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November 19, 1969

The Honorable James T. Ramey
Commissioner
U. S. Atomic Energy Commission
Washington, D. C. 20545

Re: Northern States Power Company
v. The State of Minnesota et al.
Court File No. 3-69-185 Civ.

Dear Mr. Ramey:

I very much appreciated receiving your letter of November 14 with enclosures.

You may be interested to know that attorneys for the parties to the above litigation are scheduled to meet with the Honorable Edward J. Devitt, Chief Judge, United States District Court, on November 26, 1969. The purpose of the pretrial conference is (1) to discuss the possibility of limiting the issues raised by the pleadings by excluding evidence on the defense apparently raised by paragraph 6 of the defendants' Answer that the regulations of the Atomic Energy Commission are inadequate to protect the public health, and (2) to discuss with the Court possible trial dates. In connection with the last item, it is possible that the case may be tried in January. Judge Devitt has indicated to us that he will not be available for trial during the month of February.

I shall endeavor to keep you advised of all significant developments.

My best personal wishes.

Sincerely,

Donald E. Nelson

DONALD E. NELSON

UNITED STATES DISTRICT COURT
DISTRICT OF MINNESOTA
THIRD DIVISION

Northern States Power Company,
a Minnesota corporation,

Plaintiff,

vs.

The State of Minnesota,
The Minnesota Pollution Control
Agency and Robert Tuveson,
Howard Andersen, John Borchert,
Milton J. Fellows, Steve J.
Gadler, Mace Harris, Homer
Luick, Mrs. R. C. Nelson and
F. Wayne Packard, individually
and as members of the Minnesota
Pollution Control Agency, and
John P. Badalich as executive
director and secretary of the
Minnesota Pollution Control Agency,

Defendants,

File No. 3-69-185 Civil

PLAINTIFF'S ANSWERS TO
DEFENDANTS' INTERROGATORIES
OF OCTOBER 7, 1969

Plaintiff, for its answers to defendants' interrogatories, states as follows:

1. State the names and addresses of all persons plaintiff intends calling as witnesses at the trial at this matter, or intends calling at any pre-trial or hearing.

ANSWER As of the date of these answers, no decision has been made by the plaintiff concerning the identity of the witnesses to be called at the trial. Plaintiff will, at the pre-trial conference, exchange with the defendants lists of witnesses to be called.

2. State in detail what testimony each of those named in your answer to interrogatory 1 will give on direct examination.

ANSWER No answer necessary.

3. State the names of all consultants, contractors and sub-contractors utilized in the design and construction of the nuclear fueled, electric generating plant located on the Mississippi River near Monticello, Wright County, Minnesota (hereinafter referred to as "Monticello"), and that part of the design or construction for which each is responsible.

ANSWER General Electric Company has contracted to supply, under turnkey [illegible], a total (except for circulating water system) nuclear power plant and has engaged the following major subcontractors.

Bechtel Corporation (architect-engineer and constructor)

Chicago Bridge & Iron Company (reactor vessel and containment system)

A great number of sub-tier contractors has been employed by General Electric and the above two major subcontractors. Because of the turnkey nature of the contract, Northern States Power Company does not have a list of the names of the many sub-tier contractors. Northern States Power Company has engaged the Bechtel Corporation to construct the circulating water system.

4. State and describe in detail all the materials and equipment referred to in paragraph II of the Complaint.

ANSWER Major plant equipment includes a nuclear steam supply system, a turbine generator, a containment system, together with a vast amount of associated equipment such as pumps, valves, piping, etc. Because of the turnkey nature of the contract, Northern States Power Company does not have a list of all of the materials and equipment utilized in the construction of the plant, except that a description of the systems to be included in the plant is included in the Final Safety Analysis Report. This document consists of seven looseleaf volumes which presently are about twenty inches thick and which is in the possession of the defendants, and is hereby incorporated by reference. Major components of the turbine were manufactured in Schenectady, New York. The nuclear fuel elements are being manufactured in Wilmington, North Carolina. Nuclear instrumentation was manufactured in San Jose, California. The segments of the reactor vessel were manufactured in Birmingham, Alabama. Other materials and equipment undoubtedly were manufactured in other states.

5. State the name and address of each manufacturer, distributor and sales office from which the material and equipment, referred to in paragraph II of the Complaint, were ordered and received.

ANSWER The turbine, the nuclear fuel element and the nuclear instrumentation were ordered from General Electric Company, 175 Curtner Avenue, San Jose, California 95125. The supplier of the reactor vessel is Chicago Bridge & Iron Company ordered from 901 W. 22nd Street, Oak Brook, Illinois 60521. The place of manufacture is as stated in the answer to Question #4, from which place the material and equipment is received.

Because of the turnkey nature of the contract, Northern States Power Company does not have the names and addresses of the many sub-tier suppliers involved in furnishing the plant equipment and material, most of which has been furnished in interstate commerce.

6. State the present total generating capacity of all existing generating plants owned by plaintiff or one of its subsidiaries, naming each plant, its location and its particular capacity.

ANSWER The answer is contained in the attached five-page summary, marked Exhibit A and identified as "Northern States Power Company (Minn & Subs), Tabulation of Electric Generating Plant Capabilities". The summary is used for Upper Mississippi Valley Power Pool activities. Shown on this tabulation is each plant (future and existing), its location, and four associated capabilities. Since each generating unit must have associated auxiliary equipment such as fans, pumps, and conveyors to keep it in operation, it has an effective or net rating which is determined by subtracting the demand of its auxiliary equipment from its gross rating. Also, the capability of each generating unit varies seasonally because the cooling water temperature, quantity of cooling water available, and air temperature affect the operation of plant equipment. Because Northern States Power Company experiences its highest demands during the summer and winter months, the plant capabilities are most important during these two seasons. Therefore, four ratings: winter gross, winter net, summer gross, and summer net are shown on the tabulation. The tabulation also summarizes the plant capabilities according to each state in Northern States Power Company's service area.

7. State the portion of the total given in answer to interrogatory 6 which is transmitted, distributed, or sold to each of states referred to in paragraph II of the Complaint.

ANSWER The maximum 1969 system peak demand of Northern States Power Company's customers between January 1 and October 20, 1969 was experienced at 1:30 PM on August 29. Since Northern States Power Company has been experiencing its annual peak demands during the summer months, the August 29 peak is expected to be the maximum demand for the year. The 1969 maximum demand can be attributed to customers in each of the four states of the company's service area as follows:

State	Demand at Time of System Maximum Demand in MW	% of System Maximum Demand
Minnesota	2319.6	80.8
Wisconsin	339.5	11.8
South Dakota	93.7	3.3
North Dakota	119.7	4.1
	2872.5	100.0

The energy requirement for Northern States Power Company customers in each state for 1968 was as follows:

State	Thousands of Kilowatt-hours	% of Total
Minnesota	10,504,216	78.3
Wisconsin	1,922,520	14.4
South Dakota	380,532	2.8
North Dakota	605,484	4.5
	13,412,752	100.0

8. State the present total electrical power being generated for immediate consumption by each of the existing generating plants owned by plaintiff or one of its subsidiaries.

ANSWER The total electric power generated at Northern States Power Company's generating plants varies from instant to instant. The total amount of generating capability installed is based on the system annual maximum demand which occurs on Northern States Power Company's system during the summer months. The attached tabulation (Exhibit B) shows the electric power being generated at each of Northern States Power Company's generating plants at the time of the 1969 maximum system demand, on August 29, 1969 at 1:30 PM.

9. State whether the difference between the total given in answer to interrogatory 6 and the total given in answer to interrogatory 8 is committed for a particular purpose or purposes, and if it is so committed, describe in detail said purpose or purposes.

ANSWER The tabulation answering question #8 (Exhibit B) shows that additional power totaling 512,000 kw was purchased to serve Northern States Power Company's customer requirements. Thus, the difference was a negative one, and it is therefore impossible to describe any commitment for this

At the time of the system maximum demand over 100,000 kw of generating capability was out of service due to equipment shut-down. The remainder of the total capability was held in reserve to protect against further equipment shut-down and forced plant shut-downs.

10. State the names and addresses of all electric utilities to which plaintiff has sold, transmitted or distributed electrical power since 1950.

a. State the total amount of power in megawatts or kilowatts sold to each of said utilities since 1950.

b. State the total amount of power actually transmitted or distributed to each of said utilities since 1950.

12. State the names and addresses of all electric utilities from which plaintiff has purchased or received electrical power since 1950.

a. State the total amount purchased from each said utilities for each of the years since 1950.

b. State the total amount actually transmitted or distributed to plaintiff from each of said utilities for each of the years since 1950.

ANSWER The Upper Mississippi Valley Power Pool Agreement and other agreements provide for many different types of power (demand) transactions between Northern States Power Company and other Midwest electric utilities. The purchases and sales of electric power have been categorized to satisfy certain needs inherent to electric utility operations. The categories are based on the availability (reliability) of the power desired by the purchaser or seller, the length of time the power is to be made available, and the associated cost of making the power available. The categories include firm power, participation power, general purpose power, short-term power, peaking power, replacement power, reserved power, and banked power and are defined in the various agreements.

a. A separate contract is written for each transaction with another utility based on agreements which contain provisions for entering into power exchange transactions. The other utilities involved include more than 30 municipal systems (which are included as an inherent part of Northern States Power Company's own electric load), the investor members of the Upper Mississippi Valley Power Pool, excluding Northern States Power Company (Wisconsin), and with many other utilities in the midwestern United States including members of

the Iowa Power Pool, members of the Eastern Wisconsin Utilities, the Union Electric Company, and the United States Bureau of Reclamation. The transactions with utilities outside the Upper Mississippi Valley Power Pool are possible mainly because of coordination agreements associated with programs to jointly construct interconnecting transmission lines.

Since the time period covered in a transaction usually varies from one week to one year and since several agreements are sometimes executed with a single utility in one year, over 1,000 agreements have been written to cover power transactions since 1950. There is no single document or small number of documents which summarize all of the transactions. Therefore, a complete summary would require a review of more than 1,000 agreements. However, summaries of major transactions with other utilities outside NSP's service area and with other Upper Mississippi Valley Power Pool members are available for the period of the annual maximum demand since the early 1960's when such Pool transactions were initiated. These transactions are shown on Attachment 13-A. (Exhibit C-1)

b. The power actually transmitted from one utility to another varies from instant to instant. The power (demand) transactions explained in Part a. above specify the maximum power that may be scheduled for delivery or receipt. The amount of electric energy transmitted is a function of the length of time a given amount of power is transmitted from one utility to another. Electrical energy transactions between Northern States Power Company and other utilities are available in monthly or annual summaries. Annual summaries of purchases and sales of energy are available from Company records and are reported to the Federal Power Commission in Form No. 1 and Form No. 12. Many of the energy transactions occur under the corresponding agreements for electric power (demand) transactions explained in Part a. above. However, the Upper Mississippi Valley Power Pool Agreement and others provide for special purpose energy transactions without separate written agreements for each transaction. Examples include economy energy, scheduled outage energy, emergency energy, operational control energy, dump energy and maintenance energy. A definition of each category is included in the Upper Mississippi Valley Power Pool Agreement and others. The attached copies

of Company records (Exhibits C-2 through C-32) summarize annual energy transactions with other utilities for the years 1960-68. Because the North Dakota records (Minot and Fargo-Grand Forks Divisions) are kept separately from records for the remainder of the system (Interconnected System), several pages are required to summarize one year. The addresses of utilities not included in the answer to Question #13, outside of the Company's service area, are:

Central Power Electric Co-op, Inc.
Highway 2 & 52 Bypass West
Minot, North Dakota 58702

Iowa Electric Light & Power Company
Security Building, Box 351
Cedar Rapids, Iowa 52406

Iowa-Illinois Gas & Electric Company
206 East Second Street
Davenport, Iowa 52805

Iowa Public Service Company
P. O. Box 778
Sioux City, Iowa 51102

Iowa Southern Utilities Company
300 Sheridan Avenue
Centerville, Iowa 52544

Nodak Rural Electric Cooperative, Inc.
1405 First Avenue North
Grand Forks, North Dakota 58201

Union Electric Company
P. O. Box 149
St. Louis, Missouri 63166

United States Bureau of Reclamation
Department of the Interior
P. O. Box 2553
Billings, Montana 59103

*Western Power and Gas Company
114 South 12th Street
Lincoln, Nebraska

Wisconsin Electric Power Company
231 West Michigan Street
Milwaukee, Wisconsin 53201

Wisconsin Public Service Corporation
1025 North Marshall Street
Milwaukee, Wisconsin 53201

* Formerly Central Electric and Gas Company

11. State the names and addresses of any and all electric utilities to which plaintiff is presently committed to sell, transmit or distribute power in the future.

a. State the total amount of power committed to each of said utilities through 1980.

ANSWER Because Northern States Power Company experiences its annual maximum demand during the summer months, sales for the summer period are the only sales of significance for generation planning. We anticipate that the Company will have an increasing amount of excess capability during the winter months. This capability will be sold to the extent that other Midwest power systems desire additional winter capability.

The Company is committed to the following sales during the summer periods:

Year	Utility Purchasing From Company	Megawatts Purchased
1970	Minnkota Power Co-op	19
	Iowa-Illinois Gas and Electric Co.	46
1971	Northwestern Public Service Co.	33
1972	Minnesota Power and Light Co.	56

The sales tabulated above are all banked transactions, i.e., power which is being returned to repay an earlier receipt of power, or power which the receiving utility will return at a future date. A total sale of 65 mw is indicated for the 1970 summer period, which in turn is being purchased from other utilities. The attached summary of Upper Mississippi Valley Power Pool transactions (Exhibit D) shows that the Company must also purchase 76 mw to cover its own supplemental requirement.

The addresses of Minnkota Power Co-op, Northwestern Public Service Co., and Minnesota Power and Light Co. are given in the answer to Question #13. The address of the remaining utility is:

Iowa-Illinois Gas and Electric Company
206 East Second Street
Davenport, Iowa 52805

13. State the names and addresses of each member and/or participant utility in the Upper Mississippi Valley Power Pool.

a. State the present total capacity of each of the said members and/or participants.

b. State the present total actually being generated for immediate consumption by each of said members and/or participants.

c. State the total generating capacity held in reserve by each of said members and/or participants.

d. State the reserve required by each of the members and/or participants by said Power Pool and describe in detail the necessity of said requirements.

e. Describe in detail the purpose of the Power Pool, its authority over individual members and/or participants, and the nature of the relationship between the various members and/or participants.

ANSWER The parties to the Upper Mississippi Valley Power Pool Agreement dated February 10, 1961, as supplemented, consist of the following 14 electric power suppliers:

Cooperative Power Association
6700 France Avenue South
Minneapolis, Minnesota 55435

Dairyland Power Cooperative
2615 East Avenue South
LaCrosse, Wisconsin 54602

Interstate Power Company
1000 Main Street
Dubuque, Iowa 52001

Lake Superior District Power Company
101 West Second Street
Ashland, Wisconsin 54806

Minnesota Power & Light Company
30 West Superior Street
Duluth, Minnesota 55802

Minnkota Power Cooperative, Inc.
P. O. Box 1318, State Mill Road
Grand Forks, North Dakota 58201

Montana Dakota Utilities Company
400 North Fourth Street
Bismarck, North Dakota 58501

[illegible]
P. O. Box 160
Grand Rapids, Minnesota 55744

Northern States Power Company (Minnesota)
414 Nicollet Mall
Minneapolis, Minnesota 55401

Northern States Power Company (Wisconsin)
100 North Barstow Street
Eau Claire, Wisconsin 54701

Northwestern Public Service Company
Northwestern Security National Bank Building
Huron, South Dakota 57350

Otter Tail Power Company
215 South Cascade Street
Fergus Falls, Minnesota 56537

Rural Cooperative Power Association
Elk River, Minnesota 55330

United Power Association
Elk River, Minnesota 55330

a. The determination of capability is based on the two seasons of the year in which the utilities experience maximum system demands:

Summer period: May 1 through October 31
Winter period: November 1 through April 30

(The maximum demand for a particular utility may be either during a summer period or a winter period.)

The total generating capability of each member associated with the 1969 summer period is as shown in the attached tabulation (Exhibit E).

b. The amount actually generated varies from instant to instant. However, Exhibit E shows the purchase or sale of capability that each member has arranged to date to meet 1969 maximum estimated summer demands. Such figures are subject to an "after-the-fact" verification of actual maximum system demand.

c.&d. Exhibit E indicates the relationship of the capability of a party to the Pool Agreement to its system demands including itsreserve capacity obligations. The answer to Question 13, Part b as to an "after-the-fact" verification is also applicable to this answer. The reserve obligations are based on a capability margin equal to 12% of its seasonal maximum demand. This margin was accepted by the parties to the Pool Agreement on the basis of a probabilistic model of generation plants of such parties and the acceptable level of risk that there may not be collectively sufficient generation to meet the total maximum system demands of the parties to the Pool Agreement.

e. The general purpose of the Upper Mississippi Valley Power Pool Agreement is to facilitate the interchange of power and energy between the interconnected generation and transmission systems of the parties to said Agreement. The detailed purposes and the contractual relationships between the parties thereto are as provided in the Upper Mississippi Valley Power Pool Agreement dated February 10, 1951, the 12 supplemental agreements thereto, the agreements between the several parties providing for the interconnection of their respective systems and the agreements for specific exchanges of power and energy pursuant to the Upper Mississippi Valley Power Pool Agreement.

14. State plaintiff's generating capacity for each year since 1950, indicating each of the then existing plants and its generating capacity.

ANSWER The attached tabulations (Exhibits F-1 through F-23) show Northern States Power Company generating plant capabilities for the 19-year period 1950-1968. For the years 1950-1960 the gross capabilities (defined in the answer to Question 6) are shown. For the years 1961-1968 the net capabilities (also defined in the answer to Question 6) are shown. All capabilities are for the winter months.

15. State the electrical power generated, by months, for immediate consumption by each of the then existing plants for each year since 1950.

ANSWER Attached are annual summaries (Exhibits G-1 through G-36) showing the total electric energy generated for the years 1960-68 at each electric generating plant and the maximum demand on each plant. Note that maximum demands on the plants occur at different times. Because the North Dakota records (Minot and Fargo-Grand Forks Divisions) are kept separately from records for the remainder of the system (Interconnected System) several pages are required to summarize one year.

16. State the total projected electrical demand by months for each year from January, 1970 to January, 1980.

ANSWER The attached tabulation (Exhibit H) shows projected monthly maximum demands on Northern States Power Company's system for the period March, 1969 through December, 1980. Included in the tabulation are the historic maximum monthly demands experienced for the period January, 1967 through September, 1969.

17. State and describe in detail the extent to which Monticello will produce electric power for transmission, distribution and sale to the public and interstate commerce.

ANSWER The plaintiff owns and operates an interconnected system of high voltage transmission lines in Minnesota, Wisconsin, North Dakota and South Dakota which functions to transport electric power produced in various generating stations or received through interconnections with other power suppliers. The plaintiff's system is part of an interstate extra high voltage (EHV) transmission system located in several midwestern states which in turn is interconnected with similar systems to the east. This system for the midwest area as contemplated for 1970 is illustrated by Exhibit I, attached hereto and made a part hereof. This system, commonly referred to as a grid system, will provide for the interstate purchase and sale of electric power between major power systems. These systems assist each other in times of emergency by delivering large blocks of power over this grid. By being able to rely on the grid system, a company can better cope with unusual weather conditions or loss of generating equipment and thus greatly reduce the likelihood of experiencing power blackouts. The Monticello plant, as well as other generating plants, will contribute electric power to this interstate system. It is impossible to identify the electric energy being consumed at a particular location in terms of the particular generator which produced it. Therefore, it is impossible to state either in quantitative or relative terms the extent to which the Monticello generator, as distinguished from other generators, will produce electric power for transmission, distribution or sale in interstate commerce. It can be said that the Monticello plant is one part of an integrated and interconnected system which contributes to the production of electricity sold in interstate commerce.

18. State and describe in detail any and all information utilized by plaintiff in calculating the anticipated electrical demand for the summer of 1970 and succeeding years.

ANSWER The forecasting information and method used by Northern States Power Company in forecasting the annual maximum system demand for 1970 and beyond in general is that used by most electric utilities, described as follows:

The historic demands are first analyzed for abnormal conditions that are not representative for the future. On the basis of past weather, expected weather conditions at the time of the maximum demand have been calculated. The conditions are related to humidity and temperature and are combined into a Temperature-Humidity Index (THI). Historic demands are corrected to correspond to the normal weather conditions. Any unusual customer demands are also corrected in the historical data. The unusual demands could be caused by such unusual events as a strike or vacation at a large industrial customer's plant or unusual defense activities. Also, if the maximum demand occurs on other than a Monday, the historical data is corrected to correspond with a demand that would have occurred on this more likely weekday. The five-year corrected (normalized) historical demands are then extrapolated into the future using the analytic technique of curve fitting. The curve-fitting technique used to fit the historical data by Northern States Power Company and many other utilities is called the method of least squares and is a common analytical tool. The resulting curve can be defined by a constant growth rate, i.e., the growth in demand of one year over the next is a constant percentage of the preceding year. Our experience confirms the validity of this approach.

Modifications are then made to the projected (extrapolated) maximum demands to account for other expected changes. The unusually high growth rate of the summer maximum demand can be attributed in part to the expanded use of air conditioning. It is likely that the pace of the high growth rate will decrease as more and more homes become air conditioned. The long-range future projection of Northern States Power Company's maximum demands has been modified (decreased) to recognize this air conditioning saturation effect.

It is important to note that the summer maximum demands on Northern States Power Company's system are becoming more and more sensitive to weather changes. Since forecasts are based on expected normal conditions, abnormally hot weather can increase the demand significantly. An abnormal hot spell in 1970 could increase

the maximum demand more than 200 megawatts over the forecast. Also, depending upon the extent of the South Vietnam conflict, defense production in Northern States Power Company's service area is likely to continue beyond 1969. The existing forecast for 1970 made no allowance for this continued activity. The present level of defense activity could increase the 1970 maximum demand by an additional 75 mw.

19. State and describe in detail the nature, extent and consequences of the possible impairment of the electrical service if Monticello is not in operation by June, 1970.

ANSWER During the summer of 1970, the Upper Mississippi Valley Power Pool is forecasted to have 258 mw of excess capability if the Monticello unit and a 50 mw nuclear unit at Genoa, Wisconsin are both in service. Thus, if the Monticello unit is not in service for the summer of 1970, the power pool will be deprived of 460 mw capability initially expected from Monticello resulting in a shift from 258 mw excess capability to 202 mw deficient capability. The NSP load is forecasted upon median weather conditions, but if unusually hot weather occurs during the summer of 1970, the NSP load could increase by 200 mw above the present forecast. If the present level activity of defense production continues, an additional 75 mw of load must be added to the NSP forecast. The power pool shortage with abnormally hot weather and with continued defense production activity would then be about 500 mw.

For the summer season of 1970, NSP has previously arranged for a purchase of 76 mw to satisfy its capability obligation. The ability of NSP to purchase additional power from other pool members to replace the Monticello generating capability and to cover increased demands is limited to the excess generating capacity of these pool members. The ability of NSP to purchase additional power from utilities outside the pool during the summer of 1970 is limited by the anticipated failure of other generating units in the midwest to [illegible] efforts are being made to seek arrangements with other sources of power including the United States Bureau of

Reclamation and the Manitoba Hydro-electric Board which are primarily hydro-electric systems. Any arrangements with those systems for daytime capability probably will require some type of firming arrangement involving replenishing the other systems' reservoirs which may be extremely difficult to accomplish.

The consequences of inability of NSP to purchase sufficient power to replace Monticello include increased probabilities of curtailment of load to some customers A study of the critical June 1 through August 31, 1970 period indicates that the chance that NSP would be required to curtail load to some customers is approximately 14 times greater if the Monticello unit is not available than it would be with the unit available. A high risk of load curtailment resulting from the unavailability of the Monticello unit in 1970 means an increased probability that a remote occurrence could cause a major failure of the power system to maintain operation. While such a black-out condition is expected to occur only as a result of the occurrence of highly remote events, a "brown out" is more likely. The term "brown out" means a power system failure to maintain operation or interruption to a lesser degree and extent than "black-out".

If power were available to be purchased by NSP during the summer of 1970, the projected costs of one month's delay include increased fuel costs (including maintenance penalties) of $1,181,000, increased energy purchase costs of $10,000, and increased operation and maintenance costs of $60,000 for a subtotal of $1,251,000 plus interest on nuclear fuel for Monticello of $54,000 for a total increased cost of $1,305,000 for one month's delay at Monticello. Thus, the costs of delay would be $42,000 per day for the first month.

Further delays beyond one month would not cause additional maintenance penalties because revamping the scheduled maintenance for 1970 would require a revised schedule whether Monticello is delayed one month or more than one month. However, increased costs for the energy generated at other plants or purchased would continue at $450,000 per month. In addition, demand charges for purchases from other sources would be necessary at an estimated cost of $542,000 for the second month's demand charges and $1,086,000 for the sum of the second

and third months' demand charges. The demand charges would continue at a high level through the summer period and would decrease by about one-third during the winter period.

20. State the annual percentage rate of increase for the summer peak demand since 1950 and the anticipated percentage rate of increase for peak demands through 1980.

ANSWER. See Exhibit J and K attached hereto.

21. State whether the term "plaintiff's" as used in paragraph II of the Complaint includes any electric utilities.

ANSWER No; the summer peak demand of plaintiff's customers, including local municipal systems sometimes known as utilities, is increasing at a rate of over eight percent annually.

22. If the answer given to interrogatory 21 is in the affirmative, state the names and addresses of said utilities and the amount of electrical power involved for each year since 1950 to each of said utilities.

ANSWER No answer needed.

23. State and describe plaintiff's past projections of power demands and the extent to which they are proven to be accurate.

ANSWER The attached tabulation (Exhibit L) shows forecasts of Northern States Power Company's system maximum demand one year before, three years before, and five years before the date of actual occurrence. These forecasts show that for the past few years major revisions have been made upward in the forecasts as a result of the rapidly increasing summer demands.

The actual historic maximum demand is shown along with the weather-corrected demand. The weather-corrected demand is the actual demand corrected for abnormal conditions as described in the answer to Question 18.

24. State in detail all facts underlying the allegation that AEC regulations regarding discharges of radioactive effluents limits said discharges to a level which will not endanger the public health and safety as alleged in paragraph III of the Complaint.

ANSWER Title 10, Part 20, of the Code of Federal Regulations contain standards for protection against radiation. Sections 20.105 and 20.106 in particular relate to the control of [illegible] mean any area not controlled by the licensee for purposes of protection of

individuals from exposure to radiation and radioactive materials, and therefore "unrestricted areas" are all areas occupied by the general public, as distinguished from persons employed in or who regularly enter the plant area itself. The ultimate limitation imposed by such regulations is that the proposed limits of radioactive releases shall not cause any individual to receive a dose to the whole body in any calendar year in excess of 0.5 rem. A rem, as defined by Section 20.4(c), is a measure of the dose of any ionizing radiation to body tissue in terms of its estimated biological effect. Part 20 in its entirety demonstrates that the AEC has, as alleged in paragraph III of the complaint, exercised its statutory duty by limiting radioactive discharge to a level which it has determined will not endanger the public health and safety.

In addition, defendants said in paragraph 15 of the Special Conditions Relating to Radioactive Wastes of the permit dated May 20, 1969, issued to the plaintiff: "The generally accepted I.C.R.P. [International Commission on Radiological Protection] limits are designed to restrict radiation exposure, on a continuous basis and over a lifetime, to levels that will not produce detectable or significant somatic or genetic harm." AEC regulations, as applied to gaseous wastes, are identical to I.C.R.P. limits (i.e., 0.5 rem per year) and as applied to liquid wastes are more stringent than I.C.R.P. limits.

25. State and describe in detail what alterations in the design of Monticello would be made necessary by plaintiff's compliance with the P.C.A. permit regarding radioactive discharges.

ANSWER An attempt to comply with the PCA permit regarding radioactive discharge would require three basic system additions to the Monticello Plant. The radioactive gas waste system would have to be expanded to include recombiner equipment, a charcoal adsorption system, together with associated auxiliary equipment and controls. The addition would also involve building expansion and alterations. Secondly, the liquid radioactive waste system would have to be expanded to include a concentrator, an additional demineralizer, substantial additional tankage and handling equipment, together with associated building additions and alterations. Thirdly, a low-level radioanalysis laboratory would be required and

would include the development of presently nonexistent precision equipment located in a new separate building to insure a low level of background radiation. Plaintiff is unable to conceive of any changes in the design which would make it possible to demonstrate compliance with paragraphs 4, 7 and 10 of the permit relating to radioactive wastes.

26. State in detail the increased cost and time involved for each alleged item of alteration listed in answer to interrogatory 25.

ANSWER It is impossible to answer this question as it is written because the contemplated changes described in the answer to question 25 have only been analyzed on a conceptual basis. This is explained by the fact that systems such as conceived of in question 25 do not exist in their entirety in any plant in the world. These systems would have to be designed specifically for this plant and until the design is completed, it is not certain that they will accomplish their intended result nor can plaintiff be certain of their exact costs. However, based upon estimates of the cost of anticipated components and research and development activities, it is presently believed that the plant additions described in Question 25 will cost a total of $9,500,000.00. This is divided according to the following tabulation.

Gas Waste System Additions	$7,000,000
Liquid Waste Additions	2,000,000
Low Level Laboratory	500,000
TOTAL	$9,500,000

This cost estimate is for capital plant additions only and does not include additional operating costs. Nor does it include losses which would result because of periods of time when the plant would be out of operation while attempting to integrate these systems into the plant. Such costs would be extremely high and depend upon a number of variables, such as the duration, the season and the year that the plant would be out of operation. From the time of authorization it is estimated that two years will elapse before the above-mentioned plant modifications, exclusive of instrumentation, would be placed in service. The factors involved are design time, procurement time, installation and time for complete testing and

operational integration into the other plant systems. It is questionable whether instrumentation sufficient to demonstrate compliance with the permit conditions relating to individual radioisotope concentrations can be developed in the foreseeable future. For a two year period of lost production at Monticello, if power were available to be purchased by NSP, increased demand charges may exceed $9,000,000 and increased energy costs may exceed $11,000,000.

27. State in detail all facts underlying and necessitating the allegation that compliance with the P.C.A. permit regarding radioactive discharges would result in a substantial delay in the commencement of the operation of Monticello.

ANSWER Commencement of operation at Monticello is scheduled for the spring of 1970, and even if the plant modifications described in Question 25 were to be authorized today, a delay of at least 18 months would be incurred in the commencement of Monticello operations. In addition to these time intervals, a substantial time interval must be allowed for licensing review and approval of these modifications by the United States Atomic Energy Commission. These time estimates assume that the efforts would be successful. If they were not successful, then the plant would not be able to commence operations without violation of the permit conditions.

28. State and describe for each of the items listed in answer to interrogatory 25, the extent to which the applicable portion of Monticello has already been completed.

ANSWER The current plant gaseous and liquid waste systems have been completely designed and all of the equipment involved is either installed or is under manufacture. Actual construction and installation is about 50% complete for the gas waste system and about 80% complete for the liquid waste system. The low level radioanalysis laboratory would be a complete new installation and therefore no work has been undertaken for it.

29. If in answer to interrogatory 26 there are applicable portions of Monticello less than fully complete, state and describe in detail the reasons why the alterations therein involved could not be accomplished at the present time.

ANSWER The liquid and gas waste systems referred to in the answer to Question 28 are completely designed and all equipment is specified and either

already installed or in the advanced stages of manufacture. A substantial redesign would be necessary in order to accomodate the additional equipment required to comply with certain PCA permit conditions regarding radioactive discharges. Building additions and alterations would be involved to accomodate the additional equipment and it is likely that the existing equipment would have to be relocated to accomodate the installation of the additional equipment required for compliance with the PCA permit.

30. State and describe in detail how compliance with the F.C.A. permit regarding radioactive discharges would adversely effect fuel economics of the plant.

ANSWER If the plant is forced to shut down to remove leaking fuel between normal scheduled refueling outages pursuant to condition 2(e) of the permit, the fuel that is removed would not have produced its expected energy quantity. NSP would then be incurring, on a per kw-hr. production cost basis: increased fabrication costs, increased conversion costs, increased new fuel shipping costs, increased reprocessing costs, increased interest costs and increased capital costs for spare fuel.

31. State and describe in detail the quantities of fuel lost as generating capabilities due to compliance with the F.C.A. permit regarding radioactive discharges.

32. State and describe in detail the amount of electrical power lost by reason of the quantities given in answer to interrogatory 31.

ANSWER NSP cannot state specific quantities at this time since it cannot predict the frequency or duration of shutdowns for removal of leaking fuel as required by the permit.

33. State and describe in detail whether in normal operation of plant there is any anticipated fuel loss over and above that alleged to result from compliance with the F.C.A. permit.

ANSWER No.

34. State and describe in detail all adverse effects on the reliability of Monticello's power system which would occur if plaintiff complied with the F.C.A. permit regarding radioactive discharges.

ANSWER With the [illegible], compliance with the PCA permit will have several adverse effects on the reliability of the

Monticello plant and therefore of the Northern States Power Company electrical system. The availability of the Monticello plant would be considerably reduced, mainly occasioned by frequent and lengthy shutdowns to meet the PCA limits on radioactive gas discharges. The gas was discharges occasioned by very slight fuel leaks would be allowable under the AEC limits and the plant could continue to run and supply power to the NSP power system. Operation under the PCA permit will further reduce the reliability of the Monticello plant because of the frequent shutdowns, causing extra thermal stressing of plant equipment and increasing the potential for equipment damage. This added thermal stress will require more down time for maintenance, equipment checks and calibrations, as well as shortening the useful life of the plant.

35. State the total additional dollar expenditure required to comply with the P.C.A. permit regarding radioactive discharges.

a. State how much of said additional expenditure is for excess construction costs.

b. State the items of construction which will require additional costs, the cost attributable to each of said items, and why each cost is necessitated by the P.C.A. permit.

c. State how much of the total additional expenditure is for excess operating costs.

d. State the items of operation which will require additional costs, the cost atttibutable to each of said items and why each cost is necessitated by the P.C.A. permit.

e. State the additional cost per kilowatt hour represented by the total alleged additional expenditures.

ANSWER

a. See answer to Question 26 with respect to capital expenditures and costs of shutdown time.

b. See answer to Question 26 with respect to capital expenditures and costs of shutdown time.

c. The excess operating costs are estimated at $1,250,000.00 per year, excluding carrying charges on the capital investment and excluding costs of shutdown time estimated in the answer to Question 26 for production delays caused by alterations and additions.

d. The following operating costs are estimated.

Gas Waste System Additions	$ 100,000.00
Liquid Waste Systems Additions	1,000,000.00
Low-Lev l Radioanalysis Laboratory	150,000.00
TOTAL	$ 1,250,000.00

Each cost is necessitated by the PCA permit for additional manpower, maintenance, supplies and other costs incidental to operation of the added equipment listed in the answer to Question 25.

e. The total expenditure for annual operating expenses and carrying charges on the capital investment is estimated at $2,750,000.00 per year. It is impossible to state the additional cost per kilowatt-hour without knowing the total number of kilowatt-hours over which these excess costs are to be spread; that is, whether the costs would be spread over the plaintiff's entire four-state system, over the State of Minnesota, or over some part of the State of Minnesota. Moreover, the production penalties for the system, estimated in the answer to Question 26 at $20,000,000 for a two year delay period, are excluded from the $2,750,000 estimate for Monticello plant annual operating expenses and carrying charges.

36. Names of the officials of the State of Minnesota who have publicly stated that strict adherence to the conditions and limitations of the P.C.A. permit will be required of N.S.P.

ANSWER John P. Badalich, on July 16, 1969, in a meeting with several representatives of the plaintiff, stated that if the radioactive releases at the Monticello plant exceeded the limits in the permit, the PCA would shut down the plant. In several other meetings, Robert Tuveson has made substantially the same statement, but the plaintiff cannot presently recall the exact time or circumstances of such statements. The answer filed by the defendants admits the allegation that officials of the State of Minnesota have publicly stated that strict adherence to the conditions of the PCA permit will be required of NSP.

37. For each of the officials named in answer given to interrogatory 36, give the date, place and actual language used of said statements.

ANSWER See answer to Question 36.

38. Describe and explain in detail any additional safety hazards contemplated if plaintiff complies with the P.C.A. permit regarding radioactive discharges.

ANSWER Compliance with all PCA permit special conditions relating to radioactive wastes would result in significant additional radiological exposure of plant personnel, in handling of greater amounts of radioactive wastes, and in

substantial overall degradation of the safety factors in the plant equipment. An instance of additional radiological exposure of plant personnel would be the frequent start-ups and shut-downs to search for minor leaks in fuel rods and the attendant detection procedures.

39. Describe and explain in detail the nature and extent of other substantial adverse consequences as alleged in paragraph VII of the Complaint.

ANSWER The plaintiff is a public utility of the State of Minnesota, as well as a licensee of the Atomic Energy Commission and a supplier of electric power for intrastate and interstate commerce. As such, it does not desire to violate the regulations of any governmental agency of the State of Minnesota, if those regulations are valid. But, as such, it also has a duty to each of its customers to supply adequate electric power to meet their needs. In the absence of a prompt declaratory decree as to their validity or invalidity, the plaintiff would be in the intolerable position of choosing whether to violate the PCA permit and serve its customers or attempting to comply with the PCA permit and not adequately serve its customers.

40. State and describe in detail the interrelationship between Monticello and plaintiff's existing generating plants.

ANSWER The benefits of nuclear-fueled electric generating plants mainly are the low cost of producing electric energy and the elimination of the combustion by-products associated with coal burning plants. However, the low operating cost can only be obtained by making a relatively large expenditure (capital investment) in plant facilities. The large capital investment is necessary because of the design and construction of the nuclear steam supply. Therefore, to be economically feasible, a nuclear generating plant should be operated continuously at a high output level. Such an operation will minimize the combined total of operating and capital costs. Generating capability associated with a high capital cost and low fuel or operating cost is referred to as "base-load" capability. Another example of base-load capability is a large, high-pressure steam plant fueled with coal such as the A S King generating plant near Stillwater, Minnesota.

The nuclear plant operation can be contrasted with another type of generating plant operation referred to as "peak-shaving" or peaking operation. Peaking capability can be installed at a lower capital cost, but the corresponding fuel cost is relatively high. Examples of peaking capability include jet-engine powered plants (such as the NSP Faribault plant), and diesel-engine powered plants (such as the NSP Zumbrota plant). To be economically feasible, peaking plants must operate only for short time periods.

The lowest cost of producing electricity is achieved by combining peaking-type generating capability with base-load type generating capability in an optimal manner called the optimal mix. The optimal mix depends on the nature of the customer's demand, i.e., the number of hours per year the customer has high demands and the number of hours per year the customer has low demands. This varies among utilities. For Northern States Power Company's system the optimum mix occurs when about 20% of the capability is of the peaking type and the remainder is of the base-load type plus older coal-fired steam plants.

The Monticello plant will be connected to the EHV grid system and will operate in synchronism with the existing operating plants. Future operation of the Monticello generating plant can be accurately predicted by simulation using models of the customers' demand and of generating capability as it is expected to exist in the future. This simulated operation shows the following results with respect to other generating plant capabilities.

	Megawatts (Summer Capability)		
Year	Total System Capability	Monticello Capability	Monticello as a Percent of Total System Capability
1970	3 357	460	13.7
1971	3 405	508	14.9
1972	3 935	508	12.9
1973	3 960	[illegible]	[illegible]
1974	4 490	533	11.9

The above table shows that the capability of the Monticello plant will increase with time. This is because the design allows for future increase in the output

of the nuclear steam supply. Relative to capability, simulation studies show that the Monticello plant will be more prominent in producing electrical energy, as follows:

	Millions of Kilowatt-hours		
Year	Total System Requirements	Monticello Output	Monticello as a Percent of Total Output
1970	15 526	2 290*	14.8
1971	16 773	3 788	22.6
1972	18 302	3 794	20.7
1973	19 969	3 891	19.5
1974	21 808	3 983	18.3

* The Monticello output for 1970 is lower than 1971 because the plant is scheduled to be in operation only for eight months during the first year.

41. State and describe in detail the interrelationship between Monticello and the existing generating plants of the Upper Mississippi Valley Power Pool.

ANSWER Interconnection agreements among participants in the Upper Mississippi Valley Power Pool allow for the exchange of capability and energy. Exchanges of capability are usually made to meet some immediate need or to coordinate major generating plant additions.

Energy transactions among Midwest utilities, made in association with demand transactions, account for a major portion of energy exchange. Another significant exchange has as its purpose to minimize energy production costs of the entire Pool. Economy energy transactions minimize production costs by allowing a member with high-cost generation to reduce that generation and buy from a member with a lower production cost. The resulting savings are then split equally between the two participants. During off-peak hours, the Monticello plant will displace energy production on higher cost units, thereby reducing the level at which economy energy transactions are made. As a result the entire Pool production costs will be reduced.

42. State and describe all reasons why plaintiff cannot operate both under the PCA permit requirements regarding radioactive discharges as well as within the standards promulgated by the AEC.

ANSWER It is impossible to comply fully with all requirements of the PCA permit requirements regarding radioactive waste discharges, although plaintiff

could operate well within the standards promulgated by the AEC. A specific illustration of positive interference by a PCA permit condition with AEC requirements relates to plaintiff's emergency plan submitted for AEC review and approval which provides for immediate notification in the event of accident to a number of agencies and officers including state agencies. The qualifications of the plant personnel who will, in emergency situations, administer the plan, are described in detail in the plan. These personnel do not include state officials as having authority to enter the facility to direct operations in the event of an emergency, while the Final Report on Radioactive Pollution Control in Minnesota, as incorporated in paragraph 13 of the Special Conditions Relating to Radioactive Wastes of the PCA permit, does contemplate such state direction of operations.

43. State and describe how much fuel leakage is anticipated under present design and how much is anticipated if the P.C.A. permit requirements are met.

ANSWER: The amount of fuel leakage at the Monticello Plant has no relationship to whether the PCA permit requirements are met. The amount of fuel leakage will be a given amount, depending upon a variety of different factors, such as the quality of material and workmanship involved in the manufacture of the fuel assemblies. The PCA permit can have no effect upon such factors.

44. If the answer given to interrrogatory 43 is greater under the P.C.A. permit, state in detail any and all reasons for the anticipated increase.

ANSWER: See answer to Question 43.

45. State at what percent of AEC discharge limits plaintiff intends to operate both as to gaseous as well as liquid radioactive wastes.

a. State whether the intention expressed in answer to interrogatory 45 will be exceeded at any time and if so for what periods of time and at what levels will there be such discharges.

ANSWER: Northern States Power Company intends to control operation of the Monticello plant so that radioactive liquid and gas releases will be held to the lowest level that is attainable within the limitations imposed by technological feasibility, economic reasonableness and [illegible] safety of plant personnel, and well within the limits expected to be set by the AEC for the protection of public health and safety. It is impossible to answer this question in any other

way, since the plaintiff does not have an intention which is related to any given percentage of AEC limits.

a) The foregoing intent will not change from time to time.

Dated this 28th day of October, 1969.

Arthur V. Diesnhart
Assistant Vice President
Northern States Power Company
414 Nicollet Mall
Minneapolis, Minnesota 55401

Subscribed and sworn to before me
this_____day of October, 1969.

Notary Public