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PLANT NAMES: Monticello Nuclear Generating Plant

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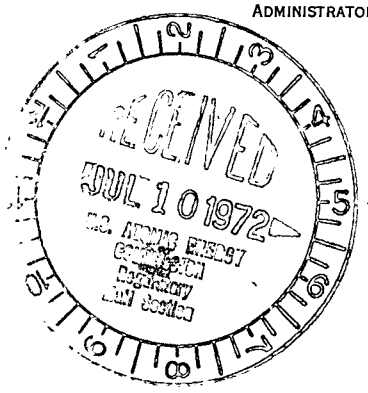

Mr. L. Manning Muntzing
Director of Regulation
U.S. Atomic Energy Commission
Washington, D.C. 20545

Dear Mr. Muntzing:

The Environmental Protection Agency has reviewed the draft environmental statement for the Monticello Nuclear Generating Plant, and we are pleased to provide our comments to you.

Operation of Monticello Nuclear Generating Plant during 1971 resulted in the discharge of radioactive gases at levels that were small percentages of 10 CFR Part 20 limits. Based on 1971 experience, continued operation until the modified off-gas system becomes operational can be expected to have only a minor environmental impact. However, current operating data should be examined and presented in the final statement to determine if they corroborate this conclusion.

The potential radiation dose to a child, as estimated by the AEC, appears to be excessive. Our comments suggest means for reducing the discharge of radioiodines, and we recommend that these or comparable methods be applied at Monticello.

In our opinion, the proposed operation of the plant does not assure that water quality standards will be met at all times. For example, it is indicated that the mixing zone will occupy 50% of the river's width and maximum temperatures will be as high as 90°F. We believe that, in order to comply with the recommendations of the National Technical Advisory Committee to the Secretary of Interior and to provide adequate protection for aquatic organisms, the mixing zone should be restricted to 25% of the river's width and temperatures should be maintained below 80°F.

Serious consideration should be given to operating the cooling towers all year unless it can be shown that limited operation will not be significantly detrimental to aquatic life. Until the plant is fully converted to a closed-cycle system, a specific operational plan should be developed to meet water quality criteria on a continuous basis. The final statement should discuss the proposed plan.

Sincerely yours,

Rebecca W. Hanmer
for
Sheldon Meyers
Director
Office of Federal Activities

Enclosure

EPA #D-AEC-00056-30

ENVIRONMENTAL PROTECTION AGENCY

Washington, D.C. 20460

July 1972

ENVIRONMENTAL IMPACT STATEMENT COMMENTS

Monticello Nuclear Generating Plant

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INTRODUCTION AND CONCLUSIONS

The Environmental Protection Agency (EPA) has reviewed the draft environmental statement for the Monticello Nuclear Generating Plant prepared by the U.S. Atomic Energy Commission (AEC) and issued on May 26, 1972. Following are our major conclusions:

1. Operation of the Monticello Nuclear Generating Plant during 1971 resulted in the discharge of radioactive gases at levels that were small percentages of 10 CFR Part 20 limits. Based on 1971 experience, continued operation until the modified off-gas system becomes operational can be expected to have only a minor environmental impact. However, current operating data should be examined and presented in the final statement to see if they corroborate this conclusion.

2. The iodine discharge from the turbine building should be reduced to meet proposed Appendix I, 10 CFR Part 50 guidelines and to ensure that the radiation dose to the child's thyroid is maintained at levels comparable to those suggested in Appendix I. (The potential dose estimated by the AEC [67 mrem] would be excessive.)

3. Several modes of operation of the liquid waste management system have been discussed in the FSAR, environmental report, and draft statement. Since each mode would result in different environmental impacts, the final statement should describe how the liquid waste treatment equipment will be operated.

4. The capability of the plant waste treatment systems to adequately process large volumes of contaminated liquids should be discussed in the final statement.

5. The analyses regarding dose assessment and liquid effluent discharge concentrations assume a condenser cooling water dilution flow of 645 cfs. Since the applicant has agreed to operate in the closed-cycle mode as much as practicable, these analyses should be made for a 36 cfs dilution flow.

6. The dose assessment should include the contribution from leakage of off-gases from the decay tanks and from direct shine from facility structures and components (e.g., turbine, tanks, and stack).

7. Dose assessments for routine releases and accidents should be evaluated using as much operational data as possible (e.g., on-site meteorology, equipment performance, leakage, and partition factors). The results should then be compared with those calculated with the standard models.

8. The proposed operation of the plart does not assure that water quality standards will be met at all times. Thus,a specific operational plan should be developed to meet water quality criteria on a continuous basis. This plan should be addressed in the final statement.

9. Serious consideration should be given to operating the cooling towers all year unless it can be shown that limited operation will not be significantly detrimental to aquatic life.

10. In order to comply with the recommendations of the National Technical Advisory Committee to the Secretary of Interior and to protect aquatic organisms, the mixing zone should be limited to 25% of the river's width and temperatures should be maintained below 80°F.

RADIOLOGICAL ASPECTS

Radioactive Waste Management

The off-gas system modification, scheduled to be operational by December, 1972, will have the capability for reducing the condenser off-gas effluent discharges to levels below those proposed in Appendix I to 10 CFR Part 50. Operation of the plant at discharge levels which are small fractions of 10 CFR Part 20 limits until the modified system becomes operational is acceptable. Operating data for 1971 are presented in the draft statement and indicate that the plant operated at small fractions of 10 CFR Part 20 limits. Continued operation at these discharge levels until such time as the modified system becomes operational would appear to have a minimal environmental impact. There is a question whether the 1971 data are representative of current operating conditions. Thus, the most recent data (since December, 1971) should be used as a bases for evaluating the environmental impact of temporary operation without the modified off-gas system. These data should be presented in the final statement.

The draft statement indicates that essentially all liquid wastes are being treated by powdex filter-demineralizers and deep-bed demineralizers and that most of the waste is to be recycled. If the waste equipment is operated as described in combination with maximum possible recycle, the waste effluents can be considered "as low as practicable" within the capabilities of the existing equipment and should be within the guidelines of the proposed Appendix I to 10 CFR Part 50. In addition, the described operation would seem to be consistent with the "requirements" provided in the State of Minnesota Waste Disposal Permit. No

assurance is given that the system will be operated as described. Further, the treatment of liquid waste as described in the draft statement is inconsistent with the applicant's description in the environmental report and FSAR.

A recent Supreme Court decision regarding some provisions of the state permit to the effect that states cannot pre-empt the effluent standards setting authority of the AEC, raises the question whether the portion of the permit requiring demineralization of all liquid radioactive waste is binding. As a consequence, the validity of the AEC analyses concerning operation of the waste treatment system is not evident since there may be no requirements on the applicant to operate the equipment in the manner described. The final statement should clarify these aspects. In addition, the applicant's criteria for providing additional treatment or to initiate discharge to the environment should be detailed.

The statement does not consider the environmental effects of effluents resulting from maintenance operations, such as draining of the torus (which has already been necessary) and condenser maintenance, or the ability of the liquid waste treatment system to process these large volumes of contaminated liquids. These analyses should be included in the final statement, including presentation of relevant details such as: (1) the expected or potential maintenance operations resulting in very large volumes of contaminated liquids, (2) the concentration of radionuclides, (3) the ability of the plant waste system to receive and treat these liquids, (4) the resulting environmental impact, and (5) the frequency of the events.

The AEC evaluation of the radioactive liquid discharges was based on 645 cfs dilution flow using once-through condenser cooling. The applicant, however, as a result of the request of the Minnesota Pollution Control Agency, has agreed to utilize the closed-cycle mode of cooling tower operation to the maximum extent practicable. The capability of attaining the proposed Appendix I discharge concentrations with a cooling tower blowdown flow of 36 cfs should be included in the final statement. Our evaluation indicates that the allowable annual discharge, as limited by Appendix I concentration limits, would be considerably less than the 5 Ci provided by Appendix I (and assumed in the statement) when operating in the closed-cycle mode.

The method of processing radioactive chemical wastes should be more clearly defined because of inconsistencies between the draft statement and the environmental report. For example, as described in the draft statement, radioactive chemical wastes are blended with other liquid wastes and demineralized or "solidified" by using them as wetting agents for the cement in the solid waste system. The applicant indicates, however, the wastes are filtered before being released to the environment, if the radioactivity levels are acceptable. Otherwise, the chemical wastes are solidified. Apparently, the AEC expects some radioactive chemical wastes will be processed as described by the applicant since, in discussing the ultimate disposal of chemical waste sludged from the twin 20,000 gallon retention basins, the environmental statement (page V-19) indicates that "...settled materials are removed and disposed of as solid radwaste."

The environmental report indicates that steam is available for use in deicing the water intake structure. The source of this steam is not described in either the FSAR or the environmental report; the draft statement did not address this. If process steam is to be used for this purpose, the radiological consequences should be evaluated and presented in the final statement.

Finally, the draft statement did not address alternatives to the present liquid waste management system. Alternatives, such as addition of evaporators, should be included.

The addition of the off-gas recombiner, the pressurized gas decay tanks, and charcoal filters should reduce the discharges of radioactive off-gases from the condenser to small fractions of 10 CFR Part 20 limits and within the guidelines of the proposed Appendix I to 10 CFR Part 50. This pressurized system, however, does have greater potential for leakage of off-gas than other currently proposed systems which are to be operated at ambient pressures. While the draft statement addresses radiogas discharges resulting from steam leakage, it does not consider leakage from the pressurized tank system. Since any releases from this system will result in ground level discharges rather than releases through the elevated plant stack, the dose consequences of the potential leakage may be significant relative to Appendix I dose limits. This leakage is not expected to significantly increase anticipated discharges of ^{131}I, since there are two charcoal filters upstream from the decay tanks.

The decay tank system is designed to provide 50 hours decay at a condenser air in-leakage of 20 cfm. Since the decay time provided by the pressurized holdup tanks is a function of condenser air in-leakage

rates, the effluent discharges may be considerably different than the levels presented in the draft statement. It would be helpful if the experience at Monticello and other comparable BWRs relative to condenser air in-leakage rates could be detailed in the final statement. In addition, a discussion of the applicant's criteria for condenser repair and/or operating requirements which would limit operation at in-leakage rates exceeding the assumed 20 cfm value should be presented in the statement.

According to the draft statement, the release of ^{131}I from the turbine building vents will result in effluent discharges substantially in excess of the proposed Appendix I levels. Also, according to the environmental report, these estimates are consistent with ^{131}I discharges experienced at operating BWR plants. The final statement should address potential means of reducing the ^{131}I concentrations released from the turbine building, giving particular attention to charcoal filters for the turbine building vents, a clean steam system for the turbine gland seal, and/or release of the turbine building ventilation air through the elevated stack.

Dose Assessment

The potential dose (67 mrem) to a child's thyroid at the nearest farm would be excessive and necessary measures should be taken to reduce the dose to levels suggested by the proposed Appendix I to 10 CFR Part 50. The other AEC projected dose consequences are well within the proposed guidelines. The statement, however, did not consider potential doses from off-gas leakage from the pressurized decay tanks nor the direct shine doses from (1) the turbine, (2) outside condensate storage tanks, (3) radwaste building equipment, and (4) the elevated stack. Furthermore, the assumptions and/or their bases used in the dose evaluations should be better defined. For instance, (1) the

statement indicates the expected releases are based on an annual average stack discharge rate of 44,000 μCi/sec while Table III - 3 indicates 100,000 μCi/sec, (2) the bases for the atmospheric dispersion factors are not included, and (3) the bases for the assumed steam leakage, iodine partition factors, and coolant leakage rates are not presented. Since this is an operating plant, actual operating data would provide the best bases for making estimates of plant performance, and we encourage the AEC to obtain pertinent measurements, to compare the measurements with the assumptions used in the standard AEC models, and to use the measured parameters in evaluating the radiological impact of the plant.

The AEC has estimated that operation of Monticello during 1971 resulted in maximum doses of (1) 8 mrem to a child's thyroid and (2) 11 man-rem to the population within 50 miles. No estimate was made of the maximum dose to the hypothetical individual at the critical site boundary or the nearest farm. In addition, these doses were based on release data from the first 6 months of operation, even though release data for the entire year are contained in the draft statement. The final statement should provide evaluation of the doses based on the entire year of operation and should be based on on-site meteorological data, if available.

Effluent Monitoring

Neither the draft statement nor the applicant's environmental report indicate that the turbine building vents are monitored for radioactivity. Since ground level discharges of radionuclides from the turbine building and the future recombiner building will contribute significant releases (particularly for ^{131}I), these vents should be monitored for gross radioactivity and iodine discharges. Since Safety Guide 21 requires such monitoring for plants currently undergoing licensing review, EPA strongly encourages that these guidelines be applied at Monticello.

Transportation and Reactor Accidents

As has been indicated in previous reviews, EPA has identified a need for additional information on two types of accidents associated with nuclear power plants which could result in radiation exposure to the public: (1) those involving transportation of spent fuel and radioactive wastes and (2) in-plant accidents. Since these accidents are common to all nuclear power plants, the environmental risk for each type of accident is amenable to a general analysis. Although the AEC has done considerable work for a number of years on the safety aspects of such accidents, we believe that a thorough analysis of the probabilities of occurrence and the expected consequences of such accidents would result in a better understanding of the environmental risks than a less-detailed examination of the questions on a case-by-case basis. For this reason, we have reached an understanding with the AEC that they will conduct such analyses with EPA participation concurrent with review of impact statements for individual facilities and will make the results available in the near future. We are taking this approach primarily because we believe that any changes in equipment or operating procedures for individual plants required as a result of the investigations could be included without appreciable change in the overall plant design. If major redesign of the plants to include engineering changes were expected or if an immediate public or environmental risk were being taken while these two issues were being resolved, we would, of course, make our concerns known.

The statement concludes "...that the environmental risks due to postulated radiological accidents at the Monticello Nuclear Generating Plant are exceedingly small and need not be considered further." This conclusion is based on the standard accident assumptions and guidance

issued by the AEC for light-water-cooled reactors as a proposed amendment to Appendix D of 10 CFR Part 50 on December 1, 1971. EPA commented on this proposed amendment in a letter to the Commission on January 13, 1972. These comments essentially raised the necessity for a detailed discussion of the technical bases of the assumptions involved in determining the various classes of accidents and expected consequences. We believe that the general analysis mentioned above will be adequate to resolve these points and that the AEC will apply the results to all licensed facilities.

Since on-site meteorological measurements may have been made for several years, the dose consequences of postulated accidents should be evaluated based on the on-site data rather than the standard assumptions given in the accident guide. While this may have been done for the analyses in the draft statement, the information provided only refers in general to the proposed annex to Appendix D of 10 CFR Part 50. We encourage the AEC to utilize the on-site meteorological data to evaluate the accident consequences.

At least one operational transient has occurred at Monticello which resulted in unplanned release of gaseous radioactivity to the environment. In addition, because of damage to baffles in the plant containment system, a controlled discharge of high volumes of radioactive liquid waste was necessary. It would be helpful in evaluating the significance of potential accidents if the abnormal occurrences experienced at Monticello could be related to the nine classes of accidents given in the draft statement.

NON-RADIOLOGICAL ASPECTS

Thermal Effects

In our opinion, the model employed by the applicant is not adequate for analyzing the behavior of the thermal plume. Throughout the statement there are various discussions which involve the low flow figures. However, the value of the 7-day once in 10-year low flow is not given. The 38 and 40 year records of flow below and above the plant site should be adequate to predict a design low flow at the site without relying completely on the six years of record. In addition, analysis of the thermal plume, withdrawal of river water for condenser use, and biological effects should be discussed for the 7-day once in 10-year low flow.

Temperature predictions for low flow are not particularly representative of low flow conditions. Similar projections should be made for the months of September and December when low flows below 1,000 cfs are common.

Calculations are given for the downstream distance affected by plume temperature rises greater than 5°F for the month of August. It would be appropriate to expand these calculations to include low flows during winter months. Such calculations would give some idea of the size of the mixing zone at those times, and indicate the area of potential impact on aquatic life.

The draft statement indicates that summer maximum water temperature in the cooling system will be about 98°F and will last about three minutes. This seems inconsistent with the fact that

the July daily maximum river temperature is around 85°F and with an anticipated delta T of 26.8°, the maximum would then approach 112°F. In addition, it is implied that the helper mode will be used, but does not mention the use of closed-cycle during this thermally critical period.

Temperature Standards

The AEC recommends to the Northern States Power Company that the plant not exceed a maximum temperature of 90°F over one-half the river width at any time. Water quality for this particular section of the Mississippi River (Fort Ripley to Anoka) is classified as adequate for purposes of drinking water, fish and wildlife, recreation, and industry. Drinking water use does not include a temperature maximum, but fish and wildlife, recreation, and industrial uses provide a maximum of 86°F. Under these conditions, we believe that the plant will exceed the temperature standard by 4°F, particularly during the warmer months of the year.

It is anticipated that in the near future Minnesota's thermal standards will be revised to conform with temperature maximums recommended by EPA at a joint meeting of Federal and state agencies held in St. Louis, Missouri, on March 3, 1971. These recommendations are:

	Temperature (°F)
January	37
February	37
March	43
April	55
May	67
June	80
July	80
August	80
September	80
October	67
November	55
December	43

Minnesota also has indicated that it will follow the mixing zone recommendations of the National Technical Advisory Committee

(Water Quality Criteria, Report of the National Technical Advisory Committee to the Secretary of the Interior, April 1, 1968, Washington, D.C.). The committee recommends that a zone of passage for aquatic organisms, "should contain preferably 75 percent of the cross-sectional area and/or volume of flow of the stream ..." This requirement conflicts with the plants current use of a mixing zone which includes 50 percent of the width of the river.

There is no description given of methods used in predicting temperature patterns. Temperature patterns are based on monthly average conditions of flow and temperature. We believe this approach will not give an acceptable analysis for potentially damaging critical periods. One statement cites average summer river temperatures for July, August, and September as 71°F (page III-10) and then cites the average summer effluent temperatures under helper mode operation.

Cooling towers were not designed for winter operations (page III-6, 7); hence, load curtailment may be necessary to meet standards. This approach, however, will mean that the river will be thermally stressed to the maximum during critical low flow periods. This should be avoided.

Cooling Requirements

To assure that the cooling system components will be operated to maximize environmental protection we recommend that the license require continuous closed-cycle operation until:

1. a mixing zone is delineated satisfactory to the State and EPA
2. an operational plan for the helper system is fully documented
3. the efficacy of this plan has been checked against several years of stream temperature and discharge data
4. full and reliable monitoring and gauging instrumentation is installed.

Biological Effects

The draft statement discusses the effects of the intake structure and velocity on fish and concludes that some impingement or entrainment of small fish entering the intake canal will probably occur. These effects may become most significant during the winter when warm water is recirculated to the intake canal to prevent ice formation. Further evidence is presented showing that survival of entrained larval fish will be low. Based on the discussions in the statement, it would appear necessary to redesign the intake structure to reduce fish entrainment. Year-round closed-cycle operation would significantly reduce this problem.

The withdrawal of 75 percent of the river water during low flow appears excessive. What will the effect on aquatic life be during this period due to entrainment and the temperature increase? Closed-cycle operation by use of cooling towers during these times, or reduction in power output should be considered.

As a result of the high temperature rise during open-cycle operation the chance of winter kill in case of a plant shutdown is greatly increased. A 27°F instantaneous drop in temperature could be lethal to most fish attracted to the discharge area.

Since the pre-operational studies did not identify spawning areas in the vicinity of the plant, a study should be made to identify and quantify such areas. Since walleye are one of the most numerous sport fish in the area, it would be appropriate to discuss their apparent need for a winter chill period and the effects of the heated water on this chill period.

The aquatic sampling frequency should list the days samples were taken. Sampling, to be more representative, should have been extended over the summer months, particularly during hot days and low flow periods.

Chemical Impact

With the exception of chlorine, the chemical and sanitary wastes should cause no problems. Peak concentrations of chlorine are above recommended levels. Average concentrations of chlorine within the discharge channel are not adequately described. When major portions of the river water are routed through the plant, there is a significantly diminished supply of dilution water remaining in the stream.

The discussion of the treatment of chemical wastes and blowdown water in the settling basin should be expanded in the final statement. The final statement should present a more thorough analysis of volume and concentration of the various waste chemicals entering the settling pond, the constituents in the blowdown water, and the volume and frequency of the blowdown water process. The removal efficiencies of the pond and the volume and concentration of pollutants in the pond effluent before dilution with cooling water should be discussed.

EPA has recommended in the past that the concentration of chlorine in receiving waters should be limited to the following:

Type of Criteria	Recommendation for Residual Chlorine
Continuous	0.002 mg/liter
Intermittent	A. 0.1 mg/liter not to exceed 30 minutes per day
	B. 0.05 mg/liter not to exceed 2 hours per day

Procedures should be discussed for disposal of sludges from the chemical retention basin and from the sanitary wastes treatment system.

MONITORING AND SURVEILLANCE

The monitoring and gauging instrumentation system for water flow and temperature in the vicinity of the plant should be installed, operated, and maintained to assure complete representation of plant operation and river conditions. Operational changes that are made to meet all water quality standards on a continuous basis should be made in sufficient time to assure no detrimental environmental effects.

Air Quality and Meteorology

The local area is classified in the state's implementation plan as priority II with respect to particulate matter and priority III to carbon monoxide, nitrogen dioxide, hydrocarbons, and photochemical oxident levels. The draft statement does not address any non-radiological air quality effects associated with the operation of Monticello Nuclear Generating Plant, even though the applicant presented some limited details in the environmental report. The draft statement should include consideration of the air quality effects of disposal of combustible solids, if by incineration, and from operation of auxiliary boilers and diesel generators. Relevant information such as number and types of sources, frequency of operation, fuel consumption rates, and type and chemical composition of fuel should be presented so that an independent evaluation may be made. Furthermore, the statement should clearly define the assumptions and bases for the quantities presented. For example, the AEC provided numerical values for air emissions from an "alternative" fossil fuel plant which are significantly different than those provided by the applicant. Without the bases and assumptions used by the AEC and because of the lack of information regarding fuel characteristics, it is not possible to resolve the differences nor to make an independent assessment.

There is no mention of the potential for accidents that could release non-radioactive air contaminants. Included in the discussion should be the types and quantities of volatile or hazardous materials that could be released, the probabilities of various types of accidents, and the environmental impact of each type of accidental release.

The source of the meteorological data presented in the environmental statement should be defined. In addition, in order to allow an independent

evaluation of the local micro-meteorological diffusion characteristics, the environmental statement should include appropriate joint frequency analyses of wind speed, wind direction, and stability conditions supplemented with relevant monthly temperature and humidity data.

Additional Comments

During our review, we noted that in certain instances the statement does not present sufficient information to substantiate the conclusions presented. While much of the individual details may not be of major importance in evaluating the environmental impact of Monticello, the cumulative effect could be significant. Therefore, it would be useful in determining the impact of the plant if the following information were included in the final statement:

1. The possibility of interaction of the cooling tower plume with gaseous pollutants, particularly from the Sherburne County power generating plants located 7 miles northwest of Monticello.

2. Available information on the production rates, dispersion, and environmental effects of ozone generation by the power transmission lines and transformers.

3. The effects of noise on the operating personnel and offsite, including the results of noise survey (dBA levels and octave band analyses).

4. Additional details of the environmental radiation monitoring program, such as the location of sample points and frequency of sampling.

5. The ultimate disposal of "solid wastes," including procedures to dispose of debris removed by the intake screens which will prohibit backwashing the debris to the river.

6. Additional information regarding the handling and disposal of drummed solid waste e.g., (1) how the drums will be decontaminated, (2) the shielding provided in the onsite storage area, and (3) the location of the onsite storage area.

7. Criteria for the utilization of the standby gas treatment system for controlling the iodine discharges during purging of the containment.

8. An evaluation of the quantities of radionuclides which may be released undetected because of limitations of effluent monitor sensitivities.

Regulatory File Cy.