UNITED STATES OF AMERICA

ATOMIC ENERGY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

Walter H. Jordan, Member
Charles E. Winters, Member
Walter T. Skallerup, Jr., Chairman

In the Matter of	)	
	)	
THE TOLEDO EDISON COMPANY and	)	
THE CLEVELAND ELECTRIC ILLUMINATING COMPANY	)	Docket No. 50-346
	)	
	)	
(Davis-Besse Nuclear Power Station)	)	

INITIAL DECISION

23 March 1971

PRELIMINARY STATEMENT

This document is the Initial Decision of the Atomic Safety and Licensing Board in this proceeding. In accordance with the Atomic Energy Act of 1954, as amended, and AEC regulations, it contains the Board's findings of fact and conclusions of law with respect to those matters set forth in the Notice of Hearing dated 30 October 1970. Since this was a contested proceeding, it also contains the Board's determinations with respect to the matters in controversy. Matters in controversy included challenges to the validity of two Commission regulations, namely, 10 CFR Part 20

"Standards for Protection Against Radiation", and 10 CFR Part 50, Appendix D, implementing the National Environmental Protection Act of 1969. Finally, this document concludes with an Order reflecting the Board's conclusion that a construction permit be issued.

BACKGROUND

1. On August 1, 1969, The Toledo Edison Company (Toledo Edison) and The Cleveland Electric Illuminating Company (hereinafter collectively reffered to as the Applicants) filed with the Atomic Energy Commission (AEC or Commission) a joint application for a license to construct and operate a nuclear power station. The proposed facility, to be known as the Davis-Besse Nuclear Power Station, will utilize a pressurized water nuclear power reactor with an initial core power level of 2633 thermal megawatts (Mwt) and an ultimate expected level of 2772 Mwt. The facility is to be located on the south shore of Lake Erie in Ottawa County, Ohio, 20 miles east of Toledo. The station will be jointly owned by the two Applicants as tenants-in-common, with Toledo Edison assuming responsibility for the design, construction and operation.

2. Following review of the application by the Commission's Regulatory Staff (Staff) and the Advisory Committee on Reactor Safeguards (ACRS), the Commission, pursuant to the Atomic Energy Act of 1954, as amended, (Act) and its own regulations, gave notice by publication

in the Federal Register on November 4, 1970, (35 Fed. Reg. 16999) that a public hearing would be held before this Atomic Safety and Licensing Board (Board) to consider whether a construction permit should be granted to the Applicants.

3. In accordance with the notice of hearing, and following a prehearing conference held November 23, 1970, a public hearing was held before this Board on December 8-10, 1970, January 5-7, and 25-29, 1971, and February 8-12, 1971, in Port Clinton, Ohio, about nine miles from the site. The parties to this proceeding are the Applicants; the Regulatory Staff; certain Intervenors, namely, the Coalition for Safe Nuclear Power (Coalition); Mr. Glenn Lau, a local resident; and Living in a Finer Environment (LIFE) along with two individuals, Dr. Irwin I. Oster and Mr. William E. Reany. By letter to the Board dated February 8, 1971, and subsequently confirmed by telegram dated March 13, 1971, Dr. Oster withdrew as an intervenor in opposition to the station. (Tr. pp. 1608-15) The orders permitting intervention by the Coalition, Lau and LIFE pursuant to §2.714 of the "Rules of Practice" were conditioned upon those contentions of the petitioners which were properly raised in reasonably specific detail, and which set forth the interest of the petitioner in the proceeding, and how that interest might be affected by the proposed Commission action. Inasmuch as the Intervenors were in opposition

to the granting of the construction permit, the hearing was a contested proceeding within the meaning of 10 CFR 2.4(n) of the "Rules of Practice".

4. A petition for leave to intervene filed by Richard E. Webb, a resident of Columbus, Ohio, alleging the unconstitutionality of the Act was denied at the prehearing conference. The constitutional question was beyond the scope of the proceeding and the petitioner had failed to set forth his interest in the proceeding and how it would be affected by the proposed issuance of the construction permit. (Tr. pp. 10-18, p. 210)

5. Pursuant to 10 CFR §2.715 of the Commission's Rules of Practice", limited appearances were made during the hearing by a representative of the Ohio Department of Health and a number of persons and groups to register their support or opposition to the issuance of a construction permit.

6. Intervenor LIFE on 25 January 1971 moved that two members of the Board be disqualified. The Board denied the motion, and referred its ruling to the Commssion in accordance with 10 CFR 2.704(c) on February 3, 1971. By Memorandum and Order dated February 19, 1971 the Commission ordered LIFE's disqualification motion be denied.

7. Intervenor LIFE on 25 January 1971 moved that an exemption sought by Applicants to allow further construction of the facility while this proceeding was pending be denied, or that the hearings be recessed until such time as a determination was made on the proposed exemption. (Tr. 1035) Upon completing its consideration of this motion the Board on 27 January 1971 ordered the Director of Regulation not issue an extension of the exemption sought by the Applicants until after the filing of the Board's Initial Decision in this matter. The Board on 18 February 1971 referred this ruling and order to the Appeal Board. To date there has been no ruling by the Appeal Board in this matter.

ISSUES TO BE DECIDED IN THIS PROCEEDING AND FINDINGS OF FACT

> Issue No. 1(a). Whether in accordance with the provisions of 10 CFR §2.104(b) and §50.35(a) the Applicants have described the proposed design of the facility including, but not limited to, the principal architectural and engineering criteria for the design, and have identified the major features or components incorporated therein for the protection of the health and safety of the public.

8. The application and the record of the proceeding include a description of the site and the basis of its suitability; a detailed description of the proposed facility, including a description

and analysis of those reactor systems and features which are essential to safety; and analysis of the safety features provided for in the facility design; and an evaluation of various postulated accidents and hazards involved in the operation of such a facility and the engineered safety features provided to limit their effect. Also included in the application and the record of the proceeding is evidence as to the financial and the technical qualifications of the Applicants, including those of their contractors to design and construct the facility, the Applicants' quality assurance program, and the proposed facility's bearing upon the common defense and security. The Regulatory Staff's Safety Evaluation (SSE) sets forth the considerations given to the important safety features of the proposed facility and the significance assigned to those systems and features important to the prevention or mitigation of accidents and to the health and safety of the public. (SSE and Tr. p. 494) No testimony was offered to controvert an affirmative finding on Issue No. 1(a).

> Issue No. 1(b). Whether in accordance with the provisions of 10 CFR §2.104(b) and §50.35(a) such further technical or design information as may be required to complete the safety analysis and which can reasonably be left for later consideration, will be supplied in the final safety analysis report.

9. Applicants have testified, (Applicants' Summary, p.37) and the Staff agrees, (SSE, p. 86) that such further information as may be required to complete the safety analysis and which can reasonably be left for later consideration will be supplied in the final safety analysis report (FSAR). No testimony was offered to controvert an affirmative finding on Issue No. 1(b).

> Issues No. 1(c) and 1(d)(i). Whether in accordance with the provisions of 10 CFR §2.104(b) and §50.35(a) safety features or components, if any, which require research and development have been described by the applicants and the applicants have identified, and there will be conducted, a research and development program reasonably designed to resolve any safety questions associated with such features or components and, on the basis of the foregoing, there is reasonable assurance that such safety questions will be satisfactorily resolved at or before the latest date stated in the application for completion of construction of the proposed facility.

10. The Applicants and Staff recognize in order to develop the final design of the facility further information and data will be needed. In addition to this information, and data required for facility operation which will be developed by research and development projects in the course of the final design work for the facility, other research and development programs in progress

are expected to provide added confirmation that the facility designs are conservative. The major areas of research and development include programs concerning the hydrogen control system, common failure modes, core stability evaluation, fuel rod cladding, control rod drive testing, once-through steam generator testing, self-powered detector testing, core thermal and hydraulic design, and flowdown forces on core internals. The objectives of these programs have been defined and the schedules for developing this technical information are compatible with the facility schedule. (SSE pp. 75-81, 86, Tr. p. 494; Applicants' Summary, pp. 29-32, 37) No testimony was offered to controvert an affirmative finding on Issues No. 1(c) and 1(d)(i).

> Issue No. 1(d)(ii). Whether in accordance with the provisions of 10 CFR §2.104(b) and §50.35(a), on the basis of the foregoing, there is reasonable assurance, taking into consideration the site criteria contained in 10 CFR Part 100, the proposed facility can be constructed and operated at the proposed location without undue risk to the health and safety of the public.

Site Considerations

11. The proposed facility will be located on the south shore of Lake Erie in Ottawa County, Ohio, approximately nine miles northwest of the City of Port Clinton, the Ottawa County seat. The

City of Toledo is twenty miles to the west and the Village of Oak Harbor is six miles southwest of the site. The site includes about 900 acres of which about half is marshland which will be leased to the U. S. Bureau of Sports Fisheries and Wildlife for management as a national wildlife refuge. The site and surrounding area terrain is virtually featureless with marsh areas along the lake shore and with farmland further inland. (Applicants' Summary, pp. 4-6; SSE, pp. 5-6)

12. The minimum distance between the reactor and the outer boundary of the exclusion area (the area in which Applicants have authority to determine all activities for purposes of 10 CFR Part 100 of the Commission's regulations) is 2400 feet. No one resides within the exclusion area. The low population zone surrounding the station, with a radius of two miles, has a permanent resident population of approximately 650 and a 1969 summer population of 1564. The nearest population centers (population greater than 25,000) are Toledo and Sandusky, each of which is approximately twenty miles from the site. (Applicants' Summary, pp. 4-6; SSE, pp. 5-6)

13. The station design takes into account site geology, meterology, hydrology and ground water conditions and the possibility of tornadoes, floods, and earthquakes. (Applicants' Summary, pp. 6-10; SSE, pp. 6-9) The containment and engineered

safety features of the station design, and all other components of the facility which bear significantly on the acceptability of the site under site evaluation factors identified in 10 CFR Part 100 have been analyzed and evaluated by the Applicants and the Staff for a core power level of 2772 Mwt, the ultimate power level expected for the reactor. (Applicants' Summary, p. 2; SSE, pp. 1-2)

14. Intervenor Lau contended that the exclusion area and low population zone around the site, and the population center distance as defined in 10 CFR Part 100 of AEC regulations, were incorrectly calculated in contravention of the Commission's own guidelines. Similarly, the Coalition contended that the Commission had violated its own guidelines for siting reactors. (Tr. pp. 809-19, 1274-76, 1399-1412) The purpose of Part 100 of AEC regulations is to provide guideline criteria for determining the adequacy of a specific site for a specific facility. Part 100 references an AEC document (TID-14844) as a point of departure for calculating particular site requirements. The intervenors apparently misinterpreted Part 100 and the method whereby TID-14844 is to be used, and extrapolated the exclusion zone radius and low population zone radius directly from a table set out in TID-14844 which was based on an assumed reactor having a simple containment and no other engineered safety features. The calculational model in TID-14844 does not take into consideration the engineered safety features.

15. Section 100.10 states a number of factors, including engineered safety features, are to be considered in evaluating proposed reactor sites. Section 100.10(d) specifically provides that a site with unfavorable site characteristics may be acceptable if "appropriate and adequate compensating engineered safeguards" are used. A note at the end of Part 100 which references TID-14844 states the calculations described therein "may be used as a point of departure for consideration of particular site requirements..." The Statement of Consideration which accompanied the publication of Part 100 on April 12, 1962, stated that applicants are "free and indeed encouraged to demonstrate to the Commission the applicability and significance of considerations other than those set forth in the guides." (27 Fed. Reg. 3509)

16. In addition to the containment structure, the facility contains a number of engineered safety features designed to limit the consequences of a loss of coolant accident. The principal engineered safety features are: (1) the emergency core cooling system, designed to prevent excessive heating of the fuel cladding and keep the core intact by delivering borated cooling water to the reactor core; (2) the containment spray and cooling system used to reduce containment pressure and remove decay heat from the containment by the use of spray headers and fan cooling units located in the upper containment; and (3) the secondary containment

structure and its associated fans, filters, and charcoal traps for discharging the leakage from the primary containment to a 240 foot high stack which are designed to reduce the concentration of radioactive releases at the boundary to limits below those prescribed in 10 CFR Part 100. (SSE pp. 31-44, Tr. p. 494)

17. Although allegations were made by intervenor Lau that no credit should be allowed for engineered safety features, no evidence was offered in support of this contention.

18. Lau also contended that Applicants' meteorological studies of the site were inadequate in that they (1) analyzed data for only six months and, (2) ignored two recent severe storms in the area. The application contains eighteen months of temperature data through February 1970 at three levels, and eighteen months of wind data at the 300 foot level. The Staff noted the Applicants will provide a year's data at the twenty-foot level prior to review of the application for an operating license, and, for purposes of this proceeding and to determine the suitability of the site, evaluated the site using a calculational model with diffusion parameter assumptions more conservative than the Applicants' six-month data at the twenty-foot level would indicate to be warranted. In regard to dispersion, the term "more conservative" means the assumption of lower wind speeds and other factors which would indicate less

dispersion of the gasses into the atmosphere than the actual observed meterological conditions would indicate. The Applicant has collected well over a year's worth of data at the twenty-foot level which confirms the conservatism of the calculational model used. (Tr. pp. 655-61, 700-2) Severe storms were considered relative to the structural adequacy of the station. The reactor structures are being designed to withstand tornadoes of substantially greater magnitude than any windstorms measured in the area of the site, including the two storms mentioned by Lau. (Tr. pp. 660, 700-2)

19. Lau further contended that inadequate consideration had been given to population growth in the area. Applicants and the Staff testified, however, the application indeed contained population growth projections for the area through the year 2000 based on U. S. Census figures. The Staff also noted the AEC retains close and continuous regulatory supervision over the plant throughout its lifetime, and the AEC is empowered to take regulatory measures which might be necessary to deal with any unexpected population increase. (Tr. pp. 654, 836-41)

20. Applicants have provided the information required by Appendix E of Part 50 concerning preliminary plans for developing emergency procedures to be implemented in the unlikely

event of an accident condition which would require evacuation of people within the low population zone. (Tr. pp. 1650-58, 1712-14, 2179-82) Lau contended, however, that evacuation of residents from the low population zone could not be accomplished in periods of flooding or heavy storms. A number of local residents of the nearby Sand Beach area testified to the severity of the winter snowstorms with resultant snow drifting which caused private local streets to be blocked by snow for at least several days during several years. (Tr. pp. 2052-2106) The record shows there are no residences within the exclusion area and that there was a fluctuating population of from 637 to 1,564 during 1969 in the low population zone, with a projected population growth rate of 1.6 percent per year. In accordance with AEC requirements, detailed emergency procedures to provide for an orderly evacuation must be fully prepared prior to operation of the station. Applicants testified they have made preliminary contract with the Ottawa County Engineer, the Civil Defense Director, the Oak Harbor Fire Department, the Highway Department, and the Ohio Highway Patrol, all of whom have indicated a willingness to cooperate with Applicants in formulating a detailed evaculation plan. Applicants testified suitable vehicles will be available to aid in the timely evacuation of individuals under adverse snow and flood conditions expected in the area. (Tr. pp. 653-4, 1093-94, 1100-1109, 1118-26, 1648-50, 2044-51, 2149-50, 2152, 2165-66, 2182-84) The

testimony of Lau's witnesses indicated that, even though the residents were often snowbound in the sense that they were unable to use their automobiles, egress on foot or by other suitable vehicles was not precluded. Applicants' expert testimony demonstrated that initially, under maximum hypothetical conditions requiring evacuation, only a selected, downwind portion of the low population zone would have to be evacuated promptly. This would involve moving a small number of people over distances of under a mile. Although the testimony indicated that evacuation could be undertaken during the course of violent weather conditions, such evacuation would not have to occur during such conditions because of the favorable dispersion characteristics afforded by the high wind speeds associated with such conditions. (Tr. pp. 2184-92, 2191-97) The Ottawa County Engineer, an elected official in charge of snow removal in the area, testified that with proper notice it is feasible to evacuate the low population zone under any weather conditions within short time periods. (Tr. pp. 2143-66) Testimony by the Staff complemented and corroborated Applicants' testimony. (Tr. pp. 2193-97, 2197-99, 2200-2206, 2207-08)

21. Lake Erie surface areas and certain air spaces in the vicinity of the station have been established by the U. S. Corps of Engineers and the Federal Aviation Agency as restricted areas. These are reserved for use by segments of the armed services and

industrial organizations located within the Erie Industrial Park for training and testing activities of aircraft, ground weapons, and airborne weapons. The Coalition contended that these activities constituted an unacceptable hazard to the safe operation of the facility. The Staff and the ACRS had given particular attention to these activities during their respective reviews of the application, and both had concluded no significant hazard existed as a result of these activities. Evidence presented at the hearing by both the Staff and the Applicants concerning the frequency of flights in the area, types of aircraft, flight paths, types of weapons tested, locations of firing ranges, and procedures for controlling aircraft and weapons testing activities in the areas supported the conclusions of the Staff and the ACRS. Applicants introduced letters from The Honorable David Packard, Acting Secretary of Defense, and from Dana L. Stewart, The Adjutant General, State of Ohio, providing assurance that all military and ordnance testing activities in the area will be carefully controlled to avoid hazard to the health and safety of the public. (Applicants' Summary, p. 10, SSE, pp. 11-13; Tr. pp. 683-6, 712-19, 731-49, 751-56, 841-50, 1636-43, 1715-17, 1908-14)

Features of the Station

22. The nuclear steam supply system for the facility is a two-loop pressurized water reactor supplied by the Babcock & Wilcox

Company (B&W), and is similar to other B&W pressurized water reactors such as Three Mile Island Nuclear Power Station Units 1 and 2 for which construction permits have been issued by AEC. (Applicants' Summary, p. 29; SSE, p. 14) The reactor will be fueled with slightly enriched uranium dioxide pellets sealed within zircaloy tubes. Core reactivity is controlled by a combination of movable control rod assemblies, a neutron absorber dissolved in the reactor coolant water, and burnable poison rod assemblies. (Applicants' Summary, pp. 16-17) The two-loop reactor primary coolant system includes the reactor vessel, four reactor coolant pumps, two steam generators, a pressurizer and interconnecting piping. The water circulating in the primary system is used as a heat transfer medium to transfer heat from the reactor core to the steam generator where steam is produced in the secondary system to drive the turbine generator. (Applicants' Summary, p. 15) The reactor containment, consisting of a free standing steel containment vessel and a reinforced concrete shield building, completely encloses the reactor and the primary coolant system and is designed to withstand the peak pressure which could result in the unlikely event of a loss-of-coolant accident. (Applicants' Summary, pp. 16-17; SSE, pp. 26-30)

23. During the course of the proceeding the Board raised a number of questions relating to some of the safety features of the

station. In response, evidence was presented, for example, that main steam and feedwater penetrations of the containment vessel will be tested for leakage and can be repaired, if necessary, when the station is shutdown for refueling. (Applicants' Response to Questions Asked by the Atomic Safety and Licensing Board at the Prehearing Conference (Applicants' Response), December 4, 1970, Q. 4, Tr. pp. 474, 500, 506-7) Other evidence relating to station safety features was presented in response to Board inquiries relating to the adequacy of multi-component piping and valves, (Applicants' Response, Q. 5, Tr. pp. 474, 500) the functioning of the atmospheric dump valves, (Applicants' Response, Q. 6, Tr. pp. 474, 500, 507-10, 690-91) the emergency diesel cooling system, (Applicants' Response, Q. 7, Tr. pp. 474, 500) and the design of the reactor coolant pump flywheels (Tr. pp. 516-17, 687-90)

Radioactive Effluents

24. Radioactive gaseous and liquid wastes will be treated by the radwaste disposal system which is designed to reduce radioactivity to a level which will permit reuse of the decontaminated waste water and release of effluents at levels well below applicable regulatory limits. Processed effluents will be isolated and sampled prior to release to the environment to ensure that adequate provisions

for safe discharge are made. In addition, effluents will be continuously monitored during release, and if their activity should exceed low preset values, their release will be stopped automatically. Applicants testified that gaseous wastes normally will be held for a period of sixty days, and in no event less than thirty days, before being filtered and released. This processing and hold-up time for decay ensures that radionuclides Cesium-137, Cesium-138, and Strontium-90, will not be released in the gaseous effluents, and will not result from decay of any of the radionuclides in the gaseous effluents. Applicants' testimony also indicated the design of the liquid radwaste system, which employs degasification, filtration, ion exchange, and distillation, incorporates provisions for reducing the radioactive content of the liquid effluent. The capabilities for sampling and monitoring permit the exercise of control over liquid and gaseous releases from the station to ensure that all discharges of radioactive material from the site will be maintained as low as practicable and well below the limits of 10 CFR Part 20. (Applicants' Summary, pp. 22-23; SSE, pp. 55-58; Tr. pp. 783-84, 790-91, 799-804, 854-61, 863-67, 1253-54, 1269-74, 1464-85, 1643-47, 1897-1904, 1940-44, 1958-66)

25. The Coalition contended there had been an insufficient examination of the critical exposure routes in considering the effluent discharge. (Tr. pp. 385, 768-804, 815-16, 1227-74, 1277-1330, 1386-90, 1647) Testimony by Applicants and Staff bearing on the Coalition's

contention, and in response to questions asked by the Coalition on cross examination and by the Board, indicated Applicants had adquately taken into account the critical exposure routes, and using extremely conservative assumptions pertaining to reconcentration in the food chain, resultant doses would be far below AEC limits. (Applicants' Response, Q. 1, 2, Tr. p. 474; Tr. pp. 499, 677-81, 707-12 1662-75, 1917-71, Applicants' Exhibit No. 1)

Accident Analysis

26. In determining the safety of the reactor design, detailed safety evaluations and analyses were made by Applicants and the Staff, and reviewed by the ACRS, to determine the capability of the station to mitigate the consequences of a loss-of-coolant accident should it occur. (Applicants' Summary, pp. 24-25; SSE, pp. 62-67) The Coalition contended that the analyses by the Applicants and the Staff are inadequate because they did not include the consequences of an uncontrolled meltdown of the nuclear fuel. The Coalition contended there is no reasonable assurance a meltdown can be avoided, but offered no direct evidence which supported the contention. (Tr. pp. 820-33, 1659-60) Evidence introduced by Applicants and the Staff, however, indicated a core meltdown is not a "credible event" as defined by the regulations, by virtue of the incorporation into the station design of redundant systems of engineered safety features to cool the core in the event of a loss-of-coolant

accident. These safety features are designed to assure the integrity of the containment system for mitigating the release of fission products to the atmosphere. (Tr. pp. 661-76, 702-3, 862-3, 884-903) Nevertheless, the Applicants' evaluation and the Staff's evaluation of the radiological consequences of the maximum hypothetical accident take into consideration a fission product release which would result from an arbitrarily postulated core meltdown and which would be far greater than calculated for the worst loss-of-coolant accident. Safety evaluations by both the Applicants and the Staff demonstrate the doses from such a remote and hypothetical accident are within the guideline values of 10 CFR Part 100. (Applicants' Summary, p. 25; SSE p. 63)

Environmental Monitoring

27. A comprehensive environmental monitoring program will be commenced prior to operation of the facility to determine the magnitude of the natural radioactivity in the surrounding environment. The program will include environmental sampling of lake and well water, soil, air particulate matter, farm products, lake biota, and lake bottom sediments. This program will continue after station operation begins, to detect and evaluate any change in radioactivity of the environment due to operation of the station. The planning and

conduct of this program will be done in cooperation with interested federal and state agencies, and will take into account the recommendations of the Fish and Wildlife Service, U. S. Department of the Interior Additionally, Applicants have been conducting a study of the local Lake Erie area since 1968. One purpose of this study is to determine the type and nature of the lake biota to ascertain the extent that these biota could concentrate radionuclides which might be discharged from the station during operation. Information obtained from this continuing study and from the environmental monitoring program will be used, among other purposes, to assure that the small amount of liquid radioactive releases will not adversely affect aquatic ecological systems and will not prevent normal utilization of the lake environment. (Applicants' Summary, pp. 10-11; SSE pp. 10-11)

Quality Assurance

28. Applicants have established a quality assurance program to assure the station will be fabricated and constructed in accordance with all applicable codes and standards. The program, according to staff testimony, is acceptable. No testimony was introduced to controvert the staff testimony. (SSE pp. 72-75)

Issue No. 2. Whether the applicants are technically qualified to design and construct the proposed facility.

29. Of the two Applicants, Toledo Edison has the responsibility for the engineering, design, construction, and operation of the facility. Toledo Edison, in addition to being qualified and experienced in the design, construction, and operation of fossil fueled generating stations, has participated in the Enrico Fermi Fast Breeder Project and has key personnel who have had experience in all phases of that project. Toledo Edison has 90 engineers on its staff, including employees with degrees in the nuclear discipline, and has employees with nuclear operations experience. In addition, a training program has been established which will ensure that a competent staff will be available for operation of the facility. The nuclear steam supply system is to be designed and supplied by the Babcock & Wilcox Company, an experienced nuclear reactor supplier, whose reactors have been incorporated into many plants approved for construction and operation in this country and abroad. Bechtel will perform the architect-engineering services and will act as construction manager. Bechtel is experienced in the nuclear industry and is presently engaged in the design and construction of 23 nuclear power units. (Applicants' Summary, pp. 33-35; SSE pp. 68-72, Tr. pp. 1134-35 No testimony was offered to controvert an affirmative finding on Issue No. 2.

30. Lau contended his limited cross-examination precludes the Board from finding the Applicants are technically qualified to design and construct the proposed facility. This contention was removed from Board consideration through the effect of the ruling of the Appeal Board on 8 March 1971.

Issue No. 3. Whether the applicants are financially qualified to design and construct the proposed facility.

31. The two Applicants will share ownership of the facility as tenants-in-common, Toledo Edison holding a 52.5 percent share and The Cleveland Electric Illuminating Company a 47.5 percent share. Testimony was received and not controverted that the Applicants are in a strong financial position with sound financing, adequate resources, and a high level of earnings, and anticipate financing their share of the construction costs from internal sources, from the sale of debt securities, and from the issuance of capital stock in such manner as to maintain sound and conservative capital structures. (Financial Qualifications of The Toledo Edison Company, November 6, 1970, Tr. p. 478; Financial Qualifications of The Cleveland Electric Illuminating Company, November 27, 1970, Tr. p. 478; SSE pp. 84-5) No testimony was offered to controvert an affirmative finding on Issue No. 3.

Issue No. 4. Whether the issuance of a permit for the construction of the facility will be inimical to the common defense and security or to the health and safety of the public.

32. The application reflects the activities to be conducted at the facility would be within the jurisdiction of the United States. All the directors and principal officers of each Applicant are citizens of the United States. There was uncontroverted testimony the Applicants are not owned, dominated or controlled by an alien, a foreign corporation, or a foreign government. The activities to be conducted do not involve any restricted data, but the Applicants have agreed to safeguard any such data which might become involved in accordance with the requirements of 10 CFR Part 50. Special nuclear material for use as fuel in the proposed facility will be subject to Commission regulations and will be obtained from sources of supply so that there will be no diversion of this material from military purposes. (SSE pp. 83-84, Tr. p. 494; Applicants' Summary, p. 36) Health and safety findings are set forth supra, paragraphs 8-28, and are incorporated herein.

CHALLENGE TO VALIDITY OF AEC RADIATION SAFETY STANDARDS, 10 CFR PART 20

33. Part 20 of AEC regulations establishes standards for protection against radiation hazards arising out of AEC licensed

activities. LIFE contends that the proposed facility "will not necessarily operate without undue risk to the health and safety of the public even if the plant meets the safety criteria of 10 CFR Part 20 ..."

34. LIFE specifically contends that Part 20 is invalid because (1) the Commission permits certain economic considerations to influence the setting of radiation standards without "congressional authority"; (2) Part 20 is "outmoded" (LIFE's Part 20 Brief, p. 5) because the recommendations of Report No. 39 of the National Council on Radiation Protection (NCRP) issued January 15, 1971, (Applicants' Exhibit No. 8) have not been factored into the regulation; and (3) Part 20 establishes exposure limits which are too high because inadequate consideration is given to the effects of reconcentration, the cumulative effects of releases from other nuclear facilities, and the low dose effect of radiation.

35. The Commission has provided Atomic Safety and Licensing Boards with guidance in proceedings where the validity of a Commission regulation is challenged. By Memorandum dated August 8, 1969, reviewing the Initial Decision in the Calvert Cliffs proceeding, the Commission stated its regulations, which are general in their application and which are considered and adopted in public rule making proceedings, are not subject to amendment by Atomic Safety and

Licensing Boards in individual cases. The Commission stated a challenge could be made to the validity of a Commission regulation in a licensing proceeding on limited grounds, if the regulation related to an issue in the proceeding. The Commission defined limited grounds:

> "By limited grounds, we mean, whether the regulation was within the Commission's authority; whether it was promulgated in accordance with applicable procedural requirements; and as respects the Commission's radiological safety standards, whether the standards established are a reasonable exercise of the broad discretion given to the Commission by the Atomic Energy Act for implementation of the statute's radiological safety objectives."

The Commission further stated:

> "...if a board believes there is a substantial question presented on the record as to the validity of a challenged regulation, the board should certify that question to the Commission for guidance prior to rendering an initial decision." (In the Matter of Baltimore Gas and Electric Company (Calvert Cliffs Nuclear Power Plant Units 1 and 2), Docket Nos. 50-317 and 50-318)

LIFE stated its challenge to the validity of Part 20 is authorized by this Memorandum of the Commission. The LIFE challenge is, however, limited to the last of the three limited grounds permitted by the Commission, namely, that Part 20 standards are not a "reasonable exercise of the broad discretion given to the Commission by the

Atomic Energy Act for implementation of the statute's radiological safety objectives."

36. The Atomic Energy Act of 1954, as amended, authorized the Commission, among other things to issue licenses for production and utilization facilities (including nuclear reactors and nuclear fuel reprocessing facilities). The Act contemplated that all licensees would be subject to safety standards to protect health imposed by the Commission. (Secs. 103 and 104, 42 USC 2133, 2134) The Commission was given general authority to

> "prescribe such regulations or orders as it may deem necessary...to govern any activity authorized pursuant to this Act, including standards and restrictions governing the design, location, and operation of facilities used in the conduct of such activity, in order to protect health and minimize danger to life and property." (Sec. 161 i., 42 USC 2201(i))

Pursuant to this broad statutory mandate, the Commission adopted radiation protection standards and these are incorporated in Part 20. As the record in this proceeding shows, the standards are based upon a considerable body of expertise and experience which has been accumulated on the subject from several authoritative sources. (Tr. pp. 1722-1726 and 1773-1805) The standards reflect the recommendations of various expert groups with respect to both control of exposures to

the general public, and control of exposures of employees of licensees (Tr. pp. 1723 and 1773-1805)

The radiation protection standards in Part 20, together with the requirements of 10 CFR Part 50, establish the effective controlling mechanisms relating to releases of radioactivity to the environment. These regulations are designed to provide reasonable assurance that the resultant exposures of members of the public generally, and of the population as a whole, from nuclear activities from all important sources of exposure, are well within recommended radiation protection guides. (Tr. pp. 1726-1746)

37. In its brief, LIFE argues that economic considerations influenced the setting of the radiation standards set forth in Part 20 and this has been done without "congressional authority." There is no basis in fact or in the record of this proceeding to support this allegation with respect to the numerical standards of Part 20. The Board views the "low as practicable" doctrine as an additional safety factor beyond the basic safe numerical standards in which the Commission is entitled to take economic considerations into account. In recent amendments to 10 CFR Parts 20 and 50 (35 Fed Reg 18385, December 3, 1970) a new section 20.1(c) was included which set forth the extent to which economic factors may be considered in maintaining radiation exposures and releases of radioactive

materials in effluents to unrestricted areas, as far below the limits of 10 CFR Part 20 as practicable. The Statement of Considerations published with the amended regulations set forth matters taken into account by the Commission in promulgating the amendments. This statement and the amendments involved make clear the amended regulations were for the purpose of clarifying a course of action which the Commission consistently has followed in promulgating radiation protection standards, namely, following the recommendations and guidance of various expert standards groups.

38. The record does not support LIFE's contention that the AEC did not have congressional authority to issue 10 CFR 20, nor are the arguments in LIFE's brief substantiated that economic considerations rather than safety considerations were paramount.

39. LIFE contends that Part 20 is outmoded as demonstrated by the fact the recommendations of NCRP Report No. 39 have not been factored into the standards. NCRP Report No. 39 recommended retention of the general standards for population dose limits and the whole body dose for individuals in the public. It recommended adjustments in the dose limits to certain organs of individuals in the public, and workers employed in the radiation industry. Although the Report recommended a reduction of the permissible dose to fertile women employed in the radiation industry, to assure the maximum dose

equivalent to the fetus from occupational exposure to the expectant mother dose not exceed 500 millirems, it recommended retention of the genetic population does limit of 170 millirems per year. The preface to the Report states with respect to the suggested changes in the occupational dose limits:

> "...with the exception of fetal exposure...any numerical changes in the dose-limiting recommendations of this report reflect the urge for simplification rather than bio-medical necessity."

The National Academy of Sciences-National Research Council Advisory Committee to the Federal Radiation Council (FRC) recently initiated a review of current radiation standards. (Tr. pp. 1798-1800) Under Reorganization Plan No. 3, effective December 2, 1970, the functions of the FRC were transferred to the new Environmental Protection Agency (EPA). Under this Plan, that part of the Commission's authority to develop and set generally applicable environmental radiation standards for the protection of the general environment also were transferred to EPA. The Commission exercises the responsibility for the implementation and enforcement of the environmental radiation standards developed by EPA through its own licensing and regulatory authority. The limited significance of the recommendations for changes in exposure limits contained in NCRP Report No. 39 cannot

reasonably be construed as "strikingly different" (LIFE's Reply Brief p. 2) or as a persuasive argument to support LIFE's contention that 10 CFR Part 20 is "outmoded".

40. Inasmuch as a challenge to Part 20 must be related to an issue in the proceeding, there must be evidence that the lowered limits proposed to certain body organs in NCRP Report 39 would be pertinent to the effluent limits for the Davis-Besse plant. Since the only isotope from this plant that is an appreciable portion of the Part 20 limits is tritium, only the tritium release rates could be affected by lower limits. Since the maximum permissible concentration for tritium is based on the whole body dose, and since no change in this dose is recommended by NCRP Report 39, it would appear any revision of Part 20 standards to reflect NCRP Report 39 would not affect the Davis-Besse plant.

41. Finally, LIFE argues that Part 20 establishes exposure limits which are too high because inadequate consideration is given to the release of radioactive gases, the effects of reconcentration, the cumulative effects of releases from nuclear facilities, and the low dose effects of radiation. In support of its allegations, LIFE relies essentially on the testimony of Drs. Ernest Sternglass and Arthur Tamplin.

42. The Sternglass testimony concerned the effects of low level radiation on humans. His own investigations chiefly involved epidemeological studies of the correlation of radioactive fallout with still-birth and infant mortality, and low level radiation and increases in leukemia in Utah. Sternglass testified that while it is nearly impossible to show a cause-effect relationship in such statistical studies, his observation led him to conclude that the degree of "association" was so high as to make the inference of cause-effect almost certain.

43. The AEC staff called a number of expert witnesses in rebuttal to Dr. Sternglass. These witnesses presented evidence that (1) the studies of Dr. Sternglass concerning relationships between fallout and deposition and fetal mortality utilized statistical and analytical methods which were deficient in a number of respects (Tr. pp. 1821-1853, 1950-1957, 2014-2017); (2) conclusions of Dr. Sternglass in his studies of the relationship of deposition and infant mortality were unfounded and unsubstantiated (Tr. pp. 1228-1229); (3) studies by Dr. Sternglass of the relationship between emissions from the Dresden Nuclear Power Station and infant mortality were based upon incorrect calculations (Tr. pp. 1854-1871); and (4) the alleged effects of tritium and strontium on humans postulated

by Dr. Sternglass on the basis of certain studies were shown to be unsupportable (Tr. pp. 1673-1675, 1871-1888). In the light of this testimony the Board finds the Sternglass testimony unconvincing.

44. Dr. Arthur Tamplin testified that the ICRP and NCRP extrapolation to the somatic effects of low doses were in error in that they failed to recognize that all types of cancer are increased by radiation to the same extent i.e., not only leukemia but also lung cancer, and stomach cancer, for example, will each be increased by some 2% per rad of radiation. Thus, according to his hypothesis, if everyone in the United States were exposed to the maximum dose allowed by Part 20, there would be at least 32,000 additional cancer deaths each year.

45. Rebuttal by witnesses for the Applicant testified that residents in the neighborhood of the Davis-Besse plant would receive only a small fraction of the allowed dose, less than one millirem and claimed therefore, that Tamplin's testimony was in error in assuming a 170 millirems dose to all residents of the U. S. The board agrees with the figures presented by Applicants' witness, Dr. M. I. Goldman, (Applicant's Exhibit No. 7) but questions whether these figures are pertinent to the issue whether the allowed 170 millirems is too high.

46. Staff rebuttal witnesses presented data in support of the ICRP-NCRP death rate per rad of exposure. These witnesses testified that the ICRP and NCRP are continuing to re-evaluate all of the data on somatic and genetic effects and have found no reason to change their risk estimation. They also testified the ICRP and NCRP are composed of outstanding experts in the field of medicine, biology, and radiation who represent a large number of institutions and professions and there is no reason to attribute a bias favoring high doses; that Part 20 is based on the ICRP-NCRP recommendations; and further, for the AEC to specify standards lower than those recommended by the Federal Radiation Council, as suggested by the intervenors' witnesses, would be difficult to justify. The Board agrees with this position.

47. Dr. Tamplin further testified if the Cesium and Strontium radioisotope concentrations were to be as high as allowed by Table 2 of Part 20, concentration mechanisms could result in doses much greater than 170 millirems to the public. The applicant argues that inasmuch as Cesium and Strontium will not be emitted by the facility this is not an issue in this case. The Board, however, finds the following more persuasive: Table 2 of Part 20 is a secondary standard for enforcement and operating convenience; the

primary standard is 170 millirems to the public. The Board notes the AEC will re' ire the operating specifications to take into account physical and biological concentration mechanisms, and require the limits be lowered to the point where no person will ingest air, water, or food that will result in 500 millirems to any person or 170 millirems of dose to those in the low population zone. Also evidence was introduced which demonstrated that people living in the neighborhood of presently operating reactors receive only a small fraction of the allowable dose, and that concentration in the food chain was a negligible effect.

48. In view of all of the evidence submitted at this hearing, the Board finds LIFE has not presented a substantial challenge to 10 CFR 20 within the framework of the controlling Commission memorandum in the Calvert Cliffs proceeding.

CHALLENGE TO VALIDITY OF AEC REGULATION IMPLEMENTING NATIONAL ENVIRONMENTAL PROTECTION ACT, 10 CFR PART 50, APPENDIX D

49. LIFE contends under the same Calvert Cliffs holding of the Commission, the AEC violated the National Environmental Protection Act (NEPA) because it abused its authority in promulgating

10 CFR Part 50, Appendix D, in that,

(a) making provision for raising nonradiological environmental considerations at public hearings for construction permits and operating licenses for which a notice of hearing is published on or after March 4, 1971, is not a "legitimate exercise of administrative discretion;"

(b) the content of the procedures effective prior to March 4, 1971, is likewise not a "legitimate exercise of administrative discretion".

More specifically LIFE contends,

> "...a construction permit must not be granted... unless and until there has been a full consideration of the plant's environmental consequences." (LIFE NEPA Brief, p. 1)

This assertion regarding the Commission's powers and duties under NEPA is not novel. Briefs provided the Board clearly demonstrat a difference of opinion regarding the legal requirements of NEPA. As the Commission's "Discussion" discloses, the position taken by LIFE in this proceeding was formally and expressly urged upon the Commission a significant period of time prior to December 4, 1970, the date the revised Appendix D was published in the Federal Register (35 Fed. Reg. 18469 et seq.), but not adopted by the Commission in toto.

50. After considering the legal materials and arguments submitted by the Parties concerning this contention, and in view of the prior action of the Commission in the full light of the same argument here proposed by LIFE, the Board finds there is nothing new of such substance here presented to warrant the Board to conclude the same issue should again be referred to the Commission. LIFE has not sustained the heavy burden of showing the Commission abused its discretion in promulgating Appendix D.

51. LIFE also contended that irrespective of the legality of Appendix D, neither the Applicant nor the AEC complied with it. In particular LIFE questions whether the document "Detailed Statement of Environmental Consideration..." complies with Appendix D because it was "...marked solely for identification, not offered as evidence, not offered for the truth or adequacy of the statements contained therein." The document was offered to show compliance with the requirements of Appendix D. (Tr. 497) The Board finds no requirement in the Commission's regulations that the environmental statement of considerations must be made part of the evidentiary record. And as noted above, inasmuch as the Board does not find Appendix D an abuse of Commission discretion, the Board finds the procedure required by Appendix D of April 2, 1970 as revised June 3, 1970, was followed by the Applicants and the Staff.

Accordingly, the Board finds no substantial challenge to 10 CFR Part 50, Appendix D.

52. The Board takes official notice of the facts contained in the records filed with the United States Court of Appeals, District of Columbia Circuit, in the following actions:

> Calvert Cliffs Coordinating Committee, Inc., et al. v. United States Atomic Energy Commission, No. 24839, filed November 25, 1970.
>
> Calvert Cliffs Coordinating Committee, Inc., et al. v. United States Atomic Energy Commission, No. 24871, filed December 7, 1970.

53. The same NEPA issue raised by LIFE in this proceeding is now before the United States Court of Appeals in the above cited cases.

REVIEW OF APPLICATION BY THE REGULATORY STAFF AND THE ACRS

54. Since the filing on August 1, 1969, the application has been under review by the Staff. In the course of the evaluation, during which eleven amendments to the application were submitted by the Applicant with additional and clarifying information, the Staff held numerous meetings with representatives of the Applicants to

explore and scrutinize all the information submitted. (SSE, pp. 2-3) Approximately thirteen Staff engineers participated in the major part of the review during the sixteen-month review period, consuming an estimated 625 man-days of effort. (Tr. pp. 513-16) The Staff made use of studies by independent experts in its evaluation of such aspects as site geology and hydrology (Geological Survey, U. S. Department of Interior), (SSE, App. D, pp. 96-99); air dispersion of gaseous effluents (Air Resources Environmental Laboratory, U. S. Environmental Science Services Administration), (SSE, App. C, pp. 94-9 site seismicity (U. S. Coast and Geodetic Survey), (SSE, App. E, pp. 100-103); ecological effects (Fish and Wildlife Service, U. S. Department of the Interior), (SSE, App. F, pp. 104-118); and seismic design criteria (John A. Blume & Associates, Engineers), (SSE, App. G, pp. 119-126). The results of the Staff's review and evaluation of the application are contained in the Staff Safety Evaluation (cited throughout this Initial Decision as SSE) which was made available to the public and admitted into evidence in this proceeding. The Staff, in finding in the affirmative for Issues Nos. 1-3 in this proceeding and in the negative for Issue No. 4, has concluded that the proposed facility can be constructed and operated at the proposed location without undue risk to the health and safety of the public. (SSE, pp. 85-87)

55. The ACRS also conducted an independent review of the application and, after identifying several items for resolution between Applicants and the Staff during construction, and making several recommendations, concluded that the facility can be constructed with reasonable assurance that it can be operated without undue risk to the health and safety of the public. (Letter from Joseph M. Hendrie, Chairman, ACRS, to the Honorable Glenn T. Seaborg, Chairman, U. S. Atomic Energy Commission, August 20, 1970) The items identified by the ACRS have been considered by the Staff in its evaluation of the application, and have been specifically responded to by the Applicants by submission of Amendment No. 11 to the application. (Applicants' Summary, p. 2; SSE, pp. 82-83)

CONCLUSIONS

56. On the basis of the Board's review of the entire record in this proceeding and of the foregoing findings, the Board concludes that:

1. In accordance with the provisions of 10 CFR §50.35(a):

   (a) The Applicants have described the proposed design of the facility including, but not limited to,

the principal architectural and engineering criteria for the design, and have identified the major features or components incorporated therein for the protection of the health and safety of the public;

(b) Such further technical or design information as may be required to complete the safety analysis and which can reasonably be left for later consideration, will be supplied in the final safety analysis report;

(c) Safety features or components, if any, which require research and development have been described by the Applicants and the Applicants have identified, and there will be conducted, a research and development program reasonably designed to resolve any safety questions associated with such features or components; and

(d) On the basis of the foregoing, there is reasonable assurance that (i) such safety questions will be satisfactorily resolved at or before the latest date stated in the application for completion of construction of the proposed facility, and (ii) taking into consideration

the site criteria contained in 10 CFR Part 100, the proposed facility can be constructed and operated at the proposed location without undue risk to the health and safety of the public.

2. The Applicants are technically qualified to design and construct the proposed facility;
3. The Applicants are financially qualified to design and construct the proposed facility; and
4. The issuance of a permit for the construction of the facility will not be inimical to the common defense and security or to the health and safety of the public.

ORDER

57. Pursuant to the Act and the Commission's regulations, IT IS ORDERED that the Director of Regulation issue a construction permit to The Toledo Edison Company and The Cleveland Electric Illuminating Company substantially in the form of the proposed construction permit introduced as Staff Exhibit 2. IT IS FURTHER ORDERED in accordance with 10 CFR 2.760, 2.762, 2.764, 2.785 and 2.786 of the Commission's "Rules of Practice" that this Initial

Decision shall be effective immediately upon issuance and shall constitute the final decision of the Commission subject to the review thereof pursuant to the above cited rules. Exceptions to this Initial Decision and a supporting brief may be filed by any party within twenty (20) days of service of this Initial Decision, and briefs may be filed by any other party in support of or in opposition to such exceptions within ten (10) days of service of such exceptions.

Dated:
23 March 1971
Washington, D. C.

ATOMIC SAFETY AND LICENSING BOARD

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Walter T. Skallerup, Jr., Chairman

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UNITED STATES OF AMERICA
ATOMIC ENERGY COMMISSION

3-23-71

In the Matter of)
)
TOLEDO EDISON COMPANY, ET AL.) Docket No. 50-346
(Davis-Besse Nuclear Power)
Station Unit 1))

CERTIFICATE OF SERVICE

I hereby certify that copies of the INITIAL DECISION dated March 23, 1971 in the captioned matter have been served on the following by deposit in the United States mail, first class or air mail, this 23rd day of March 1971:

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