DAVIS-BESSE NUCLEAR POWER STATION

Docket No. 50-346

APPLICANTS' RESPONSES

TO

AGENCY COMMENTS ON

DRAFT ENVIRONMENTAL STATEMENT

BY THE

UNITED STATES ATOMIC ENERGY COMMISSION

NOVEMBER 1972

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INDEX

APPLICANTS' RESPONSES TO
DEPARTMENT OF COMMERCE COMMENTS OF JANUARY 4, 1973

Comment

"Section 3.3.2 - Discharge Structure, Page 3-9, last paragraph:
This paragraph indicates that the volume of the collecting basin is small in comparison with flow rates into it. The possibility of enlarging the capacity of this basin to increase hold-up time, in order to reduce the discharge of toxic materials to the lake, should be included in the final environmental impact statement."

Response

The only substance in the discharge effluent that could be considered toxic is chlorine. Additional holdup time, even for an extensive time, would be of benefit principally for exposure to sunlight to reduce the chlorine content. Enlarging the basin to obtain this extremely limited reaction would be of inconsequential value.

There is an average of 18 minutes holdup time in the cooling tower basin and channel to the circulating pumps where the blowdown water originates. The estimated average transit time in the concrete discharge line from the collecting basin to the discharge structure in the lake is 80 minutes.

Comment

"Section 4.4.2 - Intake and Discharge Pipelines, Page 4-5, first paragraph:
The construction of this pipeline during the spring and summer of 1973 for a 4 to 5 month period could cause problems for spawning fish; a discussion of protective measures that will be used should be presented."

Response

The Ohio Federal Aid Project F-41-R studies discussed in Section 6.2.2 of the Draft Environmental Statement have not shown this area to be a spawning grounds; therefore, there should be no direct effect on spawning fish. Construction of intake and discharge pipelines will disrupt the bottom habitat and thus will have some small effect on the supply of fish food organisms during the 1973 season. After construction is complete, recolonization of the area by most benthic forms is expected.

Comment

"Section 5.2.3 - Thermal Discharges, Page 5-3, first paragraph:
Since the maximum heat loading to the lake occurs during April, increased water temperature might affect the spawning activities of Perch and Walleye that also take place at this time. In addition, it should be pointed out that Perch require a period of 6 months or more at temperatures of 39°F or below for successful maturation of gonads and normal reproductive success. The following statement by Dr. Donald Mount, Director of the Duluth National Water Quality Laboratory, sums up recent work in this field:

"The level of reproductive success among perch held at 39°F for about 6 months (70% fertile eggs, 53% normal larvae) was approximately twice as great as for fish held at 43°F for about 6 months (35% fertile eggs, 31% normal larvae) and approximately four times as great as for fish held at 46 and 50°F for about 6 months (16 and 21% fertile eggs, 13 and 7% normal larvae). Exposure to the above temperatures for periods less than 6 months lowered reproductive success at each temperature. The data indicate substantial impairment of Yellow Perch reproduction by an increase in winter temperature of approximately 4°F above 39°F, the lowest temperature tested. It is expected that the reproduction of closely related species such as Sauger and Walleye, may be impaired by similar increases in winter temperature."

The statement should discuss the possibility that these species of fish will become resident in a warm water area, thus suffering reproductive decline. There is a distinct possibility that this will occur, the statement should also discuss what steps will be taken to alleviate the expected adverse impact upon these populations."

Response

The comment that "Perch require a period of six months or more at temperatures of 39°F or below for successful maturation of gonads and normal reproductive success" is not consistent with the level of Perch population found in the Western Basin of Lake Erie and the physical conditions of Lake Erie water. Yellow Perch is an abundant species throughout the Western Basin and vicinity of the station site. A review of the yearly temperature data for this area of Lake Erie as reported in "Physical Characteristics of the Reef Area of Western Lake Erie, Report of Investigations No. 82, Herdendorf and Braidech," and "Lake Erie Ohio Intake Water Quality Summary, 1969, U.S. Department of Interior and Ohio Department of Health" shows that there is only a four-month period when the lake temperature is 39°F or below, with sharply changing temperatures both in the spring and fall.

Dr. Mount's work involved work with fish from a cold-water lake which have a different temperature requirement than the same species living in a warmer regime.

During this four-month period, there is a six-week period when the lake temperature is 34°F or below. The area of the lake within the 5°F isotherm of the discharge is 0.16 acres. It is inconceivable that, even though fish may be attracted to the general area of the discharge plume, sufficient fish could maintain residence in this area to have any significant effect on the total population and species propagation even if there would be in fact a lowering of reproductive capability due to residence or partial residence in the plume area.

The U.S. Bureau of Commercial Fisheries (Wolfert, 1963) found that after spawning, walleye leave the reefs and move north and west into the Detroit River, Lake St. Clair, St. Clair River, and Lake Huron. Thus, one would not expect that walleye would be exposed to the plume during the winter months.

Comment

"Section 5.5.3 - Discharge Effects, Page 5-13:
Recent research on the toxic effects of chlorine on fish and other aquatic life has indicated that levels as low as .003 ppm have reduced reproductive potential of scuds (amphipods), an important food organism present in the area (page 2-37). Since there is a common effluent collecting basin, the potential impact of chlorine in the sewage effluent (page 5-5, Section 5.2.6) should also be considered."

Response

Page 2-37 of the Draft Statement does state that in the general area near the site scuds (amphipods), among other benthos, are present. As also pointed out on page 2-37, they are not abundant in the immediate area of the discharge structure and as such there should be no significant effect on the total population of scuds in the general area even if their reproductive potential in the limited area of the discharge plume would prove to be lowered. The Draft Statement on page 5-14 estimates that within 50 feet of the discharge slot, all toxic chlorine will be converted to non-toxic substances. Actual measurements of the type of chlorine demand of the ambient lake water has shown that approximately one quarter to one third of this demand is "fast acting" instead of half as estimated by the staff. This would increase the distance from the discharge slot to the point where all chlorine is converted to non-toxic substances to approximately 90 feet.

In any case, the area encompassed by this 50 or 90-foot-long plume is entirely within the stone fill area where a benthic community would not be expected to exist.

The potential impact of chlorine in the sewage treatment plant has been considered in Section 3.6 (page 3-32) of the Draft Statement which states that it will have an insignificant environmental impact.

Comment

"Page 5-15, first paragraph:
The statement should discuss the possibility that congregation of fish in the area of the heated discharge plume, even if it is only a few degrees above ambient, could cause reproductive problems (see comment for page 5-3, Section 5.2.3)."

Response

If fish were attracted to and resident in the plume for long periods, there could be a possibility of reproductive effects. However, three additional factors must be considered: (1) availability of food would be a limitation and would probably result in much movement into and out of the plume; (2) considering the small area of the plume, the proportion of any species which might stay there and suffer possible reproductive effects could not be very great and therefore the effect on the species as a whole should not be significant; (3) F-41-R laboratory studies have shown that most fish species tested prefer temperatures from 7° to 12°C above ambient and prefer a range of temperatures rather than a specific temperature. At 7° to 12°C above ambient, the velocity of the discharge would be such that fish could not

maintain their position in it. At temperatures where velocity is not so great, the possibility exists that there would be no attraction to fish.

Comment

"Section 6.2.3 - Radiological Monitoring Program, Pages 6-5 through 6-7:
Analyses of aquatic plants were omitted from the radiological monitoring program (Table 6.2)."

Response

The basic purpose of the radiological monitoring program is to determine the radioactivity in components of the environment that can have a direct pathway to man or can indicate a substantial amplification or concentration of radioactivity. Since aquatic plants are not in either category, sampling or analyses of them is not being done.

Comment

"Section 8.2.2 - Aquatic Effects, Page 8-8:
As indicated in the comments on Page 5-13, Section 5.5.3, chlorine in small sublethal amounts may have a pronounced adverse effect on the aquatic system; this effect should also be considered in this section."

Response

As reviewed in the Draft Statement, the quantity of chlorine discharged will be small. The rapid mixing of the discharge water together with chlorine reaction with receiving water constituents produces a very small and limited area of the lake where any detectable chlorine will be present. If, in fact, small sublethal amounts of chlorine could have a pronounced effect on the aquatic system, there will not be a sufficient area of the lake containing a chlorine content from station effluent to have a pronounced effect on the aquatic system in the general area of the discharge.

Comment

"Section 10.3 - Discharge System Alternatives, Page 10-4:
The possibility of using the high velocity discharge in winter (when fry are at a minimum) to minimize the sinking plume effect and winter residence by fish (with the possibility of cold kill during shutdown and the possibility of reduced reproductive rates) should be considered. On the other hand, during other times of the year when the receiving water is warmer than 4°C (39°F) and the plume would not sink and contact the bottom of the lake, a low velocity surface release could be used, thus reducing entrainment into the plume of fry and plankters and permitting more rapid loss of the waste heat to the atmosphere than would be obtained with a submerged jet-type discharge."

Response

In designing the individual components and sub-systems which make up the total station design, a very large amount of effort was expended to the

overall requirements of meeting many objectives, requirements, and criteria. This has required a number of compromises in design to obtain a best balance in overall design to provide a facility that has minimum impact on the total environment and meet all regulatory requirements.

Applicants have considered use of a low velocity surface discharge as one means of discharge for effluents, but have retained the submerged, high velocity discharge as the best arrangement to meet all factors in this particular area.

A dual arrangement would require a structure that would present an obstacle to boating and be difficult to maintain due to the ice conditions that are experienced in this area.

The high velocity discharge arrangement results in minimum lake area that will see temperatures above ambient. The U.S. Environmental Agency comments on the Draft Statement states, "For a very small area, it should be noted that the 20°F discharge temperature differential may cause a receiving water temperature in excess of the National Technical Advisory Committee's recommendations." A low velocity surface release, while permitting more rapid loss of heat to the atmosphere, would result in a much larger surface area of the lake experiencing a temperature above ambient.

Comment

"Section 10.5 - Biocide System, Page 10-4:
The use of mechanical cleaners for the condenser should be explored."

Response

While mechanical cleaning systems are available for condensers, the condenser is only one of many components in the system which must be considered. In a once-through condenser cooling system, utilizing the open lake, auxiliary systems can be separated and treated independent of the condenser with the condenser cleaning done by means of a mechanical system.

In a closed system, utilizing a cooling tower, the cooling tower must be considered and there is no mehcanical cleaning system available for a cooling tower.

APPLICANTS' RESPONSE TO
DEPARTMENT OF TRANSPORTATION COMMENT OF JANUARY 9, 1973

Comment

"While not stated in the draft environmental impact statement, there appears a strong possibility for electrical interference effects with railroad signal and communication circuits. The transmission of EHV power can cause extraneous voltages by metallic cross or ground potential and electric or magnetic induction. Aside from the obvious personal safety hazard, it should be noted that these currents can destroy the integrity of railroad signal and communication systems and therefore create the potential for serious accident. We suggest that this problem be addressed in the final environmental impact statement."

Response

Electro-Magnetic and Electro-Static Induction

The subject of electro-static and electro-magnetic induced voltages resulting from EHV transmission lines is complex. Two (2) distinct physical phenomenon are involved and are defined as follows:

(1) Electro-magentic coupling is due to a magnetic field set up by currents in the power conductors which links the communication conductor and induces a voltage along them. The magnitude of voltages induced is dependent upon the length and proximity or parallel separations between circuits, the configuration of circuits, the earth resistivity, shieldings, and, lastly, magnitude and frequency of power current.

(2) Electro-static coupling is due to an electric field created by the voltage of the power line. The fundamental equivalent circuit is composed of a capacitance between the power lines and ground, a capacitance between the power line and communication cable, and a capacitance from the communication line to the ground. The magnitude of the voltage induced due to electro-static coupling is dependent upon the relative magnitude of the capacitance of power line to communication cable and communication cable to ground. In other words, the magnitude of the induced voltage depends upon the configuration of the circuits and magnitude of the power line voltage.

Electro-Magnetic Induction

The electro-magnetic induced voltages have always been the major source of inductive interference in control circuits. From the basic definition above, two (2) prime variables are obvious: These are, (1) the length and proximity of parallel circuits, and (2) the magnitude of current. Assuming the same physical configuration and a constant current, the voltage induced in a parallel communications conductor will be directly proportional to the parallel length. If the power line crosses the communications circuit essentially at right angles, theoretically, there will be no electro-magnetic induced voltages. This is the generally accepted reasoning of control and communications engineers.

However, there still exists the possibility that where returned currents, such as might occur during fault conditions, could use the railroad tracks for part of the return circuit. This could result in high voltages in the control circuits regardless of physical configuration or proximity of the transmission line. Because the resistivity of the earth circuit and the exact path of the returned current can seldom be calculated or accurately predicted, some risk, however small, is obviously imposed by the pressence of a transmission line. Fault currents, however, on EHV lines are normally cleared by circuit breakers in about 4 to 6 cycles (1/10 second).

During the 1971 annual meeting of the Association of American Railroads (Communications and Signal Section), a panel discussion was held on inductive interference. It was stated in this meeting that single right angle crossings at any voltage were acceptable, but that multiple crossings within a short distance (1.5 miles) would not be approved.

If the transmission line is a double circuit line, the phasing on one circuit should be ABC and on the second circuit, CBA, top to bottom. With this phasing arrangement, the electro-magnetic induced voltages due to the two (2) circuits will be less than from a single circuit.

The 1972 Advanced Reports of the same AAR group states in their report on available standards related to inductive interference; "power line crossings as such, where the construction conforms to the National Electric Safety Code requirements, do not normally constitute a problem to railroad signal and communications facilities." The 345 KV Davis-Besse lines will be constructed in accordance with the NESC 6th Edition and should not constitute a problem. Permits have been requested from all railroads crossed and approximately 50% of the crossings have been approved thus far.

Electro-Static Induction

Electro-static induction is the second phenomenon associated with communications and signal circuit interference.

According to the 1972 Advanced Report from the Association of American Railroads (Special Committee on Inductive Interference), "it is easily explained and not difficult to correct. The voltage resulting from electro-static coupling is due to the capacitance relationship between the power line and ground and between the communication and/or signal facilities and ground. The voltages are alternating, but do not present a problem insofar as control circuits are concerned if properly shielded and grounded." Complete treatment of this subject is contained in Paper 71-TP-644-PWR recommended and approved by the Transmission and Distribution Committee of the IEEE Power Engineering Society.

Where any such problems are encountered, necessary changes are made.

APPLICANTS' RESPONSES TO
DEPARTMENT OF AGRICULTURE COMMENTS OF JANUARY 11, 1973

ECONOMIC RESEARCH SERVICE

Comment

"The Applicant basically justifies the station on existing and projected growth rates of electricity consumption. Inasmuch as the production of electricity consumes natural resources and results in environmental change, we feel that the statement should include a discussion of measures that the Applicant and the regional power network of which it is a member have under consideration to encourage more efficient utilization of electricity. Some measures which could have a significant impact on demand projections might include special metering to reduce demands for costly peak power, implementation of rate structures designed to promote more efficient consumption, and the revision of any existing utility promotional efforts. Such a discussion would be compatible with NEPA Guidelines for environmental impact statements which require evaluation of alternatives to the proposed action. Recent interpretation of section 102 (2) (c) of NEPA held, in essence, that the range of alternatives required to be considered were those "reasonably available." None were to be ruled out, "merely because they do not offer a complete solution to the problem." NRDC v. Morcon (D.C. Cir. 1972)."

Response

Residential Rate Structures

It is well known that the summer peak loads are associated with the growth of air conditioning usage. Applicants' residential rates are so structured that its revenues from its customers are in line with its cost of service, as provided by law.

Toledo Edison

The Toledo Edison Company has so structured its residential rates so that households that consume in excess of 500 KWH per month pay higher rates in the summer peak load months than during the winter months. For customers with very large KWH usage, the average rate during the summer peak load months becomes even greater than during the winter months. The result of this is that existing and proposed residential rates do charge higher rates for air conditioning and other large usage residential customers.

At the present time, the rate schedules with higher summer rates for large residential users apply to over 60% of Toledo Edison's residential customers. On March 18, 1971, Toledo Edison filed proposed changes in its rates with the Public Utilities Commission of Ohio. These proposed changes have recently been accepted and would bring all medium and large residential customers under rates that are higher during the summer peak load months than during the winter months.

Cleveland Electric Illuminating

On October 7, 1971, Cleveland Electric Illuminating Company filed an application with the Public Utilities Commission of Ohio for a general increase in its electric rates. This application provides for residential rates that are higher in the non-winter months than during the winter period, and are similar to the residential rates of the Toledo Edison Company discussed above. These residential rates, if approved as submitted, will bring all of Cleveland's medium and large residential customers under rates that are higher during the summer peak months than during the winter months.

Commercial and Industrial Rate Structures

Fully 95% of Toledo Edison's sales and 94% of Cleveland's sales to their commercial and industrial customers are metered for the customer's peak demand placed on the Company's system in addition to the metering of the KWH consumed. Thus, these customers pay a charge for their peak demand in addition to the energy charge. Toledo Edison and Cleveland Electric Illuminating have always encouraged these customers to spread their usage more evenly throughout the day, and demand metering, as used by applicants, does impose an economic "penalty" on low-load factor customers, which is consistent with applicants' cost of service.

Sales Promotion by Applicants

Toledo Edison

During recent years, Toledo Edison has significantly reduced all forms of sales promotion and presently does not advertise the sale of any appliance or electricity consuming good that would add to its system peak demand.

Toledo Edison currently has an advertising program related to residential space heating that is intended to promote efficiency in the use of energy in all-electric homes. Residential gas service is not available for new households in the Toledo Edison service area and the advertising of applicant is intended to promote the efficient use of electric power in those homes under construction that will use electric energy as a heating source.

Toledo Edison does promote the use of residential security lighting, which is a minor source of sales, but of potentially great benefit to its customers because of increased security.

Neither of the two advertising programs referred to above can alter the projections of Toledo Edison's peak demand in any way. Both activities promote efficient, off-peak usage that cannot be translated to current or future power plant requirements.

Toledo Edison has made available to its customers a booklet entitled, "50 Ways to Save on Your Electric Bill." The purpose of this booklet is to reduce the wasteful use of electric power by consumers, and the booklet is being actively promoted within the company's service area by mass-media advertising.

Cleveland Electric Illuminating

Cleveland Electric Illuminating's promotional program is directed primarily to the promotion of the efficient use of electricity consuming appliances among its customers.

Cleveland continues to actively promote the use of electric heat. As is the case for Toledo Edison, additional electric heating customers do not add to the annual peak demands for Cleveland. Natural gas is not available for new residential customers in portions of Cleveland's service area.

Cleveland also actively promotes the use of security lighting. Cleveland has significantly reduced the promotion of electric ranges and dryers, and has eliminated all promotion of air conditioning and dish washers.

Cleveland has also made available to its customers the booklet entitled, "50 Ways to Save on Your Electric Bill," and has actively promoted its distribution within its service area.

APPLICANTS' RESPONSE TO
UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

Comment

"This project is in place. The main impact on forest land is the result of the construction of 101 miles (1800 acres) of transmission lines. Of this total, the draft states that the 44-mile extension of the "Beaver" line being constructed by Ohio Edison is "under a separate project." So this draft covers 4.7 miles of right-of-way through wooded areas, or 86 acres of forest cleared. The power plant site itself required the "removal of very few trees."

Both the Toledo Edison Company's Supplement to Environmental Report, Volume 1, and the draft state that consideration was given to "disturbance of forest areas," among other factors including cost, in selecting the location for the rights-of-way.

Toledo Edison's Volume 1 states that Geological Survey Circular 645, "A Procedure for Evaluating Environmental Impact," was used to analyze the impact of installing the transmission lines. The impact on forestry is described in these words: "Forest areas in the Toledo area are relatively small and mainly are used as a local supply of lumber and wood products. Any cleared land will in most instances be used for farm production. Some areas will be left as sanctuaries for birds and animals."

This impact description does not recognize other forest values which must be realized in this area for hunting, other forms of recreation, aesthetics, and other amenities. No part of the evaluation of impact is carried over into the draft statement."

Response

Applicants recognize that there are many forest values which contribute to the total environment. The use of the term forest as applied to wooded areas in Ottawa County is, however, somewhat a misnomer. Forest areas are generally considered to cover relatively large areas and this is not the case in this instance.

The "Ottawa County Comprehensive Planning Program, Volume 2, Regional Development Plan, 1971" reports that in 1940, 9,990 acres were classified as "Forest and Woodland" and that in 1960, there were 7,210 acres in this classification from a total of 172,160 acres in Ottawa County. This "Forest and Woodland" area is scattered extensively throughout the county in small wood lot areas so that forest values associated with large areas are not fully applicable in this area.

Applicants, however, certainly realize the need to consider the values of wooded areas, no matter how small. These wooded areas in Ottawa County contribute a great deal to the aesthetics since they break up and blend with the otherwise flat agricultural features. They also, to a large extent, help to blend transmission lines into the natural scenery.

The recreational value of these wooded areas is not great in Ottawa County due to their limited size and almost total location on private land. As a result, the transmission line clearing through wooded areas has had little or no impact on recreational values.

In many cases, where transmission line clearing through wooded areas has been required, the value of the wooded area for wildlife and hunting has been enhanced by providing a shrub and plant ground cover area not available in a densely wooded area. This can be particularly valuable in a predominately agricultural area such as Ottawa County where modern agriculture practices do not provide such cover."

APPLICANTS' RESPONSES TO
SOIL CONSERVATION SERVICE

Comment

"There should be a statement concerning what methods and procedures are being used to prevent erosion and sediment damage during construction of the nuclear plant."

Response

The site area has very flat topography which inherently makes disturbed areas less prone to erosion. During site preparation and fill of the station area, the fill was placed in uniform layers and compacted which did not leave large piles to provide a rapid runoff means during rainfall periods and kept erosion to a minimum. The drainage from the areas of the borrow pits was into the borrow pits which prevented any sediment from these operations from being carried into adjacent areas. Embankment areas where possible were seeded to prevent embankment erosion. The yard drain system was placed shortly after the station area fill was completed which permitted drainage of the area from a number of points so that there was no rapid runoff from the area to cause heavy erosion.

Comment

"It is stated in Chapter 2 on page 23 that the applicant has constructed a 7½-mile railroad extension to the Norfolk and Western main line. A statement specifying what erosion and sediment control measures were implemented should be included."

Response

The 7.5-mile-long railroad built by Applicants to serve the Davis-Besse Nuclear Power Station was the result of a coordinated engineering program that involved both contribution and ultimate design approval by the following parties:

1) Soil Conservation Office at Oak Harbor, Ohio, representing the U.S. Department of Agriculture.
2) State of Ohio, Highway of Natural Resources.
3) State of Ohio, Department of Highways.
4) Ottawa County Engineer.
5) Ottawa County Commissioners.
6) Benton Township Trustees.
7) Carroll Township Trustees.
8) Norfolk & Western Railroad Company Engineers.
9) Applicants' Engineers and Consultants.

In addition to basic railroad design requirements, the most difficult challenge was to assure proper drainage in protecting the railroad bed, as well as all the adjoining farm properties traversed by the railroad. Applicants'

premise was to provide drainage at least equivalent to, or better than, that in existence before railroad construction. In most instances, the adjacent areas have actually experienced superior provisions for controlling watter runoff and attendant erosion and silting.

The Oak Harbor Soil Conservation Office continually provided most valuable assistance with their knowledge of existing and future plans regarding individual farms as well as the overall Conservation District. Applicants' settlement agreements with individual property owners, affected by the railroad, included statements that overall drainage arrangements would be in compliance with long-ranging Soil Conservation designs.

Drainage provided with the Davis-Besse railroad construction incorporated the existing farm field tile systems either into new proper sloped ditches or gathered into new tile collection headers paralleling the railroad. Where Soil Conservation plans for future drain systems indicated the need for available tile crossings under the railroad right of way, these were installed and capped. Newly established earthwork formations and ditch banks were seeded promptly for vegetative erosion control.

In summary, the Davis-Besse railroad has proven, since its construction, that it was adequately provided with excellent drainage conditions, as exemplified in over a year of its existence. Applicants contributed both added material and labor beyond the normal scope of railroad construction to relieve old long-standing drainage problems along both state and county roads.

Comment

"There should be a statement in regard to what effect the proposed site will have on natural drainage patterns of other properties in the area."

Response

The rough grading and construction on the site that has had any effect on drainage patterns is complete. The drainage pattern changes on the site are minor and do not affect off-site areas. Construction of the dike through the marsh area on the north site property line would have blocked drainage from along State Route 2 in the northern area of the site which also receives some drainage from adjacent properties, but a lift station was installed to maintain the previously existing drainage pattern.

Comment

"The loss of 150 acres of agricultural land to the proposed project site will have an impact on the area. The degree and magnitude of this impact should be so stated."

Response

The "Ottawa County Comprehensive Planning Program, Volume 2, Regional Development Plan, 1971," lists the area of the site in the lowest category for suitability of land for agriculture. This same publication shows that there has

been a long-term trend in reduction of agricultural land in Ottawa County with a decrease of 10,540 acres from 1940 to 1960 and 7,768 acres between 1960 to 1970.

The loss of 150 acres of agricultural land from an area that has the lowest classification of suitability for this purpose is not considered to have any impact on the agricultural aspect of the area. This is particularly true when considered with the much larger losses due to other factors not associated with the Davis-Besse project.

APPLICANTS' RESPONSES TO
OHIO EPA COMMENTS OF JANUARY 16, 1973

Comment

"Several agencies expressed concern for a potential environmental impact which did not appear to be discussed. While we realize that safety measures and monitoring programs will be initiated to deal with accident occurrences, particular instances are of concern. A potential hazard is posed by nuclear accidents and the effect of prevailing winds on dispersed particles, gases, and etc., in the Lake Erie Islands area (the Bass Islands, Kelley's Island, Catawba Point). During the boating months, the Islands are crowded with people and the lake congested with boats. Down wind draft time from the plant to the area considered would be one to three hours. This time is significant because no adequate warning system exists, and there is a question whether an evacuation procedure exists or could be developed to deal with such an occurrence. From the material presented, it appears that 40% of the prevailing winds could carry suspended or gaseous material to the island area in the mentioned time period. We would, therefore, encourage study of these potential problems."

Response

The results of the various accidents considered in the Draft Environmental Statement are presented in Section 7. As shown in Table 7.2, none of these result in a site-boundary dosage of more than a fraction of the limits of 10 CFR Part 20 which are the Commission's Radiation Standards for unrestricted areas.

The analysis of the design basis, [illegible] hypothetical accident analyzed in the Preliminary Safety Analysis Re[illegible] (PSAR) and which will be contained in the Final Safety Analysis Report ([illegible]R) for the Commission's safety reviews, shows that the maximum distance from the station structures that would have to be considered for evacuation is two miles. This limited distance would not encompass any significant portion of the lake area and none of the offshore islands which are no closer than ten miles from the station.

Comment

"This draft gives a brief description of the on-site sewage treatment plant and the anticipated Biological Oxygen Demand leading to the lake. Additional information relative to the treated sewage effluent (e.g. concentration of suspended solids, phosphates, and nitrates) should have been provided. Section 5.5.3 states that dissolved oxygen concentrations will be near lake levels. A more precise figure should have been given (i.e. a range or an average value) if possible."

Response

The sewage treatment plant utilizes an extended aeration process. The anticipated suspended solid content in the effluent is expected to be 17 ppm or less, phosphates are expected to be in the range of 2-4 ppm and nitrates less than 10 ppm.

In regards to the dissolved oxygen content of the discharge water, a more precise figure cannot be given. The cooling tower blowdown will be saturated with dissolved oxygen with the value in mg/l being dependent upon the temperature of the cooling tower outlet water which has a direct relationship with the ambient air wet bulb temperature which varies with the prevailing atmospheric conditions.

Lake Erie water contains dissolved oxygen at a level which varies widely, both in actual content as measured in mg/l and in percentage of saturation as shown in the "Lake Erie Ohio Intake Water Quality Summary" for various years. Since this is the case, a comparison at any given time could show significant differences between the dissolved oxygen content of the blowdown and lake water, both above and bel

The minimum dissolved oxygen content of blowdown is estimated to be 7 mg/l for the extreme occurrence of approximately one day in 15 years of a wet bulb temperature of 81°F and the maximum dissolved oxygen content is estimated to be 12 mg/l corresponding to a minimum tower discharge water temperature of 45°F. The corresponding minimum and maximum dissolved oxygen content of Lake Erie as measured at the City of Toledo water intake in 1969 is 3.8 mg/l at 72°F (43% of saturation) and 15.2 mg/l at 35°F (107% of saturation) with an annual average of about 8.2 mg/l.

Comment

"An estimate was provided of the breakdown of the total dissolved solids contained in the cooling tower vapor. Some discussion of potential effects of the added salts on the terrestrial environment surrounding the plant site (e.g. soils, vegetation, animals) would seem appropriate."

Response

The Battelle Report prepared for the Ohio Department of Natural Resources discusses this potential effect and concludes that it would be insignificant and that no biological effects would be expected.

Comment

"The Toledo Edison Company and The Cleveland Electric Illuminating Company propose placing riprap over one acre of the lake's bottom near the discharge outfall. This measure is felt to be necessary to reduce turbidity in the lake waters caused by the plant's high velocity discharge striking the lake's sediment. Some explanation should have been provided for the need for one acre of riprap. Could the same results have been accomplished by using less riprap? In addition, there is no indication how the riprap will be placed in relation to the discharge outfall (i.e. in a circular, eliptical or lengthwise pattern)."

Response

The usage of the term "one acre" was simply the expression of the area contained within the approximate dimensions of the riprap or stonefill area. The general configuration of this area is shown on Figure 3.6 of the Draft Statement. The exact configuration planned is a trapezoidal area with a width dimension of 27' at the discharge structure which widens to a dimension

of 107' at a distance of 200' from the discharge point and is about one-half acre in area. This configuration was designed, based on Dr. Pritchard's analysis of the discharge plume configuration, to have a rock fill area under the plume where the velocity could be 0.5'/sec. or greater. This velocity is below that at which erosion takes place ("Physical Characteristics of the Reef Area of Western Lake Erie," Herdendorf and Braidech, 1972).

Comment

"We recommend that the applicant attempt to reduce the plant's total residual chlorine discharge concentration to 0.1 ppm maximum and a maximum pounds-per-day figure (to be determined and forwarded at a later date by Ohio EPA). This level is consistent with the U.S. Environmental Protection Agency standards for other power facilities. One method of realization of this level may be reduction of free chlorine concentration applied at four different points in the water system of the plant."

Response

Applicants do not agree with the need for a limit of 0.1 ppm of residual chlorine in the discharge water (Reference: Applicants' comments on Draft Environmental Statement, dated January 31, 1973), but do concur that it is desirable to keep releases of chlorine to a minimum and are studying alternate modes of operation to reduce the levels set forth in the Draft Statement.

Comment

"We recommend that extensive biological monitoring be extended to two years after start-up instead of one year as suggested. In addition, we would like to see a monitoring program continue for the lifetime of the plant, with frequency and parameters adjusted according to those parameters that seem to depict the effects the plant is having on the biological environment."

Response

We believe the intent of the Commission's discussions and recommendations in the Draft Statement was to have the biological monitoring program extend for a period of at least two years following start of station operation and it is the intent of Applicants to develop and carry out a pre-operation and operational monitoring program as stated in Applicants' comments on Draft Environmental Statement.

As stated in these comments, we are convinced that operation of the station will have minimum effects on the environment and these effects will be negligible and undetectable in comparison with the effects caused by actions other than the station's existence and operation, both naturally occurring and resulting from man.

Applicants, however, concur with the conditions set forth concerning monitoring programs and are formulating plans for a pre-operational environmental monitoring program which can serve as an adequate baseline. In regards to lake biota, it is anticipated that this will take the form of supplementing and augmenting the F-41-R Project discussed in Section 6.2.2 of the Draft Environmental Statement.

Preliminary review of requirements for a terrestrial monitoring program which will be implemented is being undertaken based on the work required to obtain the site flora and fauna inventory during 1972 and which is continuing on a seasonal basis. It should be noted that naturally occurring events such as the November 14, 1972, storm which inundated most of the marsh and low-lying areas along western Lake Erie could cause changes of such a nature as to make a pre-operational monitoring program meaningless as a baseline against which any effects of station operation could be measured. In regards to the marsh areas, major changes which are not necessarily adverse can result from water level control by the Bureau of Sport Fisheries and Wildlife for site areas and by private owners in adjacent marshes.

We feel that these programs carried out through a two-year period following initial station operation will establish the complete lack of adverse effect on the biota and show the absence of need for a continuing extensive program.

Comment

"A report on the effectiveness of the intake bubble screen under various operating conditions is requested."

Response

It will be difficult to evaluate the effect of the bubble screen at the intake structure by itself, but Applicants will be pleased to provide any results and to work closely with Ohio EPA on an evaluation of its effectiveness.

Comment

"If not already planned, provision of a visitor center would be advisable as this is Ohio's first major nuclear power generation facility."

Response

Applicants have seriously studied the need for, and advisability of a visitors' information center located at the station site and have concluded that construction and operation of a visitors' center is not warranted, both from a viewpoint of corporate expense and as an effective means of public education and information.

Even though the Davis-Besse Station will be the first large-scale nuclear power installation in Ohio, nuclear power stations are under construction or planned in other areas of the state and others will undoubtedly be added in future years. In the earlier days of nuclear power development, there was a decided lack of good educational material on nuclear power or means to inform the general public. Information centers, such as the one established at the Enrico Fermi nuclear facility at Monroe, Michigan, 25 miles north of Toledo, in 1956, filled a critical need for the interests and desires of the general public and schools to gain this information. Hundreds of visiting arrangements were made through Toledo Edison for Toledo area groups to visit this center (which was partially manned by Toledo Edison personnel) in past years, but there has been a decreasing interest in recent years. Part of this decrease in interest in the Enrico Fermi project from this area, no doubt, is due to

the fact that the Davis-Besse facility is more closely related to this area, but we feel that there has been a general decline in interest of such a center because nuclear power is no longer a new subject and there is now a great deal of readily available information on the subject, both pro and con.

Toledo Edison's public relations' efforts has always included an open invitation for groups to request speakers at various meetings and functions and hundreds of such arrangements have been made. These efforts also include the development and distribution of information pamphlets to the general public and all interested groups and schools. Limited facilities are available for site visits by groups and a number have been conducted through prior arrangements and this will continue to be done.

The site is located in the general area containing extensive recreational facilities such as the State of Ohio Crane Creek State Park and Magee Marsh Wildlife Area as well as the extensive Ottawa National Wildlife Refuge which includes the Navarre Unit comprising over 500 acres of the station site. Establishment of a visitors' information center could tend to draw visitors away from the Ottawa Refuge headquarters and the Sportsmen Migratory Bird Center located at Magee Marsh which are ideally suited and equipped to inform the public about the wildlife aspects of the area.

Final landscaping plans for the station have not been developed, but it is intended that an area of the site will be available for visitors to stop, obtain a view of the station facilities, and observe some basic information concerning the station.

Comment

"We would like to see statements provided on the following items:

c. Ozone releases which are typical of all high voltage transmission lines."

Response

Applicants take exception to the statement that ozone releases are typical of all high voltage transmission lines.

An extensive field measurement program was conducted by the American Electric Power Company and the Columbus Laboratories of the Battelle Memorial Institute concerning the generation of ozone by transmission lines. This program was for the purpose of determining if any gaseous effluents due to the operation of 765 KV transmission lines were detectable. The Battelle Report of December 3, 1971, concludes that "within the accuracy and precision limits of present day measuring equipment, there is essentially no evidence of increased ozone or nitrogen oxide concentration in the vicinity of the 765 KV transmission lines. The instruments used in this investigation were such that the existence of an incremental concentration of two parts per billion would have been detected. Measurements were made both at ground level and in the air close to the conductors." We can, therefore, expect that much less ozone or nitrogen oxide, if any, would be produced by a 345 KV transmission line and none would be detectable.

Details of the field measurement program were presented to the Power Engineering Society of the Institute of Electrical and Electronic Engineers on July 10, 1972, in San Francisco and are on record in IEEE Transaction Paper No. T72-551-0.

Comment

"The Ohio Environmental Protection Agency is anxious to review the environmental monitoring program which must be submitted for regulatory approval within 90 days of issuance of the Final Environmental Impact Statement."

Response

Applicants will be pleased to review with Ohio EPA and any other interested State agencies the environmental monitoring programs.

Comment

"According to records of the Ohio Department of Economic and Community Development, Figure 2.8 on page 2-14 is in error to the extent that the community of Rocky Ridge does have local zoning."

Response

"Ottawa County Planning Implementation: Zoning Study, 1972," reports that Rocky Ridge adopted zoning in July of 1966 and that zoning was repealed in November 1969.

APPLICANTS' RESPONSES TO
U. S. ENVIRONMENTAL PROTECTION AGENCY COMMENTS, JANUARY 25, 1973

Comment (1)

"Introduction and Conclusions (Page 2)
The final statement should consider alternative treatment systems to provide further reductions of chlorine and total dissolved solids in the effluent being discharged to Lake Erie."

Response

For the response concerning chlorine, see response to EPA Comment (12), Chemical Effects. For response concerning dissolved solids, see response to EPA Comment (13), Chemical Effects.

Comment (2)

"RADIOLOGICAL ASPECTS
Radioactive Waste Management (Page 3)
The radioactive waste treatment systems provided for the Davis-Besse plant appear to be designed to minimize the discharge of radioactive waste and thus, the effluent levels are expected to be consistent with the concept of "as low as practicable." While the plant appears to have adequate waste management systems, neither the Preliminary Safety Analysis Report, the environmental report, nor the draft environmental statement addressed the handling of the liquid waste resulting from the sluicing of the secondary coolant system condensate polishing demineralizers. A very brief discussion of a four cell settling basin is given in the applicant's environmental report but no decontamination factors are presented. During periods of primary-to-secondary coolant leakage combined with significant fuel failures, the secondary coolant will become contaminated with radioactivity. A large fraction of this radioactive material will be collected by the demineralizers and therefore some will be expected in the backwash of these units. Since there is little information regarding the disposition of the demineralizer sluice water, or the frequency, volumes, and concentrations of radioactivity involved, it is not possible to estimate the environmental consequences of the possible discharges from this source. The final statement should contain an analysis of the discharge pathway including (1) a description of the waste management techniques to be used to control the environmental impact, (2) the annual discharge volumes and quantities of radionuclides, and (3) an estimate of the dose resulting from the discharged radioactivity."

Response

The station design does provide means to handle, process, and dispose of both sluice water and resins from the condensate polishing demineralizers in the unlikely event of a primary to secondary system coolant leak combined with significant fuel failures.

For all periods of normal operation, the secondary system is non-radioactive and the backwash water from the condensate demineralizer containing spent resin is sluiced initially to receiving tanks and then is pumped to the settling basin where the resins settle out and the condensate sluice water is pumped to the collecting basin for discharge to the lake.

In the unlikely event that there is significant radioactivity in the secondary system resulting from a primary to secondary coolant system leak, the condensate and resin sluice from the condensate polishing demineralizers is routed to holdup tanks. The decanted condensate in these tanks can then be processed by the Miscellaneous Liquid Radwaste System if required. The spent resin slurry can then be processed by the solid waste disposal system where the resin is drummed and solidified for off-site disposal.

Comment (3)

"RADIOLOGICAL ASPECTS
Dose Assessment (Page 4)
In evaluating the effluent release source terms, the AEC assumed a partition factor of 100 for iodine in the steam generators. Since the steam generators are of the "once-through" design, in which approximately one-half the steam generator tube surface area is covered by secondary coolant, it is not justifiable to assume a partition factor greater than 1.0. In all previous environmental statements for similar reactors, the AEC assumed an iodine partition factor of 1.0 in the steam generator. The final statement should either provide the bases for the partition factor used or reevaluate the potential iodine releases and thyroid doses."

Response

Applicants agree a partition factor of 1.0 should be assumed in this situation and did use an iodine partition factor of 1.0 in determing the effluent release source term presented in the Supplement to the Environmental Report. It is Applicants understanding that the Commission also used an iodine partition factor of 1.0 and that Table 3.2 is in error in this request.

Comment (4)

"NON-RADIOLOGICAL ASPECTS
Thermal Effects (Page 7)
The heated water discharged into Lake Erie is predominantly from the cooling tower blowdown, which is discharged at a rate of 20 to 27 cfs. The discharge temperature is maintained at a level which is no greater than 20°F above lake ambient by mixture with dilution water pumped from Lake Erie. Since dilution pumping to reduce the blowdown temperature to a 20°F temperature differential prior to discharge may cause increased mechanical damage to aquatic organisms, we suggest that alternatives to dilution pumping be presented in the final statement. Because lake water is involved in both dilution pumping and lake mixing, consideration might be given to dilution to a lower temperature to take place in the lake and thereby avert mechanical damage to organisms. The final statement should compare the environmental effects and benefits of dilution with the effects and benefits of keeping the discharge at a 20°F temperature differential."

Response

Applicants have committed to use dilution water to limit the discharge to a value of 20°F above ambient lake conditions when the temperature of the cooling tower outlet water and blowdown is above this value. This commitment, in part, resulted from suggestions from the Ohio Department of Health and the Federal Water Quality Administration during 1971. Applicants also note the Proposed Lake Erie Water Quality Criteria containing proposed temperature standards for Lake Erie referenced in the U. S. EPA Comment below (5) would limit discharges to not more than 15°F above ambient levels which would require more dilution than with the 20°F limit that Applicants have imposed upon themselves.

Direct discharge without dilution would eliminate any potential mechanical damage to organisms that would be present in the dilution water but would subject organisms in the receiving waters (including any fish drawn into the initial plume) to a higher temperature zone for a short time period. It is difficult to quantify possible damage to organisms in either case. Patrick (1969) and Spigarelli (1971) state that mechanical damage to algae and plankton does not appear to be significant at temperatures less than 34°C and thus very little mechanical damage to these organisms would be expected during periods of dilution pumping.

The F-41-R studies have indicated that a 20°F temperature change is about the maximum that some species can withstand. A discharge temperature higher than 20°F above ambient could subject some fish to this temperature change for a very limited time period if drawn into the initial area of the plume at the discharge structure with some possible damage.

In either situation, very little adverse environmental damage would be anticipated. Maintaining the discharge at a limit of 20°F above the ambient lake temperature, would eliminate any concern over sudden shutdown condition during cold water periods.

Comment (5)

"NON-RADIOLOGICAL ASPECTS
Thermal Effects (Page 7)
The heated discharge will generate a thermal plume in the lake. The area of the 3°F surface temperature isotherm is estimated by the AEC staff to be 0.6 acres, and by the applicant to be three times less than this, though both he AEC and the applicant have used Pritchard's model to estimate the extent of the thermal enriched area. We believe this discrepancy should be resolved. For a very small area, it should be noted that the 20°F discharge temperature differential may cause a receiving water temperature in excess of the National Technical Advisory Committee's recommendations. Temperature standards for Lake Erie are presently under consideration, and if possible, the final statement should discuss the capability of the plant to meet those proposed standards."

Response

Dr. Pritchard has reviewed the Draft Statement and the AEC Staff's analysis of the extent of the thermal plume and feels that the AEC Staff's analysis

is in error. Dr. Pritchard's comments on the AEC Staff analysis is given in Appendix 5A attached to these responses.

Applicants feel that no purpose is served by discussing the capability to meet proposed standards. Applicants have made every reasonable effort and at considerable additional cost to provide an installation which gives minimum adverse environmental impact, meets all regulatory requirements, and which provides a best balance between the many factors involved.

Comment (6)

"NON-RADIOLOGICAL ASPECTS
Biological Effects (Page 9)
Public Law 92-500 provides that cooling water intake structures should reflect the "best technology available." The final statement should discuss those factors considered in the design of the intake and how the present design meets the requirements of "best technology available" for minimizing adverse environmental effects.

It appears that excessive numbers of fish may be drawn into the intake because of the vertical current created by the upward direction of the intake structure. Fish have very little resistance to vertical current and are very easily drawn into intakes of such design. (There is some indication that intake structures with openings on the sides create a horizontal current which entrains fewer fish.) Experiments at the Monroe Plant (which has an intake structure similar to the one proposed) indicate that large numbers of fish are drawn into the intake structure even when a bubble curtain is employed. The possibility of a similar situation occurring at Davis-Besse should be discussed in the final statement."

Response

Many factors must be considered in designing an intake structure for a particular location and service. Applicants feel that the design of the intake structure has properly considered all factors and does represent a design which reflects the "best technology available" and is best suited to the specific application to provide a structure that gives minimum effect on normal lake uses, provides best ability to withstand natural events such as ice conditions and provides minimum potential for fish to be drawn in.

Applicants are aware of experiments which tend to show that fish are better able to cope with a horizontal current to escape from an intake. Preliminary plans for the submerged intake in the lake included an elevated cap over the vertical intake pipe to produce a horizontal entering current. The design to be installed shown on Figure 3.6 of the Draft Statement was arrived at after consideration of many factors and is similar in design to several water intake cribs in the area that have not experienced any quantity of fish being drawn in. These intakes for the Cities of Oregon and Port Clinton are designed for an intake velocity of 0.25'/sec. at design flow and have operated at flows up to 1/4 of design. The intake velocity of the station's intake is 0.5'/sec. at the design flow and is

expected to operate at 1/2 of design for most periods of operation. The air bubble curtain for this type of intake is expected to be of some benefit.

Applicants assume that the Monroe Plant referred to in the EPA comments is the Monroe Power Plant of Detroit Edison. This plant does not have an intake structure similar to the one proposed for the Davis-Besse Station, but is an open canal leading to the pump intake structure. Applicants agree, based on their own experiments, that a bubbler curtain on an open canal does not appear to be an effective means to retard movement of fish into the canal.

Comment (7)

"NON-RADIOLOGICAL ASPECTS
Biological Effects (Page 9)
In the final statement, estimates should also be presented for different seasons as to the kinds and numbers of fish per acre in this area, their mobility, and the effects of artifical reef structures on their distribution, since the intake will be an artifical "reef". The biological habitat at the site with respect to fish migratory paths, spawning grounds, and nursery areas should also be carefully delineated. It is recommended that a program be devised to determine the significance of fish egg and larvae passage through the power plant."

Response

Sufficient data are available for estimating fish population diversity and density in the Locust Point area during ice-free seasons of the year, in terms of catch per unit effort; but there is insufficient data for expressing values as numbers per acre when dealing with a body of water the size of Lake Erie and given the mobility of fish.

While the intake structure might attract some spawning fish, its area (less than 1 acre) is not significant when compared with the area of natural reefs (5,317 acres) available to spawning fish.

So far as spawning and nursery grounds are concerned, the closest are on the reefs (16,000 ft. offshore), in Toussaint River and in the surrounding marshy area.

Since some species (channel catfish, suckers) do go up the Toussaint River to spawn, these may congregate to some extent in the lake around the mouth of the creek during the spring. Otherwise, except for the normal diurnal onshore-offshore movement of fish populations there are no migration paths in the area.

If the area of the intake were a spawning site, the passage of fish eggs and larvae through the plant could be of concern. However, from the results of F-41-R studies there, there is no indication that it is a spawning ground. The only eggs found have been a very few (less than 20) perch and shiner eggs in plankton and benthos samples.

Comment (8)

"NON-RADIOLOGICAL ASPECTS
Biological Effects (Page 10)
While the biological monitoring program proposed by the applicant would normally be considered adequate, further review of the proposed monitoring system is suggested since the area in which the power plant is to be located is in close proximity to Lake Erie and is in a highly viable marsh area. The projected chemical and biological monitoring system should be carefully reviewed to be inclusive of the total ecological systems involved. The subtle effects on the ecosystem that could arise from the operation of a power plant may not otherwise be discerned."

Response

See Applicants' Comments on the Draft Environmental Statement, letter dated January 31, 1973 included as Appendix 5B attached to these responses

Comment (9)

"NON-RADIOLOGICAL ASPECTS
Chemical Effects (Page 11)
If operated as planned, the Davis-Besse Nuclear Power Station will probably meet existing Ohio water quality standards. However, the State of Ohio is now revising the Ohio water quality standards as they apply to Lake Erie and other waters, and is also developing effluent standards. These final standards will probably be available soon. The AEC and the applicant should be aware of these changes, and if possible, should explicity compare the proposed effluent composition with the state standards in the final statement."

Response

It is Applicants' understanding that proposed revisions to Ohio water quality standards as they apply to Lake Erie are being prepared. These proposed revisions, however, are not available to Applicants as of this date.

Comment (10)

"NON-RADIOLOGICAL ASPECTS
Chemical Effects (Page 11)
The draft statement indicates that the use of an orthophosphate corrosion inhibitor at a concentration of about 2 milligrams per liter will be considered at a later date. Since Lake Erie needs no further enrichment, it is suggested that the use of orthophosphate for this purpose be very carefully detailed in the final statement."

Response

Applicants do not intend to use a corrosion inhibitor and do not feel that one will be required. It was pointed out in the Supplement to the Environmental Report that if operating conditions should show a need for a corrosion inhibitor, only a non-toxic inhibitor such as an orthophosphate would be considered.

Comment (11)

"NON-RADIOLOGICAL ASPECTS
Chemical Effects (Page 11)
The disposal of detergents as described in the draft statement should also be reevaluated for similar reasons. All possible steps should be taken by the applicant to reduce the discharge of nutrients into Lake Erie in view of the present eutrophic conditions there. Any preventive measures that may be taken to avert additional algae blooms in the vicinity of the station should be described in the final statement."

Response

The type of detergent that will be used will be a low or no phosphate biodegradable detergent such as TERCO 4324(NP). The addition of nutrients from this source is negligible.

Comment (12)

"NON-RADIOLOGICAL ASPECTS
Chemical Effects (Page 11)
The station plans to discharge 0.5 ppm chlorinated water for four periods per day, each period being about 2.1 hours in duration. The 0.5 ppm level of either free or combined chlorine is expected to be toxic to most aquatic organisms, including fish. For intermittent discharges EPA recommended a total residual chlorine discharge of no more that 0.1 ppm chlorine for 30 minutes per day or less; or 0.005 ppm chlorine not to exceed two hours per day. The final statement should present the applicant's program to reduce the discharge of chlorine to the levels recommended by EPA."

Response

Applicants criteria for chlorination in the condenser-cooling tower system is to chlorinate ahead of the condensers to give a 0.5 ppm residual at the condenser outlet. It is felt that this will provide adequate protection against fouling in the condenser and also prevent fouling of the cooling tower wetted surfaces. It is expected that action of passing through the cooling tower, the retention time of 18 minutes in the tower basin and return canal and transit time of 30 minutes in the discharge pipe will significantly reduce the residual level of chlorine at the point of discharge into the lake but the exact degree of reduction is difficult to estimate.

As pointed out in the Draft Statement, even with a 0.5 ppm level of chlorine in the effluent at the point of discharge, the extent of the mixing zone seeing any level of chlorine is extremely small (50 feet by the AEC staff estimate which should be increased to 90 feet due to a lower "fast acting" demand than assumed by the AEC staff as discussed in Applicants' Responses to Department of Commerce Comments). With this limited area involved and the improbability of any significant number of fish being present in this limited area, it is felt that a limit as stringent as that proposed by EPA is not required to adequately protect the lake biota. This is particularly the case since the fish species most sensitive to chlorine damage are not indigenous to Lake Erie.

Comment (13)

"NON-RADIOLOGICAL ASPECTS
Chemical Effects (Page 12)
The draft statement states that the average concentration of dissolved solids in the effluent is expected to be about 478 ppm, based upon an intake water concentration 225 ppm and the incremental addition of 253 ppm dissolved solids. It should be noted that the specific water quality objectives outlined in the International Joint Agreement on Great Lakes Water Quality specify that the level of total dissolved solids in Lake Erie should not exceed 200 milligrams per liter (Annex 1, 1.(c)). Further, this agreement has a non-degradation clause which specifies as follows:

> "Not withstanding the adoption of specific water quality objectives, all reasonable and practicable measures shall be taken in accordance with paragraph 4 of Article III of the Agreement to maintain the levels of water quality existing at the date of entry into force of the Agreement in those areas of the boundary waters of the Great Lakes System where such levels exceed the specific water quality objectives." (Annex 1,3.)

The specific water quality objectives outlined in the International Joint Agreement on the Great Lakes for Lake Erie, and the practicability of reducing total dissolved solids to a lower level, in keeping with the non-degradation clause applicable to Lake Erie, should be addressed in the final statement."

Response

The dissolved solids concentration in the Western Basin of Lake Erie varies widely at any given location as shown by the data obtained from municipal water intakes and reported in Annual Summaries by the States and U. S. EPA. The values of 225 ppm dissolved solids used by Applicants and the Commission Staff were values obtained by Applicants from analyses over a two year period of samples taken close to shore and represent the worse average conditions which could be expected. Subsequent analyses of samples from further offshore shower considerably lower dissolved solids as pointed out in the Supplement to the Environmental Report.

Based upon using a concentration factor of two (2) for the cooling tower system and taking into account the addition of sulphuric acid for pH control, Applicants reported an expected concentration of 478 ppm dissolved solids in the cooling tower blowdown, assuming a 225 ppm concentration in the intake water. Subsequent and more detailed analysis has shown that a considerable amount of carbon dioxide is formed by the reaction of the sulphuric acid with the sodium bicarbonate and a large portion of this carbon dioxide would be released as a gas in the cooling tower plume. This results in less total solids being discharged in the blowdown than are present in the intake water as shown in Table 14-14 of Amendment No. 1 of the Supplement to the

Environmental Report. This would also reduce the specific dissolved solids concentration by about 42 ppm resulting in a discharge concentration of 436 based on intake water of 225 ppm dissolved solids concentration.

Applicants feel that station operation completely complies with water qualities objectives expressed by a dissolved solids non-degradation clause since less total dissolved solids will be discharged than are present in the water taken in.

Comment (14)

"NON-RADIOLOGICAL ASPECTS
Chemical Effects (Page 12)
It is of interest that the AEC recommended in the final statement for the Point Beach Nuclear Plant (Page iii) that the applicant should determine a method of substantially reducing the discharge of demineralizer regenerant waste to Lake Michigan. Such equipment or operating techniques were to be in operation by January 1, 1974. This treatment method may be equally applicable to the Davis-Besse Plant."

Response

Applicants have carefully designed the water treating system and the demineralizer system to minimize the dissolved solids present in regenerate wastes. These wastes contribute only a small fraction (less than 2%) of the total dissolved solids in the station discharge and a major portion of the dissolved solids in regenerate waste is present in the intake water processed.

As pointed out in response to EPA Comment 13, the total dissolved solids discharged from the station is less than that taken in resulting in net reduction in the total dissolved solids present in lake water.

Comment (15)

"NON-RADIOLOGICAL ASPECTS
Chemical Effects (Page 13)
The intercepter system for the floor and storm drain systems may not be considered adequate if the oil content of the waste discharged through this system is high. In the final statement, the effectiveness of the oil interceptor system should be estimated together with the organic content of the waste. The possibility of non-nuclear accidental spills at the site and contengency plans should be considered in this evaluation."

Response

Floor drains at grade level and below where there is a remote possibility of oil accidently being present, go to sump systems with the discharge of these sumps going through oil interceptors before entering the storm drain system. The interceptors are designed to provide a 90% removal efficiency when passing continuous flow of the combined capacity of the sump pumps discharging into them. In actual operation, the sumps will operate only infrequently and oil removal efficiency in the interceptor would be essentially 100%.

The storm drain system discharges to the 7,000 foot drainage ditch and the drainage ditch flows to the Toussaint River through a submerged pipe. In the extremely remote possibility of an accidental oil discharge to this ditch, there would be no discharge to the Toussaint and any such oil could be cleaned from the ditch.

Comment (16)

"NON-RADIOLOGICAL ASPECTS
Chemical Effects (Page 13)
There appears to be some discrepancies between the AEC staff and the applicant on estimates of the levels of the thermal and chemical effluents. These should be described and explained in the final statement."

Response

See responses to EPA Comments 5 and 13.

Comment (17)

"ADDITIONAL COMMENTS (Page 14)
1. Clarification of the discharge pathway for the liquid radioactive waste from the miscellaneous liquid radwaste system and detergent waste system (e.g., to the mixing basin or to the lake in another stream) should be presented in the final statement."

Response

All discharges from the station other than the floor drains and storm drains go to the lake through the discharge pipe. The various systems discharge to the collecting basin which serves as the only entry point to the discharge pipe as shown on Figure 3.5 of the Draft Statement.

Comment (18)

"ADDITIONAL COMMENTS (Page 14)
2. The applicant has not presented results from the preoperational environmental monitoring program. Such information should be presented in the final statement."

Response

Applicants preoperational radiological monitoring program commenced in the fall of 1972 to provide two years of background data prior to station operation. The draft report for the first five months period has been received but was not available for inclusion in the Environmental Report or Environmental Statement.

Appendix 2B of the FSAR contains a summary of the lake biota portion of Applicants limnology study which commenced in 1968 and the continuing F-41-R study.

Comment (19)

"ADDITIONAL COMMENTS (Page 14)
3. The station water use diagram indicates production of potable water using a clarifier and chlorine. This potable water line is shown to be interconnected with the sanitary system, fire protection system, and a demineralizer. Specific information should be given for the design and production capacity of the water use system, the methods of water purification, and the method and dosage for disinfection. Protection against contamination from backflow and/or interconnection with other systems should be clearly outlined. A flow diagram of the proposed system should be included in the final statement."

Response

Figure 3.5 in the Draft Statement is a diagram only and does not represent all physical connections between systems. The actual arrangement of these systems of course, does provide the necessary and normal separation

The clarifier system is designed to provide a 400 gpm output. The raw lake water is prechlorinated to yield a 0.5 ppm residual at the outlet of detention tanks. From the detention tanks, the water passes through parallel clarifier units where it is clarified and softened with lime and sodium aluminate. The clarifier effluent is then filtered and flows to a clearwell tank. The three systems (Domestic, Fire Water Storage and Demineralizer Supply) are supplied from the clearwell storage.

Domestic water is chlorinated if necessary prior to use.

Comment (20)

"ADDITIONAL COMMENTS (Page 15)
4. The discussion of the borrow pits both during and after construction would be enhanced in the final statement if all comments concerning their use would be presented in one section. Any postulated groundwater effects from the borrow pits should be included in this section."

Response

The borrow pits have filled with water after construction dewatering was terminated. This water has come from the ground water aquifer, precipitation and flooding from high lake level. No use is anticipated for these borrow pit areas and no groundwater effects are anticipated.

APPENDIX A

Comments on "Thermal Plume Analysis", p. 3-12 through 3-16, Draft Environmental Statement by the United States Atomic Energy Commission Directorate of Licensing for the Davis-Besse Nuclear Power Station (Docket No. 50-346).

The analysis given in this section, which primarily compares the results of AEC staff's computer programming of my thermal plume model, with my own calculations for the dimensions of the thermal plume resulting from the discharge of heated effluent from Davis-Besse, is in error with regard to the following points:

(1) The Staff has apparently neglected to consider the buoyant rise of the plume in determining the point at which the plume would reach the surface, and computed this distance only on the basis of the rate of vertical spreading of the plume. The effluent is buoyant, and will have a vertical velocity given by

$$dZ/dt = w = \eta g t \, \Delta\rho/\rho \qquad (1)$$

where Z is the distance from the bottom to the centerline of the plume a time interval t after an element of the discharge leaves the discharge orifice; g is the acceleration of gravity; $\Delta\rho$ is the difference between the density of the ambient lake water and of the heated effluent; and η is a frictional coefficient. For a perfect non-viscous fluid η would equal unity. For the case considered here, based on observed rates of vertical movement of plumes from buoyant submerged discharges, $\eta \doteq 0.66$. Integration of Equation (1) gives

$$Z(t) = \frac{1}{2} g t^2 \cdot \frac{\Delta\rho}{\rho}$$

or, solving for t

$$t = \sqrt{\frac{2Z}{\eta g \, \Delta\rho/\rho}} \qquad (2)$$

Now the horizontal distance that an element of the heated effluent will move in time t after discharge is

$$\ell = u_o \cdot t \qquad (3)$$

and substituting for t from Equation (2) into Equation (3) gives:

$$\ell_s = u_o \sqrt{\frac{2 \cdot Dw}{\eta g \, \Delta\rho/\rho}} \qquad (4)$$

where ℓ_s is the horizontal distance at which the plume intersects the surface, and D_w is the value for Z at the surface (i.e., the depth of water over the discharge orifice). Note that in both Equations (2) and (3), the effects of entrainment on reducing $\Delta\rho$ and u_o with distance from the point of discharge have been neglected. These are, however, off-setting approximations and little error will result from using the initial values of the density difference and the horizontal velocity of the effluent.

In my computations of the thermal plume, I took as the worst case the situation in April, when for the worst day (Sub-Case-II-B) the flow rate of the blowdown plus dilution water would be 13,800 gpm, and the excess temperature at discharge would be 20°F. For April, the ambient lake temperature is approximately 46°F. For these conditions, and a slot discharge orifice dimensions of h_o = 1.5 ft., b_o = 4.5 ft., we have

$$u_o = 4.56 \text{ ft.s}^{-1} \quad \text{and} \quad \Delta\rho/\rho = 14.36 \times 10^{-4}$$

Taking the depth of water over the discharge orifice as 8 ft., Equation (4) gives

$$\ell_s = 4.56 \sqrt{\frac{2 \times 8}{0.66 \times 32 \times 14.36 \times 10^{-4}}} = 4.56 \times 23.0 \doteq 105 \text{ ft.}$$

Hence the plume would intersect the surface at a distance of 105 ft. from the discharge orifice.

(2) The Staff makes the statement in the middle of page 3-15 that after the plume reaches the surface my model should give a constant vertical thickness for the plume. This is not so, and this misconception arises from the failure of the Staff to distinguish between the buoyant rise of the plume and the vertical thickening of the plume. Note that at the point the plume intercepts the surface, the horizontal velocity is approximately 1.6 ft. sec^{-1}, and the plume will continue to thicken by vertical entrainment, since the local densimetric Froude number is at this point considerably larger than unity. In fact, with an initial densimetric Froude number of the discharge of approximately 17, the plume will continue to grow vertically until the full depth of 8 feet is attained.

(3) The vertical thickness of the plume is, for this case, given by the relationship

$$D_\theta = 1.50 + 0.699 \times 10^{-2} \zeta_\theta \qquad (5)$$

and hence the plume does not attain the full vertical thickness of 8 feet until a distance of 930 ft. from the discharge orifice.

(4) Though I cannot account for the numerical differences between the AEC calculations and my calculations in the size of the segments of the lake contained within given isotherms of excess temperature, I believe the Staff's calculations are in error. The equations I used are as follows:

(i) $\zeta_\theta = 6\, b_o \left\{\frac{\theta_o}{\theta}\right\}^2 = 27 \left\{\frac{20}{\theta}\right\}^2$ for $\theta > 0.2\, \theta_o$

(ii) $\zeta_\theta = 30\, b_o \left\{\frac{\theta}{\theta}\right\} = 135 \left\{\frac{20}{\theta}\right\}$ for $\theta < 0.2\, \theta_o$

(iii) $D_\theta = 1.50 + 0.699 \times 10^{-2} \zeta'_\theta$ (The vertical thickness of the plume)

(iv) $\theta' = \frac{1.5\theta}{D_\theta}$ for $D_\theta < 8$ ft.

ζ_θ, the length of the segment contained within the excess temperature θ, is then found for integer values of θ by interpolation from the paired values of ζ_θ and θ'.

(v) $b_\theta = 0.25\ \zeta_\theta$ (Maximum width of the segment contained within the excess temperature θ)

(vi) $A_\theta = 0.86\ \zeta_\theta\ b_\theta$ (Area)

The following table gives the computations for Sub-Case II-B.

θ(°F)	ζ'_θ (ft)(a)	D_θ(b)	θ'(°F)(c)	ζ_θ(ft)(d)	b_θ(ft)(e)	A_θ(ft^2)(f)	A_θ(Acres)(g)
14	55	1.88	11.2				
12	75	2.02	8.9				
10	108	2.25	6.7	65	16	902	0.02
8	169	2.68	4.5	87	22	1650	0.04
6	300	3.60	2.5	125	31	3370	0.08
5	432	4.52	1.7	152	38	4970	0.11
4	675	6.22	0.97	199	50	8830	0.20
3	900	7.79		264	66	15000	0.34
2	1350	8.0		377	94	30600	0 70
1	2700	8.0		658	165	93400	2.14

(a) From Equation (i) or (ii)

(b) From Equation (iii)

(c) From Equation (iv)

(d) From interpolation of paired values of ζ_θ' and θ' for the listed values of θ.

(e) From Equation (v)

(f) From Equation (vi)

(g) From 43,560 ft^2 = 1 acre

The dimensions of the surface plume are found using the fact that the first 105 ft. of the plume is submerged. Note that the ratio $b_\theta / \zeta_\theta = \frac{1}{4}$ for the maximum dimensions of the plume, but this ratio will be different from $\frac{1}{4}$ for the surface plume.

D. W. Pritchard

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30 January 1973

TOLEDO EDISON

January 31, 1973

Docket No. 50-346

U.S. Atomic Energy Commission
Washington, D.C. 20545

Attention: Daniel R. Muller, Assistant Director
for Environmental Projects
Directorate of Licensing

Dear Mr. Muller:

Applicants have reviewed the Draft Environmental Statement for the Davis-Besse Nuclear Power Station and are in general agreement with the Draft Statement and conclusions contained therein. Applicants do, however, have several comments which are as follows:

Summary and Conclusions, Page iii, Paragraph 7.

This paragraph concludes that the actions called for are the continuation of the Construction Permit and issuance of an operating license subject to certain conditions. Included in these conditions was the development of a comprehensive environmental pre-operational monitoring program and a non-radiological Technical Specification requirement for a comprehensive operational environmental monitoring program.

Applicants are convinced that operation of the station will have minimum effects on the environment and these effects will be negligible and undetectable in comparison with the effects caused by actions other than the station's existence and operation, both naturally occurring and resulting from man.

Applicants, however, concur with the conditions set forth concerning monitoring programs and are formulating plans for a pre-operational environmental monitoring program which can serve as an adequate baseline. In regards to lake biota, it is anticipated that this will take the form of supplementing and augmenting the F-41-R Project discussed in Section 6.2.2 of the Draft Environmental Statement.

Preliminary review of requirements for a terrestrial monitoring program which will be implemented is being undertaken based on the work required to obtain the site flora and fauna inventory during 1972 and which is continuing on a seasonal basis. It should be noted that naturally occurring events such as the November 14, 1972, storm which inundated most of the marsh and low-lying areas along western Lake Erie could cause changes of

such a nature as to make a pre-operational monitoring program meaningless as a baseline against which any effects of station operation could be measured. In regards to the marsh areas, major changes which are not necessarily adverse can result from water level control by the Bureau of Sport Fisheries and Wildlife for site areas and by private owners in adjacent marshes.

Applicants are sponsoring a program to monitor the effects of the cooling tower on migratory birds as noted in Section 6.2.1 of the Draft Environmental Statement. This program was initiated prior to the cooling tower reaching full height and will continue for a sufficient period of time to obtain an adequate evaluation of the effect of the structure's presence.

Applicants concur in the desirability of monitoring residual chlorine concentration in the station effluent. Applicants, however, do not concur with the suggestion that there is a need to keep this concentration at 0.1 ppm or below. As discussed in Section 5.5.3 of the Draft Environmental Statement, the area and volume of the lake seeing any appreciable fraction of chlorine contained in the discharge effluent is extremely small due to the rapid mixing and action with adjacent waters. It is extremely unlikely that fish will enter this mixing zone area due to its turbulent nature and, if drawn into it, would not have a residence time sufficient to have any appreciable effect.

The suggested method of operation contained in Appendix B of the Statement is undesirable because of potential scaling problems on condenser tubes which could result from this type of intermittent blowdown operation. Maintenance of the condenser-cooling tower system water at a non-scale-forming condition requires careful control of pH which would be very difficult under the conditions of suggested operation which would result in a constantly changing concentration factor of the system water and resulting pH control feed.

Notwithstanding the above comments, Applicants concur that releases of chlorine should be kept to a minimum and are investigating alternate modes of operation to accomplish this.

Applicants appreciate the opportunity to comment on this Statement which we feel is a complete review of the environmental factors associated with the Davis-Besse project.

Yours very truly,

Glenn J. Sampson

GJS:cd