee, the contentions are rejected.

188. ANGRY Contention EP-5(D)(2) alleges, in part, that the Commonwealth's Plan does not identify the time required to alert the public within the plume exposure pathway EPZ, in contravention of NUREG-0654, and that the York County plan states that the time for notification via route alerting and "knocking on doors" is to be included in local emergency plans which ANGRY asserts do not exist. The Board first notes that the provisions of NUREG-0654 are not requirements, as ANGRY suggests, but rather standards for guidance. See Staff. Ex. 7, at 2. The purpose of including information about necessary notification time in state and county plans is to facilitate protective action decisionmaking in the event of an emergency, since protective action decisions are dependent, in part, on the time required to alert the public. Bath and Adler-1, ff. Tr. 18975, at 18. Both the current Commonwealth and York County emergency plans identify the siren system as the primary means of public notification in the event of an emergency at TMI, and further identify 15 minutes as the siren system design objective for initial notification of the public. See Pa. Ex. 2(a), at 12-1 to 12-3; Board Ex. 5, at B-1 to B-2. This is

both consistent with NUREG-0654 and realistic, based upon the conclusions of Licensee's siren study, see ¶¶ 177-80 supra, and provides adequate guidance on the subject to officials making protective action decisions. We therefore reject that part of ANGRY Contention EP-5(D)(2). See also ¶245, infra.

189. Newberry Contention EP-14(B) contends that the use of the same siren signal for both a selective evacuation and a general evacuation will confuse the public and impede orderly evacuation. Similarly, Newberry Contention EP-16(M) alleges that the Dauphin County plan "does not specifically state a differentiated commonly recognized evacuation signal that could be recognized by the citizenry throughout the county."

190. As Contention EP-14(B) suggests, separate siren signals are not used to indicate different protective actions (such as selective evacuation versus general evacuation). Under the current scheme of notification, the only signal used for notification of a fixed nuclear facility incident is the "Attention Alert" signal, a steady three to five minute siren blast. However, this will not result in confusion of the public. The "Attention Alert" signal has only one meaning -- "Turn on your radio or your TV. The government has an important message which may affect your health and safety." Through the emergency preparedness public education program, the public will be educated as to this meaning of the siren signal. Differentiation between protective actions (such as selective

versus general evacuation) will be given by radio and TV, over the Emergency Broadcast System. This scheme is described in the Dauphin County plan, Annex C. Bath and Adler-1, ff. Tr. 18975, at 21-22; Board Ex. 6, at C-1 to C-2. The Board therefore rejects Newberry Contentions EP-14(B) and EP-16(M) to the extent that those contentions challenge the siren signal for a nuclear emergency as potentially confusing.

191. Newberry Contention EP-16(M) asserts that the failure of the Dauphin County Plan to provide for a backup power system for the siren system is a deficiency. We reject this assertion. The prompt warning system is not required to have emergency power capability, but may be powered by the normal commercial power source. Nor do FEMA and the NRC Staff believe that emergency power capability is necessary. Commercial electric power is considered sufficiently dependable, as evidenced by the fact that neither fire sirens generally nor the Nuclear Attack outdoor warning system throughout the United States have emergency power capability.⁴⁹ Bath and Adler-1, ff. Tr. 18975, at 22-23.

⁴⁹ The Board notes, however, that there is system redundancy inherent in both the power grid and the design of the siren system itself. See Tr. at 13922-23 (Rogan). In any event, the general reaction of the public in a power failure is to immediately turn on transistor radios, at which time listeners would be notified of protective actions to be taken, just as they would had the sirens sounded. See Tr. at 13923-24 (Giangi). We have previously discussed available supplemental methods of notification, which might be used as a means of public notification in the highly improbable occurrence of a failure of power to the sirens. See ¶ 186, supra; Tr. at 13923 (Rogan).

192. In summary, then, the Board concludes that the siren system being installed by Licensee will, upon installation and testing, provide the capability to essentially complete the notification of the public within the TMI plume exposure pathway EPZ within about 15 minutes, in compliance with applicable regulations and the guidance of NUREG-0654. We further conclude that -- given the extensive coverage of the siren system -- any supplemental public notification (should it prove necessary) could be given within a reasonable period. The concerns raised by ANGRY and Newberry about the system for prompt notification of the public in the event of an emergency at TMI are rejected.

193. Another class of contentions raised various issues relating to the instructions to be given to the public in the event of an emergency at TMI. The first group of these contentions that we address is the group challenging the general concept of operations for instructions to the public in an emergency.

Newberry Contention EP-14(Y): Annex N, Subsection VII, Subsection G provides for certain duties and responsibilities for a County Director and these duties and responsibilities conflict directly with those of the Emergency Management Coordinator. Specifically, this section provides that the County Director shall provide appropriate notice of information received and emergency actions taken and proposed to the York County Police and Fire Departments,

other echelons and emergency operational chains, and local news media for emergency public information and news announcements, whereas, Appendix II provides that the Public Information Officer is responsible for the issuance of official information, advice and instructions from the county to the public. This conflict renders the Plan deficient.

Newberry Contention EP-14(C): Section IV, Subsection 7(c).
(in part)

This section of the York County Plan is deficient in that it depends upon the York County Chamber of Commerce to notify and pass on the general evacuation information to business and industry. There is no assurance that the Chamber of Commerce has the necessary manpower, equipment, and training to pass on such information to the general public. For example, does the York County Chamber of Commerce possess necessary trunk lines to advise all industry within an affected area? What happens in the event that telephone communications are jammed or overloaded and that notification of industries cannot be effected by the York County Chamber of Commerce? Furthermore, does the York County Chamber of Commerce and all industry within the possible affected area have radio communication capabilities?

Aamodt Contention EP-1:
(in part)

It is contended that the licensee has not made provision for timely dissemination of information in the event of accidental release of airborne radioactive gases or

particulates. It is contended that licensee must make information available to the public which will allow appropriate action to be taken to protect persons, livestock, foodstuff and feed in the event of a discharge of significant proportion.

194. The NRC Staff, FEMA and Licensee presented testimony on these contentions. See Rogan, et al., ff. Tr. 13756, at 18-19, 23, 62-63, 81, 86-93; Chesnut, ff. Tr. 15007, at 51-58; Bath and Adler-1, ff. Tr. 18975, at 19-21; Adler and Bath-2, ff. Tr. 18975, at 10-12, 16-17. Additionally, the Commonwealth presented a witness on a contention related to the quoted part of EP-1; that witness's testimony on cross-examination provides background for other testimony on Contention EP-1. See Tr. at 18042 et seq. (Comey). We address the contentions seriatim.

195. Newberry Contention EP-14(Y) alleges that the York County plan assigns certain duties and responsibilities to the "County Director" which conflict with those of the "County Emergency Management Coordinator." The contention further alleges that the plan provides that the County Director will give certain information to emergency response agencies and local news media, which conflicts with the Public Information Officer's responsibility for the issuance of official information, advice and instructions from the county to the public.

196. At one point, the Public Information annex to the York County Plan did indeed refer to both a "York County

Director" and a "York County Emergency Management Coordinator." However, the "Director" and the "Coordinator" were the same person; the use of two titles for one position occurred as a result of a modification of the plan. Since the two titles used in the plan referred to a single position, no true conflict was presented by the apparent conflict of responsibilities. Nevertheless, for the sake of clarity, FEMA recommended that one title be deleted. Adler and Bath-2, ff. Tr. 18975, at 16-17. This has been accomplished. See Board Ex. 5, Annex F. Thus, the first part of Newberry Contention EP-14(Y) has been mooted by the revision of the York County Plan, and is -- for the reasons stated -- rejected.

197. The Board similarly rejects the second half of Contention EP-14(Y). Under the current York County plan, the only announcements which will be released by the York County Emergency Management Coordinator are the prepared statements for broadcast over the Emergency Broadcast System in the event of an emergency, which are included in the York County plan and are prepared by the County Public Information Officer (with the assistance of PEMA). In all other respects, the Public Information Officer serves as the county's spokesperson in the event of an emergency at TMI, and is responsible for the provision of official information, advice and instructions from the county to the public. Thus, the issuance of EBS warning notifications by the County Coordinator does not conflict with

the Public Information Officer's responsibility to prepare and issue emergency information and instructions that supplement the EBS announcements. Adler and Bath-2, ff. Tr. 18975, at 17; Board Ex. 5, Annex F.

198. Newberry Contention EP-14(C) alleges, in part, that the York County plan is deficient in that it relies upon the York County Chamber of Commerce to notify and pass on general evacuation information to business and industry, when the Chamber lacks the resources and training to perform such functions. However, the need for such a function has been effectively eliminated by Licensee's installation of a siren system, and the York County plan has been revised so that it no longer assigns such a role to the Chamber of Commerce. Where an accident develops slowly and time permits the full mobilization of county and state emergency response resources, the selective notification of business and industry could be useful. Consequently, FEMA would not object to such notification by the Chamber of Commerce, but does not view it as necessary, given Licensee's installation of the siren system. Bath and Adler-1, ff. Tr. 18975, at 19-21; Adler and Bath-2, ff. Tr. 18975, at 10-12; Board Ex. 5, at F-1 to F-3. The Board concurs, and therefore rejects the quoted part of Contention EP-14(C).

199. Aamodt Contention EP-1 alleges, in part, that Licensee has not provided for timely dissemination of

information in the event of accidental releases of radioactivity, and contends that Licensee must make information available to the public to allow appropriate actions to be taken to protect persons and property. However, such a course of action would contravene the established concept of operations for public notification and instructions in the event of an accident at TMI.

200. Under the current concept of operations, in an emergency, Licensee would initially contact Dauphin County (or, in the case of a General Emergency, all five counties) and PEMA. PEMA would then notify BRP, who, in turn, would call Licensee to verify the incident, receive a radiological assessment of the emergency and open a line of communication. Licensee would provide plant operational and radiological information, as well as protective action recommendations, to BRP, whose personnel have the technical expertise to assess that information. Rogan, et al., ff. Tr. 13756, at 86-88. See also Section II.C, supra.

201. Upon evaluation of the incident, BRP would notify PEMA of its assessment and of any recommended protective actions. PEMA would then contact the Chairman of the Pennsylvania Emergency Management Council, to inform the Chairman of the BRP recommendation of protective action. Upon direction of the Chairman or, in his absence, the Director of PEMA (or his designated representative), PEMA would then notify

each risk county of the specific alert/notification message to be used by the county and the specific date and time for the activation of the alert/notification system. At the date and time designated by PEMA, each risk county would activate the alert signal of the county siren system for the area at risk. Concurrent with the activation of each county's siren system, the Emergency Broadcast System ("EBS") station for each county would broadcast the designated public notification message. Pa. Ex. 2(a), at 12-1 to 12-2.

202. After completion of the initial notification of the public, PEMA would coordinate the dissemination of follow-up and continuing emergency public information by the Commonwealth and the counties. Pa. Ex. 2(a), at 12-2. See generally Pa. Ex. 2(a), Appendix 15. In addition, Licensee would disseminate information through its public information representatives, conducting news conferences as appropriate. Licensee news releases, as well as arrangements for press conferences, would be communicated to the PEMA public information officer. Rogan, et al., ff. Tr. 13756, at 91.

203. Thus, under the established concept of operations, it is the Commonwealth and the counties who bear the responsibility for notifying the public of the existence of an emergency at TMI, and for making and communicating to the public specific protective action recommendations. The Board agrees that Licensee's notification/public information role in

the initial stage of an accident is properly confined to the notification to the Commonwealth and the counties of an emergency, and the provision of plant operational data, radiological information, and protective action recommendations to BRP, which has the technical expertise to appreciate the information. We see little, if any, advantage to Licensee's dissemination of such raw data directly to the public, which lacks the technical background to assess the information. Accordingly, we reject the quoted portion of Aamodt Contention EP-1.

204. Another area of litigation focused on the Emergency Broadcast System.

Newberry Contention EP-14(FF): The York County Plan contains only only one EBS station, that being WSBA in York, Pennsylvania, and lists no other secondary station in the event that WSBA loses power or in some other way is placed out of operation. It is Intervenor's contention that the Plan is deficient in that a secondary EBS station is not included in the Plan.

FEMA and the Commonwealth presented testimony on this contention. See Bath and Adler-1, ff. Tr. 18975, at 23-24; Belser, et al., ff. Tr. 20787, at 6 (Curry). The role of the EBS station in public notification in the event of an emergency at TMI is described in Annex F of the York County Plan. Board Ex. 5. Cross-examination on the EBS system generally, and on this

contention in particular, is reflected in the transcripts of March 10, April 6, 7, and 15, May 1 and 15, and July 7, 1981.

205. Newberry Contention EP-14(FF) would require provision for a second EBS station in York County, as a backup should the primary EBS station lose power or otherwise go out of operation. However, NUREG-0654 does not recommend provision of a backup or alternate EBS station. Moreover, FEMA sees no need for such a backup or alternate system. The designated EBS station for York County, WSBA, is located outside the TMI plume exposure pathway EPZ, and therefore would not need to be evacuated in the event of an emergency at TMI. The station also has a fallout shelter with a representative protection factor meeting federal requirements. Further, WSBA has a backup power supply and will therefore continue to operate in the event of a conventional power outage. Bath and Adler-1, ff. Tr. 18975, at 23-24; Tr. at 20933 (Curry). Nevertheless, York County has two Common Program Control Stations ("CPCS's") in addition to WSBA, which also have the capability to initiate the EBS broadcast, should WSBA for some reason be unable to do so. Belser, et al., ff. Tr. 20787, at 6 (Curry); Tr. at 20932-34 (Curry). Accordingly, the Board rejects Newberry Contention EP-14(FF).

206. Another group of contentions addressed the "911" Emergency Telephone Service.

Newberry Contention EP-14 (P): Furthermore, Subsection VI of this particular section provides that the common carrier system within the Emergency Operations Center is the 911 system, of which 49 out of 79 emergency telephone trunk lines are committed. Furthermore, 6 of the lines are standby rumor-control lines, leaving 24 emergency telephone trunk lines for those areas not contained within the 911 system. The Newberry Township, Fairview Township, Goldsboro and Lewisberry areas are without 911 service. It is Intervenor's contention that, in the event of an incident at the TMI nuclear facility, the telephone grid system would become so overloaded during such an incident that the making of a phone call to the remaining 24 committed lines at the Emergency Operations Center would be difficult if not impossible. Therefore, it is claimed that this part of the Plan also is deficient in that there are not enough emergency trunk lines available for all residents within the 20-mile radius zone of TMI with a special emphasis on those areas in York County which are closest to the nuclear power facility.

Newberry Contention EP-16(Q): The Dauphin County Plan lists only two (2) 911 operators in place in the event of an evacuation. It is submitted that two operators are grossly insufficient when it is taken into consideration that the York County Plan incorporates forty-nine (49) 911 operators in order to deal with an evacuation. Until and unless there is a commitment for more 911 operators

to be in place during an emergency, the Dauphin County Plan remains deficient.

207. These contentions generally attack the capability of the "911" telephone systems in York and Dauphin Counties to handle the telephone calls which would be placed in the event of an emergency at TMI. FEMA and the Commonwealth presented testimony on these contentions. See Adler and Bath-2, ff. Tr. 18975, at 20-23, 26; Belser, et al., ff. Tr. 20787, at 9 (Wertz). The "911" system in York County is described at pages A-1, B-1 and C-1 of the York County Plan; the system in Dauphin County is described at pages A-1, B-1 and C-1 of the Dauphin County Plan. See Board Ex. 5-6. Oral examination on the "911" system generally, and on these contentions in particular, appears in the April 15-17 and 30, 1981 transcripts.

208. The Board first addresses Newberry Contention EP-14(P), which challenges the "911" system in York County.⁵⁰ There are 79 trunk lines entering the York County Emergency

⁵⁰ Contrary to the assertion of the contention, the current York County plan indicates that the "911" emergency telephone system services all of York County except for a small area of Lewisberry Borough and Fairview Township serviced by Commonwealth Telephone Company. The emergency telephone numbers in those areas tie into the County EOC through trunk lines. Board Ex. 5, at A-1.

Operations Center; 49 of these service the "911" system and enter from all sections of York County. Six of the lines can be used as standby rumor control lines and operated in emergencies. The other trunk lines are for the use of county emergency response personnel manning the EOC. Adler and Bath-2, ff. Tr. 18975, at 22.

209. Should telephone systems nonetheless jam due to excessive use, specific dedicated circuits would assist. These specific dedicated circuits are already in place and operational between the County EOC and the EBS station, and are in place (to be activated in an emergency) between the state and the EOC's of the five risk counties. Since emergency notification of the public within the TMI plume exposure pathway EPZ will be effected through the siren system installed by Licensee, followed by appropriate EBS announcements, telephone notification of large segments of the general public will not be required. Moreover, there is no requirement that there be sufficient trunk lines available for use by all residents within a 20-mile radius of TMI.⁵¹ Adler and Bath-2, ff. Tr. 18975, at 23. Accordingly, the Board finds that "911" telephone system in place in York County is adequate to fulfill its

⁵¹ The requirements for providing emergency instructions to the public focus primarily on the plume exposure pathway EPZ, which is the area within approximately a ten-mile radius of the plant. See ¶¶ 217-18, infra.

intended function; we therefore reject the quoted portion of Newberry Contention EP-14(P).

210. Newberry Contention EP-16(Q) asserts that the Dauphin County Plan is deficient in that it provides for only two "911" system operators in an emergency, whereas the York County Plan, it is alleged, provides for 49 "911" operators in such circumstances. However, contrary to the contention, York County -- with 49 trunk lines -- plans for two "911" operators. Dauphin County -- with 40 trunk lines -- also plans for two operators. This will be a sufficient number of "911" operators in an emergency, particularly since (in Dauphin County, at least) only two lines can be answered at the same time, and since the counties will set up rumor control centers, which will relieve some of the burden from the "911" operators. Call volume exceeding "911" operator capacity will be transferred to the rumor control centers or other appropriate resources. Adler and Bath-2, ff. Tr. 18975, at 26; Belser, et al., ff. Tr. 20787, at 9 (Wertz); see also Board Ex. 5, at F-2 (describing York County rumor control center); Board Ex. 6, at D-2 (describing Dauphin County rumor control center). The Board therefore rejects Contention EP-16(Q).

211. The last contention which we address in the area of Emergency Instructions challenges the procedure established by the Commonwealth for the issuance of news releases.

ECNP Contention EP-12:

ECNP contends that the routing of all information through the Governor's Press Secretary to the public adds unnecessary complexities to the entire plan. For example, since the Press Secretary of the Governor can reasonably be expected to be a political appointee and not necessarily knowledgeable at all in the area of nuclear accidents and their consequences, or the nature of radiation injury, the designation of the Governor's Press Secretary as the official and sole spokesperson adds one more pathway for and perhaps impediment to information in the cumbersome and circuitous route between an event or accident at TMI and the public. There is no need for this extra step. In addition, this extra step offers one more opportunity for errors and omissions to be introduced into the information and only adds further delay. It is not expected that this extra step will result in the removal of errors from the messages. Furthermore, the possibility exists, with this extra, unnecessary step, for political pressure to be brought to bear to alter, delay, or even withhold crucial information from the public.

212. This contention alleges that the Commonwealth's routing of all information through the Governor's Press Secretary to the public will delay the flow of information, may introduce errors or omissions (given the Press Secretary's lack of nuclear expertise), and presents a potential "for political pressure to be brought to bear to alter, delay, or even

withhold crucial information from the public." Both the Commonwealth and FEMA presented direct testimony on the contention.⁵² See Comey, ff. Tr. 18038; Bath and Adler-1, ff. Tr. 18975, at 24-26. The Commonwealth's current public education and information program -- including the role of the Governor's Press Secretary in that program -- is described in Appendix 15 to the Commonwealth's Plan. See Pa. Ex. 2(a), at 15-1 to 15-5.

213. ECNP Contention EP-12 has effectively been mooted by the revision of the Commonwealth's Plan, including the section on public education and information. Under the current Commonwealth Plan, the Governor's Press Secretary establishes policies and procedures for Commonwealth government public information, public affairs and press secretarial operations. In that capacity, the Governor's Press Secretary and Director of Communications has delegated to PEMA the role of coordinator of Commonwealth public information in response to an incident at a fixed nuclear facility. The revised public information appendix to the Commonwealth's Plan reflects this delegation of responsibility and outlines the procedures for its

52 Though ECNP advanced this contention, ECNP did not attend the hearing session at which Mr. Comey, the Press Secretary of PEMA, was cross-examined. Nor did ECNP contribute to the preparation of the cross-examination conducted by the lead intervenor representatives. Tr. at 18061-62.

implementation. Comey, ff. Tr. 18038, at 1; see Pa. Ex. 2(a), Appendix 15.

214. Selected state departments and agencies are responsible to support PEMA in the dissemination of public information during an emergency at TMI. Pa. Ex. 2(a), at 15-1. The Governor's Press Secretary will provide policy direction and state agency support to the emergency public information operation at the PEMA Media Center. Selected state agencies will provide information and support personnel to the PEMA Media Center as directed by the Governor's Press Secretary. The Governor's Press Secretary will establish and operate a rumor control center when required. The PEMA Public Information Officer will exchange information with the spokespersons of all principal organizations -- including the Governor's Press Secretary, the Governor's Action Center, the county emergency management agencies, the affected fixed nuclear facility, the NRC and FEMA -- on a regular basis as dictated by the situation, and any changes in the situation. When possible, the PEMA Public Information Officer will brief the principal organization spokespersons prior to the dissemination of emergency public information to the public. During an incident, all principal organization spokespersons may participate in the periodic joint emergency public information media briefings at the PEMA Media Center. Pa. Ex. 2(a), at 15-4.

215. The Board finds that the plan for the dissemination of emergency information to the public which is reflected in the current Commonwealth Plan accommodates the interests of both the desire to present coordinated, technically accurate information and the need for timely information. Moreover, as we noted above, ECNP's specific concern -- the routing of all information through the Governor's Press Secretary prior to release to the public -- has been alleviated by the Secretary's delegation of responsibility to PEMA. We therefore reject ECNP Contention EP-12.

E. Definition of Emergency Planning Zones

216. In this section of our Recommended Decision we address the adequacy of the emergency planning zones ("EPZ's") adopted for use around TMI. Subparagraph 1 of Sholly Contention EP-17(A) includes the assertion that "a limited evacuation will lead to problems due to spontaneous evacuation of a much larger area." While the Board does not believe this observation is particularly relevant to the issue of EPZ definition -- since regardless of where the boundary is drawn there may always be a spontaneous evacuation of a larger area -- the issue of whether the affected population would overreact or underreact was a matter litigated by the parties. This is so notwithstanding that there is no contention which directly

addresses this issue. See ¶ 7, supra. As a matter of organizational convenience, the Board considers this issue at the end of this section of our Recommended Decision.

Sholly Contention EP-17(A): Licensee's acceptance, without formal analysis or evaluation, of a circular 10-mile radius for the Plume Exposure Emergency Planning Zone (as designated by the Pennsylvania Emergency Management Agency) does not discharge Licensee's responsibility to ensure that adequate emergency response plans exist to protect the public health and safety in the event of an emergency at TMI-1. Further, acceptance of or designation of a circular 10-mile radius Plume Exposure EPZ for TMI-1 is unjustified because such an EPZ fails to adequately consider local emergency response needs and capabilities as they are affected by demography and jurisdictional boundaries. These considerations, among others, are specified in NUREG-0396, NUREG-0654, and the new emergency planning rule published in the Federal Register on August 19, 1980. The following specific local conditions should be reflected in the Plume Exposure EPZ for TMI-1:

1. The proposed 10-mile radius circular EPZ includes within the EPZ portions of numerous jurisdictions at the township, city, borough, and town levels of government. Calling for an evacuation of only a portion of any political jurisdiction due to a hazard which affects a large geographic area and basing emergency plans and response capabilities on

such a limited evacuation will lead to problems due to spontaneous evacuation of a much larger area, with a concomitant increase in traffic and supply requirements at shelters.

Therefore, the Plume Exposure EPZ for TMI-1 should include the entire geographic extent of all governmental jurisdictions at the township, city, borough, and town level which are bisected by the proposed circular 10-mile EPZ.

2. There are heavily populated areas near the cities of Harrisburg and York represented by the city proper and adjacent continuation of the urban areas into the suburbs. In the event that the wind is blowing toward either of these areas when a large release of radioactivity occurs, such areas would constitute a large percentage of the total population dose (in the case of the TMI-2 accident, for instance, Harrisburg contributed 25% of the total population dose despite the fact that most of the city is more than 10 miles distant from the plant). The urbanized areas in and around Harrisburg and York are concentrations of population for which preplanning for an evacuation is a necessity for successful implementation (for instance, preplanning would have to include evacuation routes, transportation

needs, host area requirements, and problems posed by special populations such as prisons).

Therefore, the urbanized areas around and including the cities of Harrisburg and York should be included within the Plume Exposure EPZ for TMI-1.

3. Numerous members of the Old Order Amish community reside in relatively close proximity (within 10 miles) of the outer boundary of the Licensee's Plume Exposure EPZ in Lancaster County. Because the Old Order Amish eschew the use of electricity, telephones, and automobiles, they present unique problems with respect to warning, communication of protective action advisories, and transportation. These unique problems warrant the special consideration that inclusion of Old Order Amish within the Plume Exposure EPZ would provide.
4. To the extent that the Licensee relies upon the decision of county officials in the Three Mile Island area to develop and maintain a 20-mile emergency response capability as a substitute for making a determination that the 10-mile circular EPZ is adequate, the adequacy of such a 20-mile capability must be established as a condition to the restart of TMI-1.

217. Through binding regulation, the Commission has set forth the criteria governing the geographic extent of pre-planning around commercial nuclear power plants. In relevant part, 10 C.F.R. § 50.47(c)(2) states:

Generally, the plume exposure pathway EPZ for nuclear power plants shall consist of an area about 10 miles (16 km) in radius and the ingestion pathway EPZ shall consist of an area about 50 miles (80 km) in radius. The exact size and configuration of the EPZs surrounding a particular nuclear power reactor shall be determined in relation to local emergency response needs and capabilities as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries.

In the statement of considerations accompanying adoption of this rule, the Commission identified the regulatory basis for the EPZ concept as a "decision to have a conservative emergency planning policy in addition to the conservatism inherent in the defense-in-depth philosophy." 45 Fed. Reg. 55402, 55406 (August 19, 1980). At that time the Commission also observed that "[t]he exact size and shape of each EPZ will be decided by emergency planning officials after they consider the specific conditions at each site. These distances are considered large enough to provide a response base that would support activity outside the planning zone should this ever be needed." Id. A further identification of the factors considered by the Commission and FEMA in defining the geographic extent of the EPZ's is set forth in NUREG-0654. Staff Ex. 7, at 10-13.

218. The Board's job with respect to definition of the EPZ is to determine whether there has been compliance with the Commission's regulation. We are not free to redetermine as a matter of policy whether the 10- and 50-mile ELZ's are too small or too large. Our only area of inquiry is whether "local emergency response needs and capabilities as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries" have been properly considered. For the reasons described below, we find that such factors have been properly considered.

219. The plume exposure pathway EPZ around TMI is depicted in the Commonwealth's emergency response plan. Pa. Ex. 2(b). Testimony on the adequacy of this EPZ was presented by Licensee, the NRC Staff and FEMA. See Rogan, et al., ff. Tr. 13756, at 97-111; Chesnut, ff. Tr. 15007, at 63-66; Adler and Bath-2, ff. Tr. 18975, at 61-63; Chesnut and Bath, ff. Tr. 19626, at 13-14. No other party to the proceeding presented direct testimony on this subject, and the intervenors' cross-examination in this area was extremely limited, relating almost entirely to special provisions made for the Old Order Amish. See Tr. at 14143-57, 14676-80, 17575-82, 18108-09, 18111-13, 18288-91, 18292-94, 19661-68.

220. The geographic extent of the plume exposure pathway EPZ for the TMI site was determined by PEMA. The initial step was to inscribe a circle, with a radius of 10 miles, around the

TMI site. The boundaries of this circle were then moved to a close, recognizable marker. Political boundaries, natural geographic features, roads and other readily identifiable landmarks were used in this process. The population included within the plume exposure pathway EPZ drawn by PEMA is about 30% greater than the population included within a 10-mile circle around the TMI site. Rogan, et al., ff. Tr. 13756, at 98-99, 107-08; Chesnut, ff. Tr. 15007, at 65-66. No party has brought to the Board's attention any particular boundary line which it believes is ambiguous, not well defined, or otherwise inappropriate. The Board therefore finds that, in defining the plume exposure pathway EPZ, PEMA gave appropriate consideration to such factors as demography, topography, land use characteristics, access routes and jurisdictional boundaries.

221. We next address each of the four specific concerns raised in Contention EP-17(A). At the outset it should be noted that underlying this contention is an assumption that the plume exposure pathway EPZ around TMI is a uniform circle. While there may have been some confusion during the prehearing phase of the proceeding as to the shape of the EPZ, the record is now very clear that PEMA has tailored the EPZ definition to local conditions. Rogan, et al., ff. Tr. 13756, at 108; Chesnut, ff. Tr. 15007, at 65-66.

222. Subparagraph 1 of Contention EP-17(A) alleges that the EPZ boundary should include the entire geographic extent of

all political subdivisions that are bisected by a 10-mile circle around TMI. Such an extension of the EPZ is not required by the Commission's regulations and the Board doubts whether such a rote procedure would in fact represent the consideration of local conditions required by the regulation. In some instances PEMA has extended the EPZ boundary to include the whole of a municipal area that is bisected by the 10-mile circle. E.g., Derry, South Hanover, Fairview and Conewago Townships. In other cases, PEMA has drawn an EPZ boundary that does bisect a municipal area. But in such cases this has been accomplished by using a clearly defined marker known to residents in the area. Rogan, et al., ff. Tr. 13756, at 108; Chesnut, ff. Tr. 15007, at 66. As Licensee's witnesses noted, extending the EPZ boundary further yet, to include all municipal areas bisected by the EPZ, would not be desirable since it would result in an EPZ boundary with long, nonuniform appendages. During an actual emergency this might result in confusion if protective actions were recommended for areas distant from TMI, while closer-in areas were not covered by the advisory. Rogan, et al., ff. Tr. 13756, at 108-09. In this regard, the Board sees certain advantages in attempting to maintain an EPZ boundary that is as regular and circular as is warranted by local conditions. We therefore decline to direct that the EPZ boundary be extended to include all political subdivisions bisected by a 10-mile circle.

223. Subparagraph 2 of Contention EP-17(A) seeks to extend the EPZ boundary to include the cities of Harrisburg and York and the urbanized areas surrounding those cities. While the Board is aware that there are urbanized areas on the edges of the EPZ boundaries drawn by PEMA, see Board Physical Ex. A, D and E, we cannot say on the basis of this record that the boundaries were drawn incorrectly. In Figure 6 accompanying the prefiled testimony of Rogan, et al., ff. Tr. 13756, Licensee has superimposed the PEMA-drawn EPZ boundary on Board Physical Ex. D. It is clear from Figure 6 that certain of the urbanized areas in and around Harrisburg and York have been included within the plume exposure pathway EPZ. E.g., parts of Lower Paxton, Susquehanna, Harrisburg City, New Cumberland and Springettsbury. We have no basis for finding that these boundary lines are inadequate.

224. Moreover, this Board is cognizant of the Commission's observation, quoted at paragraph 217, supra, that the about 10-mile radius of the EPZ is large enough to support emergency response outside the planning zone should such response be necessary. In cases of adverse meteorology, and therefore potentially higher offsite doses, the Harrisburg and York areas not in the EPZ probably will have from 5 to 8 hours warning time beyond that available to the closer-in areas. Conversely, if weather conditions are unstable and plume travel time is fast, the offsite dose is likely to be smaller and the

need for protective action less. Rogan, et al., ff. Tr. 13756, at 109-10. This, together with the fact that many of the functions that must be carried out by offsite agencies within the plume exposure EPZ to assure an adequate response capability are somewhat independent of the geographic extent of the EPZ, see Rogan, et al., ff. Tr. 13756, at 97-98, 99-107, leads us to conclude that there is no need to extend the EPZ boundary in some unspecified manner to include all of Harrisburg, York and the surrounding urbanized areas.

225. Subparagraph 3 of Contention EP-17(A) urges that the EPZ be extended so that Old Order Amish residing outside the EPZ boundary would receive the necessary special consideration that flows from being included within the EPZ. The Board believes that while this contention identifies a very legitimate concern -- i.e., the unique problems posed by the Old Order Amish -- it proposes a totally unrelated and therefore inappropriate solution -- i.e., extension of the EPZ boundary. The Board does not understand how extending the EPZ boundary will in any way assure that appropriate consideration has been given to the problems posed by the Old Order Amish. The more direct approach to the problem, and the one adopted by the Board during this proceeding, is to assure that adequate means are in place to protect the Old Order Amish in the event of an accident at TMI. On its own, the Board therefore inquired into this matter.

226. Within the 10-mile plume exposure pathway EPZ there are eight families, consisting of 56 persons, that are due special consideration during an emergency at TMI.⁵³ Between 10 and 20 miles from TMI there are an additional 24 families, consisting of an additional 168 persons who are due special consideration. Tr. at 18288 (Lothrop). With respect to these people, PEMA has established procedures with the Mennonite Disaster Service to assure that, in the event of an emergency at TMI, they are properly notified and advised of the protective actions they should take. Tr. at 18112, 18289-91 (Lothrop); Adler and Bath-2, ff. Tr. 18975, at 62-63. During the June 2, 1981 exercise PEMA did contact the Mennonite Disaster Service and the arrival of a representative from this service to the state EOC was simulated. Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, at item 14. The Board therefore finds that the concerns raised by Contention EP-17(A)(3) have been adequately addressed and there is no need to further extend the EPZ to ensure that appropriate consideration has been given to the Old Order Amish.

227. Subparagraph 4 of Contention EP-17(A) asserts that, if Licensee relies on the existence of 20-mile evacuation plans

53 By "due special consideration," Commonwealth witness Lothrop meant that alternative means of notification would be provided to supplement the notification given the general public. Tr. at 18293-94 (Lothrop).

to overcome an inadequacy in the EPZ boundary drawn by PEMA, then the 20-mile plans must be demonstrated to be adequate. The short answer to this claim is that neither Licensee nor PEMA relies on 20-mile evacuation plans as a substitute for making an informed judgment as to the extent of the plume exposure pathway EPZ. Rogan, et al., ff. Tr. 13756, at 111. While the Board has no knowledge whether such 20-mile plans currently exist, we find no need to either review such plans or determine their adequacy. See ¶¶ 217-18, supra. To the extent some work has been done on 20-mile plans, that effort provides additional assurance that the planning within the plume exposure pathway EPZ is adequate. Chesnut and Bath, ff. Tr. 19626, at 14.

228. In summary, the Board finds that the plume exposure pathway EPZ as drawn by PEMA complies with the Commission's regulations and is adequate to provide reasonable assurance that the public health and safety will be protected.

229. The Board now considers whether during an emergency at TMI the affected population is likely to overreact or under-react in ways that might compromise the success of protective actions ordered by the Commonwealth of Pennsylvania. We also consider whether widespread panic might similarly compromise the effectiveness of protective actions. Witnesses presented by Licensee, the NRC Staff (including FEMA personnel), the

Commonwealth of Pennsylvania, and intervenor ANGRY testified on this subject.

230. Of the witnesses who testified,⁵⁴ the only proponent of the view that the affected population might not respond to directions from government officials was ANGRY witness Dr. Kai Erikson, ff. Tr. 21686. Dr. Erikson's thesis is that nuclear accidents, because they involve the threat of radiation or some other form of contamination, are "at least potentially very different from other kinds of disaster." Id. at 2 (emphasis in original). Therefore, Dr. Erikson concludes that evidence on human behavior drawn from other types of disasters may not be applicable to nuclear accidents. Id. Furthermore, Dr. Erikson argues that, because the TMI-2 accident has changed the human environment in the area, he would expect a substantial proportion of the population to overreact if there were another emergency at TMI, while another substantial proportion of the population could be expected to underreact. Id., at 3-5.

231. Initially, the Board notes that it is troubled by an apparent lack of care and precision in the written, pre-filed testimony submitted by Dr. Erikson. As drafted, Dr. Erikson's testimony restated the position of Dr. Dynes, Licensee's expert

54 ANGRY also offered the written testimony of Dr. Donald Zeigler, which was stipulated into evidence without cross-examination, ff. Tr. 21818. We discuss Dr. Zeigler's testimony at ¶ 237, infra.

witness, that a general knowledge of crisis situations could be applied "without reservation" to the particular circumstances of the TMI area. Id., at 2. After counsel brought to Dr. Erikson's attention the testimony of Dr. Dynes, see Tr. at 21688-91, Dr. Erikson amended his testimony by dropping the "without reservation" language. Tr. at 21698 (Erikson). Similarly, Dr. Erikson's testimony states elsewhere that "[a]t one point in the hearings, Dr. Dynes assured the Chairman that people living in the TMI area would not be so immobilized with fear that they would fail to respond appropriately to a future emergency," Erikson, ff. Tr. 21686, at 5, when it is clear that Dr. Dynes never made such an unqualified, wide-sweeping statement. Tr. at 21709-10 (Erikson).

232. Dr. Erikson's written testimony also states that Dr. Dynes' knowledge of crisis situations was derived from "the 120 or 130 events studied by the Disaster Research Center", Erikson, ff. Tr. 21686, at 2. Yet, on cross-examination Dr. Erikson readily admitted that Dr. Dynes' background with crisis situations was based on "a much broader experience" than just that at the Disaster Research Center. Tr. at 21688. And, Dr. Erikson's view that neither Dr. Dynes nor his associates had studied the TMI area, Erikson, ff. Tr. 21686, at 2, supposedly was based on a statement in the hearing transcript by Dr. Dynes that he did not regard his work on the Kemeny Commission as a study of the TMI area. Tr. at 21691 (Erikson). But, Dr. Erikson later admitted that the hearing transcript contained no

such statement. Tr. at 21700-01 (Erikson). Finally, Dr. Erikson's testimony that the Disaster Research Center "has studied few, if any, crisis situations that are at all comparable" to the TMI situations, Erikson, ff. Tr. 21686, at 2, is belied by Dr. Dynes' testimony that the Disaster Research Center had done research on "probably every important incident, particularly in the United States, since 1964", including work on toxic spills, chlorine barge accidents, and on an explosion and fire in a nuclear dump in San Antonio. Compare Tr. at 17124, 17128 (Dynes) with Tr. at 21094-96 (Erikson).

233. Given these repeated instances where Dr. Erikson's testimony was not as accurate as the Board would have expected, we are disinclined to accord much weight to that testimony. We reach this conclusion not only because of the inaccuracies just noted, but also because much of Dr. Erikson's testimony does not appear relevant to the issues before the Board. See also ¶¶ 84-87, supra.

234. In this regard, Dr. Erikson cites the experiences at Hiroshima, Minamata, Seveso and Love Canal as examples of disasters that persisted for an indeterminate amount of time -- which Dr. Erikson alleges is also true for nuclear accidents -- and therefore are in many ways similar to the situation at TMI. Erikson, ff. Tr. 21686, at 3. However, in three of the four examples cited there was no "evacuation". And, in the fourth case (Seveso) the evacuation itself was successful, although

people apparently reentered the area due to a lack of adequate area control. Tr. at 21073-04 (Erikson). Thus, the examples cited by Dr. Erikson do not bear on whether people in the TMI area will overreact or underreact in the event of another emergency at TMI.

235. Nor is the reference to the work of Dr. Lifton on "psychic numbing" particularly relevant to the TMI area. Erikson, ff. Tr. 21686, at 5. As emphasized in the writings of Dr. Lifton, the "psychic numbing" phenomenon is characterized by a close relationship to death and the death encounter. Tr. at 21711-14 (Erikson). In this regard, the experiences after the TMI-2 accident have no parallel to the examples relied upon by Dr. Lifton, namely: Hiroshima, survivors of the Vietnam War, survivors of Nazi concentration camps, and the Buffalo Creek Dam disaster. Tr. at 21712 (Erikson). Without more, the Board cannot accept Dr. Erikson's view that such "psychic numbing" may be present in the TMI area and may cause people to underreact if another emergency occurred at TMI.

236. Dr. Erikson's last point is that the populace may overreact because of an alleged increase in their level of fear following the TMI-2 accident and because of a lower level of trust in the authorities who would be issuing instructions. Erikson, ff. Tr. 21686, at 4. The basis for this conclusion is Dr. Erikson's review of various studies that have been conducted since the TMI-2 accident. Tr. at 21705 (Erikson).

Dr. Erikson's review included an evaluation of the studies to determine whether the questions asked were unduly suggestive of the answer. It was Dr. Erikson's view that none of the studies he relied upon were disqualified on this ground, including a study done by Raymond Goldsteen. Tr. at 21707-08 (Erikson). Prior to Dr. Erikson's appearance, the Board itself had reason to review the Goldsteen study and, contrary to Dr. Erikson's view, we found that the questions asked were unduly suggestive. Tr. at 20991-93 (Chairman Smith). Therefore, the Board has reason to doubt the standards used by Dr. Erikson in concluding that the studies were not defective and we do not know how much weight Dr. Erikson placed on the Goldsteen study in drawing his conclusions. Moreover, in at least one of the studies relied on by Dr. Erikson, one measure of heightened stress levels (the so-called Langer scale) showed no difference between populations close to TMI and the control group beyond 40 miles. Tr. at 21723-25 (Erikson).

237. In support of Dr. Erikson's view that the population might overreact, ANGRY offered an article by Dr. Zeigler appearing in The Geographical Review, ff. Tr. at 21818.⁵⁵ We

55 Dr. Zeigler qualified his article in a very important manner (ff. Tr. 21818, at 1):

Because of the uniqueness of the case study, we offer generalizations and models to explain the decision-making process for nuclear evacuation not
(footnote continued on next page)

have reviewed that article and draw an opposite conclusion from that proffered by ANGRY. First, we believe the Zeigler article suggests that there is a definite "distance-decay" relationship, which would tend to indicate that few people beyond the plume exposure pathway EPZ would evacuate. Zeigler, ff. Tr. 21818, at 6-7.⁵⁶ Second, we believe that the "evacuation-shadow" phenomenon reported by Zeigler, see id., at 7, is based on confusion that resulted from differing public

(continued)

as definitive conclusions but rather
as hypotheses for future studies.

56 In relevant part, the Zeigler article suggests the following (ff. Tr. 21818, at 6-7):

The distance-decay function shows a sharp discontinuity approximately twelve miles from the plant * * * . Within a twelve-mile radius of the disabled reactor, 53 percent of the sample reported that at least part of the household evacuated. Beyond twelve miles, only 9 percent of the sample reported evacuation. The sharp discontinuity in the vicinity of twelve miles reveals the impact of two directives issued by the office of the governor of Pennsylvania on Friday, March 30. In the first, everyone within a ten-mile radius was advised to remain indoors, an action known as sheltering. In the second, all pregnant women and preschool children within a five-mile radius of the plant were advised to evacuate. The first directive seemed to establish the critical evacuation boundary in the minds of area residents. Beyond the ten-mile limit the proportion of respondents who evacuated declined sharply.

announcements about whether TMI-2 posed a real danger to the populace and whether people should shelter or evacuate. See Stipulation, ff. Tr. 22501. Given the improvements since the TMI-2 accident in public education and dissemination of information to the public during an emergency, see Section II.D, supra, the Board would not expect such confusion if another emergency occurred at TMI.

238. Our views in this regard are confirmed by the consistent testimony, repeated throughout the proceeding, that appropriate public education can and does reduce fear and mistrust in authority and does increase the likelihood that people will do as instructed during an emergency. See, e.g., Tr. at 17189-92 (Dynes), 19275-78, 19290-91, 19294, 19297 (Pawlowski), 19279-80, 19285-86, 19307-10 (Adler); Staff Ex. 19, at p. 3-1 (Jaske).

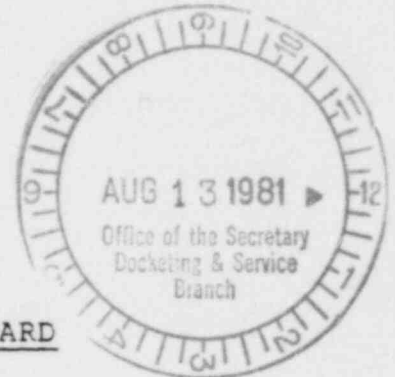
239. Moreover, it was FEMA's view that even if some people did overreact and seek rapid escape from the affected area, such activity is not panic and is not likely to constitute a problem. Those people who spontaneously evacuate typically have a place to go and have planned their evacuation. Rather than complicating evacuation plans, those who self-evacuate reduce the burden on emergency planners. Staff Ex. 19, at pp. 1-1 and 3-1 (Jaske).

240. For these reasons, the Board rejects the claim that people in the TMI area will panic, or otherwise overreact or underreact, in a manner that would compromise protective actions ordered by government officials.

Lic 8/13/81

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD



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

VOLUME TWO OF:

LICENSEE'S PROPOSED FINDINGS OF FACT
AND CONCLUSIONS OF LAW ON
EMERGENCY PREPAREDNESS ISSUES

SHAW, PITTMAN, POTTS & TROWBRIDGE

George F. Trowbridge
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F. Protective Action Decisionmaking

241. Four major issues and a variety of subissues, relating generally to protective action decisionmaking, were litigated by the parties. We address each issue in turn. The first issue deals with the general criteria used by Licensee and the Commonwealth in the protective action decisionmaking process, including information needed to assist in that process and a mutually consistent set of criteria that will be used as a planning basis for protective action decisions. Next we review the adequacy of the evacuation time estimate prepared for Licensee to be used by all response groups as a planning and implementation tool. The third part of this section deals with the manner in which a range of contingencies will be handled, both in the protective action decisionmaking process and during an actual emergency. The final issue addressed in this section is an objection raised to a particular ingestion pathway protective action guide.

- ANGRY Contention EP-4(H): RG 1.101 Sec. 6.4 requires the licensee to specify "criteria for implementing protective actions . . ." The Licensee's EP fails to set forth the following mandatory items of information regarding the time required for protective action implementation:
1. Expected accident assessment time. RG 1.70; Sec. 13.3.1-2.

2. Time required to warn persons at risk. RG 1.101, Sec. 6.4.1-2(b); RG 1.70, Sec. 13.3.1-3, 4.
3. Time required for a general evacuation. RG 1.70, Sec. 13.3.1-5, 6; November 29, 1979 letter to "All Power Reactor Licensees" from Brian K. Grimes, Director, NRC Emergency Preparedness Task Group.
4. Time required to evacuate special facilities (e.g., hospitals). November 29, 1979 letter, supra.

See N. 0654 J8.

ANGRY Contention EP-5(E):

There is no reasonable assurance that appropriate protective measures will be taken in the event of a nuclear accident with offsite radiological consequences for the following reasons:

1. The Commonwealth's criteria for appropriate protective action choice, as set forth in Sec VIII of its BORP plan, are inconsistent with those of the Licensee (EP, p. 6-13). According to the Licensee evacuation is the appropriate protective action if dose projections approach the lower limits of EPA PAGs. According to BORP this would not be the case unless the upper limits of the PAGs were approached. Although the Licensee indicates that sheltering is the appropriate choice for atmospheric releases of short duration, the BORP plan proposes evacuation for "sudden severe accidents." The Licensee would

not recommend evacuation in the event of a continuous release if "evacuation cannot be well underway prior to plume arrival," while BORP would order an evacuation in such a case regardless of wind speed and warning time.

2. The BORP plan fails to quantify protective action selection criteria such as "time to onset of release . . . time required to effect relocation," and the definition of "puff release." Such quantification of criteria is a necessary ingredient in effective planning and is required by N. 0654 Sec. J10(m).
3. The Commonwealth does not comprehend the distinction between "core-melt" and "melt-through" accidents as those terms are employed in NUREG CR-1131.
4. The Commonwealth declines to employ "state-of-the-art" calculational methodology, as set forth in EPA 520/1-78-001B, in turn referenced in N. 0654 at p. 55, n.1(3), in conjunction with hypothetical accident release characteristics to assist it in making appropriate protective action selection.
5. The Commonwealth's discussion of the sheltering option is inadequate in that it fails to emphasize the importance of the use of building basements (see NUREG CR-1131) or of ventilating the shelter at

the appropriate time (see WASH 1400, App. VI, Sec. 11.1.2) as means to maximize the effectiveness of this measure. This inadequacy is carried through to instructions to be provided the public as set forth in county plans.

ANGRY Contention EP-5(B):

The Emergency Planning Review Guidelines require state/local plans to designate "protective action guides and/or other criteria for implementing specific protective actions . . ." (Sec. IV(B)(1); emphasis added) and "information needs" for implementing such protective actions (Sec. IV(B)(2)). The BORP Plan both fails to explicitly impose upon the Licensee clear responsibility for fulfilling such information needs or, where required, to undertake to satisfy them at its own initiative.

1. Section VIII(A) of the BORP Plan indicates "time to onset of release" as a significant factor in determining the appropriateness of recommending evacuation. However, nowhere is the Licensee given explicit responsibility for providing such information, nor does the Plan contain an analysis of how variation of this factor will affect the choice of appropriate protective action. See, e.g., NUREG 0610, p. 13, par. 4(c).
2. A second factor listed is "time required to effect relocation." NUREG 75/111, Sec. J(6) requires an adequate state plan to include

development of "bases and time frames for evacuation" resulting in "estimates of the time required to carry out evacuation procedures" that reflect consideration of such factors as "impaired mobility of parts of the population" (Sec. J(7)(c)) and "potential impediments to use of egress routes, such as rush hour traffic and inclement weather" (Sec. J(7)(f)). The availability of this and other information specified by the President's Commission is an essential prerequisite to adequate emergency planning and decisionmaking whether or not in the context of an actual emergency situation. See also, N. 0654, Section j(10) (k; note requirement for specification of "contingency measures"), (l) & (m).

242. These three contentions deal with the general criteria used in the protective action decisionmaking process. The Board observes that, in our view, the contentions are needlessly complex and overlapping. This tends to obfuscate the issues in controversy and makes responding to the contention unnecessarily difficult. We also note that, with the exception of NUREG-0654, none of the regulatory criteria identified in the contentions were made a part of the record. Nor are the criteria described in those documents the currently applicable guidance. Thus, we have ignored references to Regulatory Guides 1.101 and 1.70, NUREG-75/111 and -0610, and

to the Emergency Planning Review Guidelines, all of which have been superseded by later regulatory guidance. See Chesnut, ff. Tr. 15007, at 46. This does not mean that we have ignored the thrust of Contentions EP-4(H), EP-5(E), and EP-5(B). We have reviewed the contentions and identified two principal issues which we address seriatim.

243. The first issue relates to the adequacy of information available to Licensee and the Commonwealth which may be needed during the protective action decisionmaking process. With respect to "expected accident assessment time," neither the new emergency planning rule nor NUREG-0654 requires licensees to specify the expected times to assess accidents. What is required is that a licensee's emergency plan provide for prompt accident classification and assessment using a standard four-level classification system based on predetermined plant parameters which are indicative of the seriousness of the accident. Chesnut, ff. Tr. 15007, at 46-47. We already have found that Licensee complies with this objective. See Section II.B, supra. Furthermore, Licensee is of the opinion that it could assess and declare an accident within 10 minutes. Rogan, et al., ff. Tr. 13756, at 18. While there was considerable cross-examination about the individual elements which comprise this 10-minute estimate, we believe such inquiry misses the important point -- i.e., that Licensee does in fact have in place a system for promptly assessing and declaring

accidents. The concerns raised about the 10-minute estimate do not in the Board's view put into question either the adequacy of Licensee's system to assess and declare accidents or the promptness with which such assessments will be made.

244. Similarly, current NRC Staff guidance does not expressly require a licensee to identify the estimated "time to onset of release." Nonetheless, an estimate of such time obviously is important during any emergency. Licensee has developed an "Emergency Status Report" checklist which summarizes the key plan parameters and information necessary to assess the radiological impact of the emergency. The checklist contains information on the nature of the emergency, the status of emergency safeguards systems, and information on radiological releases (i.e., source terms, meteorology, anticipated duration of releases and projected doses). The information on this checklist is communicated to BRP during BRP's initial contact with the plant. Rogan, et al., ff. Tr. 13756, at 89; Chesnut and Bath, ff. Tr. 19626, at 4. Although the Emergency Plan does not call for providing the estimated "time to onset of release" per se, the Board finds that the detailed information regarding plant conditions and radiological release characteristics provided to BRP is adequate to assure that all necessary information is available to BRP. Chesnut and Bath, ff. Tr. 19626, at 4-5. Margaret Reilly, BRP's chief of the division of environmental radiation, testified that BRP would

ask for any information it believed necessary, and was confident that Licensee would satisfy these needs. Reilly, ff. Tr. 18125, at 4. The in-place dedicated Radiological Line is adequate to ensure that such information can be communicated promptly between Licensee and BRP. See Rogan, et al., ff. Tr. 13756, at 60-61; see also Section II.C, supra.

245. Current emergency planning guidance also does not require that the "time required to warn persons at risk" be included in the Emergency Plan. Chesnut, ff. Tr. at 15007, at 47. The new emergency planning rule does require that licensees "have the capability to notify responsible state and local governmental agencies within 15 minutes after declaring an emergency." 10 C.F.R. Part 50, Appendix E, § IV.D.3. The Board already has reviewed the adequacy of Licensee's initial notification capabilities and found them to be in compliance with the rule. See Section II.C, supra. The emergency planning rule also requires that:

By July 1, 1981, the nuclear power reactor licensee shall demonstrate that administrative and physical means have been established for alerting and providing prompt instructions to the public within the plume exposure pathway EPZ. The design objective shall be to have the capability to essentially complete the initial notification of the public within the plume exposure pathway EPZ within about 15 minutes. [10 C.F.R. Part 50, Appendix E, § IV.D.3.]

The Board has reviewed Licensee's compliance with this requirement and found it acceptable. See Section II.D, supra. With these capabilities in place, the Board concludes that all emergency response organizations have adequate knowledge as to the "time required to warn persons at risk."

246. These contentions also allege that the "time required for a general evacuation" is unknown. We address this concern in considerable detail in the next part of this section. See ¶¶ 254-68, infra.

247. The second principal issue raised by these contentions is the adequacy of the general criteria that the Commonwealth uses in making protective action decisions. Subparagraph 1 of Contention EP-5(E) alleges that the Commonwealth's criteria for protective action choice are inconsistent with those of Licensee. The Commonwealth's criteria are set forth in Section VIII of the BRP Appendix to the state emergency response plan. Pa. Ex. 2(a), Appendix 8, § VIII. Criteria to be used by Licensee's Emergency Director or Emergency Support Director in making protective action recommendations to BRP are set forth in Chapter 6 of Licensee's Emergency Plan. Lic. Ex. 30, § 4.6.5.1.2, at p. 6-14. The Board has compared these criteria, and, while BRP's contains additional guidance, we perceive no conflict between the two sets of criteria. See also Reilly, ff. Tr. 18125, at 5-6; Bath and Adler-1, ff. Tr. 18975, at 8-9. Moreover, the various

criteria merely provide a planning basis from which to initiate protective action decisionmaking. Reilly, ff. Tr. 18125, at 5. Actual conditions will dictate the protective actions eventually implemented.

248. Subparagraph 2 of Contention EP-5(E) asserts that various protective action criteria have not been properly quantified. This is untrue. Specific criteria used by BRP in recommending protective action options include: whether "[r]elease time is expected to be long (greater than 2 hours)", whether the "[e]vacuation could be well underway before plume arrival, based on wind speed and travel conditions", and whether "[t]he combination of warning time, plume arrival time and release time are not long enough to effectuate evacuation." Pa. Ex. 2(a), Appendix 8, § VIII. Beyond this, BRP purposely has not sought to quantify protective action criteria. Rather, BRP prefers to consider a range of factors that are relevant to the decisionmaking process. Their concern is that adherence to a rigid set of selection criteria would or could lead to decisions being made without full consideration of all relevant factors. Bath and Adler-1, ff. Tr. 18975, at 9. The Board finds no need for quantification of selection criteria beyond that already set forth by BRP and does not read NUREG-0654, § 1I.J.10.m, as recommending such specification. See Staff Ex. 7, at 64.

249. Contrary to the claim of Contention EP-5E(3), it is clear to the Board that the Commonwealth does understand the difference between a "core-melt" and a "melt-through" accident. Reilly, ff. Tr. 18125, at 7; see also Bath and Adler-1, ff. Tr. 18975, at 10-11.

250. Subparagraph 4 of Contention EP-5(E) argues that the Commonwealth has improperly failed to employ a calculational technique described in an EPA document.⁵⁷ The referenced EPA document is cited in NUREG-0654 as one of three reports that "may be considered" in making protective action decisions. Staff Ex. 7, at 64, n.2; Bath and Adler-1, ff. Tr. 18975, at 11. It is clear from the Commonwealth's testimony that they are familiar with the contents of the document but have made a conscious decision not to use the particular calculational technique described therein. Reilly, ff. Tr. 18125, at 7-8. Their objections are similar to those we already have described (see ¶ 248, supra), and the Board sees no reason to overrule that decision. Id.; see also Bath and Adler-1, ff. Tr. 18975, at 11.

251. Subparagraph 5 of Contention EP-5(E) alleges that the consideration given by the Commonwealth and counties to the sheltering option is inadequate because it fails to discuss the use of building basements and ventilation techniques as means

57 The EPA document cited in Contention EP-5(E)(4) has not been made a part of the record in this proceeding.

to minimize exposure. In passing on this contention, the relevant inquiry is not the discussion of sheltering included in the BRP plan, see Pa. Ex. 2(a), Appendix 8, § VIII.B, but the information about sheltering included in the predistributed educational material and the EBS announcements. The PEMA pamphlet on radiological accidents includes an extended discussion of the sheltering option, see Pa. Ex. 3, at 7-10, although it does not mention basement sheltering or ventilation techniques. The county brochures each contain a small section on the basic principles of sheltering, see Pa. Ex. 4-5, and the preplanned EBS messages in the county plans include an advisory on sheltering that refers to the county brochures. See, e.g., Board Ex. 8, at F-4 to F-5. None of this material mentions either basement sheltering or ventilation techniques.

252. The Commonwealth's witness on this subject explains the absence of material on basement sheltering and ventilation techniques by observing that the recommendation to shelter is based on the nature of the accident as it develops and not on the shielding and ventilation worth of the building. Reilly, ff. Tr. 18125, at 9; see also Bath and Adler-1, ff. Tr. 18975, at 40-41. The Commonwealth is also of the view that the use of basement sheltering and ventilation techniques represents too high a degree of sophistication to prudently assume that the general public will have the physical facilities to implement such strategies. Reilly, ff. Tr. 18125, at 8. In any event,

if such strategies were warranted during a particular emergency, the means to implement them could be communicated to the public over the EBS at the time of the emergency. Bath and Adler-1, ff. Tr. 18975, at 41. The Board finds that there is no reason to fault the Commonwealth for failing to describe basement sheltering and ventilation techniques.

253. We therefore conclude that the general criteria used by Licensee and the Commonwealth in the protective action decisionmaking process provide reasonable assurance that the public health and safety will be protected.

Newberry Contention EP-14(KK): The York County Plan contains no time sequence for the removal of the exposed at-risk population. There is only assumption that there would be adequate time in which to remove all individuals; however, there is no estimate as to the number of hours that would be required to effect a selective evacuation or a general evacuation. Moreover, there is attached to the York County Plan an estimate of the number of vehicles per hour that could be handled by various major arteries and access roads; however, there appears to be a conflict in the estimates in that urban roads with parking are estimated to handle at least 1,700 cars per hour whereas major arteries could only handle 1,300 per hour and it is submitted that such a gross distortion renders the Plan deficient. Furthermore, there is absolutely no hard-core statistical data to back up the calculations relied upon in the York County Plan.

Newberry Contention EP-14(HH): The York County Plan has no provision in its population calculations for periods of time during the day when most people are working and outside of the area, during the day when there may be an increase in population because of industries located within the areas, or during summer periods when many individuals may be on vacation or there would be an influx of individuals coming into the area to vacation. Without that type of population differential tables, it is Intervenor's contention that the Plan is deficient.

Newberry Contention EP-14(MM): The York County Plan does not state how many businesses are located in risk areas and what the population of those businesses are during working hours. Without this information, it would be impossible to determine the number of hours that would be required to effect a general evacuation in the event one was ordered. Therefore, it is Intervenor's position that the Plan remains defective.

Newberry Contention EP-14(DD): The Evacuation Plan contained in the York County Plan does not contain any sensitivity analysis or differentiation between the time of day, the seasons of the year or weather conditions at the time of the evacuation. In light of these deficiencies, it is Intervenor's contention that the Plan is deficient.

Newberry Contention EP-16(P): The Dauphin County Plan as set forth does not provide for differentiation of time of day or seasons or weather conditions at the time of the evacuation. There is no sensitivity analysis as to these factors, and the

Plan is based upon an assumption of best-case analysis. Therefore, it is Intervenor's position that without taking these factors into consideration, the Plan remains deficient as concerns the time needed to effect an evacuation.

254. Newberry Contentions EP-14(KK), EP-14(HH), EP-14(MM), EP-14(DD) and EP-16(P) generally challenge the adequacy of evacuation time estimates in the York and Dauphin County plans, and certain assumptions asserted to underlie those estimates. Since the contentions were drafted, a detailed evacuation time study for the TMI plume exposure pathway EPZ has been prepared for Licensee. See Lic. Ex. 52. Thus, the actual litigation of these contentions focused heavily on Licensee's evacuation time study. The Board first reviews that study, and the use being made of that study. We then proceed to address the specific allegations of Newberry's contentions.

255. In NUREG-0654, the NRC Staff and FEMA call upon power plant licensees and state and local emergency management agencies to include in their emergency response plans time estimates for evacuation of the population within the plume exposure pathway EPZ. The methodology for preparation of the evacuation time estimates is specified in Appendix 4 to NUREG-0654. Lic. Ex. 52, at 1; see Staff Ex. 7, at 61, 63 (criteria J.8 and J.10.1), and Appendix 4. Appendix 4

discusses several elements which the NRC and FEMA believe should be included in evacuation time studies. The considerations include: (a) an accounting for permanent, transient, and special facility populations in the plume exposure pathway EPZ; (b) an indication of the traffic analysis method and the method of arriving at road capacities; (c) a consideration of a range of evacuation scenarios generally representative of normal through adverse evacuation conditions; (d) consideration of confirmation of evacuation; (e) identification of critical links and need for traffic control; and (f) use of specified methodology and traffic flow modeling techniques for various time estimates. Urbanik, ff. Tr. 19137, at 3.

256. The evacuation time estimates are for use by emergency response personnel charged with recommending and deciding on protective actions during an emergency. Staff Ex. 7, at p. 4-1. The time estimates provide emergency response decisionmakers with additional information on which to base a decision as to the feasibility of evacuation. Tr. at 15016 (Chesnut); Tr. at 15041 (Grimes); Urbanik, ff. Tr. 19137, at 6.

257. Licensee requested the engineering firm of Parsons, Brinckerhoff, Quade & Douglas, Inc., to prepare an evacuation time estimate for the TMI plume exposure pathway EPZ which would conform to the guidance of NUREG-0654, Appendix 4. Podwal, et al., ff. Tr. 17410, at 1. The report which was prepared, "Evacuation Time Estimates for the Plume Exposure

Pathway EPZ at Three Mile Island Nuclear Generating Facilities," used a volume/capacity analysis, on a roadway link basis, to determine critical roadway segments under various evacuation scenarios. A computer program was used in the analysis to count vehicles on evacuation routes and to determine volume-to-capacity ratios. The method used to compute total evacuation time was a sequential method, consistent with one of two acceptable approaches identified in NUREG-0654.

258. Detailed population estimates were made for permanent residents, transients, and special facility residents. The permanent population estimates are based on preliminary 1980 census data. A variety of data sources were used to estimate transient and special facility populations. Population figures were then converted to estimates of the number of evacuating vehicles. Permanent residents were apportioned to vehicles based on the number of automobiles available for evacuation, resulting in an average of less than two persons per vehicle. Transient population figures were converted to evacuating vehicles based on assumed occupancy rates, except for transient employees, for which vehicle estimates are based on survey data. Non-auto evacuation times are based on utilization of identified buses in close proximity to the plume exposure pathway EPZ. Multiple trips would be necessary to evacuate some special populations; the time

required would be dependent on the effectiveness of the deployment of available resources.⁵⁸ Urbanik, ff. Tr. 19137, at 5.

259. The capacity analysis in Licensee's evacuation time study is based on a capacity range. The lower bound (i.e., lowest time estimate) reflects an upper limit on capacity. The upper bound provides a reasonable estimate of increased time due to a number of variables, including less than optimal state of readiness and less than ideal capacity. This upper bound provides protective action decisionmakers with a useable mechanism for accounting for existing conditions at the time of an actual evacuation. Urbanik, ff. Tr. 19137, at 5.

260. Licensee's evacuation time estimates are based on three scenarios -- normal conditions (daytime populations), adverse weather (snow), and night (when total populations are lower, and family units together). The evacuation time study thus considers a range of evacuation scenarios representative of normal through adverse evacuation conditions, generally reflective of the type of conditions that might be expected to exist in an actual evacuation.⁵⁹ Urbanik, ff. Tr. 19137, at 5.

58 In Sections II.G.6 through II.G.9, infra, the Board discusses in detail the general coordination of transportation in an evacuation, as well as provisions for the transportation of school children, individuals without private transportation, and invalids and homebounds.

59 Mr. Urbanik expressed concern that Licensee's evacuation time study gave no indication that rain conditions had been (footnote continued on next page)

Licensee will consider the evacuation time estimates in making protective action recommendations to offsite authorities. Staff Ex. 23, at II-7 to II-8.

261. A consultant to the NRC Staff reviewed Licensee's evacuation time estimate study, and concluded that the study is responsive to and in compliance with NUREG-0654, and that the estimates generated delineate a reasonable range of times required to evacuate the TMI plume exposure pathway EPZ. Urbanik, ff. Tr. 19137, at 6; Staff Ex. 23, at II-8. Based on that evaluation, the Staff found that Licensee's evacuation time estimate study meets the criteria and the intent of NUREG-0654 and is acceptable. Staff Ex. 23, at II-8. FEMA also has reviewed Licensee's evacuation time estimate study, and has determined that it is an acceptable study. Tr. at 19027-28 (Adler); Tr. at 22921 (Chesnut).

262. A detailed study such as Licensee's evacuation time estimate must necessarily be based on some assumptions. Tr. at

(continued)

considered, since he believed that an adverse weather scenario of rain in combination with normal daytime populations might increase the adverse weather scenario time estimate. Urbanik, ff. Tr. 19137, at 6; Tr. at 19172-73 (Urbanik). However, one of the engineers who prepared the study for Licensee explained that, while there might be a reduction in driving speed under rain conditions, the impact of any such reduction in speed would not be greater than the reductions in road capacity attendant to snow. Thus, the evacuation time estimate for a scenario of rain with the normal daytime population would not be higher than that for the early morning snow adverse weather scenario used in Licensee's study. Tr. at 17934 (Schaufler).

19179 (Urbanik). The litigation of this issue included extensive cross-examination on those assumptions. The Staff's consultant, who reviewed Licensee's study, concluded that the assumptions included in that study are reasonable. Tr. at 19150-51, 19158-59, 19179 (Urbanik). It is not necessary that the assumptions on which the evacuation time study is based be completely consistent with the actual provisions of the state and county plans. Tr. at 19174 (Urbanik); Tr. at 19331-32 (Adler). In fact, one purpose of an evacuation time study is to assess the need for additional traffic control points and evacuation routes. Tr. at 15040-41 (Chesnut); Urbanik, ff. Tr. 19137, at 6; Tr. at 19188-89 (Urbanik); Tr. at 19451-52 (Adler); see Staff Ex. 7, at 4-5 and 4-10. However, state and local emergency management personnel must reconcile any significant differences between the plans and Licensee's evacuation time estimate study by accounting for those differences when making use of the study for protective action decisionmaking. Tr. at 19331-33 (Adler/Bath); Staff Ex. 23, at II-8.

263. The Commonwealth has reviewed Licensee's evacuation time estimate, and considers it "one of the best ever written" in the area. Tr. at 17846-47, 17975 (Lothrop); see also Tr. at 20853-54 (Belser). While there were at one point some differences to be resolved between the state and Licensee with respect to the evacuation time study, Tr. at 17975-76

(Lothrop), PEMA has now adopted the upper time limits of Licensee's evacuation time study, and is using the study as an adjunct to its planning effort. Tr. at 22360-61 (Bath); Staff Ex. 21, item J; Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, items 2 and 13. In fact, PEMA used the upper bounds of Licensee's evacuation time study in making protective action decisions in the course of the June 2, 1981 exercise. Tr. at 22361 (Bath). FEMA believes that the Commonwealth's planned use of Licensee's evacuation time estimate study, with the state's evacuation planning, will provide the Commonwealth with an adequate basis for determining protective actions in an emergency. Tr. at 22362 (Bath).

264. The Commonwealth intends to incorporate the time estimates and routing analysis of Licensee's evacuation time study into the county plans, where appropriate. Staff Ex. 21, item J; Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, item 13. Since protective action decisionmaking is a Commonwealth function, and since county plans state that they will rely on the Commonwealth to provide protective action recommendations, FEMA reviewed the use made of Licensee's evacuation time study at the state level. Tr. at 22363-65, 22370 (Bath). In the interim, until the county plans are modified to incorporate appropriate parts of Licensee's evacuation time study, the Commonwealth's use of the evacuation time study satisfies NUREG-0654 considerations

for county level planning. See generally Tr. at 22369-70 (Bath); Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, item 2. In any event, the county emergency management coordinators have been provided with copies of Licensee's evacuation time study, and the study is acknowledged in the current county plans. Tr. at 17924 (Rogers); Board Ex. 5, at H-7; Board Ex. 6, at E-10; Board Ex. 7, at E-7; Board Ex. 8, at M-20; Board Ex. 9, at M-6.

265. The Board finds that Licensee's evacuation time estimate study was prepared in accordance with Appendix 4 to NUREG-0654 and provides reasonable estimates of the time necessary to evacuate the population within the TMI plume exposure pathway EP2. Its use by Licensee, the Commonwealth and the risk counties satisfies the applicable NUREG-0654 criteria, and provides those responsible for recommending and implementing protective actions with a clear basis for evaluating various protective action options and reaching a decision.

266. The Board now turns to the specific allegations of Newberry's contentions on this general subject. Newberry Contention EP-14(KK) alleges, in part, that the York County plan includes no evacuation time estimate, only an assumption that there would be adequate time to implement an evacuation. Newberry Contentions EP-14(HH) and EP-14(MM) further assert that the York County plan is defective in that the population

calculations used therein do not reflect daily fluctuations (due to transient employees) and seasonal fluctuations (due to vacationers). Newberry Contentions EP-14(DD) and EP-16(P) generally allege that the York and Dauphin County plans, respectively, fail to reflect consideration of variables such as the time of day, season of the year, and weather at the time of an evacuation.

267. As the Board has previously noted, copies of Licensee's evacuation time estimate study have been provided to all five risk county emergency management agencies, and the study is acknowledged in the current county plans. See ¶ 264, supra. That study does reflect both transient and permanent populations, and considers a range of evacuation scenarios. See ¶¶ 258-60, supra. Though future modifications to the county plans will explicitly incorporate material from Licensee's evacuation time study, FEMA recognizes that the present evacuation plans of the Commonwealth and the five counties are implementable. Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, item 13. We therefore find that these contentions have been essentially resolved by the recognition of Licensee's study by the Commonwealth and the counties, and accordingly reject Newberry Contentions EP-14(HH), EP-14(MM), EP-14(DD) and EP-16(P), as well as that portion of EP-14(KK) which asserts that the York County plan includes no evacuation time estimate.

268. Newberry Contention EP-14(KK) also alleges that there is a conflict in the estimates of road capacity included in the York County plan since "urban roads with parking" have a listed capacity of 1700 vehicles per hour, whereas "major arteries" are listed at only 1300 vehicles per hour. As the Commonwealth explained, the reference to "major arteries" is listed under "Rural Roads" and refers to a 12-foot wide lane, while the "Urban Roads" reference is to a 30-foot wide one-way road, with parking. It is logical that the wider one-way road would have a greater traffic capacity. Lothrop, ff. Tr. 17996, at 5; Adler and Bath-2, ff. Tr. 18975, at 7. The Board therefore rejects that part of EP-14(KK).

269. The Board next considers three Newberry contentions which allege that evacuation planning has failed to consider various specified contingencies. We examine Newberry's allegations below.

Newberry Contention EP-14(NN): As a general overall comment, evacuation routes as set forth are not wind-dependent, and therefore, in the event of an evacuation, wind direction is a factor that would be required to be taken into consideration in order to formulate an effective evacuation plan. The Plan as set forth does not provide for this factor and, as such, persons evacuating the evacuation areas may be directed into a potentially more hazardous situation in the manner in which they are routed.

Newberry Contention EP-14(U): Annex H of the York County Plan provides in its general concept of operations that evacuation routings would be inherently dependent upon climatic conditions, time factors involved, etc. The Plan also provides that residents would be evacuated on major interstates and state highways. There is no mention as to the condition of the access roads to these major arteries and it is submitted that evacuation generally is dependent upon climatic conditions and the conditions of the access roads within the individual townships and local communities. Access roads within Newberry Township vary from a 20 to a 26-foot width and it is Intervenor's contention that in the event of an evacuation, traffic flow on these access roads could quickly become terminated as a result of the vehicles running out of gas or being involved in auto accidents for which there would be no way in which to remedy the situation. Moreover, in ice and snow conditions, it is submitted that these access roads which are located in generally hilly areas would be generally impassable and, therefore, there would be no access to the evacuation routes. Until and unless the evacuation plan provides for a means to assure that access roads will be passable during a general evacuation, it is submitted that the Plan is deficient.

Newberry Contention EP-16(N): The Dauphin County Plan does not specifically state how the following occurrences would be dealt with in the event of an evacuation:

1. Accidents on the highways;
2. Cars running out of gas;
3. Generally disabled vehicles;
and
4. Individuals who need ambulance service for removal from accidents.

The Plan does not state whether gas stations will be mandatorily required to be open in order to meet the demands of the evacuating public.

Finally, the Plan seems to assume that the best of all atmospheric and weather conditions would exist at the time of the evacuation. What would take place in the event of a snowstorm and how would that affect the evacuation? What would be done in order to clear the roads? These are all questions that have to be considered and are necessary to be considered in a total evacuation plan and the location and placement of staging areas.

270. Newberry Contention EP-14(NN) asserts that wind direction is a factor which must be considered in the formulation of evacuation plans, so that evacuees are not routed into the pathway of the plume.

271. The evacuation routes set forth in the various emergency plans are -- by design -- not wind dependent. The Commonwealth does not contemplate an evacuation by sector within ten miles of a nuclear facility. In light of the

Commonwealth's experience during the TMI-2 accident, when wind shifts of 180 degrees occurred, the Commonwealth plans a 360 degree evacuation. Lothrop, ff. Tr. 17996, at 5. Nor does NUREG-0654, Appendix 4 require that wind direction be considered in determination of evacuation routes. However, NUREG-0654 planning standard J.10 provides that wind direction shall be considered in determining appropriate protective action measures. BRP will consider wind direction and wind speed in its choice of protective actions. In an evacuation, the Commonwealth plans to utilize the best and fastest routes to get people out of the plume exposure pathway EPZ, and it is BRP's job to determine when it is dose-effective to do so. Adler and Bath-2, ff. Tr. 18975, at 8. Moreover, resources and emergency forces would be directed to concentrate in the direction perceived to be at greatest risk in the event of an emergency at TMI, as the situation permits. Lothrop, ff. Tr. 17996, at 5. Accordingly, the Board rejects Newberry Contention EP-14(NN).

272. Newberry Contentions EP-14(U) and EP-16(NN) generally allege that the York and Dauphin County Plans, respectively, are deficient in that they do not provide assurance that roads will be passable in an evacuation -- specifically, not rendered impassable by ice and snow, and not blocked by vehicles which have run out of gas or vehicles which have been involved in accidents or are otherwise disabled. Similarly,

Contention EP-16(NN) further alleges that the Dauphin County Plan is deficient in its failure to state how individuals needing ambulance service for removal from accidents will be cared for, and whether gas stations will be required to be open to meet the demands of the evacuating public.

273. NUREC-0654, criterion J.10.m specifies development of procedures that allow for choice of recommended protective action based upon factors such as plant conditions, direct and inhalation exposure, climatic conditions, and evacuation time estimates. BRP has written procedures to meet these criteria, see ¶¶ 247-52, supra, and Licensee's evacuation time estimate study, see ¶¶ 254-68, supra, considered factors such as the condition of local access roads, the time required to drive from individual homes to primary evacuation routes, and the potential blockage of routes (for whatever reason), as well as adverse weather conditions (specifically, snow). Adler and Bath-2, ff. Tr. 18975, at 55. See generally Lic. Ex. 52, especially at 45-46, 55, 60, 71-72. PEMA has adopted the upper time limits of Licensee's evacuation time study, and is using the study as an adjunct to its evacuation planning effort. Tr. at 22360-61 (Bath); Staff Ex. 21, item J; Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, item 2. Thus, contingencies such as those enumerated by Newberry in its Contentions EP-14(U) and EP-16(NN) are being planned for, have been considered in Licensee's evacuation time study, and

will be considered in the protective action decisionmaking process in the event of an actual emergency.

274. Moreover, planning efforts have specifically focused on each of the asserted contingencies, so that emergency management personnel will be prepared to address each of the listed conditions in the context of an evacuation. For example, the Commonwealth's emergency response plan provides that the Department of Transportation ("PennDOT") will, inter alia:

- a. Coordinate with PEMA and the PSP [Pennsylvania State Police] in the development and continuing analyses of projected traffic flow and road/highway capacities and the selection of major evacuation routes, traffic control points and reception centers for evacuees. This includes consideration of potential restrictions to the use of major routes, i.e., landslides, snow and adverse weather, provisions for clearing these restrictions, and the identification of alternate evacuation routes.
- b. In coordination with the PSP, conduct traffic surveillance to ensure that roads and highways designated as major evacuation routes are open and capable of handling the projected and actual traffic loads. Keep PEMA advised of proposed changes or rerouting of the traffic flow.
- c. Provide for the clearance of obstacles (i.e., landslides, snow, wrecked or stalled vehicles) to traffic flow on main evacuation routes. This effort may be augmented by National Guard equipment and operating personnel, when available.
- d. In coordination with the National Guard, establish emergency fuel distribution points on main evacuation routes.

Pa. Ex. 2(a), at 24-25.

275. PennDOT estimates that it would take approximately four hours after a snow storm to plow all major routes. This estimate was factored into Licensee's evacuation time estimate study. Licensee Ex. 52, at 60. In the event that an emergency should occur concurrent with a snow storm, the Commonwealth would begin to snowplow routes, while continually assessing the situation so that the status of preparedness to effect an evacuation can be realistically incorporated into the protective action decisionmaking process. FEMA believes that the provisions for command and control interface between the Commonwealth (PEMA) and the counties demonstrate an ability to accomplish this. Bath and Adler-1, ff. Tr. 18975, at 13-14.

276. We discuss the provisions for availability of tow trucks and gasoline for evacuating vehicles in detail in Section II.G.5, infra. Suffice it to say here that necessary provisions have been made for these services. We are mindful, in considering Newberry's contentions, that vehicles need not have full tanks of gas in an emergency, but rather need only enough gasoline to exit the plume exposure pathway EPZ. FEMA's collective institutional experience with emergency evacuations has been that neither cars running out of fuel nor traffic accidents have precluded successful evacuations in the past. Tr. at 19396 (Bath/Adler).

277. As to the allegation that the Dauphin County plan fails to provide for ambulance service for individuals injured

in traffic accidents, Annex K, "Medical Support," to the Dauphin County plan provides that, in an evacuation, Dauphin County ambulance services within the plume exposure pathway EPZ will maintain service to their normal service areas for emergencies (such as traffic accidents). Only those ambulances not necessary for emergency coverage would assist in the evacuation of hospitals, nursing homes, and non-ambulatory and ambulatory persons requiring medical attention. See Board Ex. 6, at K-2, K-16.

278. Based on the discussion above, including our references to other sections of this Recommended Decision, the Board finds that adequate consideration has been given to planning for the contingencies identified in Newberry Contentions EP-14(U) and EP-16(NN) and, accordingly, we reject those contentions.

ECNP Contention EP-11:

The BRP plan (Appendix 8) relies on the infant thyroid dose (1.5 rem) as the dose from milk ingestion to be avoided (p. IX-4). This does not take into account the fetus, whose sensitivity may greatly exceed that of the infant. In addition, the value of 1.5 rem to the thyroid from milk ingestion does not take into account the inhalation exposure.

279. This contention alleges that the PAG of 1.5 rem to the infant thyroid as the dose to be avoided from milk

ingestion fails to account for the fetus, whose sensitivity is asserted to be greater than the infant, and also fails to take into account exposure from the inhalation pathway. In support of this contention intervenor ECNP presented direct testimony by Dr. Bruce Molholt, ff. Tr. 19690. In the course of his testimony, Dr. Molholt raised various issues that are only tangentially related to Contention EP-11. For convenience, we resolve all remaining issues raised by Dr. Molholt in this section of our Recommended Decision. See also n.26, supra.

280. The principles underlying the PAG concept are set forth in an Environmental Protection Agency ("EPA") publication, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents", EPA-520/1-75-001 (September 1975, revised June 1979, February 1980). PAG's are the projected radiological dose or dose commitment values to individuals in the general population and to emergency workers that warrant protective action before or after a release of radioactive material. Lic. Ex. 30, at § 4.1.1.42. Under this concept, protective actions would be warranted provided the reduction in individual dose expected to be achieved by carrying out the protective action is not offset by excessive risks to individual safety in taking the protective action. Id.; Rogan, et al., ff. Tr. 13756, at 73-74; Chesnut, ff. Tr. 15007, at 7-8, 11-13; Tr. at 19691. Numerical PAG's for exposure to airborne radioactive materials have been

recommended by EPA, and similar limits for exposure due to ingestion of contaminated foodstuffs and water have been recommended by the Food and Drug Administration ("FDA"). Rogan, et al., ff. Tr. 13756, at 74 and Table 3.

281. The EPA and FDA recommendations have been adopted by BRP as a planning basis for protective action decisionmaking. See Pa. Ex. 2(a), Appendix 8, §§ V, IX.D & IX.F. Contention EP-11 challenges the adequacy of one of the recommended PAG's. The PAG in question is set forth in an FDA document entitled, "Accidental Radioactive Contamination of Human and Animal Feeds and Potassium Iodide as a Thyroid-Blocking Agent in a Radiation Emergency", and published in the December 15, 1978 Federal Register, 43 Fed. Reg. 58790. Peterson, ff. Tr. 20500, at 2; Tr. at 19692. The FDA document suggests a Preventive PAG of 1.5 rem projected dose commitment to the thyroid, with a newborn infant designated as the critical segment of the population. Peterson, ff. Tr. 20500, at 2; Rogan, et al., ff. Tr. 13756, at Table 3.

282. The thrust of Contention EP-11 is that the fetus, rather than the newborn infant, is the critical segment of the population, and therefore the PAG recommended by FDA is inadequate. This precise issue already has been addressed by FDA. In formulating its guidance, FDA considered whether the fetus should be considered the critical segment of the population for I-131 exposure. As indicated in the Federal Register notice:

6. One reviewer recommended that the fetus be considered the critically exposed population for iodine-131.

The Commissioner [the Commissioner of Food and Drugs] advises that the problem has been evaluated by several investigators (Refs. 3 and 4), who found that the newborn infant and not the fetus has the highest iodine-131 uptake per gram of thyroid tissue. The Commissioner believes this group should constitute the critical segment of the population.

Ref. 3: Dyer, N.C., and A.B. Brill, "Fetal Radiation Dose from Maternally Administered Fe-59 and I-131," AEC Symposium Series No. 17, p. 73, 1969.

Ref. 4: Evans, T.C., R.M. Kretzschmar, R.E. Hodges, and C.W. Song, "Radioiodine Uptake Studies of the Human Fetal Thyroid," Journal of Nuclear Medicine, 8:157-167, 1967.

On this basis, FDA determined that the newly born infant and not the fetus constitutes the critical segment of the population. Peterson, ff. Tr. 20500, at 3; Reilly, ff. Tr. 18125, at 10.

283. The Dyer and Brill study cited by FDA reports fetal thyroid dose per unit activity of radioiodine ingested by the mother to be between 0.7 and 5.9 rad to the fetus thyroid per microcurie ingested by the mother. The dose conversion factor for the infant currently used by the NRC in its licensing evaluations is 13.9 rads to the infant thyroid per microcurie of I-131 ingested by the infant. This indicates that the dose to the thyroid per unit radioiodine intake by ingestion ranges between factors of 2 to 20 times higher for the infant than for

the fetus. Thus, for the ingestion pathway the fetus is accounted for based on protective actions triggered by a more critical segment of the population -- i.e., the infant.

Peterson, ff. Tr. 20500, at 3-4

284. Dr. Molholt, who as we discuss below was of the view that the fetus represented the critical segment of the population, nonetheless agreed that the numerical comparison done by NRC witness Peterson, see ¶ 283, supra, was an appropriate method for quantifying whether the fetus or the newborn infant was the more critical segment of the population. Tr. at 19860-61 (Molholt). Given this admission by Dr. Molholt, the Board is at a loss to explain the position he adopted in this proceeding.

285. Our concerns with respect to Dr. Molholt's testimony, however, go substantially beyond this apparent inconsistency. The Board carefully observed Dr. Molholt during his two days of testimony. Tr. at 19682-20088. Given what the Board perceived to be Dr. Molholt's lack of background knowledge in the areas about which he testified,⁶⁰ the numerous instances

60 Dr. Molholt had not read all of the EPA Manual of Protection Action Guides, Tr. at 19691; had not seen the FDA Federal Register publication which established the PAG value that he questioned, Tr. at 19692; had not seen either of the two articles relied upon by the FDA in setting the PAG value that he questioned, Tr. at 19696-97; had not read an article by Book and Goldman on radioiodine exposure of the fetus thyroid, Tr. at 19697-98; had not seen the primary NCRP report on protection of the thyroid in the event of releases of
(footnote continued on next page)

where Dr. Molholt was factually inaccurate,⁶¹ and his general demeanor as a witness, the Board gives very little weight to Dr. Molholt's testimony. Indeed, we have substantial reservations about the accuracy of his testimony. Despite these reservations, we have reviewed his testimony, and we next set forth our views on that testimony.

286. Dr. Molholt testified that "[t]he developing fetus, depending upon the stage of gestation, may be 40 times as sensitive to I-131 as any of the childhood stages of thyroid development." Molholt, ff. Tr. 19690, at 2 (emphasis added). When asked for the basis of this statement, Dr. Molholt

(continued)

radioiodine, Tr. at 19698; did not know the proper units for expressing an atmospheric dispersion factor, Tr. at 19705; had not read more than two or three of the 50 to 75 papers relied upon by the Heidelberg Group in estimating maximum transfer factors, Tr. at 19743; and did not know the annual dose release design objectives of 10 C.F.R. Part 50, Appendix I, Tr. at 19720-21.

61 For example, Dr. Molholt referred to a "second" Heidelberg Report which allegedly was a "vast revision" of the original report, incorporating new atmospheric dispersion models. Tr. at 19701, 19727-28. However, when the "second" report was produced and reviewed by Dr. Molholt, he conceded that no substantial changes in approach or calculational technique were reflect in the "vast revision." Tr. at 19792-93. Dr. Molholt also identified an article by Book, et al., which he asserted demonstrated a synergistic effect between I-131 and I-132. Tr. at 19986. The article does not establish such a fact. Tr. at 20056. Similar inaccuracies occurred in Dr. Molholt's testimony with respect to an alleged windrose, see ¶ 293, infra, and a Millersville State College paper which allegedly establishes that milk monitoring after the TMI-2 accident was inadequate, see ¶ 300, infra.

responded by stating that he was "not sure from which document I retrieved that number." Tr. at 19865 (Molholt). Although a list of references was attached by Dr. Molholt to his testimony, support for this statement did not come from any of the references. Id. And, while Dr. Molholt indicated that support for the statement was in the "stack of reprints" he had with him, Tr. at 19865-66 (Molholt), at no time did Dr. Molholt come forward with the information. The Board therefore rejects Dr. Molholt's totally unsupported assertion that the fetus may be 40 times as sensitive to I-131 as any stage of childhood.

287. Dr. Molholt also testified that "[d]epending upon the stage of human fetal development (week of gestation), the human fetal thyroid gland is up to 200 times more sensitive to hypothyroidism induced by iodine-131 than the adult thyroid." Molholt, ff. Tr. 19690, at 12. Here too Dr. Molholt was unable to provide a reference to support his claim. Tr. at 19866 (Molholt). The Board therefore rejects this assertion.

288. When queried as to a minimum dose sufficient to induce hypothyroidism, Dr. Molholt testified that "16 micro-curries per gram of rat thyroid was adequate to induce clinical hypothyroidism." Tr. at 19936 (Molholt). Dr. Molholt converted this concentration to a delivered dose of 2 rads! Id. Not only is it clear that Dr. Molholt employed no scrutable methodology for performing this "calculation", Tr. at 19936-37 (Molholt), but the Board itself has done the calculation in a

traditional manner and arrived at a dose about three orders of magnitude higher than that calculated by Dr. Molholt. See Dr. Jordan's dose calculation, ff. Tr. 21304.⁶² The Board draws two significant conclusions from this disparity. First, the veracity of Dr. Molholt's testimony needs to be carefully reviewed in all cases. Second, if 16 microcuries per gram is in fact the minimum hypothyroid inducing dose, then there is absolutely no basis for Dr. Molholt's suggestion that the PAG in question be lowered from 1.5 rem to 150 mrem. See Molholt, ff. Tr. 19690, at 16.

289. The Board finds that the basis for the 1.5 rem PAG included in the BRP plan has been adequately explained and justified. In our view proper consideration has been given to the sensitivity of the fetus in setting the 1.5 rem PAG. The Board also concludes that the contrary position presented by Dr. Molholt is unsupported and unreliable.

290. As factual support for his claim that the fetus rather than the newborn infant should be considered the critical segment of the population for I-131 exposure, Dr. Molholt alleges that there was a statistically significant

62 On May 14, 1981, the Board issued a Memorandum and Order giving notice of our intent to consider Dr. Jordan's calculation, and inviting objections or comments from the affected parties. Although copies were sent to both Dr. Molholt and ECNP's representative, neither objected to Dr. Jordan's calculation or responded in any other way.

increase in neonatal hypothyroidism after the TMI-2 accident. Molholt, ff. Tr. 19690, at 13. The Board has reviewed the evidence and finds Dr. Molholt's claim groundless.

291. Dr. Molholt first asserts that Lancaster County, which he characterizes as downstream but upwind from TMI, had 6 cases of neonatal hypothyroidism after the accident. Id. Although his testimony states that this is ten times the expected number of cases, Table 1 attached to his testimony indicates that the "before" and "after" figures are not statistically significant. See also Tr. at 19885 (Molholt). Moreover, Dr. Molholt provided no mechanism for explaining how the source of drinking water for Lancaster County -- the Susquehanna River -- might have become contaminated with I-131. He admits that atmospheric deposition of I-131 into the river is an unlikely mechanism. Tr. at 19880 (Molholt). And while he was willing to guess that radioactive iodine was released directly into the Susquehanna, id., he knew of no evidence that supports such a hypothesis. Id. at 19880, 19883. In a study conducted by the Kemeny Commission, only 8 of 324 samples of drinking water showed any positive indication of radioiodine. Tr. 19882 (Molholt). Of the 8 positive samples, the highest measured concentration was .72 picocuries per liter, which according to Dr. Molholt would have required the ingestion of 500 liters to exceed Dr. Molholt's minimum hypothyroid-inducing dose. Tr. at 19883-84 (Molholt). While 500 liters itself is

beyond what one could reasonably expect a pregnant mother to consume, id. at 19884, if we consider that Dr. Molholt's asserted hypothyroid-inducing dose is low by a factor of 1000, see ¶ 288, supra, the suggestion that Susquehanna River water was sufficiently contaminated with I-131 to result in neonatal hypothyroidism is totally beyond reason.⁶³

292. Dr. Molholt did not examine any of the hypothyroidism cases to determine whether non-TMI linked reasons may have caused the problem. Tr. at 19879 (Molholt). The Commonwealth of Pennsylvania has conducted such a study, and on the basis of that study and additional epidemiological assessments concluded that "the apparent concentration of neonatal hypothyroidism in this location [Lancaster County] is not related to the TMI nuclear accident. Tokuhata, ff. Tr. 20097, at 2-3. Nor did Dr. Molholt know whether the mothers of the children with hypothyroidism were actually from the Lancaster area (or merely gave birth in Lancaster County hospitals , Tr. at 19992 (Molholt), or whether those mothers drank water from the Susquehanna River, id., or whether those mothers evacuated during the accident, id., at 19992-93.

63 At a later point in his testimony, after being shown a windrose for the period following the TMI-2 accident, see, ¶ 293, infra, Dr. Molholt was far too willing to simply change the whole of his testimony and assert that possibly the increased incidence of hypothyroidism in Lancaster was not because Lancaster was downstream of TMI but because the Lancaster residents received an inhalation dose of I-131 from the accident. Tr. at 19990-91 (Molholt). The Board views such a change in position with a high degree of skepticism.

293. Dr. Molholt also asserts that the downwind area from TMI had an increased incidence of neonatal hypothyroidism. Molholt, ff. Tr. 19690, at 13. In this instance Dr. Molholt claimed that a windrose in his possession indicated that between March 28 and April 10, 1979, the wind blew in a quadrant centered around the northeast about 80 to 85 percent of the time. Tr. at 19873-75, 19927-28 (Molholt). Despite committing to provide the referenced windrose, Dr. Molholt never did. Tr. 19930 (Molholt). And, when confronted with a windrose taken from a reference he had read and used in preparing his testimony, see Tr. at 19695-96 (Molholt), which showed the wind direction as quite scattered, with the wind persisting in each quadrant for about 25 percent of the time, Tr. at 19929 (Molholt), Dr. Molholt eventually conceded he must have been in error, but only after offering an inaccurate description of the information depicted on the windrose. Tr. at 19930-33 (Molholt).

294. The Board therefore finds that Dr. Molholt's definition of the area downwind from TMI following the Unit 2 accident is totally arbitrary. But, even if we were to accept his hypothesis of the downwind area, there still remain substantial problems with Dr. Molholt's analysis. Six of the 8 after-accident cases of hypothyroidism referred to by Dr. Molholt are in two of the most distant counties from TMI in his sample, ranging from 28 to 100 miles from the plant site. Tr.

at 19875-77 (Molholt). The closest-in area, Dauphin County, had no after-accident cases of hypothyroidism. Tr. at 19875 (Molholt). Such a result is, of course, contrary to that which one would normally expect. Tr. at 19878 (Molholt); Tokuhata, ff. Tr. 20097, at 3-4. Dr. Molholt attempted to explain away this apparent anomaly by arguing that plume touchdown is the relevant variable and therefore if the plume "skipped" closer-in areas, one would expect to see an increase of hypothyroidism farther from the site. Tr. at 19877-78 (Molholt). However, Dr. Molholt had made no inquiry to determine whether such plume "skipping" occurred during the TMI-2 accident. Id.

295. Moreover, all Dr. Molholt did is perform a simple one-year before and after comparison. Tr. at 19885 (Molholt). Although he testified that he personally used the Student's T Test to calculate whether the data were statistically significant, Dr. Molholt was totally unfamiliar with the necessary conditions for correctly applying this test, and made no inquiry to determine whether the data satisfied the appropriate preconditions. Tr. at 19886-87 (Molholt). Therefore, given the limited sample size and Dr. Molholt's failure to apply rigorous statistical techniques in handling the data, the Board finds Dr. Molholt's statistical analysis unreliable. See Tokuhata, ff. Tr. 20097, at 4-5.

296. In summary, the Board concludes that the evidence does not establish any link between the TMI-2 accident and an

alleged increase in neonatal hypothyroidism. Indeed, as we understand it, not even Dr. Molholt alleges any such link. Tr. at 20053 (Molholt). Nor is the evidence adequate to demonstrate any shortcomings in the FDA-recommended ingestion pathway PAG of 1.5 rem to the newborn infant.

297. Dr. Molholt also alleges that the official estimates of 14 to 26 curies of I-131 released during the TMI-2 accident may be orders of magnitude low. Molholt, ff. Tr. 19690, at 14-15. This position is based solely on the work of Dr. Takeshi, an otherwise unidentified Japanese scientist. What Takeshi did is to calculate the iodine to noble gas ratio at a single point in time, April 20, 1979, and extrapolate back from that point, correcting for half-life differences, to compute a value which he alleges represents the total iodine release following the accident. Tr. at 19848 (Molholt). Underlying this calculation is the assumption that the iodine to noble gas ratio, correcting for half-life differences, remained constant throughout the accident. Id. Notwithstanding that this assumption underlies the whole of the Takeshi work, Dr. Molholt did not believe it to be a reasonable assumption. Tr. at 19849 (Molholt).

298. In addition, when he initially presented his testimony, Dr. Molholt harbored a substantial misunderstanding as to the manner in which iodine was monitored during the early

hours and days after the TMI-2 accident. See Tr. at 19808, 19810-13, 19831 (Molholt). When confronted with an explanation of how iodine was measured, see Tr. at 19836-37, from a reference he had read and used in preparing his testimony, see Tr. at 19695-96, Dr. Molholt conceded that the measured amount (as indicated in the official estimates of 14-26 curies) would not have been substantially different from that actually released. Tr. at 19838-39 (Molholt). Dr. Molholt also harbored significant misunderstandings as to the quantity and quality of offsite environmental measurements for iodine following the TMI-2 accident. Compare Tr. at 19813-25 (Molholt). He had not taken the time to determine whether any of these measurements are consistent with or otherwise support the Takeshi calculations. Tr. at 19825-26 (Molholt). And, with respect to two pieces of confirming environmental evidence which Takeshi cites, see Tr. at 19827, 19829 (Molholt), both are highly suspect. Tr. at 19827-31, 19836, 19926 (Molholt).

299. The Board thus rejects the calculation of Takeshi and finds that actual I-131 releases during the TMI-2 accident were in the 14 to 26 curie range as reported by the Ad Hoc Interagency Dose Assessment Group, the Kemeny Commission study, and Licensee. See Tr. at 19926 (Molholt).

300. In a closely-related subject area, Dr. Molholt also was of the view that milk is an inadequate monitor of I-131,

Molholt, ff. Tr. 19690, at 15, and that during the TMI-2 accident the sampling of milk was inadequately distributed, both in time and space, to properly monitor I-131 releases. Tr. at 19816-17 (Molholt). As to the latter charge, while Dr. Molholt first stated that support for this claim was documented in a study done at Millersville State College, Tr. at 19817-19 (Molholt), when pressed on cross-examination he initially stated that this conclusion was "not central to their study", Tr. at 19820, and later admitted after a review of the document that "[t]he Millersville paper does not address anything about milk sampling inadequacies after the TMI accident." Tr. at 19839 (Molholt).

301. With respect to Dr. Molholt's claim that milk itself is an inadequate monitor of I-131, that too is based on the Millersville paper. The Millersville conclusion, as reported by Dr. Molholt, is that on a per-weight basis vole thyroids are more sensitive to I-131 than is milk. The error in this analysis is measuring sensitivity on a per-weight basis rather than on a per-sample basis. Because of the extremely small weight of the vole thyroid (about 3 milligrams), measuring sensitivity on a per-weight basis gives a false appearance of increased sensitivity. By comparison, if one assesses sensitivity on a per-sample basis, milk is the desired medium. Typical sensitivity for gamma spectroscopy of milk allows one

to measure down to about 10 picocuries per liter. If one attempted to measure down to the 10 picocurie level for total activity in a single vole thyroid, the corresponding concentration of radioactivity in the vole thyroid would have to be about 3300 picocuries per gram of vole thyroid. On this basis, it is apparent that the vole thyroid requires a substantially higher concentration of activity than does milk to register an equivalent activity level. Tr. at 20501-02 (Peterson).

302. Moreover there are substantial practical problems in using vole thyroids as a measure of dose to the human population. The transfer factor from air to the vole thyroid is unknown, Tr. at 19841 (Molholt), as are the transfer factors between the forage food of the vole and the vole thyroid. Tr. at 19847 (Molholt); see also Tr. at 18241-42 (Reilly). Nor is the vole part of the pathway to man, Tr. at 19946 (Molholt), as is milk. This means that at the present time, given the lack of inhalation and ingestion transfer factors, there is no way to convert between a measured dose to the vole thyroid and an estimated dose to man. Tr. at 19947-48 (Molholt). Thus, the Board sees little utility in using voles as an environmental monitor of I-131.

303. The final issue raised by Dr. Molholt is the NRC's alleged underestimate of radionuclide exposure to man from operating nuclear power plants. Molholt, ff. Tr. 19690, at

2-3. The relevance of this issue to the emergency planning matter is Dr. Molholt's claim that if transfer factors used to calculate the dose to man are underestimated for normal plant operations, those same underestimated transfer factors imply that during an emergency the calculated dose to the population will be underestimated similarly. Id. at 3. As we explain below, the Board rejects this claim.

304. Dr. Molholt's position is based on the work of a German group based in Heidelberg, West Germany. This group issued the so-called Heidelberg Report, which estimated that an individual residing within two miles of a nuclear station, or consuming vegetation grown entirely within a two-mile radius of the plant, could receive a maximum dose of up to 720 mrem per year. Molholt, ff. Tr. 19690, at 3; Tr. at 19706 (Molholt). This value is more than 100 times the 5 mrem per year design objective specified by the NRC in 10 C.F.R. Part 50, Appendix I. Thus, if the Heidelberg Report was accurate, it would be likely that many operating plants are exceeding the Commission's design objectives for releases of radioactive effluents to unrestricted (i.e., non-plant) areas.

305. In projecting an estimate of 720 mrem per year, the Heidelberg Group first began with a source term. Dr. Molholt was unable to establish the basis on which that source term was calculated, Tr. at 19707 (Molholt), although he was aware that

a criticism of the Heidelberg Report by the NRC Staff was that the report contained inadequate information to determine the basis on which the source term was estimated. Tr. at 19710 (Molholt).

306. The Heidelberg Group then calculated an atmospheric dispersion factor. Here too Dr. Molholt was unable to explain the basis on which the factor was derived. Tr. at 19715 (Molholt). He did, however, believe that he had heard that the NRC Staff was critical of the Heidelberg Group's meteorological assumptions since they had treated the parameters of wind direction, wind speed and atmospheric stability class as independent parameters when in fact they are interdependent parameters. Tr. at 19715-16 (Molholt). He also was aware that the NRC Staff concluded that the Heidelberg Group had overestimated the atmospheric dispersion factor by up to an order of magnitude. Tr. at 19723 (Molholt). In any event, the important parameter for this proceeding is the meteorology at the TMI site, and Dr. Molholt had not compared the TMI site-specific meteorology with the meteorology assumed by the Heidelberg Group. Tr. at 19718 (Molholt).

307. In calculating the component parts of the dose received from nuclear plant operation, the Heidelberg Group calculated that 82 percent of the dose was attributable to a single isotope, Cs-137, and the overwhelming fraction of the total dose was due to Cs-137 and Sr-90. Tr. at 19729-30

(Molholt). In fact, these two isotopes are such major contributors to the dose that the Heidelberg Group calculates only 11 percent of the thyroid dose is due to I-131. Tr. at 19730-31 (Molholt). This is contrary to Dr. Molholt's own expectation of the thyroid dose attributable to I-131, Tr. at 19724, 19731 (Molholt), and to the estimates of most others knowledgeable in the field. Tr. at 19731 (Molholt). It clearly indicates that there is something substantially wrong with the approach used by the Heidelberg Group. Id.

308. The reasons for this disparity become apparent when one identifies the pathways which the Heidelberg Group calculated to be the major contributors to the human dose. There are two main pathways for radionuclides to enter vegetation: direct aerosol deposition and uptake from the ground. Tr. at 19735 (Molholt). With respect to the two primary contributors to the Heidelberg dose (i.e., Cs-137 and Sr-90), the NRC estimates 90 percent of the uptake to be by aerosol deposition while the Heidelberg Group estimates 90 percent of the uptake to be from soil to plant. Tr. at 19736, 19742 (Molholt). This is because the soil-to-plant transfer factors used by the Heidelberg Group are about two orders of magnitude greater than those used by the NRC. Tr. at 19741-43 (Molholt). The Heidelberg Group soil-to-plant transfer factors are based on their review of the literature. Dr. Molholt has not reviewed the great bulk of that literature. Tr. at 19743-44 (Molholt).

He is not a soil scientist, Tr. at 19749 (Johnsrud), and he has no expertise in the subjects covered by the literature relied on by the Heidelberg Group. Tr. at 19750 (Molholt). Dr. Molholt was not aware of any soil tests that compared soil characteristics in the TMI area with that analyzed by the Heidelberg Group. Tr. at 19751 (Molholt). For these reasons Dr. Molholt could not himself support the transfer factors estimated by the Heidelberg Group. Nor will the Board accept the higher Heidelberg Report transfer factors, which we note are highly controversial, without support from a more knowledgeable witness who could be subjected to cross-examination on the details underlying the literature review conducted by the Heidelberg Group.

309. With respect to dose conversion factors, the Heidelberg Group uses a factor for Sr-90 in bone 12 times greater than that used by the NRC, Tr. at 19758 (Molholt), and a factor for Cs-137 in the kidney 39 times greater than that used by the NRC. Tr. at 19760-61 (Molholt). As to both these values, Dr. Molholt was unable to identify the evidence relied upon by the Heidelberg Group for their figures. Tr. at 19759, 19761 (Molholt). The Board therefore refuses to accept the dose conversion factors set forth in the Heidelberg Report.

310. In summary, the Board concludes that at each step in the dose calculation process the Heidelberg Report uses values

higher (and in some cases significantly higher) than those used by the 'RC, but in each case the witness offered by ECNP was unable to justify the higher values used in the Heidelberg Report. While the Board recognizes that there may be disagreements over particular values for particular steps in the dose calculation process, we observe that using consistently higher values at every step is likely to result in a final dose estimate which is substantially higher than the actual figure. See Tr. at 19763-69 (Molholt). As a result, the Heidelberg Report draws some conclusions we know are untrue -- i.e., that radioiodine is only a small contributor to the thyroid dose. Nor have the Heidelberg Report conclusions been substantiated by any actual monitoring in the field. Tr. at 19774-76 (Molholt). For all these reasons, the Board does not agree that the maximum offsite dose from normal nuclear power plant operation approaches 720 mrem per year or that this figure should be used in planning emergency response.

311. The second half of Contention EP-11 asserts that the 1.5 rem PAG does not take into account the inhalation exposure. While this statement is true, the implication of the contention -- i.e., that the limit is therefore inadequate -- is wrong and evidences a misunderstanding about the use of PAG limits during an emergency.

312. While it is possible to add the discrete projected doses from an accident for each of the various pathways and

calculate a total accumulated dose projected from the accident, there is no recommended PAG for such a total dose. Rather, there are separate PAG's for each of the various pathways. This is because there are separate possible protective or restorative actions and costs associated with each pathway. Since PAG's will be used by BRP as triggering points on which to base protective action decisions, it is necessary to distinguish between the various pathways so that the proper protective action can be implemented. The use of different PAG's for the various radiation pathways, instead of a total PAG, best serves this purpose. Chesnut, ff. Tr. 15007, at 11-12.

313. Moreover, the dose to the infant from milk ingestion is approximately 350 times greater than from inhalation due to biological reconcentration of the radioiodine by grazing cows. Thus, assuming equal radioiodine air concentrations at the location of the dairy cow and the infant, the inhalation dose would be expected to add only about 0.3% to the dose from ingestion. Peterson, ff. Tr. 20500, at 4. And, with respect to the thyroid dose, the BRP plan includes a separate PAG due to inhalation from a plume that is used to trigger protective action for inhalation exposure. Id.; Reilly, ff. Tr. 18125, at 11.

G. Implementation of Protective Actions

314. A large number of contentions were raised challenging a broad range of issues generally relating to the adequacy of protective response. In almost all cases these contentions address the ability of offsite emergency response organizations to take those actions deemed necessary to protect the public health and safety in the event of an emergency at TMI. And, in almost all cases the contentions focus on a single protective response -- i.e., the virtually complete removal of the population at risk through mandatory evacuation. We address these contentions in 14 subsections of this part of our Recommended Decision.

315. While we have little doubt that the evacuation of the plume exposure pathway EPZ tests the adequacy of offsite response to its limit, the emphasis placed on this particular response by the intervenor contentions should not be construed to indicate that other emergency response measures will not provide suitable protection for the population at risk for a broad range of emergency conditions. For example, sheltering for a limited period of time probably will be an adequate protective measure for many emergencies. This will be especially true if current hypotheses are borne out that the actual release of radioactivity to the environment is less by orders of magnitude than is estimated by presently used codes. For in

such cases noble gases are likely to represent a large fraction of the source term for which sheltering is a more effective protective action. See Levenson, ff. Tr. 19525, at 7 and Attachment, pp. 13, 15-18.

1. Unmet Needs and Letters of Agreement

Newberry Contention EP-14(W): Annex L of the York County Plan provides for resource requirements which, it is assumed, would set forth what would be required to set the whole evacuation plan of York County into operation with regard to manpower, equipment and other resources. The Plan as of this date remains under development in this area and unless the Plan is completely finalized, it is Intervenor's contention that the Plan is deficient.

ANGRY Contention EP-6(D): There are numerous assignments of responsibility to persons and organizations that are not documented by written agreements demonstrating knowledge of and ability to perform assigned roles as required by N. 0654 Sec. A3. The most important of such delegations are:

1. American Red Cross (operation of relocation centers; Annex I).
2. Maryland Dept. of Health (provision of ambulances and helicopters for hospital evacuations; Annex J).
3. Amateur radio operators (communications with local governmental units and school districts; Annex D § V.E).

4. "State C.D." (50-2 passenger ambulances for evacuation of nursing homes; Annex J, App. 2).
5. School Districts (transportation of school children to relocation centers and provision of facilities for such centers; Annex G).
6. York Area Transit Authority (evacuation of nursing home patients; Annex K).
7. State of Maryland (overflow mass care capacity; Annex I Sec. IV.D).
8. Adams County (relocation center; Annex I).
9. York Chamber of Commerce (notification of business and industry; Sec. VI.A (7)(a)).
10. York County USDA Disaster/Emergency Board (monitoring crop and animal surveillance; Annex R).

ANGRY Contention EP-4(B):

The perfunctory form letters found in Appendix C to Licensee's EP provide no indication, let alone assurance, of the existence of "mutually acceptable criteria" for implementation of emergency measures as required by Emergency Planning Review Guideline No. One, Revision One (EPRG) IV(A)(1). Also N. 0654 A3.

316. These three contentions address in slightly differing ways the issue of resource availability during an emergency situation. Since not every emergency response

organization has a full complement of all resources, both material and human, necessary to effectuate its response plans, the plans specify the means that will be employed to satisfy the "shortfall". For example, in the TMI area each level of government has identified its unmet needs and the means to ensure that these needs will be satisfied in a timely fashion. See §§ 317-21, infra. Where the provider of resources to satisfy an unmet need is another level of government, a mutual recognition by both parties in their respective response plans is used to assure the availability of the resource. Where the provider of resources is a private entity, a letter of agreement acknowledging the conditions under which assistance may be requested is used to assure the availability of the resource. In carrying out these planning functions the goal is to determine how existing community resources, both private and governmental, can be utilized most effectively in responding to the emergency. Dynes, ff. Tr. 17120, at 7-8.

317. Contention EP-14(W) challenges the adequacy of York County's preparedness in specifying its unmet needs and arranging for their availability in the event of an emergency. Under Pennsylvania law, locally available resources must be fully committed prior to seeking resource assistance from a higher level of government. See 35 Pa. Cons. Stat.

§ 7504(b).⁶⁴ This approach is consistent with the legislative

64 The Board officially noticed the Pennsylvania Emergency Management Services Code (chapters 71, 73, 75, and 77, part V, (footnote continued next page)

directive that "[i]n order to avoid duplication of services and facilities", PEMA in carrying out its overall emergency response functions is to utilize the already existing services and facilities at all levels of government. See 35 Pa. Cons. Stat. § 7314. Thus, under this statutorily mandated concept of operations, each level of government, starting at the municipal level, is expected to commit all resources at its disposal before the next higher level of government is called upon to provide additional resources. See Knopf, et al., ff. Tr. 21816, at 11; Lamison (Command and Control)-4, ff. Tr. 17818, at 1.⁶⁵

318. York County has implemented this approach to emergency response. Its emergency response plan provides that municipalities are to maintain lists of available local resources and requirements for additional personnel and equipment. Where possible, the unmet needs of municipalities will be fulfilled at the county level. Unmet needs at the county level are reported to PEMA and will be met, if possible, at the state level. Board Ex. 5, at §§ V.B, VI.B.5, VI.B.10, VI.C.4, VI.C.9, VI.C.10, VI.C.13 and Annex L, pp. 6-8 and L-1. If an unmet need cannot be satisfied at the state level, it

(continued)

title 35 of the Pennsylvania Consolidated Statutes) and copies were provided to the Board and parties for their convenience. Tr. at 22957-58.

65 Commonwealth of Pennsylvania's Testimony of Kenneth R. Lamison Pertaining to Command and Control (Contentions EP-5(C), EP-6(B), EP-14(C), EP-14(H), EP-14(J), EP-14(R) and EP-14(X)) ("Lamison (Command and Control)-4").

will be provided from federal resources. Pa. Ex. 2(a), at § V.B.2. The municipal plans include a tabulation of resource requirements at the local level, generally in Appendix 9 of the model plan. See, e.g., Board Ex. 13 (Lewisberry, Manchester and Newberry plans). FEMA has reviewed the adequacy of these provisions and found them acceptable. Adler and Bath-2, ff. Tr. 18975, at 36. The Board therefore rejects contention EP-14(W).

319. Contention EP-6(D) challenges the arrangements made by York County with various response groups that might provide assistance to York County during a radiological emergency at TMI. In particular, the contention asserts that necessary letters of agreement with these groups have not been obtained. In some instances it is difficult to respond precisely to the contention since the York County emergency response plan was modified after the contention was drafted. As a result, certain groups no longer perform the functions assumed in the contentions; in other cases the references to the plan are incorrect.

320. (a) A letter of agreement with the American Red Cross has been executed. Tr. at 20786-87 (Curry); Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, at item 4.

(b) Although the Maryland Department of Health no longer is referenced specifically in the revised county plan, a letter of agreement has been obtained. Belser, et al., ff. Tr. 20787, at 2 (Curry); Board Ex. 5, at p. T-4.

(c) York County has not executed a letter of agreement with amateur radio operators. The operations plan for the York County Radio Amateur Civil Emergency Service ("RACES") is on file in the York County EOC. The operations plan was jointly developed with four intra-county amateur radio clubs. The availability of specific individuals is indicated on a worksheet that is maintained in a call-up status in the county computer system. Belser, et al., ff. Tr. 20787, at 3 (Curry); Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, at item 4. The functions assigned to RACES are identified in the York County emergency response plan. Board Ex. 5, at Annex C, §§ IV.D, IV.E and IV.F, p. C-2. RACES has continually demonstrated its willingness to assist in emergency situations. Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, at item 4. In these circumstances, FEMA concludes that RACES has full knowledge of its role and responsibilities, will provide necessary assistance when requested, and therefore a formal letter of agreement is unnecessary. Id. The Board agrees with this assessment. See also ¶ 330, infra.

(d) The revised York County emergency response plan does not require the evacuation of nursing homes. Belser, et al., ff. Tr. 20787, at 4 (Curry). Therefore, the 50, two-passenger ambulances cited in the contention are no longer needed. In any event, since the source of these vehicles was to have been the Commonwealth, there is no need for a letter of agreement. Adler and Bath-2, ff. Tr. 18975, at 30; see also ¶ 316, supra.

(e) Letters of agreement with school districts have been obtained. Board Ex. 5, at pp. T-2 and T-3; Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, at item 4. Arrangements for the transportation of school children are addressed in the York County emergency response plan. Board Ex. 5, at Annex O; Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, at item 9; see also Section II.G.7, infra.

(f) Although the revised plan does not call for the evacuation of nursing home patients, a letter of agreement with the York Area Transit Authority has been obtained. Board Ex. 5, at p. T-6; Belser, et al., ff. Tr. 20787, at 4 (Curry); Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, at item 4.

(g) Contrary to the assumption of the contention, the revised York County emergency response plan does not require overflow mass care support from the State of Maryland. Belser, et al., ff. Tr. 20787, at 4 (Curry); compare Board Ex. 5, at Annex I. Thus, there is no need for a letter of agreement with the State of Maryland.

(h) Adams County is to provide two reception centers and associated mass care centers for about 10,000 York County evacuees. Board Ex. 5, at p. I-7. While York and Adams counties have not yet executed a letter of agreement, FEMA has ascertained through discussions with Adams County officials that they are aware of their host county responsibilities and

will provide the necessary support. FEMA concludes that this commitment is adequate and the Board agrees. Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, at item 4.

(i) A letter of agreement with the York Area Chamber of Commerce has been obtained. Board Ex. 5, at p. T-5; Belser, et al., ff. Tr. 20787, at 4 (Curry); Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, at item 4.

(j) The participation of the United States Department of Agriculture ("USDA") County Emergency Board is specifically provided for in both the Commonwealth and York County plans. Pa. Ex. 2(a), at 12-13 and Appendix 7, p. 11; Board Ex. 5, at 14, 17 and Annex N. Thus, there is no need for a separate letter of agreement. Adler and Bath-2, ff. Tr. 18975, at 30; see also ¶ 316, supra.

321. The Board therefore finds that York County has made adequate arrangements through letters of agreement, or in two cases through compensating actions (see ¶¶ 320(c) and (h), supra), to assure that necessary support will be provided in the event of an emergency at TMI.

322. Contention EP-4(B) is a broadside attack on the adequacy of the letters of agreement obtained by Licensee. No specific letters are identified as inadequate and the Board is not aware of any cross-examination aimed at demonstrating the inadequacy of Licensee's efforts in this area. Licensee presented testimony explaining the means it uses to assure the

availability of necessary support organizations and responded to specific objections identified by ANGRY in its interrogatory answers. Rogan, et al., ff. Tr. 13756, at 47-53. The NRC Staff has reviewed Licensee's letters of agreement and found them adequate. Staff Ex. 6, at 8; Chesnut, ff. Tr. 15007, at 68-73. The Board has independently reviewed the letters of agreement, Lic. Ex. 30, at Appendix C, and finds that they are adequate for their intended purpose. The Board therefore rejects Contention EP-4(B).

2. Communications

323. The issues relating to communications among those personnel responsible for implementing protective actions fall into three general categories: (a) communications between county and local emergency response agencies, (b) use of RACES operators, and (c) communication arrangements for the alternate York and Dauphin County EOC's. We address each of these issues seriatim. Other sections of this Recommended Decision relating generally to communications include our findings on initial notification of governmental units, see Section II.C, supra, and on warning and emergency instructions to the general public, see Section II.D, supra.

ANGRY Contention EP-6(C):

There is no assurance of the operability of county-local government communications links on a 24-hour basis as required by N. 0654 Sec. Fl(a) and Pa. DOP Sec. IX.B(1)(f).

Newberry Contention EP-14(N): Annex B of the York County Plan indicates that the order of notification from York County is to executive group members and then to local coordinators within the risk area with priority to those nearest the facility, then to school superintendents and then to Emergency Operations Center staff. Nowhere in the Plan is it indicated how these people would be notified of the impending emergency. Intervenor again raise the issue that in the event of an incident at TMI, members of these organizations should be able to be reached without dependence upon telephone communications. Until and unless it is indicated that these individuals can be contacted without dependence upon telephone communications, the plan is deficient.

Newberry Contention EP-14(D): Section VI, Subsection (d)(1) provides that, upon notification from PEMA, the County Director will assemble and consult with appropriate members of the county staff and elected officials. There does not seem to be included in the Plan any means in which to contact the local elected officials unless it is the assumption that these officials would be contacted by telephone. It is Intervenor's contention that, in the event of an emergency situation at Three Mile Island, once the public has any notice or indication that something has occurred at TMI, that the telephone lines will become overloaded and that incoming calls to local officials will not be able to be effected. Moreover, the Plan does not indicate where local officials will assemble, how they will know where to assemble and when to assemble and thus the Plan is still deemed to be deficient.

Newberry Contention EP-16(C): Appendix 3, Annex E of the Dauphin County Plan indicates that approximately 65 people will be notified in the event of an emergency. It indicates that notification of these people will be by radio whenever possible and then by telephone. Nowhere in the Plan is it indicated that the individuals listed have radios which are compatible with that of the County E.O.C. Moreover, there's no indication that the frequencies to be used for communicating with these individuals would be free of any outside disturbance. Therefore, until and unless it is indicated in the County Plan that these individuals have compatible radio equipment and that frequencies are being used that are relatively free from any other type of traffic, it is Intervenor's position that the Plan remains defective.

Newberry Contention EP-16(F): Appendix 6 of Annex E of the Dauphin County Plan provides that the American Red Cross, military unit assignments, fire and ambulance units, and police units will be assigned various frequencies for radio operations and will have various radio equipment at their disposal. Nowhere in the Plan is it indicated that there is an existence presently of the equipment necessary to operate on the indicated frequencies or that if the equipment is presently available, that it is being maintained. Moreover, the Plan as written indicated that the police only have two frequencies on which to operate in the event of an emergency. Furthermore, fire, ambulance, Red Cross and military units will all share the same frequency and it is submitted that in the event of an emergency, the traffic on those

frequencies will cancel effective communications among all of the groups. Therefore, until and unless it is stated that each of these units has its own frequency for operation and that there are sufficient numbers of frequencies in order to ensure effective operations, the Plan is deficient. Moreover, until and unless the Plan indicates that there is an existence of compatible equipment in order to effect this part of the Plan and that there is a responsibility for maintenance of the equipment, it is Intervenor's position that the Plan remains inadequate.

324. Contention EP-6(C) challenges the adequacy of the county-local government communication link. We note initially that the NUREG-0654 evaluation criterion referenced in the contention does not specify that the county-local government communication link be staffed 24 hours per day. Rather, the criterion specifies "24-hour per day notification to and activation of the State/local emergency response network." See Staff Ex. 7, at 47. As already noted, see ¶ 62, supra, we believe this objective is satisfied by a 24-hour per day staffing of a county EOC which possesses communication links with PEMA and with municipal police and fire departments. See Adler and Bath-2, ff. Tr. 18975, at 18-19. To the extent Contention EP-6(C) suggests that there be a 24-hour per day manning of each municipal EOC, we reject the contention. However, the Board does believe that there should be some

timely means for notifying municipal emergency response personnel. We understand this objective to be the thrust of Contentions EP-14(N), EP-14(D), EP-16(C), and EP-16(F).

325. The York County emergency response plan provides for a "cascading" call-out system. See Board Ex. 5, at Annex B, Appendix 2, p. B-5. After the County Commissioners, the County Emergency Management Coordinator and the Public Information Officer are notified, two communication clerks, and the fire, police, and medical dispatchers are responsible for notifying the remaining parts of the emergency response organization. In particular, the county fire dispatcher will notify each municipal fire department via a fire encoder (Plectron). Each municipal fire department will notify their municipal emergency management coordinator, who is responsible for notifying the local elected officials. Board Ex. 5, at Annex B, Appendix 1, p. B-4. School superintendents will be notified by the county police dispatcher. Id. at p. B-5. This concept of operations represents an improvement over the system previously used in York County and is consistent with recommendations made by the FEMA witnesses in this proceeding. See Bath and Adler-1, ff. Tr. 18975, at 5-7.

326. The adequacy of this revised call-out system was reviewed by FEMA and their favorable findings are reported in Supplement 1 to the EPE. Staff Ex. 23, at III-12 and III-14. To the extent Contentions EP-14(N) and EP-14(D) allege that the York County Plan fails to indicate how the emergency response

personnel will be notified of an impending emergency, the Board rejects such a claim since the plan sets forth the means that will be used. The Board also rejects the assertion of Contentions EP-14(N) and EP-14(D) that the plan is deficient since it relies on the telephone for contacting emergency response personnel. We reject this claim because the applicable NRC/FEMA guidance permits the use of telephones for such purposes, see Bath and Adler-1, ff. Tr. 18975, at 6-7, and because the evidence of record indicates that telephones are an adequate means for contacting emergency response personnel. See Adler and Bath-2, ff. Tr. 18975, at 20. In addition, it is apparent that radio communications will be used for much of the call-out process. Board Ex. 5, at Annexes B and C.⁶⁶

327. Contentions EP-16(C) and EP-16(F) raise similar concerns directed towards Dauphin County. Radio communication is the primary means used by Dauphin County for notifying emergency response personnel. Belser, et al., ff. Tr. 20787, at 7 (Wertz). A totally separate radio frequency, the County Emergency Management Communications System (46.56 MHZ), is

⁶⁶ Contention EP-14(D) also asserts that the York County emergency response plan does not indicate where local officials will assemble, how they will know where to assemble and when to assemble. This claim borders on the frivolous. The York County plan clearly specifies that municipalities are to designate a municipal EOC. Board Ex. 5, at § VI.C.1, p. 7. The municipal plans in turn specify the location of the municipal EOC's. See Board Ex. 13; see also Tr. at 20936-37 (Curry). Local officials are to report to that EOC when notified by the municipal emergency management coordinators. Id.

maintained by Dauphin County for the sole purpose of direction and control during an emergency. Key personnel possessing either a portable, mobile or remote radio capable of transmitting and receiving on this frequency include: the 3 county commissioners, the county and all municipal emergency management coordinators, and the Communication, RADEF, RACES, Medical, Transportation, and Situation Analysis Officers. Adler and Bath-2, ff. Tr. 18975, at 25. In addition to this network, the county fire and ambulance companies use 4 additional frequencies and the police use 5 additional frequencies. Id.; see also Board Ex. 6, at Annex B, Appendix 1, p. B-5.

328. FEMA has reviewed the adequacy of this communications system and its favorable findings are reported in Supplement 1 to the EPE. Staff Ex. 23, at III-12 and III-14. During the June 2, 1981 exercise FEMA observed the communications capability of Dauphin County. The FEMA Exercise Report states that "[w]ithout exception the counties demonstrated the equipment capability for 24-hour notification to, and activation of the emergency response network." Staff Ex. 20, at 33. This includes an adequate capability to alert emergency workers at the county and municipal levels. Staff Ex. 21, at 1.

329. Both Contentions EP-16(F) and EP-16(C) raise concerns that outside disturbances or dual use on certain frequencies will preclude effective communications. To ensure against this, the Dauphin County radio dispatchers will maintain net control on all assigned radio frequencies. This

control will allow for the proper and unimpeded use of the radio frequencies. In addition, since Dauphin County has separated its command and control frequency from the operational frequencies used by police, fire and ambulance, see ¶ 327, supra, there is less likelihood that competing uses of the radio frequencies will adversely affect emergency response. Adler and Bach-2, ff. Tr. 18975, at 23-26. The radio equipment that would be used during a radiological emergency at TMI is in routine use by Dauphin County emergency service groups and is maintained as part of the regularly utilized emergency services. The availability and operability of this equipment were confirmed during the June 2 exercise and will continue to be confirmed during the periodic communications drills specified in the Commonwealth emergency response plan. Id. at 26. For all these reasons, the Board rejects Contentions EP-16(C) and EP-16(F).

Newberry Contention EP-14(P): Annex D, Section V, provides (in part)

that the concept of operation will be effected by the regular communications staff augmented by "qualified volunteers" as required. The Plan also indicates that amateur radio will be relied upon in the event of an incident at TMI nuclear facility. There is no assurance that any amateur radio operators have agreed to participate in such an operation or that each school district has had an operator assigned to it to coordinate the utilization of school buses. Moreover, there is no definition of who is a qualified volunteer in the event that volunteers are

required to be used by the
communications staff.

330. Contention EP-14(P) (in part) questions the adequacy of relying on amateur radio operators to augment the York County communications capabilities during an emergency. The York County emergency response plan indicates RACES members will be used to provide a supplemental communications capability. Board Ex. 5, at Annex C, § IV, p. C-2. Provisions have been made for the RACES group in the York County emergency response organization and an Amateur Radio Officer has been designated. See Board Ex. 5, at 14, 18, 25, A-2 and B-5; see also Belser, et al., ff. Tr. 20787, at 6 (Curry). RACES groups are well-recognized, bonafide emergency response organizations. Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, at item 4; Adler and Bath-2, ff. Tr. 18975, at 21. FEMA has reviewed York County's use of RACES operators and, except for an initial concern over the absence of a letter of agreement with RACES, finds no objection to using amateur radio operators. Id. The Board previously has considered the arrangements made to assure the availability of RACES operators and found them acceptable. See ¶ 320(c), supra. We therefore reject Contention EP-14(P).

Newberry Contention EP-14(E): Annex A of the York County Plan provides that the alternate EOC site will be the new Hanover Borough Building in Hanover, Pennsylvania. Intervenor again raise the contention that there

still is no indication at this time that trunk lines have been laid for the transfer of the Emergency Operations Center to the Hanover location, and, as such, it renders the Plan inadequate.

Newberry Contention EP-14(P): Finally, the concept of operations in this section provides that RACES would provide interim communications at the Hanover site until full communications capability could be restored. It is Intervenor's position that the Hanover site must be placed in an immediate ready condition in order to effectively serve as an alternate site for emergency operations control. It is Intervenor's position that until and unless the Hanover site is placed in a ready condition, that the Plan remains deficient.

Newberry Contention EP-16(D): Appendix 4 of Annex E of the Dauphin County Plan provides that the alternate E.O.C. office will be located in the Millersburg Borough Building. Nowhere in the Plan is it indicated that the Millersburg Borough Building is presently in an emergency readiness condition. In short, the Plan does not indicate whether, as a matter of fact, the Millersburg Borough Building can accommodate the requirements of the E.O.C. with regard to telephone trunk lines, radio communications, and other E.O.C. requirements. Until and unless this information can be verified, it is Intervenor's position that the Plan remains deficient.

331. These three contentions challenge the adequacy of arrangements made with respect to alternate EOC's. NUREG-0654

specifies that a local level EOC be established for use in directing and controlling emergency response functions. Staff Ex. 7, at § II.H.3, p. 52. NUREG-0654 does not recommend that an alternate location be specified. Id.; Bath and Adler-1, ff. Tr. 18975, at 27. Both York and Dauphin counties have established a local level EOC and designated the location of an alternate EOC.⁶⁷ See Board Ex. 5, at Annex A; Board Ex. 6, at Annex A. These actions go beyond the guidance specified in NUREG-0654. The York County EOC is outside the plume exposure pathway EPZ. Compare Board Ex. 5, at Annex A with Pa. Ex. 2(b). This fact, coupled with the high protection factor offered by the County Courthouse basement, makes it extremely unlikely that it would ever be necessary to relocate the EOC. See Board Ex. 5, at Annex A. Similarly, the Dauphin County EOC is beyond 10 miles from TMI, Tr. at 20946 (Wertz),⁶⁸ and is located in the basement of the County Courthouse. Thus, it is

67 The York County EOC is located in the basement of the County Courthouse, 28 East Market Street, York, Pa. 17401; the alternate EOC has been designated as the New Hanover Borough Building, 44 Frederick Street, Hanover, Pa. 17331. Board Ex. 5, at Annex A. The Dauphin County EOC is located in the basement of the County Courthouse, Front and Market Streets, Harrisburg, Pa.; the alternate EOC has been designated as the Millersburg Municipal Building, 525 Front Street, Millersburg, Pa., and the alternate communications center is to be located three miles east of Millersburg on Route 209. Board Ex. 6, at Annex A.

68 The Dauphin County EOC, however, is within the far fringe of the plume exposure pathway EPZ. Tr. at 20946 (Wertz). This is because the EPZ boundary in the area of the EOC has been extended to a clearly recognized local marker. See Section II.E., supra.

not anticipated that the Dauphin County EOC would have to be relocated in the event of a radiological emergency at TMI. Belser, et al., ff. Tr. 20787, at 7 (Wertz).

332. Nonetheless, both York and Dauphin counties have designated alternate EOC's. The Board finds that this action provides an extra margin of assurance that the county emergency response plans can be implemented. The Board does not believe that it is either necessary or feasible that the alternate EOC's be equipped so that they are in an immediate state of readiness. See Bath and Adler-1, ff. Tr. 18975, at 27-28; Adler and Bath-2, ff. Tr. 18975, at 22. In the highly unlikely event that the EOC's are relocated, there should be sufficient time available to implement emergency communication systems. We therefore reject Contentions EP-14(E), EP-14(P) (in part) and EP-16(D).

3. Chain of Command

Newbury Contention EP-14(H): Appendix 2, Section III, of the York County Plan provides that the Assistant Director of Police Operations is responsible for the overall management of law and order, traffic control and security. In the event the National Guard is ordered to assist local communities, it is questionable whether the Assistant Director of Police Operations would be in a position to direct orders to a military organization as is assumed he would be in the York County Plan. There seems to be no coordination between the National Guard chain of command and the chain of

command in the operations group in Annex 2, Section III, and therefore, it is Intervenor's position that the Plan is deficient in that there is no stated area of responsibility concerning police operations, vis-a-vis the National Guard.

Newberry Contention EP-14(R): Annex F, Section II of the Plan is inconsistent with Appendix 2, Subsection III, Subsection A in that the Assistant Director of Police Operations is stated to be responsible for all management of law and order, traffic control and security, whereas Annex F provides that the Pennsylvania State Police are responsible for coordinating law enforcement and traffic control and the Pennsylvania National Guard is responsible for providing security for the evacuated areas. Intervenor is of the position that until and unless the order of command is sufficiently, adequately and clearly stated, there lies the possibility in the Plan for mass chaos and confusion with regard to who is responsible for police services. The Plan is deficient until it states in a succinct and clear manner who will be responsible for giving direct orders to the Pennsylvania State Police, the sheriff in local police departments, and the Pennsylvania National Guard in the event there is an incident at the Three Mile Island nuclear facility.

Newberry Contention EP-16(I): Appendix 9 of the Dauphin County Plan regarding police policy and procedures during relocation indicates that when evacuation is ordered, units will proceed to predesignated stations. The Plan does not indicate where the predesignated stations are located and how the chain of command will operate in the event of

relocation of local police departments and their interaction with National Guard units arriving to provide additional manpower to local departments. Until and unless a definite chain of command is stated and the relationship between civil police departments and the National Guard regarding chain of command is documented, it is Intervenor's position that the Plan is deficient.

333. Contentions EP-14(H), EP-14(R) and EP-16(I) allege that there is a lack of coordination and general confusion over the chain of command that will be exercised among the National Guard, State Police, county sheriff and municipal police forces. Since these contentions were all drafted prior to the final version of the county emergency response plans, the specific provisions and references identified in these contentions no longer relate to the current plans. Nor, for example, does the present York County emergency response plan designate an "Assistant Director of Police Operations". The Board therefore does not concern itself with resolving the specific issues identified by these contentions. Rather, the Board proceeds as if the contentions alleged that, as a general matter, a workable chain of command has not been established. Because we believe the record shows that a workable chain of command has in fact been established, the Board rejects Contentions EP-14(H), EP-14(R) and EP-16(I).

334. The York County emergency response organization chart designates three police-related positions: Police

Services Officer, Traffic Control, and Military Support. Board Ex. 5, at 14 and 18.⁶⁹ These police groups are assigned two primary functions -- law enforcement (i.e., security) and traffic control -- although they also could be used for other purposes such as search and rescue missions and support for mass care facilities. Board Ex. 5, at 17, Annexes D, E and M. The Pennsylvania State Police, assisted by the Police Services Officer, are responsible for coordinating all police activities within York County. Belser, et al., ff. Tr. 20787, at 5 (Curry); Board Ex. 5, at Annex D, §§ II.A and II.D, p. D-1. Personnel assigned to the County Sheriff's Office and municipal police departments will continue their normal responsibilities and perform special assignments that are coordinated with the Pennsylvania State Police through the York County Emergency Management Agency. Board Ex. 5, at Annex D, § II.B, p. D-1. The Pennsylvania National Guard, if required, will assist the state, county and municipal police personnel with security and traffic control. Board Ex. 5, at Annex D, §§ II.E and II.F, p. D-1, and Annex M.

335. Pennsylvania law directs that when support forces are furnished to political subdivisions those support forces

69 During an emergency, the Police Services Officer will be the County Sheriff, Board Ex. 5, at Annex D, § II.D, p. D-1; the Traffic Control position will be filled by a representative from the Pennsylvania State Police, Board Ex. 5, at 14 and 25; the Military Support position will be filled by the Pennsylvania National Guard Liaison Officer, Board Ex. 5, at 14 and Annex M.

shall remain under the operational control of the entity furnishing the support force. 35 Pa. Cons. Stat. § 7504(f); Adler and Bath-2, ff. Tr. 18975, at 47; Lamison (Command and Control)-4, ff. Tr. 17818, at 1. In other words, while command and control of police forces will originate from the York County EOC -- under the direction of the Pennsylvania State Police and the Police Services Officer -- the force commander in the field will deploy his forces in the manner he deems appropriate to best accomplish the task he has been assigned. Tr. at 17823-24 (Lamison). This chain of command applies as well to the Pennsylvania National Guard. Board Ex. 5, at Annex M, §§ II.F and IV.D, pp. M-1 to M-2. This approach is the normal means for deploying and controlling police groups during an emergency. Tr. at 19234-36 (Adler/Bath). FEMA representatives have observed the coordination of various Pennsylvania police groups during actual emergencies and have found no problems at any level of government. Tr. at 19261 (Bath); Adler and Bath-2, ff. Tr. 18975, at 48. The Board finds that York County has developed a workable chain of command for deploying and controlling police groups during an emergency at TMI.

336. Almost identical command and control procedures have been developed by Dauphin County. See Board Ex. 6, at 12-13, Annexes F, J and M. For the reasons we have just explained, the Board finds these procedures adequate. Contention EP-16(I) also alleges that the Dauphin County emergency response plan

does not designate the locations to which local police forces will relocate if it becomes necessary for the police to evacuate the plume exposure pathway EPZ. This is untrue. See Board Ex. 6, at Annex J, Appendix 2, p. J-6; Belser, et al., ff. Tr. 20787, at 8 (Wertz); Adler and Bath-2, ff. Tr. 18975, at 46. Relocation of police units, if necessary, will not alter the chain of command -- i.e., field operations still will remain under the charge of the police group's ranking officer. Adler and Bath-2, ff. Tr. 18975, at 46.

4. Police, Fire and National Guard Support

337. In addition to the chain of command issues just resolved, concern was raised in three other areas relating to police-type support services. These include: (a) mobilization of the National Guard, (b) assignment of the Pennsylvania State Police, and (c) ability to alert and warn the general population. We address each of these matters below.

Newberry Contention EP-14(X): Annex M of the York County Plan providing for military support states that the Pennsylvania National Guard will enter into active duty upon an order of the Governor. Moreover, they will respond to any individual local political subdivision's needs upon request of the local political subdivision for aid. The Plan does not state with any specificity whether the Guardsmen will be protected by radiation-proof equipment, under whose orders and directions they will remain during their encampment in a local political

subdivision, and when they will arrive in the local political subdivision after requested to do so. Until and unless these deficiencies are rectified, it is Intervenor's contention that the Emergency Plan is deficient.

Newberry Contention EP-14(OO): Because of the experiences of the past, even the limited evacuation of pregnant women and children under five years of age left many of the areas surrounding the Three Mile Island Nuclear Power Station deserted and open to looting without proper security. The assumption that the National Guard would, in the event of an evacuation, be called up by the Governor, is one that is a void in the evacuation plan and the National Guard is not called up or does not respond to the Governor's request because its members are busily evacuating their own families.

338. Specific provisions governing the mobilization and use of National Guard forces during an emergency at TMI are contained in the Commonwealth and five risk county emergency response plans. Pa. Ex. 2(a), at § VII.A.16, pp. 20-21; see, e.g., Board Ex. 5, at Annex M. These provisions provide that, if necessary, the Governor of Pennsylvania will order the National Guard to active duty to assist civil authorities in responding to an emergency. E.g., Board Ex. 5, at Annex M, § II.A, p. M-1. As previously indicated (see ¶ 335, supra), if the National Guard is sent in to the TMI area, field command will remain with the National Guard commanders,

although assignments will originate from the county emergency management agencies and be coordinated through PEMA. E.g., Board Ex. 5, at Annex M, §§ II.C. through II.F, p. M-1. One potential role for the National Guard is to assist with law enforcement and security. However, it is anticipated that the Pennsylvania State Police, the County Sheriff's Offices, and municipal police departments will be the primary means for providing law enforcement in the area. For planning purposes, the county emergency response plans assume it will take about 6 hours to deploy the National Guard.⁷⁰ Pa. Ex. 2(a) at §§ VII.A.16.b & e and VII.A.18.b & d, pp. 20 and 23; Board Ex. 5, at Annexes D and M; Lamison (Command and Control)-4, ff. Tr. 17818, at 1; Adler and Bath-2, ff. 18975, at 41. Contrary to the assertion of Contention 14(00), the Board finds that state, county and local law enforcement personnel, with the assistance of the National Guard (if needed), are adequate to provide security in the event the TMI plume exposure pathway EPZ is evacuated. The Board is unaware of any evidence indicating that looting occurred

70 Contention EP-14(00) contains the allegation that National Guard troops might not respond to the Governor's order "because its members are busily evacuating their own families." There is no record evidence that would support this assertion. The Board already has found that sufficient numbers of emergency workers will respond in the event of an accident at TMI. See §§ 67-88, supra. This finding is especially appropriate for a military group like the National Guard. Moreover, there is no reason to believe that the units of the statewide National Guard called to active duty will be residents of the TMI area.

during the TMI-2 accident, and FEMA informs us that, in their experience during mass evacuation situations, looting has not been a significant problem. Adler and Bath-2, ff. Tr. 18975, at 41.

339. Contention EP-14(X) raises issue as to whether it is necessary that National Guard troops be protected with radiation-proof equipment. The Commonwealth has inquired from the NRC and the National Guard Bureau whether special protective clothing should be worn by Guardsmen. Neither agency recommends special anti-contamination clothing for the National Guard. Normal-issue military clothing will prevent radioactive contamination of the skin, and provide a higher degree of protection than required for the situation. Lamison (Command and Control)-4, ff. Tr. 17818, at 2; see also Adler and Bath-2, ff. Tr. 18975, at 37. We therefore find that adequate provisions have been made for clothing National Guard troops assigned to the TMI area in the event of an emergency.

Newberry Contention EP-14(J): Appendix 2, Section III, Subsection (i) provides that it will be anticipated that the Pennsylvania State Police would be prepared to support York County disaster operations in the event of an incident at the TMI nuclear facility. Moreover, it indicates that the Pennsylvania State Police would coordinate with the Pennsylvania Department of Transportation for the placement of temporary signs in support of evacuation area security. It

is important to note that there is no formulated and stated plan for the involvement of the Pennsylvania State Police in the event of an incident at TMI. It is also anticipated in the Plan that there would be the placement of some sort of temporary signs to support the evacuation of the area; however, there is no statement that such temporary signs presently exist or that they would be existing at a time of need. It is therefore contended that the York County Plan is deficient because it does not state the exact assignment of the Pennsylvania State Police in connection with all other support groups in York County.

340. Contrary to the allegation of Contention EP-14(J), there is a plan for the involvement of the Pennsylvania State Police in the event of an emergency at TMI. Both the Commonwealth and five risk county emergency response plans contain a coordinated concept of operation for use and deployment of the State Police. Pa. Ex. 2(a), at § VII.B.18, pp. 23-24; see, e.g., Board Ex. 5, at Annexes D and E. In addition, both the Commonwealth and five risk county emergency response plans call for State Police representatives at the state EOC and the county EOC's. In this manner the State Police will be able to coordinate its resources with the needs of the counties and assure a timely deployment of personnel. Tr. at 18978-79 (Bath).

341. One function to be performed by the State Police is traffic control. In carrying out this responsibility the plans provide that the State Police are to coordinate with other response groups, including the Pennsylvania Department of Transportation. E.g., Board Ex. 5, at Annexes D and E. In an earlier version of the York County Plan it was indicated that the State Police and the Department of Transportation would coordinate the deployment of temporary signs during an evacuation. Contention EP-14(J) erroneously assumes that this provision contemplated procuring signs developed especially for an evacuation of the TMI plume exposure pathway EPZ. In fact, what was contemplated was the use of available traffic signs and barriers that might assist both in traffic control during an evacuation and security of evacuated areas. Such material is readily available from Department of Transportation maintenance sheds. Tr. at 18980 (Bath); Tr. at 20930 (Curry). The Board finds that, as an aid in traffic control and security, the use of existing traffic signs and barriers is adequate.

Newberry Contention EP-14(L): Appendix 3, Annex A, providing for police operations in a selective evacuation and a general evacuation provides that the police would support and assist in notification and, on request, that police operations provide fire and police support for traffic control and security. It is submitted that support and assist in notification and support for traffic control and security are

mutually exclusive operations. It is Intervenor's contention that police in local communities cannot be asked to both support traffic control and security and, at the same time, support and assist in the notification of area residents of the impending dangers and evacuation notification in the event of an incident at TMI.

Newberry Contention EP-14(S): Annex G of the York County Plan is deficient in that it assumes that local fire companies will have sufficient manpower to effect emergency operations procedures as outlined in the Plan. As has previously been pointed out by the Intervenor, there is usually insufficient staffing of the individual fire companies to assure that all residents in rural areas would be notified of an incident at the TMI nuclear facility because of the number of miles of road located in each township.

342. Contentions EP-14(L) and EP-14(S) (in part) allege that local police and fire departments have inadequate numbers of personnel to both provide traffic control, security, and fire protection, on the one hand, and assist in the warning and notification of the general public, on the other hand. We already have described Licensee's siren system being installed to provide prompt alerting of the public, see ¶¶ 177-80, supra, and the favorable impact that system will have on reducing the need for local emergency response personnel to provide supplemental alerting to the

public. See ¶¶ 184-87, supra. As a result, the Board finds that local police and fire personnel will not be diverted from their primary functions by a need for large-scale "route alerting". See Adler and Bath-2, ff. Tr. 18975, at 32-33. We therefore reject Contentions EP-14(L) and EP-14(S).

5. Wrecking and Fuel Service Support

ANGRY Contention EP-6(B): Although the Pa. DOP, Sec. IXB (1)(p) delegates the responsibility for arranging for emergency wrecker and fuel services to risk counties, the York County Plan assigns this responsibility to the Pa. National Guard (Sec. VIA(7)(c)).

Newberry Contention EP-14(CC): Nowhere in the York County Plan does there exist a catalog of the tow trucks available for use in York County. Until and unless a catalog of the tow trucks available for use is attached to the Plan, the Plan remains deficient.

Newberry Contention EP-14(C): The Plan is also defective in that it is anticipated that the Pennsylvania National Guard will provide tow trucks and gasoline along evacuation routes; however, nowhere in the Plan does it indicate that the Pennsylvania National Guard has the necessary tow trucks and fuel trucks to effect such a plan. Finally, it's noted that there is no reaction time indicated in the Plan in order to assure that such tow trucks and fuel trucks could even arrive within the evacuation area due to traffic flow on the

interstates and access
highways.

343. The Commonwealth and five risk county emergency response plans contain a coordinated concept of operations for providing wrecking and fuel service support during an evacuation. Along major evacuation routes primary responsibility is assigned to the Department of Military Affairs and the Department of Transportation to establish emergency fuel distribution points and to provide road clearance equipment. See Pa. Ex. 2(a), at §§ VII.A.16.h and VII.A.21.c & d, pp. 20 and 25. In addition, the Governor's Energy Council is tasked with providing an emergency allocation of fuel to the TMI area, if necessary. Pa. Ex. 2(a), at § VII.A.12.a, p. 17. The Commonwealth plan assigns risk counties the responsibility for providing emergency fuel and road clearance services along feeder evacuation routes. Pa. Ex. 2(a), at § VII.B.1.q, p. 27. In response to this assignment of responsibility, the York County emergency plan, for example, provides that police groups will coordinate with the Department of Transportation in the use of equipment and personnel to assist disabled motorists. Board Ex. 5, at Annex D, §§ IV.C.2 and IV.D.9, and Annex E, § III, pp. D-2, D-3 and E-1. Thus, contrary to the allegation of Contention EP-6(B), the Board finds that a consistent concept of operations with respect to wrecking and fuel service support

has been developed. See Adler and Bath-2, ff. Tr. 18975, at 28.

344. Contentions EP-14(CC) and EP-14(C) (in part) challenge whether the plans for providing wrecking and fuel service support can be implemented, in one instance, because a tow truck catalog has not been developed, and in the other case, because the resources available to the National Guard have not been quantified. The Board finds no need for developing such information. State and local law enforcement agencies utilize tow truck services for motor vehicle accidents on a daily basis. This experience can be relied upon to contact and utilize such services during an emergency. Adler and Bath-2, ff. Tr. 18975, at 38. York County, for example, has developed a composite listing of wrecker/towing emergency services that is maintained in a file available at each police dispatcher's work area. Belser, et al., ff. Tr. 20787, at 3 (Curry); Tr. at 20920-21 (Curry). Moreover, some of the municipal plans have preidentified available towing equipment and emergency supplies of gasoline. See, e.g., Board Ex. 13, Manchester Township Plan, p. 5. And, we know from the LWV testimony that in many cases municipal emergency response personnel in fact are aware of the wrecking and fuel support services available to them even though this information has not yet been documented in written plans. Tr. at 21563-64, 21566, 21576 (Ryscavage); see also ¶ 82, supra. Nor does the Board believe there is

any need for the National Guard to predesignate the wrecking and fuel service support available to it. It is sufficient to know that, if necessary, resources available to Commonwealth agencies can be brought to bear. Bath and Adler-1, ff. Tr. 18975, at 32-33.⁷¹

345. Moreover, the historical experience of the Commonwealth has been that emergency wrecker and fuel support services have been available during evacuation situations. Tr. at 17870 (Lamison). In fact, Pennsylvania experience has been that there is very little need for such support services during an emergency, although prudent planning carefully considers such matters. Id. FEMA reports that neither cars running out of fuel nor traffic accidents have precluded successful evacuations in the past. Tr. at 18396 (Adler/Bath). The Board therefore finds that adequate provisions have been made to assure sufficient wrecking and fuel service support during an evacuation.

346. A number of contentions challenged the feasibility of various plans for transportation in the event of an

71 Contention EP-14(C) (in part) asserts that tow trucks and fuel trucks might not be able to enter the evacuation area due to traffic flow on the evacuation routes. This claim ignores the Commonwealth's operational strategy that evacuation routes will be operated with normal two-way traffic patterns. This not only allows emergency vehicles easy access to disabled cars, but also would permit evacuating vehicles to temporarily use the open lane(s) in the event of a traffic accident so as to preclude the total blockage of an evacuation route. Lic. Ex. 52, at 46.

emergency at TMI. The issues raised include the general coordination of transportation planning, the transportation of school children, the transportation of individuals without private transportation, and the transportation and care of invalids and homebounds. We address these concerns seriatim.

6. Transportation - General

Newberry Contention EP-14(V): Annex K of the York County Plan provides for the transportation of various individuals out of the evacuation area. Intervenor's contention in this area is that there is no direct stated coordination of plans between YATA, local school districts, the Baltimore Transit System, and the Pennsylvania and Maryland Railroad Company. The Plan as set forth in the concept of operation indicates that total coordination of the system will be left to the county Transportation Coordinator who will establish a system, but it doesn't identify when he will establish a system to identify priority use of transportation resources. Moreover, it states that any buses without missions would report to the Vo-Tech school located in York and be dispatched from that point. There is no provision for the refueling for any of the buses in any particular area and there is no guarantee that school buses driven by volunteer drivers would be willing to return to a risk area. Furthermore, the Transportation area of the York County Plan has totally disregarded the initial

five-hour plan which had been included in the initial evacuation plan. Nowhere in this Plan does it appear that transportation could be effected in any set time period and, therefore, this section again, by implication, contains the realistic admission that, regardless of whether school was in session, the evacuation plan would be inoperable and unrealistic. Until and unless the Plan shows exact designation of buses, commitment by bus companies to react within set stated times and letters of agreement between the surrounding school districts and the York County Commissioners with regard to assurances of delivery of local school buses, the Plan will remain deficient.

Newberry Contention EP-14(AA): Annex O of the Emergency Plan is deficient in that the concept of operations division does not require mandatory preparation of local plans for emergency notification of bus drivers and the organization of mobilization of transportation necessary to meet the needs of evacuating their student populations. Moreover, the Plan does not include any direction or plan to the local school superintendents as to rerouting their buses for general evacuation of local residents. For example, in an emergency, is a principal of Fishing Creek Elementary School to send a bus to the Vo-Tech School for rerouting while area residents wait for transportation? Until and unless there is some type or generalized plan for each school district as to the

rerouting of school vehicles not in use for removal of school population, the Plan will remain deficient.

Newberry Contention EP-16(T): Moreover, the plan does not envision the method of notifying school and CAT bus drivers and assumes that all drivers will respond in an emergency situation. Moreover, it doesn't indicate anywhere that the CAT bus drivers will know what is expected of them in an emergency situation and know where they are going and how to get to the appointed emergency staging areas. This is a contingency that can be planned for in advance, should be specifically set out in a plan, and thus, the absence of such specificity in the plan renders the plan inadequate.

347. Newberry Contention EP-14(V) asserts a lack of coordination between the transportation section of the York County plan and the plans of the York Area Transportation Authority ("YATA"), the Baltimore Transit System, and the Pennsylvania and Maryland Railroad Company, and complains that the York County plan does not identify when the county transportation coordinator will establish a system for prioritizing use of transportation resources. Newberry also expresses concern about the availability of fuel for buses and about the willingness of bus drivers who have left the risk area to return to the risk area to further assist in evacuation. Newberry further alleges that the York County

plan is deficient in that it must include exact designations of buses, commitments by bus companies to react within stated times, and letters of agreement with surrounding school districts to assure delivery of local school buses.

348. Newberry Contention EP-14(V) has, to some extent, been rendered obsolete by the revision of the York County plan, making it difficult to address the contention directly. Annex K to the current York County plan addresses only transportation services for individuals without private transportation. The transportation needs of invalids in private residences requiring medical transportation are addressed in Annex J to the York County plan, the Health and Medical annex, while the transportation requirements of school children are discussed in Annex O, School Services. See Board Ex. 5, at K-1.

349. The York County Emergency Management Coordinator is responsible for providing transportation support to the people of York County. A county transportation coordinator, with a supporting staff, has been appointed to develop and coordinate transportation procedures and requirements in York County. Board Ex. 5, at K-1. The YATA Statement of Understanding, included in the York County Plan, clearly states that, in an emergency:

Direction and coordination of these resources [the vehicular and manpower resources of YATA] will come under operational control of the York County Commissioners through the designated Emergency Staff Transportation Coordinator. The

Transportation Coordinator will establish specific prioritization for the use of resources in response to the situation at hand and as specified in the appropriate County operations plan.

Board Ex. 5, at T-6; Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, item 8.⁷² Thus, the current York County plan does evidence coordination in transportation planning with YATA, and does describe in a general way the timing and means of prioritization of transportation resources.

350. The current York County plan also includes two letters of agreement from school districts outside the TMI plume exposure pathway EPZ: Spring Grove Area School District and South Eastern School District. These letters of agreement indicate that the school districts would make buses and drivers available to York County in an emergency.⁷³ See Board Ex. 5,

72 Annexes J, K and O to the York County Plan include a certain degree of implicit prioritization of resources. For example, Annex J provides that, in an evacuation, ambulance services in risk areas will continue to provide their normal service to the public, while assisting in the evacuation of non-ambulatory persons to the extent that normal duties permit. See Board Ex. 5, at J-1. Similarly, it is clear that the buses normally used to transport students to and from school are first to be used for the evacuation of those students, as necessary, before being used to evacuate members of the general public lacking private transportation. See Board Ex. 5, Annex O. See generally Staff Ex. 23, at III-21 to III-22. Moreover, while specific bus assignments might clarify operational priorities, actual emergency conditions would probably require an ad hoc distribution of transportation assets to meet the specific circumstances. Adler and Bath-2, ff. Tr. 18975, at 35.

73 FEMA does not believe that such letters of agreement are necessarily required -- even where school districts rely on private bus companies, and even though the existing (footnote continued next page)

at T-2, T-3. Such resources could be used by the county transportation coordinator to supplement the buses provided by the school districts in the risk area for the evacuation of their students, see Board Ex. 5, Annex O, or could be used in the transportation of individuals without private transportation, see Board Ex. 5, Annex K.

351. In addition, York County now maintains a Resource Manual (separate from the county plan) in the York County EOC. This manual includes telephone listings of many transportation resources (besides YATA and the school districts with which the county has letters of agreement) that York County can call upon if necessary. Board Ex. 5, Annex U; Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, item 8. As a result, the York County plan itself no longer refers to either the Baltimore Transit System or the Pennsylvania and Maryland Railroad Company. See Board Ex. 5, Annex K.

352. Contrary to the assertion of Contention EP-14(V) that no provision is made for the refueling of buses, it is expected that local fuel facilities, i.e., county fuel pumps

(continued)

leases might envision only transportation of school children, not mass transportation in an emergency. Instead, FEMA reviews the assurances of bus availability in an emergency on a case-by-case basis to assess the need for such letters. In any event, even if necessary, FEMA does not regard such letters as a high priority item. Tr. at 19216-18 (Bath/Adler). FEMA anticipates that, in an emergency, available vehicles would be used to assist in evacuation, regardless of the existence or nonexistence of such letters of agreement. Adler and Bath-2, ff. Tr. 18975, at 35-36.

and local gas stations would be utilized during initial refueling operations. Adler and Bath-2, ff. Tr. 18975, at 35. For extended operations, the county transportation coordinator could request fuel support from the state and National Guard resources, if necessary. Adler and Bath-2, ff. Tr. 18975, at 35. See generally Pa. Ex. 2(a), at 25; Staff Ex. 23, at III-22; Tr. 19202-04 (Adler/Bath). FEMA does not believe that there is a need for explicit written procedures governing distribution of gasoline. Tr. at 19444 (Adler).

353. With respect to Newberry's concern about the willingness of bus drivers who have left the risk area to return to further assist in evacuation, the FEMA witnesses testified that bus drivers can indeed be expected to return to the risk area, as needed, to accomplish their assigned missions.⁷⁴ Adler and Bath-2, ff. Tr. 18975, at 35. The experience of FEMA over the years is that people assigned responsibility for carrying out emergency missions do in fact carry out their missions. Tr. 19212-13, 19243 (Adler/Pawlowski).

354. FEMA did identify areas of the York County transportation plan that could be improved. This would include specifically identifying the numbers and sources of available

74 The Statements of Understanding which York County has with YATA and the South Eastern School District specifically state that employees will be solicited to perform their duties pursuant to those agreements. See Board Ex. 5, at T-3, T-6. The general willingness of emergency workers to perform their assigned functions is discussed in detail in Section II.A, supra.

vehicles and how those vehicles will be utilized, with reference to the points established by municipalities for the pick-up of individuals without private transportation. FEMA nevertheless concluded that an adequate basis for transportation coordination does currently exist in York County. It is FEMA's opinion that York County can utilize its existing Resource Manual, supporting municipal plans, and Licensee's evacuation time study⁷⁵ to effectively evacuate persons without private transportation in an emergency. Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, item 8. The Board is not inclined to second guess FEMA's professional judgment and, accordingly, rejects Newberry Contention EP-14(V). FEMA will continue to monitor York County's progress in this area, and will provide assistance where possible. Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, item 8.

355. Newberry Contention EP-14(AA) asserts that Annex O of the York County plan is deficient in that it does not include plans for the notification or mobilization of bus drivers necessary to evacuate students. Newberry further alleges that the plan is deficient in that it does not include "a generalized plan for each school as to the rerouting of

75 Licensee's evacuation time study could be used as a source of population distribution information. For example, Licensee's study sets forth, by sector, the number of transients who may be in an area, and may need transportation. Tr. at 22393 (Bath).

school vehicles not in use for removal of school population," but rather provides for the staging of buses at the York Vo-Tech School.

356. Although York County did not participate in the June 2, 1981 exercise, the exercise demonstrated a recognition on the parts of both the Pennsylvania Department of Education and the individual risk counties of their responsibility to ensure that designated school district superintendents are kept informed during an emergency. York County has developed a county master plan for the evacuation of schools. This plan identifies relocation points and evacuation routes, and provides a general concept of operations.⁷⁶ These plans have been coordinated with the school district superintendents, and York County is working with local school district superintendents to coordinate the operational procedures implementing the county master plan. Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, item 9.

357. FEMA believes that the lack of written school plans -- including further information on provisions for bus rerouting -- is a deficiency which should be corrected eventually. Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, item 9; Adler and Bath-2, ff. Tr. 18975, at 57.

⁷⁶ Evacuation destinations for all York County schools within the plume exposure pathway EPZ are listed in the current Annex O to the York County Plan. See Board Ex. 5, at 0-4.

However, such plans are not required for compliance with the Commission's emergency planning regulations. Tr. at 22401-02 (Bath). Moreover, discussions between the York County Emergency Management Coordinator and the county school district superintendents, discussions with Pennsylvania Department of Education personnel, the progress being made in the development of school plans, and the historical capability of York County schools (demonstrated in circumstances other than a nuclear emergency) to notify parents and bus drivers of unscheduled school closings provide assurance that -- even in the absence of written school plans -- York County schools within the risk area could be evacuated successfully. Tr. at 22397 (Bath); see generally Tr. at 20908-09 (Curry); Tr. at 19411-13 (Pawlowski/Adler/Bath). For these reasons, the absence of written school plans did not preclude FEMA from making a finding of overall adequacy with respect to the plans of the Commonwealth and the risk counties. Tr. at 22687 (Dickey). The Board therefore rejects Newberry Contention EP-14(AA).

358. Newberry Contention EP-16(T) asserts that the Dauphin County plan is inadequate because it does not specify how school and Capital Area Transit ("CAT") bus drivers will be notified, and because it assumes that all drivers will respond. The contention further alleges that there is no indication that the CAT bus drivers will know where they are to go or what they are to do in an emergency.

359. The current Dauphin County plan provides that "[t]he County Emergency Management Coordinator is responsible for

providing for transportation support to persons in risk areas of Dauphin County in the event of an evacuation associated with an incident at TMI. A Transportation Coordinator with supporting staff has been appointed to develop and coordinate transportation procedures and requirements in the event of an evacuation." Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, item 10; Board Ex. 6, at G-1. The plan includes a resource inventory of county transportation resources which lists, inter alia, numbers of available buses and telephone numbers for area bus companies and Capital Area Transit, as well as a notation that the inventory is under development and will be further refined to more accurately reflect the number and locations of available buses in the event of an emergency at TMI. See Board Ex. 6, at G-5, G-6. The current county plan also includes a listing of school district telephone numbers, to facilitate early notification to school bus drivers of a possible need for evacuation of students. See Board Ex. 6, at L-2, L-4. See generally Tr. at 19270-71 (Bath). Notification of bus drivers in Dauphin County was adequately demonstrated in the June 2, 1981 exercise. Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, item 11.

360. The plan further sets out the location of Dauphin County's two transportation staging areas, and specifies that incoming resources (such as CAT bus drivers) will be directed to the appropriate staging area when notified to mobilize.

Board Ex. 6, at G-8. Once at the staging area, the drivers' duties and destinations will be explained to them in detail.

361. Contrary to the assertion of the contention, there is no assumption in the plan that all bus drivers will respond in an emergency. In any event, FEMA has had no experience in previous disasters where a mission has failed as a result of a failure of personnel to perform their functions. Bath and Adler-2, ff. Tr. 18975, at 60. See generally ¶ 353, supra, and references therein. For these reasons, the Board rejects Newberry Contention EP-16(T).

7. School Children Transportation

Newberry Contention EP-14(B): Furthermore, this section of the York County Plan anticipates parents and/or families evacuating the area will be able to pick up children at schools. This again would lead to confusion within the Plan in that if a selected evacuation was ordered and pre-school children were to be removed from the area, the Plan anticipates that action would be taken by school superintendents in the evacuation of the children from schools and that there may be interference or lack of effective execution of the Emergency Plan set forth for the school systems.

Newberry Contention EP-16(J): Appendix 12 of Annex E of the Dauphin County Plan provides that during school hours, upon receipt of a condition yellow alert, school districts shall begin returning school students to their homes. Moreover, the Plan continues, that in the event parents are not home, children

shall be returned to one pickup point as listed in the Appendix. There is an exception to this rule indicated in the Plan. It is Intervenor's contention that the Plan is deficient because it first of all allows the busing of the children during a condition yellow situation. It is Intervenor's contention that a much more sensible approach to this problem would be to bus all the children to a predesignated area outside of the 20-mile EPZ and allow parents in an orderly fashion to pick their children up if a condition yellow alert does not change. There is a potential, as the Plan is now written, that in the middle of busing children home during a condition yellow situation that the situation could degrade to a condition red situation and there would be no means of notifying the bus drivers of the change in a situation and the change in the school policy plan under a condition red emergency situation. Finally, Section J of this part of the Plan indicates that evacuation plans of the various school districts will be on file with the County Emergency Preparedness Agency. It is Intervenor's contention that the plans of the school districts should mandatorily be on file and reviewed periodically by the County Emergency Preparedness Agency. Until or unless this deficiency is corrected, it is Intervenor's position that the Plan is defective.

362. The Board next addresses these contentions which deal exclusively with the transportation of school children in

an emergency at TMI. Newberry Contention EP-14(B) alleges, in part, that confusion may result during a selective evacuation because the York County plan provides for both the evacuation of school children as a group and for the pick up of children at school by evacuating parents.

363. This contention is apparently based on an earlier version of the York County plan. The Board has reviewed the current York County plan and finds no indication that, in a selective evacuation, evacuating parents would be informed that they could pick up their children at school. See, e.g., Board Ex. 5, at 8-12 ("Concept of Operations"), F-7 to F-8 (EBS announcement for selective evacuation), Annex H ("Evacuation"), Annex O ("School Services"). Thus, Newberry's concern has apparently been obviated by the revision of the York County plan. We note, however, that in FEMA's review of the earlier plan -- which expressly provided both for the evacuation of school children as a group in the event of a general evacuation and for pickup of children at school by their evacuating families in a selective evacuation -- FEMA did not find the cited provisions objectionable. Bath and Adler-1, ff. Tr. 18975, at 41-42. We therefore reject the portion of Newberry Contention EP-14(B) that is quoted above.

364. The first part of Newberry Contention EP-16(J) asserts that the Dauphin County Plan is deficient because in a "condition yellow" (Alert) school children will be bused home. Newberry contends that a more sensible approach would be to bus

all the students to a pre-designated area outside the risk area⁷⁷ and to allow parents to pick up the children there. Newberry is particularly concerned that, in the middle of busing children home in a "condition yellow," a "condition red" might be declared, and there would be no means of notifying the bus drivers of the change in the situation and the attendant change in school policy.

365. Annex L of the Dauphin County plan, which describes "School Services," has been revised to delete any suggestion that students will be returned home during the early stages of an incident. The current Dauphin County plan calls for the relocation of students to pre-designated host areas in proximity to prescribed public evacuation routes to facilitate reunion of parents and students outside the plume exposure pathway EPZ. The June 2, 1981 exercise demonstrated Pennsylvania's philosophy not to close schools early and return students to their homes, but rather to evacuate students from their schools if warranted. Twenty minutes prior to notification of the evacuation of the general public, the Governor recommended the closure of schools, with relocation of students to host areas. The notification of bus drivers in Dauphin County was adequately demonstrated in the exercise, as noted in paragraph 359, supra. Attachment 3 to FEMA's Interim Findings

77 We summarily reject Newberry's assertion that the children should be bused "outside of the 20-mile EPZ," for reasons explained in paragraphs 217-18, supra.

and Determinations, ff. Tr. 22350, item 11. See generally Board Ex. 6, Annex L. The Board therefore rejects the first part of Newberry Contention EP-16(J).

366. The second part of Newberry Contention EP-16(J) asserts that school district plans should be on file with and reviewed periodically by the Dauphin County Emergency Management Agency.

367. The current Dauphin County plan includes a general description of planning for the evacuation of schools. Bath and Adler-1, ff. Tr. 18975, at 55; Board Ex. 6, Annex L. Two school district plans already are on file with the Dauphin County Emergency Management Agency, Tr. at 20969 (Wertz), including the Lower Dauphin School District plan, see Board Ex. 6, at U-1, which is being used as a "model school district plan" throughout the Commonwealth. Knopf, et al., ff. Tr. 21816, at 8-9. The Steelton-Highspire School District also has adopted an emergency plan. Knopf, et al., ff. Tr. 21816, at 9. Other school district evacuation plans are being developed currently. Bath and Adler-1, ff. Tr. 18975, at 55; Tr. at 20855, 20969 (Wertz). Thus, while the coordination of school evacuation is covered at the county level, some implementation plans (i.e., district and individual school plans) are still under development. Staff Ex. 23, at III-22.

368. As noted earlier, FEMA believes that the lack of written school evacuation plans is a deficiency which should be corrected eventually. However, such plans are not required for

compliance with the Commission's emergency planning regulations. Moreover, schools do on occasion close at unscheduled times -- due to inclement weather and non-nuclear emergencies -- and successfully notify parents and bus drivers, providing assurance that even those Dauphin County schools without plans could be evacuated in the event of an emergency at TMI. See generally ¶ 357, supra. Accordingly, the lack of a complete set of written school plans did not prevent FEMA from making a finding of overall adequacy with respect to Dauphin County plan. Tr. at 22687 (Dickey); see generally Tr. at 22924 (Chesnut). The Board sees no reason to overrule FEMA's considered professional judgment.

369. The Commission's emergency planning regulations provide that responsibilities for plan development and review and for distribution of emergency plans are to be established. The guidance set forth in NUREG-0654 suggests that each emergency response organization shall update its plan as needed, certify it to be current on an annual basis, and forward approved changes to organizations and individuals with responsibility for plan implementation. In addition, each plan is to include a detailed listing of supporting plans and their sources. While NUREG-0654 does not specify that implementing procedures (such as school evacuation plans) need be maintained on file by the county, it does recommend that a listing of such procedures be maintained and that the response organizations (i.e., the school districts) be charged with that responsibility. Bath and Adler-1, ff. Tr. 18975, at 55-56.

370. In response to this guidance, Annex U of the Dauphin County plan is a listing of "Supporting Plans and Implementing Procedures," which already includes one school district plan as on file at the Dauphin County EOC, and which apparently will list other school district plans as they are adopted. See Board Ex. 6, at U-1. In this respect, Dauphin County exceeds NUREG-0654 guidance by actually keeping the school plans on file in the county EOC rather than merely listing them in the county plan. Bath and Adler-1, ff. Tr. 18975, at 55-56. The Dauphin County plan specifically tasks the Dauphin County Emergency Management Coordinator with responsibility for ensuring that the county plan, and supporting plans, are updated annually. See Board Ex. 6, at 5. Cf., Pa. Ex. 2(a), at 26-27. Accordingly, the Board rejects the second part of Newberry Contention EP-16(J).

8. Individuals Without Private Transportation

Newberry Contention EP-16(G): Appendix 8, Attachment 8-1, indicates that there are local pickup points for individuals who are without transportation. There is no indication within the Emergency Plan as now drafted that there will be police protection for people waiting at the pickup points in order to ensure security. Moreover, the pickup points as listed do not ensure that individuals who assemble at these points will be sheltered for their protection under some type of cover. Until or unless it is assured that there will be police protection provided and that sheltering will be provided, the Plan is deemed inadequate.

Newberry Contention EP-16(R): The Dauphin County Plan as presently written envisions mass transportation vehicles to assemble at two staging areas. Upon arriving at the staging areas, the vehicles would then be dispatched to various areas to be led by community leaders. It is submitted that such a plan without the provision of security being placed on the buses and mass transportation vehicles does not ensure that said vehicles will be able to carry out their intended functions. It is submitted that more staging areas would be required in order to effectively deal with mass transportation and until and unless those local regionalized areas are stated in an emergency plan, all plans will remain deficient.

Newberry Contention EP-16(H): Appendix 8, Attachment 8-2 of the Dauphin County Plan provides that local municipalities shall provide one personal lead vehicle to the E.O.C. Reception Area from the Staging Area. The problem with this particular part of the Plan is that there is no designation of who will be the person to lead vehicles to the E.O.C. Reception Area. Moreover, there is a candid admission that there is the chance that municipalities will hijack vehicles intended for other communities. Until and unless there is some type of security provided for incoming and outgoing units, the Plan shall remain deficient. Moreover, there is no provision in this Plan to provide for refueling of the incoming buses and ambulances and until and unless there is some indication of how refueling is going to take place, there is the risk that incoming buses and ambulances would run out of fuel and be rendered useless.

371. The Board next reviews those contentions which address provisions for the transportation of individuals without private transportation in the event of an emergency at TMI. Newberry Contention EP-16(G) asserts a need for police protection and sheltering at the local pickup points for individuals in Dauphin County who are without private transportation.

372. As to the need for police protection at pickup points, it has been FEMA's experience with mass evacuation that the personal security of evacuees has not been a significant problem. Adler and Bath-2, ff. Tr. 18975, at 39. See also Tr. at 19242-48, especially 19247-48 (Adler/Path/Pawlowski). With respect to shelter at pickup points, FEMA notes that there is no requirement or planning guidance specifying that short term shelter is to be provided for persons at pickup points. FEMA does not view the lack of provision for short term cover at all pickup points as a deficiency in the Dauphin County plan. Adler and Bath-2, ff. Tr. 18975, at 39. Since these measures for the pickup of persons without private transportation are specified in the various plans, protective action decisions will be made with knowledge that the concept of operations for evacuation involves exposure of the public -- particularly those at pickup points for mass transportation -- to the open air. The potential for exposure to radiation while awaiting public transportation will thus be considered in evaluating sheltering versus evacuation. The Board therefore rejects Newberry Contention EP-16(G).

373. Newberry Contention EP-16(R) notes that the Dauphin County plan envisions mass transportation vehicles assembling at two staging areas for dispatch, and asserts, in part, a need for more, localized staging areas. PEMA, in its recommendations to the local counties recommends establishing two or more staging areas; Dauphin County planned for two. One is located at City Island, Harrisburg, for incoming units from the west and north, and the other is at the Hershey Arena Parking Lot, for incoming units from the east and south. Adler and Bath-2, ff. Tr. 18975, at 59; Board Ex. 6, at G-8. FEMA's review of the Dauphin County plan disclosed no reason to believe that two staging areas are inadequate, and FEMA in fact believes that the two staging areas will be adequate. Tr. at 19269 (Bath); Adler and Bath-2 ff. Tr. 18975, at 59. The Board was presented with no evidence that the two areas would be inadequate, and therefore concurs in FEMA's judgment. The part of Newberry Contention EP-16(R) challenging the number of transportation staging areas in Dauphin County is rejected.

374. Newberry Contention EP-16(R) further asserts that there is a need for security for the mass transportation vehicles to prevent hijacking, for example. Newberry Contention EP-16(H) makes a similar allegation. However, the Commission's emergency planning guidance does not call for such security. Adler and Bath-2, ff. Tr. 18975, at 58. Moreover, FEMA is unaware of any situation during mass evacuations where emergency vehicle security was a serious problem. Adler and

Bath-2, ff. Tr. 18975, at 58-59. Except for war-time situations, FEMA is unaware of any situations in which local governments hijacked the transport capability of other governments. Adler and Bath-2, ff. Tr. 18975, at 40. In any event, the Dauphin County staging areas will be staffed, at a minimum, with an overall coordinator, communications personnel, an incoming resources coordinator, an outgoing traffic dispatcher, and a fuel coordinator. Thus, there will be government presence at the staging areas, as well as increased staffing of police forces throughout the risk area in an evacuation. See Board Ex. 6, at G-8; Adler and Bath-2, ff. Tr. 18975, at 59. The Board sees no reason to require the extra security sought in Newberry Contention EP-16(R) and EP-16(H) and rejects those contentions to the extent that they seek additional security for mass transportation vehicles.

375. Newberry Contention EP-16(H) further asserts that, while the Dauphin County plan directs local municipalities to provide one person to lead vehicles to the EOC/reception area from the staging area, it is also necessary to predesignate the persons who will be responsible for leading the vehicles to the EOC/reception area. This part of the contention has been mooted by the revision of the Dauphin County plan.⁷⁸ The plan

⁷⁸ The Board notes, however, that FEMA also examined the earlier version of the Dauphin County plan, and expressly found that the failure to predesignate lead vehicle operators was not a deficiency in the plan. See Adler and Bath-2, ff. Tr. 18975, at 40.

no longer provides for one person to lead vehicles to the EOC/reception area. Instead, the concept of operations provides that vehicles congregated at the staging area will be dispatched directly to facilities and municipalities as requested. Board Ex. 6, at G-1 to G-2. The need to designate (and, accordingly, any asserted need to predesignate) lead vehicle operators has thus been obviated. For these reasons, the Board rejects this part of Newberry Contention EP-16(H).

376. Newberry Contention EP-16(H) also alleges that the plan is deficient in that it does not specifically indicate how incoming buses and ambulances will be refueled in an emergency. As previously noted, see ¶ 352, supra, initial refueling will be conducted through local resources (county pumps and private gas stations) with support from the state and the National Guard on an as needed basis. Adler and Bath-2, ff. Tr. 18975, at 40-41. The plan specifically provides for a fuel coordinator to be stationed at each staging area. See Board Ex. 6, at G-8. FEMA does not consider the lack of explicit provisions for the refueling of emergency vehicles to be a deficiency in the plan. Adler and Bath-2, ff. Tr. 18975, at 41. Nor does the Board. The remaining part of Contention EP-16(H) is therefore rejected.

9. Transportation and Care of Invalids and Homebounds

ANGRY Contention EP-6(F):	The preparation of a "list of homebounds and invalids" and a plan for their evacuation (Annex J) and satisfaction of unmet
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"resource requirements" (Annex L) should be accomplished prior to TMI-1 restart.

Newberry Contention EP-14(I): Appendix 2, Section III, Subsection (g) of the York County Plan indicates that the Area Agency on Aging should develop a system to identify the homebound and invalid personnel that require special transportation needs and coordinate a consolidated listing with the transportation group. Until and unless the Area Agency on Aging is directed to effect such a system, it is Intervenor's position that the York County Plan is deficient because, without such listing, there would be no way in which local communities could be assured that all invalids and homebound persons would be removed from an evacuation area.

Newberry Contention EP(14(C): The Plan in Subsection (c) also (in part) assumes that homebounds and invalids will be able to be transmitted by means of ambulance and bus and that individuals with no transportation could request the same through local fire companies for bus pickup. The capabilities to effect such a plan within Newberry Township are nonexistent. For example, Newberry Township has two ambulances that could be placed into service, assuming that a volunteer would operate the same. Local communities surrounding the Newberry Township area include Goldsboro Borough and Lewisberry Borough, each borough having an ambulance to effect evacuation of their homebounds and invalids. It is submitted that within the 34-mile square area that encompasses Newberry Township and the boroughs of Lewisberry, Goldsboro and York Haven that four (4) ambulances would not be

sufficient to evacuate homebounds and invalids. Moreover, transportation through local fire companies will be impossible, as local fire chiefs have indicated that they could not guarantee that any personnel could or would effect such an evacuation service. Finally, it is submitted that if local volunteer fire companies cannot assure manpower staffing during a general emergency situation, that they cannot be again counted upon to provide transportation to designated areas for bus pickup for those individuals who are without transportation.

Newberry Contention EP-16(O): The Dauphin County Plan indicates that it has a total need of approximately 600 ambulances for the evacuation of all members of the exposed populace and indicates only 45 are available. The Plan also indicates that it could obtain an additional 226 ambulances from outside the county, still leaving a shortfall of approximately 300 ambulances. There is no solution to the problem indicated in the Plan.

Newberry Contention EP-16(K): Appendix 13 of Annex E of the Dauphin County Plan indicates that there are approximately 4,000 long-term patients that would require relocation in the event of a general evacuation. The Appendix also includes a listing of hospitals that would be amenable to accepting long-term patients in the event of an emergency. While the Plan indicates the total number of beds available at hospitals, there is no statement as to the number of beds which would be available on an average at any set time. Until and unless the Plan indicates the number of possible available beds that

could be afforded to Dauphin County in the event of an emergency, it is submitted that the Plan is deficient.

377. Next, the Board considers the contentions in the proceeding which challenge provisions for the transportation and care of invalids and homebounds in an evacuation. ANGRY Contention EP-6(F) asserts that a plan for the evacuation of homebounds and invalids in York County must be prepared prior to the restart of TMI-1. ANGRY Contention EP-6(F) further asserts, as does Newberry Contention EP-14(I), that a list of homebounds and invalids must be prepared, prior to restart, to facilitate such an evacuation. Newberry Contention EP-14(C) alleges, in part, a general inability to effect evacuation of homebounds and invalids due to an insufficient number of vehicles. The quoted portion of EP-14(C) further alleges that local fire companies will be unable to provide transportation to local pickup points for mass transportation due to a lack of personnel, implying that many firemen would themselves evacuate.

378. NUREG-0654 recommends development of procedures for the protection of persons whose mobility is impaired. Adler and Bath-2, ff. Tr. 18975, at 30, 53; Staff Ex. 7, at 61 (criterion J.10.d). Provisions for the transportation and care of invalids and homebounds in private York County residences within the TMI plume exposure pathway EPZ who would require

medical-type transportation are specified in Annex J to the York County Plan.⁷⁹ See Board Ex. 5, at J-1 to J-8. Annex G to the York County Plan further provides that, if required, firemen will provide transportation to mass transportation pickup points for persons who cannot otherwise walk or travel to the pickup points. Board Ex. 5, at G-3. Thus, those whose mobility may be impaired and who are without private transportation but do not require medical-type transportation will be provided for without tying up medical vehicles.

379. The current York County plan charges ambulance services, with the support of the respective fire companies, with responsibility for maintaining current lists of non-ambulatory persons living in private residences in York County who would require transportation assistance in the event of an evacuation. See Board Ex. 5, at J-1. Each of the six municipal plans already adopted in York County -- Dover Township, Goldsboro Borough, Lewisberry Borough, Manchester Township, Newberrytown and York Haven Borough -- clearly recognizes the responsibility to develop a list of homebounds and invalids. Each of these plans either includes the actual list of such persons in the plan or expressly states where the list is maintained. At present, the eight other municipalities

79 There are no hospitals or nursing homes in the portion of York County within the TMI plume exposure pathway EPZ. Accordingly, no special provisions for the evacuation of such facilities are necessary in York County. Board Ex. 5, at J-1.

within the York County risk area are developing their municipal plans. Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, item 6; Tr. at 22384 (Bath). However, those municipalities already have compiled lists of homebounds and invalids, which would enable them to identify individuals requiring special transportation in an emergency -- even in the absence of detailed written plans. Tr. at 22384-85 (Bath); Tr. at 20937, 20806 (Curry).

380. Moreover, the public information brochures distributed to York County residents in Fall 1980 requested that persons such as homebounds and invalids identify themselves to their local emergency management coordinator, so that special provisions can be made for their transportation in an evacuation. Adler and Bath-2, ff. Tr. 18975, at 42, 53; Tr. at 22384-85, 19438-39 (Bath); Pa. Ex. 5; Belser, et al., ff. Tr. 20787, at 6 (Curry). This provides further assurance that planning for the care of homebounds and invalids is going on at the municipal level.

381. Under these circumstances, the completion of written municipal plans for the transportation and care of homebounds and invalids in the York County risk area in an emergency is not required for operation of TMI-1. The lack of a full set of such specific written plans did not preclude FEMA from making a finding of overall adequacy with respect to the county plans. Tr. at 22687-88 (Dickey).

382. Aside from questioning whether lists of homebounds and invalids exist, these contentions also challenge whether

there are adequate vehicles to transport the homebounds and invalids. The York County plan provides that the County Emergency Management Agency will coordinate the evacuation by ambulance of non-ambulatory persons from their homes. The plan already includes a complete listing of available ambulance services in York County. See Board Ex. 5, at J-1 to J-2 and J-6 to J-8. The County Emergency Management Agency will seek support from PEMA for any health and medical needs that cannot be met with these county resources. A County Emergency Management Agency Health and Medical Officer is specifically designated as having primary responsibility for this coordinating function. If PEMA cannot obtain the needed vehicles -- a highly unlikely event -- it can seek assistance from the federal level through FEMA. The Board already has reviewed this concept for satisfying unmet needs and found it acceptable. See Section II.G.1, supra.

383. In addition, fire personnel will be available to supplement ambulance services, if necessary. See Board Ex. 5, at G-3. The fire companies in the risk area have agreed to remain in their respective municipalities as long as radiation levels permit,⁸⁰ though their families will evacuate to areas outside the plume exposure pathway EP2. See Board Ex. 5, at G-2. The firemen's dedication, reflected in the York County

80 KI will be distributed to the firemen. See Board Ex. 5, at G-2 to G-3.

plan, is consonant with other testimony in this proceeding on the willingness of emergency workers to perform their functions in an emergency. See Section II.A, supra. We reject the implication that evacuation efforts for homebounds and invalids will be frustrated because firemen will evacuate rather than fulfill their assigned responsibilities under the emergency plan.

384. For these reasons, the Board rejects ANGRY Contention EP-6(F), Newberry Contention EP-14(I), and the quoted portion of Newberry Contention EP-14(C). FEMA will continue to monitor York County Planning to ensure that the plans of the eight remaining municipalities fulfill their responsibilities in this area. Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, item 6.

385. Newberry Contention EP-16(O) alleges that the Dauphin County Plan indicates a need for 600 ambulances, and that only 45 are available within the county, plus 226 that could be obtained from outside the county, leaving a shortfall of approximately 300 ambulances. However, 600 ambulances is the number which Dauphin County identified, in an earlier version of its plan, as required for a 20 mile evacuation. Adler and Bath-2, ff. Tr. 18975, at 42. The Dauphin County Emergency Management Coordinator testified that Dauphin County would need a total of 98 ambulances to support the current plan. Belser, et al., ff. Tr. 20787, at 9 (Wertz); Tr. at 20950 (Wertz).

386. The current plan lists 48 Dauphin County ambulances (of which at least 22 will be available for use in evacuation). Board Ex. 6, at K-16; Tr. at 20950 (Wertz). Additionally, Dauphin County has identified 225 ambulances from counties north of Dauphin County that would be available to Dauphin County in an evacuation, though commitments have not yet been "firmed up." Tr. at 20950-51 (Wertz). FEMA expressed confidence that, utilizing these identified resources and converting standard vehicles into make-shift ambulances (if necessary), a sufficient number of ambulances would be available to evacuate severely incapacitated persons within the Dauphin County risk area. Adler and Bath-2, ff. Tr. 18975, at 42. The Board concurs and accordingly rejects Newberry Contention EP-16(O).

387. Newberry Contention EP-16(K) asserts that the Dauphin County Plan indicates that there are approximately 4000 "long term patients" that would require relocation in an evacuation, but is deficient in that while it includes a list of hospitals which would accept evacuated "long term patients," it does not indicate the average number of beds available at each of those facilities.

388. The Dauphin County Plan lists all Dauphin County hospitals within the TMI plume exposure pathway EPZ -- and their approximate distances from TMI⁸¹ -- in Appendix 1 to

81 All three Dauphin County hospitals are on the outer perimeter of the EPZ. See Board Ex. 6, at K-5. The Board further notes that KI will be stockpiled at all Dauphin County hospitals within the EPZ. See Board Ex. 6, at N-28.

Annex K, "Medical Support," of the Dauphin County Plan. See Board Ex. 6, at K-5. Contrary to the contention, the current plan indicates that the maximum capacity of those hospitals is approximately 1005, not 4000.⁸²

389. Appendices 4 and 5 to Annex K list "support hospitals" which will receive evacuee patients from "risk hospitals." See Board Ex. 6, at K-10 to K-11. Upon declaration of a site or general emergency, the County Emergency Management Agency will contact the "risk hospitals" to receive current hospital census reports. The County Emergency Management Agency will then notify listed "support hospitals" to advise them of the situation and to request current bed availability figures. See Board Ex. 6, at K-3. These procedures will facilitate the identification and transportation of hospital patients to be relocated in an evacuation. Bath and Adler-1, ff. Tr. 18975, at 28-29.

390. The Dauphin County Plan thus provides an established information system through which the county can determine hospital censuses within the EPZ and bed availability in hospitals outside the EPZ, in a timely manner and for the

32 Use of the maximum bed capacity in planning is conservative. One would not expect all hospitals to be filled to capacity at all times. Moreover, the concept of operations envisions that -- prior to an evacuation -- actual facility censuses would be reduced where possible (i.e., through early release of some hospital patients), further reducing the number of beds needed outside the EPZ. See Board Ex. 6, at K-3.

specific time when the need arises. As a practical matter, these figures vary from day to day, as does the seriousness of the medical conditions being treated. In these circumstances, a fixed number of available hospital beds simply cannot be established. Nevertheless, the Dauphin County plan has established a system for determining hospital bed availability on any given day and for relocating hospital patients based on needs that day. Moreover, the Commonwealth's Plan provides that, in addition to established hospitals, numerous packaged disaster hospitals can be erected if there is an insufficient number of available hospital beds. Accordingly, FEMA does not consider the failure of the Dauphin County plan to identify the average number of hospital beds available for relocated hospital patients to be a defect in the plan. Bath and Adler-1, ff. Tr. 18975, at 29-30; Pa. Ex. 2(a), Appendix N to Appendix 9. Nor does the Board. Accordingly, we reject Newberry Contention EP-16(K).

10. Post-Evacuation Support

391. With respect to the adequacy of post-evacuation support procedures, issue was raised as to: the adequacy of mass care sheltering, the need for auxiliary emergency power systems, the adequacy of lead time, the adequacy of the duration of the post-evacuation time period, and the need for the storage of evacuation support materials. We address each of these issues below.

ECNP Contention EP-13:

The evacuation plans for Cumberland, York, and Lebanon Counties are based, at least in part on the assumption that many if not most, evacuees will stay with friends or relatives outside the evacuation zone. This assumption is highly questionable, since during the early days of the still-ongoing TMI-2 accident, after women and children were ordered out of the area within five miles of TMI, many tens of thousands of people outside this area themselves evacuated voluntarily. In the event of another accident at TMI which causes a twenty-mile evacuation, for which each of the five counties expresses preparedness, the resultant voluntary evacuations of persons beyond the 20-mile radius might well mean that there will remain no friends and/or relatives for the 20-mile evacuees to reside with temporarily.

Newberry Contention EP-16(L):

Appendix 14 of Annex E indicates that within a 5-mile radius there are 24,426 individuals who would require evacuation from the area and there is an assumption made that 50 percent of the individuals would require sheltering. The total number of positions available for sheltering in the Plan equals 6,800. There is an obvious deficiency in the number of sheltering site positions available within the County Plan and until and unless there can be some type of acceptable levels of sheltering, the Plan will remain deficient. Moreover, it is Intervenor's position that there is an error in the addition that appears within this Appendix concerning the total capacity of the shelters and that the figure of

7,625 is in error. Furthermore, it is Intervenor's position that until and unless the Plan of Dauphin County indicates that there are auxiliary emergency power systems located in each one of the sheltering systems and emergency auxiliary heating systems at such sheltering locations, the Plan will remain deficient.

Newberry Contention EP-14(EE): The mass evacuation centers contained in the York County Plan do not state that the centers have auxiliary backup electrical power and heating plants in the event that they are placed into use. It is Intervenor's contention that, without such auxiliary power and heating systems, that the Plan is deficient in that evacuees would arrive either at a darkened or cold evacuation center.

Newberry Contention EP-16(A): The Dauphin County Plan, in Section V, makes the assumption that persons evacuated from a risk area will only have to remain outside of the risk area for a period of three (3) days and that adequate lead time will be available to implement the provisions of the Plan. It is Intervenor's contention that a plan based upon these assumptions is inadequate based upon past experience. In the past it has been recognized that a five (5) day selective evacuation was ordered by the Governor of Pennsylvania and that basing an assumption upon a three (3) day sheltering is a defect within the Plan itself. Moreover, there is no definition as to adequate "lead time" and whether or not a definition of that term would mean a short period of time or a relatively long period

of time, and until or unless the term is specifically defined, the Plan is deemed to be inadequate.

Newberry Contention EP-16(S): The Dauphin County Plan is deficient in that there is no long-term management provision in the event of an evacuation which would last greater than three days. Without such long-term planning, there is a possibility and a probability that confusion would reign after an evacuation of three days and it is submitted that in the March 1979 incident, the evacuation lasted for five days. Therefore, until and unless there is greater long-term management planning provided for in the emergency plan, the Plan remains deficient.

Newberry Contention EP-14(II): The York County Plan provides that the American Red Cross would provide for distribution of certain foodstuffs, clothing, and other personal articles. There is no mention in the Plan whether the Red Cross would have at its disposal the estimated foodstuffs required to feed the evacuated population, the cots needed for the sheltered area and the evacuation centers. Until and unless the plan contains the statement that these items are in storage and available for distribution, it is Intervenor's position that the Plan remains deficient.

392. These six contentions question the adequacy of post-evacuation support procedures. These procedures are described in the five risk county emergency plans. See Board Ex. 5,

Annex I; Board Ex. 6, Annex H; Board Ex. 7, Annex H; Board Ex. 8, Annex M; Board Ex. 9, Annex B. FEMA has reviewed the adequacy of post-evacuation support procedures and found them adequate. Staff Ex. 23, at III-22. In addition, both FEMA and the Commonwealth presented testimony on post-evacuation procedures and the listed ECNP and Newberry contentions. See Bath and Adler-1, ff. Tr. 18975, at 44-45, 48 and 50; Adler and Bath-2, ff. Tr. 18975, at 38 and 64; Lothrop, ff. Tr. 17996, at 3.

393. ECNP Contention EP-13 alleges that the assumption that most evacuees will stay with friends or relatives outside the evacuation zone is highly questionable. Such an assumption is implicit in these plans because the plans provide shelter for about half the potential evacuees from the plume exposure pathway EPZ rather than for all such evacuees. Past experience with other disasters indicates that less than 50% of evacuees require public shelter.⁸³ Bath and Adler-1, ff. Tr. 18975, at 49; Lothrop, ff. Tr. 17996, at 3. Nevertheless, present planning provides for enough mass care centers to support 50% of the total population in the plume exposure pathway EPZ, a figure which does not even include the shelters that would be provided for emergency workers and medical patients. Bath and Adler-1, ff. Tr. 18975, at 50. We therefore reject ECNP Contention EP-13.

83 In fact, FEMA witness Adler estimated that only 20% of the population would take advantage of mass care centers. Tr. at 19082 (Adler.)

394. Newberry Contention EP-16(L) claims that the total number of positions allegedly identified in the Dauphin County plan as available for sheltering (6,800) is inadequate. The contention also asserts that the lack of auxiliary emergency power systems for the shelters is a further deficiency. With respect to the concern about the availability of sheltering positions, the Dauphin County Plan provides for seven support counties with eight reception centers. Board Ex. 6, at H-1. The shelter figure (6,800) referenced by Newberry Contention EP-16(L) is for the Upper Dauphin County Reception Center only and does not include the sheltering positions provided by the other reception centers. In fact, Dauphin County has identified 64,000 spaces for sheltering, which is far above what the Dauphin County Emergency Management Coordinator anticipates will be needed or used. Belser, et al., ff. Tr. 20787, at 8 (Wertz). We therefore reject the assertion that the total number of positions available for sheltering in the Dauphin County plan renders the plan deficient.

395. As to the concern about auxiliary emergency power systems, FEMA does not believe that auxiliary power and heating systems are necessary. Bath and Adler-1, ff. Tr. 18975, at 51. For, in the event that a mass care center experiences a loss of power, persons from the affected center would be relocated to an unaffected center. Moreover, in such circumstances additional mass care centers could be established. Bath and Adler-1, ff. Tr. 18975, at 51. We therefore reject Newberry

Contention EP-16(L) in its entirety. Newberry Contention EP-14(EE) raises precisely the same issue, but with respect to the York County shelters. Accordingly, we also reject Contention EP-14(EE).

396. Newberry Contentions EP-16(A) and EP-16(S) assert that the Dauphin County Plan is inadequate due to its assumption that evacuees will be kept out of the evacuated area for three days. Contention EP-16(A) also asserts that the lack of a specific lead time provision in the Dauphin County plan renders the plan inadequate. As to the latter concern about specific lead time, the indication in the plan that some lead time will be needed to fully implement the plan is merely a reflection of the practical realities of emergency planning. Bath and Adler-1, ff. Tr. 18975, at 45. For example, traffic control for evacuation requires the placement of police officers at traffic control points to assist in an orderly evacuation. Those police personnel are not in place now and it would take time to put them in place. However, the absence of those personnel for some period of time will not preclude successful evacuation. Similarly, the fact that a full and orderly implementation of the plan will require lead times for various parts of the plan will not prevent the plan from being implemented. Bath and Adler-1, ff. Tr. 18975, at 45-46. We therefore reject the assertion that the lack of a specific lead time provision in the Dauphin County Plan renders the plan inadequate.

397. With respect to the concern about the post-evacuation time period of three days, we note that evacuees take enough provisions (i.e., clothing, bedding and medications) to last a minimum of three days. Lothrop, ff. Tr. 17996, at 4; Tr. at 17997 (Lothrop). If a longer stay than three days is required, then resupply of essentials can be reasonably anticipated. Bath and Adler-1, ff. Tr. 18975, at 47; Lothrop, ff. Tr. 17996, at 3. Moreover, it is important to note that the Commonwealth's planning assumptions state that evacuated persons will not return to the evacuated area for at least three days; the three day planning figure is only a minimum time frame. Lothrop, ff. Tr. 17996, at 4. We therefore reject Newberry Contentions EP-16(A) and EP-16(S).

398. Newberry Contention EP-14(II) asserts that the lack of a statement in the York County plan on the availability of mass care resources renders the plan deficient. The Commonwealth's plan provides criteria for mass care centers and assigns to the Red Cross the mass care support responsibility, in conjunction with the host county. Adler and Bath-2, ff. Tr. 18975, at 38; Pa. Ex. 2(a), at Appendix 9, p. 18. FEMA witnesses Adler and Bath explained that their experience with disasters indicates that the Red Cross, along with county emergency management agencies, has provided adequate mass care facility operations through either onhand or borrowed resources. Adler and Bath-2, ff. Tr. 18975, at 38. We therefore reject Newberry Contention EP-14(II).

399. The Board concludes that the state and local plans with respect to post-evacuation support procedures are adequate. The concerns raised by ECNP and Newberry are rejected.

11. Medical Facilities and Decontamination

400. With respect to the adequacy of the state and local medical facilities and decontamination procedures, issue was raised as to: the adequacy of medical services for contaminated individuals, the training of medical personnel, the need for an inventory of medical supplies, the availability of adequate radiological monitoring equipment and proper training in its use, and the proposed location for decontamination areas. We address each of these issues below.

ANGRY Contention EP-6(A):

There is inadequate provision in the York County Plan for providing medical services for contaminated individuals, for training persons providing these services, and for transporting radiological victims to medical facilities, all as required by N. 0654 Sec. L.

ECNP Contention EP-10:

Appendix D of the Plan contains reference to the need for the decontamination of radiologically contaminated individuals (p. 16) but does not provide any information as to how many people may be contaminated, the kind and degree of contamination expected or to be planned for, or the number of facilities and medical personnel appropriately trained in decontamination and radiation injury treatment techniques which may be necessary.

Newberry Contention EP-14(JJ): The York County Plan provides that there would be care provided for victims of radiation exposure; however, there is no statement that there are supplies on hand for radiation care or that there are sufficient numbers of supplies on hand to take care of a large mass evacuation in the event that there was a radiation leak. It is Intervenor's contention that, in order to provide sufficient medical care for the populace at risk, it is necessary that the Plan contain statements that inventories are available and are presently in place. Without such statement, the Plan remains defective.

Newberry Contention EP-14(K): Appendix 3, Annex A, Situation Analysis Group, of the York County Plan provides that it will support the State Bureau of Rad. Health with available personnel and equipment and that in the event of a general evacuation on request it will support fire and mass care operations with monitors for decontaminations. Nowhere in the Plan does it state that the Situation Analysis Group will have the necessary equipment required in order to support the various bureaus and fire and mass care operations with the necessary equipment monitors for decontamination operations.

Newberry Contention EP-14(S): (in part) The Plan also contains a concept that the county would distribute radiological monitoring equipment to individual fire companies to be monitored by the fire company personnel. There is no indication in the Plan that volunteer firemen have been trained to operate such equipment and there is no assurance that such equipment is presently

located within the county for distribution. Until these deficiencies are resolved, it is Intervenor's position that the Plan is deficient.

Newberry Contention EP-14(Z): The York County Plan provides for the decontamination of personnel and vehicles and Subsection C of that Plan provides that all vehicles passing through a designated reception center will be decontaminated and also that all vehicles that will be on major routes leaving the county will be decontaminated. The inclusion of this in the Emergency Plan of York County renders the Plan deficient and inoperable. It is Intervenor's position that, by decontaminating vehicles and personnel at the designated locations as set forth in the Plan will only cause the projected traffic flows to be severely diminished as a result of the decontamination. The Plan is deficient also because there is no projection as to the number of cars that would be able to travel on the evacuation routes after the initial jam-up occurs at the decontamination routes. In other words, the decontamination areas will provide a bottleneck for the evacuation of area residents out of risk areas that will effectively render the evacuation plan inoperable. Unless the decontamination points are removed to some other point besides the major evacuation arteries, it is submitted that the Plan is deficient.

401. These six contentions question the adequacy of the state and local medical facilities and decontamination

procedures for the area surrounding TMI-1. The medical facilities and decontamination procedures are described in the Commonwealth's Plan, at Appendix 9, pp. R-1 to R-27 and Appendix 16, and in the York County plan at Annex R. Pa. Ex. 2(a); Board Ex. 5. FEMA reviewed the adequacy of the state and local medical facilities and decontamination procedures and found them acceptable. Staff Ex. 23, at III-23 to III-25. In addition, both FEMA and the Commonwealth presented direct testimony on medical facilities and decontamination procedures and the listed ANGRY, ECNP and Newberry Contentions. Bath and Adler-1, ff. Tr. 18975, at 30-31 and 42-44; Adler and Bath-2, ff. Tr. 18975, at 27-28, 31, 32-34 and 44-45; Cox, ff. Tr. 18,497, at 2.

402. ANGRY Contention EP-6(A) asserts that the York County Plan does not adequately provide for medical services for contaminated individuals or for their transportation to medical facilities. The contention further asserts that the plan does not adequately provide for the training of persons providing such services. The Board disagrees with these claims.

403. The Commonwealth has included in its Department of Health Plan a list of 18 hospitals that are capable of providing medical care to contaminated individuals in the TMI area. Pa. Ex. 2(a), at Appendix 9, R-1, R-2. These hospitals are adequate to provide medical support to the York County residents in the event of an emergency. Tr. at 18546 (Cox);

19429-30 (Bath). Moreover, Mr. Curry testified that the Pennsylvania Department of Health's list of hospitals has been included in the York County plan itself. Belser, et al., ff. Tr. 20787, at 3; compare Pa. Ex. 2(a), at Appendix 9, R-1, R-2, with Board Ex. 5, at Annex J, J-3 to J-5. We therefore reject the assertion that the York County plan does not adequately provide for medical services for contaminated individuals. The York County plan also has made adequate provisions for the transportation of contaminated individuals to these medical facilities by means of ambulance or other appropriate vehicle. Adler and Bath-2, ff. Tr. 18975, at 28; Board Ex. 5, at Annex J, pp. J-1 to J-2 and J-6 to J-8; see also Section II.G.9, supra.

404. Training is given to persons providing medical services under the auspices of the Pennsylvania Department of Health. Adler and Bath-2, ff. Tr. 18975, at 27-28; Pa. Ex. 2(a), at Appendix 10, pp. 10-2, 10-3. The Pennsylvania Department of Health has provided specialized training in the treatment of contaminated individuals to its physicians and is now in the process of establishing radiation seminars for its nurses. Tr. at 18553-54 (Cox). The Emergency Medical Technicians receive training in such areas as initial treatment, triage, and transport of radiated patients. Tr. at 18554 (Cox); Pa. Ex. 2(a), at Appendix 10, p. 10-2. In addition, the Pennsylvania Department of Health has distributed to its medical personnel 100,000 booklets that provide

instruction on radiation in medicine and industry, as well as NCRP Report No. 65, which provides instruction on the treatment of radiated patients.⁸⁴ We therefore find that the state and local persons responsible for providing medical services receive adequate training.

405. Contrary to the assertion of ECNP Contention EP-10, the Commonwealth's Plan does provide for the care of radiologically contaminated persons and identifies specific procedures to be followed in the decontamination of personnel. Adler and Bath-2, ff. Tr. 18975, at 45; Pa. Ex. 2(a), at Appendix 16, pp. 16-4, 16-5. In addition, the Commonwealth's plan provides for a total of 228 facilities which offer basic, general and comprehensive services, including the decontamination and treatment of radiated patients. Cox, ff. Tr. 18497, at 2; Tr. at 18552 (Cox); Pa. Ex. 2(a), at Appendix 9, pp. R-1 to R-27. As previously discussed, the Pennsylvania Department of Health has provided specialized training in the treatment of radiated patients to, among other personnel, its physicians, nurses and emergency medical technicians. See ¶ 404, supra. We therefore reject ECNP Contention EP-10 in its entirety.

406. Newberry Contention EP-14(JJ) alleges that, without an inventory of medical supplies on hand, the York County plan is inadequate. Contrary to the assumption of Contention

84 We note that the Department of Health also has distributed these booklets to veterinarians, dentists and other allied health personnel. Tr. at 18554 (Cox).

EP-14(JJ), it is the Commonwealth, under the Pennsylvania Department of Health plan, which is responsible for the overall coordination and provision of medical services and care, including necessary medical supplies. Bath and Adler-1, ff. Tr. 18975, at 30; Pa. Ex. 2(a), at Attachment 1, 18-19. However, as NRC Staff witnesses Bath and Adler explained, FEMA does not believe there is a need to provide specific inventories of medical supplies in emergency plans. Bath and Adler-1, ff. Tr. 18975, at 31. In the event that persons receive large doses of radiation, they would receive specialized treatment at those medical facilities identified in the Commonwealth's plan which have the capability to provide such treatment. Tr. at 19340 (Bath); Pa. Ex. 2(a), at Appendix 9, pp. R-1, R-2. Persons receiving significant, as opposed to large, doses would require the kind of medical supplies that are normally available to any medical facility. Bath and Adler-1, ff. Tr. 18975, at 31. Consequently, it is not necessary that an inventory of specialized medical supplies be maintained anywhere except at those medical facilities which are capable of treating persons who have received large doses of radiation. Bath and Adler-1, ff. Tr. 18975, at 31. We therefore reject Newberry EP-14(JJ).

407 Newberry Contention EP-14(K) asserts that the York County plan fails to state that its emergency response units (i.e., "Situation Analysis Group") have sufficient radiological monitoring equipment to perform assigned functions. NRC Staff

witness Bath explained that the material contained in the Commonwealth's Plan in Appendices 8 and 16 is adequate to remedy this deficiency. Tr. at 19443 (Bath); see also Pa. Ex. 2(a), at Appendix 8, XIV-1 to XIV-7 and Appendix 16, 16-1 to 16-6. In addition, the York County plan itself provides for a radiological equipment resources inventory. Board Ex. 5, at Appendix 6, pp. R-15, R-16. We therefore reject Newberry Contention EP-14(K).

408. Newberry Contention EP-14(S) asserts that York County lacks adequate radiological monitoring equipment, and that the firemen have not been trained in the use of such equipment. Contrary to this claim, adequate resources for radiological monitoring do exist in York County. In addition to the provisions in the Commonwealth's Plan for monitoring equipment, see ¶ 407, supra, other radiological monitoring equipment is being redistributed to York's fire companies and selected police units. Belser, et al., ff. Tr. 20787, at 4 (Curry); Board Ex. 5, at Appendix R, pp. R-17 to R-19. Under the York County Coordinator's supervision, the fire and police departments receive training in the use of radiological equipment. Belser, et al., ff. Tr. 20787, at 4 (Curry); Tr. at 20931 (Curry). We therefore reject Newberry Contention EP-14(S).

409. Newberry Contention EP-14(Z) objects to the decontamination of vehicles on evacuation routes and at reception centers, and further asserts that the designated decontamination areas will create traffic bottlenecks.

410. Contrary to the assertion of Contention EP-14(Z), vehicles evacuating the plume exposure pathway EPZ would be decontaminated at York County mass care centers, all of which are located more than ten miles beyond the outer boundary of the EPZ, not at reception centers or on evacuation routes. Bath and Adler-1, ff. Tr. 18975, at 43; Tr. at 19076 (Adler); Board Ex. 5 at Annex R, pp. R-3, R-14. Given this concept of operations, egress from the plume exposure pathway EPZ should in no way be affected. The mass care centers, where decontamination operations are planned, were selected to provide, among other things, sufficient parking for evacuees so that traffic congestion and bottlenecks at the centers will be avoided. Bath and Adler-1, ff. Tr. 18975, at 44. Moreover, as the mass care centers are sufficiently distant from the EPZ boundary, any bottleneck that may develop at a center would be of little significance. We therefore reject Newberry Contention EP-14(Z).

411. The Board concludes that the state and local plans make adequate provisions with respect to medical facilities and decontamination procedures. The concerns raised by ANGRY, ECNP and Newberry are rejected.

12. Distribution and Administration of Potassium Iodide

412. Another group of contentions challenged the adequacy of provisions for the distribution and administration of potassium iodide (KI) as a protective action in the event of an emergency at TMI.

ANGRY Contention EP-5(A):

The Commonwealth's plan for distribution of a thyroid blocking agent to persons at risk in the event of a nuclear accident with offsite radiological consequences (Pa. Dept. of Health RERP, App. I) is deficient for the following reasons:

1. The plan assumes an advance warning time (1 hour; p. 2) that is in excess of that which NUREG-0654 concludes may be available before an initial release of radioactive materials to the environment.
2. The postulated warning time is that which is deemed the minimum necessary to enable Dept. of Health officials "to move ahead of evacuees in their distribution efforts." However the plan is silent with respect to the much more critical time period that would actually elapse between the initial notification of the Commonwealth of an emergency situation and the availability to the public of the medication. ANGRY submits that given the logistics of the distribution process as set forth in the plan such a time period would be well in excess of one hour. The "assumption" stated in Sec. IVA(1), p. 13, of the distribution plan is unsupportable as a planning basis.
3. In the case of York County, the movement of large numbers of people to the single designated distribution point for the medication, the County Courthouse, would require complete

depart from predetermined evacuation routes, particularly for residents of Fairview and northern Newberry Townships. It would also cause massive traffic congestion in the center of York City.

4. The plan would be useless in the event of a nuclear emergency for which sheltering was the chosen protective action. It is also useless to those farmers who "consider evacuation unfeasible and elect to seek or use sheltering for themselves . . ." (Pa. Dept. of Agriculture Plan, p. 17). The stated condition to the advice to "take prescribed dosage of SSKI" - 9 to App. 1, Sec. 3(c), namely, its availability, would of course not be met under the plan as presently outlined.

For all the foregoing reasons ANGRY submits that the only method of distribution capable of insuring the availability of a thyroid blocking agent is its pre-distribution to all potentially affected households and businesses, and that such predistribution should be accomplished prior to the restart of TMI-1.

ANGRY Contention EP-6(E):

The provisions in the York County plan for thyroid blocking agent distribution (Annex A, App. 3, Health-Medical Operations) are not coordinated with the state plan.

Newberry Contention EP-14(M):

Appendix 3, Annex A, Health Medical Operations, provides that that group would be prepared to assist the State Department of Health in the distribution of

thyroid blocking and other radiological health materials. Nowhere in the Plan is it stated that these materials are readily available and until and unless the Plan specifically designates that these materials are located within the York County area, it is intervenor's contention that the Plan is deficient.

Newberry Contention EP-14(C): Subsection (c) of this Plan also provides that a County Medical Officer will coordinate with the Pennsylvania Department of Health the distribution of thyroid blocking agents and other radiological health materials. The assumption is that these materials would be stored in an area in close proximity to the affected area without any assurance that such thyroid blocking agents and other radiological health materials are even available and could be delivered to the Exit 6 area of I-83 within a timeframe that would be sufficient to effect the Plan.

413. The Commonwealth's policy on the use of thyroid blocking agents (particularly KI) is described in Appendix I to Appendix 9 of the Commonwealth's Plan. Pa. Ex. 2(a). The Staff, with FEMA, has reviewed the Commonwealth's policy. See Staff Ex. 6, at 21; Staff Ex. 23, at III-21; Staff Ex. 20, at 2, 23-25. In addition, the Commonwealth and FEMA presented testimony on the Commonwealth's policy on the use of KI and on ANGRY Contentions EP-5(A) and EP-6(E), as well as Newberry Contentions EP-14(M) and part of EP-14(C). See Cox, ff. Tr.

18497, at 1; Bath and Adler-1, ff. Tr. 18975, at 33-39, as modified by Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, at 1. The oral examination of these witnesses on the subject of KI appears primarily in the transcripts of April 9 and 15-17, and July 1 and 8, 1981, though other emergency planning witnesses were occasionally briefly examined on the subject. ANGRY presented the testimony of one witness on KI. See Beyea, ff. Tr. 18350. The oral examination of Dr. Beyea appears in the April 9, 1981 transcript.

414. The KI issues actually litigated by the parties differ in focus from those presented in the quoted contentions. While the contentions, as drafted, essentially challenge the logistics of KI distribution to the public, most of the litigation concentrated on the Commonwealth's decision not to provide for the distribution of KI to the general public as a protective action option in the event of radiological emergency. See Cox, ff. Tr. 18497, at 1. Therefore, for the sake of clarity, the Board first describes the Commonwealth's KI policy and the reasons underlying that policy. Only then do we turn to address directly each of the contentions listed above.

415. It has long been assumed that the principal radioactive isotope released in a reactor accident is I-131 (along with other radioiodines). Pa. Ex. 2(a), Appendix I to Appendix 9, at I-1. When radioiodines are inhaled or ingested,

they rapidly accumulate in the thyroid and are metabolized into organic iodine compounds, which may reside in the thyroid long enough to cause local radiation damage. In the event of a radiological accident, KI can be administered to prevent or curtail markedly the accumulation of radioiodines by the thyroid. In effect, the iodide saturates the iodide transport system, essentially preventing entry of radioiodine except for small amounts that might enter the gland by diffusion. 43 Fed. Reg. 58798, ff. Tr. 18577.

416. Very recently, comparisons of consequence estimates used in risk assessment with actual results of accidents and large scale experiments have suggested that the radioactivity actually released to the environment in an accident has been substantially overestimated, due to a failure of risk assessment models to properly account for a significant number of scientific and technical phenomena (including gravity, basic aerosol physics, chemical solubility, chemical reactivity, physical plate out, and absorption). Levenson, ff. Tr. 19525, at 2-4. As background to our discussion of the KI issue, the Board briefly reviews this research as it bears on the release of radioiodine in an accident.

417. Elemental iodine is extremely reactive and, in reducing conditions such as the presence of hydrogen and zirconium, is probably present as cesium iodide. The researchers postulate that if fuel temperatures rose above the decomposition point of cesium iodide, both cesium and iodine

might be volatilized from the fuel. However, the elemental species would travel only inches before the temperature would start to drop drastically and the iodine would recombine with some available material. Even if this process did not occur, the condensed iodine would impact pressure vessel internals and pipe walls with attendant retention before it exited from the primary system. The material that did exit would be in a wet steamy space, surrounded by wet walls, pipes, valves, railings, gratings and hundreds of tons of miscellaneous steel and concrete items. At every contact with any surface and at the surface of every falling drop of water, some of the radioactivity would be immobilized by reaction, solubility or absorption. Exactly how much would be removed at each step by which phenomena would vary for each scenario, but the total removal would always be significant, so that the actual release of radioiodine to the environment would be less by orders of magnitude than is estimated in risk assessments.⁸⁵ Levenson, ff. Tr. 19525, at 4-6.

85 Though, for purposes of our discussion here, we focus on the phenomena attenuating radioiodine, similar mechanisms apply for other fission products (including cesium, tellurium and ruthenium), except xenon and krypton. Moreover, there are no preconditions for these phenomena; for example, containment integrity may greatly affect the quantity of noble gases released to the environment, but the chemical and physical attenuation of other elements occurs whether or not containment integrity is maintained. Nor do any of the attenuation phenomena require the functioning of any of the engineered safeguards features of the plant. Levenson, ff. Tr. 19525, at 4-6.

418. Experiences with reactor accidents and other empirical data -- small scale experiments, large scale containment tests, and experimental reactors tested to destruction -- support the theory that these natural phenomena (not accounted for in modeling) play a significant role in limiting the dispersal of radioactivity to the atmosphere. For example, there have been a number of serious accidents at experimental reactors, involving significant core damage, where no significant amounts of radioactivity were released to the environment. These accidents include Detroit Edison's Fermi Unit 1, the Experimental Breeder Reactor-I in Idaho (1955), the Sodium Reactor Experiment facility in California (1959), the NRX reactor at Chalk River (1952), and the Westinghouse Test Reactor (1960). There also have been at least three major accidents that resulted in radioactive releases to the environment -- Windscale, the SL-1 reactor, and TMI-2. At each, there was major damage to the reactor core. Both the Windscale and SL-1 accidents occurred in noncommercial reactors; neither had a containment building. Nevertheless, in each of these accidents, the radiological releases were limited. In each, the point of interest is the fractional inventory release; i.e., the amount of radioactivity escaping relative to the radioactivity in the core. At Windscale, an air-cooled reactor, substantial amounts of radioactive iodine were present in the core, much of which was released from the fuel in the fire at the reactor. Only a small fraction exited the stack,

however; the highest radiation level reported offsite was about 4 mrem per hour, reported at a single location 1 mile from the reactor. Similarly, in the SL-1 accident, only 20 curies of I-131 reached the atmosphere, of an initial core inventory of 28,000 curies. And, at TMI-2, less than one part in ten million of the iodine in the core was released to the environment. Levenson, ff. Tr. 19525, Appendix A, at 3-10.

419. In addition to this research which calls into question the amount of radioiodine released in an accident, the Board is also cognizant of ongoing debate among experts as to the toxicity of radioiodine to the thyroid. Tr. at 18365, 18376 (Beyea). See generally Tr. at 18364-80 (Beyea). Both these factors may ultimately have great bearing on the need for KI for thyroid blocking purposes in an emergency. While the Board does not rest its decision on these considerations, we are nevertheless mindful of them in assessing the relative merits of the positions advanced by the parties.

420. NUREG-0654, sections J.10.e and f specify that emergency plans are to include provisions for the use of radioprotective drugs (such as KI), particularly for emergency workers and institutionalized persons in the plume exposure pathway EP2, and that state and local plans are to indicate the method by which decisions on the distribution of such drugs to the general public will be made in an emergency. The distribution of radioprotective drugs to the general public is not suggested or recommended by NUREG-0654. Bath and Adler-1, ff. Tr. 18975, at 33.

421. The Commonwealth's Plan reflects the policy of its Department of Health to provide for a supply of KI for emergency workers (police, fire, ambulance and emergency management personnel) and institutionalized persons (staff and patients/residents of hospitals, nursing homes and prisons) within the plume exposure pathway EPZ.⁸⁶ This is consistent with the guidance of NUREG-0654. Bath and Adler-1, ff. Tr. 18975, at 34; Pa. Ex. 2(a), Appendix I to Appendix 9, at p. I-3. PEMA will store and maintain the KI for state agency personnel (with the exception of a few agencies to which it will be predistributed). KI also will be stockpiled at the local emergency response organizations and institutions listed

86 The Commonwealth has experienced difficulty in procuring KI to implement its plan. Carter-Wallace Pharmaceuticals (which produces Thyro-Block, the only form of KI approved by the FDA for use as a thyroid-blocking agent in radiological emergencies) has ceased production of the drug, and now offers only Thyro-Block tablets with an expiration date of December, 1981. Cox, ff. Tr. 18497, at 1; Tr. at 18498-99 (Cox). The Commonwealth then considered purchasing Lugol's solution, a liquid form of KI. Tr. at 18499 (Cox). However, the Commonwealth has now abandoned those plans, primarily because the FDA has not approved the use of Lugol's solution for thyroid-blocking purposes. The Commonwealth is therefore now focusing its efforts on procuring KI pills. Tr. at 22767 (Adler). Thus, though KI has not yet been secured, the Commonwealth still has every intention of doing so. During the June 2, 1981 exercise, because the Commonwealth did not have a supply of KI on hand and distributed, the state Department of Health made arrangements to have a supply of KI flown in from Illinois. Such emergency distribution would require from four to six hours from Illinois to the individual who is to use it. Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, item 1. See also Staff Ex. 20, at 23-24.

above. Bath and Adler-1, ff. Tr. 18975, at 34; Pa. Ex. 2(a), Appendix I to Appendix 9, at pp. I-5 to I-9.

422. The current Commonwealth Plan does not provide for the distribution of KI to the general public. The Commonwealth's decision not to provide KI to the general public is primarily based on a position paper issued by the Food and Drug Administration (FDA), which states:

FDA is not presently in a position to define specific conditions for use of potassium iodide in the general population because of:

- A. Expense.
- B. Shelf life of 24 months.
- C. The incidence of allergic and adverse reactions.
- D. The need for a good comparative evaluation in nuclear emergency scenarios using sheltering, evacuation and the use of potassium iodide.

Pa. Ex. 2(a), Appendix I to Appendix 9, at pp. I-2 and I-3; Bath and Adler-1, ff. Tr. 18975, at 34-35; Cox, ff. Tr. 18497, at 1. The logistical problems presented also weigh against the distribution of KI to the general public. Tr. at 18507 (Cox). BRP will not rely on KI as a protective action option for the general public; instead, BRP will rely on other protective action options -- such as sheltering or evacuation -- for public protection in the event of a radiological emergency. Bath and Adler-1, ff. Tr. 18975, at 35.

423. In assessing the risks posed by side effects and allergic and adverse reactions from the use of KI as a

thyroid-blocking agent, the Commonwealth consulted a number of eminent experts in endocrinology, health physics and other related fields. Tr. at 18516-20 (Cox); Cox, ff. Tr. 18497, at 1. Doses of KI which are higher than those which would be used for thyroid-blocking have been used widely for many years in the treatment of bronchial asthma and other pulmonary disorders. Although a variety of reactions have been reported in connection with the use of KI in treating pulmonary disorders, the incidence of reaction is considered, in general, to be directly proportional to the dose and duration of therapy. 43 Fed. Reg. 58798, 58799, ff. Tr. 18577. Accordingly, individuals are cautioned not to exceed the recommended dose for thyroid-blocking purposes, and not to take it for periods of time longer than instructed. Pa. Ex. 2(a), Appendix I to Appendix 9, at pp. I-2, I-14.

424. Possible side effects of KI include skin rashes, swelling of the salivary glands, and "iodism" (metallic taste, burning mouth and throat, sore teeth and gums, head cold symptoms, and occasional gastrointestinal symptoms). Pa. Ex. 2(a), Appendix I to Appendix 9, at pp. I-2, I-14. A few people (estimated at 1 in 50,000) have allergic reactions with more serious symptoms. These symptoms include an elevated temperature, joint pains, swelling of the face and body and at times severe shortness of breath requiring immediate medical attention. Pa. Ex. 2(a), Appendix I to Appendix 9, at pp. I-2, I-14; Tr. at 18517-18 (Cox). Taking iodide may also (rarely)

cause overactivity of the thyroid, underactivity of the thyroid, or enlargement of the thyroid (goiter). Pa. Ex. 2(a), Appendix I to Appendix 9, at p. I-14.

425. In this context, we review the position taken by ANGRY. ANGRY not only supports the use of KI by the general public in an emergency, ANGRY advocates the predistribution of KI "to all potentially affected households and businesses." ANGRY Contention EP-5(A). Dr. Beyea recommends that KI be stockpiled for the public, at a minimum, but favors its predistribution to the general public, for "timely availability" in the event of an accident. The concerns attendant to the stockpiling of KI for distributing to the general public are generally amplified by predistribution to the public. Thus, even Dr. Beyea admits that there is considerable disagreement even among experts who favor use of KI by the general public about the wisdom of predistributing it to the general public. Beyea, ff. Tr. 18350, at 8-9.

426. Dr. Beyea concedes that there is valid concern that people may lose their supplies of KI if it is predistributed to them (for example, via the mails) long before an accident. Beyea, ff. Tr. 18350, at 12. Therefore, Dr. Beyea recommends that KI be predistributed through attachment to every residential utility meter. Beyea, ff. Tr. 18350, at 11-12. However, there are very practical problems attendant to this form of predistribution. KI must be stored at controlled room temperature, between 59° and 86°F, and is sensitive to both

moisture and light. Pa. Ex. 2(a), Appendix I to Appendix 9, at p. I-14; Tr. at 18386-89 (Beyea). These properties of KI do not make it suitable for storage on utility meters which are either outside or in damp, cool basements.

427 However, the most serious concerns attendant to the predistribution of KI arise from the relative loss of control over the time and manner of administration of the drug. Dr. Beyea concedes that if the drug is predistributed (and therefore readily accessible), individuals may -- on the basis of rumor or a misunderstanding of plant status -- take the drug spontaneously, without being instructed to do so, thereby exposing themselves unnecessarily to the risk of allergic and adverse reactions and side effects from the drug.⁸⁷ Beyea, ff. Tr. 18350, at 12. Similarly, predistribution may increase the chance that individuals will exceed the recommended dose (i.e., take several doses rather than just one). There is also a

87 Dr. Beyea disputes the incidence of adverse and allergic reactions to KI projected by the Commonwealth. See Beyea, ff. Tr. 18350, at 12, 16 fn. 7. Dr. Beyea extrapolated his estimate from figures in a single report; he performed no independent analysis. Tr. at 18405 (Beyea). Moreover, in estimating the incidence of reactions, Dr. Beyea equated "risk per dose" with "risk per person," though persons included in the report's data base actually took multiple doses of the drug, so that the incidence of reactions per person would be higher than the incidence per dose. See generally Tr. at 18396-402 (Beyea). Thus, Dr. Beyea's figure of 10^{-7} or 10^{-6} does not represent the risk per person taking KI in a radiological emergency. This flaw in Dr. Beyea's calculations explains at least some of the difference between the projections of Dr. Beyea and the Commonwealth.

danger that children may accidentally ingest the drug, in the absence of any need for the drug and quite possibly in doses exceeding the recommended dosage, exposing themselves unnecessarily to risks (and, in the case of excessive doses, possibly increased risks) of side effects and allergic and adverse reactions, including anaphylactic shock. See generally Tr. at 18516-17 (Cox). Dr. Beyea also admits that the efficacy of the drug would be reduced somewhat if an individual took the drug for a period exceeding ten days (the manufacturer's recommended period of administration), although Dr. Beyea does not believe that a "significant" reduction in efficacy would occur unless one took KI a week prior to the actual release of radioactive iodine. Beyea, ff. Tr. 18350, at 12-13; Pa. Ex. 2(a), Appendix I to Appendix 9, at p. I-14.

428. The Board steps lightly in areas such as this one, where the Commonwealth has balanced the risks associated with exposure to radioiodine against factors such as the incidence of allergic and adverse reactions to KI, the logistical problems of KI administration, and the availability of other protective action options, and has made a public health policy decision at the state level not to provide for the distribution of KI to the general public in the event of a radiological emergency. See generally Tr. at 18509, 18527, 18536 (Chairman Smith). We are also, as we noted in paragraph 419, supra, sensitive -- in a general way -- to the present uncertainties as to the amount of radioiodine which would be released in an

accident and the toxicity of radioiodine to the thyroid.⁸⁸ Even based on our own independent consideration of the cited factors -- particularly the potential side effects and adverse and allergic reactions to KI -- we are not inclined to overrule the Commonwealth's public health policy decision and order that provisions be made for the distribution of KI to the general public in the event of an emergency. The case against the predistribution of KI to the general public is even more compelling.

429. The multiple uncertainties associated with the KI issue are reflected in current Commission policy, pursuant to which the Staff is to, inter alia:

1. Continue to work with appropriate Federal agencies, i.e., FEMA, FDA and EPA, to address the uncertainties in

88 Given these uncertainties, which impact the need for KI, we note also that there are significant costs associated with KI. The Commonwealth estimates the cost of KI at approximately 75 cents per unit (14 tablets). Using that figure, the cost of one unit of KI for each person within the TMI plume exposure pathway EPZ would be approximately \$105,000. Tr. at 18512 (Cox). Nor would the cost represent a one-time expenditure, since Thyro-Block has a shelf life of only two years. Cox, ff. Tr. 13497, at 1; Pa. Ex. 2(a), Appendix I to Appendix 9, at p. I-2. Dr. Beyea disputes the cost figures used by the Commonwealth. See Beyea, ff. Tr. 18350, at 11. However, Dr. Beyea's figures are based on extrapolations from the cost of the KI program in Sweden, whereas the Commonwealth's figures are based on price quotations from the company which actually sells Thyro-Block in the U.S. Compare Beyea, ff. Tr. 18350, at 10-11 and Tr. at 18424 (Beyea) with Tr. at 18512 (Cox). These differences in cost figures matter little to the Board. While we cannot completely disregard the cost of KI as a factor in our decision, we accord little weight to that consideration and instead rest our decision on the other factors discussed.

the use of KI by the general public and possible alternative respiratory protection strategies.

2. Press on with source term technology studies * * * to a point where the Commission can adequately consider the potential impact on -- among other regulatory matters -- alternative protective actions for public use in a nuclear plant emergency.

Memorandum to Dircks from Chilk, dated March 26, 1981, ff. Tr. 20394. The Commission has expressly reserved judgment on the advisability of recommending the stockpiling of KI for the general public. Id.

430. The Board notes that, since the Commonwealth does not rely on KI as a protective action option and since federal guidance on the administration of KI to the general public is incomplete, the provisions in the Commonwealth Plan on this subject are not inconsistent with federal emergency planning guidance (including the planning standard in 10 C.F.R. Part 50, Appendix E, on Protective Response); that is, the Commonwealth has predetermined that KI will not be used for the general public, and that complies with the NUREG-0654 planning standard. Bath and Adler-1, ff. Tr. 18975, at 35. While comprehensive federal guidance, applicable to all operating reactors, may at some point in the future dictate the use of KI by the general public in an emergency, it would be at best premature -- in light of the uncertainties presently associated with the issue, and the ongoing Commission study of those uncertainties -- for this Board to now order either that KI be predistributed

to the general public in the TMI-1 plume exposure pathway EPZ or even that provisions be made for its distribution to the general public in the plume exposure pathway EPZ in the event of an emergency at TMI. Accordingly, we decline to do so. We next address the specific allegations of the contentions.

431. At the time ANGRY drafted its Contention EP-5(A), the Commonwealth was planning to stockpile KI for distribution to the general public within the TMI-1 plume exposure pathway EPZ in the event of an emergency, though the Commonwealth was not planning to predistribute KI to the public. *Beyea*, ff. Tr. 18350, at 6. The contention was thus rendered somewhat obsolete by the Commonwealth's change in policy. The contention asserts, in part, that KI must be predistributed to the public (rather than merely stockpiled) because the Commonwealth's Plan assumes advance warning time for KI distribution which exceeds the time that may actually be available prior to a release in an accident. As we have previously indicated, the Commonwealth no longer intends to distribute KI to the general public in the event of an emergency at TMI, and we have expressly declined to order that provisions be made for such distribution. See ¶ 430, supra. The state Department of Health has drafted a procedure for the distribution of KI to emergency workers and institutionalized persons, and KI will be stockpiled at numerous distribution points, in accordance with that procedure. *Bath and Adler-1*, ff. Tr. 18975, at 37. These measures ensure that KI will be

timely distributed to emergency workers and institutionalized persons in an emergency. Moreover, the current Commonwealth Plan makes no assumptions about advance warning time for KI distribution, and does recognize value -- although diminished - in taking KI after exposure. Bath and Adler-1, ff. Tr. 18975, at 37; Pa. Ex. 2(a), Appendix I to Appendix 9, at p. I-5.

432. ANGRY Contention EP-5(A) further asserts that, unless KI is predistributed to the general public, it will be useless since it would take excessive time to distribute KI at the time of an accident, since distribution at stockpiling centers would involve traffic congestion and departure from evacuation routes, and since KI would be unavailable when sheltering was the protective action option chosen (particularly where farmers elect to shelter rather than evacuate as advised). Again, these concerns have been largely mooted by the Commonwealth's change in policy with respect to KI. Since the use of KI is no longer a protective action option for the general public, evacuees will not be delayed or directed to specific locations to receive KI. Nor will the public (including farmers) be asked to leave shelters to receive the drug. Bath and Adler-1, ff. Tr. 18975, at 37. Accordingly, the Board rejects ANGRY Contention EP-5(A).

433. ANGRY Contention EP-6(E) asserts that the provisions of the York County plan for KI distribution are not coordinated with the provisions of the Commonwealth Plan. However, the

revised York County plan is now completely consistent with the plans of the Commonwealth and the other four risk counties with respect to the distribution of KI. Attachment 3 to FEMA's Interim Findings and Determinations, ff. Tr. 22350, at 1. See Board Ex. 5 at R-20 to R-28. Therefore, we reject ANGRY Contention EP-6(E).

434. Newberry Contention EP-14(M) asserts that the York County Plan is deficient in that it does not expressly provide for the stockpiling of KI in York County. As we have noted, the Commonwealth has determined that KI will be distributed only to emergency workers and institutionalized persons in the event of an emergency. See ¶¶ 421-22, supra. The Commonwealth Plan includes a listing of KI distribution points for emergency workers and institutions within the TMI plume exposure pathway EPZ, which will include a list of emergency organizations and institutions in York County which are within the TMI plume exposure pathway EPZ where KI will be stockpiled. See Pa. Ex. 2(a), Appendix I to Appendix 9, at pp. I-6 to I-9. While the copy of the Commonwealth Plan that was entered into evidence does not include a complete listing of KI distribution points, the Commonwealth has now recieved the information from the counties necessary to complete the listing. Tr. at 22420-21 (Bath). A complete list for York County is already included in the York County plan. See Board Ex. 5, at R-23 to R-28. The Board therefore rejects Newberry Contention EP-14(M).

435. Newberry Contention EP-14(C) alleges in part that the York County plan is deficient since it provides for the

distribution of KI to the public at Exit 6 of I-83 without assurance that KI is actually available and could be timely delivered to that location. The current York County Plan does not provide for the distribution of KI to the general public, and includes no reference to that location as a distribution point. See Board Ex. 5, at R-20 to R-28. Since KI will not be distributed to the general public in an emergency, provisions for delivery of KI to Exit 6 of I-83 are unnecessary. Bath and Adler-1, ff. Tr. 18975, at 38-39. Accordingly, the Board rejects the quoted portion of Newberry Contention EP-14(C).

13. Farmers and Livestock

436. A number of the contentions litigated in the proceeding related generally to the adequacy of emergency planning and preparedness to protect farmers and livestock. We address these concerns below.

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| Aamodt Contention EP-2: | It is contended that present evacuation plans do not provide for care and/or relocation of livestock. It is further contended that such provision should be made before restart of TMI-1. |
| ANGRY Contention EP-4(A): | There is no provision in the EP for the prevention of damage to property (<u>e.g.</u> , livestock) in the area surrounding the plant site as required by Appendix E to 10 CFR 50, §§ II(C), III, and IV(C). |
| ANGRY Contention EP-5(G): | The Commonwealth's Dept. of Agriculture Plan is inadequate for the reason that it provides |

no information on measures for for the the self-protection of farm personnel who "consider an evacuation unfeasible and elect to seek or use sheltering for themselves . . ." (p. 17). The plan offers the farmer no choice between the two extremes of exposing himself to potentially dangerous levels of radiation or complete abandonment of his investment in his livestock.

Newberry Contention EP-14(BB): Annex R of the York County Plan does not provide for any evacuation of domestic farm animals and until and unless the Plan does provide for a plan of evacuation, the Plan remains deficient. Domestic farm animals cannot be left for any period of time without human care and, therefore, it is assumed that farmers who have such large investments in livestock will not leave their investment unattended and, thus, they are left at risk. Moreover, the agricultural part of the York County Plan provides that the County Emergency Management Agency Director will charge and distribute dosimeters for agricultural personnel who are required to enter the designated risk area but does not state who will provide the dosimeters and who will interpret the dosimeter readings. Until and unless these two facets of the York County Plan are remedied, it is Intervenor's contention that the Plan remains deficient.

ANGRY Contention EP-6(G): The York County Fairgrounds is an inappropriate location for the agricultural "Information Center" (Annex R, Sec. IVF) since it is within the 20-mile distance from the plant to which under the plan's assumptions a

total evacuation may be required. The provision establishing this center fails to provide also for the necessary predetermination by farmers wishing to avail themselves of its services of the nature and timing of the "essential functions" for their farms, the number of persons needed to perform such functions, and the identity of such persons. Dissemination of information concerning this program and the compiling of information provided in response thereto should be accomplished prior to TMI-1 restart.

437. The Commonwealth's Plan and the five county plans include sections addressing the particular problems posed by farmers and livestock in the event of an emergency at TMI-1. See Pa. Ex. 2(a), Appendix 7; Board Ex. 5, Annex N; Board Ex. 6, Annex O; Board Ex. 7, Annex O; Board Ex. 8, Annex K; Board Ex. 9, Annex K. In addition, the NRC Staff and FEMA presented testimony on the listed contentions. See Chesnut, ff. Tr. 15007, at 66-68; Bath and Adler-1, ff. Tr. 18975, at 47-48; Adler and Bath-2, ff. Tr. 18975, at 49-51, 63. The Commonwealth presented prepared testimony on a number of the listed contentions, see Van Buskirk and Cable, ff. Tr. 18296, and also presented a witness to generally address the Commonwealth's Agriculture Plan, though that witness did not sponsor prepared testimony. See Tr. 18831-95 (Furrer). The Commonwealth also presented testimony through a panel including the Emergency

Management Coordinators of Dauphin and York Counties, which addressed -- inter alia -- the general subject of these contentions. See Belser, et al., ff. Tr. 20787. The Aamodts presented testimony on their Contention EP-2. See Lytle, et al., ff. Tr. 18749; Weber, ff. Tr. 18799 (including oral testimony of Samples and Weber, beginning at Tr. 18755); Stewart and Smith, ff. Tr. 20243.⁸⁹ Oral examination of these witnesses, and others, on the general topics raised in the listed contentions appears in the transcripts of March 10 and 24, April 7 and 8, 14 through 16, 24 and 29, and May 1, 1981.

438. The Board first addresses ANGRY Contention EP-4(A), which asserts that Licensee's emergency plan fails to comply with specified provisions of the Commission's emergency planning regulations, in that the plan does not provide for the prevention of damage to property (e.g., livestock). The parts of 10 C.F.R. Part 50, Appendix E cited in the contention -- §§ II(C), III and IV(C) -- do not require that emergency plans provide for the protection of property in areas surrounding a plant site. The cited sections deal with information required in the Preliminary Safety Analysis Report at the construction permit stage, information required in the Final Safety Analysis Report at the operating license stage and emergency plan

⁸⁹ Mr. Stewart and Mr. Smith are the County Agricultural Agents of Dauphin and York Counties, respectively. Stewart and Smith, ff. Tr. 20243. They testified in this proceeding under subpoena of the Board, issued upon motion of the Aamodts. Tr. 17985-88 (Chairman Smith).

provisions for activation of the emergency organization, respectively. None of these provisions relate in any way to requirements for the protection of property. Chesnut, ff. Tr. 15007, at 66-67.

439. Neither the Commission's emergency planning regulations nor NUREG-0654 set forth requirements for the protection of property, including livestock, during a radiological emergency. Bath and Adler-1, ff. Tr. 18975, at 47. During the development of the new emergency planning regulations, which became effective on November 3, 1980, the Commission decided that the regulations would focus exclusively on protection of the public health and safety. As explained in the Statement of Considerations to the new rule, 45 Federal Register 55402, the Commission's decision was based on its determination that "public health and safety should take clear precedence over actions to protect property. Measures to protect property can be taken on an ad hoc basis as resources become available after an accident." Chesnut, ff. Tr. 15007, at 67-68. See generally Bath and Adler-1, ff. Tr. 18975, at 47; Adler and Bath-2, ff. Tr. 18975, at 50.

440. The Commonwealth opposes the evacuation of livestock in a radiological emergency as a practical matter:

Evacuation as an option to reduce livestock exposure to radioactivity after an accident is impractical as an across the board action throughout the potentially hazardous area. The priority for road use and transportation is of necessity directed toward protecting the people in any case of immediate evacuation and any attempted

movement of livestock would be disruptive. As an additional factor, subjecting the stock to the stresses and disease exposure of an evacuation is likely to present a greater risk to the animal than that caused by radiation.

Pa. Ex. 2(a), Appendix 7, at 17. Thus, the absence in Licensee's emergency plan of explicit provisions for protecting property (including livestock) is not a defect and is, in fact, consistent with the Commission's new emergency planning regulations. Chesnut, ff. Tr. 15007, at 67-68; Bath and Adler-1, ff. Tr. 18975, at 47; Adler and Bath-2, ff. Tr. 18975, at 50. Nor does the Commonwealth favor planning for the evacuation of livestock in a radiological emergency. The Board therefore rejects ANGRY Contention EP-4(A). We review Aamodt Contention EP-2, ANGRY Contention EP-5(G), and Newberry Contention EP-14(BB) in this context.

441. Aamodt Contention EP-2 and Newberry Contention EP-14(BB) (a York County plan contention) primarily focus on the lack of plans for evacuation of livestock in the event of a radiological emergency. Newberry Contention EP-14(BB) further suggests, as does ANGRY Contention EP-5(G), that farmers may refuse to leave their livestock. For this reason, Contention EP-5(G) asserts that the Commonwealth's Plan should provide information on "measures for the self-protection of farm personnel" who refuse to evacuate. Newberry Contention EP-14(BB) also alleges that, though the York County Plan provides for the charging and distribution of dosimeters for

agricultural personnel who enter the risk area, the Plan does not state who will provide and interpret the dosimeters, and is in that respect defective.

442. Under the present concept of operations, farmers are considered members of the general public. In the event of a radiological emergency, should conditions warrant evacuation, farmers will be advised to evacuate along with other members of the general public. However, since the thrust of emergency planning is the protection of public health and safety,

¶¶ 439-40, supra, evacuation of livestock is not planned.

Adler and Bath-2, ff. Tr. 18975, at 51. Thus, under existing emergency planning regulations, farmers may be faced with the choice of leaving their livestock or exposing themselves to potential dangers from a radiological accident. This choice is similar to that faced by farmers in the event of natural disasters such as floods, volcanoes and hurricanes. Should the economic interests of farmers be injured in a radiological incident, the recovery for such losses after the incident, like all other property damage losses, would present a legal question. Van Buskirk and Cable, ff. Tr. 18296, at 3.

443. While present emergency planning does not provide for the evacuation of livestock, it does -- contrary to the assertion of Contention EP-2 -- provide for the care of livestock. The planned protective actions for livestock emphasize sheltering and the use of feed and water that has been protected from contamination. Annex B to the Department

of Agriculture Plans for Nuclear Power Station Incidents (Appendix 7 to the Commonwealth's Plan) provides guidance for the emergency protection of livestock and poultry from radiation injury. The guidance takes into consideration the tolerance livestock have to the effects of low level radiation (see, e.g., Pa. Ex. 2(a), Appendix 7, at 17), and it minimizes exposure on the part of the farmer during the release of radioactive material. The emphasis on the use of shelter and protective feed and water provides time for an assessment of the size and duration of the radiation hazards. Van Buskirk and Cable, ff. Tr. 18296, at 1-2. See generally Adler and Bath-2, ff. Tr. 18975, at 50.

444. The Commonwealth's Department of Agriculture has overall responsibility for providing information to the agricultural community on the need to take protective actions for livestock. Pa. Ex. 2(a), Appendix 7, at 8. The Department of Agriculture is discharging this responsibility by distributing to farmers within the plume exposure pathway EPZ the "fact sheets" included in the Commonwealth Plan, which were developed from the "Disaster Handbook For Extension Agents." Tr. at 20421-22, 18882 (Furrer); Pa. Ex. 2(a), Appendix 7, Annex B. The county emergency management agency coordinators have prepared Emergency Broadcast System (EBS) announcements, which direct farmers to shelter their livestock, for broadcast in appropriate situations. Adler and Bath-2, ff. Tr. 18975, at 50. See, e.g., Board Ex. 5, at F-12 (York County announcement); Board Ex. 6, at D-10 (Dauphin County

announcement). Farmers are advised to report their status and the status of their livestock to their county agricultural agent if an evacuation advisory is issued to the general public, so that the farmers can obtain advice and assistance. Information on measures for the self-protection of farm personnel electing not to evacuate is included in the public education materials provided to residents of the plume exposure pathway EPZ. Van Buskirk and Cable, ff. Tr. 18296, at 2, 4; Bath and Adler-1, ff. Tr. 18975, at 48.

445. The county agricultural agents (emergency workers) will work closely with evacuated farmers to provide for their earliest return to their property and livestock. Bath and Adler-1, ff. Tr. 18975, at 48. Depending on conditions, the farmers may be allowed to return to their livestock for maintenance purposes during the period of general public evacuation; travel within the plume exposure pathway EPZ for livestock care will be controlled by local officials, based on local conditions. Adler and Bath-2, ff. Tr. 18975, at 51. Should the assessment of the incident indicate that the evacuation of the public will continue for a protracted period and that accumulated doses will be a health hazard to the farm operators, assistance can be arranged in caring for the farmers' livestock. Should the assessment of the incident indicate that the accumulated doses will be a hazard to the livestock, a decision may be made to permit farm operators on an individual, case-by-case basis, to relocate livestock. Van Buskirk and Cable, ff. Tr. 18296, at 2.

446. The consequences of the movement of livestock will be a consideration of prime importance in determining whether to permit the re'location of livestock. The mingling of livestock and sharing of equipment enroute to and at relocation sites increases the chances of exposure to dangerous transmissible (infectious and contagious) diseases. During the past several years, outbreaks of Brucellosis and Tuberculosis in cattle and Pseudorabies in swine and cattle have occurred in counties surrounding TMI. The movement of livestock results in a greatly increased risk of these diseases and other diseases, such as mastitis and respiratory diseases. Current regulations to prevent disease in cattle require that each animal, before being moved (except to slaughter), meet minimum health requirements. Any exception to the health requirements would be considered on a case-by-case basis. Van Buskirk and Cable, ff. Tr. 18296, at 2-3.

447. The concerns about the provision of dosimetry to agricultural personnel raised in Newberry Contention EP-14(BB) are addressed by the sections of the current York County plan providing for dosimetry for emergency workers. The county emergency management agency will provide self-reading dosimeters and dose record cards, with other appropriate dosimetry, to agricultural emergency workers who may be required to survey the risk area to assess the effects of the accident on the ingestion pathway. Miller and Bath-2, ff. Tr. 18975, at 51; Board Ex. 5, at R-2 to R-3, R-10 to R-12.

448. The Board therefore finds that the emergency plans make adequate provisions for the protection of livestock in the event of an accident at TMI, balancing the primary interest in the protection of public health and safety and the interest in the protection of property, recognizing that some farmers may elect not to evacuate -- in spite of an advisory to do so -- in order to protect their investments. The Board further finds that any farmers who elect not to evacuate will be provided with information on measures for self-protection. Finally, the Board finds that the York County Emergency Management Agency will provide self-reading dosimetry, along with other dosimetry, as appropriate, to agricultural emergency workers who must enter the risk area to conduct radiological surveys. Accordingly, the Board rejects Aamodt Contention EP-2, ANGRY Contention EP-5(G), and Newberry Contention EP-14(BB).

449. ANGRY Contention EP-6(G) alleges that the York County Fairgrounds are an inappropriate location for the agricultural "Information Center," since the fairgrounds are within a 20 mile radius of TMI. The contention further asserts that -- prior to restart -- information concerning the services of the "Information Center" should be provided to farmers, and information about farmers wishing to avail themselves of those services should be compiled.

450. The York County Plan no longer provides for the use of the York County Fairgrounds as an agricultural "Information Center." See Board Ex. 5, at N-1. Accord, Belser, et al., ff.

Tr. 20787, at 2 (Curry). The United States Department of Agriculture (USDA) County Emergency Board and the county agricultural agent are now the primary means for dissemination of guidance to farmers concerning protective actions. Information and guidance from state agencies for farmers will be forwarded through emergency management channels to the USDA County Emergency Board. Board Ex. 5, at N-1. The Emergency Broadcast System is the primary vehicle for emergency information, including agricultural recommendations. The USDA County Emergency Board will be located in Pleasant Aires (a home for the aging), and the county agricultural agent will be stationed in the York County EOC -- both outside the TMI plume exposure pathway EPZ. Belser, et al., ff. Tr. 20787, at 2 (Curry); Tr. 20924 (Curry); compare, Board Ex. 5, at A-1 with Pa. Ex. 2(b).

451. Thus, ANGRY Contention EP-6(G) has been mooted by the revision of the York County plan and is, accordingly, rejected. To the extent that ANGRY Contention EP-6(G) can be read to assert that the USDA County Emergency Board and the County Agricultural Agent should be located outside the 20 mile radius of TMI, the contention is rejected as a challenge to the Commission's emergency planning regulations. See §§ 217-18, supra.

14. Coordination

Newberry Contention EP-15(E): Section 4.6.1(2) of the Emergency Plan provides that the responsibility for actions to

protect persons in the offsite areas rests with the Commonwealth of Pennsylvania and that the Pennsylvania Emergency Management Agency shall be the agency with which the responsibility rests for the placing, in effect, of protective options such as evacuation, sheltering and thyroid prophylaxis. The same section indicates that in the event of a general emergency, precautionary measures may be taken such as sheltering, evacuation and evacuation of certain sectors based upon wind speed and direction. It is again Intervenor's contention that this particular section of the Emergency Plan providing for the precautionary measures cited have not been coordinated with local county plans to any measurable extent. For example, in the county plans, there is no indication of how the counties would instruct its local Civil Defense Directors to evacuate only certain sectors within a community instead of within radial distances of the Three Mile Island nuclear facility. This is again only but one example of a lack of coordination between the Emergency Plan and the various county plans and it is Intervenor's position that this lack of coordination is symptomatic of the entire Emergency Plan as it is now written. The Emergency Plan submitted by the Licensee should encompass a total coordination of all Emergency Plans formulated by federal, state and county agencies. This lack of coordination creates a deficiency which has to be remedied.

452. Newberry Contention EP-15(E) asserts a general lack of coordination among the various emergency response plans. The specific example alleged in the contention relates to the protective action decisionmaking process and the manner in which the selected protective action option will be transmitted from the state level to the county and municipal officials responsible for implementing the selected option. With respect to the coordination between Licensee and BLP in assessing various protective action options, we already have addressed that matter fully in Section II.F, supra, and find no need to rehearse the issue again. As to the particular protective action option identified in the contention -- selective evacuation of a certain sector -- that is a measure that the Commonwealth does not anticipate using in the event of an accident at TMI. See Staff Ex. 20, at 18-19; Pa Ex. 2(a), at Appendix 6, § III.B, p. 6-2; Lothrop, ff. Tr. 17996, at 5. Thus, we see no need to discuss that particular protective action option. The Board, however, does have a general interest in the coordination among the various emergency response plans and the methods used by the affected parties to ensure a coordinated response during an emergency. We discuss this matter below.

453. In paragraph 17, supra, the Board described in general terms the coordination effort among the various onsite and offsite response groups during the planning stage. We find that this effort has resulted in a coordinated and consistent

set of emergency response plans by all affected parties. By necessity, such planning must begin at the highest government level and work down. Knopf, et al., ff. Tr. 21816, at 11. In this regard, the Commonwealth of Pennsylvania, working together with Licensee and FEMA, has developed general concepts of operations that it will follow in responding to radiological emergencies at TMI. See Pa. Ex. 2(a), especially § VI and Appendix 6, § III, pp. 8 to 11 and 6-2. The Commonwealth's plan assigns to state and county agencies those responsibilities necessary to implement the concept of operations described in the plan. See Pa. Ex. 2(a), especially § VII, pp. 11 to 30. The Commonwealth plan further specifies the manner in which the key state level agencies will discharge those responsibilities. See Pa. Ex. 2(a), especially Appendices 7, 8 and 9; see generally Knopf, et al., ff. Tr. 21816, at 12.

454. With respect to those responsibilities assigned to county-level agencies, each of the five risk counties within the TMI plume exposure pathway EPZ also has developed a plan for responding to a radiological emergency at TMI. See Board Ex. 5-9. The concept of operations specified in the county plans is both consistent with that specified in the Commonwealth's Plan and limited to those matters unique to the county-level response. See Knopf, et al., ff. Tr. 21816, at 12. Much of this Recommended Decision has focused on concerns raised about the adequacy of particular provisions, or the lack thereof, in the Dauphin and York County plans. Based on our

review of those issues, the Board is confident that adequate (albeit not perfect) emergency response plans have been developed at the county level.

455. Beyond the county-level plans, our inquiry also has focused on the ability of municipal-level agencies to implement those responsibilities assigned to them by the state and county plans. Throughout this proceeding, intervenors have argued that without detailed, written plans at the municipal level, there was no assurance that municipal agencies could in fact fulfill their responsibilities. As we explain below, the Board rejects that argument.

456. It is clear that, if each of the 38 municipalities within the TMI plume exposure pathway EPZ were to develop their own emergency response plans, it is highly unlikely that a coordinated response making the best use of all available resources at every level of government would result. It is for this reason that planning must start at the state level. Knopf, et al., ff. Tr. 21816, at 11. Given the substantial amount of planning done by the Commonwealth and the five risk counties, we believe there is little need for municipalities to engage in further additional planning. What we believe is desirable is that each municipality be aware of the responsibilities assigned to it by the state- and county-level plans, and that the municipality consider how the resources at hand will be brought to bear to implement the accepted concept of operations. Knopf, et al., ff. Tr. 21816, at 12. While it

would be best if the municipalities documented their work in formal, written plans, the Board does not believe that this is a necessary prerequisite to effective emergency response. We reach this conclusion for a number of reasons.

457. First, we agree with Licensee's expert Dr. Dynes that planning should be viewed as a process, rather than a product. Dynes, ff. Tr. 17120, at 4. One goal of that process is to educate planners and those responsible for implementing the plan about anticipated events and problems, and the most efficient and effective response to those problems during an emergency. Id. From this perspective, it is desirable that planners focus on the essential principles necessary for an effective emergency response, and not elaborate the written plans with details that may soon become obsolete. Id. at 4-5.

458. Second, we believe that the planning process which has occurred to date at the municipal level is adequate to meet the objectives just summarized. Consultants retained by Licensee have, with the aid of a Model Plan and Worksheet, worked with each of the 38 municipalities within the TMI plume exposure pathway EPZ. One goal of this effort was to identify specific local conditions that should be considered by the local planners. Knopf, et al., ff. Tr. 21816, at 6-7, 13. This process is precisely the educational effort that Dr. Dynes viewed as so important. While written municipal plans have been developed during this process, see Board Ex. 13, the Board believes the important fact is that each municipality has

participated in the learning process. Thus, the lack of a written municipal plan from each political subdivision, or perceived deficiencies in the plans developed to date, is not an indication of an inadequate response capability at the municipal level. Knopf, ff. Tr. 21816, at 13. Moreover, Licensee has arranged through its consultants to provide ongoing assistance to the 38 municipalities within the TMI plume exposure pathway EPZ. This will assure that plans are kept current, that planning is coordinated and has a sense of urgency, and that local officials maintain a high emergency response capability. Id. at 14.

459. Third, we find that the responsibilities assigned to municipal governments, and the resources that would have to be brought to bear most quickly in the event of a radiological accident at TMI, are precisely the same resources that routinely respond to a broad range of community emergencies. Knopf, et al., ff. Tr. 21816, at 13. These response organizations -- i.e., police, fire, medical and county EOC personnel -- demonstrate their capabilities on a daily basis. In such circumstances, such organizations have less need for detailed, written plans than do other groups not normally involved in emergency response.

460. The Board was interested in confirming with those people responsible for the planning effort whether, in fact, our view of the process was consistent with their understanding of the process. Mr. Curry, the York County Emergency

Management Coordinator provided that confirmation. He testified that, while it is highly desirable to have written plans at the municipal level, the absence of such plans does not indicate that the response at the local level will be inadequate. Rather, it was Mr. Curry's view that those responsible for emergency activities at the municipal level perform similar activities on a daily basis using essentially the same resources that would be needed in responding to a radiological emergency. Tr. at 20908-09 (Curry). Mr. Belser from PEMA was of the same view. Tr. at 20910-11 (Belser).

461. The Board finds reasonable assurance that all levels of government (state, county and municipal) will respond in a coordinated and effective manner to a radiological emergency at TMI.

H. Maintaining Emergency Preparedness

462. The issues dealing with maintenance of emergency preparedness put into controversy by the parties relate generally to three primary matters: the adequacy of the training received by emergency response personnel within the plume exposure pathway EPZ, the adequacy of the annual radiation emergency exercise conducted by the onsite and offsite response groups, and Licensee's ability to audit and review its Emergency Plan. We deal with these concerns below.

ANGRY Contention EP-5(F):	TMI-1 should not be permitted to restart until persons responsible for implementing emergency
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response network within the plume EPZ have successfully completed the training mandated by N. 0654 Sec. 04 and provided for in Pa. DOP App. 10.

ANGRY Contention EP-5(H):

The Commonwealth plan for hiring and training a nuclear engineer to be dispatched to the TMI-1 control room upon the occurrence of any future nuclear accident should be completed before re-starting is authorized.

463. These two contentions question the adequacy of the training received by emergency response personnel. Licensee's training program is described in Section 4.8.1.1 and Table 12 of its Emergency Plan. Lic. Ex. 30. The NRC Staff has reviewed the adequacy of this training program and its favorable conclusions are reported in the EPE and Supplement 1 thereto. Staff Ex. 6, at 26-28; Staff Ex. 23, at II-12 to II-13. The Commonwealth of Pennsylvania's training program is described in Appendix 10 of its emergency response plan. Pa. Ex. 2(a). Each of the five risk county plans also contains a section on training. Board Ex. 5, at Annex Q; Board Ex. 6, at Annex R; Board Ex. 7, at Annex R; Board Ex. 8, at Annex T; Board Ex. 9, at Annex S. Licensee, the NRC Staff and the Commonwealth presented testimony on the training program for emergency response personnel and ANGRY Contentions EP-5(F) and EP-5(H). See Rogan, et al., ff. Tr. 13756, at 114-20; Chesnut and Bath, ff. Tr. 19626, at 15-18; Lamison (Training)-2, ff.

Tr. 17818.⁹⁰ Oral examination of these witnesses on this subject appears throughout the March 3-5, 10, April 7, and 21 hearing transcripts. The intervenors presented no testimony on this issue, although these parties did participate in the cross-examination of the witnesses.

464. The Board begins its consideration of this issue by evaluating the training provided to Licensee, Commonwealth and local emergency response personnel. This discussion resolves the concerns raised in ANGRY Contention EP-5(F). The Board then addresses ANGRY Contention EP-5(H), which contends that, prior to restart, the Commonwealth must have the capability during an emergency to send its nuclear engineer to the TMI-1 control room.

465. Licensee has developed a three-part Emergency Plan training program to ensure that all personnel receive adequate instruction.⁹¹ Rogan, et al., ff. Tr. 13756, at 115. The training of Licensee personnel is divided into two phases. Tr. at 13841 (Tsaggaris). The first phase consists of the general

90 Commonwealth of Pennsylvania's Testimony of Kenneth R. Lamison Pertaining to Training (Contention EP-5(F)), dated February 23, 1981 ("Lamison (Training)-2").

91 As Licensee witness Tsaggaris explained, the training program is designed for onsite Licensee personnel, Licensee headquarter's support personnel and offsite emergency response personnel. Tr. at 13841 (Tsaggaris). Licensee committed to begin this training program on April 1, 1981, with the expectation that the program would be well underway by the June 2 drill. Tr. at 13846 (Rogan). In addition, Licensee committed to complete one entire iteration of the program prior to restart. Tr. at 13845 (Rogan).

employee training program, which all TMI employees and contractor personnel permitted unescorted access to Unit 1 receive each year. The program includes orientation on the content of the Emergency Plan and Implementing Document, employee responsibilities, emergency facilities and equipment, familiarization with station alarms and communication systems, radiation protection, and instructions and requirements associated with accountability, evacuation, and exposure criteria. Rogan, et al., ff. Tr. 13756, at 115; Lic. Ex. 30, at 8-2. The second phase of training provided to Licensee personnel includes specialized instruction to personnel with specific emergency response functions. The Emergency Plan and Implementing Document delineate which personnel will receive specialized training, the type of training, and the minimum required frequency of such training.⁹² Rogan, et al., ff. Tr. 13756, at 115; Lic. Ex. 30, at 8-3.

466. The Board also observes that the training of Licensee emergency response personnel has been and continues to be ongoing in the form of walk-throughs, drills, and exercises. Chesnut and Bath, ff. Tr. 19626, at 16; Tr. at 13842 (Giangi). The following drills and exercises will be conducted on a

92 In addition to the training described in the Emergency Plan and Implementing Document, Licensee has committed to provide to the members of Licensee's senior management who have joined Licensee in the last two years and who are designated to act as Emergency Directors or as Emergency Support Directors a formal training course addressing site-specific plant design features. Lic. Ex. 56, at 4.

periodic basis: medical emergency drill; fire emergency drill; repair and damage control drill; communication links test; radiological monitoring drill; radiological controls drill; and a radiation emergency exercise (i.e., a major drill appropriate to a Site or General Emergency). Rogan et al., ff. Tr. 13756, at 117; Tr. 13,842-44 (Rogan/Giangi); Lic. Ex. 30, at 8-8, 8-9. During 1980, more than a dozen Emergency Plan drills were run at TMI. These drills exercised various facets of Licensee's onsite and offsite emergency organizations, as well as state and local emergency response agencies. Rogan, et al., ff. Tr. 13756, at 117; Tr. at 13843 (Giangi). The Board therefore finds that Licensee's emergency response personnel have received adequate training.

467. Training provided to the Commonwealth's emergency response personnel is covered by an extensive program developed by PEMA. Tr. at 17938 (Lamison). Emergency response team leaders receive instruction in radiation protection, radiation exposure, and contamination control, as well as practice in radiological accident simulation scenarios. Tr. at 17942-43 Pa. Ex. 2(a), at Appendix 10, p. 10-1. The directors of the various state response organizations, e.g., BRP, attend periodic training sessions that cover material on emergency response considerations and protective action measures. Tr. at 17939-41 (Lamison); Pa. Ex. 2(a), at Appendix 10, p. 10-2. The response personnel, such as fire and police, receive basic instruction in dealing with a wide range of toxic and

radioactive materials. Tr. at 17941-42 (Lamison); Pa. x. 2(a), at Appendix 10, p. 10-2. Personnel responsible for accident assessment receive instruction in normal and abnormal reactor operating modes and take part in accident simulation scenarios. Tr. at 17942 (Lamison); Pa. Ex. 2(a), at Appendix 10, p. 10-2. PEMA also provides training for medical support personnel, including instruction and training in the treatment of radiation injuries. Tr. at 17944-45 (Lamison); Pa. Ex. 2(a), at Appendix 10, p. 10-2, 10-3. State personnel responsible for the transmission of emergency information receive periodic training on the dissemination of information and the utilization of communication systems. Tr. at 17945 (Lamison).

468. The Commonwealth's training program is supplemented by instruction that Licensee offers to offsite emergency response personnel. Rogan, et al., Tr. at 13756, at 116; Tr. at 13841 (Tsaggaris); Lic. Ex. 30, at 8-3. The program, which is scheduled in conjunction with the training of TMI personnel, is designed to familiarize offsite emergency response personnel with the TMI site, the TMI Emergency Plan, and the manner in which the plan interfaces with each offsite agency. Rogan, et al., ff. Tr. 13756 at 116; Tr. at 13842 (Tsaggaris); Licensee Ex. 30, at 8-3, 8-4. The Board therefore finds that the Commonwealth's emergency response personnel receive adequate training.

469. At the local level, PEMA provides training to the county emergency management coordinators in areas consistent

with their responsibilities -- i.e., emergency response considerations, relationships and responsibilities of response organizations, and protective action measures. Tr. at 17949 (Lamison); Pa. Ex. 2(a), at Appendix 10, p. 10-2. In turn, the county coordinators are responsible for ensuring the training of local emergency response personnel. Tr. at 17949 (Lamison). Under this supervision, local emergency response groups, such as the fire and police departments, receive appropriate radiological training, including the use of radiological monitoring equipment. Belser, et al., ff. Tr. 20787 at 4 (Curry); Tr. at 20931 (Curry). In addition, as previously noted, Licensee's training program provides supplemental instruction to local emergency response organizations, including fire departments, ambulance services, police departments and county emergency management agencies. Tr. at 13842 (Tsaggaris); Lic. Ex. 30, at 8-3 to 8-6. The Board therefore finds that emergency response personnel at the local level receive adequate training.

470. The Board next considers ANGRY Contention EP-5(H), which asserts that the Commonwealth's plan for sending its nuclear engineer to the TMI-1 control room in the event of an accident should be in place prior to restart. Contrary to the assumption of Contention EP-5(H), the Commonwealth plans to send its nuclear engineer to Licensee's Emergency Operations Facility ("EOF"), and not the TMI-1 control room, Tr. at 23017 (Dornsife); the Commonwealth recently has added a second

nuclear engineer to its staff, which will facilitate stationing a nuclear engineer at the EOF. Tr. at 23019 (Dornsife). The Board finds that the state has provided for the timely dispatch of a trained nuclear engineer to the site in the event of an emergency at TMI.

471. Issues raised as to the adequacy of the annual radiation emergency exercise include: provisions for the participation of federal agencies, the need for all major elements of the various emergency response organizations to be tested in an exercise prior to restart, and a requirement that York County direct all local emergency service forces to participate in the annual exercise. We consider each issue below.

ANGRY Contention EP-4(F):

The provisions for the conducting of a "Radiation Emergency Exercise" of the Licensee (EP, p. 8-8) and of the Commonwealth (Pa. DOP, App. 14) are inadequate in that they do not clearly provide for the participation therein of federal agencies. The necessity for such participation is clearly established by the extensive involvement of federal agencies in the TMI accident. Second, the aforementioned appendix to the Commonwealth's emergency plan indicates that "all major elements of the plans and preparedness organizations" may be tested only over a period of five years. All such elements should be tested in an exercise prior to the restart of TMI-1.

Newberry Contention EP-14(C):
(in part)

Moreover, Section VI, Subsection (c)(4) provides that there will

be an exercise and training of emergency service forces to include at least one annual exercise conducted in connection with PEMA. It is submitted that this part of the Plan is deficient because it does not require mandatory participation of all of the local emergency service forces. A most recent test conducted by PEMA in July of 1980 did not include the participation of a majority of the local townships and boroughs because the persons who would have been involved in that training exercise are volunteers and would not or could not obtain leave from their employers to participate in such a training exercise. It is contended that the Plan is still deficient in this area unless and until the Commonwealth of Pennsylvania through its police powers provides that those who are considered to be emergency service forces within the local boroughs and townships are given nonprejudicial paid leave time by their employers in order to participate in such an exercise.

472. Licensee's radiation emergency exercise is described in Section 4.8.1.2 of its Emergency Plan. Lic. Ex. 30. The NRC Staff has reviewed the provisions made for this exercise in Licensee's Emergency Plan and its favorable conclusions are reported in Supplement 1 to the EPE. Staff Ex. 23, at II-16. The Commonwealth's annual exercise is described in Appendix 14 of its emergency response plan. Pa. Exhibit 2(a). FEMA has reviewed the provisions made for the Commonwealth's annual

exercise and its favorable conclusions are reported in Supplement 1 to the EPE and in its Interim Findings and Determinations. In addition, Licensee, the NRC Staff and the Commonwealth presented testimony on ANGRY Contention EP-4(F) and Newberry Contention EP-14(C) (in part). See Rogan, et al., ff. Tr. 13756, at 116-18; Chesnut, ff. 15007, at 78-80; Bath and Adler-1, ff. Tr. 18975, at 52-54; Lamison (Exercises and Drills)-3, ff. Tr. 17818.⁹³ Oral examination of these witnesses on this subject appears throughout the March 3-6, 10-12, 17 and 24, April 7 and 15-17, and June 1 and 7-9, 1981 hearing transcripts.

473. ANGRY Contention EP-4(F) asserts that the Licensee and Commonwealth provisions for conducting the radiation emergency exercise are inadequate in that they do not provide for the participation of federal agencies. As Licensee's witnesses explained, in accordance with 10 C.F.R. Part 50, Appendix E, § IV.F.2, it is expected that federal emergency response agencies will participate in the radiation emergency exercise at TMI at least once every five years. Rogan, et al., ff. Tr. 13756, at 117; Tr. at 14276 (Giangi). In fact, the NRC regional emergency response team, consisting of Region I inspectors and the NRC TMI site organization, was activated and

93 Commonwealth of Pennsylvania's Testimony of Kenneth R. Lamison Pertaining to Exercises and Drills (Contentions EP-4(F), EP-5(D)), dated February 23, 1981 ("Lamison (Exercises and Drills)-3").

did participate in the recent June 2, 1981 exercise. Donaldson and Chesnut, ff. 22236, at 5. This Board has no authority to direct federal participation in the annual radiation emergency exercise beyond that specified in the Commission's regulations. Accordingly, we reject that part of Contention EP-4(F) relating to an alleged inadequate level of federal participation in the exercise.

474. ANGRY Contention EP-4(F) also argues that all major elements of the various emergency response organizations should be tested in an exercise prior to the restart of TMI-1. In accordance with short-term order item 3(e), such an exercise was conducted on June 2, 1981. Donaldson and Chesnut, ff. Tr. 22236, at 7; Tr. at 13846 (Rogan); Staff Ex. 18, at 1. The participants in the exercise included Licensee, the Commonwealth, four of the five risk counties (Dauphin, Lebanon, Lancaster and Cumberland), three municipalities, and several voluntary support organizations. Donaldson and Chesnut, ff. Tr. 22236, at 2; Staff Ex. 18, at 1. York County did not participate in the exercise. Tr. at 22747 (Adler); Staff Ex. 18, at 1. However, as Commonwealth witness Hippert explained, York County plans to have an exercise on August 29, 1981, which will demonstrate York County's ability to implement its emergency plan. Tr. at 22874 (Hippert). We already have indicated that the Board will require the NRC Staff to certify that an adequate exercise of the York County plan has been conducted. See ¶ 18, supra.

475. The NRC Staff evaluated Licensee's performance during the June 2 exercise and reported that Licensee demonstrated the ability to implement its Emergency Plan. Donaldson and Chesnut, ff. Tr. 22236, at 7. Tr. at 22323-24 (Chesnut). This review included an evaluation of such major functional areas as accident assessment, notification of offsite agencies, radiological dose assessment and projection, interface with the NRC response organization, and public information. Donaldson and Chesnut, ff. Tr. 22236, at 5. FEMA's evaluation of the performance by state and local response groups is reported in a detailed exercise report. Staff Ex. 20. Although FEMA identified 72 specific recommendations for improvement, it concluded that the overall response capability of Pennsylvania exceeds minimum standards, Staff Ex. 20, at 1, and that the Commonwealth and county radiological emergency response plans site-specific to TMI are capable of being implemented. Tr. at 22645 (Dickey); Staff Ex. 18, at 2. We therefore find that all major elements of the Licensee, Commonwealth and local government emergency plans either have been or will be tested in an exercise prior to the restart of TMI-1.

476. Newberry Contention EP-14(C) asserts, in part, that the York County plan is deficient in that it does not require mandatory participation by all local emergency service forces in the annual radiation emergency exercise. The emergency planning rule, 10 C.F.R. Part 50, Appendix E, § IV.F.1, requires annual participation by local emergency response

personnel. However, the regulation does not require that every element of each local response organization participate in each exercise.⁹⁴ Bath and Adler-1, Cf. Tr. 18975, at 52; Tr. at 22748 (Adler). We therefore reject that part of Newberry Contention EP-14(C) which asserts that the York County plan is deficient because it does not require mandatory participation of all local emergency response groups.

Sholly Contention EP-17(B): Licensee's Emergency Plan fails to adequately provide a mechanism which will assure the effectiveness of the Emergency Plan throughout the operational lifetime of the TMI-1 facility.

477. This contention questions Licensee's ability to maintain the effectiveness of its Emergency Plan throughout the operational lifetime of TMI. Licensee's procedures for the audit and review of its Emergency Plan are described in Sections 4.8.1.2, 4.8.1.3 and 4.8.2 of its Emergency Plan. Lic. Ex. 30. The NRC Staff has reviewed the adequacy of Licensee's audit and review procedures and its favorable conclusions are reported in the EPE and Supplement 1 thereto. Staff Ex. 6, at 28-29; Staff Ex. 23, at II-16. In addition,

94 In the recent June 2 exercise, three municipalities did participate. Staff Ex. 18, at 1. FEMA concluded that the emergency response of the three municipalities was adequate. Staff Ex. 18, at 1. In addition, other municipalities will be exercised in the series of annual exercises that PEMA will continue to conduct. Tr. at 22749-50 (Hardy).

both Licensee and the NRC Staff presented testimony on Licensee's audit and review procedures and Sholly Contention EP-17(B). See Rogan, et al., ff. Tr. 13756, at 118-20; Chesnut, ff. Tr. 15007, at 80-81.

478. Contrary to the assertion of Contention EP-17(B), Licensee's Emergency Plan does, in fact, provide mechanisms to ensure that the effectiveness of the plan is maintained. Chesnut, ff. Tr. 15007, at 81, Lic. Ex. 30, at 8-7, 8-9, 8-10. For example, Licensee's Emergency Plan provides for a Supervisor-Emergency Preparedness who is responsible for the coordinating of proposed revisions to the Emergency Plan and the Implementing Document, the upgrading of emergency equipment and supplies, and the monitoring of changes in federal regulations and guidance that impact emergency planning. Rogan, et al., ff. Tr. 13756, at 118; Lic. Ex. 30, at 8-7, 8-9, 8-10. In addition, the Emergency Plan requires that a critique be scheduled and held as soon as practicable following a drill or exercise. Rogan, et al., ff. Tr. 13756, at 118; Lic. Ex. 30, at 8-7. The comments of observers and participants in the drill are presented to the Supervisor-Emergency Preparedness for resolution and follow-up as appropriate.⁹⁵ Rogan, et al., ff. Tr. 13756, at 118. These comments are submitted to the Vice President TMI-1 for his review. Recommended changes

⁹⁵ Licensee uses an action item tracking system to ensure timely resolution of these items. Rogan, et al., ff. Tr. 13756, at 118.

approved by the Vice President TMI-1 will be incorporated into the Emergency Plan or Implementing Document under the direction of the Supervisor-Emergency Preparedness. Rogan, et al., ff. Tr. 13756, at 118-19; Lic. Ex. 30, at 8-7. In addition, the TMI-1 Emergency Plan, including appended letters of agreement, will be reviewed and updated on an annual basis. The Quality Assurance Department is responsible for conducting an independent periodic audit to verify compliance with the Operational Quality Assurance Plan, the Fire Protection Program Plan, Licensee's internal rules and procedures, federal regulations, and operating license provisions. The Supervisor-Emergency Preparedness provides a further ongoing review of the TMI emergency preparedness program. Rogan, et al., ff. Tr. 13756, at 119; Lic. Ex. 30, at 8-10.

479. We therefore find that Licensee has provided for maintaining the effectiveness of the Emergency Plan throughout the operational lifetime of TMI-1.

III. CONCLUSIONS OF LAW

480. The Board has considered all documentary and oral evidence presented by the parties on the contentions raised by intervenors, the questions raised by the Board, and the recommendations of the Director of Nuclear Reactor Regulations as stated in the Commission's Order and Notice of Hearing, CLI-79-8, 10 N.R.C. 141 (1979). Based upon a review of the entire record in this proceeding and the foregoing findings of

fact, the Board enters the following conclusions of law with respect to emergency preparedness issues.

481. The emergency preparedness short- and long-term actions recommended by the Director of Nuclear Reactor Regulation and set forth in Section II of the Commission's Order and Notice of Hearings, as further defined by the Commission's new emergency preparedness regulations, are necessary and sufficient to provide reasonable assurance that the Three Mile Island Unit 1 facility can be operated without endangering the health and safety of the public. Completion of the actions identified in paragraph 484 below will bring Licensee in full compliance with the short- and long-term order items.

482. The radiological emergency response plans of Licensee, the Commonwealth of Pennsylvania, and the risk Counties of Dauphin, York, Lancaster, Lebanon and Cumberland comply with the Commission's emergency preparedness regulations.

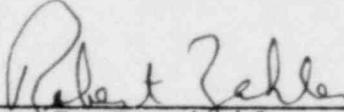
483. None of the concerns raised by the intervenors require further modifications to the emergency response plans of Licensee, the Commonwealth and the risk counties.

484. Prior to restart, Licensee shall complete installation and testing of the system for the prompt alerting of the population within the plume exposure pathway EPZ, and an

exercise demonstrating the capability to implement the York
County emergency plan shall be conducted.

Respectfully submitted,

SHAW, PITTMAN, POTTS & TROWBRIDGE



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