UNITED STATES OF AMERICA
ATOMIC ENERGY COMMISSION

John B. Farmakides, Chairman
Cadet H. Hand, Jr., Member
Frederick J. Shon, Member

In the Matter of

THE TOLEDO EDISON COMPANY AND
THE CLEVELAND ELECTRIC
ILLUMINATING COMPANY

(Davis-Besse Nuclear Power
Station)

Docket No. 50-346

Construction Permit (Sec. B)

September 13, 1973

INITIAL DECISION

Appearances

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The Coalition for Safe Electric Power

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I. Preliminary Matters

1. The Toledo Edison Company and The Cleveland Electric Illuminating Company (Applicants) are holders of Construction Permit No. CPPR-80, issued by the U. S. Atomic Energy Commission (Commission) on March 24, 1971. This Construction Permit authorized Applicants to construct a pressurized-water nuclear reactor, the Davis-Besse Nuclear Power Station (the facility), at the Applicants' site on the southwestern shore of Lake Erie in Ottawa County, Ohio.

2. The facility is subject to the provisions of Section B of Appendix D to 10 CFR Part 50, which establishes procedures for the review of environmental

considerations pursuant to the National Environmental Policy Act (hereinafter NEPA) for construction permits issued between January 1, 1970, and September 9, 1971.

3. On January 5, 1973, pursuant to said Section B of Appendix D, the Commission published a notice of Hearing,[1/] and directed that a hearing be held before an Atomic Safety and Licensing Board (Board) to consider and make determinations on the following matters:

> "1. In the event that this proceeding is not a contested proceeding as defined by 10 CFR § 2.4(n) of the Commission's 'Rules of Practice,' the Board will without conducting a de novo evaluation of the application determine whether the environmental review conducted by the Commission's regulatory staff pursuant to Appendix D of 10 CFR Part 50 has been adequate.
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> "2. In the event that this proceeding is a contested proceeding, the Board will decide any matters in controversy among the parties within the scope of Appendix D to 10 CFR Part 50, with regard to whether, in accordance with the requirements of Appendix D to 10 CFR Part 50,

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1/ 38 Fed. Reg. 904.

the construction permit should be continued, modified, terminated or appropriately conditioned to protect environmental values.

"3. Regardless of whether the proceeding is contested or uncontested, the Board will, in accordance with section A.11 of Appendix D of 10 CFR Part 50, (a) determine whether the requirements of section 102(2)(C) and (D) of NEPA and Appendix D to 10 CFR Part 50 of the Commission's regulations have been complied with in this proceeding; (b) independently consider the final balance among conflicting factors contained in the record of the proceeding with a view toward determining the appropriate action to be taken; and (c) determine, after weighing the environmental, economic, technical and other benefits against environmental costs and considering available alternatives, whether the construction permit should be continued, modified, terminated or appropriately conditioned to protect environmental values."

4. The Notice of Hearing further provided that petitions for leave to intervene could be submitted by any person whose interest might be affected with respect to whether, considering those matters covered by Appendix D to 10 CFR Part 50, the Construction Permit should be continued, modified, terminated, or appropriately conditioned to protect environmental values.

5. On March 15, 1973, the Commission published a Notice of Establishment of the Atomic Safety and Licensing Board,[2/] which designated the individual members of this Board for this proceeding.

6. In response to said Notice of Hearing, by letter dated January 14, 1973, Mr. Steve Gannis requested that he " . . . become a formal legal party in the case". Both the Applicants and the Staff opposed the admission of Mr. Gannis as a party. By letters dated February 2, and February 5, 1973, Mrs. Evelyn Stebbins sought to intervene on behalf of herself and the Coalition for Safe Nuclear Power (now known as The Coalition for Safe Electric Power; hereinafter Coalition). The Applicants opposed the admission of the Coalition; the Staff opposed in part but proposed that the Coalition be permitted to cure their petition.

2/ 38 Fed. Reg. 7016.

7. By Memorandum and Order dated March 30, 1973, this Board denied Mr. Gannis' request because his petition did not meet the requirements of 10 CFR 2.714. While the Board found that the Coalition's petition failed in substantial part to meet the requirements of Section 2.714, it nevertheless permitted the Coalition a further opportunity to correct certain defects in its petition. On April 16, 1973, the Coalition submitted an Amended Petition to Intervene. Both the Applicants and the Regulatory Staff responded.

8. On May 4, 1973, the Board issued a Notice and Order for Special Prehearing Conference,[3/] in order to clarify and resolve the status of the Coalition's petition. On May 22, 1973, said Special Prehearing Conference was convened in Cleveland, Ohio.

9. On considering the filings of the Coalition and the statements of the parties at the Conference,

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3/ 38 Fed. Reg. 12149.

the Board, in its Special Prehearing Conference Order dated May 31, 1973, found that the Coalition had adequately identified its interest and had set forth with sufficient particularity and basis, eight issues which the Board identified in the May 31 Order. In so ruling, the Board took account of the fact that the Coalition did not have the benefit of counsel.[4/]

10. On June 28, 1973, pursuant to Notice,[5/] a Second Prehearing Conference was held in Toledo, Ohio. At said Conference, the Board approved certain stipulations of the parties which (1) established further schedules for the proceeding, (2) resolved certain objections by Applicants to interrogatories submitted to them by the Coalition, (3) clarified several issues, and (4) provided for the admission into evidence of certain documents.[6/] At said Prehearing Conference,

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4/ Subsequently, the Coalition obtained counsel for the remainder of the proceedings.
5/ 38 Fed. Reg. 15862; 38 Fed. Reg. 16416.
6/ Prehearing Conference Order, July 10, 1973, pp. 1-4.

the Applicants moved to strike Issue 3,[7] dealing with transportation of radioactive wastes and spent fuel, as a challenge to AEC Regulations, and made without the showing required by 10 CFR § 2.758. The Board noted its reasons for tentatively agreeing with the Applicants but asked for responses from the other two parties before final ruling.[8] The Staff responded in support of Applicants' motion on July 5, 1973. The Coalition filed no response. Thereafter, the Board, citing its earlier reasons, granted the Applicants' motion.[9]

11. All parties filed direct testimony in accordance with the schedule established and reflected in the Prehearing Conference Order. No direct testimony was filed by the Coalition on Issues 4 and 5.

7/ Identified in Board's May 31, 1973, Order; Tr. 102-103.
8/ Tr. 128-131.
9/ Prehearing Conference Order, July 10, 1973, pp. 4-5.

12. On July 13, 1973, Applicants moved to strike the testimony of Dr. Ernest J. Sternglass, submitted by the Coalition with respect to Issues 6 and 7, on the grounds that the testimony was irrelevant to these issues. Issue 6 alleged that radioactive releases from nuclear plants would increase with age. The testimony by Dr. Sternglass on Issue 6 was silent as to the effects of aging. It purported, rather, to show that the relatively small releases from the Shippingport Power Station and the Plum Brook Reactor Facility were resulting in high dose levels in the environment. Issue 7 asserted that locating the Davis-Besse facility in a largely agricultural area would result in industrial and population growth. The testimony of Dr. Sternglass on Issue 7 claimed that radioactivity releases from nuclear reactors had resulted in increased mortality and disease. The Staff supported the Applicants' motion.[10/] The

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10/ Staff response, July 20, 1973.

Coalition filed no written response. After oral argument,[11] the Board found that Dr. Sternglass' testimony was irrelevant and immaterial to Issues 6 and 7 and granted the Applicants' motion.[12] The Board, however, noted its possible relevance to an apparent new issue which the Board concluded to be of potentially serious public health and safety interest.[13]

13. On July 13, 1973, the Applicants also moved to strike Issues 4, 5, 6, and 7, on the grounds, inter alia, that the Coalition had failed to meet its burden of going forward on these issues and failed to make a prima facie case, as required by the Appeal Board in Consumers Power Company.[14] Since the Coalition had presented no testimony on Issues 4 and 5 and had presented no relevant testimony on Issues 6

11/ Tr. 209-211.
12/ Tr. 339.
13/ See paragraph 16 below.
14/ Consumers Power Company, ALAB-123, RAI-73-5, at 345 (May 18, 1973).

and 7, the Applicants argued that these issues should be stricken. The Staff opposed this motion, based upon an Appeal Board Decision issued subsequent to Applicants' motion, Wisconsin Electric Power Company.[15/] In view of the Staff's position and because of the Board's desire to develop a complete and adequate record, the Board denied the Applicants' motion, and ruled that it would hear the written direct testimony submitted by the Applicants and the Staff. The Board further ruled that it would permit cross-examination by the Coalition, provided that the Coalition would advise the Board in advance of the intended purpose of such cross-examination and would specify what the Coalition would show by it.[16/]

14. On July 16, 1973, the Applicants moved to strike the testimony of Dr. Ernest Sternglass, submitted by the Coalition on Issues 6, 7, and 8, on the ground that the same methodology and arguments relied upon by

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15/ Wisconsin Electric Power Company, ALAB-137, July 17, 1973; Applicant responded. Tr. 214-218.

16/ Tr. 339B.

Sternglass had been presented earlier by him; and had been subsequently examined and rejected by the Commission. The Staff supported this motion as to Issues 6 and 7. By a separate motion, submitted July 16, 1973, the Applicants also moved to dismiss Issue 8 on the ground that its subject matter as limited by the direct testimony submitted by the Coalition (the radiological effects on fish) had been litigated in the earlier hearings on this facility.[17/] The Staff opposed the motion;[18/] the Coalition filed no written response to either motion. The Board ruled that the Applicants' said motion as to Issues 6 and 7 was in effect moot since Dr. Sternglass' testimony had already been stricken for other reasons. But with respect to Issue 8, the Board concluded that the methodology and reasoning

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17/ Initial Decision, In the Matter of Toledo Edison Company, et al, Docket No. 50-346, March 23, 1971, at pp. 33-34; Initial Decisions, In the Matter of Toledo Edison Company, et al, Docket No. 50-346, May 19, 1972, July 9, 1972. These hearings related to the suspension of the construction permit pending completion of the full environmental review.

18/ Response to the AEC Regulatory Staff to the Applicants' Motion to Strike, etc, July 20, 1973.

used by Dr. Sternglass in his testimony appeared to be of use in developing the record and did not appear to be the same as that which had been considered and rejected in other proceedings.[19/] At the Evidentiary Hearing, Applicants moved to strike the testimony of Dr. Sternglass as to Issue 8 on the ground that Dr. Sternglass lacked any educational or professional qualifications with respect to fish population. The Board ruled that it would accept the testimony for whatever it was worth,[20/] but would strike from this testimony on Issue 8 all references to the testimony submitted by Dr. Sternglass with respect to Issues 6 and 7.[21/]

15. Also on July 16, 1973, the Applicants filed a motion, accompanied by the necessary affidavits, for summary disposition on Issues 2, 4, 6, and 7. The Staff supported the Applicants' motion; the Coalition

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19/ Tr. 340.
20/ Tr. 589.
21/ Tr. 558-561, 576, 577, 674-675.

opposed only with respect to Issues 2 and 6. In the absence of any opposition with respect to dismissing Issues 4 and 7, ard following a study of the record, the Board found that there was no genuine issue of fact as to these Issues 4 and 7 and granted the Applicants' motion.[22/] With respect to Issues 2 and 6, the Board granted the Applicants' motion for summary disposition except as to the facts controverted by the Coalition as specifically identified on the record by the Board.[23/]

16. On July 24, 1973, during the Evidentiary Session, the Board, on its own motion, raised a new issue (Issue 9) which appeared to have potentially grave public health, safety, and environmental implications.[24/] The new issue stemmed from the allegations contained in the testimony of Dr. Sternglass submitted on Issues 6 and 7 that the techniques for estimating

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22/ Tr. 235.
23/ Tr. 341-342.
24/ Tr. 202-205, 343-348.

environmental dose rates from radioactive releases from nuclear facilities were substantially in error.[25] Specifically, Dr. Sternglass asserted that releases from the Shippingport Power Station and the Plum Brook test reactor, while releasing smaller quantities of radioactive materials than predicted for the Davis-Besse facility, had resulted in radioactive dose levels much higher than those predicted for the Davis-Besse facility. However, the Board excluded from the new issue the allegations relating to the biological effects of radiation in that such issues were res judicata and had been previously resolved adversely to Dr. Sternglass in other proceedings.[26] The Board rejected the Applicants' argument that Issue 9 should be dismissed.[27] Later, following receipt of evidence from one witness,[28] Dr. Norman A. Frigerio, the

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25/ Testimony of Dr. Sternglass on Issues 6 and 7 (stricken as irrelevant to Issues 6 and 7, but retained for purposes of Issue 9).

26/ Tr. 820-821; Trustees of Columbia University, ALAB-50, May 18, 1972; see also Initial Decision, In the Matter of Toledo Edison Company, et al, March 23, 1971, Docket No. 50-346.

27/ Tr. 345-347, 530-536, 596.

28/ Tr. 608-612.

Applicants moved the Board to reconsider its ruling admitting Issue 9.[29/] The Board deferred ruling until all evidence on the matter could be received and considered.[30/]

17. On August 6, 1973, the Coalition filed a motion to delay the closing of the record with respect to Issue 2 and an accompanying motion to compel discovery.[31/] Following oral argument, the Board denied the motions on several grounds: the Coalition showed no reason for reopening discovery at such a late stage in the Hearing; the information sought by the Coalition was not relevant to matters in controversy as established by the Board's summary disposition ruling; and the Board saw no reason to continue the proceeding on this issue.[32/]

29/ Tr. 624.
30/ Tr. 627. See paragraph 73, infra.
31/ Tr. 760.
32/ Tr. 1117-1118.

18. In order to assist the Board in developing a complete record and in order to preclude unnecessary duplication, the Board, without objection, incorporated by reference into the record of this proceeding the record of the hearings held in May and July, 1972, pursuant to Section E of Appendix D to 10 CFR Part 50, with respect to whether construction of this same Davis-Besse facility should be suspended pending completion of the full NEPA review.33/

19. In order to assure an accurate record in view of the extensive material introduced in this proceeding, a list of exhibits and testimony is appended hereto as Appendix A to this Initial Decision, and further includes the manuscripts of testimony presented at the Evidentiary Hearings as corrected by Order Correcting Transcript, dated September 12, 1973.

20. On August 20, 1973, the Coalition, by telephone call to the Board, requested one additional day beyond its allotted time in which to submit its

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33/ Tr. 729-730. See Fn. 17, supra.

proposed findings of fact and conclusions of law. The Applicants and the Staff had no objection provided they would be afforded a like additional time for their filings. The Board agreed and granted the Coalition the time requested.

21. In general, the Board has accepted the substance of the proposed findings submitted by the Staff and the Applicants. As to the issues, the Coalition submitted proposed findings only on Issues 1 and 9. The proposed findings on Issue 1 simply repeated the Coalition's allegations and referenced the Coalition's exhibits. With respect to Issue 9, the Coalition simply called attention to the testimony and exhibits offered by Dr. Sternglass. In addition, as part of their proposed findings, the Coalition has submitted a section entitled "Findings of Fact". This section apparently was intended to allege that Issues 1, 2, 5, and 8 have not been properly considered, and that the issue regarding biological effects of radiation on public health should have been heard.

In light of our findings elsewhere herein, these proposed findings are rejected as unsupported by the clear weight of the evidence. All of the proposed findings and conclusions submitted by the parties which are not incorporated directly or inferentially in this Initial Decision are herewith rejected as being unsupported in law or fact, or as being unnecessary to the rendering of this Initial Decision.

II. Environmental Report and Statements

22. The Applicant submitted an Environmental Report on August 3, 1970.[34/] On November 5, 1971, in compliance with revised Section B, Appendix D to 10 CFR Part 50, the Applicant submitted a two-volume Environmental Report Supplement.[35/]

23. During November, 1972, a Draft Environmental Statement was made available to the public and sent to

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34/ Davis-Besse Nuclear Power Station Environmental Report.

35/ Supplement 1 to Davis-Besse Environmental Report.

sixteen Federal, State, and local agencies for comment. In March of 1973, a Final Environmental Statement (FES), prepared by the Directorate of Licensing, after considering all the comments received, was made available by the Staff to the public, to the Council on Environmental Quality, and to the other agencies. It specifically included the comments received as appendices from the eleven agencies that had submitted same.[36/]

III. Findings of Fact--Matters in Controversy

24. In its Special Prehearing Conference Order of May 31, 1973, this Board identified eight issues as matters in controversy; each of which will be considered below, seriatim.[37/] In the Prehearing Conference Order of July 10, 1973, on the basis of the record and as

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36/ FES: iii, Appendices C-L.

37/ As noted in paragraph 10 above, Issue 3 was stricken; as noted in paragraph 15, Issues 4 and 7 were dismissed on the Applicants' Motion for Summary Disposition.

stipulated by the parties, the Board limited Issue 1 to seven specific alternative means of conserving energy; limited Issue 2 to storm damage which could result in facility damage, which in turn may cause environmental damage; and limited Issue 8 to contaminants other than radioactive contaminants.

Issue 1:

The Coalition contends that the Final Environmental Statement constitutes an arbitrary and capricious refusal to comply with considerations of alternatives as required by Section 102(2)(c)iii of the National Environmental Policy Act of 1969, in that the "Staff" has failed and refused to consider the alternative of conservation of energy within the Applicants' service areas so as to obviate the need for the 872 MW additional capacity of the Davis-Besse Plant.38/

38/ As set forth in Special Prehearing Conference Order, dated May 31, 1973. By stipulation, the Issue was limited to seven possible conservation methods which will be discussed below herein: ban on promotional advertising and activities, conservation advertising, changes in rate structure (cost-based pricing rather than promotional pricing; higher rates), changes in the use of electricity, changes in public attitudes, energy efficient buildings, and energy-efficient appliances. While portions of this issue may be considered "broad social questions" within the meaning of ALAB-137, which case was rendered after said Issue 1 was formulated, the Board, without objection, agreed to hear the Issue especially as it bore upon the need for power. Tr. 138, Prehearing Conference Order dated July 10, 1973, p. 3.

25. The Coalition introduced testimony[39/] which questioned: whether the twenty (20) percent reserve capacity margin recommended by the Federal Power Commission (FPC) is necessary for the power system; whether the reserve capacity should be taken as above "native" or "internal" load (the latter term includes interruptible load); and whether present predictions may not overestimate the need because they fail to account for decrease in demand with proposed rate increases. The Coalition's Witness, Mr. Morgan, also presented examples of promotional advertising by the Central Area Power Coordination Group (CAPCO) companies (which will draw electricity from the pool to which Davis-Besse would serve). He also asserted that Rand Corporation has projected substantial potential decrease in demand for electricity in California if energy conservation measures (among them the seven listed as sub-issues in Issue 1) were in effect.

39/ Testimony of Mr. Richard F. Morgan, following Tr. 327.

However, on further examination, Mr. Morgan admitted that he had never performed any systematic energy demand forecasts before, and that he had performed no studies of plant reliability or forced outages.[40] He further agreed with one of the Applicants' witnesses that there was no real way of estimating how effective an advertising campaign to save electricity could be,[41] although Mr. Morgan had stated earlier in his oral testimony that it had come to his attention that Consolidated Edison of New York had reduced demand an estimated four to five percent through such a program. Apparently the source of such information was a sentence in the prepared testimony of Mr. Nightingale,[42] taken out of context, in the course of which Mr. Nightingale had questioned the validity of that figure. The Coalition also offered other evidence[43] to show that the Applicants (Cleveland Electric Illuminating

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40/ Tr. 328.
41/ Tr. 334.
42/ Mr. D. J. Nightingale, Testimony following Tr. 683, p. 5.
43/ Intervenor Exhibits 1 through 4, 16A through 16LL.

Company [CEI] especially) engage in promotional advertising.

26. On the other hand, witnesses[44/] for the Applicants testified that price elasticity of demand was very small in Northwest Ohio where alternate energy sources were few. They testified that even using the Rand Corporation's figures for California (which would probably overestimate the effect) only a fraction of a percent decrease would result from projected rate increases. They stated that the advertising policy of the Toledo Edison Company encourages or promotes "security lighting", i.e., outside lighting to enhance home protection; that the advertising policy of CEI promotes the use of electric dryers and ranges, and electric water heaters[45/] but these do not significantly affect incremental peak demand because of the diversity factor.[46/] Both companies have "Area Development"

44/ Messrs. Roe and Reynolds, testimony following Tr. 241; Tr. 243-244.
45/ Testimony following Tr. 241 at pp. 8-11; Tr. 265.
46/ Ibid.

programs which encourage general economic development in their areas.[47/] These programs, they assert, are aimed primarily at preventing any decline in manufacturing job opportunities in the Cleveland-Toledo area. Apparently, all-electric homes have a peak demand in winter months;[48/] and thus do not add to the Applicants' peak, which occurs in the summer. While the Coalition introduced exhibits showing advertising by Cleveland Electric,[49/] there was no evidence whatsoever that such advertisements significantly affected peak demand. In contrast, economic studies by the Applicants showed that advertising expenditures were not a significant influence on the level of residential electric use.[50/] While the Coalition's witness cited the "Save-A-Watt" program of the Consolidated Edison Company as an example of how increased expenditures for conservation advertising might slightly reduce peak

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47/ Messrs. Roe and Reynolds, testimony following Tr. 241, p. 7; Tr. 362.
48/ Id, pp. 9, 10; Tr. 241.
49/ Intervenor Exhibits 16A-16LL.
50/ Messrs. Roe and Reynolds, testimony following Tr. 241, pp. 11-12.

demand, the same witness conceded that there was no real way to determine the validity of the claimed savings.[51/] However, that Utility in fact indicated that any reductions in peak demand were due both to involuntary voltage reductions, and to the Utility's advertising program, without differentiating the percentage attributable to either factor.[52/] The Board concludes that the Applicants' advertising programs do not significantly add to peak demand.

27. The Applicants also have energy conservation programs aimed at providing residential builders and industrial customers with advice in building properly insulated and electrically efficient houses and plants.[53/] For example, Toledo Edison distributes a free booklet on ways to conserve electricity.[54/]

51/ Tr. 323, 333-334.
52/ Tr. 292-296.
53/ Messrs. Roe and Reynolds, testimony following Tr. 241, p. 12.
54/ Applicants Exhibit 1.

28. With regard to rate structures, the Applicants' witnesses alleged that these are "designed to follow costs of providing service".[55/] The demand for electric power is price inelastic because electricity is a small percentage of the typical family budget and of the cost of operation for commercial and industrial facilities, and because of the absence of good substitutes for electric power.[56/] Thus, it would appear that increases in the price of electricity would not significantly alter growth in power usage.[57/] A recent increase in industrial rates by twenty (20) percent has not changed industrial use of electricity.[58/]

29. The projected CAPCO reserve margins used by the Staff in the FES were based upon the 1972 East Central Area Reliability Coordination Agreement (ECAR) Report. These show CAPCO reserve margins without the

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55/ Messrs. Roe and Reynolds, testimony following Tr. 241, p. 6.
56/ Tr. 244-249.
57/ Messrs. Roe and Reynolds, testimony following Tr. 241, p. 1.
58/ Id., p. 7.

Davis-Besse facility of 9.6 percent, 10.6 percent, and 4.3 percent in 1973, 1976, and 1977, respectively.[59/] Using the 1973 ECAR data, without the Davis-Besse facility, CAPCO reserve margins would still be below the twenty (20) percent margin recommended by the FPC.[60/] Based on the entire record, the Board concludes that CAPCO's planned reserve margins, including the capacity of the Davis-Besse facility, are prudent and reasonable.

30. The Board has examined and considered all the above testimony. The Board notes that the FES does not consider energy conservation as an alternative to construction of the facility; rather it evaluates the need for power by standard approaches.[61/] While the FES considers other ways of filling the need for power,[62/] it fails to consider means of conserving

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59/ FES, Table 8.3.
60/ FES, p. 8-3.
61/ FES, p. 8-1.
62/ FES, § 9.

power and reducing the need for more power.[63] With respect to the specific alternatives contended by the Coalition as viable methods for reducing power, the Board in view of the findings above, further concludes and finds as follows:

(a) Ban on promotional advertising

Very little such advertising is actually being done. Further, the specific types of electrical promotion in which the Applicants are engaged, promoting security lighting, electric ranges, dryers, and water heaters, are probably very insensitive to advertising. While no witness could present firm data on the response of electric demand to advertising, those witnesses having the greatest experience with forecasting[64] stated that electric power demand was much more responsive to such matters as life style, household income, and

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63/ FES, p. 12-1, Appendix D-2.
64/ Messrs. Roe and Reynolds, testimony following Tr. 241; Tr. 262, 263.

available alternative energy sources than to advertising. The specific uses promoted include one (security lighting) which clearly relates to changing life styles, and three (dryers, ranges, and water heaters) for which the best alternative, gas, is in short supply.[65/] Stopping these promotional activities seems unlikely to reduce demand sharply.

The only other promotion-related activity undertaken by the Applicants is the Area-Development Program of each. This would not seem to be a strong factor for increasing demand, although its cessation might, by discouraging industrial developing and reducing employment, eventually lessen the need for electric power in the immediate area.

(b) Conservation Advertising

This sub-issue is essentially simply the negative of issue (a). The Board finds no

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65/ Tr. 249, 363.

reason to conclude that conservation advertising would be effective in reducing need for power.

(c) Changes in Rate Structure

As with sub-issues (a) and (b), the most reliable and probative evidence seems to indicate that demand would be quite insensitive to rate changes and that rates are already cost based.

(d) Changes in the Uses of Electricity

The Coalition presented no testimony to indicate what sort of changes in the uses of electricity could substantially decrease demand. The Rand Corporation study, which Witness Morgan cited and which suggested possible savings in California by substituting gas for electrical energy, does not seem applicable to the climate and needs of Northwestern Ohio.

(e) Changes in Public Attitude

Here, too, the allegation by the Coalition was not accompanied by any substantial evidence that a change in public attitude would reduce the need for power, or that means were at hand to effect such a change. The discussion, supra, of the influence of advertising and of rate structures seems to subsume this point.

Moreover, as the Appeal Board has clearly indicated, a Licensing Board need not inquire into the propriety of customary uses of electricity,[66/] nor consider broad social questions.[67/]

(f) and (g) Energy-Efficient Buildings and Appliances

Except for Witness Morgan's citation of the Rand Corporation study, the Coalition produced

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66/ Fn 14, supra, at p. 352.
67/ Fn 15, supra, at p. 23.

no estimate of how much electricity could be saved by energy-efficient buildings and appliances. Mr. Morgan's testimony briefly mentioned the ability of individual building or appliance designs to effect saving[68/] but did not discuss the difficulties of conversion. Mr. Nightingale pointed out that such changes could not substantially affect demand in the late 1970's.[69/]

31. Accordingly, the Board finds that, of the proposed energy conservation alternatives, none would appear to be sufficiently promising to warrant discontinuation or termination of the construction permit and subsequent reliance on an energy conservation program as an alternative to construction of the Davis-Besse facility. Nor do we find any reason to require that conditions (such as the Applicants'

68/ Testimony following Tr. 327 at p. 10.
69/ Testimony following Tr. 683 at p. 13.

agreeing to start an advertising campaign to limit electric consumption) should be placed on the construction permit.

32. However, in view of our findings in paragraphs 24-29, above, the Board finds that the FES has not adequately examined and evaluated the potential energy conservation alternatives to facility construction in Sections 8, 9, and 12 of the FES.[70/] Accordingly, the FES will be deemed modified to include a consideration of energy conservation as an alternative to facility construction as discussed herein in paragraphs 24 through 30.

Issue 2:

The Coalition contends that the Final Environmental Statement has not properly evaluated all possible storm damage and the environmental consequences of such incidents as having the cooling tower lost due to storms, flooding of the area, or damage to buildings. The high lake levels and severe lake storms make these events distinctly possible.[71/]

70/ See also FES, Appendix D-2.
71/ As stated in Special Prehearing Conference Order, May 31, 1973.

33. As stated in paragraph 15, above, this issue was subject to a motion for summary disposition whereby the Applicants contended that there was no genuine issue as to certain listed facts.[72/] Following response by the Coalition and the Staff, the Applicants agreed that the only controverted facts related to whether the ground level elevation and wave protection dike assure that the facility is adequately protected against all credible floods and high lake levels and whether the wave protection dike is designed and constructed to withstand the erosive action of storm-generated waves and wind-driven ice.[73/] The controverted facts on which the Board agreed[74/] to receive evidence were stated as:

72/ Motion for Summary Disposition and Applicants' Statement of Material Facts as to which There Is No Genuine Issue To Be Heard, July 20, 1973, Tr. 222-223, 341-343. Motion was adequately presented and in conformance with Section 2.749.

73/ Tr. 221-222.

74/ Tr. 341.

(a) Whether the wave protection dike and the elevation of the site will "assure that the plant is adequately protected against all credible floods and high lake levels" and

(b) Whether "[t]he wave protection dike is designed and constructed to withstand the erosive action of storm-generated waves and floods".

34. Direct testimony from the Coalition consisted of several statements from residents of the site area, and correspondence between Dr. Owen Davis and the U. S. Coast Guard,[75/] together with photographs of the facility following severe storms.[76/] The evidence was offered apparently to show that the recent flooding of November, 1972, and March, April, and June, 1973, had been most severe and had caused general flooding of low-lying areas and caused certain other alleged damage,

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75/ Tr. following 672.
76/ Intervenors Exhibits 8A through 8M.

including damage to the dikes. In addition, in response to the Applicants' motion for summary disposition, the Coalition submitted an affidavit of Mrs. Stebbins stating, inter alia, that the flooding of the access roads to the facility could cause isolation of employees, resulting in fatigue, and leading to operator error. Each of the allegations made in such statements was apparently based on mistaken information, or was clearly controverted by other testimony or cross-examination.[77/]

35. Testimony from the Applicants, including that obtained through cross-examination, shows that the ground level elevation of the site is higher than the probable maximum high-water level conditions, and more than seven feet above the record high-water level.[78/] At no time, even during the recent storms, referenced by the Coalition, did the water level rise

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77/ Tr. 647, 649, 650, 655, 656.
78/ Tr. 654, 664-667, 669-670. Mr. Roe testimony following Tr. 630, pp. 3-5.

to within seven feet of station elevation.[79] To determine the probable maximum high water level of 583.7 feet International Great Lakes Datum (IGLD) for the site, the maximum wind tide, and maximum transverse seiche effects caused by the probable maximum meteorological event were superimposed on the probable maximum mean monthly lake level.[80]

36. The Staff's testimony indicated that as part of its review of the operating license application for the Davis-Besse facility, and because the mean monthly lake level for June, 1973, was 0.1 feet above the probable maximum mean monthly level, the Staff is currently reviewing its evaluation to reconfirm that the design water level is adequate.[81] The Staff does not believe that this review will change the water level design requirements,[82] which represent the

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79/ Ibid.
80/ Tr. 631.
81/ Mr. Hulman, testimony following Tr. 504; Tr. 509.
82/ Tr. 517.

extremely remote conditions against which the Commission requires that the facility be designed.[83/] In fact, the probability of the postulated high water level approaches zero.[84/]

It is the Staff's practice to re-evaluate facility protection features whenever a record natural event occurs at a facility, and this re-evaluation includes a re-assessment of the probable maximum flood.[85/] Questioning by the Board clarified the seeming contradiction between the prepared testimony, which stated that the recent flooding had "not altered the Staff's conclusions",[86/] and the oral testimony, which implied that re-evaluation indeed might alter those conclusions.[87/] Apparently, as testified by Witness Hulman, while there is some chance that a design change may be required, the chance is remote; and

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83/ Tr. 511-512.
84/ Staff Supplement to Issue 2 testimony, following Tr. 502, p. 2.
85/ Tr. 509.
86/ Supplemental testimony to FES related to construction of the Davis-Besse Nuclear Facility, following Tr. 502, p. 2.
87/ Tr. 516.

there is no present indication that any such design change will be dictated.[88/]

37. The Applicants testified that high lake levels would not present operational problems for the Davis-Besse facility. Even with the high water conditions associated with the storms of November, 1972, and March, April, and June, 1973, there was no time when Davis-Besse personnel could not enter or leave the facility.[89/] In fact, the foot of the wave protection dike was far above the levels reached by last year's record flood.[90/] In any event, the Applicant testified that emergency transportation, including helicopter, would be available to bring in additional personnel, and if necessary, the duty shift could shut the plant down and maintain it in a safe shutdown condition.[91/] After considering the

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88/ Tr. 517.
89/ Tr. 633.
90/ Tr. 632.
91/ Tr. 633.

entire record, the Board concludes that the maximum credible high water level has been properly calculated in the FES and that the Davis-Besse facility will not be damaged by any reasonably anticipated high water so as to present any safety hazard.

38. The wave protection dike between the Davis-Besse facility and Lake Erie is an earthfill breakwall 15 feet wide at the top, having a 3 to 1 slope and built up to an elevation of 591.0 feet IGLD.[92/] This dike is composed of dry clay earth material extremely impervious to water flow, free from organic matter, compacted to specified density, and placed on undisturbed earth.[93/] The dike, which was designed in accordance with U. S. Army Corps of Engineers specifications,[94/] is faced with a stone filter blanket to allow water to run off without eroding the dike. On top of

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92/ Mr. Roe, testimony following Tr. 630, p. 4.
93/ Tr. 635, 659.
94/ Tr. 637.

the stone blanket is large stone riprap, with the stones ranging from 100 to 6,000 pounds. About 75 percent of the stone riprap is in the 1,000 to 6,000 pound range.[95/] There is extensive experience that this design will withstand wave action and erosion[96/] and that it will withstand moving ice floes and be adequately protected against their possible effects.[97/]

37. Accordingly, based on the entire record, the Board finds conclusive evidence that there is reasonable assurance that the high ground level elevation and the wave protection dike assure that the Davis-Besse facility is adequately protected against all credible floods and high water levels and that the wave protection dike is designed and constructed to withstand the erosive action of storm-generated waves and floods and wind-driven ice.

95/ Tr. 635, 637-638, 659.
96/ Tr. 655-656.
97/ Tr. 636, 654-655.

Issue 4: Fuel Failure Rate

The Final Environmental Statement's evaluation of the threat of radioactivity to the agricultural and farming lands, and farm animals and products has been underestimated in that the Final Environmental Statement should have assumed a fuel failure rate higher than 0.25 percent of failed fuel to obtain a source for environmental impact calculations.98/

40. Issue 4 was the subject of the Applicants' motion for summary disposition. No party opposed the motion with respect to Issue 4. Accordingly, pursuant to 10 CFR § 2.749, the Board concluded that the following facts were admitted:99/ substantial experience has been accumulated on Zircaloy clad fuel in pressurized water reactors (PWR); the Davis-Besse Nuclear Power Station will utilize Zircaloy clad prepressurized fuel; this experience shows that the fraction of failed fuel rods is less than 0.1 percent; only three of the sixteen operating PWRs using Zircaloy clad fuel have experienced

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98/ As stated in Special Prehearing Conference Order, May 31, 1973.

99/ Applicants' Statement of Material Facts as to which There Is No Genuine Issue To Be Heard, dated July 20, 1973, pp. 2-3.

fuel failure rates exceeding 0.2 percent for any one cycle; the major causes of these failures have been identified, and replacement fuel in these reactors has experienced failure rates of less than 0.1 percent to date; and excluding reactors which utilized fuel which was not prepressurized, the fuel failure rate experienced is about 0.05 percent.

41. Accordingly, based on the evidence of record, the Board finds that the Final Environmental Statement was properly conservative and not incorrect in assuming a fuel failure rate of 0.25 percent of failed fuel to obtain a source for environmental impact calculations.

Issue 5: Effects of Davis-Besse Effluents and Effluents from Nuclear Reactors on Lakes Michigan, Huron and Superior

The Final Environmental Statement is inadequate in that it fails to evaluate the cumulative and synergistic effects on Lake Erie of the effluents from the Davis-Besse Nuclear Reactor together with whatever effluents may be produced by other nuclear reactors operating adjacent to Lakes Michigan, Superior and Huron.100/

100/ As stated in Special Prehearing Conference Order, May 31, 1973.

42. The Applicants moved to strike this issue because contrary to their initially-stated position, the Coalition submitted no direct testimony on this issue, and also because the Coalition has not responded to certain of the Applicants' interrogatories. In view of its potentially serious environmental effects, the Board denied the motion and decided to hear testimony on the issue. Accordingly, the Applicants presented direct testimony[101/] showing that they had evaluated cumulative radiological effects on Lake Erie to the year 2010 and of all presently operating or planned nuclear generating stations on Lakes Superior, Muchigan, and Huron.[102/] Applicants further testified that the calculated annual population dose in the year 2010 to an assumed 15 million users of Lake Erie would be 200 man-rem, as compared with approximately 2,000,000 man-rem received by the same population from

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101/ Dr. Morton Goldman, testimony following Tr. 705.
102/ Ibid; Applicants Exhibit 6 (NUS Report NUS-1044).

natural sources. Therefore, the maximum individual exposure would be extremely small and thus, the cumulative effect would be insignificant.[103/]

43. The effect of liquid releases from test reactors on the area of Lake Erie near the Davis-Besse facility would be essentially zero[104/] since releases from test reactors are miniscule as compared with an individual power plant. In determining dose, the method for selecting isotopes considered in evaluating long-term buildup used the isotopes' effective half-life, maximum release rate, and concentration factor.[105/] Projected concentrations were averaged over the entire volume of the particular lake involved.[106/] Over relatively long periods of time, this is a reasonable assumption, taking into account the action of vertical mixing which would occur with overturning of thermoclines.[107/] Even if

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103/ Ibid.
104/ Applicants Exhibit 6, fn. p. 3; Tr. 713.
105/ Id., pp. 10-16.
106/ Id., p. 5.
107/ Tr. 714-715, 718-719.

the lake were assumed to be stratified and mixing were minimized both horizontally and vertically, the change in concentration estimates would be by no more than a factor of 10.[108/] Cross-examination by the Coalition did not elicit any showing to the contrary.

44. The Staff testified that, even if several hundred reactors were operating on Lakes Michigan, Superior, and Huron, the resultant temperature rise and chemical contributions in Lake Erie would be much smaller than the observed natural variation in Lake Erie, and would be undetectable by biota.[109/] The Staff also noted that the Applicants had received a Section 21(b) certification under the Federal Water Quality Act of 1970 and that the facility would conform to all the requirements of the Federal Water Pollution Control Act (FWPCA).[110/] The Staff concluded that there could be no synergism since the necessary factors were not present.[111/]

108/ Tr. 717-722, 725-726.
109/ Staff Supplemental Testimony following Tr. 724.
110/ Federal Water Pollution Control Act Amendments of 1972, 86 STAT. 816.
111/ Staff Supplemental Testimony following Tr. 724.

45. Accordingly, based on the entire record, the Board finds that there is no evidence to support the Coalition's allegations. There is no evidence to suggest that there will be cumulative and synergistic effects on Lake Erie resulting from the effluents of the Davis-Besse facility along with whatever other effluents may be produced by other nuclear reactors operating adjacent to said Lakes Michigan, Superior, and Huron. On the other hand, the evidence presented shows the FES properly and adequately treats the effect of effluents.

Issue 6: Increased Radioactive Releases with Aging

The Final Environmental Statement is inadequate in that no consideration has been given to the fact that operating experiences at nuclear plants show that radioactive releases go up with aging of the reactor. The evaluation, therefore, of radioactivity on the environment is completely inadequate and incorrect.112/

112/ As stated in Special Prehearing Conference Order, May 31, 1973.

46. The Applicants moved for summary disposition of Issue 6. The following facts were uncontroverted:[113] experience with Zircaloy fuel in operating pressurized water reactors shows that fuel failure rates do not increase over plant lifetime. Since operating experience is used to improve fuel design, failure rates to date have tended to decrease after the first operating cycle; the significant factors affecting the magnitude of releases are the level of fuel defects, changes in the effectiveness of waste management system components, and steam generator leaks.

47. The Coalition, by affidavit, asserted that releases from reactors, such as the power reactors at Indian Point (for the years 1962-1966), Big Rock Point (for the years 1962-1968), and San Onofre (1968-1970), increased with time.[114] They further asserted that it is impossible to repair all leaks in reactors.[115]

113/ Applicants' Statement of Material Facts as to which There Is No Genuine Issue To Be Heard, dated July 20, 1973, pp. 3-4; Tr. 223-224, 341-342.
114/ Affidavit, Mrs. Stebbins with data.
115/ Ibid.

48. In view of the pleadings and documents presented, the Board agreed that the following facts were in controversy:[116/]

(a) Whether the fact that radioactive waste discharges have not increased more rapidly than total nuclear power shows that radioactive releases have not tended to increase with aging of reactors.

(b) Whether periodic refueling maintenance and equipment modification and repair assure that none of these factors will cause increased releases over the lifetime of the plant due to aging.

49. The Applicants' Witness, Dr. Morton I. Goldman, traced the radioactive emission histories of six boiling water reactors and six pressurized water reactors over

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116/ Tr. 341-342.

the period from 1960 to 1972.[117] In general, there is an increase shortly after start up, followed by an oscillation around a mean value -- sometimes above that mean, sometimes below it -- as the years pass. The data show no consistent tendency to increase with time. Significantly, two of the reactors cited by the Coalition (Big Rock Point and Indian Point) were shown to have emissions which indeed rose during the periods cited by the Coalition but then fell substantially in subsequent years.[118] This evidence was not controverted.

50. Applicants also testified that materials in nuclear systems are selected for corrosion resistance; that valve packings are selected for leak tightness and leakage from them would be detectable; that bearings are generally not part of the pressure-retaining system, but that any leakage from them is detectable; that all fittings are corrosion-resistant, and leaks through

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117/ Dr. Goldman, testimony following Tr. 733, Tables 1, 2, and 3, Figures 1-6.
118/ Tr. 734.

them are detectable; that leaks through any of these items would be accessible for repair; and that leaks too small to detect would be inconsequential.[119/] Cross-examination failed to develop any controverting evidence or to present any reason to doubt the Applicants' direct testimony. Experience has not indicated that unrepairable leaks develop in nuclear power plants[120/] and technical specifications would be in force to assure that the plant would be shut down should any substantial leaks develop.[121/]

51. The Coalition offered the testimony of Dr. E. J. Sternglass on Issue 6. The Applicant moved to strike this testimony as irrelevant to said issue; the Board agreed.[122/] While the Coalition pointed to two reactors in which releases per unit power increased between 1968 and 1970,[123/] these increases were attributed

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119/ Mr. Roe, Tr. 737-740.
120/ Tr. 751.
121/ Tr. 751.
122/ Tr. 339B. However, as noted in paragraph 16, supra, in examining this testimony, the Board uncovered a new issue. Accordingly, the applicable portions of Dr. Sternglass' testimony were continued for purposes of said new issue.
123/ Tr. 744.

by later witness to steam generator tube leaks which were subsequently repaired and lower energy generation resulting from plant shutdowns.124/

52. The Staff presented testimony to show that its analysis of radioactive releases from the Davis-Besse facility was based upon a normalized liquid source term of five (5) curies per year, equal to a total leakage flow of 3,383 gallons per day. This evaluation of the radioactive waste system indicated a probable leakage rate of 115 gallons per day resulting in a liquid source term of only 0.15 curies per year.125/ Thus, the leakage rate estimates used in the FES to evaluate environmental impact were thirty-three (33) times the rates actually expected and from eight (8) to twenty-six (26) times the rates experienced by older plants.126/

124/ Tr. 745.
125/ Staff supplemental testimony on Issue 6, following Tr. 753.
126/ Ibid.

53. In view of the evidence of record, the Board concludes that nuclear facility emissions remain relatively constant after the first few years of operation, and that leaks can be prevented, detected, and repaired. Accordingly, the Board finds no reason to believe that radioactive emissions from the Davis-Besse facility would be expected to increase with time to values which would in any way invalidate the assumptions of the FES. The FES has adequately considered operating experience at nuclear reactors in evaluating radioactive releases.

Issue 7: Industrial and Population Growth

> The Final Environmental Statement is inadequate in that population growth in this area has not been properly assessed inasmuch as the placing of this plant in this largely agricultural area will probably stimulate the growth of industry and population. The environmental effects assumed in the Final Environmental Statement are incorrect.127/

127/ As stated in Special Prehearing Conference Order, May 31, 1973.

54. Issue 7 was the subject of the Applicants' motion for summary disposition. No opposition to the motion with respect to Issue 7 was submitted. Pursuant to 10 CFR § 2.749, there is no controversy with respect to the following factors: the most important factors with respect to the location of industry in Ottawa County are infrastructure (urbanization economies) and localization economies; the presence of the Davis-Besse facility in Ottawa County will not result in any changes in the infrastructure or localization economies; although the availability of electric power is one aspect of a suitable infrastructure, the proximity of a power plant is not; the local tax rates resulting from the increased tax revenues supplied by the Davis-Besse facility to local governments would not be a major influence on industrial growth; the factors which would cause an influx of population into an area are the availability of job opportunities and the easy access to existing population centers; the presence of the Davis-Besse facility will not cause the availability of significant numbers of job opportunities or

make access to population centers easier; experience in areas surrounding other nuclear facilities shows that the presence of a nuclear power facility has not affected the industrial or population growth of these areas; and the Davis-Besse facility will not stimulate the growth of industry or population in the surrounding area.[128/]

55. Pursuant to the Applicants' motion for summary disposition, the Board ruled there were no controverted facts as to Issue 7.[129/] Accordingly, the Board finds that the FES adequately assesses the population growth at the vicinity of the site in view of the construction of the Davis-Besse facility, and adequately assesses the environmental effects occasioned thereby.

128/ Applicants' Statement of Material Facts As To Which There Is No Genuine Issue To Be Heard, dated July 20, 1973, pp. 4-5, Tr. 235.

129/ Tr. 235.

Issue 8: Effect of Effluents on Lake Erie

The total effect of all effluents (radioactive, heat, chemicals, dissolved solids and suspended solids, and B.O.D.) to Lake Erie as a result of all operations of the Davis-Besse Plant (either alone or in combination with other pollutants) will add to the pollution of Lake Erie, endanger fish, wildlife, spawning grounds, aquatic biota, their habitat and supporting ecosystem, recreational aspects or water supplies, and will be in violation of the nondegradation clause of the water quality standards of Ohio as approved by the Environmental Protection Agency. These effects have not been properly assessed in the Final Environmental Statement.130/

56. In support of Issue 8, the Coalition produced a single witness, Dr. Ernest J. Sternglass,131/ with a background in engineering physics, physics, nuclear physics, and statistical studies of the effects of radiation on man but with no specific training in matters related to fisheries or biology of fishes.132/ Dr. Sternglass testified that: Lake Erie fish populations of such species as walleye showed sudden

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130/ As stated in Special Prehearing Conference Order, May 31, 1973. This issue was further modified in later Prehearing Conference Order, July 10, 1973, wherein the Board approved agreement of parties to exclude radioactivity from this issue as it applies to the Ohio State water quality standards.

131/ Tr. 553; testimony of Dr. Sternglass, submitted as Intervenors Exhibit 7.

132/ Tr. 580-581.

unexplained drops which the Witness correlated with fallout patterns from certain bomb tests; the Norwegian fish catch showed a decrease in catch correlated with certain nuclear bomb tests; and the Alaskan salmon catch showed a similar decline and correlation. Dr. Sternglass also presented certain other data apparently to show correlations between these selected fishery declines and Strontium-90 distribution at certain points. The intended thrust of his testimony was that the low levels of radioactive release anticipated from the Davis-Besse facility, and as compared to certain data from the Plum Brook and Shippingport facilities, suggest that the effect of the Davis-Besse facility on fish populations will possibly be orders of magnitude greater than the effects Dr. Sternglass claimed to have identified as fallout effects on fish populations. The Coalition presented no direct testimony on nonradiological effects.

57. With respect to the effect of nonradiological effluents from the Davis-Besse facility, the Applicants'

Witness, Dr. Charles E. Herdendorf,[133/] testified that the 3°F isotherm will cover only 0.7 acres and the 1°F isotherm will cover only 2.1 acres.[134/] Few fish could swim against the effluent current to enter the very small area where there is a significant temperature shift. No adverse effect on invertebrate fauna is expected beyond the discharge apron. The Davis-Besse facility will not alter the balance of dissolved or suspended solids and will not result in levels detrimental to biota.[135/] The use of Lake Erie water for cooling the facility and subsequent discharge of said water to the lake will not result in lethal concentrations to Lake Erie biota.[136/] Chemicals added to the discharged water as a result of facility operation would not be expected to be detrimental to biota, with the exception of chlorine which may present some detriment

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133/ Dr. Charles E. Herdendorf, Tr. 385.
134/ Dr. Herdendorf, testimony following Tr. 386, p. 1.
135/ Id., Testimony following Tr. 386, pp. 1-4.
136/ Tr. 544.

to fish. However, because of plume velocity, fish would not be able to stay in the small area of potentially detrimental chlorine concentration for a long enough time to experience lethal effects. Chlorine and other added chemicals would be below measurable levels at about 600 feet from the point of discharge.137/ The biological oxygen demand (BOD) release from the Davis-Besse facility will be very much lower than the natural BOD of the Lake.138/ The Applicants' Witness, Dr. Peter J. Mellinger, presented testimony indicating that at very low doses which aquatic life will experience from radioactive effluents from the Davis-Besse facility, no synergistic effects between radioactivity and temperature, or between radioactivity and chemicals would be expected. Effects have been experimentally observed only at dose levels thousands of times greater than those which would be received by aquatic organisms from the Davis-Besse facility.139/

137/ Tr. 544-546.
138/ Tr. 546.
139/ Dr. Peter J. Mellinger, testimony following Tr. 388 and 529, Tr. 522-527, 542, 548-549.

58. In specifically addressing the arguments presented by Dr. Sternglass, one of the Applicants' Witnesses, Dr. Wilber L. Hartman, who had authored a number of papers on Lake Erie fisheries including one which summarizes 150 years of past history which includes analyses of the causes of fluctuations in the fish populations and commercial fisheries, testified that: total commercial fish catch in Lake Erie has remained steady from 1914 to 1966, and remained near the long-term average during the 1950's.[140/] The causes for changes in the Lake Erie fish community have been widely studied and are generally recognized to be: exploitation (overfishing); changes in the watershed (erosion, silting, dams); nutrient loading; and introduction of new fish species.[141/] The decline of Lake Erie whitefish probably began with the sedimentation of river and bay spawning areas from 1890 to 1918. The long-term temperature increase in the Lake may also have stressed this species since it is at the

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140/ Dr. Hartman, testimony following Tr. 389, pp. 4, 11, Figure 2.

141/ Id., pp. 2-4.

southern edge of its zoographical range.[142/] Lake Erie walleye catch rose sharply from the mid-1930's until 1956 when it precipitously dropped. A sharp increase in fishing pressure and a conversion from cotton to nylon gill nets and other technological improvements led to overfishing of this population.[143/] Another of the Applicants' Witnesses, Dr. Lauren R. Donaldson, testified that the annual world catch has increased at a fairly steady rate from 1948 to 1968 with the declines of 1969 and 1971 due to fluctuations in the Peruvian anchoveta fishery.[144/] Total United States catch has remained constant over the years with species composition shifted due to abundance and competition.[145/] The Norwegian fishery shows greater fluctuation than that of other major fishing nations, with drastic shifts in species composition. Thus, as

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142/ Id., pp. 4-7, Figure 3.
143/ Id., pp. 8-9.
144/ Testimony of Dr. Lauren R. Donaldson, "Comments on 'Fallout and Reproduction of Ocean Fish Population' by E. J. Sternglass", following Tr. 389, p. 1, Table I.
145/ Id., p. 4.

the Norwegian herring catch dropped sharply from 1967 to 1969 due to overfishing, the Norwegian capelin catch dramatically increased.[146/] Dr. Donaldson also testified that experiments with fish and fish eggs show that no measurable effect was produced at levels of irradiation below 5 roentgens/day, a level many hundreds of times greater than that expected from the Davis-Besse facility. The experiments indicate that levels of radiation to be released from the Davis-Besse facility would have no adverse effect on the population of fish in Lake Erie.[147/]

59. Witness Sternglass presented data[148/] which showed a marked decline in the Alaskan fish catch (salmon) in the period 1945-1955. However, Witness Donaldson pointed out that detailed studies on salmon spawning in the Hanford reach of the Columbia River have shown an overall trend toward an increasing

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146/ Id., pp. 4-7, Table II, Figure II.
147/ Id., pp. 13-15; Tr. 401.
148/ Intervenors Exhibit 7, p. 8-1, Figure 4.

population.[149] Also studies at radiation levels comparable to that occurring during periods of fallout have no deleterious effects on young salmon or on the reproduction of adults or on other fish and that the sharp increase in the Alaska catch for 1965-1966 was largely due to the gigantic run of sockeye salmon returning to Bristol Bay from the 1961 brood year.[150] These later fish were spawned in 1961 in Alaskan lakes and streams in the direct fallout path of the September, 1961, Russian tests. Moreover, many fish populations have been shown to be very cyclic, ranging from high to low populations, and this has been demonstrated in some areas, such as the Alaskan Bristol Bay population over the last 100 years.[151] Another factor in considering the behavior of fish populations is the lag time between spawning and the growth of these fish to a size suitable for catching in the

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149/ Testimony of Dr. Donaldson, fn 144, supra, p. 9.
150/ Id., p. 13ff; Tr. 476; 484.
151/ Tr. 407.

commercial fishery. Thus, fishery declines or increases are dependent upon spawning stocks (adult fish) that were present some number of years previously.[152] The Coalition's testimony suggests an instantaneous effect on the fishery catch, whereas cause and effect should not be in juxtaposition here but should be mismatched by some particular number of years.[153]

60. The Staff's Witness, Dr. Frigerio, testified that the doses to biota set forth in the FES were somewhat conservative and that even at those conservative values, no deleterious effects would be expected.[154] The Staff's testimony[155] corroborated that of the Applicants' and indicated that there would be no significant effect of a synergistic nature from the thermal or chemical effluents of the Davis-Besse

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152/ Tr. 409.
153/ Ibid.
154/ FES § 5.6; Tr. 602-603.
155/ Staff Supplemental Testimony on Issue 5, following Tr. 724; Issue 8, following Tr. 600, FES 5.2.5-7 and 5.5.3.

facility, when such effluents are added to Lake Erie. In evaluating the Coalition's testimony, it appears that Dr. Sternglass arbitrarily chose whitefish and walleye population to demonstrate a decline in Lake Erie fisheries, but apparently ignored the facts that total commercial production in Lake Erie during the 1950's remained near the long-term average, that other species such as smelt increased dramatically during the 1950's, and that the walleye production in the Eastern basin of Lake Erie increased from the 1940's to 1965 and has remained at a constant level since that time.156/ If fallout had been the cause of the drop of walleye population as calimed by Dr. Sternglass, the effect would have been uniform in both the Eastern and Western basins.157/ The Board finds no basis for Dr. Sternglass' attempted correlation between nuclear testing and fish population. In addition, the Board

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156/ Tr. 394-395; See Dr. Hartman's testimony, pp. 4, 9-11, Figure 7.

157/ Tr. 399-401.

finds that there appears to be deliberate ignoring of available information which would contradict his proffered scientific conclusions.158/

61. Issue 8 also alleged that the "non-degradation" clause of the Ohio water quality standards would be violated by the operation of the facility. The Coalition introduced no evidence on this matter. The Applicants have received from the State of Ohio a certification that there is reasonable assurance that the Davis-Besse facility will meet applicable water quality standards.159/ The Staff has also independently evaluated the effect of discharges from the Davis-Besse facility upon Lake Erie and has found that, subject to the adoption of the conditions set forth in the FES,160/ such discharges will comply with Ohio water quality standards, with the water quality objectives of the United States-Canada

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158/ Tr. 391-393, Tr. 472. Tr. 611.
159/ Tr. 77; FES 1.3.2; Initial Decision In the Matter of Toledo Edison Company, et al, (Davis-Besse) July 9, 1972 (Section E proceeding), p. 11.
160/ FES, pp. iii-iv.

Great Lakes Agreement, and are otherwise acceptable within the environmental impact of the facility.161/

62. Accordingly, the Board finds no substance to Issue 8 and, based on the entire record, concludes that the effects of effluents from the Davis-Besse facility have been properly assessed in the FES. Such effluents will not significantly affect Lake Erie, its fish, wildlife, spawning grounds, or biota, nor adversely affect recreational aspects or water supplies, nor violate the "non-degradation" clause of the Ohio water quality standards, and will be

Issue 9: Shippingport and Plum Brook Releases

The Intervenor contends that the Final Environmental Statement underestimates the dose levels from releases from the Davis-Besse facility in that radiation levels and contamination levels around two other reactors, Shippingport and Plum Brook, have been much higher than those predicted for the Davis-Besse facility although the releases of radioactive materials from those reactors have been much lower than those predicted for the Davis-Besse facility.162/

161/ Tr. 766-768; FES, 12.19-12.21.

162/ This Issue was framed by the Board. In the course of examining testimony proffered (cont'd)

63. In essence the points raised by Dr. Sternglass were as follows: (a) measurements of radioactivity carried out by the Environmental Protection Agency of the State of Ohio and by Bio-Test Laboratories (Applicants' consultants) show that when the total amounts of radioactivity discharged by the Plum Brook Reactor were far below the discharges planned for Davis-Besse, the radiation doses near the facility were 1,000 to 100,000 times as great as those predicted theoretically for the Davis-Besse facility;[163/] (b) measurements by the Ohio EPA, as reported for 1969, 1970, and 1971, for radioactivity in drinking water taken from Lake Erie at points between Toledo and Cleveland show that both beta and alpha activity peaked at the water plants near the reactor and dropped

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Fn 162 (cont'd) by the Coalition on Issues 6 and 7, the Board noted another issue -- implied but not formally articulated by the Coalition -- which caused the Board serious concern. Tr. 202, 203, 344. After considering comments of the parties, the Board admitted Issue as stated. Tr. 596.

163/ Intervenors Exhibit 10A.

off in both directions east and west away from Sandusky during 1970.[164] Further, these peaks are 15 times (β activity) and 20 times (α activity) normal;[165] (c) during 1971, Plum Brook released radioactivity described as typical which was only one-two hundred forty-fifth (1/245) of the amount projected for the Davis-Besse facility. But in late 1972 and early 1973, dosimeter T-24 showed readings in excess of background, as did other locations within 40 miles. These readings were higher during late 1972, when the reactor was operating, than in early 1973 when operations were reduced;[166] (d) from the values given by dosimeter T-24, the Plum Brook releases considered normal, and the projected releases for the Davis-Besse facility, one can calculate that the FES underestimates dose rates by a factor of about one million;[167] (e) around the Shippingport Power Station,

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164/ Intervenors Exhibit 10A, Figure 6.1.
165/ Id., p. 2.
166/ Id., p. 5.
167/ Id., pp. 6-7.

measured levels of ^{90}Sr in soil peaked near the plant and decreased as distance from the plant increased in 1971[168/] according to measurements made by NUS Corporation;[169/] (f) according to these same NUS measurements, the peaks of ^{90}Sr in soil were 50 to 100 times the levels measured in late 1971, after repairs to the reactor had been carried out, and were far larger than the values measured in early 1972, by which time the levels were typical of those for the Eastern United States;[170/] (g) the levels of ^{90}Sr in milk in the Pittsburgh area lie between the level measured near Shippingport and those measured near Harrisburg and the United States average, thus showing that a facility such as the Davis-Besse facility could contaminate milk over an unexpectedly large area;[171/] (h) the ^{90}Sr levels in milk near Shippingport as measured by NUS

168/ Id., Appendix 6-II, Figures 1, 2, and 3.
169/ Id., Appendix 6-II, p. 2.
170/ Ibid.
171/ Intervenors Exhibit 10A, Appendix 6-II, p. 2.

Corporation "parallel" those in soil, being high for 1971 and early 1972, and returning to normal in "early 1972" when soil levels returned to normal;[172] (i) during early 1971, the ^{90}Sr concentration in milk as measured by NUS for six dairies within ten miles of Shippingport rose and fell "paralleling" the power output of the plant;[173] (j) the ^{90}Sr peaks in soil and milk were accompanied by peaks in external dose rates. These peaks reached rates of 410 mr/yr;[174] (k) in early 1972, ^{131}I in milk for dairies within ten miles of the plant reached peaks above the permissible level presently set. Nowhere else in the Eastern United States at this time did levels exceed 10 percent of the limit;[175] (l) the radioactivity in Ohio River bottom sediment was high "paralleling" the rise in ^{90}Sr in milk and soil in early 1971;[176]

172/ Id., p. 2, Figure 4.
173/ Id., p. 3, Figure 5.
174/ Id., p. 3, Figure 6.
175/ Id., p. 4, Figure 7.
176/ Id., p. 4, Figure 8.

(m) the history of radioactive releases to Plum Brook, as measured by the Ohio EPA, shows peaks in 1964 and 1970 which "parallel" the peaks at Sandusky, Toledo, and Cleveland; the Sandusky figures being highest, and the values declining with the distance from the facility;[177] and (n) the Ohio River, measured upstream and downstream of the facility, shows a gain in radioactivity corresponding to releases from the facility of tens of hundreds of curies.[178] The Board, after its own extensive examination, and after reviewing the entire record with great care, has found no evidence to substantiate any of the allegations raised by Dr. Sternglass.

64. Testimony by the Applicants,[179] and the Staff[180] established that the methods used in the FES to predict dose and contamination levels from releases

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177/ Intervenors Exhibit 10B, pp. 1-2, Figure 7-1.
178/ Id., Appendix 7-1, Tables of Appendix I.
179/ Tr. 340.
180/ Tr. 961.

are standard methods, verified through many years of experiments and that such methods tend generally to overpredict dose and contamination. One Witness pointed out that if one takes the 1970 peak reported by the Ohio EPA for Plum Brook emissions as offered by Dr. Sternglass,[181/] and applies the methods used in the FES to predict concentrations at Sandusky, one obtains 47 pCi/l.[182/] This is about one and one-half (1-1/2) times the maximum which Dr. Sternglass noted in 1970.[183/] Thus, the Board may conclude from the Coalition's own data that the methods used in the FES are conservative, contrary to the Coalition's allegation.

65. The Board notes that Dr. Sternglass' testimony suggests that the peak of radioactivity in lake water near Sandusky is unexplained and has been present for several years. Dr. Sternglass also alleged that such a peak occurs in drinking water. However, testimony by Mr. Richard P. Crouse, Applicants' Witness, points

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181/ Intervenors Exhibit 10B, Figure 7.1.
182/ Tr. 964.
183/ Intervenors Exhibit 10A, Figure 6.1.

out that while the peak exists for 1970, similar data for 1969 and 1971, available to Dr. Sternglass, but not used, show no such peak.184/ Further, although represented by Dr. Sternglass as "drinking water" and compared by him to drinking water values to obtain his values of 15 or 20 times normal, the values on the graph were actually obtained for raw lake water, which loses much of its activity during purification.185/ The data Dr. Sternglass presented were apparently further distorted to suggest high activity levels. This distortion results because he obtained his "total activity" value by using the sum of maximum dissolved and maximum suspended radioactivity measured in water samples obtained at different times in the year, rather than using these two values as obtained from the same sample.186/

184/ Mr. Crouse, testimony following Tr. 854.
185/ Tr. 854, 858.
186/ Tr. 856.

66. With regard to the high level of radiation allegedly measured at Station T-24 near Plum Brook, it appears that this effect is also the result of selective presentation of data. Testimony by Mr. Crouse indicates that this Station showed background dose rates no higher than other stations in the period July-December, 1972, and January-March, 1973.[187] The high values were registered by dosimeters exposed for a complete quarter year, while monthly dosimeters exposed at the same time showed no such high reading.[188] Dr. Sternglass apparently ignored the monthly readings, though these are generally felt to be more reliable than the quarterly ones.[189] The Board finds that the most likely explanation of the anamolous quarterly readings is that the dosimeters were exposed in transit.[190]

187/ Tr. 868.
188/ Tr. 867, 612; Applicants Exhibit 9.
189/ Tr. 867.
190/ Tr. 872, 967.

67. The high ^{90}Sr levels in soil, noted by Dr. Sternglass in the NUS environmental survey near Shippingport, were apparently the result of analytical error by an inexperienced laboratory.[191] Those of the original soil samples, which could be located, have been re-analyzed by other laboratories and show much lower values.[192] Further, although Dr. Sternglass alleged that the ^{90}Sr levels decreased with distance away from the facility,[193] such a decrease is only evident in two selected quarter-years. Other quarter-years show no such effect.[194] Apparently then, Dr. Sternglass' conclusions are again based upon use of anamolous or inconsistent data and rejection of consistent, reliable data whenever such selection supports his thesis.

68. With respect to the matter of the alleged high levels of ^{90}Sr in milk in 1971 and 1972, which

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191/ Tr. 875, 923, Applicants Exhibit 10.
192/ Applicants Exhibit 10.
193/ Intervenors Exhibit 10A, Appendix 6-II, Figures 1-3.
194/ Tr. 876.

levels allegedly returned to normal shortly after the soil levels "decreased", and which allegedly showed a decrease as a function of distance from Shippingport,[195/] Applicants' Witness, Dr. Goldman, testifying on this point,[196/] indicated that similar peaking in milk samples at locations that were not near reactors had been ignored.[197/] The counting planchets from these samples still are available and have been recounted by independent laboratories; the latest values show the concentration to have been considerably lower.[198/] Using the correct data, one finds no relationship, either in time or geographical location, that would suggest that Shippingport was the source of this material for a period just before a "repair" shutdown.[199/]

69. As to Dr. Sternglass' mention of high external dose readings around Shippingport by NUS, these, too,

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195/ Intervenors Exhibit 10A.
196/ Tr. 888; Applicants Exhibit 11.
197/ Tr. 888, 889.
198/ Applicants Exhibit 11.
199/ Tr. 889.

appear to result from selection of anamolous data from single dosimeters.200/ The Applicants' Witness pointed out that the NUS' Annual Report for 1971 noted that the values included transit dose and that the system had a "serious problem which tends to overstate the external radiation levels".201/ Further, analysis of the NUS data by EPA concludes ". . . the data as it was reported by NUS does not represent the actual exposure",202/ and that the high levels resulted from exposure in transit and other handling errors. Dr. Sternglass attempted to discredit the EPA analysis by pointing out a high correlation between the control dosimeter location used by EPA to correct the readings and one of the on-site dosimeters.203/ He alleged that this showed the control dosimeter was kept on site and characterized his allegation as a "serious charge".204/

200/ Intervenors Exhibit 10A, Appendix 6-II, p. 3, Figure 6.
201/ Tr. 890.
202/ Applicants Exhibit 13, p. 2
203/ Intervenors Exhibits 11-C through 11-F, Tr. 982.
204/ Tr. 985, 986.

He was unable, however, to explain to the Board, why, if the control dosimeter had been in fact kept on site, the other dosimeters on site did not show especially high correlations with the control dosimeter.[205/] Nor could he offer any evidence or explain why the correlations of some off-site dosimeters with the control dosimeter were higher than those of on-site ones.[206/] Accordingly, since one would expect some correlation among all dosimeters simultaneously exposed to natural background, and since the control dosimeter is intended to be handled concurrently with others, the Board concludes that the differences in correlation among the various dosimeters are no greater than one would expect.[207/]

70. Dr. Sternglass also alleged that ^{131}I concentrations were elevated in milk in local dairies

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205/ Tr. 1021, 1022.
206/ Ibid.
207/ The grounding of a "serious charge" (in effect a charge of scientific dishonesty) on such ephemeral differences in correlation coefficients borders on the irresponsible.

in early 1971 around the Shippingport plant.[208] However, EPA's analysis of this data asserts that "[t]he ^{131}I levels found . . . cannot logically be attributed to plant releases".[209]

71. As to the allegedly high activity in Ohio River bottom sediment,[210] this appears also to be an artifact of data selection on the part of Dr. Sternglass. The Applicants' Witness testified that samples upstream of Shippingport showed higher activity levels than those collected downstream.[211] Thus, it seems unlikely that the activity came from the Shippingport facility.

72. We have also considered Dr. Sternglass' allegation that large quantities of radioactivity have inadvertently, and without explanation, entered the Ohio River.[212] The Applicants presented contradicting testimony to the effect that this allegation, too, was

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208/ Intervenors Exhibit 10A, Appendix 6-II, p. 4, Figure 7.
209/ Applicants Exhibit 13, p. 15.
210/ Intervenors Exhibit 10A, Appendix 6-II, p. 4, Figure 7.
211/ Tr. 901.
212/ Intervenors Exhibit 10B, Appendix 7-1, Tables of Appendix 1.

based on data selection.[213] Apparently, Dr. Sternglass used measurements which were not simply upstream and downstream of the facility, but, rather, were located in part on tributaries, 24 and 45 miles upstream, and at a point six miles downstream.[214] Further, Dr. Sternglass took no account of the different and varying flow contributions of the tributaries where the "upstream" measurements were made, and did not account for the many other sources, such as hospitals, universities, and fallout drainage areas that might also lie between these sampling points.[215] In particular, Dr. Sternglass ignored the data from the nearest upstream sampling station where levels were nearly as high as those downstream.[216] He also transposed data from one quarter-year to another and ignored limits of error on these measurements.[217] Apparently, as noted by the Office of Radiation Programs,

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213/ Dr. Goldman, Tr. 903.
214/ Tr. 903. Apparently, too, the downstream point was incorrectly identified by Dr. Sternglass.
215/ Tr. 903-904.
216/ Tr. 903.
217/ Tr. 906-108, 911-912.

EPA, in analyzing the same allegations by Dr. Sternglass, "Dr. Sternglass only used data which supported his theory and ignored data which did not . . . [C]onclusions drawn from the Sternglass analysis are meaningless".218/

73. Based on the entire record, the Board finds that the dose rates and contamination levels reported around Shippingport and Plum Brook are either artifacts of data selection, analytical errors, or reflect known distribution paths for radionuclides, paths which are adequately accounted for in the FES. We see no reason whatsoever to believe that the FES has underestimated the impact of the Davis-Besse facility on its environment, as alleged by Dr. Sternglass. While the lack of any substance in Dr. Sternglass' allegations might have led the Board to grant the Applicants' motion for dismissal of Issue 9 -- without the findings and discussion above -- nevertheless, because of the seriousness of the allegations made, the Board preferred to discuss them in detail.

218/ Applicants Exhibit 12, p. 5.

V. Compliance with Section 102(2)(C) and (D) of NEPA and Appendix D of 10 CFR Part 50

74. Pursuant to Appendix D to 10 CFR Part 50, the Applicants submitted to the Commission: their Environmental Report, dated August 3, 1970,[219/] a two volume Supplement to the Environmental Report, dated November 8, 1971, as amended by Amendment No. 1, dated July 13, 1972;[220/] and a Cost-Benefit Analysis Supplement, dated July 5, 1972.[221/]

75. The Staff, based on documentation submitted by the Applicants, and on their own investigations, made an independent assessment of the considerations specified in Section 102(2)(C) and (D) of NEPA and Appendix D of 10 CFR Part 50.[222/] On November 25, 1972, notice of availability of the Staff's Draft Environmental Statement, prepared pursuant to Section B

219/ Applicants Exhibit 2.
220/ Applicants Exhibit 3. Notice of availability of the Supplement to Environmental Report was published in the Federal Register on December 24, 1971 (36 Fed. Reg. 25065).
221/ Applicants Exhibit 4.
222/ Draft Environmental Statement.

of Appendix D, and a notice of availability of the Applicants' Environmental Report and supplements thereto were published in the Federal Register.[223/] After receipt and consideration of the comments received on the Draft Environmental Statement, the Staff prepared the FES and published a notice of its availability.[224/] The FES includes a discussion of the comments received and the disposition thereof; a final cost-benefit analysis which considers and balances the environmental effects of the facility and the alternatives available for reducing or avoiding adverse environmental effects, as well as the environmental, economic, technical, and other benefits of the facility; and a conclusion that after weighing the environmental, economic, technical, and other benefits against environmental costs and considering available alternatives, the action called for is the continuation of the

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223/ 37 Fed. Reg. 25065.
224/ 38 Fed. Reg. 6424.

Construction Permit with appropriate conditions to protect environmental values.

76. In view of the above, and the record established in this proceeding, the Board finds that both the Applicants' Environmental Report and Supplements thereto and the Staff's Draft and Final Environmental Statements comply procedurally and substantively with the requirements of NEPA and Appendix D of 10 CFR Part 50.

VII. Findings of Fact - Independent Consideration of the Final Balance Among Conflicting Environmental Factors

A. Impact of Construction

77. Continued construction of the Davis-Besse facility will have little, if any, significant impact. The effects of continued construction have been previously evaluated.[225/] Transmission lines have been

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225/ Initial Decision, In the Matter of Toledo Edison Company, et al, May 19, 1972, Docket No. 50-346.

routed to minimize land use conflicts, disturbance to the existing environment, and historic or scenic areas.[226/] The relatively minor amounts of dredging which remain will not cause significant aquatic impact and dredged areas will be restored to their natural condition.[227/] Through an arrangement between the Applicants and the Bureau of Sports Fisheries and Wildlife, the marsh areas on site will be preserved and protected.[228/] The Board has considered the unavoidable impact of construction and finds that the Applicants are taking appropriate measures to minimize them.

B. Impact of Operations

78. The radiological effects of accidents during plant operation and in transportation of fuel and radioactive wastes have been analyzed using realistic

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226/ FES 4.1; Supplement to Environmental Report, 4.2.
227/ Id. at 4.2.2; at 6.3.
228/ Id. at 4.3; at 6.3.

assumptions. Environmental risks due to postulated radiological accidents are exceedingly small.[229/] Transportation of fuel and radioactive wastes will be carried out in accordance with AEC and Department of Transportation Regulations. The radiological impact of such shipments will be minimal.[230/]

79. During routine plant operation, small quantities of radioactive materials will be released to the environment, but will be so low that exposure levels will not be detectable and will be negligible compared with normal background radiation. Taking into account all effluent pathways including direct radiation, routine plant operation will contribute a negligibly small incremental dose and will not constitute a meaningful risk.[231/] The effects on wildlife have been previously reviewed in some detail.[232/]

229/ Id. at 7.; at 8.
230/ FES 5.9; Supplemental Environmental Report, 5.
231/ Id. at 5.7; at 7.2.
232/ See Fn. 135; Id., pp. 10-11.

Accordingly, no significant effects are anticipated for either aquatic or terrestrial organisms.

80. The thermal and chemical effects of plant operation, including synergistic effects, on the Lake Erie ecosystem were examined in the contest of Issue 8 and have been found not to result in any significant adverse impact herein.

81. The natural draft cooling tower will produce a visible plume with an average length, conservatively calculated, of 1.5 miles and a length exceeding five miles less than three (3) percent of the time. Ground level fog, increased precipitation and icing are not expected to result from cooling tower operation. Drift will be insignificant.[233/] Neither the presence of the cooling tower nor other station structures is likely to pose any significant hazard to migrant birds.[234/]

233/ FES 5.3; 5.4; Supplemental Environmental Report, 7.4.

234/ Initial Decision, In the Matter of Toledo Edison Company, et al (Davis-Besse), May 19, 1972, p. 22; FES 5.4.

C. Need for Power

82. The need for the power to be generated by the Davis-Besse facility was considered under Issue 1 herein. The capacity to be provided by the Davis-Besse facility is needed to assure a reliable power supply.

D. Alternatives

83. Alternatives to the Davis-Besse facility which were considered in addition to those of Issue 1, include the purchase of power, alternate sites, and other forms of power generating including coal, gas, and oil fueled fossil plants. Purchased power is not a reasonable alternative because other possible vendors also need additional new capacity. Construction of an equivalent plant at a different site would yield no significant environmental gains to balance the economic penalty or delay. Other forms of power generation are either not available or would result in economic penalties and no environmental gains.235/ Also

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235/ FES 9; Applicants Exhibit 4.

considered were alternate cooling systems (open cycle, mechanical draft towers, cooling pond, spray canal), alternate intake and discharge system designs, chemical, biocide, and sanitary waste system alternatives, and alternate transmission line designs.[236/] The Board finds that the designs selected for the Davis-Besse system represent reasonable and appropriate choices.

E. Board Evaluation

84. On the basis of the entire record and the discussion and findings herein, that the Applicants and the Staff have employed an interdisciplinary approach in the environmental review of the Davis-Besse facility, that their procedures have ensured that environmental factors have been given appropriate consideration in decision making along with technical and other considerations, and that both the Applicant's Environmental

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236/ FES 10; Applicants Exhibit 4.

Report and supplements thereto, and the Staff's Final Environmental Statement (when modified in accord with paragraph 32, above) contain consideration of alternatives to minimize environmental impacts and suitable environmental cost-benefit analyses, as required by NEPA and Appendix D to 10 CFR Part 50.

85. The Board, on the basis of the entire record, finds that the principal benefits and costs of the Davis-Besse facility may be summarized as follows:

a. The total site area is 954 acres of which 160 acres have been removed from production of grain crops and converted to industrial use. Approximately 600 acres of the area is marshland which will be maintained as a wildlife refuge.

b. There will be temporary turbidity, silting, and destruction of bottom organisms due to disturbance of the lake shore and lake bottom during construction of the facility water intake and discharge pipes.

c. Because of the location of the facility in a migratory bird flyway and close proximity to bird refuges, there is a possibility of occasional occurrences in which birds are killed by flying into the cooling tower and other facility structures.

d. The cooling tower blowdown and service water which the facility discharges to Lake Erie, via a submerged jet, will be heated no more than 20°F above the ambient lake water temperature. Although some small fisk and plankton in the discharge water plume will be disabled as a result of thermal shock, exposure to chlorine and buffeting, few adult fish will be affected. The thermal plume resulting from the maximum thermal discharge is calculated to have an area of less than one acre within the 3°F isotherm (above lake ambient).

e. The facility's natural-draft cooling tower will have a visual impact on the surrounding areas. There is a possibility that the cooling tower may augment natural fog (estimated to be 1 hour/year compared with 831 hours/year natural) within several miles of the facility -- particularly in the winter months.

f. A total of 101 miles of transmission lines are being constructed, primarily over existing farmland, requiring about 1,800 acres of land for the rights-of-way. Land use will essentially be unchanged since only the land required for construction of the towers is removed from production. Herbicides will not be used to maintain the rights-of-way.

g. It is calculated that the facility may discharge approximately 5 curies per year of mixed isotopes in liquid wastes and 1000 curies per year of tritium to Lake Erie. Approximately 3000 curies per year of

gaseous radioactive wastes may be discharged to the atmosphere.

h. The risk associated with accidental radiation exposure is very low.

i. The facility will provide 6.1 billion kilowatt hours per year (at an average capacity factor of 80 percent) of the additional electrical power forecast to be required due to the continuing increases in population and industrial development in the region. An improvement in the local economy will result from facility operation and the additional taxes should benefit the State and local governments.

j. The meteorological, hydrological, biological, and radiological monitoring programs initiated for the facility's vicinity will provide data on the impact of the plant and be of interest to the scientific community, particularly in regard to the ecology of Lake Erie.

VII. Conclusions

86. In accordance with Appendix D to 10 CFR Part 50 of the Commission's Regulations, and on the basis of the entire record in this proceeding and the foregoing discussion and findings, the Board concludes:

a. The environmental review conducted by the Commission's Regulatory Staff pursuant to Appendix D of 10 CFR Part 50, when modified as in paragraph 32, supra, is adequate;

b. The requirements of § 102(2)(C) and § 102(2)(D) of NEPA and Appendix D of 10 CFR Part 50 have been complied with in this proceeding; and

c. Having considered and decided all matters in controversy among the parties and having independently considered the final basis among conflicting factors contained in the

record of the proceeding with a view to determining the appropriate action to be taken, the Board has determined that the Construction Permit should be continued, subject to the following conditions for the protection of the environment as recommended by the Regulatory Staff in the Final Environmental Statement:

(1) A comprehensive, preoperational environmental monitoring program shall be established to provide an adequate baseline for measuring the operational impact of the Davis-Besse facility.

(2) The Applicants shall submit, during the time of the operating license review, proposed environmental Technical Specifications governing the operation of the Davis-Besse facility which

assure that the environmental impacts are not significantly different from those described in the FES.

(3) A monitoring program shall be established to record any kills due to birds hitting the cooling tower and other facility structures, placing emphasis on observations during adverse weather conditions and during the spring and fall migratory seasons.

(4) The objective of the design of the Davis-Besse facility shall be such that by careful operation, the total residual chlorine concentration in the effluent will be 0.1 ppm or less, not to exceed two (2) hours/day.

(5) If harmful effects or evidence of irreversible damage are detected by the monitoring programs, the Applicants will provide to the Staff an analysis of the problem and plan of action to be taken to eliminate or significantly reduce the detrimental effects or damage.

VIII. Order

87. Based on the Board's findings and conclusions and pursuant to the Atomic Energy Act, as amended, and the Commission's Regulations, IT IS ORDERED that the Director of Regulation is authorized to continue in effect the Construction Permit No. CPPR-80, and to amend such permit consistent with the terms of this Initial Decision. IT IS FURTHER ORDERED, in accordance with 10 CFR § 2.760, § 2.762, § 2.764, § 2.785, and § 2.786, that this Initial

Decision shall constitute the final Decision of the Commission subject to review thereof pursuant to the above-cited Rules.

IT IS SO ORDERED.

THE ATOMIC SAFETY AND
LICENSING BOARD

Cadet H. Hand, Jr., Member

Frederick J. Shon, Member

Jo. B. armakides, Chairman

Issued at Washington, D. C.,
this 13th day of September, 1973.

UNITED STATES OF AMERICA
ATOMIC ENERGY COMMISSION

John B. Farmakides, Chairman
Cadet H. Hand, Jr., Member
Frederick J. Shon, Member

In the Matter of

THE TOLEDO EDISON COMPANY AND
THE CLEVELAND ELECTRIC
ILLUMINATING COMPANY

(Davis-Besse Nuclear Power Station) Docket No. 50-346

Construction Permit (Sec. B) September 13, 1973

APPENDIX A
TO INITIAL DECISION
SEPTEMBER 13, 1973

The record of the hearing includes the following exhibits offered by the parties:

I. The Applicants offered the following exhibits which were received into evidence:

1. Booklet entitled "50 Ways to Save on Your Electric Bill" (Tr. 257).

2. Applicants' Environmental Report, dated August 3, 1970 (Tr. 352-354).

3. Applicants' two-volume Supplement to Environmental Report, dated November 8, 1971, as amended by Amendment No. 1 dated July 13, 1972 (Tr. 352-354).

4. Applicants' Cost-Benefit Analysis Supplement dated July 5, 1972 (Tr. 352-354).

5A & B. Preoperational Radiological Monitoring Study Reports by Industrial BIO-TEST Laboratories covering July - December, 1972 (dated March 9, 1973) and January - March, 1973 (dated May 11, 1973) (Tr. 352-354).

6. Martin, D. E., "Radiological Impact of Nuclear Power Generation on the Water Quality of Lake Erie", NUS-1044, June 1973 (Tr. 705-706).

7. Ohio EPA, Radiological Health Report, "Surface and Ground Waters of Ohio, 1969-1970-1971-1972" (Tr. 849-853).

8. Chart, "Maximum Beta Activity in Lake Erie Water" (Tr. 860-861).

9. Table, "Thermoluminescent Dosimeter Readings, mrem/month" (Tr. 870-871).

10. "Table 1 Strontium-90 in Soil, 1971" (Tr. 875-876).

11. "Table 2 Strontium-90 in Milk, 1971" (Tr. 886-888).

12. Testimony by W. D. Rowe, Environmental Protection Agency, before the Governor's Fact-Finding Committee at Hearings in Aliquippa, Pennsylvania, July 31, August 1-2, 1973 (Tr. 913-915, 920, 1056, 1060).

13. Report by Eastern Environmental Radiation Facility, EPA, "Assessment of Environmental Radioactivity in the Vicinity of Shippingport Atomic Power Station, July 20, 1973" (Tr. 918, 920-921).

14. Report by AEC, "Summary Report on the Assessment of Environmental Radioactivity in the Vicinity of the Shippingport Power Station, May 1973" (Tr. 918, 920-921).

15A - D. Charts, "Annual Average Total Activity in Untreated Lake Water, 1963, 1967, 1969, 1971" (Tr. 1023, 1061-1062).

II. The Coalition offered the following exhibits (marked and numbered as Intervenor's Exhibits) which were received in evidence except as otherwise noted:

1 - 4. Documents prepared by Toledo Edison's Area and Industrial Development Departments (Tr. 303-308).

5. Summary of The Toledo Edison Co. Advertising, Sales Promotion and Public Relations Expenses, 1968 through 1973 (Exhibit 1-D to Applicants' Answers to Coalition's Interrogatories, dated July 5, 1973) (Tr. 313-315).

6. Summary of The Cleveland Electric Illuminating Co. Advertising, Sales Promotion and Public Relations Expenses, 1968 through 1973 (Exhibit 1-E to Applicants' Answers to Coalition's Interrogatories, dated July 5, 1973) (Tr. 313-315).

7. Testimony of Dr. Sternglass with respect to Issue 8 (Tr. 578, 589, 674-675).

8A - M. Photographs of the Davis-Besse site (Tr. 644-652, 673-674).

9. State of Ohio Information Circular No. 39, "The November 1972 Storm on Lake Erie" (1973) (Tr. 673-674).

10A. Testimony of Dr. Ernest Sternglass submitted with respect to Issue 6 (Tr. 817-827, 898-900).

10B. Testimony of Dr. Ernest Sternglass submitted with respect to Issue 7 (Tr. 817-827, 898-900).

11A - F. Charts and Tables prepared by Dr. Sternglass regarding Shippingport TLD data (Tr. 940-945, 951-952, 987-990).

12. "Summary Sheet of Radioactivity Measurements" in Pennsylvania Surface Waters, prepared by C. E. Moss (Tr. 992, 998, 1002) (rejected).

13. Chart, "Ohio EPA Water Radioactivity Measurements at East Liverpool and Toledo", prepared by Dr. Sternglass (Tr. 998-1002) (rejected).

14. Figure, "Average Monthly Values of Sr-90 Deposition", prepared by Dr. Sternglass (Tr. 1002-1009) (rejected).

15. Figure, "Radioactivity in Drinking Water with Distance from Plum Brook Reactor", prepared by Dr. Sternglass (Tr. 1009-1012).

16A - SS. Materials on Advertising by Applicants (Tr. 1047).

17. N.Y. State Dept. of Environmental Conservation, "Radioactivity in Air, Milk and Water, Oct. - Dec. 1972" (Tr. 1050, 1057).

18. U.S. Department of Health, Education & Welfare (Public Health Service), "Radioactive Waste Discharges to the Environment from Nuclear Power Facilities, BRH/DER-70-2" (Tr. 1051, 1057).

19. 19A - D. NUS Reports, Preoperational Radioactivity Monitoring Program, Beaver Valley Power Station, June 1971 - March 1972 (Tr. 1051, 1057-1058).

20. "Report of Reactor Operations for the NASA Plum Brook Reactor, April 9, 1971 - May 19, 1972" (Tr. 1053, 1058).

21. Penn. Dept. of Environmental Resources, "Water Quality Network Radioactivity Results, August 1964 Through August 1972, Southwestern Penn. Counties, Rivers or Major Tributaries Thereto" (Tr. 1053, 1058).

22. Michelson, "Some Observations on the Reports of Excessive Radionuclides in the Shippingport Area" (Tr. 1053, 1058).

23. Statement by Prof. Harold L. Rosenthal (Tr. 1053, 1058).

24. Ohio Dept. of Health, "Radiological Monitoring Program 1966, 1967, 1968" (Tr. 1054, 1059).

24A. "Radiological Monitoring Stations" (Tr. 1054, 1059).

24B - GG. Ohio Department of Health, "Radiological Analysis of Ground and Surface Waters in Ohio", 1962-1969 (Tr. 1054-1055, 1059-1060).

III. The Staff offered the following exhibits (marked and numbered as Staff Exhibits) which were received in evidence:

1. Letter to Dr. John Gofman from Dr. Norman A. Frigerio, October 23, 1972 (Tr. 1071-1072).

2. Letter to Dr. Frigerio from Dr. Gofman, December 10, 1972 (Tr. 1076-1077).

3. Letter to Dr. Gofman from Dr. Frigerio, December 18, 1972 (Tr. 1079).

4. Letter to Dr. Frigerio from Dr. Gofman, February 5, 1973 (Tr. 1080-1081).

5. Letter to Dr. Frigerio from Dr. Gofman, March 21, 1973 (Tr. 1085-1086).

6. Letter to Dr. Gofman from Dr. Frigerio, March 27, 1973 (Tr. 1088-1089).

7. Letter to Dr. Gofman from Dr. Frigerio, April 2, 1973 (Tr. 1089).

8. Letter to Dr. Gofman from Dr. Frigerio, May 21, 1973 (Tr. 1089).

IV. The following was incorporated in the record of the hearing:

(a) Applicants' direct testimony on Issue 1 (Testimony of Reed Reynolds and Lowell Roe, following Tr. 241); Issue 2 (Testimony of Lowell Roe, following Tr. 630); Issue 5 (Testimony of Dr. Morton I. Goldman, following Tr. 705); Issue 6 (Testimony of Dr. Morton I. Goldman, following Tr. 733); and Issue 8 (Testimony of Dr. Charles E. Herdendorf, following Tr. 386; Dr. Peter Mellinger, following Tr. 388 and Tr. 529; Dr. Lauren R. Donaldson, following Tr. 389; Dr. Wilbur L. Hartman, following Tr. 389).

(b) Coalition's direct testimony on Issue 1 (Testimony of Richard E. Morgan, following Tr. 327); Issue 2 (Statements by several residents of the area near the Davis-Besse site, letter dated July 10, 1973, from U.S. Coast Guard to Dr. Owen Davies, following Tr. 672).

(c) Staff's direct testimony including the Final Environmental Statement Related to Construction of Davis-Besse Nuclear Power Station, March 1973 (following Tr. 498) and additional direct testimony on Issue 1 (Testimony of Dennis J. Nightingale, following Tr. 683), Issue 2 (following Tr. 502, and see Tr. 563), Issue 5 (following Tr. 724), Issue 6 (following Tr. 753) and Issue 8 (following Tr. 600).