

UNITED STATES OF AMERICA
ATOMIC ENERGY COMMISSION

Before Atomic Safety and Licensing Board

In the Matter of
THE TOLEDO EDISON COMPANY
and
THE CLEVELAND ELECTRIC ILLUMINATING COMPANY
(Davis-Besse Nuclear Power Station)

Docket No. 50-346

PROPOSED FINDINGS OF
FACT, CONCLUSIONS AND ORDER
SUBMITTED BY THE TOLEDO EDISON COMPANY
AND THE CLEVELAND ELECTRIC ILLUMINATING COMPANY

I. INTRODUCTION

1. This proceeding involves the determination of whether activities under Construction Permit No. CPPR-80 authorizing the construction of the Davis-Besse Nuclear Power Station (the construction permit), should be suspended, in whole or in part, pending completion of the ongoing review pursuant to the National Environmental Policy Act of 1969 (NEPA). The Toledo Edison Company and The Cleveland Electric Illuminating Company (Permittees) received the construction permit on March 24, 1971. As a result, Permittees are subject to the requirements of Section E of Appendix D to 10 CFR Part 50.

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In conformance with Section E.3 of Appendix D, Permittees on October 15, 1971, filed with the AEC a statement of reasons why, with reference to the criteria in Section E.2, the construction permit should not be suspended, in whole or in part, pending completion of the NEPA review. This statement was made publicly available.

2. On November 19, 1971, Jerome S. Kalur, Esq., writing on behalf of Coalition for Safe Nuclear Power (Coalition) and Living in a Finer Environment (LIFE) requested that the Commission suspend the construction permit, alleging that continued construction would foreclose the adoption of alternative design features relating to radioactive waste discharges and thermal discharges from the plant. On November 30, 1971, the Director of Regulation issued a Determination Not to Suspend Construction Activities at the Davis-Besse Nuclear Power Station Authorized Pursuant to CPPR-80 Pending Completion of NEPA Environmental Review. The Discussion and Findings by the Division of Reactor Licensing which accompanied the Determination specifically considered the matters raised by Mr. Kalur's letter of November 19, 1971, and concluded that they presented no substantial new information which would warrant a different determination. The Division of Reactor Licensing determined that none of the alternative design features noted in Mr. Kalur's letter would be foreclosed by continued construction. Discussion and Findings, p. 21.

3. Pursuant to Section E.4(b) of Appendix D, members of the public were entitled to request a public hearing with respect to the AEC's determination. No such request was filed with respect to the Davis-Besse determination. On December 8, 1971, Mr. Kalur on behalf of Coalition and LIFE advised AEC that "we do not intend to request a hearing on the matter" despite their objection to the Commission's determination. On January 3, 1972, the Director of Regulation advised Mr. Kalur that a hearing could still be requested. No such request was ever filed.

4. Coalition and LIFE did, however, attempt to secure an order staying the effectiveness of the construction permit from the U. S. Court of Appeals for the District of Columbia Circuit. On April 7, 1972, the Court in Coalition for Safe Nuclear Power v. USAEC, No. 71-1396, ruled that the request for injunctive relief was premature in that Coalition and LIFE had failed to exhaust their administrative remedies. The Court remanded the record to AEC directing that a hearing be held and the record returned to the Court within sixty days. The Court also required the remand hearing to consider whether the additional investment in the plant during the NEPA review period might affect the eventual decision reached on the NEPA review. Slip op. at 4.

5. On April 12, 1972 (37 Fed. Reg. 7644, April 18, 1972), the Commission issued a Memorandum and Order and Notice of Hearing on Suspension of Construction Activity at Davis-Besse Nuclear Power Station which ordered a hearing before this Board and named as parties the Regulatory Staff, Permittees, and Coalition and LIFE. The AEC directed this Board to render a de novo decision based on the criteria in Section E.2 of Appendix D and the Court of Appeals decision. The Commission placed the burden of proof on Permittees. In order to meet the time limit established by the Court, the Commission required this Board to render its initial decision by May 19, 1972. Pursuant to the Commission's April 12, 1972 Order, Permittees on April 19, 1972 filed their Answer. No replies to Permittees' Answer were filed.

6. A conference of counsel was held on April 20, 1972. For the convenience of counsel for Coalition and LIFE, the conference was held in his office in Cleveland, Ohio, rather than in Washington, D. C., where it was originally scheduled. At that meeting, Permittees distributed a preliminary version of the substantial part of their written testimony. The final version was distributed to all parties on April 27, 1972, at which time Permittees also supplied certain additional information which had been requested by counsel for Coalition and LIFE at the conference of counsel. No written testimony was

submitted by Coalition and LIFE. With the consent of all parties, the Board, accompanied by counsel for Permittees and Coalition and LIFE, visited the Davis-Besse site on May 2, 1972.

7. The public hearing was held in Toledo, Ohio, on May 2-4, 1972. No petitions to intervene and no limited appearance statements were received. Jerome S. Kalur, Esq., who had been representing Coalition and LIFE in this proceeding, stated that he no longer represented LIFE because he had had no contact with it and had no affirmative proof that it was a viable organization. Tr. 8-9. Mr. Kalur also moved to dismiss the Regulatory Staff as a party to this proceeding even though the Commission's April 12, 1972 Order named it as a party. The Board denied this motion. Tr. 13-14.

8. At the hearing, Permittees introduced into evidence "Testimony on Behalf of The Toledo Edison Company and The Cleveland Electric Illuminating Company," (hereinafter Permittees' Testimony), Tr. 100. Permittees also introduced into evidence the two volume Supplement to Environmental Report, filed with the Commission pursuant to Appendix D to 10 CFR Part 50 on November 18, 1971, Tr. 129, and testimony relating to "Anticipated Environmental Effects of Dredging a Temporary Barge Canal at the Davis-Besse Nuclear Power Station" by Professor Charles E. Herdendorf (hereinafter Herdendorf Testimony), Tr. 294-95. The Permittees also presented substantial

oral testimony. The Coalition and the Regulatory Staff presented only oral testimony. The parties had the opportunity for thorough cross-examination within the scope of the issues.

9. At the hearing on May 2, 1972, the Board ordered that the Coalition particularize those issues which Coalition believed were related to its case. Tr. 105. This ruling was in response to a Commission Memorandum and Order, dated May 2, 1972, requiring particularization in conformance with several recent Commission decisions. Tr. 101-03. See e.g. Commission Memorandum and Order, March 30, 1972, In the Matter of Florida Power & Light Co. (Turkey Point Units Nos. 3 & 4), Docket Nos. 50-250, 50-251. The Coalition stated that it would place in controversy the following contentions:

a. That physical construction of the cooling tower, containment building and transmission lines during the NEPA review period would be injurious to the migratory bird population;

b. That dredging of a barge canal would cause lasting ecological damage to the Locust Point and Lake Erie areas, and would result in a weak point in what has been a strong and essential lake buffer for the Navarre Marsh;

c. That continued construction of the radioactive waste treatment system would foreclose installation of a liquid "zero-release" system, which the Coalition alleged to be technologically feasible;

d. That abandonment of the entire project would be foreclosed by continued construction;

e. That alternative plans for transporting spent fuel elements would be foreclosed by increased expenses;

f. That Permittees' assessment of the effect of abandonment on the consumer and of anticipated power needs was incorrect; and

g. That the additional irretrievable commitment during the NEPA review period would make a rational NEPA balancing review impossible.

Tr. 110-12. The direct testimony presented by the Coalition, however, dealt only with the effect on migrating birds of the existing structures and the cooling tower now under construction at the Davis-Besse site. Tr. 462A.

II. ISSUES TO BE DECIDED IN THIS PROCEEDING

10. The issue to be decided by the Board, as set

forth in the Commission's Memorandum and Order and Notice of Hearing of April 12, 1972, is whether, based on consideration and balancing of the following four criteria, continued construction activity at the Davis-Besse Nuclear Power Station should be suspended, in whole or in part, pending completion of the NEPA review.

(a) Whether it is likely that continued construction during the review period will give rise to a significant adverse impact on the environment; the nature and extent of such impact, if any; and whether redress of any such adverse environmental impact can reasonably be effected should modification, suspension, or termination of the construction permit result from the ongoing NEPA review.

(b) Whether continued construction during the prospective review period would foreclose subsequent adoption of alternatives in facility design or operation of the type that could result from the ongoing NEPA environmental review.

(c) The effect of delay in facility construction or operation upon the public interest. Of primary importance under this criterion are the power needs to be served by the facility; the availability of alternative sources, if any, to meet those needs on a timely basis; and delay costs to the Permittees and to consumers.

(d) Whether the additional investment cost of continued construction might affect the eventual decision reached on the NEPA review.

11. The NEPA review period was originally estimated by the Regulatory Staff as extending until August 30, 1972. Discussion and Findings, p. 3. At the conference of counsel, the Staff indicated that the NEPA review period would extend until December, 1972; and both the Coalition and Permittees accepted this adjusted NEPA review schedule.

III. ENVIRONMENTAL IMPACT OF CONTINUED CONSTRUCTION

12. The Davis-Besse facility is being constructed on a 954 acre site on the shore of Lake Erie in Carroll Township, Ottawa County, Ohio. The site includes 524 acres known as the Navarre Marsh. Of this tract, 477 acres have been leased by Permittees to the U. S. Bureau of Sport Fisheries and Wildlife for a period of 50 years for use as a National Wildlife Refuge. Other prime marshland on the site totalling 135 acres will be so leased for a period of 25 years and an additional 33 acres of marshland on the site will be managed by the Bureau. Permittees will not undertake any activity in the marsh during the NEPA review period which is related to the construction and operation of the Davis-Besse facility. Permittees' Testimony, pp. 2-4. The already completed dike system isolates the marsh from the construction area. Wildlife at the present time is abundant in the marsh. The refuge area is virtually silent of construction noise and

receives none of the airborne dust which might be generated on the construction site. Tr. 454-56, 459. There has been no discernible disruption to the wildlife due to noise or construction activity, Tr. 171-72.

13. The station structures, except for the cooling tower, are located on 56 acres at the center of the site and about 3,000 feet from the shoreline. Permittees' Testimony, pp. 2-3. At the present time, the tallest structures are the 220 foot high shield building (at full height since May, 1971), on top of which is a 280 foot high crane. There is also a 300 foot tall meteorology tower which has been on the site since 1968. Permittees' Testimony, p. 6; Tr. 143. The turbine and office building base substructure work is complete and 75% of the structural steel is erected. The auxiliary building below grade is complete and certain areas above grade are in place. Permittees' Testimony, pp. 6-7.

14. Work within the main station area, 56 acres almost entirely on the upland portion of the site, will continue during the review period. This work will include erection of the hemispherical top of the steel containment vessel, completion of the turbine building and office building structural steel, and completion of placing crush rock granular material around the lower portions of the station structures. Permittees' Testimony, pp. 4-7. Most of the work in this area will

take place inside structures which are already erected. Construction noise levels will decrease as the structures are enclosed during the NEPA review period. Tr. 171. No additional land on the site will be cleared, Tr. 168. Continued construction will not involve any significant discharges to the air or to the water of Lake Erie, the Toussaint River or the marsh. Tr. 168.

15. Dewatering operations in the excavated area will continue for part of the NEPA review period. The flow has remained very constant since the area was initially excavated and will remain at the same level until certain onsite structures are completed. This completion is scheduled to occur during the NEPA review period. At that time, the dewatering operation will cease. Tr. 179-80. Although the zone of influence of dewatering on the water table does extend offsite for a short distance, dewatering has not in any manner affected surface water conditions. The effect on local wells has been minimal. When dewatering operations are completed, the affected aquifer will return to its normal level. Permittees' Testimony, p. 6. Water pumped from the excavated areas is pumped to an aeration pond to remove the hydrogen sulfide content. Tr. 180. The water then flows into a 7,000 foot drainage ditch which forms the southern site boundary. From the drainage ditch, the water flows into the Toussaint River

near its mouth into Lake Erie. A check valve allows flow into the river but not from the river into the discharge ditch. Tr. 181. Permittees, since the early stages of the dewatering operation, have monitored the chemical and physical quality of the flow. Tr. 182-83. Carp are abundant in the drainage ditch, Tr. 186, indicating that the waters in it do not pose a danger to aquatic life. On completion of dewatering, the three upland borrow pit areas (one of which was partially used as a quarry) will fill with water. The surrounding land will be landscaped which will result in attractive ponds compatible with the wildlife refuge nature of the marsh areas. Permittees' Testimony, p. 5.

16. The cooling tower is located northwest of the main station area and outside of the marsh areas. The tower is described in Sec. 4.6.4 of the Supplement to Environment Report. Construction of the reinforced concrete shell will be completed by December, 1972. Permittees' Testimony, p. 7. No additional land will be cleared in conjunction with cooling tower construction. The cooling tower as it is completed will be massive in size and a prominent landmark, but will be an architecturally pleasing structure. Permittees' Testimony, pp. 21-22.

17. Considerable evidence was presented, including the only direct testimony presented on the Coalition's behalf,

with respect to the effect that the cooling tower as it is completed (as well as the existing station structures and transmission towers) would have on migratory birds. The ornithological background of the Coalition's witness, Dr. Owen Davies (Ph.D in physical chemistry), was entirely avocational. Tr. 463. Permittees' witness, Dr. William Jackson, received a doctoral degree in ecology with particular emphasis in ornithology and mammalogy, is professor of biology at Bowling Green University, a teacher of ornithology and Director of Environmental Studies at the University. Tr. 490-92.

18. With regard to existing structures onsite, the testimony shows that there have been no bird kills resulting from impact on the 220 foot tall reactor building (at that height since May, 1971), topped by a crane extending an additional 280 foot high, or the 300 foot high meteorological tower (constructed in 1968). Tr. 143, 145. Although Dr. Davies indicated that scavengers such as owls might eat birds which had been killed, leaving no traces, Tr. 479-80, Dr. Jackson believed that it would be rather unlikely that predator animals would have consumed so many dead birds that they would not have been observed in the vicinity of the structures. Dr. Jackson observed that predator mammals such as raccoons, skunks or rats would leave traces of dead birds, that hawks and owls generally feed on living targets, and that gulls are daytime

feeders and thus would be observed. Tr. 494-95. We find Dr. Jackson's testimony persuasive.

19. With respect to the danger of impacts on the station structures, both Dr. Davies and Dr. Jackson indicated that the problem of migratory birds impacting on tall structures was solely a nighttime phenomenon. Tr. 476, 495-96. Since Dr. Davies indicated that the endangered species which might be in the area were not night migrants, both Dr. Davies and Dr. Jackson believed that these species (if in fact they were in the area) would not be affected. Tr. 481-82, 495-96. Dr. Davies indicated that the conventional red navigational lights which would be on the cooling towers, Permittees' Testimony, p. 22, would cause a number of bird kills. Tr. 473. Yet with regard to the Commodore Perry Monument, the one example of actual bird impacts discussed by Dr. Davies, Tr. 481-82, he was unaware that the problem was caused not by navigational lights but by floodlights on the Monument. Tr. 486-87. As Dr. Jackson testified, the floodlighting of the Monument had been the cause of the relatively large number of impacts during the 1950's. After adopting a policy of turning off the floodlights during migratory seasons, the number of bird impacts drastically decreased; on an average night during a migratory season, perhaps half a dozen birds might be killed at the Commodore Perry Monument. Under very adverse conditions,

which might occur several times a year, the number of birds affected by the Monument involves about several dozen. Tr. 492-94. The Coalition's witness, Dr. Davies, testified that the expected frequency of bad weather conditions which could cause impacts on lighted tall structures would normally be limited to three or four times during a migratory season. He acknowledged that such frequency does not occur every year. Tr. 477-78.

20. There are no floodlights at the Davis-Besse site. Tr. 496. It was Dr. Jackson's expert opinion, which we find convincing, that the cooling tower and other station structures will not have a significant adverse effect on migratory birds in the area. Tr. 496. The types of birds most likely to be involved have short life-spans and are not endangered species. Tr. 481-82, 485, 500. Dr. Jackson, on the basis of his studies of bird population dynamics, concluded that the loss of the few birds which might impact the structures would not be significant in terms of the population surplus, the energy flow within this ecosystem, and the population subtracting devices in the ecosystem. Tr. 497, 499-500.

21. Beginning in August, 1972, Permittees are scheduled to dredge a 650 foot long channel from deep water in the Lake to the beachfront and to temporarily open the beachfront to connect with the open intake canal. (The intake canal itself

was constructed in late 1970). This will enable barge delivery of the reactor vessel. Following delivery, both the channel and the beachfront will be restored to their original condition. Restoration will take place in late September and October, 1972. The dredging will be shallow and involve only two acres of Lake bed. Permittees' Testimony, p. 8; Tr. 360. Testimony by Prof. Charles E. Herdendorf, Director of the Center for Lake Erie Research of Ohio State University, indicated that the dredging would not create any significant impact. The dredging would be only an average of 1.8 feet deep, with a maximum of 3.6 feet. Tr. 356. It would create minimal turbidity because of the characteristics of the dredged material. Herdendorf Testimony, p. 9; Tr. 365-66. Introduction of dissolved pollutants into the water will be minimal in view of the low level of pollutants in the dredged material as determined by actual analysis. Herdendorf Testimony, p. 9; Tr. 363-65. The temporary nature of the channel, the favorable time of year, and the fact that the sand supply for the shore area in front of the dredging comes from offshore demonstrates that shore processes, including the westward sand flow to the Sand Beach area, will not be significantly affected. Herdendorf Testimony, p. 9; Tr. 357-59. Accordingly, the Navarre Marsh will not be affected by the opening of the beachfront. Tr. 355-57. Dr. Herdendorf testified that he anticipated no effect on spawning and minimal impact on aquatic fauna in light of the fact

that the area, based on his surveys and analyses, is not a particularly good habitat for benthic organisms. Herdendorf Testimony, p. 12; Tr. 366-68. He anticipated no shore erosion. Herdendorf Testimony, p. 12. Replacing the dredged material as planned following the barge delivery will restore the lake bottom to its original condition with no permanent damage to its stability. Tr. 355-56. No testimony contradicting any part of Dr. Herdendorf's Testimony was proffered or received.

22. Of the three transmission lines from the Davis-Besse site, no offsite work will be done on the line to the Beaver Substation during the NEPA review period. The twenty-mile line to the Bay Shore Station is largely complete. Six miles of this line were completed in the summer of 1971 to provide temporary construction power at the site. All remaining right-of-way has already been cleared and all towers erected. Installation of the remaining conductors is scheduled for May, 1972. The third line, to the Lemoyne Substation is currently under construction. Tower bases have been installed on 7-1/2 miles of this line's 21 mile length and 75% of the right-of-way has been acquired and cleared. Tower installation is scheduled to begin in June, 1972. Permittees' Testimony, p. 9. Since the remaining 25% of the Lemoyne right-of-way is scattered in generally small parcels of farmland along the right-of-way, the entire right-of-way is well defined by

the lands already acquired and cleared. Tr. 170-71, 188. No displacement of people will be required to complete the Lemoyne line. Although some timber would be cleared, none is virgin timber. No park or marshland would be involved in clearing or acquisition during the NEPA review period. Tr. 188-89.

23. Based on the above discussion, we find that continued construction will not result in significant adverse environmental impacts and that those impacts which might occur are easily redressible.

IV. FORECLOSURE OF ALTERNATIVES BY CONTINUED CONSTRUCTION

24. The Board strongly encouraged all parties to present evidence as to any possible alternatives and whether they might be foreclosed by continued construction during the NEPA review period. Tr. 46, 447-48. In addition to abandonment of the Davis-Besse facility which is discussed in the context of the fourth criterion (Section VI below), the significant areas for which alternatives were discussed are the radioactive waste treatment systems, the cooling water system, systems relating to the environmental consequences of accidents, and transmission line routes.

A. Radwaste Systems

25. Permittees identified a number of alternatives

to the present systems in the Davis-Besse plant which collect, process and control releases of radioactive effluents (radwaste systems). One alternative would be to remove two ion exchangers or demineralizers. This would reduce the capability of the liquid radwaste systems of the Davis-Besse plant to the level of the so-called "zero release system" of the Palisades Plant, Tr. 162-63, a system which the Coalition had claimed "would be vastly superior to the present Davis-Besse system." Request for Suspension of Construction Permit No. CPPR-80 by Coalition and LIFE, submitted to AEC on November 19, 1971, p. 4. (The same statement was made by Coalition and LIFE to the U. S. Court of Appeals in their Brief in Support of Motion for Hearing on Interlocutory Injunction, p. 2, filed with the Court on January 18, 1972).^{*} Other alternatives (all of which would add to the capability of radwaste systems involve augments to, but do not involve changes in, the present radwaste systems) include adding more demineralizers or evaporators (liquid radwaste system), additional gas holdup tanks, more charcoal filters, or a cryogenic or absorption system (gaseous radwaste system). Permittees testified that

* It is ironic that counsel for Coalition at this hearing, the same counsel who filed the two documents referenced above, objected to testimony on the Palisades Plant radwaste system. Tr. 161.

none of these possible alternatives would be foreclosed by continued construction during the NEPA review period. Additional components such as demineralizers, evaporators, or cryogenic components would require additional building space whether construction were suspended or allowed to continue during the review period. Addition of such equipment assuming continuation of construction would not be considerably more expensive than would addition of such equipment assuming a suspension. The cost of continued work on the radwaste system during the NEPA review period will involve an expenditure of about \$556,000. Tr. 161-67. The present radwaste treatment system, without any of the aforementioned augments to the present design, will enable the Permittees to comply with the numerical dose limits in the proposed Appendix I to 10 CFR Part 50 which would define the Commission's "as low as practicable" criterion for radioactive effluents. Tr. 167-68.

26. The Staff's witness testified that a zero release liquid radwaste system is theoretically impossible. He also identified the following alternatives (some of which are still under development) and additions to Permittees' gaseous and liquid radwaste systems: additional evaporators or demineralizers, flocculation and precipitation, removal of ions in solution by chemical additives, conversion of filters to Powdex units, and boron control (liquid radwaste system) and

presurrized holdup tanks, additional filters and charcoal absorbers, ambient or cryogenic charcoal beds, cryogenic distillation, solvent absorption, membrane separation, foam encapsulation, and substitution of hydrogen for nitrogen as cover gas. Tr. 300-02. The Staff's witness agreed with Permittees' testimony that continued construction would not render any of these design alternatives technically unfeasible or preclude their subsequent adoption. Tr. 303. The Staff's witness knew of no alternatives to the Davis-Besse solid rad-waste system. Tr. 302.

27. Coalition presented no testimony suggesting other alternatives or indicating that continued construction would foreclose any of the alternatives listed by Permittees or the Staff. Nor did the Coalition elicit any such information through cross-examination.

B. Cooling Water System

28. The only alternatives to the present cooling tower system are a once-through condenser cooling system, cooling ponds (with or without power spray modules) and dry cooling towers. Tr. 155-61. None of these alternatives appear to be reasonable. The once-through system (originally planned for the Davis-Besse facility), although less expensive than the present system, was opposed by the Environmental

Protection Agency and the U. S. Fish and Wildlife Service, Tr. 156. Its adoption must therefore be considered unlikely. Adoption of this alternative as a result of the NEPA review would also delay placing the plant into commercial service. Tr. 157. Cooling ponds would require the use of 900 or more acres of land (600 acres with powered spray modules). Were the pond to be adjacent to the present station, it would require destruction of all marsh areas on the site. If the pond were located offsite, the one or two years needed for land acquisition would make it impossible to meet the present operation schedule. Tr. 158-59. This would incur the substantial financial costs set forth in Section V below. Dry cooling towers are not technically feasible because turbines of the size needed for Davis-Besse which would be suitable for use with a dry cooling tower are not available. Tr. 159-60, 257-60.

29. Continued construction of the present cooling tower system would only involve an additional unrecoverable cost of about \$2 million. Tr. 158; it would not foreclose subsequent adoption of the alternatives listed above.

30. Evidence was presented showing that a number of augments to the existing cooling system could be considered. Either a forced-draft cooling tower or a cooling pond could be used to further cool the blowdown from the cooling tower.

Permittees' Testimony, p. 19; Tr. 151, 160. These augments among others are described in detail in the Supplement to Environmental Report, pp. 14-5 to 14-9, 14-31 to 14-32, Figure 14-5. Although it may be environmentally unacceptable, the blowdown from the cooling tower could be discharged through the drainage ditch to the Toussaint River. Tr. 191. Continued construction would not preclude the adoption of these alternatives. Nor would their cost be greater if they were added after continued construction than if added at the present stage of construction. Permittees' Testimony, p. 19; Tr. 160. The present cooling system, without any of the aforementioned design augments, provides reasonable assurance of compliance with applicable water quality standards. Tr. 168.

C. Systems Relating to the Environmental Consequences of Accidents

31. The available alternatives to further mitigate environmental consequences of nuclear accidents were identified. These alternatives, many of which may not be prudently required, include additional charcoal filters to further reduce iodine release, collection equipment on rotating and sliding seals, a closed sampling system, diking of outside tanks, installation of tritium detectors on the liquid discharge line in addition to the existing radiation monitors, use of a higher stack, reduction of radioactive gas inventory in any given tank by the addition of more tanks, addition of a xenon and krypton

absorber system, increasing the purification rate in the primary coolant system, increasing the turbine by-pass capacity, use of turbines in a load following mode, installation of an N₁₆ monitor on the steam line, operating with a smaller percent of defective fuel, use of a quench tank for steam relief, modifying containment ventilation for recirculation mode operation, reducing the number of spent fuel elements transported in each fuel cask, reduction in containment leak rate, and addition of chemical additives to containment sprays. None of these alternatives would be foreclosed by continued construction during the NEPA review period. Tr. 274-88.

D. Transmission Lines

32. Since the Davis-Besse to Bay Shore line is already essentially complete, Tr. 170, there can be no foreclosure of alternatives from anything which would occur during the NEPA review period. The route of the Davis-Besse to Lemoyne line is already well defined by the 75% of the right-of-way already cleared. Completing construction of this line during the NEPA review period would not further preclude adoption of an alternate route. Tr. 170-71. Since no offsite construction will be undertaken on the third line, Davis-Besse to Beaver, during the NEPA review period, an alternate to this line could not be foreclosed during the NEPA review period. Tr. 170.

V. EFFECT OF DELAY ON THE PUBLIC INTEREST

33. If a suspension of construction activity under the construction permit were to be ordered and the full NEPA review were to conclude that the facility could be completed as currently designed, the seven-month suspension would result in delaying the commercial startup of Davis-Besse by ten months. The additional three months would be needed to restart construction and reassemble a trained construction force. Permittees' Testimony, p. 41.

34. A suspension, with its attendant delay in the startup of the Davis-Besse facility, would result in very substantial additional costs. Each month that the facility is delayed would cost \$1.9 million in interest on funds already invested, escalation on items delayed and additional maintenance and security costs. The additional one-time cost of stopping construction and restarting it at a later date would be \$2.2 million. Thus, a ten-month delay would add an estimated \$21.2 million to the station's initial cost. Permittees' Testimony, pp. 45-46. Detailed justification of each of these costs, their component elements, and the method for their computation was provided during extensive cross-examination of Permittees' witnesses. Tr. 216-31.

35. In addition to this added capital cost, Permittees

and other members of CAPCO (the operating and generating pool of which Permittees are a part) would incur added costs to supply the power to replace Davis-Besse capacity. Without the Davis-Besse facility available for the peaks of December, 1974 and June, 1975, the load forecasts made by Permittees and CAPCO indicate that they would not have reserves adequate to provide reliable service to their consumers. The reliability of such forecasts is borne out by the accuracy of previous load forecasts by Permittees and CAPCO. Permittees' Testimony, pp. 27-40. Permittees' testimony also showed that possible excess capacity from ECAR (East Central Area Reliability Coordination Agreement, composed of CAPCO and ten other operating pools) would not necessarily be available for purchase. Permittees' Testimony, pp. 41-44.

36. The Staff presented an expert witness from the Federal Power Commission who testified that CAPCO needs a reserve of about 20%. Tr. 388-89. Based on a detailed analysis of the peak period in the Summer of 1975, the FPC witness testified that a delay in operation of the Davis-Besse plant would reduce reserves for The Toledo Edison Company from 7.7% to minus 24.7%, The Cleveland Electric Illuminating Company from 21.3% to 9.4%, and CAPCO from 17% to 9.6%. Tr. 395-96. Although he had not conducted a similar detailed analysis for power supply in the Winter of 1974, he agreed that Permittees' figures for

that period were reasonable, particularly if scheduled maintenance was to be considered. Tr. 410-12. The consequences of CAPCO's failure to provide a 20% reserve could result in load-interruption or load-shedding unless sufficient emergency power were available from surrounding areas. Tr. 389. Those utilities, pools and regional reliability councils which are closest to CAPCO were also projected as having low reserves. Tr. 391-94. Because of this reserve situation, Permittees' ability to purchase power to replace delayed Davis-Besse capacity could not be assured. The reasonable availability of purchased power is also threatened by slippage in the construction of new fossil and nuclear generating plants. Permittees' Testimony, pp. 41-42; Tr. 399.

37. Permittees provided additional justification for their load projections by showing, after the matters were raised on cross-examination by the Coalition, that neither a change to a so-called regressive rate structure nor a change in Permittees advertising program would lead to lower peak loads. Reed S. Reynolds, Toledo Edison's Corporate Planning Economist, testified that the impact of having an increasing (rather than a decreasing) rate per kilowatt hour would be very slight. Tr. 437-38. Mr. Reynolds also testified in response to a question from counsel for the Coalition that, based upon multiple regression analyses considering intercompany

differences in promotional expenditures per customer, he had found no correlation between advertising and electrical demand. Tr. 347. Permittees also testified that the purpose of their advertising was to increase load factor and off-peak usage and not to increase the peak load demand. For that reason, air conditioning is not encouraged by advertising. Tr. 417-21.

38. Because power from other sources could not be relied upon to replace delayed Davis-Besse capacity, the only other alternative would be to install combustion gas turbine generating units. Tr. 403. These turbines would have to be fueled with fuel oil since natural gas is not available in most areas. Tr. 210. Permittees and the FPC witness agree that substitute installation of a fossil plant would be impossible within the time period. Permittees' Testimony, p. 44; Tr. 403. If Davis-Besse were to be delayed, the installation of combustion gas turbines three years ahead of scheduled CAPCO requirements would result in additional fixed charge costs of \$16.6 million. The total excess cost for substituting turbines for delayed Davis-Besse capacity, including savings from not operating Davis-Besse during this period, would total \$33.8 million. Permittees' Testimony, pp. 46-47. The Regulatory Staff's FPC witness confirmed that turbines would cost much more to operate than the Davis-Besse Plant and, because turbines are not designed for base load operation, would be less

reliable. Tr. 400-03. The FPC witness also questioned whether combustion gas turbines could be obtained in time. Tr. 400. Based upon a computation made for the customers of Toledo Edison alone, this delay cost would mean cost increases to residential consumers of 5%, to commercial consumers of 5%, to industrial consumers of 9%, and to other customers (schools, government buildings) of 6% in the first year of delay. Tr. 234-36. Delay in Davis-Besse would also require increased generation from CAPCO's older coal and oil-fired units, with the resulting release of sulfur dioxide, nitrogen oxides, carbon dioxide and particulates to the atmosphere. Permittees' Testimony, p. 44.

39. Another cost to the public which would be caused by a suspension could be the job loss for the duration of the suspension for people now working at the Davis-Besse site. As of June 1, 1972, approximately 750 construction workers will be employed on the site. During the suspension period only 75 persons would be required on site. Tr. 231-32.

40. There is a reasonable probability that the Davis-Besse plant will be ready for commercial operation about December, 1974, in the absence of a suspension. Construction could not be accelerated following a suspension of the plant, or any of its major systems, to make up lost time. In critical schedule areas, Permittees are already on a two-shift basis. A three-shift basis would be unlikely to further

accelerate construction because of loss of productivity and lack of additional qualified manpower. Tr. 195-206.

VI. EFFECT OF THE COST OF CONTINUED
CONSTRUCTION ON THE NEPA REVIEW

41. Permittees testified as to the cost of abandoning the Davis-Besse facility at the end of the NEPA review period first assuming a suspension of construction activity as of June 1, 1972 and second assuming continuation of construction until abandonment. The cost of abandonment has three components: 1) the unrecoverable costs of abandoning Davis-Besse; 2) the additional generating costs; and, 3) the fixed charges on storage costs of salvageable material. Permittees' Testimony, p. 26c.

42. The record contains the unrecoverable cost of abandoning the Davis-Besse plant at the end of the NEPA review period assuming a suspension of construction on June 1, 1972, and assuming no suspension as follows:

<u>Costs</u> Assuming Suspension of Construction on June 1, 1972	<u>Description</u>	Assuming Constructio Continues to December 31, 1972
\$ 97,249,000 (1)	Total Investment and Interest During Construction through 5/31/72	\$ 97,249,000 (1)
<u>6,240,000 (2)</u>	Less Interest During Construction	<u>6,240,000 (2)</u>
\$ 91,009,000 (4)	Total Investment	\$ 91,009,000 (4)
<u>Added Investment Costs</u>		
-	Containment	8,187,000 (3)
-	Auxiliary Building	9,024,000 (3)
-	Turbine Building	5,528,000 (3)
-	Cooling System	2,369,000 (3)
-	Switchyard	545,000 (3)
-	Miscellaneous Structures	3,561,000 (3)
-	Temporary Barge Canal	25,000 (3)
2,582,000 (3)(8)	Station Eng. & Const. Mgmt.	2,582,000 (3)
-	Transmission	1,187,000 (3)
770,000 (3)(9)	Administrative Costs	770,000 (3)
-	Sub-Total	<u>33,778,000 (3)</u>
<u>12,963,000 (10)</u>	Equipment Payments (6/1/72 to 12/31/72)	12,963,000 (10)
\$ 16,315,000 (4)	Sub-Total	-
10,658,000 (4)	Interest During Construction through 12/31/72	11,393,000 (10)
32,409,000 (4)	Equipment Delivered after 12/31/72	32,409,000 (11)
<u>14,327,000 (4)(5)</u>	Construction Contractors Cancellation	<u>11,805,000 (11)</u>
\$164,718,000 (4)	Total Investment & Int. as of 12/31/72	\$193,357,000 (11)
<u>75,146,000 (4)(6)</u>	Less Salvageable Material	<u>75,146,000 (6)</u>
\$ 89,572,000 (4)	Total Abandonment Costs	\$118,211,000 (12)
	Added Cost of Abandonment due to Const. 6/1/72 to 12/31/72	\$ 28,639,000 (7)(12)

Notes:

- (1) Total shown in Table IV-2, Permittees' Testimony, p. 25
- (2) Interest during construction shown in Table IV-2, Permittees' Testimony, p. 25
- (3) Total of monthly costs shown in Table IV-1, Permittees' Testimony, p. 26

(Notes continued on following page)

- (4) Amounts shown in note to Table IV-3, Permittees' Testimony, p. 26c
- (5) Cost shown in text, Permittees' Testimony, p. 26a
- (6) Amount shown in text, Permittees' Testimony, p. 26b; Tr. 337-38
- (7) Difference in total abandonment costs shown in text, Permittees' Testimony, p. 26c; Tr. 242
- (8) Total of "Engineering and Const. Mgmt." shown on Permittees' worksheet "Cost of Construction with Delay," Intervenor's Exhibit 7
- (9) Total of "Administrative Costs" shown on Permittees' worksheet "Cost of Construction with Delay," Intervenor's Exhibit 7
- (10) Tr. 239
- (11) Tr. 240
- (12) Tr. 241

The added unrecoverable cost of abandonment if construction is permitted to proceed until the end of the NEPA review period would be \$28,639,000 (equivalent to a January 1, 1975 present worth of \$34,182,000).

43. If Davis-Besse were abandoned, its generating capacity would have to be replaced since abandonment would not reduce the demand for power. Tr. 152. As discussed in Section V above, combustion gas turbines would be the only method of replacing Davis-Besse capacity by December, 1974. Older fossil plants would be used more extensively until new base

load plants were built. Sites for these plants might include the Davis-Besse site for a new fossil plant. Tr. 152-55. The additional generating costs to CAPCO if Davis-Besse were to be abandoned were determined by a complete economic analysis comparing the present CAPCO capacity addition plan through 1990 with an alternative plan substituting combustion gas turbines for Davis-Besse in 1974 and utilizing the salvageable material from the Davis-Besse plant as early as possible in a nuclear unit at another site. The alternative plan was \$30,900,000 more expensive (January 1, 1975 present worth). On a present worth basis, the additional cost for years after 1990 becomes insignificant. Tr. 243-44.

44. The third element of the cost of abandonment would be the fixed charges on storing salvageable material from the Davis-Besse plant. Use of the salvageable material would, of course, minimize the cost of abandoning Davis-Besse, since there would be in excess of \$75 million in salvageable material. Permittees' Testimony, p. 26c; Tr. 330-32, 337-38. The earliest that a nuclear unit replacing Davis-Besse and making use of the salvageable material from Davis-Besse could be completed would be 1980. Permittees' Testimony, p. 26a. The additional cost of that unit over Davis-Besse, as well as the other excess costs of the CAPCO capacity addition plan based upon abandonment of the Davis-Besse facility, is included in the second element of the cost of abandonment with the exception

of storage costs on the salvageable material. These costs would be accrued until the replacement nuclear plant went into operation and then charged as fixed charges over the life of that plant. Since the CAPCO capacity addition program was only analyzed through 1990 and since the amount has to be put on a comparable basis so that it may be added to the other cost elements, the fixed charges on these storage costs are stated on a January 1, 1975 present worth as \$24,597,000. Permittees' Testimony, p. 26c; Tr. 244. This amount would be the same whether or not construction continued until the completion of the NEPA review period.

45. By totalling the three elements, i.e. the unrecoverable cost of abandoning Davis-Besse, the additional generating costs if Davis-Besse is abandoned, and the fixed charges on storage costs on salvageable material from Davis-Besse, the January 1, 1975 present worth of the cost of abandoning the Davis-Besse plant on December 31, 1972 would be \$162,406,000 if construction were to be suspended on June 1, 1972 and \$196,588,000 if construction were to continue until December 31, 1972 for a January 1, 1975 present worth difference of \$34,182,000. Permittees' Testimony, p. 26c. We therefore find that the cost of abandoning the Davis-Besse facility is already so substantial that the additional costs which would be added by continued construction until December 31, 1972 could not reasonably tilt the balance that would otherwise be developed in the NEPA review.

46. Independent of our finding based upon a comparison of the costs of abandoning the Davis-Besse facility, there are other considerations which indicate that continued construction during the NEPA review will not affect its final outcome, and that total abandonment is not a likely prospect. Permittees have waived all consideration of the additional investment to be made during the review period for the purposes of the cost-benefit evaluation to be developed in the full NEPA review. Permittees' Testimony, p. 26a; Tr. 22. The Regulatory Staff indicated that they did not regard this waiver as dispositive. Tr. 25-26. While this Board is not prepared to rule upon the right of Permittees to waive the incremental investment cost from consideration by the Commission in its NEPA review, the waiver of the investment, which is made at Permittees' own risk, is not an insignificant factor to be considered in the ultimate cost-benefit analysis. The major concerns which had been voiced by Coalition deal with thermal effects and radiological discharges. See, e.g. Coalition and LIFE Request for Suspension of Construction Permit No. CPPR-80, filed with the Commission on November 19, 1971. With respect to these factors, we note that no additional radwaste equipment would be necessary for the Davis-Besse plant to meet the conservative numerical dose limits in proposed Appendix I to 10 CFR Part 50. Tr. 167-68. With respect to thermal discharges, Permittees have received a certification from the Ohio Water Pollution Control

Board pursuant to Section 21(b) of the Federal Water Pollution Control Act that there is reasonable assurance that the Davis-Besse facility will meet applicable water quality standards. Tr. 168. In any event, suitable augments to the present radioactive waste and thermal effluent systems are available to further reduce the planned effluent levels. The incremental investment during the NEPA review period in the radioactive waste and cooling water systems is not significant. The uncontradicted testimony shows that there has been accumulated a substantial store of knowledge with respect to the effects of radioactivity on man and on lower forms of life which generally concludes that man is the most sensitive to radioactivity. Adequate limitations on radioactive effluents from Davis-Besse to protect man will adequately protect the lower forms of animal and vegetable life which inhabit the surrounding marshlands. Tr. 441-43. The testimony herein also shows that the tall structures of the site will not be significantly adverse to migrating birds. Tr. 490-98.

VII. CONCLUSIONS

47. Based upon the Board's consideration of the entire record and in light of the foregoing findings, the Board concludes that:

- a) It is not likely that continued construction during the NEPA review period will give rise to

a significant adverse impact on the environment.

b) Even in the event that a significant adverse impact might occur, redress could reasonably be effected should modification, suspension or termination of the construction permit result from the ongoing NEPA review.

c) Continued construction during the NEPA review period will not foreclose subsequent adoption of alternatives in facility design or operation of the type that could result from the ongoing NEPA environmental review.

d) Suspension pending completion of the NEPA review would significantly delay the operation of the Davis-Besse facility imposing extremely substantial delay costs to Permittees and their consumers and a significant adverse impact on the public interest.

e) Additional investment from continued construction during the NEPA review period will not tilt the balance that would otherwise be developed in the full NEPA review.

48. Upon consideration and balancing of the criteria in Section E.2 of Appendix D to 10 CFR Part 50 together with the consideration specified in the remand of the U. S. Court of Appeals for the District of Columbia Circuit in Coalition for Safe Nuclear Power v. USAEC, No. 71-1396 (April 7, 1972), the