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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING APPEAL BOARD

In the Matter of	)	
	)	
PHILADELPHIA ELECTRIC COMPANY	)	Docket Nos. 50-352 OL
	)	50-353 OL
(Limerick Generating Station, Units 1 and 2)	)	

NRC STAFF'S RESPONSE IN OPPOSITION TO THE APPEALS OF AIR AND WATER POLLUTION PATROL, FRIENDS OF THE EARTH IN THE DELAWARE VALLEY AND LIMERICK ECOLOGY ACTION RELATING TO THE SECOND PARTIAL INITIAL DECISION OF AUGUST 29, 1984

Benjamin H. Vogler
Counsel for NRC Staff

Ann P. Hodgdon
Counsel for NRC Staff

Dated: January 7, 1985

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I. INTRODUCTION

This matter is before the Atomic Safety and Licensing Appeal Board (Appeal Board) on the separate appeals of Air and Water Pollution Patrol (AWPP), Friends of the Earth in the Delaware Valley (FOE) and Limerick Ecology Action (LEA). These appeals, filed pursuant to 10 C.F.R. § 2.762, are from the Atomic Safety and Licensing Board's (Licensing Board) Second Partial Initial Decision, LBP-84-31, 20 NRC 446 (1984). 1/

II. STATEMENT OF THE CASE

On August 29, 1984, the Licensing Board issued a Second Partial Initial Decision, deciding in favor of the Applicant, Philadelphia Electric Company, all issues in controversy necessary for the issuance of low power operating

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1/ Citations hereafter to the Second Partial Initial Decision are to the paragraph number.

The first Partial Initial Decision on Supplementing Cooling Water Systems Contentions was issued on March 8, 1983, LBP-83-11, 17 NRC 413 (1983), and was sustained in part and reversed in part by the Appeal Board in ALAB-785, 20 NRC 848 (1984).

licenses pursuant to 10 C.F.R. § 50.57(c). On October 26, 1984, the Director of Nuclear Reactor Regulation issued an operating license to the Applicant restricted to five percent of rated power.

Air and Water Pollution Patrol and Frank Romano, a joint party and a pro se intervenor, referred to as "AWPP," appealed from the Licensing Board's disposition of its environmental contention regarding the adverse impact of carburetor icing on small planes flying in airspace affected by the cooling tower plumes and its contention alleging inadequacies in the Applicant's quality assurance program. Friends of the Earth in the Delaware Valley and Robert L. Anthony, a joint party and a pro se intervenor, referred to as "FOE," has appealed from the Licensing Board's findings regarding the impact on the safety of the facility from industrial petroleum and natural gas pipelines located at or near the site. Intervenor Limerick Ecology Action has appealed from the Licensing Board's conclusion that the Applicant's onsite emergency planning was adequate and from the Licensing Board's rejection of some of its proposed contentions concerning the Staff's treatment of the risk of severe accidents in its Final Environmental Statement.

III. STATEMENT OF THE ISSUES ON APPEAL

A. Whether the Licensing Board erred in concluding that emissions from the cooling towers would not constitute a significant environmental hazard to pilots of small planes flying in the affected airspace.

B. Whether the Licensing Board erred in: (1) respecifying AWPP's contention regarding the adequacy of the Applicant's quality assurance program; (2) requiring AWPP to file its findings first; (3) basing findings on the testimony of Applicant's witnesses Boyer and Clohecy and, (4) rejecting the testimony of AWPP's expert witness, Dr. Iversen.

C. Whether the Licensing Board erred in determining that the proximity of industrial (petroleum and natural gas) pipelines would not pose a safety problem for the facility.

D. Whether the Licensing Board erred in determining that the Applicant's onsite emergency plans concerning: (1) emergency response facilities and (2) hospital facilities for contaminated injured individuals were adequate.

E. Whether the Licensing Board erred in (1) rejecting LEA's proposed severe accident risk contention DES-5 concerning mitigation; (2) rejecting LEA's proposed contention DES-6 concerning sabotage; (3) rejecting LEA's proposed contentions concerning socio-economic and industrial impacts; and (4) concluding that the record of decision complies with the Commission's regulations.

IV. ARGUMENT

A. The Licensing Board Correctly Concluded That AWPP's Contention Regarding Adverse Environmental Impacts From Cooling Tower Emissions On Carburetors Of Small Planes Flying In The Affected Airspace Lacked Merit

1. Background

In Section II.A. of LBP-84-31 the Licensing Board made findings of fact on AWPP Contention V-4 and concluded that the contention lacked merit. ¶ A-40. [2/] Specifically, the Licensing Board in rejecting Contention V-4 made the following principal findings:

2/ Contention V-4, which was raised under the National Environmental Policy Act (NEPA), asserted:

> Neither the Applicant nor the Staff have adequately considered the potential for the impact of carburetor icing on aircraft flying into the airspace that may be affected by emissions from the Limerick cooling towers.

beyond a quarter of a mile from the cooling towers, temperature and humidity differences between the plume and ambient air are insignificant ¶ A-16;

plumes would not present a potential carburetor icing hazard different from the naturally occurring atmosphere because an airplane could not remain in such a small region of the plume for more than a few seconds ¶¶ A-28, A-29;

even if conditions in the entire plume (up to about 10 miles long) were significantly different from the surrounding air, it would be highly unlikely that an airplane would, or even could, remain in the plume long enough for sufficient carburetor ice to accumulate to cause engine failure ¶ A-30; and

plume behavior would not result in adverse weather conditions in the local airport traffic pattern so as to cause airplanes to remain in the plume for long periods ¶ A-34 n.2.

Although the Licensing Board concluded that these findings demonstrated the contention's lack of merit, it made further findings

> . . . to show that the conservative assumption used to this point that the pilot would not prevent or, if encountered, remedy carburetor icing, is unrealistic. ¶ A-31.

The principal additional findings of the Licensing Board were:

normal pilot procedure is to use a required carburetor heat system to prevent ice accumulation ¶¶ A-34-37;

if carburetor ice begins to accumulate there is ample notice to the pilot due to the symptoms of degraded engine performance that ice is accumulating and that, therefore, carburetor heat should be applied to melt the ice ¶ A-33; and

pilots normally confront variations in temperature and humidity conditions over relatively small changes in air space of greater magnitude than variations that would be presented by cooling tower plumes ¶ A-39.

In reaching its conclusion on Contention V-4, the Licensing Board also considered the disparate levels of expertise between the witnesses offered by the Applicant and Staff on the one hand and AWPP on the other hand. AWPP's lay cross-examiner (Mr. Romano) was also its only witness. Although a licensed pilot, Mr. Romano, in the Licensing Board's estimation, had no knowledge of the meteorology involved in plume behavior and the Li-

censing Board considered Mr. Romano to have insufficient knowledge and expertise to be relied upon. ¶ A-6. The Licensing Board was, however, impressed by the knowledge displayed by the Applicant and Staff witnesses regarding the meteorology of cooling tower plumes and the capability of licensed pilots to prevent or remedy carburetor icing. Id.

2. Argument

AWPP has largely ignored the requirements of 10 C.F.R. § 2.762(d)(1) that:

> An appellant's brief must clearly identify the errors of fact or law that are the subject of the appeal. For each issue appealed, the precise portion of the record relied upon in support of the assertion of error must also be provided. 3/

AWPP provides no citations to the record in support of many of the arguments set forth in its brief. With respect to those arguments, the other parties have not been put on notice as to the precise matters to which they must respond. 4/ Nevertheless, the Staff has addressed the three principal arguments which it perceives to be raised in the brief. 5/ Where AWPP has provided an obviously incorrect citation and the Staff believes it knows the correct citation, the Staff has responded based on the correct citation. The Staff has not addressed

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3/ See, Public Service Electric and Gas Co. (Salem Nuclear Generating Station, Unit 1), ALAB-650, 14 NRC 43 at 49 (1981), aff'd sub nom. Township of Lower Alloways Creek v. Public Service Electric and Gas Co., 687 F. 2d 732 (3d Cir. 1982); Consolidated Edison Company of New York, Inc. (Indian Point Station, Unit 2), ALAB-159, 6 AEC 1001 (1973).

4/ Pro se intervenors are obliged to familiarize themselves with the Commission's Rules of Practice and the proper briefing format. Pennsylvania Power & Light Co. (Susquehanna Steam Electric Station, Units 1 and 2), ALAB-563, 10 NRC 449, 450 n.1 (1979).

5/ Some arguments are made several times by AWPP in its brief, but are treated only once in the Staff's response. See, for example, AWPP's citation at pages 2, 3 and 7 of its brief to Mr. Geier's testimony on instantaneous ice formation.

in its response documents cited by AWPP that are not in the record of this proceeding, even though some of those documents have been provided to the Appeal Board and parties by AWPP's filing dated October 12, 1984, 6/ since parties are limited in their appeal briefs to arguments based on matters of record. 10 C.F.R. § 2.762(d)(1).

a. The Quarter Mile Principle.

The Applicant provided testimony predictive of the behavior of the plumes from the Limerick cooling towers based, in part, upon two cooling tower plume studies. Smith and Seymour, ff. Tr. 6234, at 5-7; Tr. 6423 (Smith). One of these studies (the Thomson Keystone study) 7/ was particularly relied upon by the Licensing Board in its findings (see, A-15-19) and is the subject of two arguments made by AWPP on appeal.

6/ The following documents cited by AWPP are not in the record of this proceeding:

- an article by Alfred R. Puccinelli in the November 1980 issue of AERO magazine (see brief at 2, 3);
- an article entitled "Carburetor Ice: Still A Threat" by Thomas A. Horne in the Safety Corner section of the April 1980 AOPA Pilot (see brief at 2, 3, 10);
- an instructional book for student pilots entitled the "Private Pilot" (see brief at 3); and
- the AOPA Air Safety Foundation "Operational Flyer" Volume 2, Number 1 (see brief at 9).

7/ The Thomson Keystone study was conducted by Pennsylvania State University at the Keystone cooling towers in Western Pennsylvania. App. Ex. 13. The Licensing Board found the results of the Thomson Keystone study valid for Limerick, since the key climatic conditions relevant to carburetor icing are nearly identical at Keystone and Limerick (¶ A-17) and the difference in height of the towers (lower at Keystone) was not of significance in applying the data. ¶ A-18.

The Licensing Board found that the Thomson Keystone study results indicate that ambient temperature and humidity levels would exceed those of the plumes only within one quarter-mile of the towers and for very short periods. ¶ A-16. Beyond one quarter-mile the in-plume temperatures would be almost indistinguishable from ambient and the humidity differences would be very small. Smith and Seymour, ff. Tr. 6234, at 5-6; Tr. 7094, 7106-07 (Markee). The Licensing Board concluded that beyond one quarter-mile from the Limerick cooling towers the temperature and humidity in the plume would not exceed ambient conditions sufficiently to cause or exacerbate carburetor icing. ¶ A-19.

AWPP cites testimony of Applicant witness Smith that Limerick plumes will reach a minimum of 1000 feet above ground level as contradicting the "¼ mile principle." AWPP Brief at 5. Essentially this argument had been presented by AWPP before the Licensing Board and rejected. ¶ A-20. The Licensing Board noted that AWPP was confusing testimony on the physical extent of cooling tower plumes with testimony on the lack of significant temperature and humidity deltas of the plume in relation to the ambient air at distances greater than one quarter-mile from the tower. Id. 8/ The Licensing Board's distinction was correct. Testimony in the record that the Limerick plumes will always reach a height of at least 1,000 feet above ground before

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8/ AWPP charges the Licensing Board with bias against it on the basis of the Board's observation that:

> The arguments by AWPP's representative show an unfortunate apparent inability to understand the testimony . . . . AWPP seems to believe that the testimony that plumes will not affect carburetor icing beyond a quarter mile from the tower means that Applicant and Staff believe that plumes longer than a quarter mile will not exist . . . . LBP-84-31, ¶ A-20.

The Licensing Board's statements were a legitimate observation based upon AWPP's persistence in setting forth arguments that the Licensing Board viewed as having been conclusively disproved.

leveling off (Smith and Seymour, ff. Tr. 6234, at 7-8) relates to the physical extent of the plume and not to the excess temperature and humidity over the ambient in the plume. AWPP's brief provides no basis for overturning the Licensing Board's finding.

The Thomson Keystone study was conducted expressly to determine conditions inside and outside visible and invisible plumes. ¶ A-15. This was done by airplane flights at various altitudes and at various distances along the length of the visible plume, with the same procedure being employed downwind from the point where the visible plume terminated to test the invisible plume. Id. Applicant's witness Smith testified that this procedure enabled the researchers to intersect the invisible plume with great regularity. Tr. 6262, 6279, 6419-20, 6459.

AWPP argues that it "was not the purpose of the Thomson Penn State Keystone experiment to study invisible plumes, or distances from tower that the plume traveled." AWPP brief at 5. The distinction that AWPP seeks to draw between stating the purpose of the study as "determin[ing] conditions inside and outside visible and invisible plumes" and stating it as "to study invisible plumes, or distances from tower that plume traveled" is not apparent. AWPP's argument does not undermine the Licensing Board's reliance on the Thomson Keystone study for predicting plume behavior at Limerick. ¶ A-17.

AWPP also argues (AWPP brief at 5) that there is a contradiction between the testimony of Mr. Smith that the Penn State researchers had difficulty finding any measurable differences in temperature and humidity as they flew across the plume downwind of the visible plume or flew at right angles to the visible plume (Tr. 6259-60) and the finding of the Licensing Board that the technique used by the Thomson Keystone researchers enabled them to intersect the invisible plume with regularity. ¶ A-15. The Staff perceives

nothing inconsistent between the cited testimony and the testimony supporting the finding since there was convincing evidence before the Board to demonstrate the high likelihood that the researchers were intersecting the invisible plume Tr. 6262, 6279, 6419-20, 6459 (Smith). The fact that they did not find significant variations in the invisible plume from ambient temperature and humidity addresses a different point and does not detract from the "intersecting" evidence.

b. Instantaneous Carburetor Ice Formation.

AWPP argues in its brief that:

> The Applicant states the plumes would not present a potential carburetor icing hazard different from the naturally occurring atmosphere, because an airplane could not remain in such a small region of the plume for more than a few seconds. This is rebutted by the Staff's own witness Mr. Geier, who testified carburetor ice can form instantaneously. (Geier's written testimony at A-4). (AWPP brief at 1-2).

The Staff takes the reference to Answer 4 [9/] of Geier's testimony to actually refer to Geier, ff. Tr. 6883, Answer 5, where he states:

> Although ice can form instantaneously under the proper conditions, it does not accumulate at such a rate that the pilot who pays attention to the signs can not prevent engine stoppage due to blocking by ice of the carburetor throat.

AWPP is apparently attempting to argue that since ice can form instantaneously, carburetor icing could be a hazard even though the aircraft remained in the small region of the plume for only a few seconds. Mr. Geier's testimony does not support that proposition. The quoted statement he made above was part of an explanation concerning factors affecting the rate at which carburetor ice can accumulate. The record supports the Licensing Board's finding

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9/ Geier's testimony at A-4 in its entirety reads as follows:

> My testimony addresses those aspects of Contention V-4 which raise issues relating to the operation of aircraft especially with regard to the regulations of the FAA.

(¶ A-28) that instantaneous ice formation does not result in an accumulation of carburetor ice which would create a flying hazard. Geier, ff. Tr. 6883, Answer 5; Smith and Seymour, ff. Tr. 6234 at 9; Tr. 6374-77, 6527-28 (Seymour).

In support of its view of the significance of Mr. Geier's testimony that ice can form instantaneously in aircraft carburetors, AWPP asserts that Mr. Geier gave contradictory testimony on the amount of time that an aircraft would have to be exposed to adverse weather conditions without carburetor heat before carburetor ice could present a significant hazard. AWPP brief at 7-8. The Staff believes that AWPP's argument arises from Mr. Geier's testimony (Tr. 7002) that he had no basis to agree or disagree specifically with the conclusion of the Applicant's study showing that it would take approximately eight minutes of flying through adverse conditions without carburetor heat before a carburetor icing problem could be encountered. ¶ A-28. Mr. Geier testified that the time of flight through adverse weather conditions that could lead to potential carburetor icing problems would vary depending upon the type of aircraft. Tr. 7003. Mr. Geier's testimony does not, however, provide any support for AWPP's apparent thesis that carburetor icing problems can result from a few seconds of exposure to adverse weather conditions. Tr. 7003-04.

c. Particular Dangers Of Carburetor Icing Due To Proximity Of Pottstown - Limerick Airport

At various places in its brief AWPP raises points related to one of its principal arguments, that the Limerick cooling tower plumes are a particular threat to aircraft using the Pottstown - Limerick airport, which is within two miles of the cooling towers. PECo Ex. 14.

As noted in the background statement, the Licensing Board made findings as to the pilot's ability to prevent or eliminate carburetor icing. These findings related to the training received by pilots and the procedures

they are expected to follow (¶¶ A-33-37) and to the presence of carburetor heat systems for the prevention or elimination of carburetor icing in almost all aircraft with carburetors. ¶ A-32.

AWPP's arguments are based principally on Attachment B to the testimony of Staff witness Krug. See, AWPP brief at 3, 6-10, 13, 15. That document is a Federal Aviation Administration report which states that:

> carburetor icing accidents/incidents are less likely to occur on ascent/descent than while cruising and that weather is not normally a factor in such accidents/incidents. Krug, ff. Tr. 6883 at 3.

Table 3 of Attachment B lists carburetor icing accidents/incidents from the FAA's national computer data base for the period 1976-1980 by phase of flight. The data indicates that of the 329 accidents/incidents reported, 159 occurred while the aircraft involved were cruising. The table also shows that 66 of the accidents/incidents occurred while the aircraft were taking off. AWPP misreads the "cruise" entry in Table 3 as being 15 (rather than 159) accidents/incidents and argues that the table therefore contradicts testimony of Seymour (Tr. 6673-75) and Krug (Tr. 7042) that the potential for carburetor icing is less when the throttle is fully open, as at takeoff. AWPP brief at 10. When read correctly, the data in Table 3 do not support AWPP's argument. Additionally, the record indicates that it is standard procedure for a pilot to test his carburetor heat control before taking off to assure that it is working and that there is no ice present in the carburetor. If this check suggests the presence of ice, carburetor heat should be reapplied just before takeoff to assure the carburetor is clear at that time. Smith and Seymour, ff. Tr. 6234 at 12; Tr. 6673-74 (Seymour).

AWPP asserts that ". . . pilots with as much experience as the Applicant's witnesses had carburetor ice accidents, indicat[ing] carburetor ice can sneak up on any pilot, but more so a student pilot who gets disori-

ented." AWPP brief at 3. AWPP bases this assertion on Table 6 of Appendix B, which shows carburetor icing accidents/incidents for the five year period 1976 through 1980 for pilots with 31 different types of ratings and certifications, including 17 carburetor icing accidents/incidents for certified flight instructors with five different types of ratings. AWPP's designation of these events as accidents is, however, misleading, since the title of the table ("Pilot Certification/Rating for Carburetor Icing Accidents/Incidents 1976-1980") indicates that at least some of the reports were of incidents that did not result in accidents. The fact that pilots experience carburetor icing incidents is not contested. Tr. 7094-5 (Geier).

Table 6 of Attachment B to Mr. Krug's testimony is not inconsistent with the Board's findings that pilots are trained to check for carburetor ice and to apply carburetor heat at the first indication of an icing problem. ¶¶ A-34-37. Mr. Geier put the figures in context by noting that of approximately 432,000 private pilots in the United States, Table 6 reports 28, 29 and 42 carburetor icing accidents/incidents in 1978, 1979 and 1980 respectively. Tr. 7004. Mr. Geier testified that these figures indicated that the average pilot can and does take care of carburetor ice. Id.

AWPP cites to page 1 of Attachment B to Mr. Krug's testimony as demonstrating the incorrectness of the Licensing Board's finding that:

> A trained pilot would not be likely to confuse the indications of other engine problems with the indications of the accumulation of carburetor ice. Geier, ff. Tr. 6883, at 4-5. ¶ A-33.

The referenced page does not address the ability of trained pilots to identify carburetor icing by degradation in engine performance, but rather discusses the potential for additional carburetor ice detector/warning devices to provide pilots with a false sense of security. Krug, ff. Tr. 6883, Attachment B. The Licensing Board's finding is not based on the availability of such detec-

tion/warning devices, but upon the pilot's inference of carburetor icing from indications of drop in engine RPM if a fixed-pitch propeller is installed or in manifold pressure if a constant-speed propeller is installed. Geier, ff. Tr. 6883 at 4-5; Tr. 6373-81 (Seymour). Mr. Geier further testified that:

> Other conditions resulting in engine failure manifest themselves in indications which are different from those which lead to a diagnosis of carburetor ice. ff. Tr. 6883, at 5.

AWPP also cites to page 20 of Attachment B for the proposition that engine performance degradation may not be caused by carburetor ice formation. AWPP brief at 15. While Attachment B does contain the statement cited by AWPP, it is preceded by a statement that:

> Existing standard cockpit instrumentation is adequate to alert the pilot of a possible onset of carburetor ice formation. Krug, ff. Tr. 6883, Attachment B at 19-20.

Whether or not there might be some other causes of engine degradation that could be confused with carburetor icing, the evidence in the record tends to indicate that trained pilots would apply carburetor heat if they suspected an icing problem. Smith and Seymour, ff. Tr. 6234 at 12; Tr. 6675 (Seymour).

In citing the testimony of Mr. Smith that in completely saturated air conditions the cooling tower plume would blend with the cloud deck, AWPP seeks to demonstrate that the cloud deck could be at the pattern altitude of the Pottstown-Limerick airport. AWPP brief at 4, citing Tr. 6408-10. The record demonstrates, however, that the pattern altitude of the Pottstown-Limerick airport (889 feet above ground) is below the lowest altitude at which the plumes would level off. Tr. 7101-02 (Geier); Tr. 6894, 6908-09 (Markee); Tr. 6298, 6334, 6619 (Smith).[10/]

10/ AWPP also asserts that Mr. Smith's testimony that plumes will blend with the cloud deck in saturated air is contradicted by Figure 9 of PECo Exhibit 9, which shows a plume rising through a natural cloud

(FOOTNOTE CONTINUED ON NEXT PAGE)

AWPP also asserts that Mr. Geier was mistaken as to the landing pattern at the Pottstown-Limerick airport. AWPP brief at 3. AWPP ignores Mr. Geier's modification of his testimony to reflect recent changes in the landing patterns. Geier, ff. Tr. 6883 at 6; Tr. 6875-79. AWPP does not contest the accuracy of Mr. Geier's testimony as modified.[11/]

3. Conclusion

For the foregoing reasons, the Staff submits that the arguments raised in AWPP's appeal from the Licensing Board's decision on Contention V-4 are not supported by the record and should be rejected. The Licensing Board's findings on this contention should be affirmed.

B. The Licensing Board's Disposition Of AWPP's Contention Regarding Quality Assurance Was Correct And Reasonable

1. Background

In Section II.D of LBP-84-31, the Licensing Board confirmed its findings made on the record that AWPP Contentions VI-1 (QA/QC of Welding) lacked merit. LBP-84-31, ¶¶ D-1-17.

10/ (FOOTNOTE CONTINUED FROM PREVIOUS PAGE)

deck at approximately 3500 feet. AWPP brief at 6. AWPP cites nothing in the record, however, to indicate the humidity conditions prevailing in Figure 9, whereas Mr. Smith's testimony was addressed to conditions of completely saturated air. Tr. 6408-09. Mr. Smith also testified that not only humidity, but also temperature, wind and turbulence would affect the extent of the rise and the distance from the tower exhibited by plumes. Tr. 6407.

11/ There is no basis for AWPP's apparent attack on Mr. Geier's qualifications as an expert witness on Contention V-4. (See statement at page 7 of its brief that Mr. Geier's ". . . statements are opinion and not what happens with flyers . . . .") Mr. Geier is the Manager of the General Aviation and Commercial Division, Office of Flight Operations, FAA and has been a certificated pilot for 41 years. Professional Qualifications of Bernard Geier, ff. Tr. 6883. The Licensing Board found Mr. Geier to be an "excellently qualified witness." ¶ A-5.

As originally submitted in the fall of 1981, Contention VI-1 read:

> Applicant has failed to establish and carry out an adequate quality assurance program as required by Appendix B of 10 CFR Part 50. This is shown by a pattern of careless workmanship, departure from specified procedures, together with faulty inspection and supervision in the construction of Units 1 and 2 of the Limerick Generating Station.
>
> Specifically, Applicant has been cited by the NRC for numerous infractions concerning defects in concrete placement, improper repair, including damage to concrete reinforcing bars, improper record keeping, and failure to maintain reinforcing steel clearances. Other infractions involved cleanliness in the area of containment penetrations, failure to follow specified procedures for welding, infractions bypassed by inspection and reported by concerned workmen, and failure to adequately correct various violations.
>
> Further, Applicant has failed to comprehensively monitor the effects of quarry blasting as it relates to effects on concrete setting, concrete integrity in structures, and changes in sub-rock fractures.
>
> The lack of quality assurance during construction of the Limerick reactors increases the risk of an accident and thereby threatens the health and safety of Petitioners and the public.

The Applicant objected to the admission of the contention on the grounds of its being a "generalized attack" and there being no assertion that the matters complained of were unresolved. The Staff did not object to the admission of the contention, except for the part relating to monitoring of the effects of quarry blasting. In its First Special Prehearing Conference Order, the Licensing Board admitted the contention subject to further specification by AWPP. 15 NRC 1423 at 1517-18.

As resubmitted on April 12, 1983, AWPP Contention VI-1 dropped the second paragraph concerning concrete problems and seemed to focus on quality assurance problems related to the welding of structural steel. Both the Applicant and the Staff objected to the admission of the respecified contention largely because there was no relationship between the statement of the contention and the basis provided, which was a list of Applicant/NRC corres-

pondence that did not suggest the existence of a pattern of carelessness. In its Second Special Prehearing Conference Order the Licensing Board conditionally rejected Contention VI-1 largely for the reasons stated by the Applicant and Staff. 18 NRC 67 at 88-91. On August 5, 1983, AWPP filed a motion for reconsideration, which was based on new information provided by the Applicant concerning welding deficiencies. The matter was discussed at a prehearing conference, Tr. 4610-16, 4883-4919, and thereafter, the Licensing Board rewrote and admitted AWPP's respecified Contention VI-1. 12/ At the conclusion of the evidentiary hearing on this issue, in which AWPP presented no witnesses, the Licensing Board reached the preliminary conclusion that the Applicant had overwhelmingly met its burden of proof. ¶ D-5. AWPP was then given the opportunity to submit proposed findings and to have oral argument thereon. See, ¶¶ D-6-7.

AWPP raises four arguments on appeal of the Licensing Board's disposition of AWPP's Contention VI-1 regarding quality assurance. They are: 1) the Licensing Board erred in narrowing AWPP's contention, which as submitted concerned a pattern of carelessness in quality assurance not limited to welding; 2) the Licensing Board erred in requiring AWPP to file its proposed findings first and AWPP was prejudiced by this departure from the "normal course"; 3) the facts as found in ¶ D-13 of the Second Partial Initial Decision are contradicted by deposition testimony of Philadelphia Electric's Vice-President for

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12/ As admitted, Contention VI-1 reads:

> Applicant has failed to control performance of welding and inspection thereof in accordance with quality control and quality assurance procedures and requirements, and has failed to take proper and effective corrective and preventive actions when improper welding has been discovered. Tr. 4913.

Nuclear Power, Vincent Boyer; and 4) the Licensing Board erred in excluding the proffered testimony of Professor Iversen.

As discussed below, the NRC staff believes that the Licensing Board's rulings regarding all of these matters were correct and reasonable and that the Licensing Board's conclusion that AWPP's contention lacked merit was sound and should be affirmed.

2. Argument

a. AWPP Was Not Prejudiced By The Licensing Board's Rewording Of Its Contention

Contrary to the assertions now made by AWPP (See, AWPP brief at 17), AWPP was not prejudiced by the Licensing Board's rewriting of Contention VI-1 excluding the language concerning a "pattern of carelessness," as AWPP had provided no basis for such an allegation. The Licensing Board was under no obligation to rewrite the contention and could have rejected it outright had the Licensing Board strictly applied the Commission's regulations in 10 C.F.R. § 2.714(b) regarding bases and specificity.[13/] AWPP was not prejudiced by the Licensing Board's determination to provide a focus to its contention.[14/] See, Tr. 4913, 4918; ¶¶ D.1, 2.

b. The Commission's Regulations In 10 C.F.R. Part 2 Permit Licensing Boards To Vary The Normal Course Of Filing Findings

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13/ 10 C.F.R. § 2.714(b) reads in pertinent part:

> The petitioner shall file a supplement to his petition to intervene which must include a list of the contentions which petitioner seeks to have litigated in the matter, and the basis for each contention set forth with reasonable specificity.

14/ As regards AWPP's argument on appeal concerning QA for concrete, the Staff notes that the matter was raised in AWPP's motion for reconsideration and was rejected by the Licensing Board because AWPP failed to show a basis for a continuing concern in light of a Director's Decision, issued under 10 C.F.R. § 2.206, in response to a petition by AWPP concerning QA for concrete at Limerick. 10 NRC 609 (1979); Tr. 4884-94. Further, QA for concrete did not form a part of AWPP's Contention VI-1 as submitted in April 1983; therefore, AWPP's reference to QA for concrete, which was untimely in August 1983, is obviously less timely now.

AWPP argues that it was prejudiced by the Licensing Board's departure from the normal course in requiring AWPP to file its findings first. However, the Commission's regulations permit Licensing Boards to vary procedures in performing their responsibility to conduct fair and impartial hearings according to law and to take appropriate action to avoid delay. See, 10 C.F.R. §§ 2.754(a) and 2.718. 15/ Actually, far from being prejudiced by the Licensing Board's action, AWPP was benefitted by it, as the procedures devised by the Licensing Board allowed AWPP the opportunity to focus its proposed findings on those parts of the record which it believed contradicted the Licensing Board's preliminary conclusion that the Applicant had overwhelmingly met its burden of proof. Further, AWPP was afforded an opportunity for oral argument on the findings filed by AWPP, the Staff and the Applicant. See, ¶¶ D-5, D-6, D-7.

c. The Licensing Board's Finding Based On The Testimony Of Applicant's Witnesses Boyer And Clohecy Is Supported By The Record

AWPP asserts that the testimony of two of Applicant's witnesses is inconsistent with depositions that were taken during discovery. AWPP brief at 10. The Licensing Board's finding on AWPP's QA contention was based on three and one half days of hearing during which the Licensing Board had an opportunity to observe the deportment of the witnesses and to evaluate the quality of their responses to direct and cross-examination. The testimony of the Applicant's panel was fully responsive to the questioning of AWPP's repre-

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15/ While 10 C.F.R. § 2.754(a) provides that the party having the burden of proof (normally the Applicant) will file proposed findings first, it also provides that the presiding officer may order otherwise. 10 C.F.R. § 2.718 states, in part, "A presiding officer has the duty to conduct a fair and impartial hearing according to law, to take appropriate action to avoid delay and to maintain order. He has all the powers necessary to these ends including the power to: (e) regulate the course of the hearing and the conduct of the participants."

sentative and the Licensing Board. In addition, the Staff's panel substantiated the testimony of the Applicant's witnesses. The deposition testimony that AWPP cites on appeal was not in the record and was not used by AWPP during cross-examination. Additionally, AWPP has not shown that there was any contradiction between statements made on the record and statements made in deposition. Therefore, even if the deposition had been received in evidence or had been used by AWPP in an attempt to impeach the witness, it would not have provided a basis for the Licensing Board to change its findings in ¶¶ D-7 and D-13.

d. The Licensing Board's Ruling Rejecting The Late-filed Testimony Of Professor Iversen Was Reasonable

The Licensing Board rejected the testimony of Professor Iversen, who was proffered by AWPP as an expert witness to testify about statistical sampling. The proposed testimony of Professor Iversen was not pre-filed as required by the Licensing Board's Order of March 15, 1984, but was proffered at the hearing at which it was proposed to be received. The Licensing Board's rejection of Professor Iversen's testimony was based on inexcusable lateness and the lack of relevance and materiality of the proposed testimony to any of the instances AWPP had specified as indicative of welding QA problems at Limerick. ¶ D-3. The ruling was consistent with the requirements of 10 C.F.R. §§ 2.714(a) and 2.743(c) regarding admissibility and was within the Licensing Board's discretion to reject for failure to prefile. Indeed, Professor Iversen's testimony concerned methods of statistical sampling, an issue that was not raised by the contention or the testimony of the parties. The Applicant's testimony, supported and substantiated by the Staff's testimony, indicated that the Applicant's inspection program involved a one hundred percent inspection of safety related welds, not an inspection of a sample of safety related welds. ¶ D-8. AWPP offers no argument on appeal that was not addressed by the

Licensing Board and rejected in its determination not to admit the testimony of Dr. Iversen. See, Tr. 10,428-35.

3. Conclusion

For the foregoing reasons, the Staff submits that AWPP has not shown any error in the Licensing Board's determinations regarding its disposition of AWPP's Contention VI-1. On the contrary, the record fully supports the Licensing Board's conclusion that Contention VI-1 totally lacks merit. AWPP's appeal should, therefore, be denied.

C. The Licensing Board Correctly Determined That The Proximity Of Industrial (Petroleum And Natural Gas) Pipelines Would Not Be A Safety Hazard To The Limerick Generating Station

1. Background

On September 18, 1981, Friends of the Earth in the Delaware Valley (FOE) petitioned to intervene in this operating license proceeding. During a prehearing conference held January 6-8, 1982, the Licensing Board found that FOE had standing to intervene and provided FOE an opportunity to state its contentions alleging that nearby petroleum (ARCO) and natural gas (Columbia) pipelines pose a danger to the Limerick facility.[16/] In an unpublished order, dated November 22, 1982, "Order (Concerning Proposed FOE Contentions on Hazards From Industrial Activities)," FOE Contentions V-3a and V-3b were admitted.[17/]

16/ See, Philadelphia Electric Company (Limerick Generating Station, Units 1 and 2), LBP-82-43A, 15 NRC 1432, 1513-14 (1982); LBP-84-31, ¶¶ B-1-3.

17/ As litigated, Contention V-3a states:

> In developing its analysis of the worst case rupture of the ARCO pipeline, the Applicant provided no basis for excluding consideration of siphoning. Thus, the consequences from the worst case pipeline accident are understated.

(FOOTNOTE CONTINUED ON NEXT PAGE)

At the hearing on these contentions, both the Applicant and Staff offered testimony concerning the effects of siphoning on the worst case analysis and the effects of radiant heat on various Limerick Generating Station structures. In addition, pursuant to the Licensing Board's request, the Applicant and Staff also filed supplemental testimony concerning the ability of all the safety related structures to withstand estimated overpressure effects caused by a postulated detonation of a hydrocarbon vapor cloud.

The Licensing Board evaluated various scenarios concerning different locations and sizes of postulated breaks or ruptures in the ARCO pipeline and concluded that the spray areas and the amount of gasoline assumed to be released would not affect operation of the Limerick facility. ¶ B-7. For example the Licensing Board examined the possibility of a break in the ARCO pipeline that would cause a flammable vapor cloud to form and accumulate in Possum Hollow Run (PHR).[18/] The gasoline vapor would then rise above the banks of PHR where it would detonate as a single point source instead of the more realistic line source and cause extensive damage to the plant, adversely affecting safety related structures.[19/] Based on expert testimony presented by the NRC staff

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17/ (FOOTNOTE CONTINUED FROM PREVIOUS PAGE)

Contention V-3b reads:

> In discussing deflagration of gas and petroleum due to pipeline rupture, no specific consideration has been given to the effect of radiant heat upon the diesel generators and associated diesel fuel storage facilities. ¶ B-3.

18/ Possum Hollow Run is a small stream that traverses the Limerick site south of the Limerick station structures. For the most part it flows through a deep wooded valley from the southeast to the southwest where it empties into the Schuylkill River. PHR is accurately portrayed on Applicant's Exhibit 7.

19/ The distance from the bottom of the PHR streambed to the site grade level for the Limerick Unit 2 reactor building at the location selected by the Applicant for the assumed detonation is 67 feet. Tr. 5575 (Walsh); Tr. 5579 (Boyer).

and Applicant, the Licensing Board concluded that such a sequence of events is not possible and even if possible would not result in damage to safety related structures. ¶¶ B-7, 24-25, 90. In addition, the Licensing Board reviewed the effects of a large spray of gasoline emanating from a breach in the pipeline and the results of siphoning and/or continued pumping and concluded that these phenomena would not alter the Board's conclusions. ¶ B-16.

In evaluating effects of a postulated rupture of the Columbia Gas pipeline, the Licensing Board indicated that Staff's and Applicant's evidence showed that detonation of an unconfined natural gas vapor cloud is not possible. ¶ B-55. Nevertheless, the Licensing Board, in order to consider the impact of an explosion on safety related structures, examined a scenario which postulated that a methane vapor cloud in a flammable concentration would be transported some 3500 feet from a postulated pipeline rupture to within 1200 feet of the Limerick Generating Station and detonate. ¶ B-56. While this assumption represents a hypothetical situation going beyond a credible worst case analysis, the resulting estimated overpressures revealed that the design basis of the safety related structures was adequate and that the effects of a blast on either safety related or nonsafety related structures would not prevent a safe shutdown of the plant. ¶¶ B-67-68, 90. The Licensing Board also examined effects of a postulated deflagration resulting from an accident at each pipeline and concluded that the operation of Limerick would not be affected. ¶¶ B-7, 45, 49, 90.

Finally, the Licensing Board found the Staff's and Applicant's witnesses to be qualified and competent in their respective disciplines and their testimony to be credible and persuasive. ¶ B-8. On the other hand, the Licensing Board found FOE's sole witness, Mr. Hasbrouck, to be limited in education, training and experience with regard to the issues raised in this contention and

assigned no weight to his testimony. ¶ B-8. Based on the expert testimony of the Staff's and Applicant's witnesses, the Licensing Board found that conservative methodology employed in the design and construction of the safety related structures provided a significant margin over the postulated blast overpressures. ¶¶ B-67, 68, 90. While certain nonsafety related structures may experience some damage from a blast, and in the case of the cooling towers may even be destroyed, any effects from the collapse of the structures or flooding from a breach in the cooling tower basin would not adversely affect a safe shutdown of the Limerick facility. ¶¶ B-84, 85, 90. Therefore, the Licensing Board properly found that neither the ARCO nor the Columbia gas pipelines presented any significant safety hazard to the Limerick Generating Station and determined that FOE's Contentions V-3a and V-3b were without merit. ¶¶ B-7, 90.

2. Argument

a. FOE's Brief On Appeal

FOE's brief on appeal is nothing more than a series of one sentence comments on, or more lengthy general disagreements with, LBP-84-31. 20/ For the most part these comments or disagreements are made without any reference or record support. Sometimes a transcript citation without any further explanation is provided. FOE starts with the Licensing Board's Finding ¶ B-3 and proceeds selectively and sequentially through that part of LBP-84-31 that relates to its Contention V-3a, V-3b. In an effort to categorize and make

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20/ The Staff points out that FOE's brief on appeal does not satisfy the requirements of 10 C.F.R. § 2.762(d)(1). See, discussion of § 2.762(d)(1) at pp. 5-6, supra and the cases cited in fn. 3. Although FOE's brief is inadequate in this regard, the Staff does not urge the Appeal Board to reject FOE's brief because of the delay that would be encountered in attempting to have FOE redraft its appeal brief. Rather, the Staff believes that FOE's brief is inadequate on the merits as well and urges that it be denied for that reason.

some semblance of order out of FOE's brief, the Staff has set forth below, in appropriate categories, those comments by FOE that in the Staff's view warrant a response.

b. General Comments

FOE begins its appeal by stating, without further explanation, that R. L. Anthony should have been permitted to testify in this matter and that the Licensing Board in accepting Staff's and Applicant's figures gave no consideration to the consequences of worst case accidents. The Staff disagrees. FOE fails to mention that Mr. Anthony's credentials as an "expert" witness in this matter were thoroughly reviewed by the Licensing Board before the start of the hearing. Mr. Anthony was found by the Licensing Board not to have the necessary qualifications to testify as a pipeline expert. 21/ Mr. Anthony provided no information that would support his claim as an expert witness and the Licensing Board was correct in not permitting Mr. Anthony to testify. Therefore, to the extent that the refusal to permit Mr. Anthony to testify forms the basis for FOE's complaint that the Licensing Board ignored his testimony, FOE's complaint is unfounded. FOE brief at 2-5.

In addition to FOE's unsupported complaints about the Licensing Board having ignored its testimony, FOE has attached to its brief a pleading dated June 6, 1984, entitled "R. L. Anthony/FOE Rebuttal of Applicant's Reply Findings, 5/18/84, on Contentions V-3a and V-3b" and designated this pleading as Exhibit A. Exhibit A was objected to by the Staff and Applicant when it

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21/ Philadelphia Electric Company (Limerick Nuclear Generating Station) "Memorandum and Order Ruling on Motions to Strike Testimony" (Unpublished), December 1, 1983.

See also, "Response of NRC Staff in Support of Applicant's Motion to Strike Testimony of R. L. Anthony ---," November 29, 1983 at 3; "Prefiled Testimony of R. L. Anthony/FOE ---," November 14, 1983 at 1.

was originally filed on June 6, 1984 on the grounds that the Commission's regulations made no provision for such a pleading and that it was not in accord with the Licensing Board's Order of December 9, 1983 or its instructions to the parties on March 23, 1984. 22/

In any event, Exhibit A consists of unsubstantiated comments and conclusions with respect to the Applicant's and Staff's proposed findings that were filed with the Licensing Board on April 23 and May 14, 1984, respectively and does not merit consideration by the Appeal Board.

c. The ARCO Pipeline

At page 3 of its brief FOE states that the Licensing Board should have required the relocation of both pipelines because of the possibility of external explosions. This is a bare and unsubstantiated statement which does not follow from the V-3a and V-3b findings and conclusions of the Licensing Board. After reviewing all of the credible evidence on this aspect of the proceeding, the Licensing Board determined that the Limerick safety related structures would withstand the effects of the postulated ruptures of the ARCO and Columbia Gas pipelines. ¶ B-7. The Licensing Board also found all of FOE's allegations and speculations regarding sequences of events omitted from the Staff's and Applicant's analyses to be without merit. ¶¶ B-7, 90.

22/ 10 C.F.R. § 2.754 provides that the party who has the burden of proof may reply to the findings of the other parties, but no further pleadings are authorized. Staff notes that although 10 C.F.R. § 2.754(a) permits the presiding officer to depart from this provision the Licensing Board did not provide for replies other than the Applicant's in its Order of December 9, 1983. Order, Establishing Format of Proposed Findings of Fact and Conclusions of Law. December 9, 1983. See also, Tr. 9276-A (March 23, 1984).

See, NRC Staff's Motion in Support of Applicant's Motion to Strike the Filing of R. L. Anthony/FOE in Rebuttal of Applicant's Reply Findings on Contention V-3a and V-3b, June 26, 1984.

There is no indication in LBP-84-31 or elsewhere in the record of the Licensing Board's disposition of this matter.

In commenting on the worst case basis for hillside and streambed evaporation areas, FOE complains that the Licensing Board failed to take into account the fact that Staff witnesses calculated overpressures of 24 pounds per square inch (psi) resulting from the detonation of gasoline vapor. FOE brief at 3. FOE then notes that the Staff also failed to use the 24 psi figure in its own calculations. 23/ (Id.) In the same context, FOE at pages 3-4 of its brief accuses the Licensing Board of ignoring Mr. Hasbrouck's calculation of 28 psi and states the Licensing Board failed to fairly evaluate the worst case. (Id.)

In making these allegations FOE ignores the fact that the Staff witness, Dr. Campe, performed the overpressure calculations in question at the request of FOE's Mr. Anthony, who on cross-examination posed a series of hypothetical situations. Specifically, at Tr. 7508 Dr. Campe denied that the figure of 24 psi was close to the calculations provided earlier by FOE's witness Mr. Hasbrouck, and on the very next page, Tr. 7509, in a further exchange with Mr. Anthony both Staff witnesses, Charles N. Ferrell and Dr. Campe, denied that the 24 psi figure represented their own calculations and Dr. Campe stated that he simply performed the calculation at the request of FOE. See, Tr. 7509 (Ferrell, Campe). In view thereof, it is clear that the Licensing Board was correct in not relying on FOE's claimed 24 psi calculation since there is no basis in the record to support such a calculation. See, ¶ B-23.

23/ The Staff, using the evaporation rate assumed by the Applicant with a wind speed of one m/sec. at 500 feet from the Unit 2 containment building, calculated a 2.1 psi. Tr. 7332, 7334 (Campe). Upon the Licensing Board's suggestion, the Staff increased the evaporation area 100 fold and calculated a 5.5 psi at 960 feet. Tr. 7305-06 (Campe). The Licensing Board found the peak positive reflected pressure of 2.1 psi as calculated by the Staff to be conservative. ¶¶ B-22, 25.

With regard to FOE's allegation that the Licensing Board ignored Mr. Hasbrouck's testimony about the potential size of the sprayed area and his resulting 28 psi calculations, Mr. Hasbrouck admitted on cross-examination that he had not performed a calculation or evaluation for determining the size of the spray areas. Tr. 5995, 6003-04, 6100, 6115. Mr. Hasbrouck also admitted that his assumption was no more than a supposition without any scientific basis. Id. In addition, Mr. Hasbrouck admitted that his statements concerning the amount of gasoline that would remain liquid or evaporate and become explosive were all assumptions. Tr. 6042-44 In the Staff's view, there is no evidence in this record to support FOE's allegation of a larger spray area or the higher psi advocated by Mr. Hasbrouck. FOE's citations, as discussed above, are unsupported and its assumptions have no scientific basis. The Licensing Board was correct in rejecting Mr. Hasbrouck's testimony on this point. See, ¶¶ B-23-25.

At page 4 of its brief FOE states that the Licensing Board misunderstood its concept of a greatly enlarged gasoline pooling area in PHR as the result of a dam appearing under a railroad bridge in PHR opposite a reactor building. FOE alleges that Staff witness Dr. Campe testified that such a dam could create an additional 500,000 cubic feet of gasoline in PHR, thus changing completely the Staff's and Applicant's concept of the capacity of the PHR. 24/ Finally, in this regard FOE alleges it was wrong for the Licensing Board to have discarded this "scenario" because of the possibility

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24/ Both Applicant and Staff witnesses testified that even with continued pumping after a postulated pipeline rupture the PHR evaporation area would not be increased because the additional amount of gasoline would simply flow out of PHR and into the Schuylkill River where it would dissipate downstream from Limerick. Ferrell et al. ff. Tr. 6136 at 3, 13. Tr. 6140, 7249, 7482 (Ferrell); Tr. 5569, 5597 (Walsh).

of its creating a much larger flammable mass of gasoline vapor in the vicinity of the reactor.

Once again FOE's statements are not in complete accord with the record evidence. First, Staff witness Dr. Campe testified that it was difficult to make a realistic estimate of whether PHR could be dammed in the manner assumed by FOE. Tr. 7530. Next, Dr. Campe was requested by the Licensing Board to assume a complete blockage of PHR with continued pumping on the ARCO pipeline for a period of three hours, after a postulated rupture. Tr. 7531, 7533. Dr. Campe then estimated that such a scenario would raise the level of dammed gasoline in PHR less than one foot. Tr. 7536 (Campe). Finally, Dr. Campe expressed his opinion that the damming did not appear to have the potential for appreciably increasing the evaporative area of the gasoline and he could see no basis for the forming of vapor clouds as postulated by FOE. Tr. 7552 (Campe). In its brief, FOE fails to discuss the small evaporation area created, which determines the amount of gasoline vapor that could form (Walsh, ff. Tr. 5411 at 6) for detonation purposes, and concentrates instead on the volume, 500,000 cubic feet, that would be created by its assumed dam.

Finally, FOE completely ignores the remarks of the Licensing Board concerning this "scenario," where the Licensing Board told FOE that it was "throwing dimensions in here that have no connection to anything in the record. On top of that we are throwing in assumptions with no evidentiary basis." Tr. 7545. Given the Licensing Board's remarks and its findings at ¶¶ B-23, 24, 25 that these FOE scenarios are unsupported, it is clear that the Licensing Board did not "discard" FOE's assumptions as alleged. The Licensing Board considered and rejected them. The Licensing Board was correct in assigning "no credence to the FOE postulates and resulting calcu-

lations of overpressure on the Limerick structures resulting from a breach of the ARCO pipeline." ¶ B-25.

d. The Columbia Gas Pipelines

During the hearing a considerable amount of time was devoted to the location of the Columbia Gas pipelines and the terrain through which they travel in order to determine if any escaping natural gas could reach the Limerick reactor in a flammable mixture. FOE's brief is silent on this aspect of the proceeding except to state that the Licensing Board can "give no weight" to any travel scenario for the flammable mass of natural gas since all such scenarios are hypothetical and the "worst case" should be evaluated. FOE brief at 4. The Staff agrees with FOE that all natural gas travel scenarios were hypothetical. However, the Staff disagrees with FOE's comments on the evidentiary weight to be given these scenarios. In commenting on FOE's assumptions, the Licensing Board determined that it would give no weight to FOE's scenario after its witness, Mr. Hasbrook, stated he believed it was possible for natural gas to travel 5,500 feet down PHR and still maintain a flammable mixture. Tr. 6008-09 (Hasbrouck). On cross-examination Mr. Hasbrook admitted he had no technical basis for this assumption and subsequently described it as "half-baked," Tr. 6008-09 (Hasbrouck). In view of the comments of FOE's own witness the Staff submits the Licensing Board was correct not to give any weight to this testimony. ¶ B-39.

Next, FOE asserts that the Licensing Board erred in using Staff's Regulatory Guide 1.91, Rev. 1, 25/ because the Guide has not been proven to be the correct value. FOE brief at 4. In addition, FOE alleges

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25/ Regulatory Guide 1.91, Rev. 1, Evaluation of Explosions Postulated to Occur on Transportation Routes Near Nuclear Power Plants, Revision 1, February 1978.

that all who testified admitted to not being able to understand it and that the Guide was discredited. Id. All of these remarks concerning Reg. Guide 1.91 are gratuitous, because they are made without any reference to the record and, most important, are contrary to the evidence of record. Reg. Guide 1.91, Rev. 1 was admitted into evidence as Staff Exhibit 7 after the Staff testified that it set forth the source term regularly used by the Staff in all of their reviews in determining blast overpressures. Tr. 6150-51 (Ferrell). Staff witness Campe advised - - - "the principal portion or aspect of the reg. guide that's applicable that we use routinely is the TNT equivalency calculation and the factor of 2.4 that was being discussed here. That's its princip[al] use when it comes to pipelines." Tr. 6152 (Campe). The Staff certainly experienced no difficulty in interpreting its own Reg. Guide. Indeed it was used by the Staff for its calculations in this matter. Id. The Applicant also had no difficulty and in fact advised the Licensing Board that it considered Reg Guide 1.91, Rev. 1, to be conservative insofar as its conversion factors were concerned. Tr. 5553-57 (Walsh). FOE's bare allegations concerning Reg. Guide 1.91, Rev. 1, are without any record support and should be disregarded.

FOE's assertion that the Licensing Board must accept the possibility of a natural gas ignition sparked by a confined mass is made without any record support and indeed flies in the face of the record evidence. FOE brief at 5. The Staff and the Applicant testified repeatedly that the detonation of an unconfined natural gas cloud is not a credible event. Ferrell, ff. Tr. 9041 at 2 and Tr. 9066; Tr. 6156-57 (Campe); Boyer et al., ff. Tr. 8213 at 5). The Licensing Board agreed. ¶ B-55. Further, the Staff testified that even if it were possible to detonate unconfined natural gas clouds, such a detonation could be accomplished only by high energy sources such as TNT in a

confined state Tr. 6157-58, 7450-52 (Campe) and that to their knowledge no such sources exist at Limerick. (Id.) The Licensing Board agreed. ¶ B-56.

e. Blast Overpressure Calculations And Margin Analysis

FOE next alleges that there is no record of what the Staff found when they checked the Applicant's calculations on blast overpressures and margin analysis. Again, FOE's remarks are made without any reference to the record for support and again its allegations are contrary to the record evidence. The Staff's witnesses in their prefiled testimony and on the record at the hearing clearly advised that they had reviewed the Applicant's blast overpressure calculations and margin analysis and found them to be correct and in compliance with applicable NRC guidelines. Kuo and Romney, ff. Tr. 9043 at 3-4; Tr. 9069-70, 9221 (Romney); Tr. 9602-08, 9221-23 (Kuo). The Licensing Board agreed. ¶ B-66.

At page 5 of its brief FOE disagrees with the Licensing Board's analyses and conclusions of the various loadings on safety related structures by alleging the Licensing Board, in considering effects of blast overpressures, ignored the structure's dead weight, vibratory load, temperature differentials, settlement and hydrostatic forces. Again FOE does not cite to the record to support its argument. Indeed it cannot, because the record clearly shows that the Applicant and the Staff addressed these issues and found that none of these factors would adversely affect the ability of these structures to withstand blast overpressures. Tr. 9182-9247 (Romney and Kuo); Tr. 8367-83, 8442-54, 8463-73 (Wong, Boyer, Vollmer, Palaniswamy, Walsh and Benkert). The Licensing Board fully considered and correctly rejected FOE's allegations in this regard and properly found that the review was adequate and that none of the factors would have any effect on the integrity of the safety related structures. ¶¶ B-70-74.

In a similar fashion FOE takes issue with the Licensing Board's conclusion that failure of the louver or the roof openings from blast overpressures would not affect the integrity of the reactor building. FOE brief at 5. Again, FOE fails to state why the Licensing Board's review of this matter is not sufficient. A review of the record and the Licensing Board's opinion reflect a thorough review of the issue. See, ¶¶ B-75-77. FOE's complaints in this regard are without any record support and are also without merit.

Finally, FOE's bare allegation, made without any record reference, that the Licensing Board was "wrong to dismiss the dangers - - - to the public" from failure of the cooling towers, transmission towers and breaching of basins (FOE brief at 5) has no foundation in the record and should be disregarded. The Licensing Board's consideration of the potential for overturning of the cooling towers and breaching of basins was based on reliable and probative evidence. See, ¶¶ B-79-85.

3. Conclusion

In view of the foregoing, the Staff submits that the Licensing Board properly found that FOE's allegations and speculations on sequences of events that were omitted from the Applicant's and Staff's analyses were without merit and that its Contentions V-3a, V-3b were not based on reliable and probative record evidence. Therefore, the Licensing Board's decision on the matter should be affirmed and FOE's appeal should be denied.

D. The Licensing Board Correctly Determined That The Applicant's Onsite Emergency Plans With Respect To Emergency Response Facilities And Arrangements For The Treatment Of Contaminated Injured Onsite Personnel Were Adequate

1. Background

On September 21, 1981, Limerick Ecology Action (LEA) filed a petition to intervene in this operating license proceeding. During a pre-

hearing conference held January 6-8, 1982, the Licensing Board found that LEA had standing to intervene and provided LEA the opportunity to file proposed contentions regarding the adequacy of the Applicant's emergency plans. However, the Board decided to defer ruling on the emergency planning contentions until the Applicant's emergency plan submitted in response to the new requirements of 10 C.F.R. § 50.47 and Appendix E to Part 50 was available. 26/ The Applicant served the Emergency Plan on the Licensing Board and parties in September 1983, and the Board requested LEA to resubmit its onsite emergency planning contentions. LEA filed those contentions on November 14, 1983. During subsequent negotiations between the parties various portions of the admitted onsite emergency planning contentions were either settled or dropped. The remaining seventeen contentions were litigated.

The Staff and the Applicant presented testimony which established, with respect to the issues in controversy, that the onsite emergency plans for Limerick were adequate and in compliance with applicable regulations and criteria. LEA did not present any testimony, but cross-examined the Staff's and Applicant's witnesses concerning the onsite emergency plans.

Based on expert testimony by the Staff's and Applicant's witnesses, the Licensing Board concluded with respect to the issues in controversy that the Applicant's plans for onsite emergency preparedness were adequate and in compliance with all applicable regulations and criteria. ¶¶ E-45, 46, 47. While some portions of the plans were not yet complete, the Licensing Board found that there was an adequate basis in this record to conclude that subsequent evaluation and review by the Staff would demonstrate that those portions of the plan would be implemented in a manner that would meet all applicable re-

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26/ See, Philadelphia Electric Company (Limerick Generating Station, Units 1 and 2), LBP-82-43A, 15 NRC 1423, 1519-20 (1982).

quirements and criteria. ¶¶ E-22, 23, 45, 46. The Board also examined the Applicant's provisions for medical services for contaminated, injured personnel, including agreements with hospitals, and found them to be adequate. ¶ E-74. On appeal LEA takes issue with the Licensing Board's disposition of only two of the seventeen contentions that were litigated at the hearing. These two contentions involve the Applicant's plans for onsite emergency response facilities (Contention VIII-8(b)) and the Applicant's arrangements for medical services for onsite contaminated injured individuals (Contention VIII-12(a)). The Staff discusses these two contentions below.

2. Argument

a. The Licensing Board's Findings With Respect To The Applicant's Emergency Response Facilities Are Appropriate And Supported By The Record

LEA argues that it was error for the Licensing Board to find in Applicant's favor on LEA Contention VIII-8(b) 27/ and to close the record. LEA

27/ LEA's Contention VIII-8(b) reads as follows:

> The LNGSEP fails to demonstrate that adequate emergency facilities and equipment to support emergency response are provided and maintained as required by 10 C.F.R. § 50.47(b)(8), especially in that:
>
> > (b) The Plan's descriptions of the Emergency Operations Facility (Plan § 7.1.2), the Technical Support Center (Plan § 7.1.3), the Operational Support Center (Plan § 7.1.4), and emergency equipment and supplies are all insufficient to meaningfully assess compliance with 10 C.F.R. § 50.47(b)(8) and to evaluate the facilities with respect to the criteria of NUREG-0654, Supplement 1 to NUREG-0737 (§ 8), and NUREG-0696. Intervenor contends the applicant has not demonstrated that the facilities proposed are adequate. Applicant's response to Q. 810.30 states that the plan will be expanded when final information is available on these facilities.

(FOOTNOTE CONTINUED ON NEXT PAGE)

brief at 39. Such action by the Licensing Board, according to LEA, precluded LEA from litigating an issue properly presented for litigation. At the time of the hearing the Staff had not yet conducted its onsite emergency response facility appraisal, but had reviewed the onsite emergency plans submitted by the Applicant, which included a complete description of the three facilities in question. LEA submits that the determination of the Licensing Board to close the record denied it the right to "submit evidence on the Staff's review, to confront and cross-examine witnesses, and to propose meaningful findings on the adequacy of the facilities." LEA brief at 39. For the reasons set forth below the Staff disagrees with LEA's assertions.

The Licensing Board, in considering this contention, noted that litigation of emergency planning is first and foremost concerned with plans (i.e., is predictive in nature). ¶ E-47. Since the Applicant's Emergency Plan provided complete descriptions of the Emergency Operations Facility (EOF), the Technical Support Center (TSC) and the Operational Support Center (OSC), the record contained sufficient information to support the Licensing Board's finding in Applicant's favor on Contention VIII-8(b). ¶ E-4. The Licensing Board further believed that LEA had a burden of raising specific concerns with the adequacy of these facilities during the hearing and noted that LEA had failed to identify any specific concerns. ¶ E-47. The Staff agrees.

In its brief, LEA does not set forth the information that it was precluded from presenting or what it would have expected to establish had it had the opportunity to keep the record open. Furthermore, LEA acknowledg-

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27/ Basis: 10 C.F.R. § 50.47(b)(8); Part 50, Appendix E; NUREG-0654, Criteria H.1, 2.9, NUREG-0696; "Functional Criteria for Emergency Response Facilities": NUREG-0814, pp. 2-15; Supplement 1 of NUREG-737 § 8. 25.

es that in the emergency planning area the Licensing Board may have some authority to make predictive findings. However, in this case it argues that the Licensing Board has failed to make any findings and has left the matter of the resolution of the acceptability of the emergency facilities to the Staff. LEA brief at 37.

Contrary to LEA's arguments, it was appropriate for the Licensing Board to make predictive findings with respect to the emergency response facilities and to conclude that in view of what remained to be done by the Staff in its review of emergency response facilities, the record should be closed. ¶ E-46. The record establishes that the Applicant has met its burden of proof on this issue and that the remaining items for Staff review were appropriate for resolution outside the hearing process.

The Appeal Board has on several occasions considered the question of predictive findings in the area of emergency planning. 28/ Prior to 1982, the Commission's regulations regarding emergency planning required a determination that "the state of onsite and offsite emergency preparedness provides reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency." 29/ However, in July, 1982, the Commission amended its emergency planning regulations ". . . clarifying that the findings on emergency planning required prior to license issu-

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28/ E.g., Southern California Edison Company, et al. (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-717, 17 NRC 346, 380 n.57 (1983); Cincinnati Gas and Electric Company, et al. (Wm. H. Zimmer Nuclear Power Station, Unit 1), ALAB-727, 17 NRC 760, 773 (1983); and Louisiana Power and Light Company (Waterford Steam Electric Station, Unit 3), ALAB-732, 17 NRC 1076, 1103 (1983). The Licensing Board discussed Waterford and its significance to the instant proceeding at ¶ C-37 through C-39 and ¶ E-5.

29/ Waterford, supra.

ance are predictive in nature and [by] eliminating the reference to the state of emergency preparedness." 30/

In Waterford, the Appeal Board stated that while generally issues should be resolved in hearings and not left for later resolution, with respect to emergency planning the Commission takes a "slightly different course" and authorizes the use of predictive findings in appropriate circumstances. The record in the instant proceeding provided the necessary support for the Licensing Board to conclude that there was reasonable assurance that adequate protective measures can be taken, provided that the Staff completes its review and finds that the emergency response facilities are acceptable. LEA does not question the criteria relied upon by the Staff in reviewing these facilities. See, ¶ E-46. Based on the foregoing, it is clear that a Licensing Board dealing with an emergency planning issue may rely upon the existing record to make predictive findings. In this case, the record fully supports the conclusions reached by the Licensing Board.

LEA asserts that the Board closed the record " . . . after a meaningless hearing in which not even the Staff could yet ascertain the facility's adequacy because so much work was yet to be done." LEA brief at 34. Contrary to LEA's assertion, while Staff witness Sears testified that the Staff's review of the emergency response facilities and equipment in accordance with NUREG-0737 was incomplete, he repeatedly stated the Staff's expectation to complete its review of the emergency response facilities and find compliance

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30/ Id. In Union of Concerned Scientists v. United States Nuclear Regulatory Commission, 735 F.2d 1437 (D.C. Cir. 1984), the Court of Appeals addressed the Commission's emergency planning regulations. The court recognized that NRC's requisite findings on emergency preparedness are more predictive in nature than before the 1982 amendment to the regulations, and stated that its holding in no way reflected on the propriety of that modified standard.

with NUREG-0737. Mr. Sear's testimony (Tr. 10,064-73) was not "meaningless", but reflected the then current status of the review and the anticipated result. Furthermore, Mr. Sears was available for cross-examination at that time and LEA failed to inquire about the adequacy of the plans or Mr. Sears' opinion of them.

LEA argues that:

> The Staff testimony demonstrated that as of the hearing, the Staff simply had not yet evaluated the facilities against the applicable criteria. (See Sears, Tr. 10,061-73) and that its assessment of the facilities' adequacy would depend upon future NRC Onsite Emergency Response Facilities Appraisal Visit (Sears, ff. Tr. 9776 at page 10). [Footnote omitted because it refers to a document not in the record]. As the Board noted, the Staff's review was still far from complete. PID, page 132. [sic] 31/

Under LEA's theory of the law, a predictive finding could not be made under these circumstances. However, as discussed above, the Appeal Board has sustained predictive findings based on the adequacy of the plans in circumstances similar to those presented here.

Emergency Plan descriptions of the EOF, TSC, and OSC are contained in Sections 7.1.2, 7.1.3 and 7.1.4 of the Emergency Plan. Boyer et al., ff. Tr. 9772 at 6-7. The plan describes the physical layout, equipment, documents and supplies necessary for the efficient and reliable operation of these facilities. The Staff also set forth in its direct testimony descriptions of the EOF, the TSC and a reference to the description of the OSC. Sears, ff. Tr. 9776 at 10. When fully functional, these facilities will meet the requirements of NUREG-0737, Supp. 1. Id. at 7. The Applicant has committed to comply with Section 8 of Supplement 1 to NUREG-0737, which describes the NRC's basic requirements for emergency response facilities. Id.

31/ LEA Brief at 35.

The fact that emergency response facilities will be subject to an onsite appraisal prior to a determination of their acceptability provides the basis for the Staff position that these facilities will be adequate for the performance of their functions. Sears, ff. Tr. 9776 at 10. Mr. Sears also testified that the Applicant's onsite emergency plans are adequate, and in compliance with the Staff's view of the requirements of 10 C.F.R. § 50.47. Id. As noted earlier, LEA did not cross-examine Mr. Sears to determine why he felt the Applicant's plans were adequate and in compliance with the applicable Commission regulations. In addition, LEA failed to establish through cross-examination of Mr. Sears that there was anything wrong with the ERF Plans.

LEA's claim that the Licensing Board defaulted in its obligation to make findings on this issue and made neither findings of adequacy nor inadequacy is also incorrect. LEA brief, at 36. In the summary portion of the Licensing Board's decision with regard to onsite emergency planning the Board stated that it ruled in favor of the Applicant on all 17 contentions. ¶ E-4.

b. Medical Services For Onsite Contaminated Injured Individuals

LEA argues that it was error for the Licensing Board to find in Applicant's favor on LEA Contention VIII-12(a).[33/] LEA brief at 39. A

32/ LEA contention VIII-12(a) reads as follows:

> The onsite plans fail to demonstrate that adequate arrangements have been made, for medical services for contaminated injured individuals onsite, as required by 10 C.F.R. § 50.47(b)(2) and (12):
>
> > (a) While medical services and facilities are described in sections 5.3.2.1 - 5.3.2.5 of the Plan, it has not been demonstrated that these services and facilities are adequate for the potential number of persons contaminated by the spectrum of credible accident scenarios for which planning is required, including some

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majority of the Licensing Board determined that the arrangements made by the Applicant for the treatment of contaminated injured onsite personnel at two hospitals[33/] complied with the requirements of 10 C.F.R. § 50.47(b)(12). ¶ E-74. The decision of the Licensing Board was not unanimous with respect to this conclusion. One of the Licensing Board members believed that the arrangements made by the Applicant would not be adequate for the care of the contaminated injured in the event that a radiological emergency required the evacuation of PMMC. ¶ E-77. The dissenting Licensing Board member would have required the Applicant to make arrangements with an additional hospital in the Limerick area. ¶ E-79. LEA urges that the action recommended by the dissenter was "sensible, reasonable and consistent with the Commission guidance in San Onofre." LEA brief at 46. The Staff supports the conclusion of the majority of the Licensing Board that the arrangements made by the Applicant are adequate and in conformity with 10 C.F.R. § 50.47(b)(12) and Planning Standard L of NUREG-0654.

32/ (FOOTNOTE CONTINUED FROM PREVIOUS PAGE)

> coremelt sequences (see NUREG-0396). The plans contain an agreement with Pottstown Memorial Hospital, a facility only two miles from the site, to provide emergency treatment to contaminated patients. In a general emergency, the hospital will be required to evacuate its own patients, which will preclude acceptance and treatment of radiation victims coming from the site. The status of medical support from the Hospital of University of Pennsylvania is unclear as well (see Contention VIII-9(a), above). These are the only two hospitals listed in the Plan as available for medical services to onsite contaminated victims. See NUREG-0654, Criteria B.9 and L.1.

33/ Pottstown Memorial Medical Center (PMMC) located less than two miles from the Limerick plant and the hospital of the University of Pennsylvania (HUP) located approximately forty-five minutes from the Limerick plant. ¶¶ E-62 and E-63.

The Commission's regulations provide, in 10 C.F.R. § 50.47(b)(12), that:

> The onsite . . . emergency response plans for nuclear power reactors must meet the following standards: (12) Arrangements are made for medical services for contaminated injured individuals.

Planning standard L (Medical and Public Health Support) of Chapter II (Planning Standards and Evaluation Criteria) of NUREG-0654, Rev. 1 (Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants) sets out the evaluation criteria for the planning standard in 10 C.F.R. 50.47(b)(12). Insofar as it is relevant here, it reads:

> Each organization shall arrange for local and backup hospital and medical services having the capability for evaluation of radiation exposure and uptake, including assurance that persons providing these services are adequately prepared to handle contaminated individuals. 34/

The specific arrangements made by the Applicant, about which there is no controversy, are set out in paragraph E-62 of LBP-84-31:

> The applicant has made arrangements for the treatment of contaminated injured with two hospitals. Under these arrangements, Pottstown Memorial Medical Center, (PMMC), would be the

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34/ In Southern California Edison Company, et al (San Onofre Nuclear Generating Station, Units 2 and 3), CLI-83-10, 17 NRC 528, 535, fn. 9, (1983), the Commission described the special arrangements for emergency treatment of contaminated injured onsite personnel and emergency workers:

> 9. These special arrangements would include (a) local and backup hospital and medical services having the capability for evaluation of radiation exposure and uptake, including assurance that persons providing these services are adequately prepared to handle contaminated individuals, (b) onsite first aid capability and (c) transportation capability See NUREG-0654, Planning Standard L; 10 C.F.R. § 50.47(b)(12); 10 C.F.R. Part 50, App. E § IV(E).

main receiving point for onsite personnel who are contaminated, injured. See App. Ex. 42. Through an agreement with the Radiation Management Corporation (RMC), which is the applicant's contractor, the Hospital of the University of Pennsylvania (HUP), in Philadelphia would receive contaminated injured when it could provide specialized personnel and equipment PMMC could not. See App. Ex. 43. HUP would also assist with the treatment of persons suffering severe radiation exposure with no traumatic injury. Id.; Tr. 9804-05 Linnemann; and App. Ex. 40.

Although the majority stated that it agreed that it would be prudent to make more formal arrangements with a third hospital, one less vulnerable to evacuation than PMMC and one closer than HUP, the majority did not require such an arrangement. ¶ E-74. A major reason that the majority declined to require more formal arrangements with a third hospital is the low probability of Pottstown Memorial's unavailability. E-74. Staff witness Sears testified that the probability of evacuation of Pottstown Memorial was "vanishingly small". Tr. 9930. Applicant's witness Dr. Linnemann agreed. Tr. 9941.

Furthermore, the selection of the HUP as the backup hospital is supported by the record, in that: (1) the likelihood of the unavailability of PMMC is exceedingly small, ¶ E-74; (2) the primary concern is for those with traumatic injury, Tr. 9906, 9920-30 (Linnemann); 35/ (3) the major concern for those who have received traumatic injury is limited to those who cannot withstand the 45 minute transport to HUP, Tr. 9844 (Linnemann); and (4) in the event of the unavailability of PMMC and the need for immediate medical services, the record shows that all hospitals in the local area have plans

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35/ Applicant's witness, Dr. Linneman, testified that radiation injuries do not actually occur until days or weeks after the exposure and, unlike trauma, can be handled without undue pressure on the hospital. (Tr. 9807).

for handling contaminated injured persons from whatever source. 36/ Tr. 9912-14 (Linnemann).

Although Dr. Linnemann indicated that it would have been reasonably prudent to make at least skeletal arrangements with another alternate hospital, further away than the Pottstown Hospital, but not so far as the University of Pennsylvania Hospital, in his judgment from both a medical and economical point of view, one hospital with excellent preparation such as Pottstown or other hospitals associated directly with a nuclear power plant seemed adequate. Tr. 9915-16 (Linnemann). While Dr. Linnemann, in answer to a Licensing Board question regarding whether it was unusual for a hospital to be within the plume exposure emergency planning zone, responded that because the primary concern is with serious traumatic injury "We would be remiss in jumping over a close hospital to set up a hospital farther away," he concluded, nevertheless, that the arrangements made were adequate for the reasons previously stated. Tr. 9906. John Sears, for the Staff, added that having one hospital nearby with a back-up many miles away is not unlike the situation found at other sites around the country. Tr. 9929 (Sears).

3. Conclusion

For the above reasons, the Staff submits that the Licensing Board was correct in concluding that Contention VIII-8(b) should be resolved in favor of the Applicant and that further hearings on this issue were not required. The Licensing Board's conclusions with respect to emergency response facilities

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36/ Plans for handling contaminated injured patients is a requirement of the Joint Committee on Hospital Accreditation (JCHA). The subject hospitals could not operate without this accreditation. (Tr. 9912-14). Applicant witness Dr. Linnemann testified that it would not be reasonable to have a concern that those hospitals would decline to accept a patient because the patient was radioactively contaminated. (Tr. 9914).

should be affirmed. The majority of the Licensing Board also correctly held that the selection of HUP as a backup hospital fulfilled the requirements of 10 C.F.R. § 50.47(b)(12). The Licensing Board's conclusion regarding this matter should, therefore, be affirmed.

E. The Licensing Board's Rulings Concerning LEA's Severe Accident Risk Contentions Were Correct

1. Background

In Section II.F of LBP-84-31, the Licensing Board made findings of fact on LEA's Contentions DES-1, -2, -3 and -4, all of which concerned the environmental risks of severe accidents. LEA has not appealed from these findings but seeks review of other Licensing Board rulings concerning issues raised by LEA in connection with the Staff's severe accident risk analysis.

The background against which these rulings were made begins with the Applicant's submission of a probabilistic assessment of the risk of accidents (PRA). LEA filed a number of contentions with respect to this document; however, the Licensing Board initially admitted only a single general contention alleging the inadequacy and deficiency of the PRA for use by the NRC staff in determining whether the operation of the Limerick facility might constitute a disproportionate risk in view of its proximity to heavily populated areas. LBP-82-43A, 15 NRC 1423 at 1489-94. This ruling was made prior to the issuance of the Staff's review of the PRA. In addition to its PRA contentions, LEA submitted a number of safety contentions, one of which, Contention I-60, alleged that the Applicant had not provided adequate means to control gas and liquid radioactive effluent and contended that additional engineered safety features such as filtered vented containment and/or molten core retention devices should be required. In responding to allegations that this contention lacked specificity, LEA indicated that this contention could be made more

specific after the results of the PRA were reviewed. See, LBP-82-43A at 1506. The Licensing Board admitted LEA's Contention I-60 with the requirement that it be respecified based on the results of the PRA review. The Licensing Board noted, however, the possibility that Commission rulemaking related to requirements for additional compensating engineered safety features might affect the admissibility of the contention. LBP-82-43A, 15 NRC at 1505-06.

Subsequently, the Staff issued a draft review of the Applicant's PRA, prepared by the Staff's contractor, Brookhaven National Laboratory (BNL). NUREG/CR-3028. LEA submitted five contentions concerning BNL's review together with thirteen contentions representing redrafted versions of its original PRA contentions. LEA also resubmitted I-60. In its Second Special Prehearing Conference Order, the Licensing Board considered the statements of the Staff as to its plans for the use the PRA and two Commission policy statements issued since the first Special Prehearing Conference Order (i.e., since June of 1982), Policy Statement on Safety Goals for the Operation of Nuclear Power Plants, 48 Fed. Reg. 10,772 (March 14, 1983) and Proposed Commission Policy Statement on Severe Accidents and Related Views on Nuclear Reactor Regulation, 48 Fed. Reg. 16,013 (April 13, 1983). 37/ The Licensing Board declined to admit any

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37/ The Staff's statements regarding its plans for use of the Limerick PRA are correctly recited by the Licensing Board in its Second Special Prehearing Conference Order, 18 NRC at 70-73, and need not be repeated in detail here. In essence, the Staff indicated its intentions to use the PRA as a check in its safety review to verify whether any identified dominant sequences were attributable to systems or procedures that failed to satisfy regulatory requirements. Additionally, in the event that use of the PRA uncovered a dominant risk sequence attributable not to a failure to satisfy the regulations, but rather to a unique design aspect of Limerick, the Staff intended to recommend additional measures to compensate for the unique problem. See, 18 NRC at 70-71.

The Staff indicated its intention to use the information in the PRA and in the Applicant's Severe Accident Risk Analysis (SARA) in its

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contentions concerning PRA methodology but stated that any design problems uncovered by the PRA could be litigated as safety issues. LBP-83-39 at 73. The Licensing Board denied LEA's resubmitted Contention I-60, which alleged the need for engineered safety features (incore thermocouples and filtered vented containment) to prevent and/or mitigate accidents beyond the design basis. In rejecting LEA's Contention I-60, the Licensing Board noted the Proposed Commission Policy Statement on Severe Accidents, notably the statement that:

> Accordingly, individual licensing proceedings are not appropriate forums for a broad examination of the Commission's regulatory requirements relating to control and mitigation of accidents more severe than the design basis. Similarly, notwithstanding the Class 9 accidents review requirements for environmental hearings of the Commission's Statement of Interim Policy on "Nuclear Power Plant Accident Considerations Under the National Environmental [P]olicy Act of 1969" (45 FR 40101, June 13, 1980), the capability of current design or procedures (or alternatives thereto) to control or mitigate severe accidents should not be addressed in case-related safety hearings. LBP-83-39, 18 NRC at 87.

The Licensing Board further stated that:

> Prior to the April 1983 proposed policy statement, it might have been open to LEA to allege, with basis and particularity, a credible degraded core accident scenario for which additional design measures should be considered to control airborne radiation releases. Cf. Three Mile Island, supra, at 675. However, LEA's contention does not do so. It is simply a broad concern that an unspecified accident beyond those presently designed for is credible, and that unbounded (except for two examples) additional design measures should be required. Accordingly, the contention does not provide adequate bases or specificity, and is rejectable also for this reason. 18 NRC at 88.

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37/ environmental review pursuant to the Commission's Statement of Interim Policy Concerning Nuclear Power Plant Accident Considerations Under the National Environmental Policy Act of 1969, 45 Fed. Reg. 40,101 (1980). The Staff also indicated an intention to consider recommending compensating features if the risk associated with the operation of Limerick was shown to be significantly greater than the operating risks of other reactors. See 18 NRC at 72.

In April 1983, the Applicant submitted a revision to its Environmental Report in which it presented a plant and site specific probabilistic assessment of severe accident risks, including the effects of external events such as fires and earthquakes. A supporting document, "Limerick Generating Station Severe Accident Risk Analysis" ("SARA"), accompanied the revision.

On August 31, 1983, pursuant to the Licensing Board's direction in its Second Prehearing Conference Order, LEA submitted seven contentions concerning SARA. However, the Licensing Board did not rule on the admissibility of LEA's SARA contentions but determined that contentions on severe accident risk should be reformulated and resubmitted after the Staff issued a supplement to the DES analyzing the risk of severe accidents. Memorandum and Order Confirming Schedules Established During Prehearing Conference, (unpublished) May 16, 1983, and LBP-83-39 at 72-73.

The Staff supplemented its DES with an environmental analysis of the risk of severe accidents, issued in December 1983, and on February 13, 1984, LEA filed six contentions. The Licensing Board 1) admitted three contentions, DES-1, -2 and -3, challenging the Staff's modeling of emergency response to severe accidents; 2) admitted five sub-parts of DES-4, concerning the adequacy of the DES's disclosure of certain named impacts of severe accidents, while denying the other sub-parts; and 3) denied two contentions in their entirety, DES-5, alleging that NEPA requires consideration of alterna-

tives to prevent and/or mitigate risk; [38/] and DES-6, alleging that NEPA requires consideration of the risks associated with sabotage and human errors of commission.

Limerick Ecology Action (LEA) raises four issues on appeal. Three of them concern what LEA regards as the Licensing Board's improper rejection of LEA's proposed contentions regarding (1) the Staff's obligation pursuant to the National Environmental Policy Act (NEPA) to discuss in its Final Environmental Statement (FES) "preventative and/or mitigative alternatives to the design, mode of operation, procedures and/or number of reactors" proposed; (2) the Staff's obligation pursuant to NEPA and the Commission's regulations and policy pursuant to NEPA to discuss in its FES "the whole range of accident scenarios," including those initiated by sabotage; and (3)(a) the socio-economic cost of compensation required for health effects induced by radiation exposure and (b) industrial impacts beyond the first year following the accident. The fourth issue concerns the alleged failure of the FES and the record of decision to provide an adequate disclosure pursuant to NEPA of the impacts of severe accidents.

38/ The Licensing Board's rejection of DES-5 was subject to reconsideration to be based on further filings by the parties concerning certain Staff contracts. On consideration of LEA's "Statement of Significance of NRC Severe Accident Mitigation Systems Contract Documents to LEA Contention DES-5" and after hearing from cognizant Staff personnel, the Licensing Board reconfirmed its determination to deny admission of its Contention DES-5. Order Confirming Rulings and Schedules Made at Special Prehearing Conference on NEPA Severe Accident Contentions (Unpublished), April 20, 1984, Slip op. at 3; Tr. 9471-75.

2. Argument

a. The Licensing Board Properly Rejected LEA's Proposed Contention Regarding The Staff's Obligation Under NEPA To Consider Alternatives To Mitigate Severe Accident Risks

In support of its claim that the Licensing Board erred in denying admission of its Contention DES-5, 39/ LEA argues that: (1) NEPA, the Council on Environmental Quality's (CEQ) regulations and the NRC's regulations in 10 C.F.R. Part 51 require consideration of alternatives; (2) alternatives suggested by LEA were being considered by the Commission in other contexts, e.g., Proposed Policy Statement on Severe Accidents and Related Views on Nuclear Reactor Regulations, 48 Fed. Reg. 16,013 (April 13, 1983), and by the Staff's contractors studying severe accident mitigation systems, and (3) the Licensing Board's ruling regarding the necessity for holding hearings on the environmental contentions related to the operation of the Supplemental Cooling Water System at Point Pleasant prior to the start of construction there in order to protect its ability to require mitigative features was authority for the admission of LEA's DES-5 alleging the need to consider alternatives. LEA brief at 5, 7-9, citing LBP-82-92A, 16 NRC 1387 (1982) at 1388.

39/ LEA Contention DES-5 reads as follows:

> The environmental risk of accidents during operation of the Limerick facility as proposed for licensing is significant, and preventative and/or mitigative alternatives to the design, mode of operation, procedures, and/or number of reactors presently proposed must be considered for purposes of compliance with the National Environmental Policy Act of 1969 and with 10 C.F.R. §§ 51.20(b), 51.21, 51.23(c) and 51.26. None have been considered.

While NEPA and 10 C.F.R. Part 51 [40/] require consideration of alternatives, neither the statute nor the Commission's regulations require a discussion of all possible alternatives to all features of the proposal. The Supreme Court stated in Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, 435 U.S. 519, 551 (1978) that:

> [A]s should be obvious even upon a moment's reflection, the term "alternatives" is not self-defining. To make an impact statement something more than an exercise in frivolous boilerplate the concept of alternatives must be bounded by some notion of feasibility. As the Court of Appeals for the District of Columbia Circuit has itself recognized:
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> > "There is reason for concluding that NEPA was not meant to require detailed discussion of the environmental effects of 'alternatives' put forward in comments when these effects cannot be readily ascertained and the alternatives are deemed only remote and speculative possibilities, in view of basic changes required in statutes and policies of other agencies- making them available, if at all, only after protracted debate and litigation not meaningfully compatible with the time-frame of the needs to which the underlying proposal is addressed." NRDC v Morton, 148 US App DC 5, 15-16, 458 F2d 827, 837-838 (1972).
> >
> > See also, Life of the Land v. Brinegar, 485 F2d 460 (CA9 1973), cert denied, 416 US 961, 40 L ED 2d 312, 94 S Ct 1979 (1974). Common sense also teaches us that the "detailed statement of alternatives" cannot be found wanting simply because the agency failed to include every alternative device and thought con-

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40/ In revised Part 51, published in the Federal Register at 49 Fed. Reg. 9352 (March 12, 1984), the DES/FES at the operating license (OL) stage, is a Supplement to the FES prepared in connection with the application for a construction permit (CP). It covers only those matters that differ from or that reflect significant new information concerning matters discussed in the final environmental impact statement (i.e. the FES-CP). 10 C.F.R. § 51.95. Revised Part 51's effective date was June 7, 1984. However, as the Staff is aware of no Part 51 revision that significantly affects any issue raised on LEA's appeal, there is no necessity for determining which version of Part 51 governed specific events related to NUREG-0974, the Limerick FES-OL.

10 C.F.R. § 51.71, cited by LEA as authority for the need to consider design alternatives in environmental statements on an operating license application, is not specifically applicable to FES-OL's. Part 51's regulation applicable to operating licenses is § 51.95.

> ceivable by the mind of man. Time and resources are simply too limited to hold that an impact statement fails because the agency failed to ferret out every possible alternative, regardless of how uncommon or unknown that alternative may have been at the time the project was approved.

The Licensing Board's rejection of LEA's contention DES-5 on the basis of lack of adequate specificity was correct, reasonable and consistent with Vermont Yankee, supra.

In rejecting LEA's Contention DES-5, the Licensing Board noted that in July, 1983, it had ruled on safety contentions and had emphasized that parties had every opportunity to allege with bases and specificity any particular changes they believed were warranted in the plant. Tr. 9471. In that same Order, the Licensing Board had rejected LEA's proposed Contention I-60 for lack of basis and specificity. LBP-83-39, 18 NRC at 88. DES-5 is nothing more than a rearticulation of I-60, except that it has been moved from the safety side to the environmental side. 41/ In rejecting LEA's Contention DES-5, the Licensing Board commented that LEA had failed to allege that there was any particular dominant sequence for which changes would be cost-effective. Tr. 9472. LEA had not, according to the Board, alleged anything specific.

41/ In rejecting an intervenor contention that NEPA required that the NRC staff issue and circulate a supplemental environmental impact statement discussing alternative methods of protecting the Hope Creek plant from accidents involving tankers carrying liquid natural gas on the Delaware River near the plant, the Appeal Board stated:

> We have found that the likelihood of the accident about which intervenors are concerned is so low that the plant does not have to be designed to withstand it. We can think of no logical reason why NEPA should require so much more than do the safety provisions of the Atomic Energy Act and this Commission's regulations. Public Service Electric and Gas Company (Hope Creek Generating Station, Units 1 and 2).

ALAB-518, 9 NRC 14 at 38-39 (1979). (Emphasis added).

Tr. 9473. The Staff agrees. A contention proposed for litigation in an operating license proceeding that asserts a need to consider mitigative alternatives is impermissibly vague unless it identifies the particular impact to be mitigated. LEA has failed to identify such an impact.

In sum, there is no nexus between LEA's bare allegation that NEPA requires consideration of alternatives, and LEA's Contention DES-5, which asserts a NEPA requirement to consider alternatives to mitigate risks without identifying either the risk to be mitigated or the mitigative measure being urged. Furthermore, LEA failed to identify any basis for a challenge to the FES conclusions that the risks from accidents at Limerick are small when compared with either the background risks of accidental deaths or cancer fatality to which the population near the facility are generally exposed. Further, LEA does not challenge on appeal the Licensing Board's finding that the environmental risk of severe accidents is "clearly small." LBP-84-31, ¶ F.71. This finding confirms the correctness of the Licensing Board's denial of admission of LEA's proposed Contention DES-5. 42/

2) The Commission's Proposed Policy Statement on Severe Accidents and the work being done by Staff contractors studying severe accident mitigation systems do not provide the requisite specificity found by the Licensing Board to be lacking in Contention DES-5. 43/ The Licensing Board made clear that LEA's reliance on such documents was much too general to provide the requi-

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42/ The Staff's objection to the admission of DES-5 was that the Staff had found the risk to operation posed by severe accidents to be "insignificant" and that insignificant impacts did not need to be mitigated.

43/ Philadelphia Electric Company (Limerick Generating Station, Units 1 and 2) Order Confirming Ruling and Schedules Made at Special Prehearing Conference on NEPA Severe Accident Contentions, April 20, 1984.

site specificity. Tr. 9472. In particular, the Licensing Board stated that: "But now in DES-5, all the contention is -- it's a very general contention that says, 'look at alternatives.' That is a much different animal than LEA coming up with a particular sequence for which it wants to allege that changes would be cost effective." Id.

In the proposed policy statement the Commission addressed the question of whether additional regulations should be issued requiring increased capability to mitigate the consequences of severe accidents in operating plants and plants under construction, stating:

> Although, as noted above, there are large programs presently ongoing that will provide information related to this question, they have not yet produced significant new insight into consequence mitigation features sufficient to support further regulatory changes, nor have they yet shown a clear need to add such features. 48 Fed. Reg. at 1601.

Furthermore, the Commission made it clear that "the capability of current designs or procedures (or alternatives thereto) to control or mitigate severe accidents should not be addressed in case related safety hearings." Id.

LEA argues that the existence of NRC staff contract studies demonstrates that mitigative measures for reactors like Limerick are possible. LEA regards the studies as providing the requisite specificity to support admission of its contention. LEA brief at 6-8. LEA's assertion regarding a need for such measures to mitigate severe accidents at Limerick is based on nothing except remote and speculative possibilities whose consideration is not required by NEPA. 44/

3) The Licensing Board's determination to hold early hearings on the SCWS in order to protect its ability to require mitigative features should they

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44/ Houston Lighting and Power Company (Allens Creek Nuclear Generating Station, Unit 1), ALAB-529, 13 NRC 75, 81 (1981).

prove necessary does not provide authority for LEA's position on the instant appeal. LEA cites to the Licensing Board's determination to conduct early hearings on the environmental issues raised on the operation of the SCWS as authority for its claim that the Licensing Board erred in excluding its Contention DES-5. However, the two situations are distinguishable. When the Licensing Board determined to hold early hearings on the SCWS, it had already determined that several of the proposed contentions were admissible and had in fact admitted them. Having determined that a hearing was required, the issue was whether the hearing should be expedited in view of the fact that construction had not yet begun and that mitigative features that might be identified could prove more difficult after construction had begun. In contrast, when the Licensing Board ruled on LEA's DES contentions, Limerick Unit 1 was nearly completed and had been determined by the Staff to be in compliance with the Commission's safety standards. See NUREG-0991. In addition, the Staff's probabilistic assessment had indicated that, although the consequences could be severe, the risk of severe accidents was insignificant. See, FES, NUREG-0974 at 5-126. In the face of these Staff determinations and without directly challenging the Staff's basis for any of them, LEA contended that NEPA required that mitigative design alternatives be considered. In view of the dissimilarities in the two situations, the Licensing Board's determination regarding hearings on the SCWS does not provide authority for LEA's position on appeal. Further, once the Licensing Board determined that the impacts of operation of the SCWS would be insignificant, it refused to consider late contentions proposing alternatives. Memorandum and Order - Denying Petitions of Del-Aware For Reconsideration and To Admit A Late Contention, (unpublished) March 8, 1983.

b. The Licensing Board's Denial Of LEA's Proposed Contention DES-6 Regarding The Need To Separately Consider The Environmental Risk Associated With Sabotage Was Correct

LEA has limited its appeal from the denial of proposed Contention DES-6[45/] to its assertion that sabotage should have been considered in the environmental statement. The Licensing Board ruled that proposed Contention DES-6 was too broad and vague to be admissible and that the whole question of accident scenarios was speculative in terms of how those risks would be treated in a PRA.[46/] Tr. 8778-81. The Licensing Board indicated that the Commission's

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45/ LEA's Contention DES-6 reads as follows:

> The DES does not include a consideration of the whole range of accident scenarios necessary to produce a reliable and realistic cost-benefit analysis, and thus does not comply with NEPA, the Commission's Interim Policy Statement on Severe Accidents Under NEPA, or 10 CFR §§ 51.20(b), 51.21, 51.23(c) and 51.26.
>
> BASIS
>
> (a) Sabotage, both externally and internally initiated, during both construction and operation, was not included. (See, excerpt from Sholly, Steven, "Report on Review of Severe Accident Risk Assessment, Limerick Generating Station," UCS, August, 1983, attached to LEA's SARA contention filing.)
>
> (b) Human errors of commission during accident or transient mitigation were not included.

46/ LEA raised a similar contention, I-12, as a "PRA" contention, i.e., a contention challenging the Applicant's PRA. In Contention I-12, LEA alleged that the Applicant's PRA failed to account for intentional or accidental errors and that such errors, if included, could be revealed to be major contributors to risk. The Licensing Board's remarks in its Second Special Prehearing Conference Order in rejecting that contention are equally applicable here. The Licensing Board said:

> It does not appear that LEA is concerned with a particular vulnerability of Limerick to such errors. Rather,

(FOOTNOTE CONTINUED ON NEXT PAGE)

policy statement on safety goals and proposed policy on severe accidents militated against admission of the contention. The Licensing Board noted in particular its reliance on the Commission's proposed policy on severe accidents. The Staff's objection to the admission of the contention was based on the Commission's statement in its safety goals policy, which the Staff believed guided Licensing Boards' consideration of contentions regarding the need to separately assess the contribution of sabotage to severe accident risk. Specifically, the Staff noted the Commission's view that the probabilistic assessment of the risk of sabotage was beyond the state-of-the-art as currently understood. 48 Fed. Reg. at 10,772 (March 14, 1983).

In Part (a) of its Basis for DES-6, LEA referenced a document, previously filed by LEA in support of its Contention SARA-7, consisting of a page and a half, which LEA stated was an excerpt from "Report on Review of Severe Accident Risk Assessment, Limerick Generating Station," by Mr. Steven Sholly of the Union of Concerned Scientists, August, 1983.[47] In the material provided by LEA, Mr. Sholly sets forth a generalized discussion of the risk of sabotage

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46/ (FOOTNOTE CONTINUED FROM PREVIOUS PAGE)

> LEA appears to be concerned that the overall societal risk from Limerick will be understated. 18 NRC at 77.
>
> In any case, there seems to be considerable overlap between LEA's I-12 and its DES-6. Intentional errors include sabotage and those errors were included in the data base for equipment failures. Intentional acts were considered in the DES/FES.
>
> LEA's concern in DES-6 seems to be that the risk of the operation of Limerick might have been understated in the DES/FES because a sequence in which sabotage might have played a part could have been undervalued by ignoring sabotage as an initiator or contributor.

47/ The Staff has never seen the complete document. It had not been offered as expert opinion prior to LEA's filing of its appeal brief. In any case, the Staff's opposition to LEA's appeal of the denial of DES-6 does not depend on whether or not Mr. Sholly is an expert in probabilistic risk assessment.

at nuclear power plants without any specific reference to vulnerabilities of the Limerick facility, to the ability of such an analysis to provide a sufficiently complete set of scenarios to allow adequate judgments to be made or to the Applicant's SARA and concludes that a sabotage risk analysis could be performed and that such an analysis would have large uncertainties. The excerpt fails to provide any basis why such an analysis should be performed, but indicates that an analysis performed on a "best estimate" basis would ascertain the degree to which sabotage risks contribute to risk at Limerick. Mr. Sholly suggests that "if the uncertainty bounds of this analysis extend into the combined results from the LGS PRA and SARA, then a more detailed analysis would be warranted to more precisely identify the approximate magnitude of the risk and to explore possible means of mitigating this risk (by design and/or procedural changes)." Mr. Sholly has nothing to offer beyond this generalized statement that such a risk could be identified, quantified and possibly, if found to be significant in relation to the overall risk of severe accidents, even mitigated. Mr. Sholly's review adds nothing to DES-6 and fails to provide a basis for its admission.

LEA now argues on appeal that NEPA requires a worst case analysis of the risk of sabotage. The cases that LEA cites as authority to support its position that NEPA requires the NRC staff to prepare a worst case analysis of the risks of sabotage as a part of its environmental impact statement concerning the operation of the Limerick facility do not support such a proposition. Sierra Club v. Sigler, 695 F.2d 957 (5th Cir. 1983), cited by LEA in support of its argument that NEPA requires a worst case analysis of the risk of sabotage, concerns a proposal to deepen the Port of Galveston channel to accommodate supertankers. The proposal required permits from the U.S. Army Corps of Engineers and would thus have been a "federal action" for NEPA purposes. The

project would have been the first in the United States to permit oil tankers to operate in a wildlife sanctuary. On appeal of a denial of the Sierra Club's challenge to the adequacy of the Corps of Engineers' discussion of the associated impacts, the Circuit Court of Appeals held that NEPA required consideration of a total cargo loss by a supertanker in the Bay. The factual situation in the instant case is unlike that in Sigler in that the Limerick FES-OL includes an analysis comparable to that found by the Court of Appeals in Sigler to be required by NEPA with respect to the action proposed there. The NRC staff's FES considered the effects on the environment of "a broad spectrum of possible accidental releases of radioactive material into the environment by atmospheric and liquid pathways. Included. . . are postulated design-basis accidents and more severe accident sequences that lead to a severely damaged reactor core or core melt." NUREG-0974 at 5-125. LEA offers no basis for a belief that a separate consideration of sabotage as an initiator of such events would contribute significantly to the Staff's study.

The Preamble to the Commission's Part 51 rejects 40 C.F.R. § 1502.22, the CEQ's "worst case" regulation, 48/ as applicable to the Nuclear Regulatory Commission's environmental statements wherever its application would have a substantive effect. See, 49 Fed. Reg. 9352 at 9356. However, that same section of the Preamble, entitled "Worst Case Analysis", makes clear that the Commission's Statement of Interim Policy on Nuclear Power Plant Accident Considerations under NEPA, 45 Fed. Reg. 40101, (June 13, 1980), was a response to CEQ Chairman Speth's letter to the Commission, dated February 4, 1980.

48/ On December 31, 1984, the CEQ published an Advance Notice of Proposed Rulemaking in the Federal Register, 49 Fed. Reg. 50,744, in which it announced that it was considering the need to amend its worse case regulation, 40 C.F.R. § 1502.22. Nothing in the notice changes the Staff's position on LEA's appeal of the denial of its Contention DES-6.

The Commission explained there that the Interim Policy set forth the way in which it had chosen to respond to the CEQ's concerns regarding the inadequacy of the Commission's past practices with respect to the environmental analysis of possible nuclear accidents under NEPA. In other words, the Commission's Interim Policy implements 40 C.F.R. § 1502.22 insofar as that regulation affects environmental impact statements prepared by the NRC in connection with applications to construct and operate nuclear power plants. 49/

Sigler does not provide authority for the proposition that a "worst case" analysis should separately consider the risk of sabotage. The Staff addressed in its FES its decision not to explicitly consider the risk of sabotage in its probabilistic assessment of the risk of the operation of Limerick. In discussing the "Probabilistic Assessment of Severe Accidents", the Staff stated:

> Neither the applicant's analysis nor the staff's analysis includes the potential effects of sabotage; such an analysis is considered to be beyond the state of the art of probabilistic risk assessment. However, the staff judges that the additional risks from severe accidents initiated by sabotage are within the uncertainties of risks presented for the severe accidents considered here. NUREG-0974, at 5-74.

In discussing uncertainties in the results of the probabilistic analysis, the Staff discussed the contribution of "Errors of Completeness, Modeling, Arithmetic and Omission" to the uncertainties in the results:

> This area of lumped uncertainty includes such topics as the omission of a model of sabotage, modeling errors in event trees, common cause failures other than those originating in external events or fires, improvements in design or operating criteria undertaken or to be undertaken by the applicant, potential errors in the different models used to assess risks, statistical errors, and arithmetic errors. The impact

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49/ In Deukmejian v. Nuclear Regulatory Commission, No. 81-2034, ___ F.2d ____, decided on December 31, 1984, the U.S. Court of Appeals for the District of Columbia Circuit held that consideration of Class 9 [i.e. severe] accidents was not required by NEPA but was a discretionary policy choice of the Commission. Slip op. at 22.

> on risk estimates of this class of uncertainty could be large, but is unknown and virtually impossible to quantify accurately (Rowsome, 1982). Because of the depth to which the applicant and the staff have considered risks for Limerick, however, uncertainties of this type are not expected to be as large as for other reactors for which less comprehensive probabilistic risk assessments have been performed. NUREG-0974 at 5-112.

LEA has not maintained that there would be any qualitative difference between a worst case impact explicitly including sabotage and one excluding it. Therefore, the Staff's rationale that consideration of sabotage would add nothing to that result and that sabotage risks are within the uncertainties of the severe accidents considered should be reason enough for excluding it. Finally, if LEA had any basis for believing that the Limerick facility was particularly vulnerable to sabotage, then LEA should have raised a contention concerning the Applicant's compliance with the regulations in 10 C.F.R. Part 73.

In sum, LEA's objection that the Staff has not complied with 40 C.F.R. § 1502.22 (CEQ's "worst case" regulation) is not well-taken. See, LEA's Brief at 13. The statement from the FES which LEA cites: "Neither the Applicant's analysis nor the Staff's analysis include the potential effects of sabotage; such an analysis is considered to be beyond the state of the art of probabilistic risk assessment," FES at 5-74, quoted in LEA's Brief at p. 11, does not, despite LEA's assertion to the contrary, trigger a need to prepare a worst case analysis of the severe accident risk from sabotage. In the statement cited by LEA from the FES, the Staff is not stating that the missing information regarding sabotage is "important to the decision and the means to obtain it are not known" (the determination which triggers the need for a worst case analysis in 40 C.F.R. § 1502.22(b)(2)) but is merely explaining why

it didn't isolate sabotage for separate consideration in its DES/FES severe accident risk assessment. 50/

c. The Licensing Board Correctly Determined To Exclude Contentions Regarding The Need To Consider The Socio-Economic Impact Of Compensation Of Victims And Total Industrial Impacts Of Severe Accidents Pursuant To NEPA

LEA objects to the Licensing Board's rejection of two sub-parts of its proposed Contention DES-4 in which LEA asserted that the DES/FES should have considered the socio-economic costs of compensation required for health effects induced by radiation exposure, (DES-4(A)(4); and industrial impacts beyond the first year following the accident and quantification of costs beyond the "output loss" mentioned in the DES, at 5-46, (DES-4(A)(5). The Licensing Board rejected these sub-parts as calling for analysis of impacts that were speculative, unquantifiable, and remote. Tr. 8773. A contention should set forth a basis with enough specificity to give other parties notice of what is required. 51/ Neither of the two sub-parts provides sufficient specificity to allow parties to respond. Therefore, they were properly rejected.

In its brief, LEA acknowledges that the FES offers a basis for excluding a discussion of certain impacts while including others. See, LEA's Brief

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50/ In Deukmejian v. Nuclear Regulatory Commission, supra, the Court of Appeals gave great deference to the Commission's determinations on such matters. Citing Seigel v. Atomic Energy Commission, 400 F.2d 778, 783 (D.C. Cir. 1968), it noted that the Atomic Energy Act of 1954 created a regulatory scheme which is "virtually unique in the degree to which broad responsibility is reposed in the administration agency, free of close prescription in its charter as to how it shall proceed in achieving the statutory objectives." Slip op. at 6. Also, as noted in fn. 49, supra, the Court in Deukmejian held that the Commission's Interim Policy was discretionary, not required by NEPA. Since NEPA does not require an environmental assessment of severe accidents, it cannot require a consideration of a subelement of that matter, namely sabotage, as an initiator of such accidents.

51/ See, Philadelphia Electric Co. (Peach Bottom Atomic Power Station, Units 1 and 2), ALAB-216, 8 AEC 13, 20 (1974).

at 20, citing FES at 5-106, 5-107. In explaining why its consideration of industrial impacts was limited to the first year following an accident, the Staff explained that "longer term consequences are not considered because they will vary widely depending on the level and nature of efforts to mitigate the accident consequences and to decontaminate the physically affected areas." NUREG-0974 at 5-106. The Staff analysis in fact covers those industrial impacts with a reasonably causal relationship to the postulated accidents. This is the standard articulated by the Supreme Court in Metropolitan Edison Company v. People Against Nuclear Energy 460 U.S. 766 (1982) (PANE). 52/ The Staff's treatment of impacts of severe accidents is entirely consistent with PANE.

The Staff does not understand LEA's argument relating to Price-Anderson. LEA's discussion of the compensation of victims under Price-Anderson is apparently offered as support for its assertion that the Licensing Board erred in excluding consideration of the socio-economic cost of compensating for radiation induced health effects. LEA seems to assume that the total "statutory scheme" comes into play on the occurrence of a "severe accident" and that NEPA requires that the "statutory scheme" be discussed in an FES. LEA's

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52/ In considering whether NEPA required an environmental assessment prepared in connection with the proposal to restart the Three Mile Island reactor to include a discussion of "psychological stress," the Supreme Court stated:

> Some effects that are "caused by" a change in the physical environment in the sense of "but for" causation will nonetheless not fall within § 102 because the causal chain is too attenuated. Our understanding of the Congressional concerns that led to the enactment of NEPA suggests that the terms "environmental effect" and "environmental impact" in § 102 be read to include a requirement of a reasonably close causal relationship between a change in the physical environment and the effect at issue. This requirement is like the familiar doctrine of proximate cause from tort law.

brief at 21. Although LEA is mistaken regarding the triggering of Price-Anderson, the Staff does not respond specifically to LEA's argument because it is not clear to the Staff why LEA regards the discussion of the dollar cost of compensating victims of a severe accident as being necessary to a reasoned discussion of the environmental impacts of a severe accident at Limerick. The principal health impacts of severe accidents were discussed in the FES. FES at 5-98-5-102. The FES also indicates that the Staff considered the costs of health care. FES at 5-102. In admitting five sub-parts of LEA's DES-4(A) for litigation, the Licensing Board said that the other sub-parts of this very contention, i.e., other than DES-4(A)(4) and (5), go more directly to things of concern. Tr. 8443-44. In the Staff's view, the Licensing Board was correct in its assessment that DES-4(A)(4) and (5) added nothing to the sub-parts admitted for litigation.

LEA cites 40 C.F.R. § 1508.04 as support for its statement that an EIS must discuss economic or social effects that are "interrelated" with other environmental effects. Presumably, LEA intended to reference 40 C.F.R. § 1508.14, which defines "human environment." Section 1508.14 states: "When an environmental impact statement is prepared and economic or social and natural or physical environmental effects are interrelated, then the environmental impact statement will discuss all of these effects on the human environment." LEA has failed to show either in its contention as proposed or in its brief on appeal how the effects that it urges should have been considered are "interrelated" within the meaning of the regulation. The provisions of Price-Anderson and the Commission's regulations implementing that statute do

not seem to the Staff to "interrelate" with the physical impacts of a severe reactor accident so as to require explicit discussion. 53/

LEA argues that the Licensing Board should not have excluded the part of its contention calling for a worst case analysis of industrial impacts beyond a year from the occurrence of an accident. As discussed above, the Staff disagrees regarding what triggers the need for such an analysis and also regarding the necessity for including all conceivable impacts. See, ¶ F. 71, where the Licensing Board stated, "Where [estimates of environmental effects] are small . . . compared to the risks to which the population and the environment are otherwise exposed, second order effects cannot reasonably be considered significant."

d. There Has Been Adequate Disclosure Pursuant To NEPA

i. The FES And The Record Of Decision Adequately Disclose For NEPA Purposes The Risk Of Human Health Impacts From Severe Accidents

In its brief, LEA maintains that neither the FES nor the Staff's testimony on its Contention DES-4(1) adequately disclose the genetic effects of severe accidents at Limerick. LEA points to the Licensing Board's Finding 14 as support for LEA's statement that the risk of genetic effects "constitutes a greater risk than any other health effect analyzed in the FES." The Licensing Board's ¶ F-14 reads:

> With respect to the risk from genetic effects, 0.26 cases per reactor year, it is in fact (numerically) greater than any other health effect analyzed (listed in Table 5.11h) in the FES. With respect to non-fatal cancers, the Staff agreed

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53/ "Effects" (i.e. impacts) are defined by the CEQ's regulations in 40 C.F.R. § 1508.8 as "direct" (caused by the action and occurring at the same time and place), "indirect" (caused by the action and later in time or removed in distance but still reasonably foreseeable) and "cumulative" (defined in § 1508.7). The impacts which LEA would have had the Staff consider in its DES/FES are none of the above, but are as the Licensing Board noted in rejecting LEA's DES-5(A)(4) "remote." See, Tr. 8773.

> that this risk is (numerically) greater than any other health effects analyzed in the FES and is the highest risk."

Although these effects are numerically greater then effects explicitly considered in the FES, they are, as the Staff explained, less important qualitatively than injuries leading to fatalities. As such, there did not need to be disclosed directly, given that the numerical risk of the occurrence of consequences of severe accidents was itself stated to be insignificant and that such risks may be estimated using the information available and referenced. As the Commission explained in the preamble to Part 51, "The sentence in § 51.45(b)(1) which reads, 'Impacts shall be discussed in proportion to their significance' is identical to the first sentence of § 1502.2(b) of the CEQ regulations which provides the following further explanation: There shall only be a brief discussion of other than significant issues . . . " 49 Fed. Reg. 9363. In addition, the Commission's comment on Section 51.45 (Environmental Report) and Section 51.71 (Draft Environmental Impact Statement) in the Preamble to Part 51 explains that "cost-benefit analysis" has been superseded by "analysis" to reflect a greater awareness of the quality of the environment and the importance of giving full consideration to unquantified environmental impacts, values and amenities . . ." The Staff's determination to discuss certain impacts, while omitting discussion of others but referencing relevant literature, was based on a decision regarding the relative importance and significance of the impacts considered for discussion in the FES. The decision is consistent with the regulations in Part 51 discussed above.

The health effects that LEA asserted should have been considered in the FES, genetic effects, non-fatal cancers, benign thyroid modules and hypothyrodism, spontaneous abortions, sterility and developmental impairment of children, were, as the Staff explained, not explicitly stated in the FES as consequences of the risk of severe accidents at Limerick because the

probability of the occurrence of severe accidents resulting in health consequences was so low that only the most serious consequences, i.e. fatalities and early injuries needed to be discussed. Other health effects were considered but were not included in the FES since only the most important effects were reported. See, ¶ F-12; Tr. 11,201 (Acharya).

ii. The Record Of Decision Augments The FES And Recirculation For Further Comment Is Not Required

LEA argues that the Licensing Board erred in relying on precedent regarding modification of the FES by the record of decision pursuant to now superseded 10 C.F.R. § 51.52(b)(3), in that that section was not readopted in new Part 51. LEA seems to be arguing a point that § 51.102, on which the Licensing Board relied in its Second Partial Initial Decision, is somehow different from § 51.52(b)(3) regarding recirculation for comment. Neither version of Part 51 requires that a record of decision modifying an FES be recirculated for comment. However, in the instant proceeding, the Licensing Board left no doubt concerning that matter. The Licensing Board found that "The basic conclusions of the FES are unchanged by our findings. The modifications to the FES made by the record of decision in this case create no reason to recirculate the FES for further comments." ¶ F-6.

On appeal LEA maintains that the FES was deficient in not having adequately discussed the health consequences that were the subject of LEA's Contention DES-4. However, the Licensing Board did not find that the FES was deficient and, in any case, it was supplemented by the testimony, as explained above.

3. Conclusion

For the reasons discussed, LEA's appeal from LBP-84-31 regarding Contentions DES-4, -5 and -6 should be denied.

V. CONCLUSION

For the foregoing reasons, the NRC staff believes that the Intervenors have failed to show that the Licensing Board committed reversible error in its Second Partial Initial Decision or its other preliminary rulings included in the record of decision. Accordingly, the Appeal Board should affirm the Licensing Board's decision.

Respectfully submitted,

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Ann P. Hodgdon
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Dated in Bethesda, Maryland
this 7th day of January 1985

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING APPEAL BOARD

In the Matter of	)	
	)	
PHILADELPHIA ELECTRIC COMPANY	)	Docket Nos. 50-352
	)	50-353
(Limerick Generating Station, Units 1 and 2)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of "NRC STAFF'S RESPONSE IN OPPOSITION TO THE APPEALS OF AIR AND WATER POLLUTION PATROL, FRIENDS OF THE EARTH IN THE DELAWARE VALLEY AND LIMERICK ECOLOGY ACTION" in the above-captioned proceeding have been served on the following by deposit in the United States mail, first class, or as indicated by an asterisk through deposit in the Nuclear Regulatory Commission's internal mail system, this 7th day of January 1985:

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