University of Minnesota
St. Anthony Falls Hydraulic Laboratory

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HYDROPOWER POTENTIAL AT EXISTING DAMS IN THE STATE OF MINNESOTA

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ABSTRACT

The study identifies existing dam sites in the State of Minnesota which may be economically feasible for hydropower development. This is accomplished in a three step process. A first stage screening uses existing information on the 853 Minnesota dams and a rule-of-thumb criteria to eliminate sites with no hydropower feasibility from further investigation. A second stage screening improves the compiled information on the sites not eliminated in the first stage through site visits, contacts with government agencies, and contacts with dam owners. The final stage of the analysis is a pre-feasibility study on each of the dam sites not eliminated from consideration through the two screening processes. Guidelines for hydropower project cost estimates are developed and incorporated into a computer program which also uses hydrologic and hydraulic information and information on any existing hydroplant to determine the optimum plant capacity for economic return. The financial and economic feasibility criteria chosen are those typical of a municipality. The sites are ranked in order of economic return, based upon the benefit-cost ratio after 35 years of operation. In addition, each site is given a qualitative ranking of very good, good, marginal or poor feasibility. The very good, good and marginal sites amount to 165.7 MW of additional undeveloped hydropower potential in the State of Minnesota. These sites may generate an additional 581 GWH of electricity per year. The total cost to develop these sites is estimated to be 255 million dollars (1982 base year).

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I. INTRODUCTION

The escalation of nonrenewable energy production costs over recent years has prompted considerable interest in the development of small-scale hydropower as an alternative energy source. Small-scale hydropower sites, which previously could not economically generate power, may now be feasible because of rising fuel prices, increasing construction costs for thermal generation facilities, and public concern over the safety of nuclear plants and the storage of nuclear waste products. On a world-wide basis, hydropower represents approximately 23 percent of the total electrical energy generated. According to Armstrong [1]* , there is approximately 4.2 million megawatts of developed and potential hydropower existing in the world. Of this amount, 16 percent exists in North America, of which approximately 33 percent is actually developed. This compares with approximately 60 percent developed in Europe.

At the present moment, the most attractive hydropower potential is in the increase of capacity or development of new capacity at existing sites. This type of hydropower retrofitting has a relatively short construction time of approximately two years. In addition, there are lower initial costs since a new dam is not built. Many of the dam sites considered attractive for hydropower development would not be feasible if a new dam needed to be constructed. In addition, the environmental impact caused by installing hydropower at these existing sites is usually small, relative to other forms of power generation. Gulliver and Lindblom [2] have reviewed the environmental impact of hydropower development at existing dam sites in the State of Minnesota.

Hydropower development at a given existing dam site is generally small when compared to thermal power plants and the more spectacular hydroplants such as the Hoover Dam. It is therefore called small-scale hydropower development, classified by the U. S. Department of Energy as being 15 MW or less. There are a number of advantages to small-scale hydropower which have inspired the U. S. Congress and the Minnesota State Legislature to encourage the development of this resource.

First, hydropower is a renewable energy source and that alone is a significant advantage. It is also a long-term investment, literally an investment in the future. A hydropower facility will last 50 to 100 years or more. In some cases, the number of small sites which may be developed can add up to the same amount of power as one large nuclear power plant without the safety or security hazard normally involved with a large scale development. By having the total amount of power distributed over several small plants, the overall reliability can increase, since it is not very

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*Numbers in brackets indicate references on page 57.

likely that all plants would suffer an outage at the same time. In addition, hydropower development in general is capital intensive and, hence, inflation proof. Finally, when considering hydropower development within a given region, it is also important to look at the overall economics of that region. A substantially larger percentage of the investment capital for hydropower can stay within a given region since the developmental work can be done by local architects, enginees, and contractors. The more sophisticated thermal power plants are designed and built by specialized contractors and in many cases this results in large amounts of capital leaving the local economy. The same is true for the amount of capital necessary for fuel in the case of thermal power plants, creating a substantial drain on the economy. For example, in the State of Minnesota it is estimated that each dollar spent on out-of-state coal is equivalent to three dollars invested within the state. This net outflow of capital would not occur in the operation of a hydropower facility.

There are also several disadvantages to small hydropower development. The most obvious is the fact that economy of scale does not prevail. This results in high initial cost for a relatively low installed capacity. In many cases these plants are run-of-the-river; that is, their capability of generating power fluctuates widely with season, and this prevents a system of small power plants from acting as an equivalent base load plant. In many areas of the country peak power is available in late spring, and the system peak occurs in midsummer. This mismatch of power availability can be quite serious.

In addition to the lost economy of scale, it should also be pointed out that there are other disadvantages which relate to the low head available at most Minnesota dams, generally less than 60 ft. The problem with these sites is that the power available is proportional to the product of flow and head. As the head decreases, larger amounts of flow must be handled in order to generate a given power level. In addition, with less head a larger turbine is required to pass the same amount of flow. This means that the size of the machine increases, producing a disproportionate increase in the cost for the amount of power developed.

Hydopower schemes can either be single purpose, where the only purpose is the production of electricity, or multi-purpose, where hydropower production is just one aspect of the total utilization of the facility. Multipurpose facilities include those in which hydropower is developed in conjunction with irrigation, flood control, navigation, and water supply. Hydropower plants are also categorized to the type of utilization. For example, a baseload plant is one in which the power is used to meet all or part of a sustained and constant portion of the electrical load. Energy from these plants, which is available a large percentage of the time, is referred to as firm power. The need for power varies during the day, and power requirements over and above the baseload requirement are met by peak load facilities. These are plants in which the electrical production capacity is relatively high, and the volume of water discharged through the units can be changed readily to meet peak demands. Storage or pondage of the water supply is necessary for these facilities to operate. Hydropower plants are particularly adaptable to peak load demands, since they can be started and stopped more rapidly and economically than fossil fuel and nuclear power plants. The use of small hydropower plants as peak load facilities is therefore particularly attractive.

There is no set pattern which must be followed in developing a hydropower facility. The following "typical hydropower development sequence," however, gives an idea of where the various levels of study fit in the development process.

1. Power Production Screening

The power production screening uses basic information such as the net head and flow available at the site to determine whether it is worthwhile to even consider hydropower development. Potential feasibility is determined from general criteria such as that used in this study for first stage and second stage screening.

2. Preliminary Feasibility Study

The preliminary feasibility study is a limited investigation utilizing existing information to develop a preliminary indication of project feasibility. The basic purpose is to determine whether it is worthwhile to allocate funds and effort to a comprehensive feasibility study of the proposed project. A pre-feasibility study for purely economic feasibility may be completed for a given site in one man week if cost curves and other sources of standardized information are used. The pre-feasibility study is the limit of the analysis on Minnesota dam sites herein.

3. Review of Other Potential Development Constraints

There are many other potential constraints to hydropower development. Three examples are: 1) financing may not be obtainable, 2) severe potential environmental impacts may restrict development, and 3) local regulatory agencies or public opinion may be against development of the site. These and other potential development constraints should be considered before proceeding with a feasibility study.

4. Preliminary Permit Application

The Federal Energy Regulatory Commission (FERC) Preliminary Permit retains the right of the permit holder to file for a FERC license without being preempted by another application. Three to five man days are usually required to complete a preliminary permit application if a pre-feasibility study has been completed.

5. Comprehensive Feasibility Study

The objective of a feasibility study is to propose a viable project development, to make recommendations on development strategy, and to provide the basis for further studies required for licensing and permits. A feasibility study will normally include:

- hydraulic and hydrologic analysis,

- formulation of project development alternatives,
- cost estimates for equipment and construction, which are more detailed than those in the pre-feasibility study
- analysis of plant operation strategies,
- computation of expected energy production,
- analysis of energy value and market,
- benefit-cost analysis
- financial analysis
- analysis of environmental impacts
- analysis of socio-institutional impacts, and a
- strategy for project implementation

6. Application for local, state and federal permits and a FERC license.

There are numerous state and local permits which need to be obtained for hydropower development. These should be undertaken as soon as, or possibly before, the decision to proceed with development is made.

7. Purchaser Negotiations

Negotiations with potential purchasers should begin as soon as the project implementation decision has been made.

8. Facility Design

The design study often includes the review of bids for equipment from manufacturers.

9. Construction and Installation

10. Operation

This study focuses on the first two steps in the hydropower development sequence. A power production screening, using a general criteria, is performed for all 853 existing dam sites included in the U. S. Army Corps of Engineers National Dam Safety Inventory for the State of Minnesota. The safety inventory includes all dams with a structural height equal to or greater than 6 ft. The results obtained at the end of the screening process eliminates sites with poor hydropower feasibility from further consideration.

A preliminary feasibility study is then performed on each of the remaining sites to refine the general rule-of-thumb assessment of the screening process. The core of the study is a computer program which incorporates flow data, hydraulic data, information on any existing hydroplant and information on the proposed powerplant to give feasibility parameters for the proposed facility. These parameters include the design head, turbine discharge, plant capacity, annual energy production, equipment cost, total project cost, cost of operation and maintenance, and the benefit-cost ratio after 35 years of operation. The program concludes which sites have a very good, good, marginal, or poor hydropower feasibility based upon the computed benefit-cost ratio.

II. SCREENING OF EXISTING SITES FOR HYDROPOWER POTENTIAL

A. Methodology

In preliminary hydropower feasibility studies at twenty-one existing dam sites in the State of Minnesota, Gulliver et al. [3] established project relative cost as a means of estimating hydropower feasibility of a dam site. Relative cost is the total initial project cost divided by the annual energy production and can be conceptually defined as the rate of which energy must be sold to pay off the project in one year. The advantage of using the relative cost in a preliminary study is that assumptions such as amortization period, discount rate, operation and maintenance, etc. are not required.

Relative cost based upon design or feasibility studies for a number of existing dam sites is plotted against design head and average annual discharge in Fig. 1. Based on a generic financial feasibility analysis as a function of relative cost, Gulliver et al. determined that dam sites in Minnesota with an estimated relative cost equal to or less than 0.50 $/KWH indicate good hydropower feasibility. Dam sites with a relative cost between 0.5 and 1.4 $/KWH were classified as marginally feasible. A relative cost of greater than 1.4 $/KWH was classified as poor feasibility.

For the first stage of screening all existing dam sites in Minnesota Fig. 1 was divided into regions, according to the criteria given above. Region A indicates good feasibility, Region B indicates marginal feasibility, and Region C indicates poor feasibility. The power capacity of a given site is determined by using hydraulic height and average annual discharge to compute power based on the following formula:

$$P(\text{kW}) = \frac{e\ Q(\text{ft}^3/\text{sec})H(\text{ft})}{11.81} \qquad (1)$$

where P = power capacity of site in kW

Q = average annual discharge (ft^3/sec)

H = hydraulic height or design head (ft), and

e = overall plant efficiency (fraction), assumed to be 0.85.

The use of an average annual flow to compute plant capacity is a rule-of-thumb which may not be correct for a given site, but will give fairly accurate estimates when a number of sites are incorporated.

The purpose of the hydropower screening process is to eliminate those sites with no hydropower potential, without eliminating any site with any measurable potential. The feasibility regions in Fig. 1 were therefore

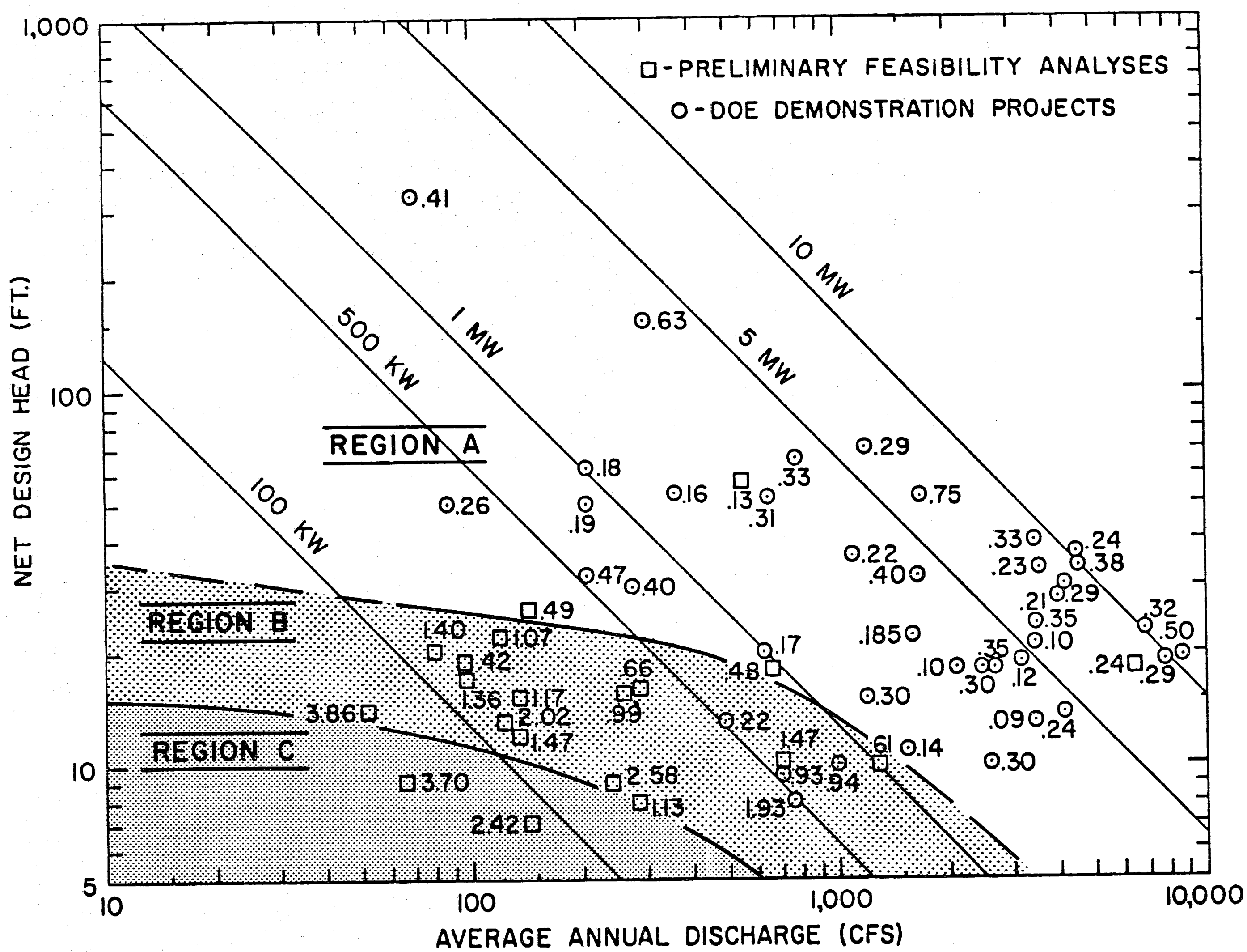

Fig. 1. Hydropower feasibility regions for existing Minnesota dam sites, based upon the relative cost estimates of previous studies.

developed to be conservative in the elimination process, so that no feasible sites would be overlooked.

B. First Stage Screening for Hydropower Potential

Although there are 853 existing dam sites in Minnesota, the majority of these are extremely low head with very low flow, and thus are not suitable for hydropower development. The first stage screening used available data to estimate hydropower potential, with little or no improvement in the data base.

1. Available Data

Knowing the design hydraulic head and the average annual discharge for all 853 existing dams listed in the National Dam Safety Inventory of the U. S. Army Corps of Engineers, the "hydropower feasibility region" of each dam site was determined.

The design hydraulic head was assumed to be equal to the hydraulic height given in the inventory. In many cases, this head was found to be significantly greater than the actual net available head at the dam, and thus does not provide a reliable estimate of net head. Since the inaccuracy in head would tend to place the dam in a higher feasibility region, rather than in a lower one, it is believed that none of the truely marginal or good sites were eliminated from consideration. At dam sites where a more reliable estimate of net head is available, that value was used in place of the hydraulic height given by the National Dam Safety Inventory.

The most accurate means of determining average annual discharge at any stream location is to use data from a USGS stage-discharge station on the same stream and scale the results according to drainage area. The average annual discharge at a site would then be estimated with the following equation:

$$Q_{site} = Q_{gage} \left(\frac{\text{D.A. site}}{\text{D.A. gage}} \right) \qquad (2)$$

where Q_{site} = average annual discharge at dam site,

Q_{gage} = average annual discharge at USGS stage-discharge gage,

D.A. site = drainage area of the site, and

D.A. gage = drainage area of the USGS stage-discharge gage.

Many of the sites in this study, however, are on ungaged streams and the average annual discharge was estimated by correlation with drainage area. Figure 2 gives a plot of average annual discharge versus drainage area for all stage-discharge gages in Minnesota [4]. The wide scatter of data indicated that some subgrouping of stations was required. A subgrouping of gages within each two inch annual rainfall isopleth was attempted without success, as shown in Fig. 2. A more distinct correlation with drainage area was found when the stage-discharge gages were grouped by the major drainage basins given in Fig. 3. The resulting correlations for each drainage basin subgroup are given in Figs. 4 through 9. These correlations were then used with the site drainage area to estimate average annual discharge at dam sites where more reliable data were not available. The Minnesota River Basin was subdivided into two subbasins, as shown in Fig. 6. The lower basin begins at New Ulm, Minnesota. The drainage area correlation for the Red River of the North Basin, given in Fig. 7, could not be represented by one "best fit" curve due to the excessive scatter. Instead, upper and lower envelope curves were drawn. An average annual discharge from each curve was applied to any dam site in the basin, representing the range of possible discharges at the site.

The drainage area of each dam site was found from one of the following sources:

- Drainage areas for some of the sites were determined by the St. Paul Regional Office at the U. S. Army Corps of Engineers National Hydropower Study.
- National Dam Safety Inspection Reports, which have been prepared for a few of the dam sites in the study include the drainage area.
- Existing files at the Minnesota Department of Natural Resources gave drainage area in a few instances.
- For a few select sites, drainage areas could be determined using information given in Water Resources Data for Minnesota Water Year 1979, U. S. Geological Survey.
- The remaining sites were identified on 1:250,000 scale USGS contour maps. The drainage basin was then outlined and planimetered to determine drainage area.

2. Results

At the end of the first stage screening of the 853 dam sites 55 were found to be in Region A, indicating a good hydropower feasibility; 53 in Region B, indicating marginal hydropower feasibility; and the remainder in Region C, indicating poor hydropower feasibility. The total potential capacity of Region A sites was estimated to be 350 MW. The present capacity of all the hydropower facilities at Region A sites is 169 MW. In addition, 14 MW of capacity have been retired. The total additional capacity of Region A sites, at this state of the study, was estimated to be 180 MW.

The existing dam sites listed in Region B indicating marginal hydropower feasibility were estimated to have between 9 MW to 10 MW. Since the present total capacity of these sites is 0.56 MW the additional potential capacity for Region B sites, at this stage of the study, was estimated to be 9 MW.

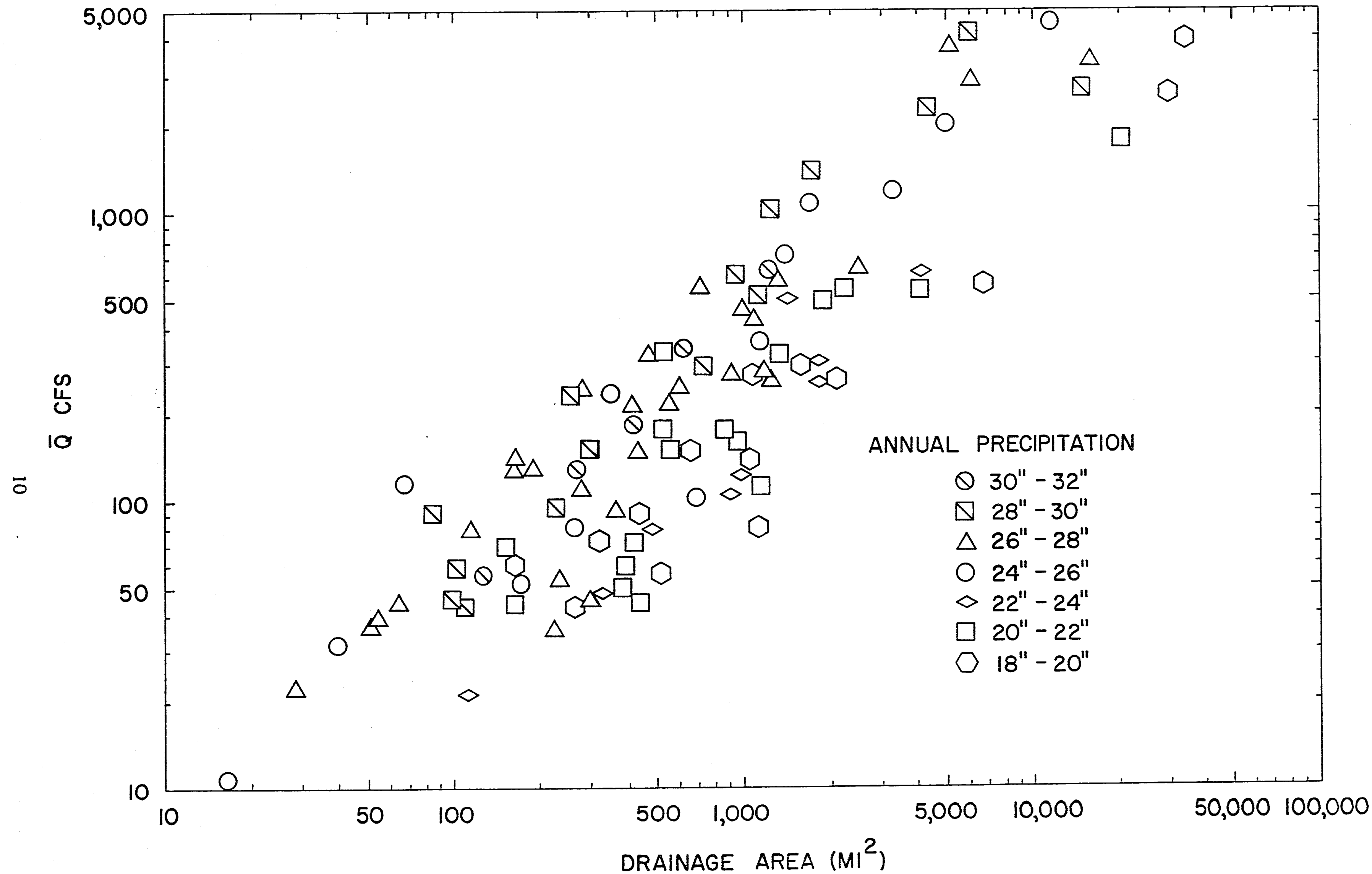

Fig. 2. Average annual discharge ($\overline{Q}$) versus drainage area for USGS stream-discharge gages in Minnesota.

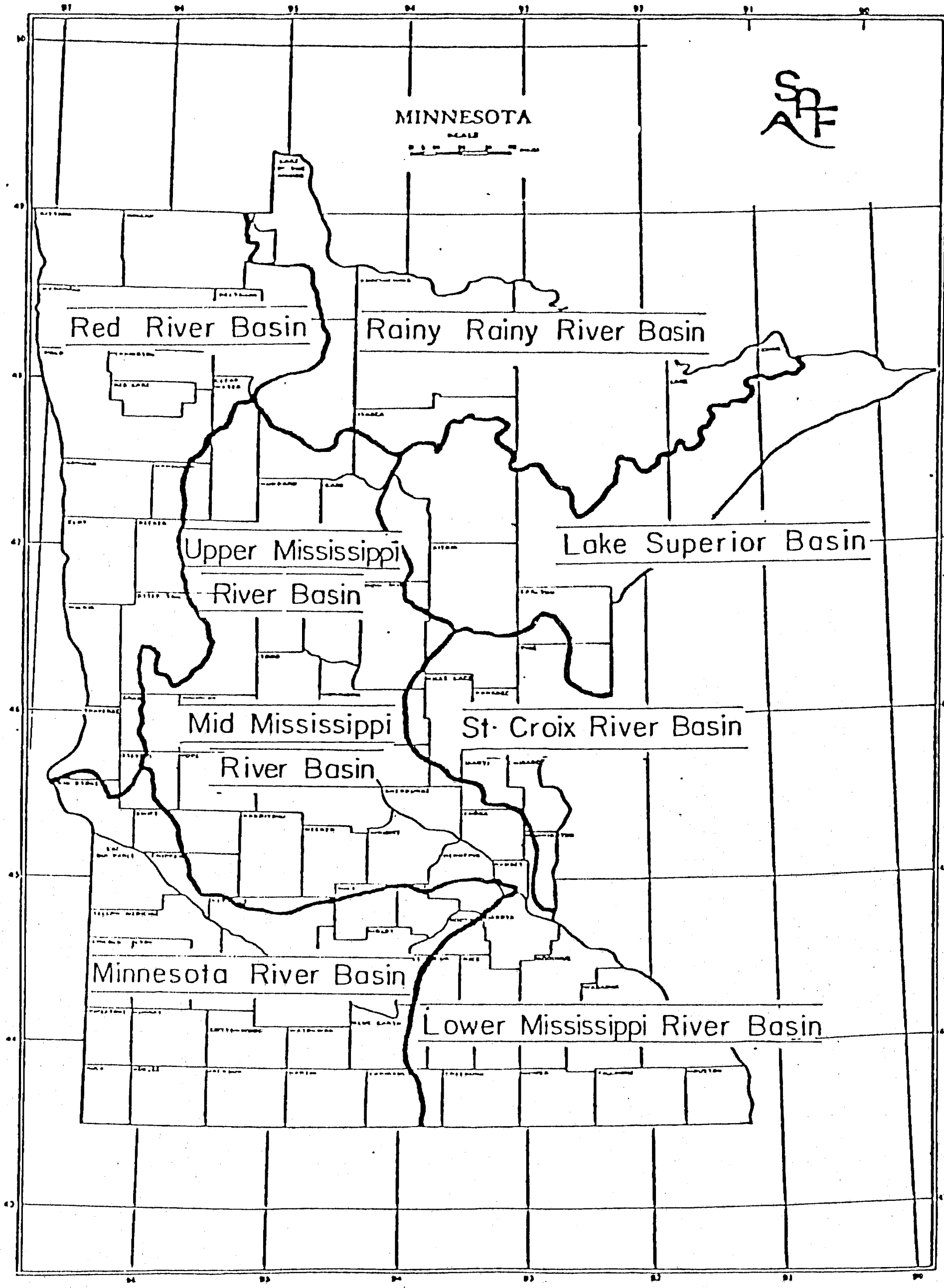

Fig. 3. Major drainage basins in the State of Minnesota.

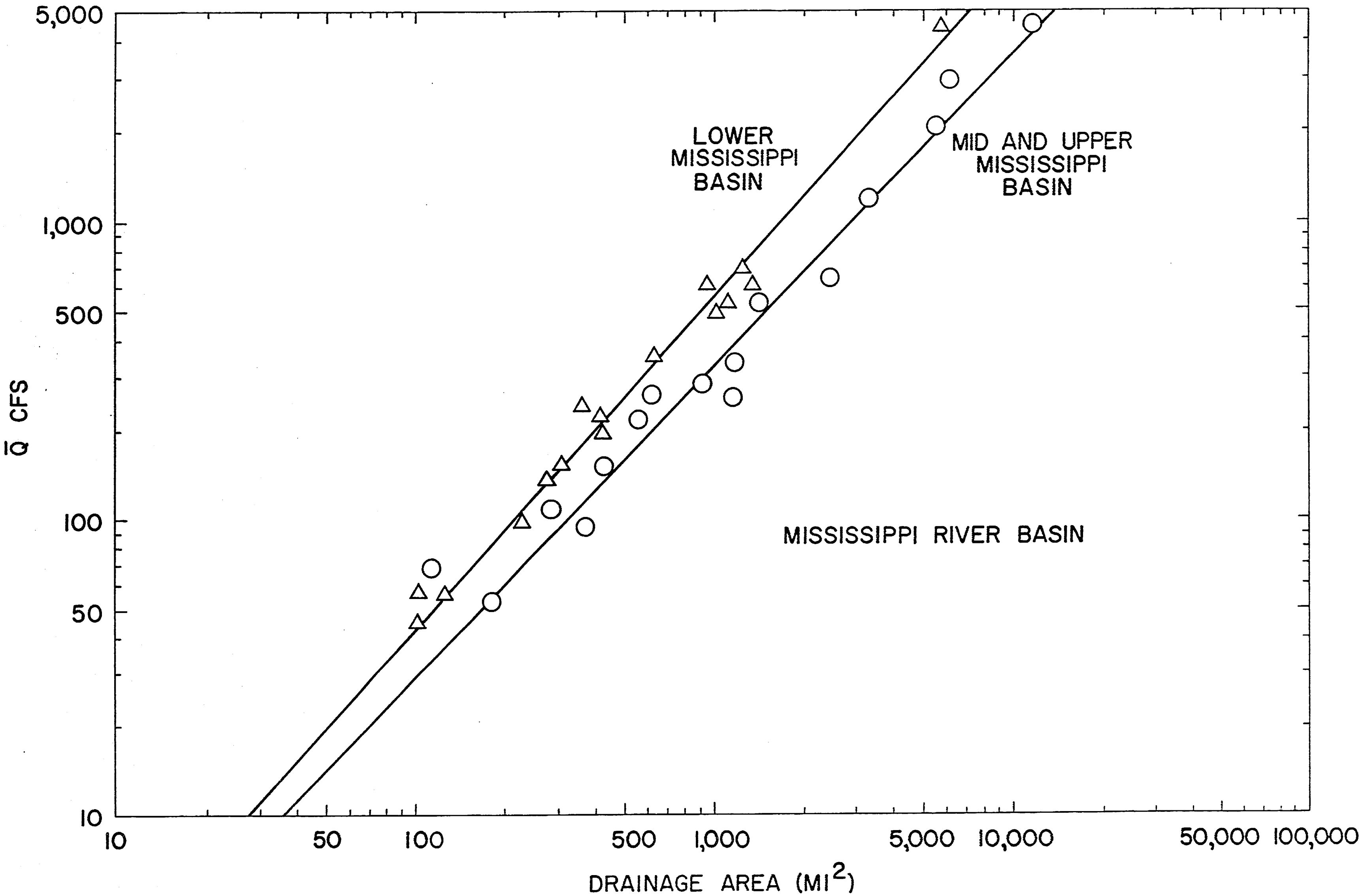

Fig. 4. Average annual discharge ($\overline{Q}$) versus drainage area for the Mississippi River basin.

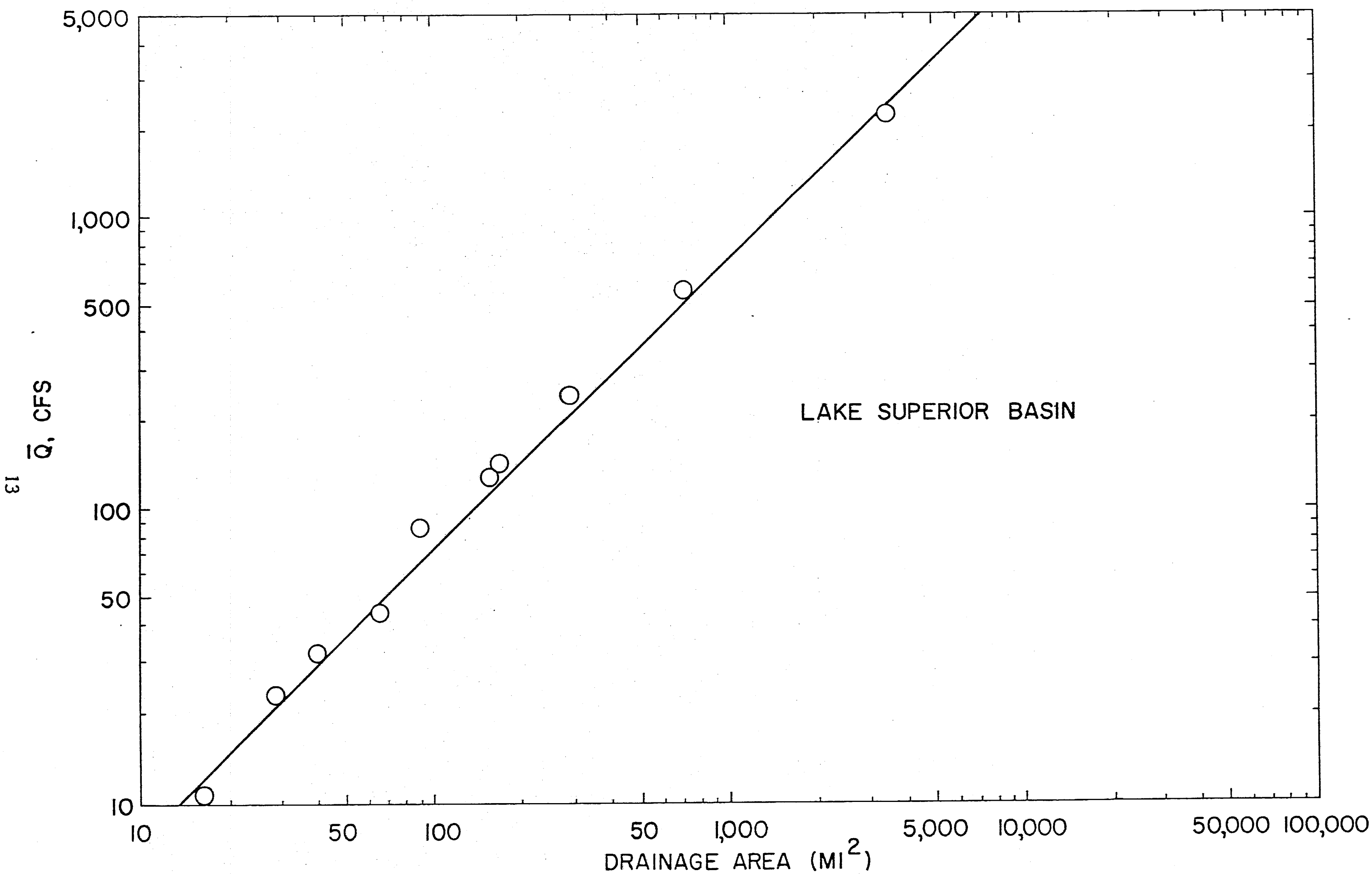

Fig. 5. Average annual discharge ($\bar{Q}$) versus drainage area for the Lake Superior basin.

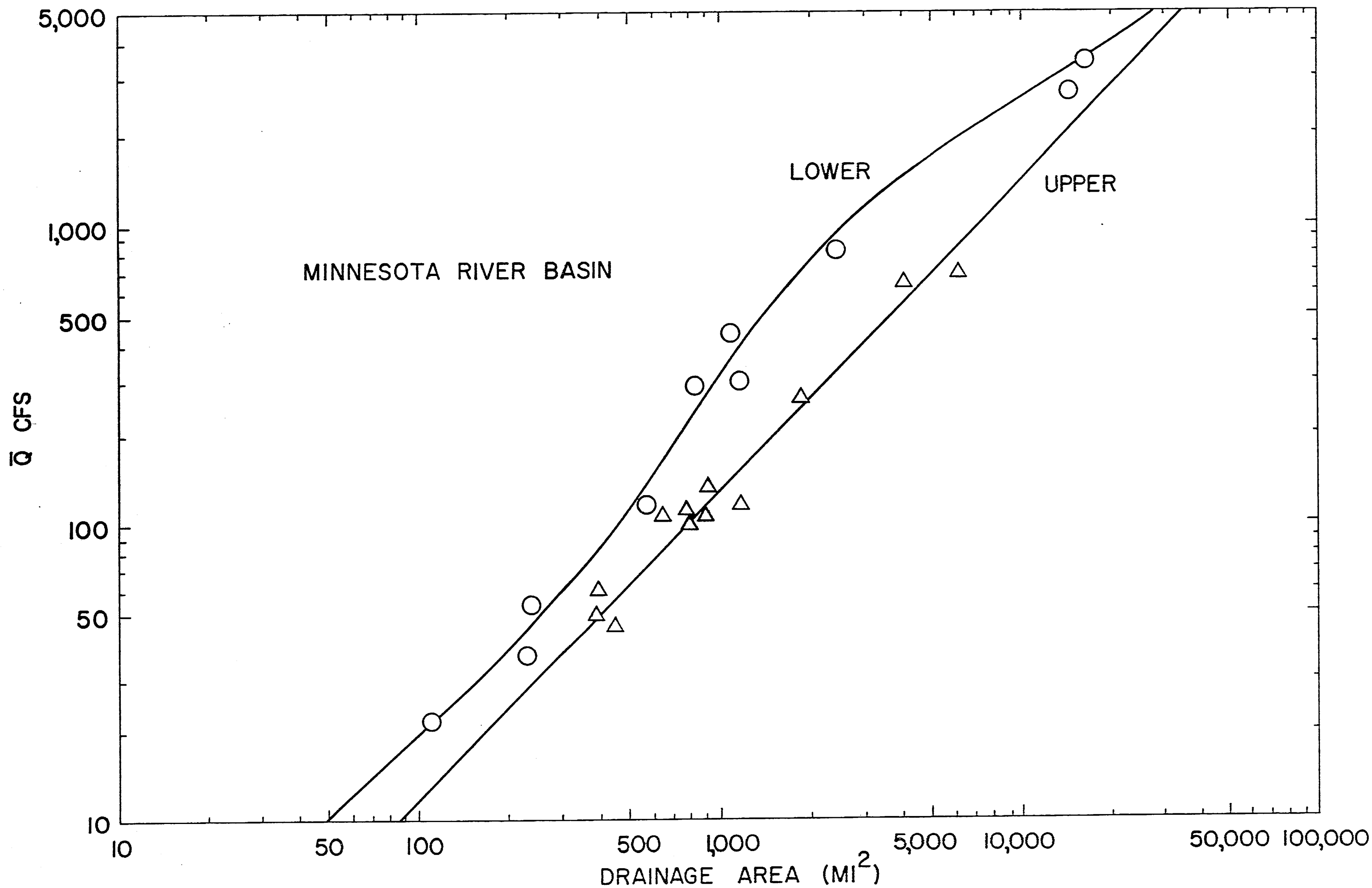

Fig. 6. Average annual discharge ($\overline{Q}$) versus drainage area for the Minnesota River basin.

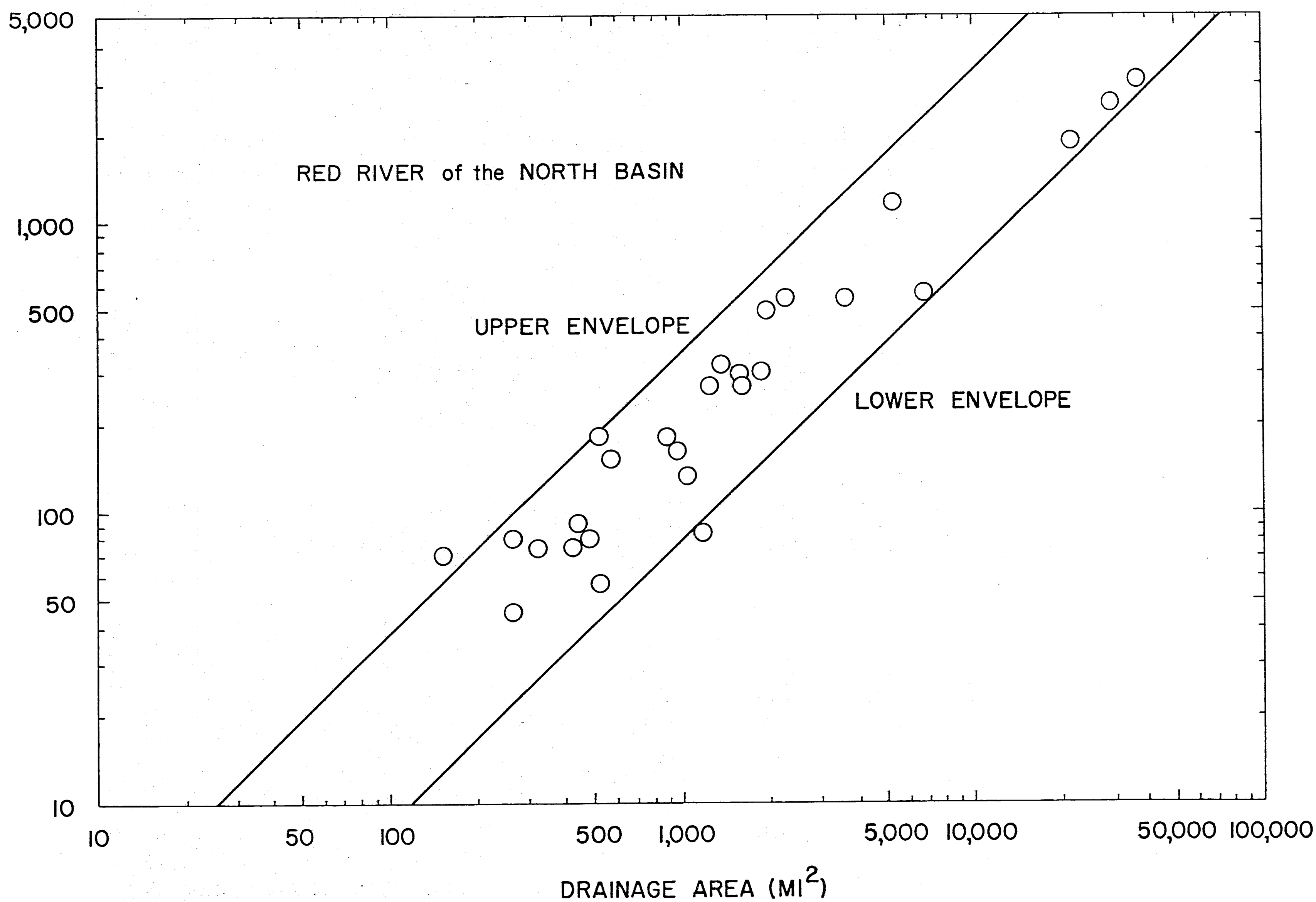

Fig. 7. Average annual discharge ($\overline{Q}$) versus drainage area for the Red River of the North basin.

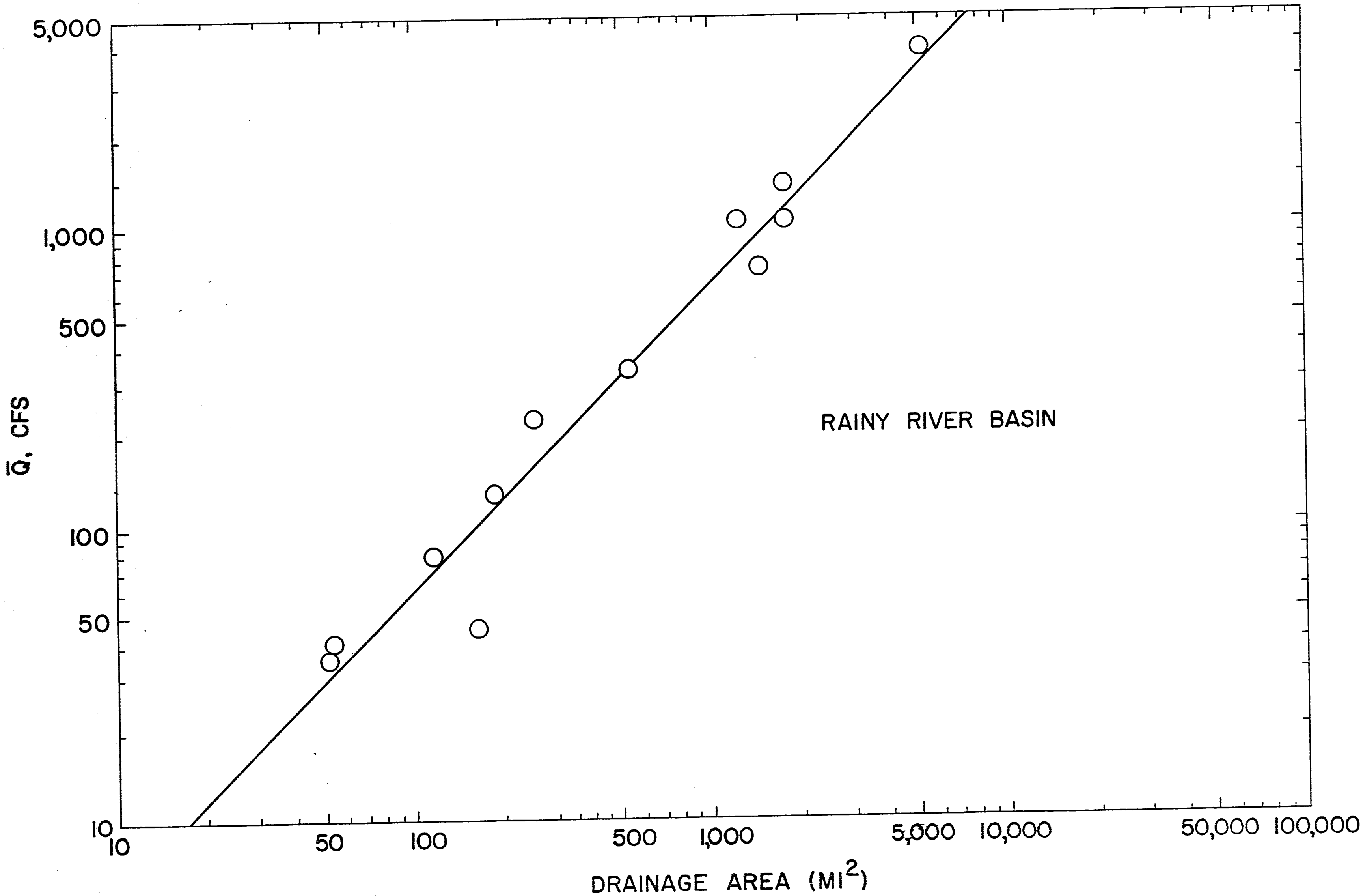

Fig. 8. Average annual discharge ($\overline{Q}$) versus drainage area for the Rainy River Basin.

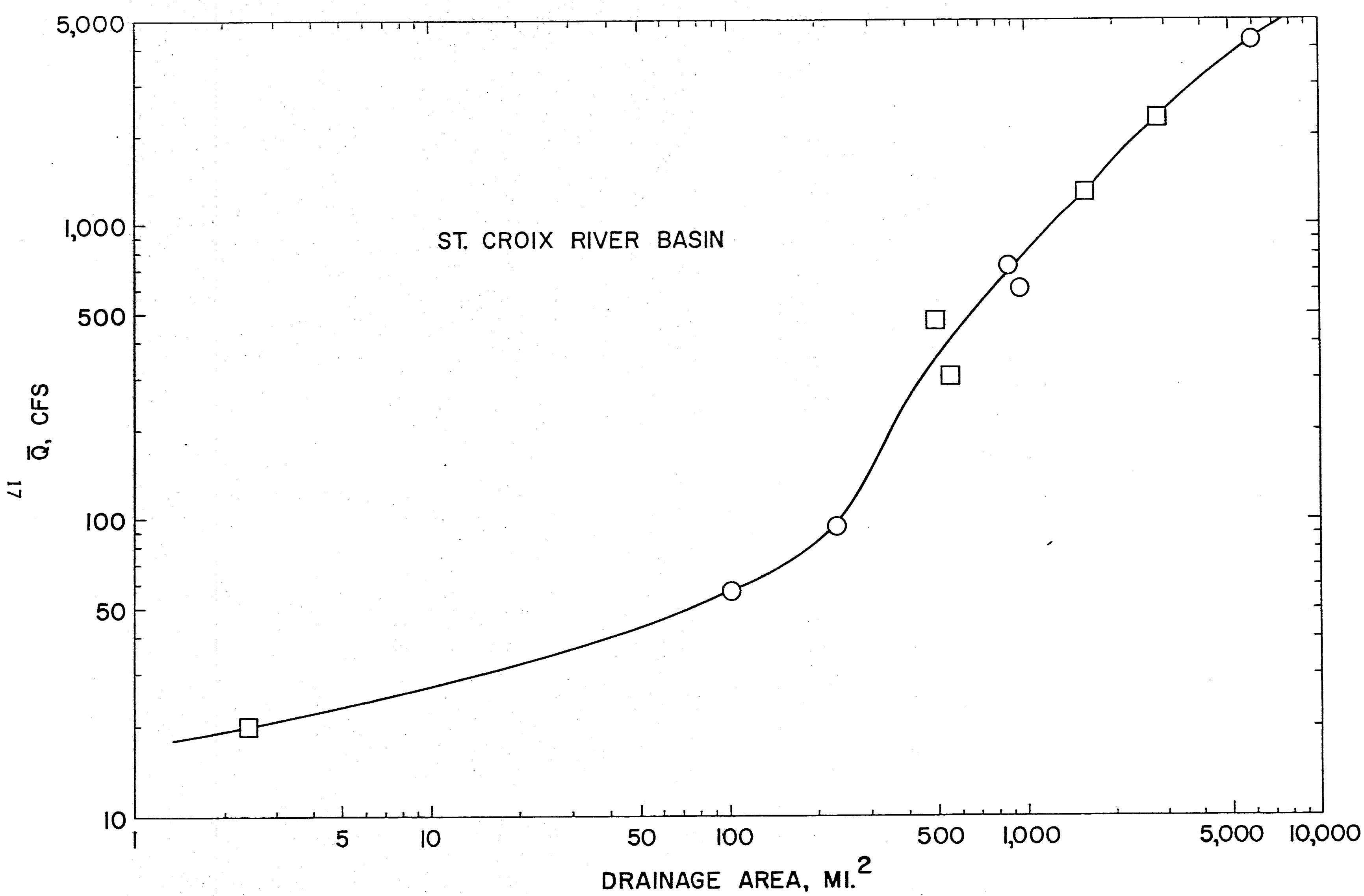

Fig. 9. Average annual discharge ($\overline{Q}$) versus drainage area for the St. Croix River basin. Square symbols indicate discontinued.

C. Second Stage Screening

1. Data Collection

The second portion of the study concentrated on improving the accuracy of the data on the 108 sites in Regions A and B. Attempts to contact all the dam owners were made and information such as plans of the dam sites and headwater and tailwater elevations where requested. USGS historical records of stream discharge were used to estimate the flow at the sites as described in Section III.A.1a. Forty-two of the dam sites were visited in order to compile information which was not otherwise available. The hydraulic head was measured for each site and in some sites a stream flow measurement was conducted at a typical cross section downstream to the dam site. The dimensions of the spillway were recorded and pictures of the dam sites were taken and used as a first assessment to determine proposed hydroplant location, or, in sites with an existing powerhouse, where to install the additional turbines. The site visits proved to be crucial to the study, since in many cases the actual net head measured in the field was significantly smaller than that on record, and in extreme cases it was found that some dams no longer exist. The hydraulic measurements were used in the development of headwater and tailwater rating curves as described in Section III.A.1b.

2. Results

Based on project relative cost, the same criteria used in the first stage screening, a second screening using the improved data reduced the 108 sites to 34 sites with good hydropower feasibility and 31 sites with marginal hydropower feasibility.

All the dam sites in Region A, indicating good hydropower feasibility, and the sites in Region B, indicating marginal hydropower feasibility, are listed in Table 1. The other information given in Table 1 includes:

- Dam inventory identification number.
- County where the dam is located.
- Average annual discharge at the river of the dam site.
- Average hydraulic head.
- Source of information for the dam site. The abbreviations in this column are:

  SV - site visit
  SIR - National Dam Safety Program Inspection Report
  DNR - Data obtained from the Department of Natural Resources
  OC - Owner Contacted
  SAFHL - Feasibility study prepared by St. Anthony Falls Hydraulic Laboratory

- Reliability of data used for energy calculations:

TABLE 1. Existing Dam Sites in Region A and Region B Indicating Good and Marginal Hydropower Feasibility

ID Number	Site Name	County	Source of Site Information	hydraulic height, ft	Average Annual discharge, cfs	Potential Power Capacity, MW	Present Capacity (former capacity)	Reliability of Data Used in Energy Calculation	Second Screening Feasiblity Region
MN00583	Sandy Lake Lock & Dam	Aitkin	OC	9.5	215	0.15		G	B
MN00549	Rum River	Anoka	SV, SAFHL	12	637	0.55		VG	B
MN00512	Rapidan	Blue Earth	OC	62	835	3.7	(1.5)	VG	A
MN00598	Cloquet	Carlton	SV, OC	39	2290	6.4	5.5	VG	A
MN00603	Fon Du Lac	Carlton	SV, OC	81	2405	14.0	11.8	VG	A
MN00604	Thomson	Carlton	SV, OC	363	2375	62.1	68.6	VG	A
MN00605	Scanlon	Carlton	SV, OC	16	2290	2.6	1.5	G	A
MN00606	Knife Falls	Carlton	SV, OC	18	2290	3.0	1.9	G	A
MN00601	Sylvan	Cass	OC	22	2470	2.3	1.9	M	A
MN00585	Leech Lake Dam (federal)	Cass	OC	7	360	0.18		VG	B
MN00586	Winnibigoshish Dam	Cass	SV, OC	12	515	0.46		VG	B
MN00582	Pine River Dam	Crow Wing	OC	13	217	0.20		M	B
MN00597	Brainerd	Crow Wing	OC	20	3465	5.0	3.7	VG	A
MN00594	Lock & Dam #2	Dakota	OC	12	10700	9.0		VG	A
MN00514	Byllesby	Dakota, Goodhue	SIR	57	414	1.7		VG	A
MN00517	Lanesboro	Fillmore	SV, SAFHL	27	140	0.34		VG	A
MN00026	Mustinka R	Grant	DNR	13	50	0.05		P	B
MN00507	Coon Rapids	Hennepin	SV, SIR	20	7560	10.9	(6.5)	VG	A
MN00590	St. Anthony Upper Lock & Dam	Hennepin	SV, OC	49	7790	27.5	12.5	VG	A
MN00591	St. Anthony Lower Lock & Dam	Hennepin	SV, OC	24	7790	13.5	8.0	VG	A
MN00593	Lock & Dam #1	Hennepin	OC	38	7795	21.3	14.4	VG	A
MN00234	Fish Hook	Hubbard	SV, SAFHL	15	100	0.10		VG	B
MN00584	Pokegma Lake & Dam	Itasca	OC	10	1135	0.78		M	B
MN00602	Blandin	Itasca	OC	21	1170	1.8	2.1	VG	A
MN00117	Jackson Dam	Jackson	SIR	11	283	0.22		G	B
MN00607	Winton	Kake	OC	65	1000	4.7	5.0	VG	A
MN00062	New London	Kandiyohi	SIR	16	50	0.06		G	B
MN00017	Bronson Lake	Kittson	SIR	26	89	0.17		VG	B
MN00653	Rainy Lake	Koochiching	SIR	28	10035/2*	10.1	10	G	A
MN00580	Lac Qui Parle	Lac Qui Parle	OC, SV	13	632	0.57		VG	B
MN00581	Highway 75 Dam	Lac Qui Parle	SV, OC	13	127	0.12		G	B
MN00120	Brawner Lake	Lyon	SIR	21	39	0.06		G	B
MN00599	Blanchard	Morrison	OC	45	4375	14.2	13.4	VG	A
MN00600	Little Falls	Marrison	OC	24	4380	7.6	4.6	VG	A
MN00608	Crow Wing R. (Pillager)	Morrison	OC	22	1470	2.3	1.5	VG	A

(Cont'd)

*Average annual discharge was divided between the Canadian and American sides.

TABLE 1. Existing Dam Sites in Region A and Region B
Indicating Good and Marginal Hydropower Feasibility

ID Number	Site Name	County	Source of Site Information	hydraulic height, ft	Average Annual discharge, cfs	Potential Power Capacity, MW	Present Capacity (former capacity)	Reliability of Data Used in Energy Calculation	Second Screening Feasibility Region
MN00365	Shady Lake	Olmsted	SV, SIR	18	210	0.27		M-G	B
MN00364	Mayowood	Olmsted	SV	13	55	0.05		M	B
MN00515	South Branch Zumbro R	Olmsted	SV	11	110	0.09		G	B
MN00190	Pelican Rapids	Ottertail	SIR	15	64	0.07		G	B
MN00191	Pelican River	Ottertail	SIR	16	77	0.09		G	B
MN00574	Orwell Dam	Ottertail	OC, SV	33	305	0.59		VG	A
MN00502	Red Lake I (Thief R)	Pennington	SV, SAFHL	15	816	0.88	0.55	VG	B
MN00544	Willow River	Pine	SIR	13	65	0.06		G	B
MN00513	Kettle River	Pine	SV, SAFHL	19	692	0.95	(0.47)	VG	A
MN00008	Red Lake II (Crookstone)	Polk	SV, OC	10	1120	0.81	(0.175)	VG	B
MN00550	Grand Fork East	Polk	SV, OC	10	2550	1.6		VG	A
MN00356	Cannon River II	Rice	SV, OC	11	300	0.24		G	B
MN00535	Sand Creek	Scott	SV	13	46	0.04		M	B
MN00516	Elk River	Sherburn	SIR, OC	16	269	0.31		M-G	B
MN00614	Fish Lake	St. Louis	OC	18	52	0.07		M	B
MN00092	Pike River	St. Louis	SV	21	85	0.13		M	B
MN00093	Kettle Falls	St. Louis	DNR (Inv. File)	10→17	9600	6.9→11.7		P	A
MN00094	St. Louis River	St. Louis	SV, OC	15	550	0.59		VG	B
MN00610	White Face Lake (Skunk Creek)	St. Louis	OC	34	82	0.20		M	A
MN00612	Island Lake	St. Louis	OC	37	230	0.61		M	A
MN00505	Mississippi (Sartell)	Stearns	SIR	23	4765	7.9	3.2	VG	A
MN00506	St. Cloud	Stearns	SV, SAFHL	18	5100	7.4	(2.2)	VG	A
MN00508	Sauk R. I (cold spring)	Stearns	DNR	8	270	0.16		M	B
MN00561	Sauk River III	Stearns	SIR	12	170	0.15		G	B
MN00011	Zumbro R (Mazappa)	Wabasha	SV, DNR	12	115	0.10		M	B
MN00358	Zumbro Lake	Wabasha	SV, SIR	55	388	1.5	2.2	VG	A
MN00587	Lock & Dam #7	Winona	OC	7	27800	14.0		VG	A
MN00589	Lock & Dam #5	Winona	OC	8	26250	15.1		VG	A
MN00152	Minnesota River I	Yellow Medicine	SV, SAFHL	17	705	0.86	(0.78)	VG	A
MN00510	Minnesota River II (Grante Falls)	Yellow Medicine	SV, SAFHL	18	705	0.91	(0.58)	VG	A

SV = Site visit
OC = Owner contact
SIR = Safety Inspection Report
DNR = General Information obtained from the DNR
SAFHL = St. Anthony Falls Hydraulic Laboratory feasibility studies

VG - very good
G - good
M - marginal
P - poor

- Potential power capacity.

- Existing or former power capacity.

Note that in some cases the potential power capacity is less than the existing capacity. The source of these differences is that the potential power capacity was calculated using the average head and the average annual discharge, which is approximately the discharge at 25 percent exceedance. Therefore, if the design flow of the existing turbines is at a lower percent exceedance (higher flows) they can produce more power than the potential estimated by the screening. This could occur if the turbines were designed for peaking. Other possible reasons are that the existing turbines were over designed or that their efficiency is higher than the one assumed for the potential power calculation.

The data collected on all of the dam sites in Minnesota and the screening calculations for each site are given in Appendix A. A preliminary feasibility study, described in Section III, was performed on each of the 65 sites remaining after the second stage screening.

III. PRE-FEASIBILITY STUDIES OF HYDROPOWER POTENTIAL

The final stage in estimating the hydropower potential at all existing dam sites in Minnesota is a preliminary feasibility study on each of the 65 sites remaining after the second stage screening. The pre-feasibility studies included more detailed hydraulic and hydrologic information, techniques for estimating equipment costs and total project costs, and a financial feasibility analysis using financial criteria typical of a public municipality. The pre-feasibility studies were standardized by developing a computer program which reads site specific information and estimates project benefits, costs, and assesses economic feasibility.

A. Methodology

1. Energy and Power Production

a. Hydrologic analysis

The hydrologic analysis utilizes the flow duration curve to describe the timing and magnitude of flow at the site. This method may incorporate minimum stream flow and daily peaking but cannot incorporate storage and peaking over a period greater than one day. The flow duration curve is developed by sorting daily flow measurements for the period of record according to magnitude. A given flow is identified by the number of flow measurements of record exceeding that value, or more precisely, by the percent of time that flow is equalled or exceeded. A sample flow duration curve is given in Fig. 10.

Flow duration curves were developed by one of the following methods, in descending order of preference:

(a) Using the relationship between the drainage area of the U. S. Geological Survey continuous record stage-discharge gaging stations at or near the site and the drainage area of the dam site. The flow duration data for these gaging stations can be applied to the dam site by using the following equation:

$$Q \text{ (at site)} = \left[\frac{A(\text{site})}{A(\text{USGS gage})}\right]^n Q_i(\text{USGS gage}) \qquad (3)$$

where Q_i = flow at i percent exceedance,

A = drainage area, and

n = constant based on the characteristics of the watershed which may vary from 0.60 to 1.4.

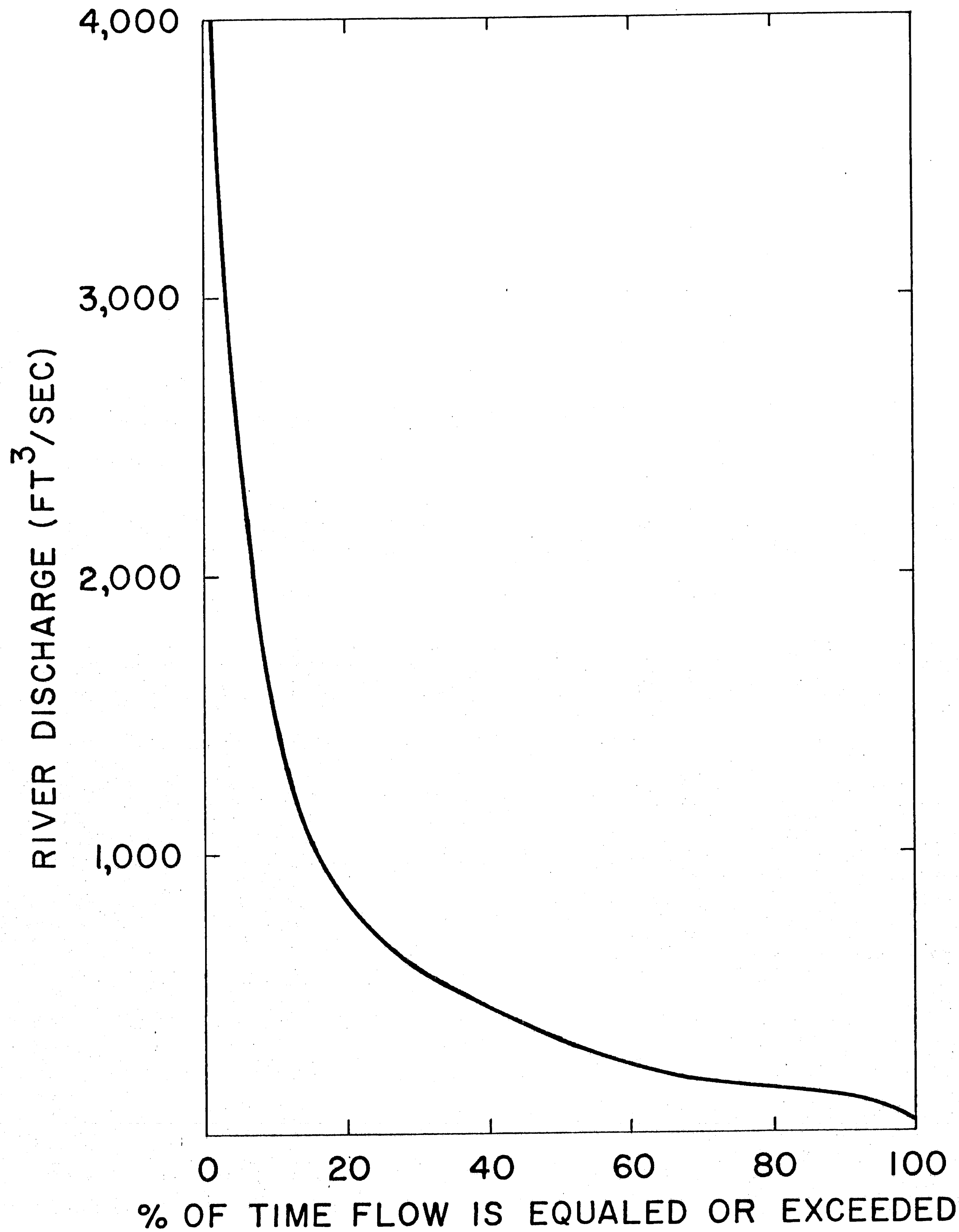

Fig. 10. Flow duration curve for the Rum River Dam.

For cases when the ratio of the drainage areas was found to be greater than 0.5 or less than 2.0, sufficient accuracy was achieved by using n equal to 1.0.

(b) When the ratio of drainage areas between the site and a continuously recording stage-discharge gage was less than 0.5 or greater than 2.0, the value of n was determined by comparing flow data from a partial discharge gage at or near the site and the continuous gage. Then for each flow measurement at the partial gage:

$$n = \frac{\log \left[\dfrac{Q \text{ (partial gage)}}{Q \text{ (cont. gage)}}\right]}{\log \left[\dfrac{A \text{ (partial gage)}}{A \text{ (cont. gage)}}\right]} \tag{4}$$

where Q = average daily flow measured at both stations on the same day. The average value of n computed with Eq. 4 was used in Eq. 3, giving a more accurate estimate of the flow duration curve to be applied to the site. This method was also used for entirely ungaged watersheds, when the only continuous flow duration data available was from a gaging station in a nearby stream.

(c) Parametric flow duration curves for a watershed may be used as the last (and least accurate) means of estimating the flow duration curve at a dam site. The parametric curves are a plot of discharge versus drainage area for a number of USGS gages within the watershed. The State of Minnesota was divided into seven major drainage basins as shown in Fig. 3. A set of curves for each river basin was developed, representing the flow at a given percent exceedance as a function of drainage area. An example correlation is given in Fig. 11. For watersheds where there was a wide scatter in the data, an upper and lower envelope curve were drawn and used to represent the range of possible discharges at the site. This method was only applied in a few cases where the previously described methods were not applicable.

b. Hydraulic analysis

The hydraulic data necessary for evaluating the power production at a dam site is headwater elevation and tailwater elevation versus discharge. A headwater (elevation) curve represents the variation of the water surface elevation upstream of the dam versus the discharge over the spillway, and was determined in the following manner:

(a) Natural Dam Safety Inspection Reports, conducted for a number of sites in the State of Minnesota, provide headwater curves.

(b) If the transverse length and shape of a spillway are known, a headwater curve may be computed from the weir equation [5],

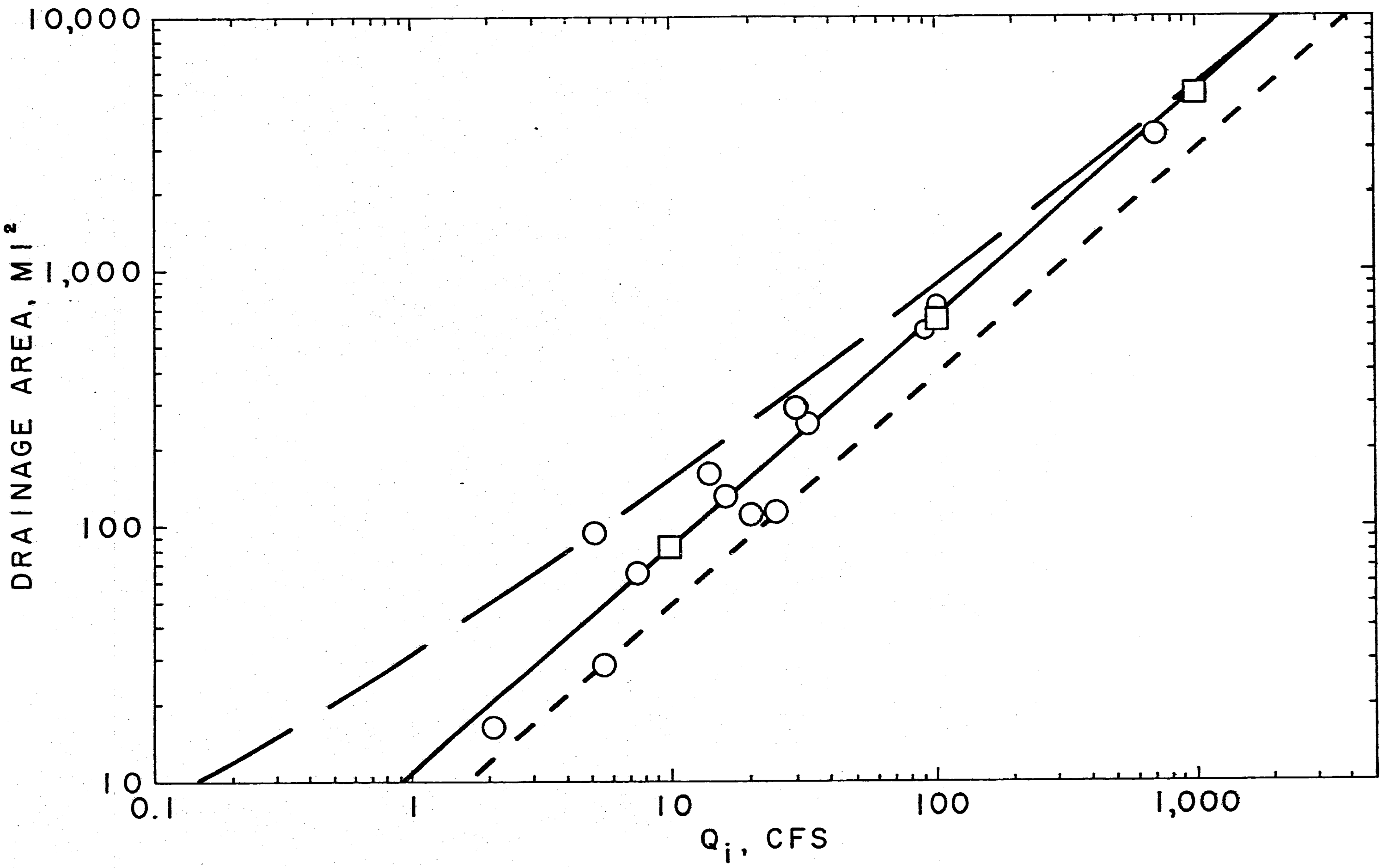

Fig. 11. Correlation between drainage area and river discharge at 85 percent exceedance for the Lake Superior drainage basin.

$$Q = CBH^{3/2} \tag{5}$$

where Q = discharge over the spillway,

C = discharge coefficient, which may be determined from Brater and King [5] and other handbooks,

B = transverse length of spillway, and

H = head of reservoir water level above spillway crest.

The length of the spillway was obtained from the plans of the dam or by direct measurements conducted during site visits.

(c) When neither of the above sources were available or when the operation procedure of the reservoir indicated that water surface elevation is maintained at a specific elevation, a constant headwater elevation equal to the normal pool elevation was assumed.

One sample of a typical headwater curve derived for the Rum River at Anoka is given in Fig. 12.

The tailwater elevation versus river discharge was determined in the following manner, in descending order of preference:

(a) Using the rating curve of a USGS stage-discharge gaging station when the gage is located immediately downstream of the dam site. In cases where the gaging station is located further downstream to the dam (within a reasonable distance) the rating curve of the gage was shifted upstream by using the average slope along the length of the stream.

(b) Using tailwater curves included in the National Dam Safety Inspection Report, prepared by the Department of Natural Resources.

(c) Cross-sectional data at the site and local slope along the length of the stream combined with the estimation of a roughness coefficient such as Manning's n, were used to develop a tailwater curve when no other data existed. A relation between river discharge and water surface elevation was obtained from Manning's equation assuming uniform flow. Flow measurement taken during site visits enabled verification of one point on the computed tailwater curve. Since the weakest link in Manning's equation is in determining Manning's n [6, 7], this parameter was adjusted so that the computed tailwater curve fit the measured tailwater elevation.

River discharge was measured during site visits by one of the following two methods:

i. Dividing the cross section of the stream into segments and directly measuring velocity profiles. In each of the

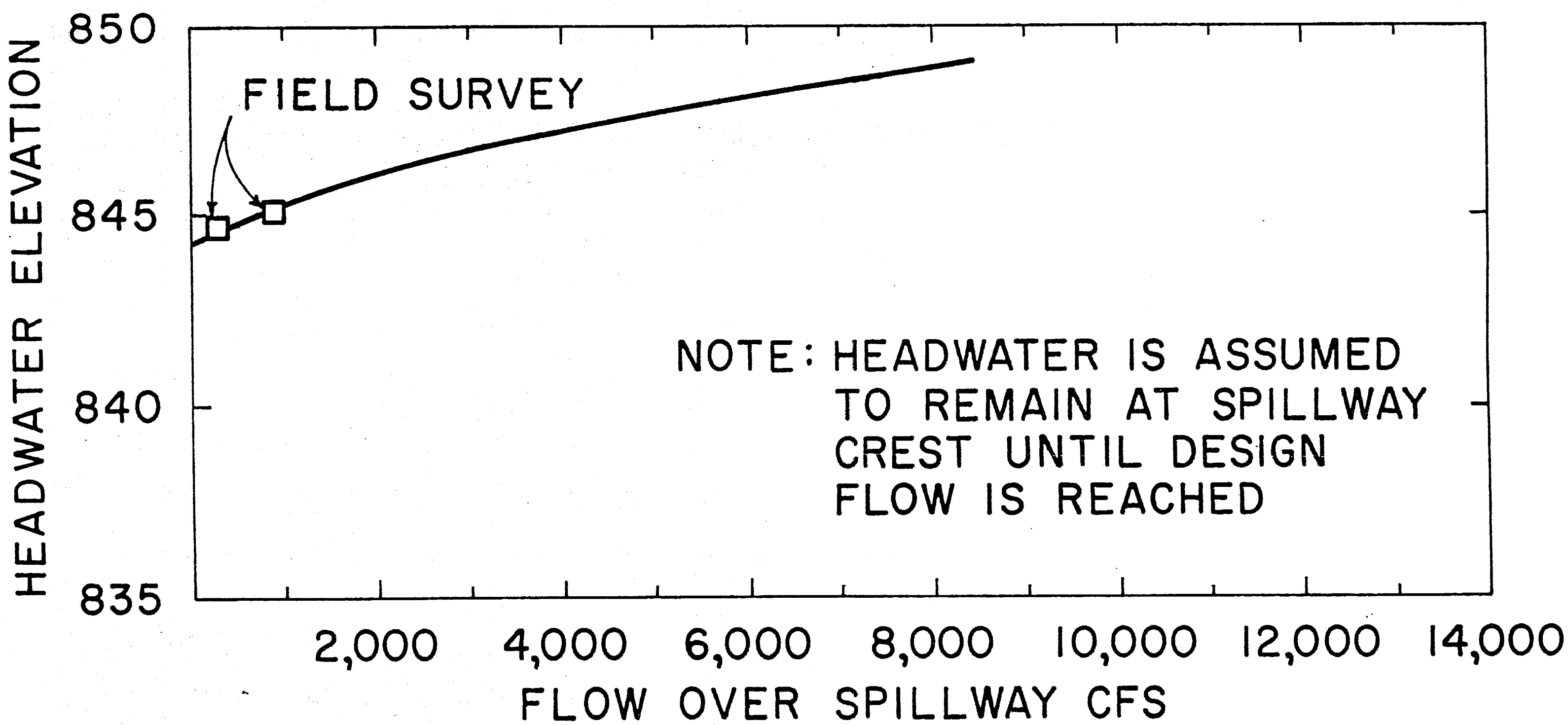

Fig. 12. Headwater curve for the Rum River Dam.

segments the velocity of the flow is measured with a flow meter at 20 and 80 percent of the depth. The average velocity multiplied by the area gives the discharge at the segment. The total discharge is the summation of the discharges along the cross section.

ii. The surface velocity on each segment is measured by using the "stick method" where travel time of a stick along a measured distance gives the velocity of the water surface. The mean velocity is then determined from a logarithmic velocity profile [8].

$$\frac{U - U_{max}}{U^*} = \frac{1}{K} \ln \frac{y}{h} \tag{6}$$

where $U^* = \sqrt{f/8}\ \overline{U}$, shear velocity,

U_{max} = surface velocity,

$\overline{U}$ = mean velocity,

f = friction factor,

K = Von Karman's constant $\cong 0.4$,

y = distance from channel bottom, and

h = channel depth.

Equation 6 may be integrated to give mean velocity as a function of surface velocity:

$$\overline{U} = \frac{U_{max}}{1 + \sqrt{\dfrac{f}{8K^2}}} \tag{7}$$

Multipling the mean velocity with the area of the segment will give the discharge that passes through that segment. Then summation of discharges along the cross section gives the total stream discharge.

A typical tailwater curve for the Rum River at Anoka is given in Fig. 13.

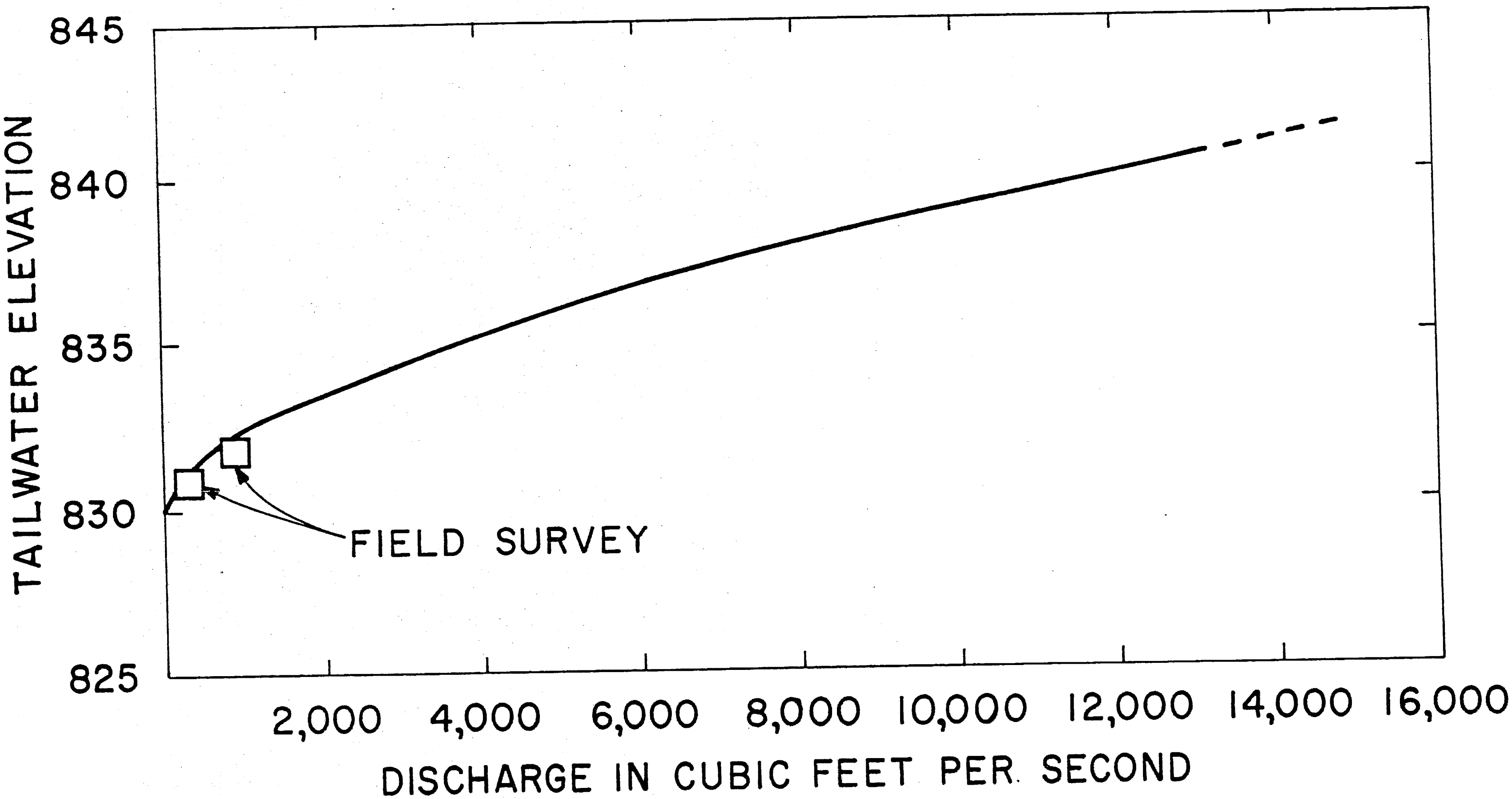

Fig. 13. Tailwater elevation curve for the Rum River Dam.

c. Power production

The design power capacity of a hydroelectric plant is expressed by the formula:

$$P_d(KW) = \frac{Q_d\ H_d\ C}{11.8} \qquad (8)$$

where P_d = design generation capacity in kW,

Q_d = turbine design discharge in cfs,

H_d = head in ft available for power generation at Q_d, and

e = overall hydroplant efficiency, including turbine, generator, and speed increaser (fraction).

For a given turbine design discharge the design head can be determined by using the headwater and tailwater curves. The efficiency of new installed turbine units was assumed to be 85 percent. The efficiency of existing units was assumed to be 75 percent, corresponding to typical values observed in 30-year old hydroplants.

Knowing the turbine design discharge and the flow duration curve, a power duration curve may be developed. The power duration curve represents power production versus the percent exceedance for the corresponding river flow, or:

$$P_i = \frac{Qt_i\ H_i\ e}{11.8} \qquad (9)$$

where i = percent exceedance,

Qt_i = turbine discharge at i percent exceedance,

H_i = total head available at Q_i,

P_i = power generation when river flow is at Q_i ,

The total head available is not always the direct difference between the headwater elevation and the tailwater elevation corresponding to stream flow at a given percent exceedance because the headwater curve is a function of spillway discharge, rather than river discharge. The available head is therefore affected by the turbine design discharge, as illustrated in Fig. 14. When the river flow is less than the turbine design discharge, all the flow will pass through the turbine, and headwater elevation will remain at the spillway crest. When the river flow exceeds the turbine design discharge, the excess water flows over the spillway, and headwater

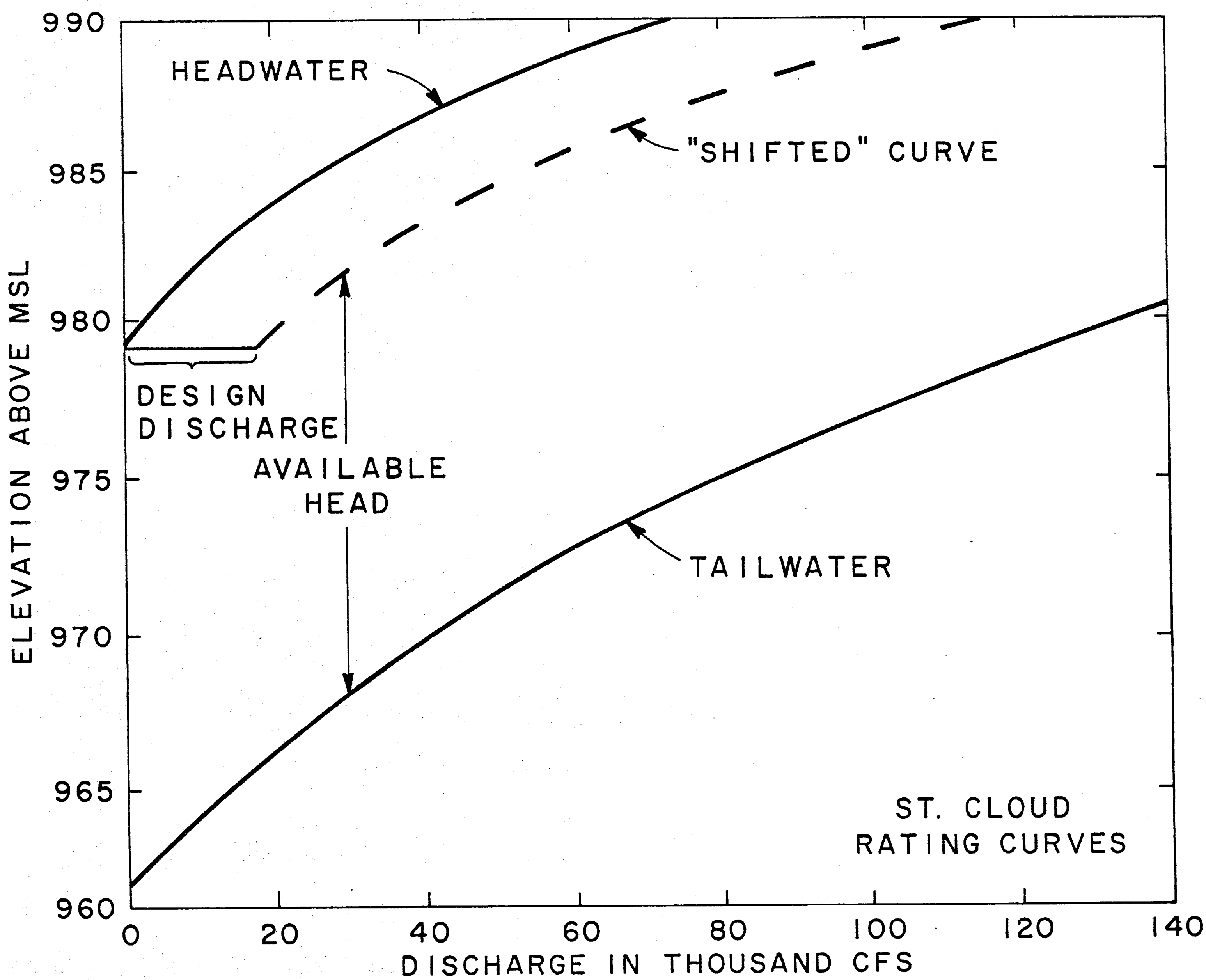

Fig. 14. Illustration of net available head variation due to a change in turbine discharge.

elevation increases according to the headwater curve. As the turbine design discharge is increasing, the "shifted" headwater curve causes the total available head to be reduced. In a low head hydropower plant the reduction in the available head may vary significantly and must be taken into consideration in the power production calculations.

The turbine discharge is a function of the design head, the turbine design discharge and the total available head. If the turbine is designed for a given flow at the design head, that turbine will pass less flow at lower heads. Turbine discharge as a function of head is approximated by the orifice equation:

$$Qt_i = \text{the smaller of } \left(Q_d \sqrt{H_i/H_d}\ ,\ Q_i\right) \tag{10}$$

When the stream flow is less than the turbine design discharge, all stream discharge will flow through the turbines to generate power, and $Qt_i = Q_i$.

d. Average annual energy

The average annual energy production which can be expected from a hydropower facility is found by determining the area under the power duration curve. Due to differences in market value, distinction was made between dependable energy and nondependable energy as shown in Fig. 15. The dependable energy is assumed to be the energy that is generated from power that is available 50 percent of the time. This power is the median power and is determined by sorting the power along the power duration curve. The area confined below the median power is dependable energy, and the area above the median power is nondependable energy. The 50 percent level was chosen as typical of what a Minnesota hydroplant using daily peaking could achieve.

Two additional limitations to energy production are minimum streamflow and minimum turbine discharge. Minimum streamflow (for protection of the stream biota) is determined in Minnesota through negotiation, with no generally established standards. Minimum turbine discharge is specific to the particular turbines under consideration. It is therefore very difficult to incorporate these two factors into a generic study of this sort. The general guideline chosen is that no power is generated if streamflow is below the 80 percent exceedance level or 100 cfs, whichever is less. These parameters will not greatly affect hydropower feasibility except in extreme cases, i.e. an unusually high minimum streamflow specification.

At sites where an existing hydropower facility exists and an increase in capacity is being considered, the energy production is the combined output of the old and proposed new units. Since the new turbine units generally operate with a higher efficiency, it is assumed that the low flows will pass through the new turbine units and the old turbines will start to operate only when the river flow exceeds the design discharge of the new units. The efficiency of the combined operation of the new and old turbine units will therefore be a weighted average of the amount of flow through each unit. Figure 16 gives an example "weighted average

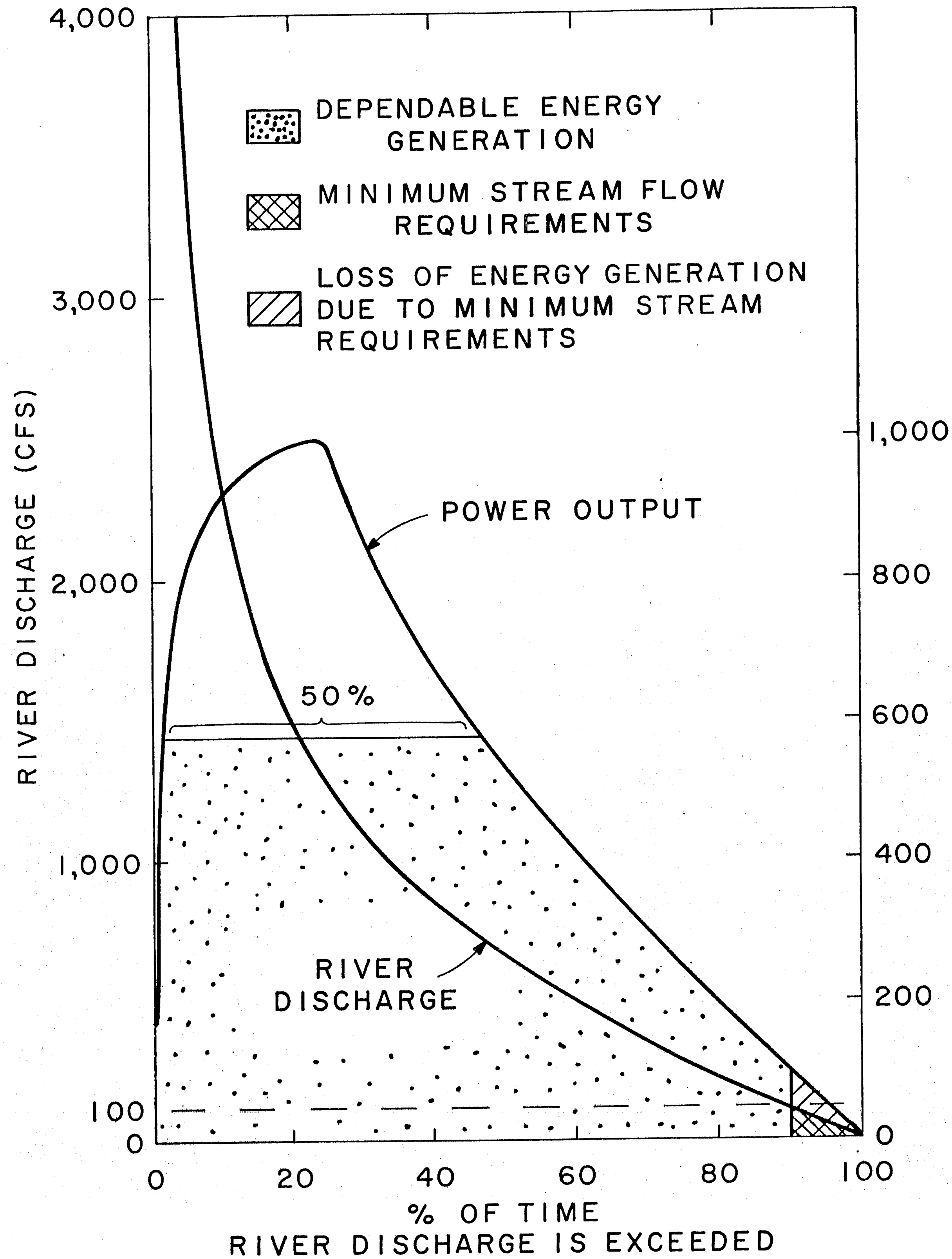

Fig. 15. Flow duration and power duration curve for Crookston Dam site illustrating power production regimes.

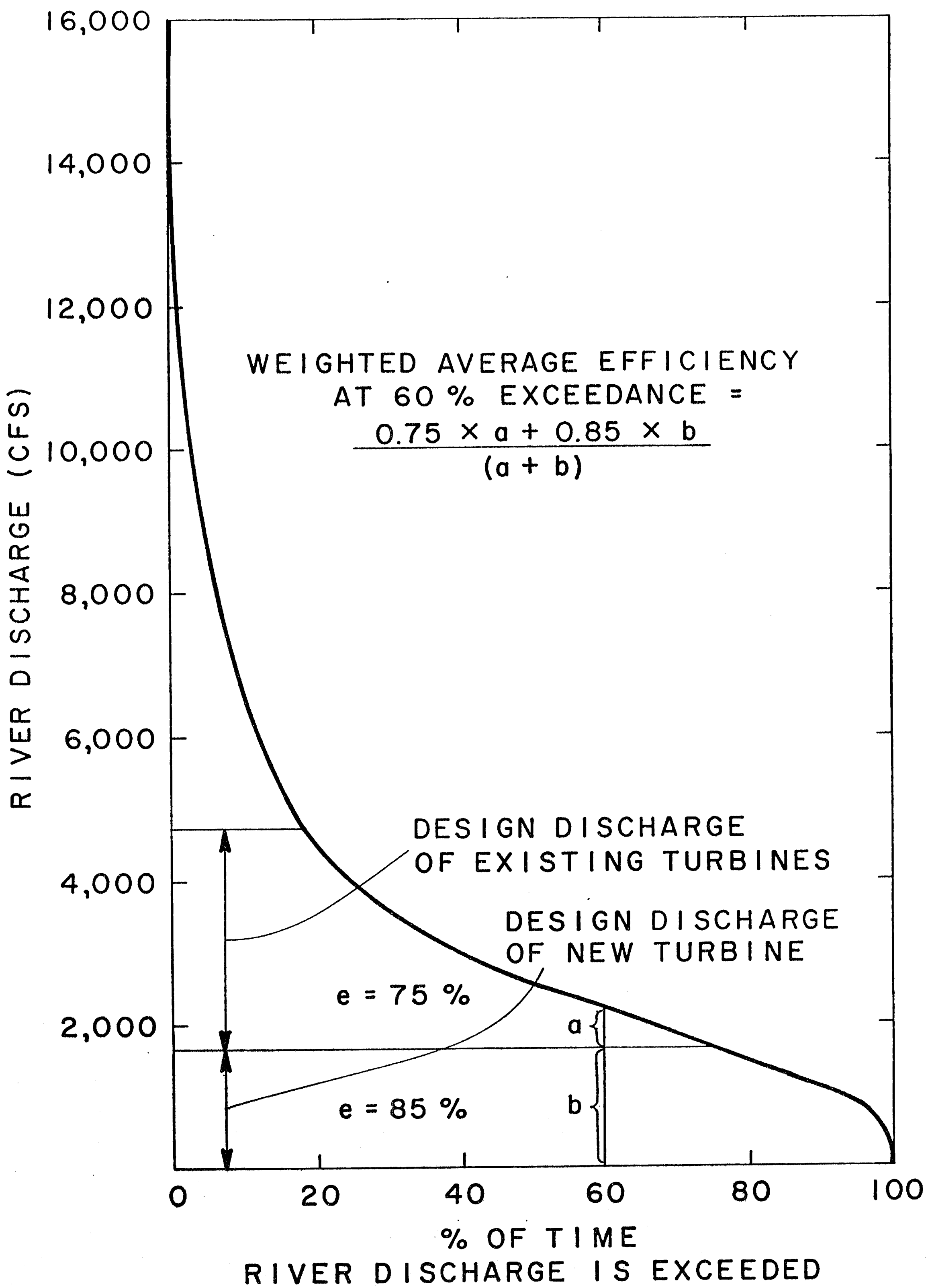

Fig. 16. Example of "weighted average efficiency" as a function of stream discharge for a proposed increase in hydroplant capacity at the Brainerd Dam Site.

efficiency" as a function of stream discharge for a proposed increase in hydroplant capacity. The weighted average efficiency is computed from the equation

$$\bar{e}_i = \frac{e_n (Q_D - Q_{OD}) + e_o (Q_i - Q_D + Q_{OD})}{Q_i} \tag{11}$$

where $\bar{e}_i$ = weighted average efficiency of combined new and old turbines when operating at a flow of i percent exceedance,

e_n = efficiency of the newly installed turbines,

e_o = efficiency of the old turbines,

Q_D = the design discharge of the new and old turbines,

Q_{OD} = the design discharge of the old turbines, and

Q_i = river flow at i percent exceedance.

when Q_i is less than $(Q_D - Q_{OD})$ then, of course, the weighted average efficiency is equal to e_n. When Q_i is greater than Q_D, then Q_D is substituted for Q_i in Eq. 11.

2. Cost Estimates

The total project cost estimate is based on the concept developed by Gordon [9] which incorporates a single equation for equipment cost and a "site factor" for the total project cost.

Gordon demonstrated that the cost of all equipment components of a power facility such as a turbine, generator controls, transformer, switchgear, etc. are related to plant capacity and net head. It was found that the relationship developed by Gordon, however, overestimated total equipment cost for hydroplants below 1000 KW capacity. This is likely because Gordon's formula was developed before the recent cost-effective innovations in mini- and micro-turbines such as the marketing of pumps as turbines. Total equipment cost information was therefore compiled for various projects and plotted in Fig. 17. A best-fit curve through this data is

$$C_T = 9600 \; KW^{0.82} \; H_R^{-0.35} \tag{12}$$

where C_T = equipment cost in \$, 1982

KW = total plant capacity in KW

H_R = rated head in ft.

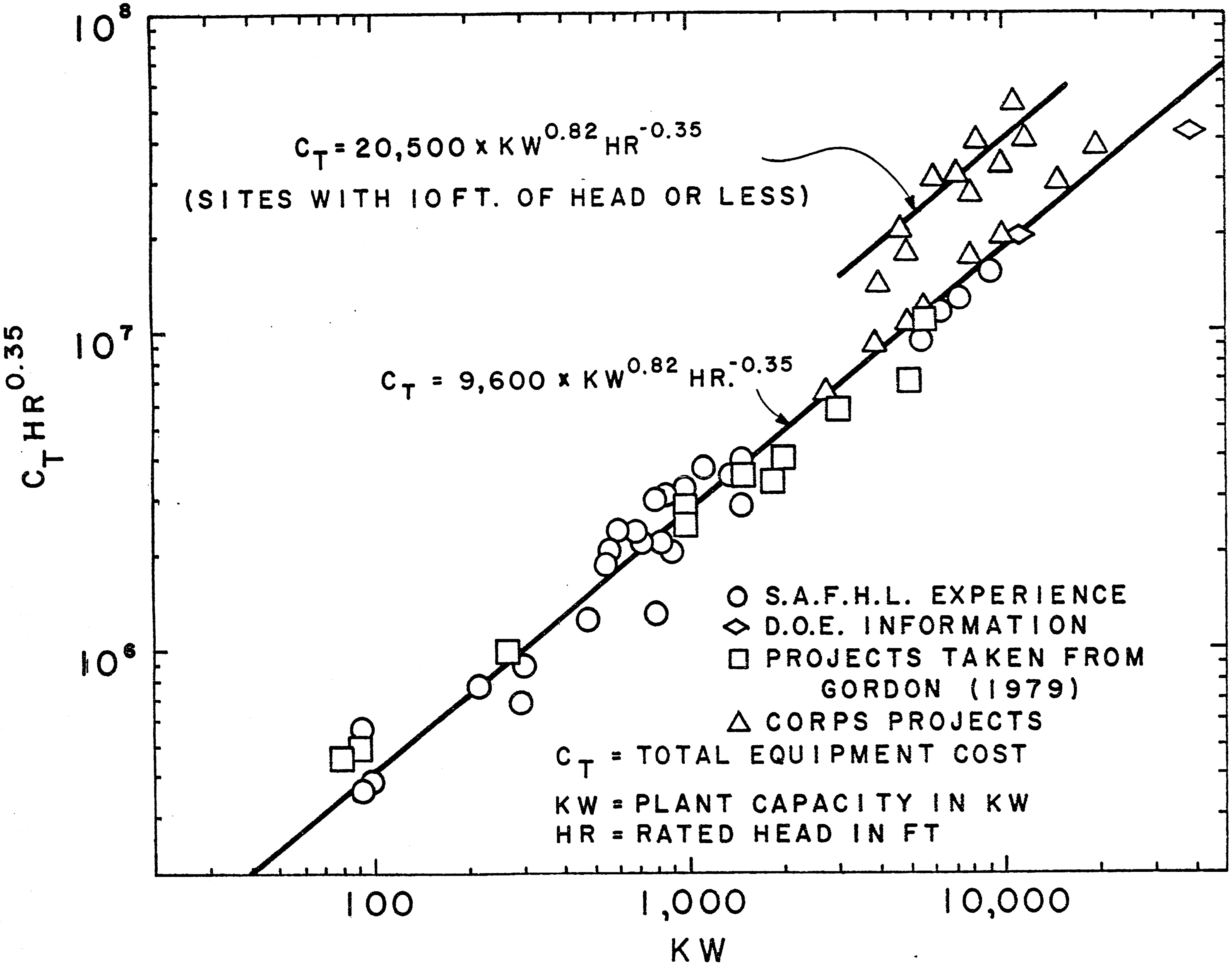

Fig. 17. Equipment cost equation, 1982 base year.

This equation gives satisfactory equipment cost estimates for a plant capacity range from 50 KW to 40,000 KW, with the exception of sites with less than 12 ft of head and high flows, such as some of the lock and dams located on the Mississippi River. For sites with less than 10 ft of head the constant in Eq. 12 was changed from 9600 to 20,500.

Civil works (construction) costs are an important, undefined variable in hydropower development because the costs are very site-specific. An estimate of the cost of a hydropower project therefore requires prior knowledge of the civil works costs associated with the site. To give consistency to these estimates, Gordon and Penman [10] introduced the concept of a "site factor" which is the total project cost divided by the total equipment cost for a hydropower project. If a site factor for a given site has been estimated, total equipment cost for Eq. 12 may be multiplied by site factor to determine total project cost.

In this study Gordon's site factor concept has been redefined to incorporate only the component costs which are present in all hydropower projects, such as headrace, headworks, powerhouse, tailworks, tailrace, engineering costs, and management costs. It does not include the cost of a penstock, diversion works, transmission lines, and remote access facilities; factors which can greatly escalate project cost, but may or may not exist at a given site and should be determined separately.

The newly defined site factor for various projects is plotted against design capacity in Fig. 18. These data were used to formulate the following observations:

- A site factor of 1.5 adequately represents situations where a new unit is added to an existing powerhouse without extensive modification, as observed by Gordon [9].

- An existing powerhouse which requires some major repairs will typically have a site factor between 1.5 and 2.0.

- Site factors for locations with no existing powerhouse fall between the two envelope curves given in Fig. 17. The lower envelope curve has a constant value of 2.0. The upper envelope curve has a constant value of 3.0 if plant capacity is greater than 5 MW. If plant capacity is less than 5 MW, the upper envelope curve is given by the equation

$$SF = 9.8\ KW^{-0.14} \qquad (13)$$

where SF = site factor, and KW = plant capacity (all new units) in KW.

Except in extreme cases, the site factor for a new powerhouse should be between the upper and lower envelope curves. A choice of the precise site factor value between the envelope curves requires knowledge of the

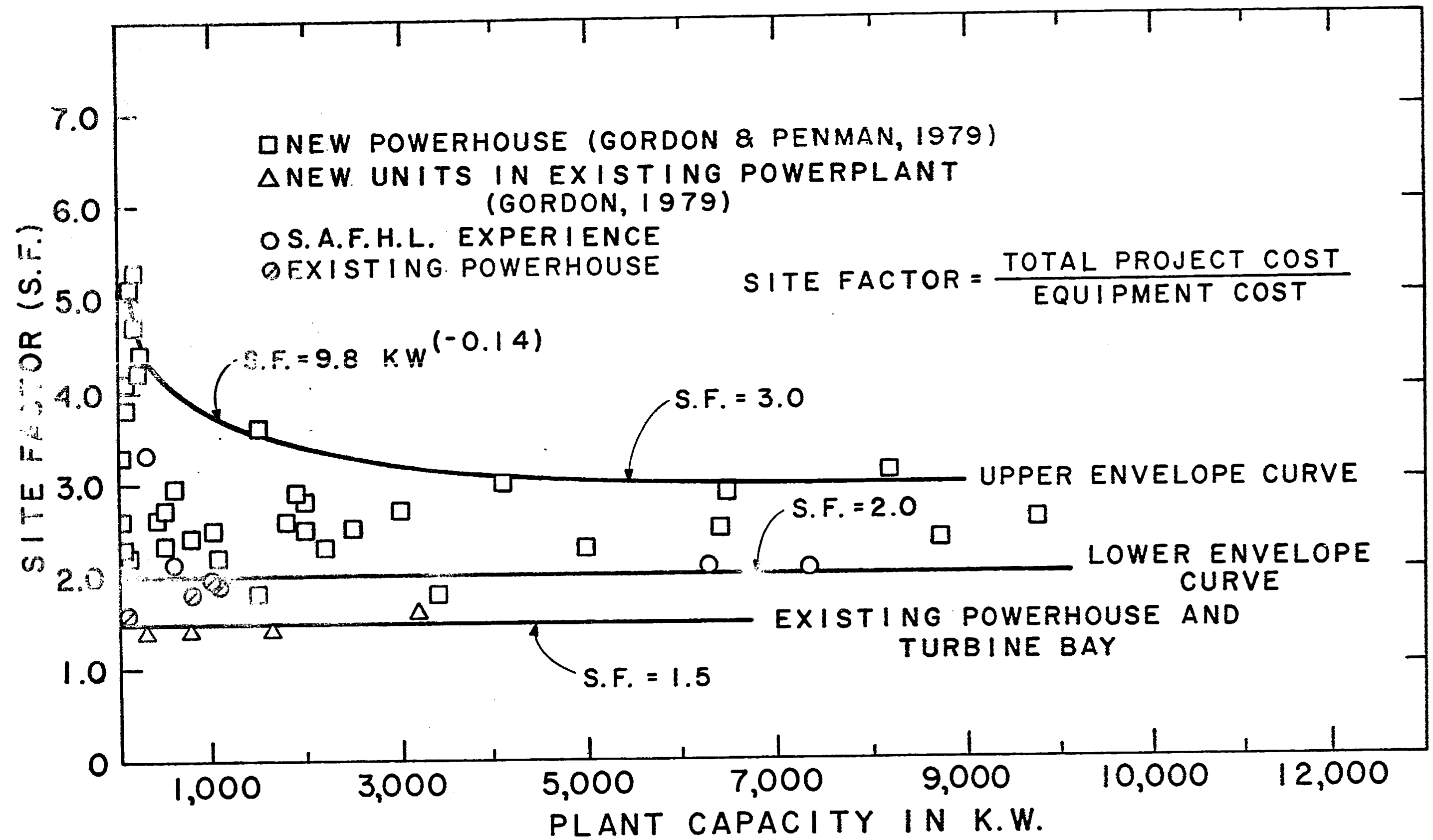

Fig. 18. "Site factor" envelope curves.

site and engineering judgement. The method described above, however, provides a foundation for such decisions.

In order to further facilitate the incorporation of civil works and other costs into total project costs, a "weighting factor" was established as a replacement for site factor. The weighting factor is the fraction distance between the upper and lower envelope curves, and was found by the authors to be a more consistent criteria for sites below 5 MW, where the upper envelope curve varies greatly. A weighting factor of 1.0 will give a site factor on the upper envelope curve. A weighting factor of 0.0 will give a site factor on the lower envelope curve. The weighting factor can be assigned to a proposed site by comparison with completed projects, regardless of the plant capacity. Thus, a project with a weighting factor of 0.8 will have a site factor of 3.4 for a 1000 KW project and a site factor of 4.5 for a 100 KW project. The authors believe that the use of a weighting factor will give a more consistent and reliable estimate of total project costs.

The following are two examples of how a weighting factor was estimated for the 65 sites in the pre-feasibility analysis:

Site Name: Orwell Dam
Stream: Ottertail River
County: Ottertail
Owner: U. S. Army Corps of Engineers
Average Annual Flow: 305 cfs
Average Head: 33 ft

Estimated Weighting Factor: 0.9 to 1.0

The Orwell Dam is a rolled earth-filled type with structural height of 47 feet, side slopes 1:3, and a top width of 20 feet. The construction of the powerhouse will therefore include the building of a very high coffer dam upstream to the dam, the building of concrete walls for the headrace, cutting through the earth embankment which will involve a large amount of excavation, the building or a relatively long tailrace and a channel that will convey the flow back to the discharge channel of the spillway; all of this for approximately 1 MW capacity. All the above mentioned factors increase the weighting factor to be as high as 1.0.

Site Name: Lac Qui Parle Dam
Stream: Minnesota River
County: Lac Qui Parle
Average AnnualFlow: 632 cfs
Average Head: 12.6 ft

Estimated Weighting Factor: 0.1 to 0.3

The Lac Qui Parle Dam is a concrete gravity dam which consists of 12 gates. The maximum discharge of all the gates is 56,000 cfs. A rating curve obtained from a gaging station downstream to the dam indicates that at maximum gauge height of 39.8 feet (bankfull flow) which corresponds to the elevation 939.8, the discharge is approximately 30,000 cfs. The conclusion is that 11 gates, out of 12 existing gates, could pass the 30,000 discharge and one bay could be utilized for the proposed powerhouse. In this case, there is no need to build a headrace and a tailrace. The bay's walls and floor can be used and the actual civil works would be minor.

It is important to emphasize that the method described above was developed for pre-feasibility assessments, where a first approximation of the cost is required, for example, to rank various dam sites in order of economic priority.

3. Economic Analysis

The basic choice as to whether a site is or is not feasible for hydropower development is economic. Based upon the project cost, energy production, and the value of the energy produced, will the proposed hydroplant provide a positive economic return? A hydropower project is somewhat different from many investments in the extremely long life of the facility; a well-maintained hydroplant will function for 50 and 100 years and possibly longer. In addition, a hydroplant is highly capital intensive and thus feasibility is highly dependent upon the difference between escalation of the value of energy and the discount rate applied to the project.

The economic analysis performed herein is designed to be as close as possible to that of a public municipality considering a hydropower project. The economic analysis for private development would be substantially different, and specific to the individual developer. For that reason only public development is incorporated into the economic analysis.

a. Procedure

The economic analysis was performed as follows for a given site:

- A plant capacity is chosen, and the total project cost is computed from Eq. 11 and the weighting factor estimate.
- A power duration curve is developed and average annual energy is computed.
- Cost and benefit streams are computed for the project life and present worth costs and benefits are determined.
- A new plant capacity is chosen and the calculations continue until the optimum economic return is achieved.

At each plant capacity two economic feasibility indicates are computed. The first is the benefit-cost ratio:

$$B/C(J) = TDB(J)/TDC(J) \tag{14}$$

where TDB = total discounted benefits after a given period of operation,

TDC = total discounted costs after a given period of operation, and

J = percent exceedance at which plant capacity is sized.

The other economic feasibility indicator is the incremental benefit-cost ratio, or the incremental benefit divided by the incremental costs.

$$INC.B/C(J) = \frac{TDB(J) - TDB(J-1)}{TDC(J) - TDC(J-1)} \tag{15}$$

where J = percent exceedance at which plant capacity is sized,

INC.B/C = incremental benefit cost ratio,

TDB = total discounted benefits, and

TDC = total discounted costs.

The total discounted benefits are the present worth of the project benefits after N years of operation, or

$$TDB(J) = \sum_{n=1}^{N} \left[E_A R(1+e_r)^n/(1+d_r)^n + DE \cdot BCI/(1+d_r)^n\right] \tag{16}$$

where TDB(J) = total discounted benefits for plant that is sized at J percent exceedance,

E_A = annual energy production (KWH/year),

R = initial rate at which energy is sold ($/KWH),

e_r = annual escalation in the value of energy,

d_r = interest and discount rate,

DE = annual dependable energy generation (KWH/year),

BCI = base capacity income ($/KWH), and

N = project economic life.

Total discounted costs are the present worth of the initial project costs and annual costs, given by the equation

$$TDC(J) = \sum_{n=1}^{\substack{\text{[The lesser}\\ \text{of N,M]}}} \frac{Ci \cdot d_r \cdot (1+d_r)^M}{[(1+d_r)^M - 1](1+d_r)^n} + \sum_{n=1}^{N} \frac{OM(1+c_r)^n}{(1+d_r)^n} \qquad (17)$$

where TDC(J) = total discounted costs for a plant that is sized at J percent exceedance,

M = amortization period,

Ci = initial project cost, and

OM = operation, maintenance, and replacement costs.

A public development will normally size plant capacity to maximize net benefits, or the difference between total discounted benefits and total discounted costs. This capacity is the same at the point where the incremental benefit-cost ratio moves from above 1.0 to below 1.0. A private development will normally have a given benefit-cost ratio or internal rate of return which must be exceeded. The private developer will therefore size plant capacity somewhere between the maximum benefit-cost ratio and the capacity where the incremental benefit-cost ratio moves below 1.0.

The two economic criteria will not often size the plant at the same capacity. This is illustrated in Fig. 19 where the net discounted benefit, incremental benefit-cost ratio, and the benefit-cost ratio are plotted as a function of the percent exceedance at which the plant was sized for an example site. Figure 19 shows that the net discounted benefit is maximum at the point where the incremental benefit-cost ratio moves below 1.0, e.g. at the 40 percent exceedance level in plant capacity. The maximum benefit-cost ratio occurs at the 55 percent exceedance level, which does not maximize net discounted benefits.

b. Assumptions

The following assumptions are incorporated into the economic analysis:

- The economic life of the project is assumed to be 35 years.
- The initial project cost will be amortized over the typical period used in public works, 20 years.
- 8 percent interest and discount rate. Historically, A-rated tax-exempt bonds have been near the rate of inflation. The recent tax cuts, however, have reduced the attractiveness of

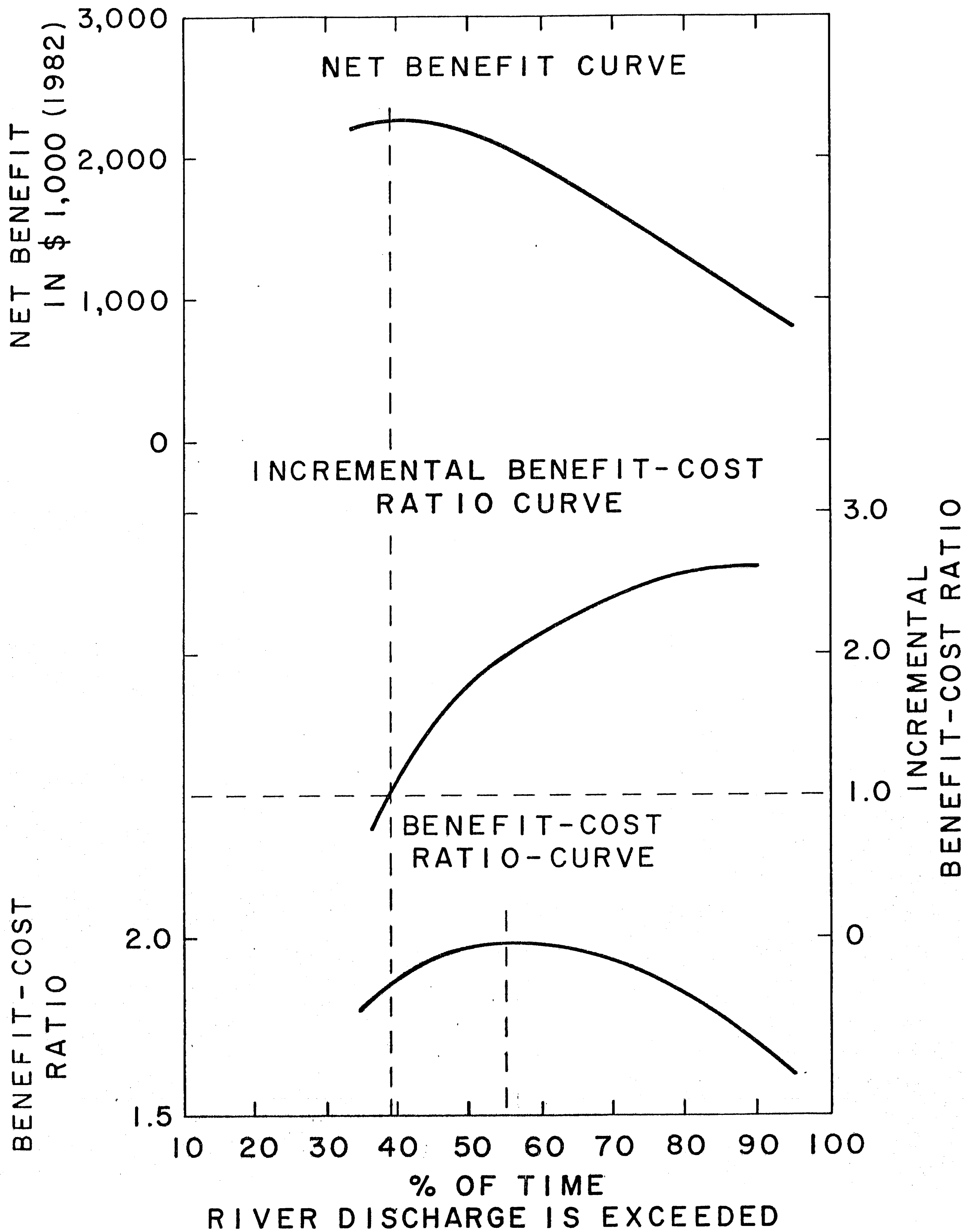

Fig. 19. Example of benefit-cost ratio, incremental benefit-cost ratio, and net discounted benefit as a function of the design percent exceedance for a proposed hydropower facility.

tax exempt bonds. Many economic analysists believe the difference between long term rates for tax exempt bonds and nontax-exempt financing rates will decrease by approximately 1.5 percent.[1] For this reason a 2 percent spread between interest rate and escalation rate will be used.

- 6 percent annual escalation in the value of energy. Power producing utilities in the State of Minnesota have projected that the value of electricity will increase at or near the rate of inflation over the next 20 years.[2] The CPI is currently moderating and most economic forecasters are predicting inflations rates near 6 percent over the next five years.

- 6 percent annual escalation in operation, maintenance and replacement costs. This rate was chosen to coincide with the predicted inflation rate.

- A two-year construction period. [11]

- A linear expenditure of capital during project contruction.

- Annual operation, maintenance and replacement costs were determined from an equation based upon operation, maintenance and replacement costs compiled by Tudor Engineering [11], and escalated to 1982 base year.

$$OM = 583.75 \; KW^{0.543}$$

where OM = annual operation, maintenance and replacement cost ($, 1982), and
KW = plant capacity (KW).

The economic analysis is most sensitive to the difference between the discount and escalation rates (2 percent), rather than the magnitude of those rates. In addition, the analysis is sensitive to total project cost, the value of energy and power, and operation and maintenance costs.

c. Value of energy and power

Hydropower feasibility is very sensitive to the price at which the generated electricity is sold. To avoid the extremely complex price structure of electricity, the price of energy was based upon average values during peak and off-peak periods given to the Department of Natural Resources by the Northern States Power Company. These values are assumed to represent the value of energy and power throughout Minnesota. The price includes three components (1982 base year).

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[1]Donald Porter First Boston Corporation, New York, N. Y.

[2]Minnesota Energy Agency.

- Value of peak energy is 3.1 cents per KWH
- Value of off-peak energy is 1.5 cents per KWH
- Base capacity income is 168 dollars per KW

Assuming a 6 hour daily peaking period and a 18 hour off-peak period gives an average rate of 1.9 cents per KWH for the first two components. Translating the third component into the rate of base capacity income gives the value of 2.7 cents per KWH. The base capacity income may be translated into an additional value of 1.7 cents per KWH for dependable energy. Thus, in the first year of operation, non-dependable energy was valued at 1.9 cents/KWH and dependable energy was valued at 4.6 cents/KWH. The base capacity portion of the above rates, however, were not escalated, and will become less important over time.

B. Description of Computer Program HYFEAS

HYFEAS is a computer program which estimates energy and power production, equipment cost, total project cost, and the benefit-cost economic indicators described in Section III.A. The program uses a flow duration curve, headwater and tailwater curves, a weighting factor estimate, other construction costs not included in the weighting factor, and information on an existing hydroplant to size plant capacity at the optimum economic return. The program also computes benefit-cost ratios and qualitatively assesses project feasibility.

The program reads river discharge and the corresponding headwater and tailwater elevations from an input data file starting from 100 percent exceedance down to zero percent exceedance at increments of 5 percent. If there is an operating hydroplant at the site, the program also reads the design discharge of the existing turbines, the design capacity of the plant, and the overall efficiency of the existing equipment. Only three pieces of information on the proposed powerplant are read: a best estimate for weighting factor, costs that are unassociated with the powerhouse, and the overall efficiency of the newly installed equipment. The economic assumptions described previously are then used in a financial feasibility analysis.

For a given site the program starts at 100 percent exceedance, assumes that the plant is designed to operate with a turbine design discharge equal to the flow at that percent exceedance, computes the necessary parameters, and then decreases the design percent exceedance by 5 percent, repeating the computations. At each percent exceedance the program calculates turbine design discharge, total energy generation (if there is an existing turbine energy generation from the combined operation of new and old turbines is included), the incremental energy obtained from the new installed turbine, total discounted benefits over project life, discounted cost of operation and maintenance over project life, total project cost, design capacity, benefit-cost ratio, and incremental benefit-cost ratio. The plant is sized at a given percent exceedance using the criteria of maximum net benefit which occurs when incremental benefit-cost ratio is equal to 1.0. Information output for the proposed hydroplant includes design head, turbine design discharge, design capacity, design percent exceedance, equipment cost, total project cost, site factor and 35-year benefit-cost ratio.

An analysis of the results' sensitivity to construction cost estimates is then performed by adding and subtracting 0.5 to the best estimate of weighting factor, giving results for high and low weighting factor estimates. The conclusion for the pre-feasibility assessments is determined by the following qualitative scale:

- Very good hydropower feasibility is assigned to sites with a benefit-cost ratio greater than 1.8 for the authors' best weighting factor estimate and a benefit-cost ratio greater than 1.0 under the high weighting factor estimate.

- Good hydropower feasibility is assigned to sites with a benefit-cost ratio greater than 1.2 for the authors' best weighting factor estimate.

- Marginal hydropower feasibility is assigned sites which have a benefit-cost ratio greater than 1.0 under the low weighting factor estimate.

- Poor hydropower feasibility is assigned to the sites which do not have a benefit-cost ratio greater than 1.0 under any of the three weighting factor (high, best estimate, and low).

A general flow chart for the computer program HYFEAS is given in Fig. 20.

C. Results

Preliminary feasibility studies were performed using HYFEAS on each of the 65 sites remaining after the second stage screening. The results of each pre-feasibility study are given in the computer program printouts in Appendix B. The Computer program sized the hydroplant according to two economic criteria: incremental benefit-cost ratio equal to 1.0 (maximum net discounted benefits) and maximum benefit-cost ratio. Since the economic feasibility criteria chosen were those typical of a municipality, the incremental benefit-cost ratio was chosen as the criteria which is most consistent with the analysis. The results are set in order of economic priority based on the computed benefit-cost ratio.

The results are also summarized in Table 2, which includes the design capacity for the proposed powerplant, the incremental annual energy generation, the total initial project cost for each plant, and the benefit-cost ratio after 35 years of operation. Comments on each site, listed in the last column, may include any assumptions made in energy calculations, the proposed location of the powerhouse, the results of other work which has been or is being performed on the site, etc. The comment "low weighting factor estimate" indicates that the benefit-cost ratio was greater than 1.0 only in the sensitivity analysis, using a reduced weighting factor.

The comments column in Table 2 indicates a number of sites on which more detailed studies have been performed than those herein. These may be compared with the results given in Table 2 as an indication of the accuracy of the pre-feasibility studies performed with HYFEAS, as follows:

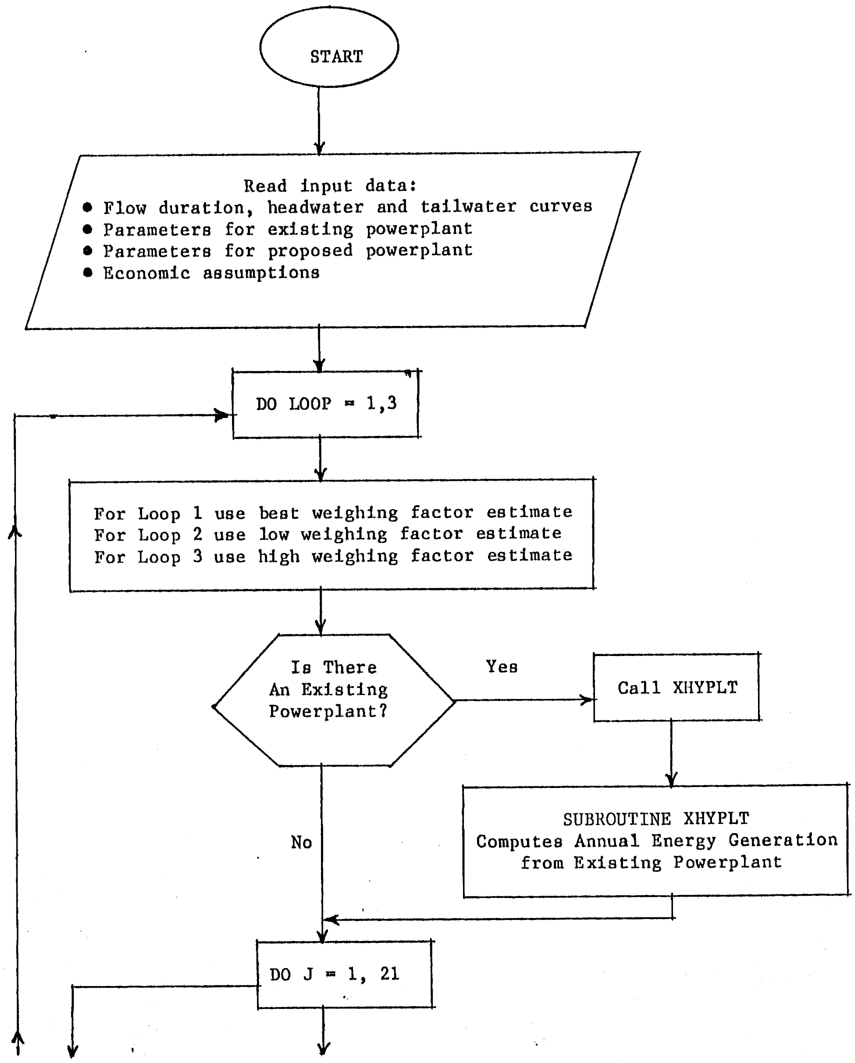

Fig. 20. General flow chart for computer program HYFEAS (Cont'd).

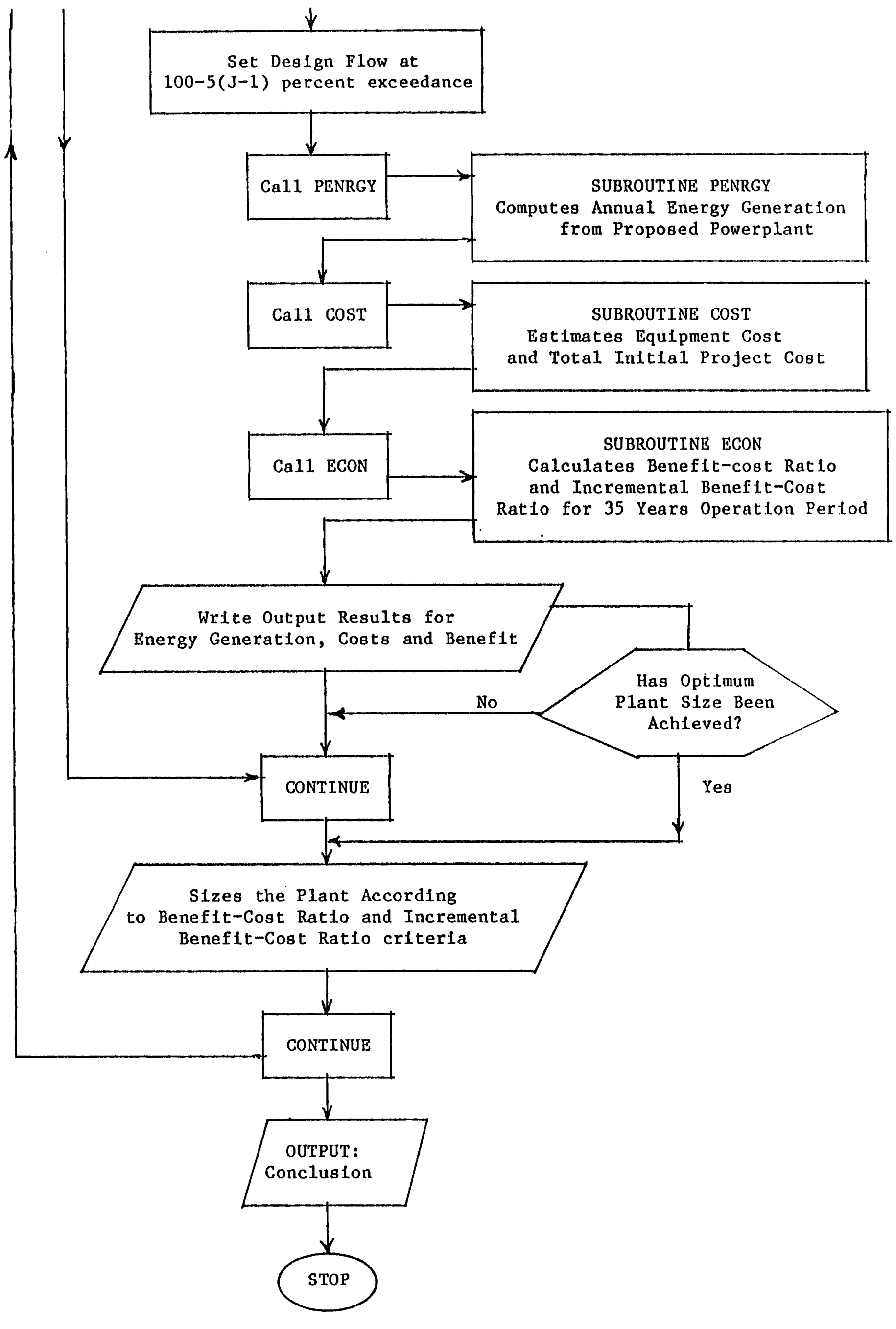

Fig. 20 (Cont'd). General flow chart for computer program HYFEAS.

TABLE 2. Summary of the Results for Hydropower Potential at Existing Dam Sites in Minnesota

Sites with VERY GOOD Hydropower Feasibility

Site ID	Site Name	Design Capacity (KW)	Incremental Energy (MWH/Yr)	Total Project Cost ($1000, 1982)	35-Year Benefit-Cost Ratio	Comments
MN00506	St. Cloud	5135	33169	8790	2.43	A feasibility study by SAFHL recommended between 5500 and 8000 KW with benefit-cost ratio of 1.9 to 2.2.
MN00514	Byllesby	1159	6779	1504	2.31	Rehabilitation of the existing powerhouse is assumed. Dakota-Goodhue counties have licensing exemption.
MN00507	Coon Rapids	8600	50543	16118	2.11	Assuming that entirely new powerhouse is built. Preliminary permit issued to City of Anoka.
MN00513	Kettle River	403	2818	737	1.95	A feasibility study by SAFHL recommended 1100 KW with benefit-cost raito of 1.7.
MN00590	St. Anthony Falls Upper Lock & Dam	21630	72588	20271	1.84	Location of powerhouse is at wasteway No. 2
MN00512	Rapidan Dam	2440	11036	3017	1.82	Utilizing the existing substructure of the old powerhouse. 5000 KW currently being installed.
	Total:	39367	176933	50437		

Sites with GOOD Hydropower Feasibility

Site ID	Site Name	Design Capacity (KW)	Incremental Energy (MWH/Yr)	Total Project Cost ($1000, 1982)	35-Year Benefit-Cost Ratio	Comments
MN00517	Lanesboro	233	1515	397	1.73	Installing new turbines at existing powerhouse. SAFHL recommended rehabilitating existing turbines.
MN00612	Island Lake	506	3223	1177	1.59	Assumed avg. head of 37'. Bulb turbine installed at existing draft tube.
MN00591	St. Anthony Falls Lower Lock & Dam	10250	30208	12133	1.39	Installing horizontal tubular turbine units in the auxiliary lock.
MN00093	Kettle Falls	6060	45630	25104	1.36	Excellent flow duration curve; constant head of 12' assumed. Cost of transmission line included. Constant in equip. cost equation No. 11 changed from 9600 to 18000.
MN00234	Fish Hook	97	689	244	1.29	A feasibility study by SAFHL recommended 97 KW with 1.7 benefit-cost ratio.
MN00152	Minnesota I	447	2351	958	1.29	SAFHL has developed cost estimates but no detailed feasibility analysis for this site.
MN00589	Lock & Dam #5	8040	54181	31984	1.24	Installing turbines in tainter gate bays on east side of dam. Constant in equip. cost equation was changed from 9600 to 20500.
MN00505	Sartell	3735	14250	6805	1.24	Assuming that an entirely new powerhouse is built.
MN00599	Blanchard	10380	20053	7719	1.22	Installing turbine in existing powerhouse.
	Total:	39748	172100	86521		

TABLE 2. Summary of the Results for Hydropower Potential at Existing Dam Sites in Minnesota

Sites with MARGINAL Hydropower Feasibility

Site ID	Site Name	Design Capacity (KW)	Incremental Energy (MWH/Yr)	Total Project Cost ($1000, 1982)	35-Year Benefit-Cost Ratio	Comments
MN00594	Lock & Dam #2	3040	20936	12667	1.19	Installing turbines in spillway dam and river lock. Constant in equip. cost Eq. No. 12 changed from 9600 to 20500
MN00604	Thomson	52680	89948	39452	1.17	Cost includes penstock, bifurcation, by-pass facilities and surge tanks.
MN00549	Rum River	272	1874	966	1.15	Feasibility study by SAFHL found site not quite feasible for development by City of Anoka.
MN00094	St. Louis River	311	1943	984	1.14	Crest elevation is maintained at design elevation.
MN00516	Elk River	148	987	454	1.13	Substructure of old powerhouse is used.
MN00586	Winnibigoshish Dam	495	2925	1642	1.10	Powerhouse location adjacent to the right abutment wall.
MN00587	Lock & Dam #7	5960	40834	28622	1.06	Placing units under existing storage yard. Constant in equip. cost Eq. No. 11 was change from 9600 to 20500.
MN00597	Brainerd	2120	6131	2825	1.05	Installing turbine units in abandoned turbine bays of existing powerhouse.
MN00368	Shady Lake	108	775	410	1.02	Powerhouse location is at the left abutment of the dam.
MN00607	Winton	2660	5732	2365	1.01	Turbine installed in existing bay; cost of penstock is included.
MN00008	Red Lake II	227	1406	556	1.29	Low WF estimate. Reconstruction of old powerhouse.
MN00550	Grand Fork East	517	2905	1284	1.27	Low WF estimate.
MN00610	White Face Lake	98	644	240	1.23	Low WF estimate. Constant head of 34' is assumed.
MN00653	Rainy Lake	6270	16211	6836	1.20	Low WF estimate. Utilizing only half of flow at river. Other half assumed utilized by Canadian Powerhouse.
MN00600	Little Falls	2860	9574	4272	1.18	Low WF estimate.
MN00356	Cannon River II	96	682	287	1.16	Low WF estimate.
MN00584	Pokegama Lake	847	5866	3507	1.15	Low WF estimate. Constant in equip. cost Eq. No. 12 was changed from 9600 to 20500. Constant head of 9.6' is assumed.
MN00593	Lock & Dam #1	7440	20205	9362	1.13	Low WF estimate. Powerhouse located downstream to the existing PH; the water would be transported by tunnel.
MN00574	Orwell Dam	430	2523	1394	1.09	Low WF estimate. Avg. headwater elevation was derived from 10 yrs of reservoir operation.
	Total	86579	232101	118125		

TABLE 2. Summary of the Results for Hydropower Potential at Existing Dam Sites in Minnesota

Sites with POOR Hydropower Feasibility

Site ID	Site Name	Design Capacity (KW)	Incremental Energy (MWH/Yr)	Total Project Cost ($1000, 1982)	35-Year Benefit-Cost Ratio	Comments
MN00598	Cloquet	3290	6937	4351	0.98	Installing turbine unit in abandoned turbine bay of existing powerhouse.
MN00011	Mazeppa Dam	47	326	271	0.96	Rehabilitating existing powerhouse.
MN00603	Fon-du-Lac	4308	7992	6768	0.76	Includes new penstock and a structure for new units.
MN00190	Pelican Rapids	50	328	343	0.75	Rehabilitating abandoned powerhouse.
MN00608	Crow Wing	810	1878	1776	0.64	Installing turbines in existing turbine bay.
MN00602	Blandin	597	1931	2139	0.63	Building entirely new powerhouse for new units.
MN00585	Leech Lake Dam	348	1836	2237	0.62	Proposed to locate powerhouse at north side of dam.
MN00605	Scanlon	1301	3512	3558	0.62	Installing turbine at tainter gate bay adjacent to existing powerhouse.
MN00191	Pelican River	60	349	441	0.62	Powerhouse assumed to replace one spillway gate.
MN00606	Knife Falls	1371	3697	3551	0.61	Installing turbine at gate bay adjacent to existing powerhouse.
MN00117	Jackson Dam	56	267	308	0.61	Rehabilitating old powerhouse.
MN00582	Pine River	164	1016	1355	0.58	Powerhouse construction involves large amount of civil works.
MN00092	Pike River	57	306	404	0.56	Poor flow duration curve. Possible to use substructure of old powerhouse
MN00508	Sauk River I	52	338	492	0.55	Building entirely new powerhouse (impossible to use the substructure of old plant).
MN00515	South Branch Zumbro River	52	312	444	0.53	Installing turbine in tainter gate bay.
MN00510	Granite Falls	677	1845	1329	0.53	Feasibility study by SAFHL found site marginal for capacity addition.
MN00358	Zumbro Lake	299	555	697	0.51	Installing turbine in existing turbine bay of powerhouse.
MN00544	Willow River	47	265	410	0.49	Powerhouse is proposed to be located adjacent to right abutment wall.
MN00580	Lac-Qui-Parle	58	297	492	0.45	Building the powerhouse in one of the gate bays.
MN00601	Sylvan	887	1708	2445	0.44	Assuming constant head of 22 ft.
MN00561	Sauk River III	49	210	318	0.43	Installing turbine in gate section.
MN00364	Mayowood Lake	47	226	383	0.42	Utilizing the existing headrace channel.
MN00502	Thief River	515	1545	2696	0.36	Study conducted by SAFHL indicated poor feasibility.
MN00017	Bronson Lake	52	194	388	0.32	Powerhouse is proposed to be located adjacent to right abutment wall.
MN00583	Sandy Lock & Dam	73	266	583	0.30	When the stage at the Mississippi River is high, it backs up the Sandy River and the head at the dam is almost zero.
MN00062	New London	55	210	528	0.25	Impossible to use penstock openings because of safety hazard.
MN00581	Hwy 75 Dam	61	263	690	0.24	Powerhouse is proposed to be located at low flow outlet.
MN00614	Fish Lake	65	243	767	0.20	Including cost of transmission lines.
MN00120	Brawner Lake	59	188	575	0.19	Very poor flow duration curve.
MN00535	Sand Creek	49	175	529	0.19	Very poor flow duration curve.
MN00026	Mustinka River	47	50	610	0.04	Including cost of transmission lines.

- 5000 KW are currently being installed at the Rapidan site. HYFEAS estimated 2440 KW. The difference is due to daily peaking which adds significant income to the hydroplant.

- A feasibility study of the St. Cloud site recommended between 5500 and 8000 KW with a benefit-cost ratio (B/C) of between 1.9 and 2.2. HYFEAS estimated 5135 KW with a B/C of 2.43.

- A feasibility study of the Kettle River site recommended 1100 KW with a B/C of 1.7. HYFEAS estimated 403 KW with a B/C of 1.95.

- A feasibility study of the Fish Hook site recommended 97 KW with a B/C of 1.7. HYFEAS estimated 97 KW with a 1.29 B/C. The difference in B/C is due to the seasonal storage capacity of the reservoir, which improves energy value and increases generation.

These comparisons indicate that the 35-year benefit-cost ratio computed by HYFEAS is within expectations. In some instances, however, the installed capacity estimated by HYFEAS was less than that of the more comprehensive feasibility studies. This is due to a number of causes, primarily: 1) the pre-feasibility computations did not incorporate either daily or seasonal peaking, 2) the general economic assumptions used in the pre-feasibility computations are not specific to each potential developer, and 3) there is some scatter in the equipment costs used to formulate Eq. 12 as indicated in Fig. 17. As a whole, the authors believe that the estimated potential hydropower capacities are satisfactory for the pre-feasibility level of analysis. The method is designed to identify and rank the sites according to potential economic return, and installed capacity is a useful, but secondary, by-product.

The general trend is that the installed capacities computed by HYFEAS are equal to or below those of the more comprehensive feasibility studies, inferring that the total installed capacity in Table 2 may be somewhat underestimated. This observation is offset by the fact that a portion of the marginal sites will not be found economically feasible for development. Thus, very good, good, and marginal sites should give the most appropriate estimate of the total hydropower potential at existing Minnesota dams which may be economically developed.

The total potential capacity of all the existing dam sites indicating very good hydropower feasibility is estimated to be 39.4 MW, with an annual electricity generation of 177 GWH. The total initial cost to develop these sites is approximately 50 million dollars (1982 base year). A site with very good hydropower feasibility may qualitatively be defined as one for which development is economically justified under most economic conditions.

The total potential capacity of all the existing dam sites indicating good hydropower feasibility is estimated at 39.7 MW with an annual energy generation of 172 GWH. The total initial cost required to develop these sites is approximately 86.5 million dollars (1982 base year). A site with a good hydropower feasibility may qualitatively be defined as one for which development is economically justified under the economic conditions assumed in this study, which the authors' believe to be somewhat conservative.

The total potential capacity of all the existing dam sites indicating marginal hydropower feasibility is estimated is 86.6 MW with an average annual energy generation of 232 GWH. The total initial cost to develop these sites is 118 million dollars (1982 base year).

A site classified as marginal is one where the economic return is positive but not spectacular (35 year benefit-cost ratio less than 1.2) or where the economic return is not positive but could be within the accuracy of the calculations. The ultimate feasibility of these sites depends upon the financial conditions specific to the developer and upon the innovative abilities of the project design firm to keep cost down while still designing an acceptable facility. In addition, pinning down many of the generalizations made in this study for a specific site may improve project feasibility. Thus, the economic return of the sites classified as marginal may be improved if:

- the site has potential for daily or seasonal peaking, neither of which are considered in this study,

- the total project cost is lower than that estimated here,

- used equiment is available and applicable to the site, which will reduce project cost,

- operation, maintenance, and replacement costs are kept at a lower level than that estimated herein, and

- the value of energy and capacity is greater than that used herein.

It should also be noted that a 35-year benefit-cost ratio between 1.0 and 1.2 does not mean a site should not be developed. Considering that a typical hydropower feasibility will operate between 50 and 100 years or more, a public or private entity may wish to develop the site and consider the facility a long-term investment.

The same can be said for some of the sites classified as poor feasibility in the appendix. This study is a first step sorting of all of the dam sites in the State of Minnesota. The results are therefore a first estimate for a given site, not the final answer.

Combining the results of all the sites with very good, good, and marginal feasibility will give an estimate of the total economic feasibility potential at existing Minnesota dam sites. This total additional hydropower capacity at existing Minnesota dam sites is estimated to be 165.7 MW. The additional annual energy generation from all of these sites is estimated to be 581 GWH, and it is estimated that the total cost to develop these sites for hydropower generation will be 255 million dollars (1982 base year).

The general location of each dam site with very good, good, or marginal hydropower feasibility is given in Fig. 21.

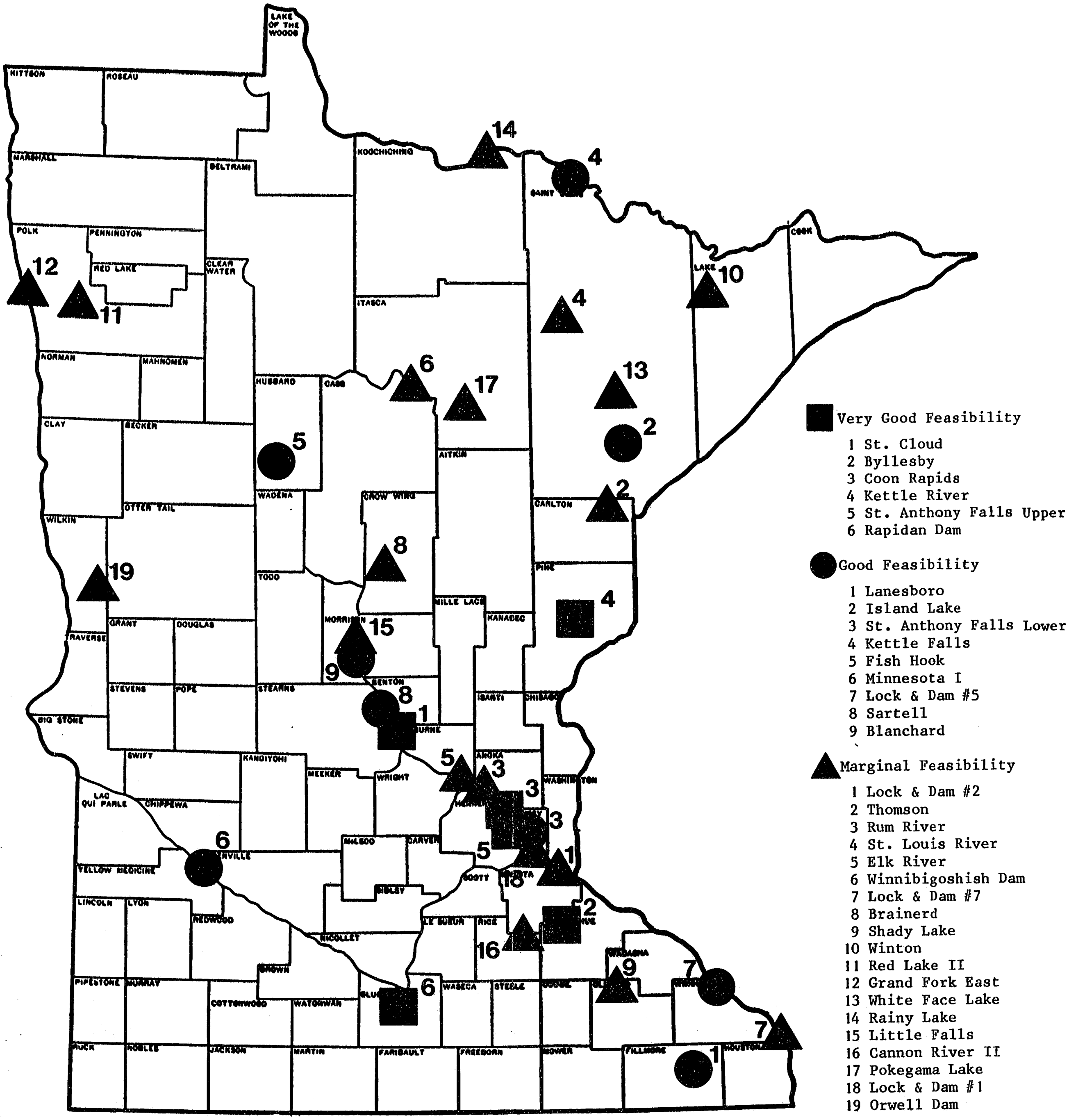

Fig. 21. General location of dam sites with very good, good or marginal hydropower feasibility as indicated by pre-feasibility studies in the final stage screening.

IV. SUMMARY AND CONCLUSIONS

1. A preliminary estimate of hydropower production feasibility was made for all of the 853 existing dam sites in the State of Minnesota.

2. Relative cost, defined as the initial project cost divided by the annual energy production, was used as a means of first and second stage screening to eliminate poor sites from further consideration.

3. Relative costs obtained from recently completed feasibility studies, were plotted against design head and average annual discharge of the site and three feasibility regions were defined: Region A - indicating good feasibility, Region B - indicating marginal feasibility, and Region C - indicating poor feasibility.

4. Using the relative cost criteria, a qualitative assessment of preliminary hydropower feasibility was made for each site by identifying the site's feasibility region.

5. The first stage screening identified 55 sites with good hydropower feasibility and 53 sites with marginal hydropower feasibility, a total of 108 sites. The remainder of the dam sites indicated a poor hydropower feasibility.

6. A second stage screening concentrated on improving the data for the 108 sites, including hydraulic and hydrologic analysis, plans of the sites, site visits and field measurements.

7. Again using the relative cost criteria, a second qualitative assessment of preliminary hydropower feasibility reduced the number of sites to 34 sites with good hydropower feasibility and 31 sites with marginal hydropower feasibility, a total of 65 sites.

8. After the site screenings, a preliminary feasibility study was performed on each of the 65 sites, in order to provide a more accurate estimate of the economic feasibility of each site.

9. Guidelines for quick and simple hydropower project cost estimates were developed. The guidelines incorporate a single equation utilizing design power and head for total equipment cost and a "site factor" to estimate a total project cost. Site factor is defined as total project cost divided by the equipment cost.

10. Site factors for a number of hydropower projects were plotted against design capacity and envelope curves were identified.

11. A "weighting factor" which is the fraction distance between the upper and lower envelope curve, was determined for each site, and later used in optimizing plant capacity.

12. A computer program was developed to standardize the prefeasibility analysis; the program incorporates flow data, hydraulic data, information on any existing hydroplant and information on the proposed hydroplant to determine the optimimum plant capacity and to give feasibility parameters for the proposed facility.

13. The economic and financial feasibility criteria chosen were those typical of a municipality. Hydroplant capacity was chosen in order to maximize net discounted benefit after 35 years of operation, corresponding to the capacity at which the incremental benefit-cost ratio is equal to 1.0. This criteria is believed to be the most representative of public development.

14. The results for the pre-feasibility study of hydropower potential at existing dam sites in Minnesota are:

    Very good: six (6) sites
    Good: nine (9) sites
    Marginal: nineteen (19) sites
    Total additional hydropower capacity (KW): 165,700
    Total additional energy generation (MWH/year): 581,000
    Total project costs (1982): $255,000,000

15. A site with a very good hydropower feasibility may qualitatively be defined as one for which development is economically justified under most economic conditions.

16. A site with a good hydropower feasibility may qualitatively be defined as one for which development is economically justified under the economic conditions assumed in this study.

17. A site with a marginal hydropower feasibility may qualitatively be defined as one where the economic return is positive but not spectacular or where the economic return is not positive but could easily be so within the accuracy of the calculations.

18. All the results are based on the assumption that most of the sites have low head reservoirs which are classified as run-of-the-river with no significant storage capabilities. A significant storage capability may improve the hydropower feasibility of a given site if the reservoir may be operated to enhance power generation.

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APPENDIX A

List of Dam Sites Considered in the First Stage Screening

(Listed by County)

COUNTY/ Site ID	Site Name	Stream	Owner	Latitude	Longitude	Hydraulic Height, ft	Drainage Area, sq mi	Average Annual cfs Discharge	Potential Power Capacity, Kw	Hydropower Feasibility Region
AITKEN										
MN00242	Pine Lake	Ripple River	State of Minn.	46° 26.5'	93° 44.3'	6	33	*	*	C
MN00243	Ripple Lake	Ripple River	State of Minn.	46° 27.7'	93° 41.4'	6	90	26	11	C
MN00244	Hanging Kettle Lake	Ripple River	State of Minn.	46° 28.6'	93° 42.0'	6	93	27	12	C
MN00245	Hill Lake	Hill River	State of Minn.	46° 58.7'	93° 36.3'	6	28	*	*	C
MN00246	Waukenabo Lake	Little Willow River	State of Minn.	46° 44.1'	93° 37.5'	7	10	*	*	C
MN00247	Moose-Willow 1	Moose River	State of Minn.	46° 56.6'	93° 31.7'	12	79	56	48	C
MN00248	Moose-Willow 2	Willow River	State of Minn.	46° 57.3'	93° 31.7'	10	153	108	78	C
MN00249	Washburn Lake	Willow River	State of Minn.	46° 58.6'	93° 28.2'	6	<100	*	*	C
MN00286	Thomas Digman	Pine River	Russell Brigan	46° 12.0'	93° 05.0'	8	<100	*	*	C
MN00287	Carrol Heft	Sissabagamah Creek	Carrol Heft	46° 28.8'	93° 37.0'	7	<100	*	*	C
MN00557	Hammond Pond	Savanna River	Hammond	46° 46.7'	93° 14.6'	10	< 50	*	*	C
MN00583	Sandy Lake Lock & Dam	Sandy River	DAEN-NCS	46° 47.3'	93° 19.7'	10	421	215	150	B
MN00622	Rice River Pool	Rice River	DOI BSFW	46° 33.7'	93° 21.7'	9	145	13	8	C
MN00623	Rice Lake Pool	Rice River	DOI BSFW	46° 32.4'	93° 19.0'	8	138	12	79	C
MN00687	Little Willow River Dam	Little Willow River	MN Div Wildlife	46° 43.8'	93° 41.9'	6	<100	*	*	C
MN00698	Little Willow River Wildlife Area	Little Willow River	DNR-Game & Fish	46° 41.3'	93° 41.5'	10	< 50	*	*	C
MN00708	Jewett WMA Impoundment Dike 2	Dam Brook	DNR-Wildlife	46° 24.0'	93° 23.5'	6	<100	*	*	C
MN00709	Jewett WMA Impoundment Dike 1	Little Hill River	DNR-Wildlife	47° 00.8'	93° 42.5'	6	<100	*	*	C
MN00745	Cornish Flowage	Savanah River	DNR-Wildlife	46° 53.1'	93° 13.6'	8	<100	*	*	C
MN00747	William Lange Structure	Morrison Brook	William Lange	47° 00.7'	93° 38.0'	6	<100	*	*	C
ANOKA										
MN00396	Lock Lake	Rice Creek	City of Fridley	45° 05.4'	93° 16.5'	8	145	53	31	C
MN00499	Peltier Lake	Rice Creek	Ramsey County	45° 10.5'	93° 04.1'	6	52	18	8	C
MN00549#	Rum River	Rum River	City of Anoka	45° 23.4'	93° 23.4'	12	1590	637	550	B

COUNTY/ Site ID	Site Name	Stream	Owner	Latitude	Longitude	Hydraulic Height, ft	Drainage Area, sq mi	Average Annual cfs Discharge	Potential Power Capacity, KW	Hydropower Feasibility Region
BECKER										
MN00019	Bass Lake Dam	Indian Creek	State of Minn.	47° 06.6'	95° 22.2'	3	<100	*	*	C
MN00020	Two Inlets Lakes	Hay Creek	State of Minn.	47° 01.8'	95° 11.0'	6	110	32	14	C
MN00021	Height of Land	Ottertail River	State of Minn.	46° 53.2'	95° 37.8'	6	195	16 → 19	7 → 30	C
MN00022	Round Lake	Ottertail River	State of Minn.	47° 01.8'	95° 33.5'	11	73	10 → 25	8 → 20	C
MN00023	Many Point Lake	Ottertail River	State of Minn.	47° 03.5'	95° 32.4'	7	60	*	*	C
MN00024	Little Toad Lake	Total River	State of Minn.	46° 49.8'	95° 32.7'	6	7	*	*	C
MN00025	Little Bemidji Lake	Ottertail River	State of Minn.	47° 05.6'	95° 33.0'	6	28	*	*	C
MN00123	Buffalo Lake	Buffalo River	State of Minn.	46° 58.4'	95° 49.0'	6	33	*	*	C
MN00124	Eurice Lake	Pelican River	State of Minn.	46° 44.2'	95° 56.5'	6	6	*	*	C
MN00126	Little Floyd Lake	Pelican River	State of Minn.	46° 54.9'	95° 46.4'	6	<100	*	*	C
MN00127	Melissa Lake	Pelican River	Detroit Lakes	46° 45.3'	95° 54.0'	13	20	3	3	C
MN00129	White Earth Lake	White Earth River	State of Minn.	47° 09.0'	95° 45.8'	6	37	*	*	C
MN00130#	Ottertail River	Ottertail River	Vill. of Frazee	46° 43.1'	96° 42.5'	15	95	8 → 35	9 → 38	C
MN00131	Acorn Lake	Ottertail River	State of Minn.	46° 44.3'	95° 44.0'	6	<100	*	*	C
MN00144	Marshall Lake	Unnamed	Becker County	46° 50.1'	95° 01.8'	6	<100	*	*	C
MN00484	Ted Kath Dam	Buffalo River	Ted Kath	46° 54.0'	95° 56.6'	6	<100	*	*	C
MN00485	Ted Kath Dam	Buffalo River	Ted Kath	46° 53.5'	95° 57.1'	12	< 50	*	*	C
MN00487	Hamden Gun Club Dam	Buffalo River	Hamden Gun Club	46° 58.0'	96° 00.8'	7	<100	*	*	C
MN00488	Gary Lehman Dam	Ottertail River	Gary Lehman	47° 54.3'	95° 31.7'	11	< 50	*	*	C
MN00489	Koenig and Elton Wildlife Area	Buffalo River	Koenig & Elton	46° 49.7'	95° 59.7'	6	<100	*	*	C
MN00490	Amer Froysland Dam	Buffalo River	Amer Froysland	46° 49.6'	95° 58.4'	7	<100	*	*	C
MN00491	Amer Froysland Wildlife Dam	Buffalo River	Amer Froysland	46° 49.8'	95° 59.5'	6	<100	*	*	C
MN00492	August Nelson, Jr.	Buffalo River	August Nelson	46° 53.2'	96° 02.0'	16	< 50	*	*	C
MN00616	Flat Lake	Egg River	DOI BSFW	46° 59.2'	95° 38.2'	6	90	7.5 → 47	3 → 20	C
MN00617	Chippewa	Ottertail River	DOI BSFW	46° 57.3'	95° 36.3'	12	114	98 → 42	8 → 36	C
MN00618	Rice Lake	Ottertail River	DOI BSFW	46° 55.0'	95° 35.1'	6	<100	*	*	C
MN00619	Ogemash	Egg River	DOI BSFW	47° 00.3'	95° 39.1'	8	<100	*	*	C
MN00620	South Tamarac Lake	Buffalo River	DOI BSFW	46° 54.7'	95° 40.5'	10	11	*	*	C
MN00621	Balsam Lake	Buffalo River	DOI BSFW	46° 57.4'	95° 41.3'	9	<100	*	*	C
MN00631	Dry Lake	Egg River	DOI BSFW	47° 01.8'	95° 34.8'	8	<100	*	*	C
MN00746	Stakkelhouse Lake	Pelican River	G. Greggerson & S. C. Peterson	46° 50.4'	95° 47.9'	11	< 50	*	*	C
MN00820	Straight Lake	Straight River	State of Minn.	46° 53.3'	95° 15.1'	15	< 50	*	*	C
MN00830	Amer Froysland New Wildlife Dam	Buffalo River	Amer Froysland	46° 49.8'	95° 59.5'	12	< 50	*	*	C
MN00882	Long Lake	Pelican River	State of Minn.	46° 48.5'	95° 53.4'	6	<100	*	*	C
MN00883	Hubbel Pond	Ottertail River	State of Minn.	46° 51.6'	95° 42.0'	9	<100	*	*	C
MN00884	Cotton Lake Diversion Dam	Ottertail River	State of Minn.	46° 52.1'	95° 41.3'	6	<100	*	*	C
MN00885	Muskrat Lake Locks and Dam	Pelican River	Detroit Lakes	46° 46.9'	95° 53.2'	8	<100	*	*	C
MN00905	Town Lake	Ottertail River	State of Minn.	46° 43.5'	95° 42.5'	6	<100	*	*	C

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BELTRAMI										
MN00014	Fox Lake	Turtle River	State of Minn.	47° 36.8'	94° 44.9'	6	100	*	*	C
MN00015	Movil Lake	Turtle River	State of Minn.	47° 35.7'	94° 50.1'	12	77	22	19	C
MN00016	Mud River Dam	Mud River	Red Lake Fisheries, Inc.	47° 53.1'	94° 54.2'	15	50	*	*	C
MN00504†	Mississippi River	Mississippi River	Ottertail Power Co.	47° 29.1'	94° 43.1'	23	608	190	328	A
MN00748	Douglas Forster Rice Paddies	Rustad Creek	Douglad J. Forster	47° 50.1'	94° 38.5'	8	100	*	*	C
BENTON										
MN00241	Mayhew Lake	Mayhew Creek	State of Minn.	45° 42.0'	94° 06.1'	9	27	11	7	C
MN00692	Little Rock Creek	Little Rock Creek	State of Minn.	45° 47.0'	94° 12.0'	7	100	*	*	C
BIG STONE										
MN00169	Big Stone Lake	Minnesota River	State of Minn.	45° 17.8'	96° 26.9'	5	1160	110	39	C
MN00170	Long Tom Lake	Stony River	Lena Huizenga	45° 18.9'	96° 21.1'	10	50	*	*	C
MN00727	Holtz Irrigation Pond Dam	Big Stone Lake	Jerome Holtz	45° 32.2'	96° 46.4'	53	5	*	*	C
BLUE EARTH										
MN00071	Cottonwood Lake	Big Cobb River	State of Minn.	43° 56.5'	93° 52.1'	6	100	*	*	C
MN00136	Perch Lake	Big Cobb River	State of Minn.	43° 59.4'	93° 53.9'	8	100	*	*	C
MN00512#	Rapidan	Blue Earth River	Blue Earth Co.	44° 05.5'	94° 06.5'	62	2430	835	3730	A
MN00749	Eagle Lake	LeSuer River	Blue Earth SWCD	44° 10.3'	93° 52.7'	6	100	*	*	C
BROWN										
MN00070	Hanska Lake	Watonwan River	Kandiyahi County	44° 06.6'	94° 35.0'	6	41	*	*	C
MN00754	Sleepy Eye Control	County Ditch #5	City of Sleepy Eye	44° 18.3'	94° 43.7'	7	100	*	*	C
CARLTON										
MN00281	Langhurst Dam	Portage River	Alvin Langhorst	46° 27.2'	92° 39.1'	9	100	*	*	C
MN00288	Ninefeldt Pool	West Branch Moosehorn River	Ernest Ninefeldt	46° 32.5'	92° 44.1'	7	100	*	*	C
MN00385	G-2 Pond	Bob Lake Moosehorn River	State of Minn.	46° 38.2'	92° 37.7	10	50	*	*	C

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CARLTON										
MN00598‡	Cloquet	St. Louis	Potlatch Corp. NW Paper Co.	46° 43.6'	92° 25.7'	39	3430	2290	6430	A
MN00603‡	Fon Du Lac	St. Louis	Minn. Power	46° 39.9'	92° 17.6'	81	3600	2400	14030	A
MN00604‡	Thomson	St. Louis	Minn. Power	46° 40.0'	92° 24.2'	363	3560	2375	62100	A
MN00605‡	Scanlon	St. Louis	Minn. Power	46° 42.8'	92° 25.2'	16	3436	2290	2640	A
MN00606‡	Knife Falls	St. Louis	Minn. Power	46° 43.8'	92° 26.9'	18	3426	2290	3050	A
MN00723	Moehrke SCS	Deer Creek	Douglas Moehrke	46° 33.0'	92° 26.5'	21	<30	*	*	C
MN00737	Walter Hacken Smith Fishpond	Deer Creek	Walter Hackensmith	46° 32.1'	92° 24.0'	26	<30	*	*	C
MN00752	Park Lake	Park Lake Creek	Carlton County	46° 36.7'	92° 39.1'	7	<100	*	*	C
MN00809	Rice Portage Lake	Judicial Ditch #1	State of Minn.	46° 42.3'	93° 40.8'	6	<100	*	*	C
MN00831	Hanson Dam	Skunk Creek	Hanson Invest. Co.	46° 30.0'	92° 30.0'	35	< 5	*	*	C
MN00832	Herman Mader Pond	Net River	Herman Mader	46° 27.1'	92° 23.9'	17	<50	*	*	C
MN00312	Harold Hesse Wildlife Pond	Minnesota River	Harold Hesse	44° 48.3'	93° 33.2'	11	<50	*	*	C
MN00313	Elizabeth Batzli Wildlife Pond	Chaska Creek	Elizabeth Batzli	44° 47.1'	93° 42.0'	7	<100	*	*	C
MN00407	Eagle Lake	South Fork Crow River	State of Minn.	44° 53.3'	94° 55.8'	6	<100	*	*	C
MN00769	Lunsten Lake	Six Mile Creek	Hennepin Co. Park Reserve	44° 53.1'	93° 43.5'	20	<30	*	*	C
MN00808	Jonathan	East Creek	City of Chaska	44° 49.5'	93° 36.2'	30	< 5	*	*	C
MN00837	Ray Buesgens Wildlife Pond	Chaska Creek	Ray Buesgens	44° 50.6'	93° 38.6'	9	<100	*	*	C

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CASS										
MN00029	Dry Sand Lake Wildlife Mgt Unit	Farnham Creek Lot 4507	State of Minn.	46° 32.2'	95° 46.2'	15	< 50	*		C
MN00030	Blackwater Lake	Bay River	State of Minn.	46° 55.1'	94° 17.9'	6	120	36	16	C
MN00031	Portage Lake	Brook River	State of Minn.	46° 50.5'	94° 25.8'	6	18	*		C
MN00032	Bowen Lake	Pine River	State of Minn.	46° 48.9'	94° 29.7'	6	<100	*		C
MN00033	Pine Mountain Lake	Pine River	State of Minn.	46° 48.0'	94° 31.0'	6	65	*		C
MN00034	Hatke Lake	Pine River	State of Minn.	46° 48.6'	94° 23.5'	10	77	22	16	C
MN00035#	Norway Lake Dam	Pine River	City of Pine River	46° 43.2'	94° 24.0'	9	77	22	14	C
MN00036	Mayo Lake	Stony River	State of Minn.	46° 33.3'	94° 19.8'	6	<100	*		C
MN00037	Girl Lake	Bay River	State of Minn.	47° 58.8'	94° 12.6'	9	12	*		C
MN00039	Lower Trelipe Lake	Laure River	State of Minn.	47° 59.4'	94° 05.5'	6	32	*		C
MN00040	Mud-Goose Lake	Leech Lake River	State of Minn.	47° 16.1'	93° 57.3'	2	1150	145	21	C
MN00041	Willow River	Willow River	State of Minn.	47° 01.0'	93° 50.3'	8	81	23	13	C
MN00043	Washburn Lake	Daggett Brook	State of Minn.	46° 51.5'	94° 51.9'	7	16	*		C
MN00044	George Lake	Daggett Brook	State of Minn.	46° 52.3'	94° 01.0'	6	14	*		C
MN00141	Daggett Brook	Baggett Brook	State of Minn.	46° 54.2'	94° 05.3'	8	<100	*		C
MN00272	Crackel Dam	Beaver Creek	Warren Crackle	46° 40.0'	94° 46.8'	6	<100	*		C
MN00388	Kaylor Fish Pond	Mississippi River	Kaylor	47° 04.7'	97° 37.0'	13				
MN00585	Leech Lake Dam	Leech Lake River	DAEN NCS	47° 14.9'	94° 13.3'	7	1163	360	180	B
MN00586	Winnibigoshish Dam	Mississippi River	DAEN NCS	47° 25.8'	94° 03.0'	12	1142	515	460	B
MN00596	Gull Lake	Gull River	DAEN NCS	46° 24.7'	94° 21.2'	9	287	34	22	C
MN00601†	Sylvan	Crow Wing	Minnesota	46° 18.0'	94° 22.7'	22	3575	1470	2330	A
MN00642	Cuba	Leech Lake River	USDA FS	47° 18.0'	94° 32.0'	7	<100	*		C
MN00643	Sucker Bay Imp.	Sucker Bay of Leech Lake	USDA FS	47° 17.0'	94° 27.2'	8	<100	*		C
MN00648	Highland Creek	Highland Crek	USDA FS	47° 16.0'	94° 34.2'	11	< 50	*		C
MN00650	Loon Lake	Willow River	USDA FS	47° 06.2'	93° 52.5'	7	<100	*		C
MN00651	Bear Brook	Bear Brook	USDA FS	47° 17.0'	94° 05.0'	10	< 50	*		C
MN00685	Six Mile Creek Impoundment	Six Mile Brook	USFS	47° 16.1'	94° 03.5'	15	< 50	*		C
MN00706	So. Fork Pine Rivers	So. Fork Pine River	State of Minn.	46° 45.3'	94° 34.0'	6	<100	*		C
MN00707	Loon Lake	Mayo Creek	State of Minn.	46° 35.4'	94° 20.0'	6	<100	*		C

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CHIPPEWA										
MN00180	Chippewa River Montevideo	Chippewa River	State of Minn.	44° 52.1'	95° 44.0'	12	226	27	23	C
MN00578	Chippewa River Diversion	Chippewa River	DAEN NCS	45° 01.3'	95° 46.5'	12	1720	245	210	B
MN00742	Hardeen-Jahn Group Pond	Minnesota River	Lawrence Jahn	44° 57.3'	95° 47.5'	29	< 30	*	*	C
MN00888	Shakopee Lake Dam	Shakopee Creek	Chippewa Co. SCD	45° 08.1'	95° 29.5'	11	135	16	13	C
CHISAGO										
MN00536	Rush Creek	Rush Creek	State of Minn.	45° 40.9'	92° 58.3	8	<100	*	*	C
MN00537#	Sunrise River Pool 3	Sunrise River	State of Minn.	45° 26.1'	92° 54.0'	7	259	90	45	C
MN00538#	Sunrise River Pool 1	Sunrise River	State of Minn.	45° 23.5'	92° 57.4'	12	104	58	50	C
MN00539#	Sunrise River	Sunrise River	Chisago County	45° 28.8'	92° 52.4'	13	150	69	65	C
CLAY										
MN00690	Moorhead Lagoon	Red River	City of Moorhead	46° 54.3'	96° 45.6'	9	<100	*	*	C
MN00705	Red River -	Red River	--	46° 49.7'	96° 47.0'	3	6785	557	120	C
MN00753	Ganz Dam	Buffalo River - South Branch	Paul Horn Farms, Inc.	46° 52.2'	96° 37.5'	8	500	40 → 75	23 → 101	C
CLEARWATER										
MN00231	Rice Lake Upper	Wild River River	State of Minn.	47° 23.1'	95° 19.5'	7	16	*	*	C
MN00232	Clearwater Dam	Clearwater River	State of Minn.	47° 44.0'	95° 12.1'	14	43	36 → 16	4 → 16	C
MN00259	Ferdi Anderson Wildlife Pond	Clearwater River	Ferdi Anderson	47° 44.0'	95° 21.0'	14	<50	*	*	C
MN00553	Bid Swamp	Clearwater River	DOI BSFW	47° 52.5'	95° 29.3'	15	308	24 → 105	26 → 113	C
MN00573	Lower Red Lake Dam	Red Lake River	DAEN NCS	47° 57.4'	95° 16.6'	3	1950	492	75	C
COOK										
MN00089	Devils Track Lake	Devils Track River	Cook County	47° 49.1'	90° 22.0'	8	24	*	*	C
MN00090	South Fowl Lake	Pigeon River	Arpen Canada	48° 02.4'	89° 59.8'	7	470	395	228	C

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COTTONWOOD										
MN00161	Talcot Lake WMA	Des Moines river	State of Minn.	43° 53.1'	95° 26.2'	11	457	90	71	C
MN00162	Warren Lake	Perkins Creek	State of Minn.	43° 53.3'	95° 06.7'	13	< 50	*	*	C
MN00163	Eagle Lake	Watonwan River	Cottonwood County	43° 56.8'	95° 00.4'	8	2	*	*	C
MN00164	Fish Lake	Watonwan River	State of Minn.	43° 52.2'	95° 02.1'	7	3	*	*	C
MN00165	Mountain Lake	Blue Earth River	State of Minn.	43° 57.1'	94° 56.2'	10	< 50	*	*	C
MN00223	Talcot Lake WMA Frerichs Tract Imp	Des Moines River	State of Minn.	43° 53.9'	95° 26.6'	7	12	*	*	C
MN00554#	West Fork Des Moines River	West Fork Des Moines River	City of Windom	43° 50.9'	95° 07.2'	7	1000	232	117	C
MN00680	Talcot Lake Wildlife Area	Des Moines River	State of Minn.	43° 27.5'	95° 27.5'	7	<100	*	*	C
CROW WING										
MN00045	Sibley Lake	Mayo Creek	State of Minn.	46° 34.5'	94° 19.5'	6	51	15	7	C
MN00046	Pelican Lake	Pelican Brook	Pelican Lake	46° 37.0'	94° 11.0'	6	81	22	10	C
MN00047	Ossawinnamakee Lake	Pelican Brook	State of Minn.	46° 37.6	94° 10.0'	10	85	26	19	C
MN00048	Eagle Lake	Daggett Brook	State of Minn.	46° 44.8'	94° 03.1'	6	85	26	11	C
MN00049	Greer Lake	Pine River	State of Minn.	46° 38.1'	94° 03.9'	6	11	*	*	C
MN00050	Velvet Lake	Pine river	State of Minn.	46° 39.4'	94° 03.0'	8	<100	*	*	C
MN00051	Rosevelt Lake	Daggett Brook	State of Minn.	46° 46.9'	94° 59.6'	8	40	11	6	C
MN00052	Emily Lake	Pine River	Village of Emily	46° 43.0'	93° 56.8'	9	14	5	3	C
MN00053	Duck Lake	Little Pine River	State of Minn.	46° 45.3'	93° 53.6'	6	<100	*	*	C
MN00054	Island Lake	Mud Brook	State of Minn.	46° 40.7'	93° 53.7'	6	81	24	10	C
MN00055	Round Lake	Nokasippi River	State of Minn.	46° 13.2'	94° 13.5'	6	140	41	18	C
MN00056	Blackbear Lake	Mississippi River	State of Minn.	46° 30.7'	94° 04.0'	6	5	*	*	C
MN00057	Lower Long Lake	Nokasippi River	State of Minn.	46° 16.3'	94° 06.2'	6	61	18	8	C
MN00058	Pascoe Lake	Rabbit River	State of Minn.	46° 29.4'	94° 01.9'	6	<100	*	*	C
MN00235	Pointon Lake	Nokasippi River	State of Minn.	46° 21.8'	93° 59.2'	6	<100	*	*	C
MN00236	Long Lake Upper	Nokasippi River	State of Minn.	46° 17.8'	94° 03.4'	6	45	13	6	C
MN00237	Clearwater Lake	Nokasippi River	State of Minn.	46° 24.7'	93° 54.4'	6	5	*	*	C

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CROW WING										
MN00238	Holt Lake	Mille Lacs Lake – Offstream 1	State of Minn.	46° 15.1'	93° 49.6'	6	1	*	*	C
MN00239	Borden Lake	Mille Lacs Lake – Offstream	State of Minn.	46° 18.6'	93° 50.1'	6	24	*	*	C
MN00582#	Pine River Dam	Pine River	DAEN NCS	46° 40.1'	94° 06.7'	13	562	217	200	B
MN00597†	Brainerd	Mississippi River	Potlatch Corp.– NW Paper Div.	46° 22.7'	94° 11.1'	20	7320	3465	5000	A
MN00714	Birchdale Lake	Mud Brook	State of Minn.	46° 43.3'	93° 51.5'	6	<100	*	*	C
MN00735	Hawthorne Dam	Nokasippi River	Bower Hawthorne	46° 23.6'	93° 56.3'	6	<100	*	*	C
MN00755	Little Pine Creek	Little Pine Creek	Little Pine Co.	46° 42.2'	93° 48.3'	6	<100	*	*	C
MN00827	Richard Perkins	Daggett Brook	Richard Perkins	46° 41.0'	94° 08.0'	8	406	125	72	C
DAKOTA										
MN00349	Blackdog Lake	Minnesota River	NSP Co.	44° 49.5'	93° 14.0'	20	4	*	*	C
MN00389	Vermillion River Dam	Vermillion River	Peavey Co.	44° 41.3'	92° 50.4'	8	*	*	*	C
MN00594	Locks and Dam No. 2	Mississippi River	DAEN NCS	44° 45.6'	92° 52.1'	12	37100	10,700	9250	A
MN00675	Kaposia Park Dam	Mississippi River	City of South St. Paul	44° 54.7'	93° 03.4'	79	215	<3	<2	C
DODGE										
MN00338	Jim Donaldson Pond	South Middle Branch Zumbro River	Jim Donaldson	44° 03.0'	92° 53.0'	8	<100	*	*	C
MN00339	Alberts-Rueg Group	Middle Fork – Zumbro River	Caryol Kennedy	44° 10.0'	92° 43.0'	24	<30	*	*	C
MN00340	Walter Buehler Deten.	Middle Branch – Zumbro River	Walter Buehler	44° 08.8'	92° 48.0'	17	67	26	32	C
MN00390	Mantorville Dam	Fort Zumbro River	Mantorville	44° 03.8'	92° 45.1'	12	147	64	55	C

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DOUGLAS										
MN00171	Long Lake	Chippewa River	State of Minn.	45° 57.7'	95° 41.8'	6	<100	*	*	C
MN00172	Stowe Lake	Chippewa River	State of Minn.	46° 59.2'	95° 39.3'	6	20	*	*	C
MN00173	Aaron Lake	Chippewa River	State of Minn.	46° 04.0'	95° 25.1'	6	6	*	*	C
MN00174	Upper Hunt Lake	Chippewa River	State of Minn.	46° 00.9'	95° 37.1'	6	<100	*	*	C
MN00175	Minister Lake	Chippewa River	State of Minn.	45° 54.7'	95° 37.5'	10	< 50	*	*	C
MN00176	Ida Lake	Long Prairie River	State of Minn.	45° 57.1'	95° 25.0'	6	<100	*	*	C
MN00177	Albert Lake	Chippewa River	State of Minn.	46° 56.3'	95° 45.5'	6	<100	*	*	C
MN00178	Geneva Lake	Long Prairie River	State of Minn.	45° 54.8'	95° 19.8'	6	28	*	*	C
MN00179	Victoria Lake	Long Prairie River	State of Minn.	45° 53.1'	95° 19.7'	6	14	*	*	C
MN00181	Miltona Lake	Long Prairie River	State of Minn.	46° 01.5'	95° 23.2'	6	35	*	*	C
MN00182	Louise Lake	Long Prairie River	State of Minn.	45° 55.3'	95° 25.1'	6	<100	*	*	C
MN00183	Brophy Lake	Long Prairie River	State of Minn.	45° 54.6'	95° 26.1'	6	15	*	*	C
MN00184	Lobster Lake	Long Prairie River	State of Minn.	45° 52.9'	95° 29.6'	6	38	*	*	C
MN00564	Spruce Creek	Spruce Creek	Erwin Koep	46° 04.2'	95° 13.3'	20	< 30	*	*	C
MN00725	Maple Lake Inlet	Intermittent Stream	State of Minn.	45° 48.0'	95° 22.3'	6	<100	*	*	C
MN00741	Anderson Lake	Intermittent Stream	Vernon Ostrum	46° 04.3'	95° 37.2'	6	<100	*	*	C
MN00757	Millerville Sportsman Gp Wildlife Struc	Chippewa River	Nick Otto	46° 05.1'	95° 35.0'	6	<100	*	*	C
MN00817	Jennie Lake Flowage Fish Barrier	Chippewa River	State of Minn.	45° 55.3'	95° 43.5'	9	<100	*	*	C
MN00818	Chippewa River Fish Barrier	Chippewa River	State of Minn.	45° 57.0'	95° 43.2'	16	< 50	*	*	C
FARIBAULT										
MN00113	Rice Lake	Rice Lake	State of Minn.	43° 47.6'	94° 04.3'	6	28	*	*	C
MN00114	Minnesota Lake	Maple River	Village of MN Lake	43° 50.5'	93° 52.9'	6	40	*	*	C
MN00142	Rice Lake	Blue Earth River	Faribault County	43° 39.1'	93° 44.3'	8	<100	*	*	C
MN00148	South Walnut Lake	East Fork - Blue Earth River	State of Minn.	43° 39.8'	93° 47.2'	6	99	11.5	5	C

COUNTY/ Site ID	Site Name	Stream	Owner	Latitude	Longitude	Hydraulic Height, ft	Drainage Area, sq mi	Average Annual cfs Discharge	Potential Power Capacity, KW	Hydropower Feasibility Region
FILLMORE										
MN00317	T. Rain Struc	Mahoney Creek	Tilford Rain	43° 45.7'	92° 04.0'	22	< 30	*	*	C
MN00318	Donald Wangen	Root River-Offstream	Donal Wangen	43° 47.5'	92° 04.0'	28	< 30	*	*	C
MN00319	Ross Graves	Willow Creek	Roos Graves	43° 39.0'	92° 05.5'	28	32	12	24	C
MN00320	Vernon Finseth	Root River-Offstream	Vernon Finseth	43° 47.0'	94° 04.5'	24	< 30	*	*	C
MN00321	Ray Waller	Root River-Offstream	Ray Waller	43° 49.9'	92° 09.9'	26	< 30	*	*	C
MN00322	Otto Mayer	Root River-Offstream	Otto Meyer	43° 39.3'	92° 14.0'	23	< 30	*	*	C
MN00323	H. Ruen	Duschee Creek	H. Ruen	43° 40.5'	91° 57.5'	26	< 30	*	*	C
MN00324	Howard Ruen Detention Gp	Root-River-Offstream	Howard Ruen	43° 40.5'	91° 57.5'	29	< 30	*	*	C
MN00325	Lee Copeman	Rice Creek	Lee Copeman	43° 47.0'	92° 48.0'	25	< 30	*	*	C
MN00326	Miller Lange Pond	Root River-Offstream	William Miller	43° 33.0'	92° 02.0'	25	< 30	*	*	C
MN00327	Ness, Rudlong, Ellenberg Gp	Root River-Offstream	Thelmer Rudlong	43° 47.0'	92° 22.0'	33	20	7	17	C
MN00328	Robert Highum	Root River-Offstream	Robert Highum	43° 48.0'	91° 48.0'	27	< 30	*	*	C
MN00329	Donal Lawstuen	Root River-Offstream	Donal Lawstuen	43° 45.2'	92° 01.0'	26	< 30	*	*	C
MN00330	East Willow Creek	East Willow Creek	Jerry Scheevel	43° 36.0'	92° 09.0'	36	< 5	*	*	C
		Offstream						*	*	C
MN00331	East Willow Creek	East Willow Creek	Lee Fishbaugher	43° 33.5'	92° 07.8'	28	< 30	*	*	C
MN00332	East Willow Creek	East Willow Creek	Fay Sikkink	43° 36.0'	92° 08.5'	29	< 30	*	*	C
MN00333	East Willow Creek	East Willow Creek	Billy Fishbaugher	43° 33.2'	92° 06.5'	37	< 5	*	*	C
MN00334	East Willow Creek	East Willow Creek	John Mensink	43° 34.5'	92° 08.5'	35	7	< 4	< 10	C
MN00335	East Willow Creek	East Willow Creek	Roger Ristau	43° 38.8'	92° 07.2'	28	< 30	*	*	C
MN00391	Bear Creek	Bear Creek	Donald Bowland	43° 45.8'	92° 22.5'	23	55	22	36	C
MN00514‡	Byllesby	Cannon River	Dakota and Goodhue Cty	44° 30.7'	92° 56.4'	57	1116	414	1700	A
MN00517†	Lanesboro Dam	South Br-Root River	City of Lanesboro	43° 43.0'	91° 58.7'	27	297	140	340	A
MN00759	Eickhoff Deten. Dam	Sugar Creek	Emergy Eickhoff	43° 43.9'	92° 11.8'	20	< 30	*	*	C
MN00760	Erickson Deten	Rice Creek	Robert Erickson	43° 44.0'	92° 12.0'	17	< 50	*	*	C
MN00805‡	Lagoon Park Dam	Trout Creek	George Borgen	43° 49.1'	92° 03.7'	10	< 50	*	*	C
MN00857	Rediske Vatland Gp	Donaldson Creek	Rediske Vetland Gp	43° 32.0'	91° 51.0'	25	< 30	*	*	C
MN00858	Sorenson Group	South Br-Root River	Sorenson Group	43° 43.0'	91° 59.7'	28	< 30	*	*	C
MN00859	Hatlevig-Bayum Gp	Pine Creek	Hatlevig-Boyum Gp	43° 49.9'	91° 53.2'	24	< 30	*	*	C
MN00860	Hanning Bros Gp Pond	South Br-Root River	Hanning Bros Gp	43° 37.4'	92° 09.8'	25	< 30	*	*	C
MN00861	Ronald Gehling	Mid Br-Root River	Ronald Gehling	43° 46.8'	92° 13.5'	27	< 30	*	*	C
MN00862	Herihan-Hazel Gp	Root River-Offstream	Horihan-Hazel Gp	43° 44.0'	91° 58.2'	29	< 30	*	*	C
MN00863	Fillmore County Rd 21	Root River	Fillmore Cty	43° 44.6'	92° 01.0'	31	< 5	*	*	C
MN00901	Rudlong Struc	Kedron Brook	Thelmer Rudlong	43° 47.9'	92° 21.7'	24	< 30	*	*	C

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‡Indicate sites no longer producing power.

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FREEBORN										
MN00359	Geneva Lake	Turtle Creek	Freeborn Co.	43° 16.3'	93° 16.3'	10	30	10	7	C
MN00360	Fountain Lake Dam	Shell Rock River	City of Albert Lea	43° 39.1'	93° 21.6'	15	64	26	28	C
MN00361	Freeborn Lake	Big Cobb River	Freeborn Co.	43° 45.3'	93° 34.8'	5	*	*	*	C
MN00362	Albert Lea Lake	Shell Rock River	Freeborn Co.	43° 36.7'	93° 16.3'	10	153	68	49	C
MN00387	Johnson Pool	Turtle Creek	D. Johnson	43° 44.2'	93° 06.5'	17	< 50	*	*	C
MN00413	Gerald & Robert Pestorious Fish Pond	Shell Rock River	Gerald Pestorious	43° 39.2'	93° 27.3'	16	< 50	*	*	C
MN00684	Bear Lake	Lime Creek	State of Minn.	43° 32.3'	93° 29.6'	7	<100	*	*	C
GOODHUE										
MN00450	R. Rush	Wells Creek	Richard Rusch	44° 25.4'	92° 27.9'	25	< 30	*	*	C
MN00451	Harold Eckblad	Spring Creek	Harold Eckblad	44° 33.6'	92° 37.8'	22	< 30	*	*	C
MN00452	Kepner Group	Cannon River	William & Mary Dobs	44° 29.3'	92° 51.5'	27	< 30	*	*	C
MN00453	Arthur Voth Detention	Hay Creek	Arthur Voth	44° 32.2'	92° 36.3'	34	< 5	*	*	C
MN00454	William Dankwalt	Mississippi River	William Dankwart	44° 28.5'	92° 20.3'	28	< 30	*	*	C
MN00455	Erredge Group Denten.	Bitter Creek	James Erredge	44° 16.5'	92° 41.8'	25	< 30	*	*	C
MN00456	Evan Josephson	Belle Creek	Evan Josephson	44° 27.8'	92° 47.1'	25	< 30	*	*	C
MN00457	Donald Johnson	Spring Creek	Donald Johnson	44° 30.8'	92° 41.3'	23	< 30	*	*	C
MN00458	Thomforde Group Struc. No. 1	North Br-Zumbra River	Peter Doyle	44° 20.0'	92° 43.2'	25	< 30	*	*	C
MN00459	Donald Banks Group	Butler Creek	Donald Banks Group	44° 25.8'	92° 51.0'	26	< 30	*	*	C
MN00460	Elmer Voth Detention	Hay Creek	Elmer Voth	44° 31.4'	92° 35.9'	36	< 5	*	*	C
MN00461	West Fork Group Struc. No. 1	Wells Creek	Stanley Kuèsler	44° 29.0'	92° 31.0'	30	< 5	*	*	C
MN00462	West Fork Group Struc. No. 2	Wells Creek	West Fork Group	44° 28.2'	92° 31.0'	29	< 30	*	*	C
MN00463	Lower & Gp-Struc. #1	No. Br-Zumbro River	John McWaters	44° 20.6'	92° 43.0'	27	< 30	*	*	C
MN00464	Peaceful Valley Group Struc. No. 1	Cannon River	Ray C. Samuelson	44° 28.4'	92° 48.3'	29	< 30	*	*	C
MN00465	Cecil Franklin	Spring Creek	Cecil J. Franklin	44° 29.7'	92° 38.7'	29	< 30	*	*	C

COUNTY/ Site ID	Site Name	Stream	Owner	Latitude	Longitude	Hydraulic Height, ft	Drainage Area, sq mi	Average Annual cfs Discharge	Potential Power Capacity, KW	Hydropower Feasibility Region
GOODHUE										
MN00466	Charles Vangsness	Belle Creek	Charles Vangsness	44° 22.6'	92° 46.0'	23	< 30	*	*	C
MN00467	George Lamberty	Cannon River	George Lamberty	44° 29.7'	92° 53.4'	30		*	*	C
MN00468	Lower 7 Gp-Struc. #2	No. Br-Zumbro River	Erwin Geth	44° 20.7'	92° 43.3'	19	< 50	*	*	C
MN00469	Henry Henricks	Mississippi River	Henry W. Henricks	44° 32.8'	92° 43.3'	23	< 30	*	*	C
MN00470	Eldon Anderson	Belle Creek River	Eldon M. Anderson	44° 24.0'	92° 29.0'	19	< 50	*	*	C
MN00471	Swanson, Holmand Hemmah Group	Cannon River	Robert Hemmah	44° 29.2'	92° 48.8'	29	< 30	*	*	C
MN00518	Little Cannon River	Little Cannon River	City of Cannon Falls	44° 30.5'	92° 54.5'	25	95	40	72	B
MN00595	Lock & Dam No. 3	Mississippi River	DAEN NCS	44° 36.6'	92° 36.6'	5	46,600	16,400	5960	A
MN00765	Overland Pond	Aumbro River	Glen Overland	44° 13.9'	92° 39.8'	15	< 50	*	*	C
MN00806	Welch Dam	Cannon River	Welch Village Ski Area	44° 34.1'	92° 44.4'	8	<100	*	*	C
MN00807	L. Jackson Pond	Dry Run	Leighton Jackson	44° 20.5'	92° 49.5'	6	<100	*	*	C
MN00864	Bullard Crek No. 6	Bullard Creek	Hattemer-Schaller	44° 31.5'	92° 31.0'	30	< 1	*	*	C
MN00865	Bullard Creek Struc. #1	Bullard Creek	Fischer	44° 31.5'	92° 31.0'	38	< 1	*	*	C
MN00866	Bullard Creek Struc. #2	Bullard Creek	Stumps	44° 31.5'	92° 31.0'	30	< 1	*	*	C
MN00867	Belle Creek R-1	Belle Creek	Watershed Board	44° 23.8'	92° 47.1'	47	*	*	*	C
MN00868	Belle Creek R-4	Belle Creek	Belle Creek Watershed Brd	44° 25.1'	92° 49.2'	52	5	4	15	C
MN00891	Minneola Township Pool Site 3	Zumbro River	Minneola Township Brd	44° 21.2'	92° 43.8'	22	< 30	*	*	C
MN00898	Joseph Frederich	No. Fk-Zumbro River	Joseph Frederich	44° 21.0'	92° 42.2'	20	< 30	*	*	C
MN00899	Thomforde-Rockne #1	No. Fk-Zumbro River	Thomforde & Rockne	44° 20.0'	92° 43.5'	21	< 30	*	*	C
MN00900	Thomforde-Rockne #2	No. Fk-Zumbro River	Thomforde & Rockne	44° 19.8'	92° 43.7'	12	< 50	*	*	C

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COUNTY/ Site ID	Site Name	Stream	Owner	Latitude	Longitude	Hydraulic Height, ft	Drainage Area, sq mi	Average Annual cfs Discharge	Potential Power Capacity, KW	Hydropower Feasibility Region
GRANT										
MN00026	Mustinka River	Mustinka River	State of Minn.	45° 52.4'	96° 07.3'	13	239	20 → 82	19 → 77	B
MN00027	Carp Dam	Pelican Creek	State of Minn.	46° 04.4'	95° 49.3'	9	<100	*	*	C
MN00028	Barrett Lake	Pomme De Terre River	Village of Barrett	46° 54.7'	95° 53.0'	10	134	16	12	C
MN00716	Blakesley Slough	Pomme De Terre River	USDA FS	45° 58.1'	95° 53.6'	6	63	*	*	C
HENNEPIN										
MN00366	Rice Lake	Elm Creek	City of Maple Grove	45° 07.8'	93° 26.9'	10	< 50	*	*	C
MN00411	Riley Lake	Riley Creek	State of Minn.	44° 49.8'	93° 31.0'	7	<100	*	*	C
MN00507#	Coon Rapids	Mississippi River	Hennepin Co. Park Res.	45° 08.6'	93° 18.7'	20	19,000	7560	10,900	A
MN00520	Elm Creek	Elm Creek	Champlin Township	45° 10.9'	93° 23.4'	16	93	32	37	C
MN00521	Snelling Lake Outlet	Minnesota River	State of Minn.	44° 53.1'	93° 12.5'	12	< 50	*	*	C
MN00567	Nine Mile Creek	Nine Mile Crek	City of Bloomington	44° 49.8'	93° 18.9'	6	<100	*	*	C
MN00590†	St. Anthony Falls Upper Lock & Dam	Mississippi River	DAEN NCS	44° 58.9'	93° 15.5'	49	19,680	7790	27,500	A
MN00591†	St. Anthony Falls Lower Lock & Dam	Mississippi River	DAEN NCS-NSP	44° 58.7'	93° 14.8'	24	19,685	7790	13,500	A
MN00593†	Locks and Dam No. 1	Mississippi River	DAEN NCS-Ford Motor Co.	44° 54.9'	93° 12.1'	38	19,700	7790	21,300	A
MN00762	Hampton Hills Golf Course Impoundment	Unnamed	Ken Hampton	45° 04.6'	93° 27.7'	6	<100	*	*	C
MN00763	Riley Creek	Riley Creek	Russel H. Zakariagen	44° 49.6'	93° 29.8'	14	< 50	*	*	C
MN00764	William Mills Pond	Lake Minnetonka	William T. Mills	45° 58.2'	93° 36.1'	10	< 50	*	*	C
HOUSTON										
MN00341	Karl Rauk Detention	Pine Creek	Karl Rauk	43° 49.9'	91° 26.2'	27	< 30	*	*	C
MN00342	Fitting Bros. Pond	Root River	Fitting Bros.	43° 48.2'	91° 37.3'	25	< 30	*	*	C
MN00343	Thorson Group No. Detention	So. Fork Root River	C. Gaustad	43° 44.1'	91° 37.7'	28	< 30	*	*	C
MN00344	Thorson Group West Detention	So. Fork Root River	C. Gaustad	43° 44.0'	91° 37.9'	29	< 30	*	*	C

COUNTY/ Site ID	Site Name	Stream	Owner	Latitude	Longitude	Hydraulic Height, ft	Drainage Area, sq mi	Average Annual cfs Discharge	Potential Power Capacity, KW	Hydropower Feasibility Region
HENNEPIN										
MN00345	James Bennet Gp Struc	Offstream-Root River	James Bennet	43° 47.5'	91° 21.3'	26	30	*	*	C
MN00346	Richards Gp Struc	Offstream-Crooked Crk	Robert Richards	43° 36.8'	91° 18.0'	26	30	*	*	C
MN00347	Baumgartner Gp Struc	Brush Valley Creek	Ambrose Baumgartner	43° 47.3'	91° 23.1'	28	30	*	*	C
MN00348	Pollema Structure	Offstream-Root River	James Pollema	43° 50.5'	91° 30.1'	32	1	*	*	C
MN00522	Structure R-4	Crooked Creek	Crooked Creek Dist	43° 37.4'	91° 22.5'	46	3.86	3	10	C
MN00523	Structure R-1	Crooked Creek	Wohlers & Crooked Creek Dist	43° 38.7'	91° 28.2'	42	5	1	3	C
MN00524	R3 Structure	So Fork Crooked Crk	Crooked Creek Dist	43° 36.2'	91° 24.9'	25	36	14	25	B
MN00804	Schechs Mill Dam	Beaver creek East	Ivan Krugmar	43° 40.0'	91° 34.8'	8	100	*	*	C
MN00892	Crooked Creek S1-B	No Fork Crooked Crk	Crooked Creek WSD	43° 39.8'	91° 25.9'	21	30	*	*	C
MN00893	Crooked Creek R-2	No Fork Crooked Crk	Crooked Creek WSD	43° 38.0'	91° 26.1'	43	*	*	*	C
MN00894	Crooked Creek S-3	So. Fork Crooked Crk	Crooked Creek WSD	43° 36.2'	91° 28.6'	33	*	*	*	C
HUBBARD										
MN00185	Portage Lake	Portage River	State of Minn.	46° 57.8'	95° 06.0'	8	155	45	26	C
MN00186	Potato Lake	Fish Hook River	State of Minn.	46° 58.7'	95° 02.8'	6	210	62	27	C
MN00187	Long Lake Dam	Shell River	State of Minn.	46° 50.5'	95° 00.7'	15	333	100	108	B
MN00188	Crow Wing No. 5 Lake	Crow Wing River	State of Minn.	46° 54.6'	94° 53.5'	6	21	*	*	C
MN00189	Crow Wing No. 8 Lake	Crow Wing River	State of Minn.	46° 57.0'	94° 48.4'	6	9	*	*	C
MN00234#	Fish Hook River Dam	Fish Hook River	City of Park Rapids	46° 55.2'	95° 03.1'	15	173	100	100	B
ISANTI										
MN00059	Collinwood Lake	Collinwood Creek	State of Minn.	45° 03.9'	94° 15.5'	6	33	*	*	C
MN00408	Green Lake	Green Lake Brook	State of Minn.	45° 34.0'	93° 25.6'	8	24	*	*	C
MN00475	Margaret Lake Dam	Rum River	State of Minn.	45° 28.0'	93° 18.7'	12	50	*	*	C
MN00476	Benson Wildlife Dam	Rum River Offstream	Stanley Benson	45° 25.6'	93° 20.0'	7	100	*	*	C
MN00477	Trulson Wildlife Pond	No. Br-Sunrise River	Paul Trulson	45° 33.1'	93° 03.2'	12	50	*	*	C
MN00528	So. Stanchfield Lake	Stanchfield Creek	State of Minn.	45° 38.9'	93° 27.9'	6	40	*	*	C
MN00529	Lory Lake Struc. 1	Stanchfield Brook	State of Minn.	45° 43.4'	93° 21.6'	6	100	*	*	C

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ITASCA										
MN00012	Fletcher Creek	Fletcher Creek	USDA FS	47° 42.4'	93° 52.1'	8	100	*	*	C
MN00076	Deer Lake	Deer River	State of Minn.	47° 23.5'	93° 42.8'	6	38	*	*	C
MN00077	Wabana Lake	Clearwater River	State of Minn.	47° 24.4'	93° 29.8'	6	20	*	*	C
MN00078	Little Splithand Lake	Splithand Creek	State of Minn.	47° 04.3'	93° 26.9'	6	100	*	*	C
MN00079	Splithand Lake	Splithand Creek	State of Minn.	47° 04.2'	93° 28.3'	6	25	*	*	C
MN00080	Busties Lake	Deer River	State of Minn.	47° 52.4'	93° 29.2'	6	100	*	*	C
MN00081	Deer Creek	Deer River	State of Minn.	47° 51.2'	93° 26.1'	8	25	*	*	C
MN00082	Balsam Lake	Prairie River	State of Minn.	47° 32.0'	93° 22.6'	14	20	2	2	C
MN00106	Holland Lake	Fletcher Creek	USDA FS	47° 43.5'	93° 52.5'	13	50	*	*	C
MN00128	Jungo Lake	Rice River	USDA FS	47° 43.0'	93° 42.4'	11	8	*	*	C
MN00223	East Lake	Spring Lake Creek	USDA FS	47° 40.3'	93° 51.2'	11	100	*	*	C
MN00273	Louis Peloquin Wildlife Impoundment	Stony Brook	Itasca County	47° 42.2'	97° 08.7'	7				C
MN00377	Dishpan Lake	Moose River	State of Minn.	47° 46.1'	94° 06.0'	11	50	*	*	C
MN00566	Beaver Lodge	Fletcher Creek	USDA FS	47° 41.3'	93° 53.5'	11	50	*	*	C
MN00584	Pokegama Lake Dam	Mississippi River	DAEN NCS	47° 14.9'	93° 35.2'	10	3265	1135	780	B
MN00602†	Blandin	Mississippi River	Blandin Paper Co.	47° 13.9'	93° 31.8'	21	3370	1170	1770	A
MN00609†	Prairie River	Prairie River	Blandin Power Co.	47° 17.2'	93° 29.8'	35	446	280	700	A
MN00644	Ball Club Imp.	Coffee Creek	USDA FS	47° 23.0'	94° 00.0'	9	100	*	*	C
MN00645	Spur Lake	Fletcher Creek	USDA FS	47° 42.2'	93° 55.1'	12	100	*	*	C
MN00649	Amik Lake	Simpson Creek	USDA FS	47° 33.0'	94° 05.0'	10	50	*	*	C
MN00652	Welch Lake	Popple Creek	USDA FS	47° 48.0'	94° 11.0'	9	100	*	*	C
MN00656	Wolf Lake	Prairie River	State of Minn.	47° 33.7'	93° 15.8'	9	100	*	*	C
MN00657	Hartley Lake	Prairie River	State of Minn.	47° 32.6'	93° 19.1'	7	100	*	*	C
MN00658	Charter Dam	Swan River	M.A. Hanna Mining Co.	47° 17.4'	93° 13.6'	8	100	*	*	C
MN00710	Little Wolf Lake Wildlife Impoundment	Intermittent	USDA FS	47° 28.7'	93° 29.0'	12	50	*	*	C
MN00711	Dishpan WMA Imp. #2	Dora Lake-Big Fork R	State of Minn.	47° 46.5'	94° 06.5'	9	*	*	*	C
MN00721	King Lake Gp Lake Outlet Struc.	Prairie River	Itasca Co.-SCS	47° 32.3'	93° 24.2'	6	100	*	*	C
MN00739	Pigeon Dam Lake	Pigeon Flowage	State of Minn.	47° 31.0'	94° 09.3'	9	100	*	*	C

COUNTY/ Site ID	Site Name	Stream	Owner	Latitude	Longitude	Hydraulic Height, ft	Drainage Area, sq mi	Average Annual cfs Discharge	Potential Power Capacity, KW	Hydropower Feasibility Region
ITASCA										
MN00772	Patrick Stilling Dike	Unnamed	Hanna Mining Co. AGE	47° 21.0'	93° 13.8'	25	30	*	*	C
MN00773	Buckeye Two Tailings Dike-Offstream		Hanna Mining Co. AGE	47° 18.4'	93° 27.8'	50	*	*	*	C
MN00774	Hanna Tailings Dike	Offstream	Hanna Mining Co. AGE	47° 19.2'	93° 28.7'	25	*	*	*	C
MN00777	Perry-Wyman Tailings Dike-Offstream		Hanna Mining Co. AGE	47° 24.5'	93° 08.8'	35	*	*	*	C
MN00778	Mesabi Chief Tailings Dike 2-Offstream		Hanna Mining Co. AGE	47° 22.9'	92° 59.8'	40	*	*	*	C
MN00779	Mesabi Chief Tailings Dike 3-Offstream		Hanna Mining Co. AGE	47° 23.2'	92° 59.7'	24	*	*	*	C
MN00780	Mesabi Chief Clarif. Dike-Offstream		Hanna Mining Co. AGE	47° 23.1'	92° 59.7'	24	*	*	*	C
MN00783	Lind Greenway Dike	Offstream	Jones and Lauglin Steel	47° 17.3'	93° 31.6'	58	*	*	*	C
MN00784	Hill Annex Dike One	Offstream	Jones and Laughlin Steel	47° 18.4'	93° 15.0'	65	*	*	*	C
MN00785	Hill Annex Dike Three	Offstream	Jones and Laughlin Steel	47° 18.4'	93° 15.1'	63	*	*	*	C
MN00793	Arcturus Water Supply Dike-Offstream		U.S. Steel Corp.	47° 19.2'	93° 26.8'	40	*	*	*	C
MN00794	Arcturus Tailings Basin-Offstream		U.S. Steel Corp.	47° 19.9'	93° 26.8'	40	*	*	*	C
MN00795	Trout Lake Tailings Dike-Offstream		U.S. Steel Corp.	47° 15.9'	93° 23.0'	35	*	*	*	C
MN00798	Reservoir No. 6 Dam	Offstream-Welcome Cr	Hanna Mining Co. AGE	47° 21.6'	93° 05.5'	35	*	*	*	C
MN00799	Reservoir Two Dam	Welcome Creek	Hanna Mining Co. AGE	47° 21.1'	93° 06.7'	33	< 5	*	*	C
MN00802	Butler Taconite Initial Tailings Dike	Offstream-O'Brien Cr	Hanna Mining Co. AGE	47° 20.0'	93° 09.4'	18	<50	*	*	C
MN00803	O'Brien North Dam	O'Brien Creek	Hanna Mining Co. AGE	47° 22.6'	93° 08.4'	49	< 5	*	*	C
JACKSON										
MN00115	Heron Lake Outlet	Heron Lake Outlet	State of Minn.	43° 47.6'	95° 17.5'	7	457	74	53	C
MN00117#	Jackson Dam	Des Moines River	City of Jackson	43° 37.2'	94° 59.0'	11	1233	283	220	B
MN00841	Doctor Tubola Deten. Structure	Des Moines River	Doctor Tubola	43° 41.4'	95° 01.4'	27	<30	*	*	C
MN00842	Tillman Gruhlke Dam	Des Moines River	James Tillman	43° 39.1'	95° 01.4'	28	<30	*	*	C
KANABEC										
MN00138	Forshier Pool	Knofe River	James and Lee Forshier	46° 01.3'	93° 18.4'	11	<50	*	*	C
MN00274	Gus Herwig Dam	Spring Brock	Gust Herwig	45° 50.5'	93° 15.0'	16	<50	*	*	C
MN00275	Foshier Gp Farm Pond	Snake River	H. Foshier & E. Bachman	46° 01.5'	93° 18.0'	11	<50	*	*	C
MN00301	Bergstedt Dam	Knife River	Bod Bergstedt and Bros.	46° 02.5'	93° 25.0'	6	<100	*	*	C
MN00302	Emanuel Bachman	Knife River	Emanuel Bachman	46° 01.5'	93° 20.0'	10	<50	*	*	C
MN00303	Richards Pond	Knife River	Louis Richards	46° 04.0'	93° 23.3'	12	<50	*	*	C

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COUNTY/ Site ID	Site Name	Stream	Owner	Latitude	Longitude	Hydraulic Height, ft	Drainage Area, sq mi	Average Annual cfs Discharge	Potential Power Capacity, KW	Hydropower Feasibility Region
KANABEC										
MN00304	Carda Impoundment	Knife River	Eugene Carda	45° 58.3'	93° 19.5'	14	< 50	*	*	C
MN00305	Lake Albert	Snake River	Albert Koskela	45° 55.7'	93° 15.5'	18	< 50	*	*	C
Mn00400	Knofe Lake	Knife River	State of Minn.	45° 57.7'	93° 18.8'	6	92	40	17	C
MN00401	Wm. Peal Jr. Mem. Dam	Ann River	State of Minn.	45° 55.5'	93° 22.4'	15	< 50	*	*	C
MN00534	Mud Lake	Mud Creek	State of Minn.	45° 53.8'	93° 09.6'	6	<100	*	*	C
MN00572	Ann River	Ann River	State of Minn.	45° 51.0'	93° 17.2'	7	79	51	*	C
MN00833	Ernest Linder Wild-life Pond	Snake River	Ernest Linder	45° 51.5'	93° 17.8'	12	< 50	*	*	C
KANDIYOHI										
MN00060	Foot Lake	Hawk Creek (Co. Ditch #10)	Kandiyohi Co.	45° 07.5'	95° 04.2'	4	<100	*	*	C
MN00061	Nest Lake	Middle Fork Crow R	Kandiyohi Co.	45° 15.8'	94° 56.0'	7	85	29	15	C
MN00062#	New London	Middle Fork Crow R	State of Minn.	45° 18.0'	94° 56.9'	18	95	30	126	C
MN00064	Kandiyohi Lake Inlet	J.D. #1 (Branch)	State of Minn.	45° 00.5'	94° 54.8'	7	97	28	14	C
MN00065	Long Lake	Middle Fork Crow R	New London Sand & Gravel	45° 19.6'	94° 53.1'	7	57	19	10	C
MN00066	Calhoun Lake	Middle Fork Crow R	State of Minn.	45° 15.8'	94° 49.9'	7	144	67	34	C
MN00067	Calhoun Lake Diversion	Middle Fork Crow R	State of Minn.	45° 15.8'	94° 50.1'	10	144	50	36	C
MN00068	Florida Lake	Shakopee Creek	State of Minn.	45° 14.8'	95° 04.2'	4	15	*	*	C
MN00069	Diamond Lake	Co. Ditch #28	Kandiychi Co.	45° 11.2'	94° 49.2'	6	17	*	*	C
MN00075	Calhoun Lake-West	Middle Fork Crow R	State of Minn.	45° 16.1'	94° 50.8'	6	15	15	6	C
MN00370	Green Lake	Middle Fork Crow R	State of Minn.	45° 16.1'	94° 52.0'	6	168	49	21	C
MN00493	Leif Langsjoen Waterfowl Develop.	Mud Creek	Leif Langsjoen USDA SCS	45° 23.6'	95° 08.7'	4	<100	*	*	C
MN00494	Weber Unit Fish & Wildlife Control	Hawk Crek	DOI BAFW	45° 10.9'	95° 00.9'	7	<100	*	*	C
MN00495	Fischer Unit Dam	Hawk Creek	USDA FS	45° 11.1'	95° 04.5'	9	<100	*	*	C
MN00496	Fla. Slough L. Str.	Shakope	Kandiyohi Co.	45° 14.4'	95° 05.7'	6	18	*	*	C
MN00497	Swan L. Watershed Str.	Shakopee Creek, J.D.18	Kandiyohi Co.	45° 12.5'	95° 11.1'	9	21	10	6	C
MN00498	Elkhorn L. Rearing Pond	Middle Ford-Crow R	Kandiyohi Co.	45° 12.5'	94° 56.5'	6	<100	*	*	C

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KITTSON										
MN00017	Bronson Lake	Two Rivers- So. Br.	State of Minn.	48° 43.4'	96° 38.0'	26	444	89	170	B
MN00018	Two Rivers	Two Riv.-Mid. So.Br.	State of Minn.	48° 45.1'	96° 56.1'	10	625	50	36	C
MN00378	Red R of No.-Drayton	Red River of the No.	City of Drayton, N.D.	48° 35.9'	97° 08.7'	6	35,034	3870	1670	A
MN00766	Joe River Watershed Wildlife Impound.	Lateral 2, Br. 2 Joe River	Joe River Watershed Dist.	45° 58.9'	96° 59.9'	6	<100	*	*	C
MN00767	State Ditch #90	So. Br.-Two Rivers	State of Minn.	48° 37.8'	96° 24.2'	6	<100	*	*	C
KOOCHICHING										
MN00091	Clear, Dark, Little Lakes Project	Lost River	State of Minn.	47° 57.7'	94° 05.5'	7	<100	*	*	C
MN00653#	Rainy Lake	Rainy River	Boise-cascade Corp.	48° 36.4'	93° 24.1'	28	15,176	10,035	20,240	A
LAC QUI PARLE										
MN00579	Marsh Lake Dam	Minnesota River	DAEN NCS	45° 10.3'	96° 05.6'	4	2470	385	111	C
MN00589	Lac Qui Parle Dam	Minnesota River	DAEN NCS	45° 01.3'	95° 52.0'	13	4050	632	570	B
MN00581	Highway 75 dam	Minnesota River	DAEN NCS	45° 14.9'	96° 17.5'	13	1340	127	120	B
MN00726	Lac Qui Parle Wildlife Refuge #2	Minnesota River	DNR-Wildlife	45° 12.2'	96° 13.5'	6	<100	*	*	C
MN00744	Wm. Webber Dam	Cobb Creek	Lac Qui Parle SWCD	44° 48.3'	96° 25.0'	30	< 5	*	*	C
LAKE										
MN00083	Dam Five Lake	Wanless Creek	USDA FS	47° 38.4'	91° 05.6'	12	< 50	*	*	C
MN00084	Murphy Lake-1	Murphy Creek	USDA FS	47° 20.0'	91° 46.5'	6	<100	*	*	C
MN00085	Sullivan Lake	Sullivan Creek	USDA FS	47° 22.3'	91° 40.7'	6	<100	*	*	C
MN00086	Wind Lake	Basswood River	USDA FS	48° 01.1'	91° 33.4'	6	8	*	*	C
MN00087	McDougal Lake	Stony River	State of Minn.	47° 38.4'	91° 33.7'	8	37	21	12	C
MN00088	Wilson Lake	Wilson Creek	George Thompson	47° 39.4'	91° 04.3'	10	33	19	14	C
MN00397	Cross River No. 3	Cross River	USDA FS	47° 41.4'	91° 02.3'	6	<100	*	*	C
MN00607†	Winton	Kawishiwi	Minn. Power & Light	47° 56.0'	91° 45.5'	65	1200	1000	4680	A
MN00646	Prairie Portage	Rainy River	USDA FS	48° 03.0'	91° 26.3	13	140	75	70	C
MN00647	Gabbro Lake #2	Isbella River	USDA FS	47° 15.3'	91° 37.7'	7	321	200	101	C
MN00654	Birch Lake	So. Fork-Kawishiwi R	Minn. Power & Light	47° 48.9'	91° 47.0'	6	467	290	125	C
MN00718	Heinz-Meschbach Wildlife Pond	Unnamed	Karl-Heinz Meschbach	47° 11.0'	91° 46.0'	7	<100	*	*	C
MN00720	Two Harbord Dock	Lake Superior	Duluth, Miss.-Ironrange	47° 00.7'	91° 40.8'	32		*	*	C
MN00810	Richard Lammi-SCS	Knife River	Richard Lammi	47° 03.3'	91° 43.2'	11	< 50	*	*	C
MN00836	Edwin Hansen Pond	Silver Creek	Edwin Hansen	47° 09.4'	91° 39.2'	13	< 50	*	*	C

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LAKE OF THE WOOD										
MN00219	Roseau River	Roseau River	State of Minn.	48° 32.7'	95° 19.2'	7	<100	*	*	C
MN00689	Browns Lake	Judicial Ditch 63	State of Minn.	48° 46.0'	95° 09.1'	6	<100	*	*	C
LE SUEUR										
MN00150	Tetonka	Cannon River	State of Minn.	44° 13.4'	93° 34.3'	9	110	47	30	C
MN00154	Gorman Lake	Cannon River	State of Minn.	44° 20.1'	93° 39.4'	6	38	14	6	C
MN00155	Jefferson Lake	Big Cannon River	State of Minn.	44° 16.7'	93° 44.6'	6	20	*	*	C
MN00314	Le Suer Erosion Proj	LeSuer Creek	Ms. Ken Sumberman	44° 28.2'	93° 54.0'	17	< 50	*	*	C
LINCOLN										
MN00122	Shackotan Lake	Yellow Medicine River	Lincoln County	44° 24.4'	96° 21.1'	6	18	*	*	C
MN00472	Minnoname 4	Norwegian Creek	Henry Albers	44° 19.8'	96° 20.6'	22	< 30	*	*	C
MN00473	Vernon Mack	Yellow Medicine River	Vernon Mack	44° 31.4'	96° 06.1'	22	< 30	*	*	C
MN00853	Dillon-Syltie-Boulton Structure	Yellow Medicine River	Dillon & Syltie	44° 36.6'	96° 09.9'	33	5	1	2	C
MN00854	Miller Est. Farm Pond	Yellow Medicine River	Miller Estate	44° 36.1'	96° 09.3'	22	< 30	*	*	C
MN00855	Van Overbeke-Fier Str.	Yellow Medicine River	Antone Fier	44° 33.9'	96° 07.5'	23	< 30	*	*	C
MN00856	Gerald Christianson Farm Pond	Lac Qui Parle River	Gerald Christianson	44° 33.6'	96° 22.8'	20	< 30	*	*	C
LYON										
MN00072	Redwood River	Redwood River	City of Marshall	44° 26.2'	95° 48.8'	27	272	0→42	0→82	C
MN00120	Brawner Lake	Redwood River	State of Minn.	44° 20.1'	95° 55.3'	21	252	39	80	B
MN00121	Dog Creek	Dog Creek	City of Balaton	44° 13.7'	95° 50.2'	6	<100	*	*	C
MN00230	Yankton Lake	Dog Creek	City of Balaton	44° 13.7'	95° 51.5'	8	<100	*	*	C
MN00474	Runholt-Mellethin	Redwood River	Ernest Mellethin	44° 25.8'	95° 55.1'	16	< 50	*	*	C
MN00679	Rogel-Madden Dam	Meadows Creek	D. Pagel & K. Madden	44° 22.2'	95° 52.0'	28	< 30	*	*	C
MN00730	Coon Creek Dam	Coon Creek	State of Minn.	44° 20.2'	96° 02.1'	8	84	12.5	7	C
MN00768	Cottonwood Lake	Yellow Med. River 24	RM Meehl-Attorner	44° 37.2'	95° 41.5'	9	<100	*	*	C
MN00843	Kruger-Gregore Farm P	Cottonwood River	Kenneth Kruger	44° 15.0'	95° 45.5'	32	4	1	2	C
MN00844	Kass-Morgan Farm Pond	Cottonwood River	Ken Kass	44° 14.3'	95° 41.3'	25	< 30	*	*	C
MN00845	Griffith-Glynn Farm P	Cottonwood River	John Griffith	44° 15.6'	95° 41.7'	21	< 30	*	*	C

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McLEAD										
MN00156	Marion Lake	Buffalo Creek	Co Sportsman Club	44° 46.3'	94° 22.8'	7	<100	*	*	C
MN00157	Round Grove Lake	S.D. 24	McLead Co.	44° 42.1'	94° 29.9'	8	<100	*	*	C
MN00158	Hutchinson	So. Fork-Crow River	City of Hutchinson	44° 53.7'	94° 22.1'	13	224	25	23	C
MN00159	Winsted Lake	So. Fork-Crow River	City of Winsted	44° 57.3'	94° 01.5'	4	<100	*	*	C
MAHNOMEN										
MN00215	Frog Lake	Marsh Creek	State of Minn.	47° 26.0'	96° 01.5'	7	22	*	*	C
MN00216	Beaulieu Lake	March Creek	Mahnomen Co.	47° 29.3'	95° 51.4'	6	<100	*	*	C
MN00217	McCraney Lake	White Earth River	State of Minn.	47° 09.9'	95° 43.3'	6	10	*	*	C
MN00688	Tamarac Wetland	Mahnomen Co.-Ditch 3	USDA FS	47° 10.2'	95° 53.1'	8	<100	*	*	C
MARSHALL										
MN00218	Thief Lake	Thief River	State of Minn.	48° 29.2'	94° 49.1'	13	61	32	30	C
MN00228	Old Mill State Park	Middle River	State of Minn.	48° 22.2'	96° 34.1'	7	245	20 → 84	10 → 42	C
MN00368	East Park WMA Pond	JD #19	Marshall Co. SWCD	48° 29.6'	96° 21.9'	6	95	7.5 → 35	3 → 15	C
MN00552	Middle River	Middle River	State of Minn.	48° 20.2'	96° 48.7'	11	306	24 → 105	19 → 83	C
MN00624	Pool 20	Mud River	DOI BSFW	48° 20.2'	95° 54.3'	8	247	20 → 87	11 → 50	C
MN00625	Pool 21	Mud River	DOI BSFW	48° 22.2'	95° 53.3'	8	159	13 → 58	7 → 33	C
MN00626	Pool 22	Webster Creek-Mud R	DOI BSFW	48° 21.9'	95° 55.3'	8	<100	*	*	C
MN00627	Pool 23	Webster Creek-Mud R	DOI BSFW	48° 22.5'	95° 53.7'	8	<100	*	*	C
MN00628	Pool 24	Mud River	DOI BSFW	48° 21.9'	95° 55.6'	8	<100	*	*	C
MN00629	Pool 25	Webster Creek	DOI BSFW	48° 22.0'	95° 56.8'	7	171	14 → 63	7 → 32	C
MN00630	Pool 27	Thief River	DOI BSFW	48° 18.8'	96° 00.8'	5	165	13.5 → 60	5 → 22	C
MN00632	Pool 19	Thief River	DOI BSFW	48° 19.4'	95° 53.8'	11	254	21 → 91	17 → 72	C
MN00633	East Pool	Thief River	DOI BSFW	48° 18.4'	95° 55.4'	6	<100	*	*	C
MN00634	Pool 17	Thief River	DOI BSFW	48° 18.5'	95° 55.2'	6	<100	*	*	C
MN00635	Pool 15	Thief River	DOI BSFW	48° 18.1'	95° 59.0'	8	20	*	*	C
MN0636	Pool 14	Thief River	DOI BSFW	48° 17.2'	95° 59.8'	9	15	*	*	C
MN00637	Pool 11	Thief River	DOI BSFW	48° 18.2'	96° 03.3'	8	171	14 → 63	8 → 36	C
MN0638	Pool 10	Thief River	DOI BSFW	48° 18.6'	96° 03.5'	9	171	14 → 63	9 → 41	C
MN00639	Pool 7	Thief River-Offstream	DOI BSFW	48° 22.2'	95° 59.8'	8	96	8 → 36	5 → 21	C
MN00640	Pool 3	Thief River-Offstream	DOI BSFW	48° 22.2'	96° 00.4'	9	95	7.5 → 35	5 → 23	C
MN00641	Pool 1	Thief River-Offstream	DOI BSFW	48° 23.9'	95° 59.8'	11	90	7.4 → 33	6 → 26	C
MN00889	Tamarac River R1 Str.	Tamarac River	Marshall Co. SWCD	48° 25.2'	96° 39.5'	12	239	19 → 86	16 → 74	C

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MARTIN										
MN00101	Eagle Lake	Lilly Creek	Martin Co.	43° 42.2'	94° 35.'	6	<100	*	*	C
MN00102	George Lake	Center Creek	City of Fairmont	43° 39.7'	94° 28.5'	10	105	21	15	C
MN00374	North Silver SLake	Blue Earth River	Martin Co. Cons. Club	43° 32.5'	94° 28.4'	6	<100	*	*	C
MILLE LACS										
MN00250	Ogechie Lake	Rum River	State of Minn.	46° 07.8'	93° 46.8'	8	426	168	97	C
MN00251	Dewitt Pool	Little Ann River	State of Minn.	45° 59.5'	93° 26.8'	7	<100	*	*	C
MN00252	OnaMIA Lake	Rum River	State of Minn.	46° 04.1'	93° 40.4'	6	430	170	73	C
MN00562	Korsness Pool	Rum River	State of Minn.	46° 00.4'	93° 37.2'	6	<100	*	*	C
MN00563	Ernst Pool	Knife Rier	State of Minn.	46° 03.5'	93° 30.2'	6	<100	*	*	C
MORRISON										
MN00134	Rice-Skunk Lakes	Platte River	State of Minn.	45° 56.3'	94° 15.0'	6	360	135	58	C
MN00240	Stanchfield Lake	Unnamed	State of Minn.	46° 16.2'	94° 32.5'	12	< 50	*	*	C
MN00478	Gold Pond	Crow Wing	Don Gold	46° 17.4'	94° 36.6'	8	<100	*	*	C
MN00480	Loberg Wildlife Pond	Little Elk River	Chester Loberg	46° 08.3'	94° 37.0'	8	<100	*	*	C
MN00481	Kurtz Pond	Hillman Creek	Richard Kurtz	46° 02.8'	93° 51.7'	6	<100	*	*	C
MN00599†	Blanchard	Mississippi River	Minn. Power	45° 51.6'	94° 20.7'	45	11,425	4375	14,200	A
MN00600†	Little Falls	Mississippi river	Minn. Power	45° 58.5'	94° 22.1'	24	11,425	4330	7600	A
MN00608†	Crow Wing River	Crow Wing River	Minn. Power	46° 18.9'	94° 29.1'	22	3154	1470	2300	A
MN00713	Skunk River	Skunk River	City of Pierz	45° 58.4'	94° 05.3'	6	126	44	19	C
MN00715	Pierz Lake	Platte River	State of Minn.	45° 57.7'	94° 10.0'	6	<100	*	*	C
MOWER										
MN00013#	Dobbins Creek	Dobbins Creek	City of Austin	43° 40.2'	92° 53.1'	10	< 50	*	*	C
MN00409	Lake Louise	Little Iowa River	State of Minn.	43° 31.4'	92° 30.9'	9	<100	*	*	C
MN00526#	Cedar River	Cedar river	George Hormel	43° 40.3'	92° 58.1'	11	215	63	50	C
MN00527#	Ramsey Dam	Cedar River	Goerge Hormel Co.	43° 42.9'	92° 57.6'	13	172	51	48	C
MN00743	Pine Lawn Park Struc.	Deer Creek	City of Grand Meadow	43° 42.5'	92° 32.5'	12	< 50	*	*	C

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MURRAY										
MN00073	Fulda Lake	Jack Creek	Murray Co.	43° 51.3'	95° 35.6'	6	<100	*	*	C
MN00118	Sarah Lake	Des Moines River	Murray County	44° 07.9'	95° 45.9'	7	29	*	*	C
MN00119	Shetek Lake	Des Moines River	State of Minn.	44° 04.8'	95° 40.9'	8	299	56	32	C
MN00852	Post Group Detention Reservoir	Chanarambie Creek	Franklin & James Post	43° 55.5'	95° 59.0'	34	35	5	12	C
NICOLLET										
MN00160	Middle Lake	Co. Ditch 4-A	Nicollet County	44° 17.2'	94° 10.8'	6	17	*	*	C
MN00315	State Hospital Pond	Minn. River-Offstream	State of Minn.	44° 18.5'	93° 59.5'	31	< 5	*	*	C
MN00678	Swan Lake	Nicollet Creek	State of Minn.	44° 17.1'	94° 14.0'	6	<100	*	*	C
NOBLES										
MN00103	Okabena Lake	Ocheyedan	City of Worthington	43° 37.4'	95° 37.0'	10	< 50	*	*	C
MN00104	Ocheda Lake	Ocheyedan River	State of Minn.	43° 32.6'	95° 38.2'	6	<100	*	*	C
MN00316	Stateline Structure	Ocheyedan River	LKS-Okabena-OCHDA WS Dist.	43° 30.0'	95° 37.5'	10	< 50	*	*	C
MN00731	Kremer-Leiner-Goedtke Pond	Jack Creek	Clarence Kremer et al.	43° 47.6'	95° 39.9'	25	35	5	9	C
MN00732	Desiltation Proj 73-2	Jack Creek	Middle Des Moines WSD	43° 48.0'	95° 39.0'	8	<100	*	*	C
NORMAN										
MN00147	Group Pond	So. Br.-Spring Creek	East Agassig-SWCD	47° 23.4'	96° 23.2'	26	10	*	*	C
MN00486#	Wild River River	Wild Rice River	Wild Rice Watershed Dist.	47° 18.6'	96° 16.5'	15	< 50	*	*	C
MN00691	Faith Dam	Wild Rice River	Faith Flour Mill	47° 17.0'	96° 06.0'	10	520	102	72	C
MN00724	Mashaug Creek-Multiple Purpose Dam #3	Wild Rice River	Norman County	47° 21.8'	96° 11.6'	32	*	*	*	C
MN00740	Habedank-Skaurud	Wild Rice River	Norman County	47° 15.1'	96° 10.1'	28	< 30	*	*	C
MN00811	Sunny Hill-Upper	Wild Rice River	Norman County	47° 21.2'	96° 09.3'	19	< 50	*	*	C
MN00812	Sunny Hill-Lower	Wild Rice River	Norman County	47° 12.0'	96° 08.8'	19	< 50	*	*	C
MN00825	Rockwell Dam	So. Br-Wild Rice R	Norman County	47° 10.0'	96° 22.0'	25	< 30	*	*	C

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#Indicate sites no longer producing power.

COUNTY Site ID	Site Name	Stream	Owner	Latitude	Longitude	Hydraulic Height, ft	Drainage Area, sq mi	Average Annual cfs Discharge	Potential Power Capacity, KW	Hydropower Feasibility Region
OLMSTED										
MN00363	Stewartville	No. Br-Root River	City of Stewartville	43° 51.5'	92° 29.5'	10	120	50	36	C
MN00364	Mayowood Lake	So. Fork-Zumbro Riv	Olmsted County	43° 59.4'	92° 31.2'	13	129	55	52	B
MN00365	Shady Lake	Mid. Fork-Zumbro Riv	Olmsted County	44° 09.7'	92° 32.1'	20	432	210	303	B
MN00432	Dresser Valley Wtrshd	Zumbro Riv-Offstream	John Dreher	44° 05.4'	92° 21.6'	21	30	*	*	C
MN00433	La Moyne Bruce Deten.	Zumbro Riv-Offstream	LaMoyne, Bruce	44° 08.3'	92° 37.9'	25	30	*	*	C
MN00434	Simonson Detention	Zumbro Riv-Offstream	Jack Polan	44° 05.5'	92° 23.1'	27	30	*	*	C
MN00435	Hoehne Bros.	Zumbro Riv-Offstream	Hoehne Bros.	44° 10.6'	92° 34.5'	28	30	*	*	C
MN00515	South Br-Zumbro Riv	So. Br-Zumbro Riv	City of Rochester	44° 02.2'	92° 27.5'	11	242	110	87	B
MN00869	Olmsted County-Rd 10	Lynch Creek	Olmsted County	43° 53.6'	92° 10.2'	37	5	*	*	C
OTTERTAIL										
MN00190	Pelican Rapids	Pelica River	City of Pelican Rapids	46° 34.3'	96° 05.0'	15	390	64	68	B
MN00191	Pelican River Dam	Pelican River	Warren B. Diedrich	46° 22.8'	96° 07.5'	16	468	77	89	B
MN00192	Prairie Lake	Pelican River	State of Minn.	46° 35.3'	96° 04.3'	8	200	17 → 70	10 → 40	C
MN00193	Lizzie Lake	Pelican River	State of Minn.	46° 36.7'	96° 01.9'	6	167	13.5 → 61	6 → 26	C
MN00194†	Hoot Lake	Ottertail River	Ottertail Power	46° 17.5'	96° 02.6'	70	615	320	1614	A
MN00195†	Central Wright	Ottertail River	Ottertail Power	46° 16.9'	96° 04.4'	25	1250	208	374	A
MN00196†	Dayton Hollow	Ottertail River	Ottertail Power	46° 13.8'	96° 07.0'	33	1820	305	705	A
MN00197†	Pisgah Dam	Ottertail River	Ottertail Power	46° 16.8'	95° 06.1'	30	1255	209	452	A
MN00198	Pelican Lake	Pelican River	State of Minn.	46° 40.4'	96° 01.2'	6	85	*	*	C
MN00199†	Friberg Dam Taplin Gorge	Ottertail River	Ottertail Power	46° 22.9'	96° 47.3'	30	400	80	169	A
MN00200	McDonald Lakes	Dean River	State of Minn.	46° 34.1'	95° 47.4'	6	12	*	*	C
MN00201	Ten Mile Lake	Pomme de Terre	State of Minn.	46° 06.9'	95° 56.4'	6	77	*	*	C
MN00202	Ottertail River	Ottertail River	Ottertail River	46° 22.8'	95° 49.3'	7	870	57 → 300	29 → 151	C
MN00203	Long Lake	Ottertail River	State of Minn.	46° 39.3'	95° 41.6'	6	20	*	*	C
MN00204	Rose Lake	Ottertail River	State of Minn.	46° 39.9'	95° 44.4'	6	11	*	*	C
MN00205	Wimer Lake	Ottertail River	State of Minn.	46° 41.7'	95° 43.6'	6	6	*	*	C
MN00206	Dead Lake East Dam	C.D. 28	State of Minn.	46° 27.6'	95° 43.2'	6	115	10	4	C
MN00207	Dead Lake West Dam	Dead River	State of Minn.	46° 27.9'	95° 45.7'	6	120	10	4	C

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OTTERTAIL										
MN00208	East Battle Lake	Ottertail River	State of Minn.	46° 17.2'	95° 35.9'	6	33	*	*	C
MN00209	Ottertail Lake	Ottertail River	State of Minn.	46° 21.9'	95° 44.0'	6	550	44 → 195	19 → 84	C
MN00210	Block Lake	Block Lake	State of Minn.	46° 09.9'	95° 29.8'	6	8	*	*	C
MN00211	Rush Lake	Ottertail River	State of Minn.	46° 28.5'	95° 34.2'	6	402	32 → 143	14 → 62	C
MN00212	Pine Lake Big	Ottertail River	State of Minn.	46° 35.5'	95° 30.3'	7	330	26 118	13 → 60	C
MN00213	Little Pine Lake	Ottertail River	State of Minn.	46° 37.4'	95° 32.4'	6	192	16	7	C
MN00214	Blanche Lake	Ottertail River	State of Minn.	46° 21.5'	95° 38.9'	6	102	8	3	C
MN00296	Jorgenson Structure	Reed Creek	Dell Jorgenson	46° 28.0'	95° 58.0'	27	< 30	*	*	C
MN00297	Kugler Structure	Wing-Offstream	Al Kugler	46° 11.0'	95° 27.5'	7	<100	*	*	C
MN00298	Estvick Wildlife Wetland Structure	Pelican River-Offstream	Dewey Estlick	46° 33.0'	96° 02.5'	7	<100	*	*	
MN00574	Orwell Res. and Dam	Ottertail River	DAEN NCS	46° 13.0'	96° 10.8'	33	1830	305	725	A
MN00662	Rose Lake	Pomme de Terre Riv	Oridia Viger	46° 11.3'	95° 58.4'	16	< 50	*	*	C
PENNINGTON										
MN00502†	Red Lake River	Red Lake River	Thief River Falls	48° 06.8'	96° 10.7'	15	3450	816	880	A
PINE										
MN00269	Orville Harmon	Litle Sand Creek	Orville Harmon	46° 01.1'	92° 40.3'	9	<100	*	*	C
MN00270	Scott Dixon Pond	Sand Creek	Scott Dixon	46° 12.1'	92° 41.6'	8	<100	*	*	C
MN00299	Calvin Harth Wildlife	St. Croix River	Calvin Harth	45° 59.9'	92° 46.1'	10	46	42	30	C
MN00300	Lawrence Mans	Mission Creek	Lawrence Mans	45° 58.0'	92° 54.5'	11	< 50	*	*	C
MN00393	Hay Creek	Hay Creek	Pine County	46° 05.3'	92° 24.1'	10	42	41	30	C
MN00395	Tamarach River	Tamarack River	State of Minn.	46° 12.7'	92° 29.4'	10	< 50	*	*	C
MN00500	Cross Lake	Snake River	State of Minn.	45° 50.4'	93° 56.3'	7	958	596	300	B
MN00513‡	Kettle River	Kettle River	State of Minn.	46° 06.4'	92° 51.7'	19	863	692	947	A
MN00542	Big Pine Lake	Pine River	State of Minn.	46° 13.2'	93° 02.0'	6	22	*	*	C
MN00543	Grindstone River	Grindstone River	State of Minn.	46° 01.2'	92° 56.6'	18	70	49	64	A
MN00544	Willow River	Willow River	State of Minn.	46° 19.4'	92° 50.3'	13	137	65	61	B
MN00545	Irons Pool	Zimbrick Pool	Lawrence Irons	46° 04.0'	92° 37.4'	8	<100	*	*	C
MN00547	Harmon Wetland	Little Sand Creek	Orville Harmon	46° 01.1'	92° 40.2'	7	<100	*	*	C
MN00548	Clayton Lake	Clover Creek	State of Minn.	45° 56.4'	92° 37.4'	16	< 50	*	*	C
MN00834	Chengwatanna Wildlife	Red Horse Creek	State of Minn.	46° 51.6'	92° 47.4'	6	<100	*	*	C
MN00835	Leonard Huer Wildlife	Bear Creek	Leonard Huer	46° 00.3'	92° 44.6'	9	<100	*	*	C
MN00906	T. Nammacker	Kettle River	T. Nammacker	46° 01.8'	92° 52.0'	19	< 50	*	*	C

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PIPESTONE										
MN00100	Splitrock Lake	Splitrock Creek	State of Minn.	43° 53.5'	96° 21.9'	16	< 50	*	*	C
MN00277	Minn. No Name 1	Splitrock Creek	Harlan Kolsrud	43° 51.3'	96° 24.1'	14	< 50	*	*	C
MN00851	Howard Snyder Farm Pond	Rock River	Howard Snyder	43° 53.8'	96° 10.1'	27	< 30	*	*	C
POLK										
MN00008#	Red Lake River	Red Lake River	Ottertail Power Co.	47° 46.5'	96° 36.8'	10	5280	1120	807	B
MN00009	Nielsville	Red River of North	Robert Brekke Sr.	47° 32.3'	96° 49.9'	20	< 30	*	*	C
MN00010	East Grand Forks	Red Lake River	East Gran Forks	47° 55.4'	97° 01.1'	4	5606	1190	343	C
MN00221	Sand Hill River	Sand Hill River	Garfield Flow Mill	47° 32.1'	96° 18.8'	8	225	18 → 82	10 → 47	C
MN00222	Maple Lake	Cyr Creek	County of Polk	47° 40.7'	96° 07.4'	6	23	*	*	C
MN00224	Badger Lake	Badger Creek	Polk County	47° 41.0'	96° 01.0'	6	<100	*	*	C
MN00225	Oak Lake Outlet	Co. Ditch 85	Polk County	47° 39.7'	95° 57.2'	7	<100	*	*	C
MN00226	Hill River Lake	Hill River	State of Minn.	47° 40.4'	95° 49.0'	6	<100	*	*	C
MN00227	Sand Hil Lake	Sand Hill River	State of Minn.	47° 30.9'	95° 44.8'	6	33	*	*	C
MN00260	Mn No Name 3	Red River	Robert Brekke Sr.	47° 32.3'	96° 49.9'	16	< 50	*	*	C
MN00550	Grand Forks East	Red River	City of Grand Forks	47° 56.9'	97° 03.5'	10	100	2550	1837	A
POPE										
MN00253	Maria Lake	E. Br-Chippewa River	John Martin	45° 35.8'	95° 17.8'	6	<100	*	*	C
MN00254	Grove Lake	No. Fork-Crow River	State of Minn.	45° 36.1'	95° 10.2'	6	33	*	*	C
MN00255	Mud Creek No. 5 Gp	Mud Creek	Clasrence O. Kjas	45° 26.1'	95° 12.3'	12	< 50	*	*	C
Mn00295	Lake Linka Struc. #1	E. Br-Chippewa River	Pope Co. SWCD	45° 30.1'	95° 22.4'	29	< 30	*	*	C
MN00558	Lybeck Lake	W. Br-Chippewa River	Wayne Hawtin Son	45° 40.7'	95° 42.9'	12	< 50	*	*	C
MN00559	Chippewa River	E. Br-Chippewa River	Terrace Mill Foundation	45° 30.7'	95° 19.2'	16	47	5.3	6	C
MN00722	Bohmer Wildlife Pond	Unnamed	John Bohmer	45° 26.8'	95° 18.2'	18	< 50	*	*	C
MN00750	Pelican Lake Inlet	Trapper Run Creek	State of Minn.	45° 39.0'	95° 26.6'	6	<100	*	*	C
MN00896	Maria Mill Pond Struc.	E. Br-Chippewa River	John Morton	45° 36.3'	95° 17.8'	14	< 50	*	*	C
MN00897	Osterberg Lake	Chippewa River	State of Minn.	45° 43.3'	95° 43.0'	9	<100	*	*	C

COUNTY/ Site ID	Site Name	Stream	Owner	Latitude	Longitude	Hydraulic Height, ft	Drainage Area, sq mi	Average Annual cfs Discharge	Potential Power Capacity, KW	Hydropower Feasibility Region
RAMSEY										
MN00398	Keller Lake	Keller Creek	Ramsey Co.	44° 59.9'	93° 03.8'	10	< 50	*	*	C
MN00540	Round Lake	Rice Creek	Fed'l Cartridge Corp.	45° 04.7'	93° 10.3'	10	< 50	*	*	C
RED LAKE										
MN00145	Seeger Group Pond	Red Lake River	Walter Seeger	47° 52.3'	96° 19.8'	40	< 5	*	*	C
MN00824	Miller Wildlife Dam	Clearwater River	Miller	47° 52.0'	96° 08.0'	17	< 50	*	*	C
REDWOOD										
MN00511†	Redwood River	Redwood River	Redwood Falls	44° 32.4'	95° 07.3'	34	697	125	306	A
MN00681	Dike 2	Minnesota River	State of Minn.	44° 37.5'	95° 09.6'	7	<100	*	*	C
MN00682	Dike 2	Minnesota River	State of Minn.	44° 37.0'	95° 09.2'	8	<100	*	*	C
MN00683	Merten's Dike	Minnesota River	State of Minn.	44° 37.5'	95° 10.0'	7	<100	*	*	C
MN00728	Walnut Grove Reservoir	Plum Creek	Redwood County	44° 13.0'	95° 29.7'	54	Dam built '79, map revised '79			C
MN00729	Arlen Knott Det. Dam	Cottonwood River	Arlen S. Knott	44° 17.5'	95° 25.3'	32	*	*	*	C
MN00847	Phil Draayum Pond	Plum Creek	Jeff and Jack Lau	44° 12.8'	95° 34.1'	28	< 30	*	*	C
MN00848	Duane Knott Det. Res.	Cottonwood River	Duane Knott	44° 16.8'	95° 23.5'	24	< 30	*	*	C
MN00849	Leo Hogan Wildlife Pd	Wabasha Creek	Leo Hogan	44° 30.9'	94° 57.7'	13	< 50	*	*	C
MN00890	Redwood River	Redwood River	Redwood Falls	44° 32.5'	95° 07.3'	12	697	125	108	C
RICE										
MN00350	Rice Lake	Big Cannon River	State of Minn.	44° 19.9'	93° 29.8'	6	<100	*	*	C
MN00351	Morristown Pond	Cannon River	Village of Morristown	44° 13.7'	93° 26.4'	6	136	59	26	C
MN00353‡	King's Mill Dam	Cannon River	Rice County	44° 17.5'	93° 17.7'	11	340	160	127	B
MN00354	Cannon River	Cannon River	City of Faribault	44° 18.5'	93° 16.4'	6	226	105	45	C
MN00355	Cannon River	Cannon River	E. T. Archibald & Co.	44° 25.7'	93° 12.4'	9	751	285	180	B
MN00356	Cannon River	Cannon River	Malt-O-Meal Co.	44° 27.1'	93° 10.2'	11	790	300	238	B
MN00414	Dr. John Komarek	Wolf Creek	John Komarek	44° 25.6'	93° 25.8'	10	< 50	*	*	C
MN00870	Horning-Festler Det.	Cannon Riv-Offstream	Unknown	44° 26.1'	93° 07.0'	20	< 30	*	*	C
ROCK										
MN00111	So. Mound Creek Pool	Mound Creek	State of Minn.	43° 42.9'	96° 10.6'	19	< 50	*	*	C
MN00112	No. Mound Creek Pool	Mound Creek	State of Minn.	43° 43.1'	96° 11.4'	15	< 50	*	*	C
MN00570	Rock River Dam	Rock River	City of LuVerne	43° 39.0'	96° 11.8'	9	401	64	41	C

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ROSEAU										
MN00074	Hayes Lake Dam	Reseau	State of Minn.	48° 37.2'	95° 32.9'	35	17	*	*	C
MN00821	Roseau Riv. Wildlife Mgt. Area Pool 1	Pine Creek Diver.	State of Minn.	48° 57.5'	96° 06.0'	8	100	*	*	C
MN00822	Roseau Riv. Wildlife Mgt. Area Pool 2	Roseau River	State of Minn.	48° 57.0'	96° 14.0'	9	100	*	*	C
MN00823	Roseau Riv. Wildlife Mgt. Area Pool 3	Roseau River	State of Minn.	48° 57.0'	96° 16.5'	6	100	*	*	C
ST. LOUIS										
MN00002	Smith Lake	Little Cloquet River	State of Minn.	47° 08.6'	91° 55.5'	6	100	*	*	C
MN00003	Wolf Lake	Wolf Creek	State of Minn.	47° 16.0'	91° 57.8'	8	45	33	19	C
MN00004	Hartley Pond	Tischer Creek	City of Duluth	46° 50.1'	92° 06.0'	10	50	*	*	C
MN00005	Ely Lake	St. Louis River	State of Minn.	47° 26.6'	92° 28.4'	6	224	155	67	C
MN00092#	Pike River	Pike River	State of Minn.	47° 47.5'	92° 22.1'	21	130	85	129	B
MN00093	Kettle Falls	Namakan River	Boise Cascade Co.	48° 30.3'	92° 38.2'	17	13,993	9600	11,756	A
MN00094	St. Louis River	St. Louis River	Oglebay Norton Co.	47° 22.2'	92° 34.1'	15	713	550	594	B
MN00095	Sturgeon Lake	Sturgeon River	State of Minn.	47° 39.6'	93° 01.0'	6	95	58	25	C
MN00096	Floodwood Lake	Floodwood River	State of Minn.	47° 10.1'	93° 02.1'		18			C
MN00097	Pelican Lake	Pelican River	State of Minn.	48° 02.0'	92° 49.9'	6	59	29	13	C
MN00098	Wynne Lake	Embarrass River	State of Minn.	47° 32.3'	92° 18.8'	8	98	70	40	C
MN00099	Esquagama Lake	Embarrass River	State of Minn.	47° 27.3'	92° 23.0'	8	147	105	61	C
MN00149	Daniels Pond	Hason Creek	Russel C. Daniels	48° 09.4'	92° 31.3'	10	50	*	*	C
MN00369	Bear Island	Bear Island River	Unknown	47° 47.4'	91° 55.4'	6	46	27	12	C
MN00503	Wilbur Luama Pond	Pelican River	Robert Wheeler	48° 02.2'	92° 47.9'	16	50	*	*	C
MN00610	White Face Lake	Skuak & Whiteface R	Minn. Power	47° 16.3'	92° 12.2'	34	116	82	201	A
MN00611	Boulder Lake	Boulder Creek	Minn. Power	47° 03.1'	92° 12.0'	15	33	24	26	B
MN00612	Island Lake	Cloquet	Minn. Power	46° 59.5'	92° 13.5'	37	320	230	613	A
MN00613	Rice Lake	Beaver River	Minn. Power	46° 54.6'	92° 09.7'	7	100	*	*	C
MN00614	Fish Lake	Beaver River	Minn. Power	46° 57.4'	92° 16.7'	18	73	52	67	B
MN00663	Erie Basin One Dike	Unnamed-Offshore	Erie Mining Co.	47° 36.1'	92° 08.2'	100	*	*	*	C

COUNTY/ Site ID	Site Name	Stream	Owner	Latitude	Longitude	Hydraulic Height, ft	Drainage Area, sq mi	Average Annual cfs Discharge	Potential Power Capacity, KW	Hydropower Feasibility Region
ST. LOUIS										
MN00664	Erie Basin Two Dike	Unnamed-Offstream	Erie Mining Co.	47° 36.4'	92° 09.0'	135	*	*	*	C
MN00665	Hibbing Tac. Dam 1	Rock Lake Creek	Hibbing Taconite Co.	47° 30.8'	93° 00.3'	41	< 5	*	*	C
MN00666	Hibbing Tac. Dam 2	rock Lake Creek	Hibbing Taconite Co.	47° 30.9'	93° 00.2'	25	*	*	*	C
MN00667	Hibbing Tac. Dam 3	Rock Lake Creek	Hibbing Taconite Co.	47° 31.5'	92° 58.2'	50	*	*	*	C
MN00668	Whitney Tailings Dike	Offstream-Closed Sys	Hanna Mining Co. AGE	47° 25.3'	92° 53.1'	37	*	*	*	C
MN00669	Whitney Clearwater Dk	Offstream-Closed Sys	Hanna Mining Co. AGE	47° 25.3'	92° 53.2'	25	*	*	*	C
MN00670	Inland Stl. Tailings Dk	Wuori Creek-Closed Sys	Inland Steel Co.	47° 35.8'	92° 27.4'	44	4.6	*	*	C
MN00672	Minntac Tailings Dike	Offstream-Closed Sys	U.S. Steel Corp.	47° 34.8'	92° 37.5'	50	*	*	*	C
MN00673	Eveleth Tac. Tail. Dam	Offstream-Unnamed	Eveleth Tac.-Eveleth Expa.	47° 20.5'	92° 34.1'	50	*	*	*	C
MN00686	Stephen Slimak Wildlife	Whiteface River	Stephen Slimak	47° 10.0'	92° 26.5'	9	184	130	84	C
MN00719	Duluth-Superior Harbor Erie Pier Dike	Erie Basin-L. Superior	City of Duluth	46° 45.1'	92° 07.5'	11	*	*	*	C
MN00770	White Water Res. Dam	St. Louis River	Erie Mining Co.	47° 29.3'	92° 11.0'	35	6	*	*	C
MN00771	White Water Res. Dam	St. Louis River	Erie Mining Co.	47° 30.9'	92° 11.5'	31	127	90	201	A
MN00775	Douglas Tailings Dike	Offstream	Hanna Mining Co. AGE	47° 27.7'	92° 52.4'	40	*	*	*	C
MN00776	Wabigone Tail. Dike	Offstream	Hanna Mining Co. AGE	47° 30.5'	92° 47.4'	10	*	*	*	C
MN00781	Sauntry Crk Settling Dk	Sauntry Creek	Inland Steel Co.	47° 33.1'	92° 29.7'	32	*	*	*	C
MN00782	Plant Site-Settling Dk	Offstream	Inland Steel Co.	47° 33.9'	92° 33.2'	15	*	*	*	C
MN00786	McKinley Clearwater Dk	Offstream	Jones & Laughlin Steel	47° 30.4'	92° 23.8'	36	*	*	*	C
MN00787	Pioneer Tailings Dike	Lansdorf Creek	U.S. Steel Corp.	47° 53.3'	91° 53.3'	25	*	*	*	C
MN00788	Pioneer Clarif. Dike	Lonsdorf Creek	U.S. Steel Corp.	47° 53.3'	91° 54.4'	25	*	*	*	C
MN00789	E. Stephens Settling Dk	Second Creek	U.S. Steel Corp.	47° 34.0'	92° 12.0'	15	< 50	*	*	C
MN00790	W. Stephens Settling Dk	Second Creek	U.S. Steel Corp.	47° 34.1'	92° 12.5'	10	< 50	*	*	C
MN00791	Donora Settling Dike	Offstream	U.S. Steel Corp.	47° 34.0'	92° 14.0'	20	< 30	*	*	C
MN00792	W. Two River Dam	West Two rivers	U.S. Steel Corp.	47° 27.9'	92° 41.2'	3	< 30	22	5	C
MN00796	Sherman Gp. Tailings Dk	Offstream	U.S. Steel Corp.	47° 29.2'	92° 49.9'	48	*	*	*	C
MN00797	Sherman Mine Waste-water Dike	Offstream	U.S. Steel Corp.	47° 29.2'	92° 49.9'	20	*	*	*	C
MN00800	NSPC Inl. Tailings Dk	Offstream-Hay Creek	Hanna Mining Co. AGE	47° 22.4'	93° 03.5'	45	*	*	*	C
MN00801	NSPC Stage 2 Tail. Bas.	Offstream-Hay creek	Hann Mining Co. AGE	47° 20.3'	93° 03.6'	20	*	*	*	C
MN00813	Whiteface L.-Sect. 2	Whiteface	Minn. Power	47° 16.5'	92° 11.1'	38	121	83	227	A
MN00814	Whiteface L.-Sect. 3	Paleface River	Minn. Power	47° 16.4'	92° 13.2'	15				
MN00850	Morris Finstad Wildlife Pond	Echo River-Offstream	Morris Finstad	48° 11.8'	92° 30.5'	9	<100	*	*	C
MN00886	Zywicki Pool	Cloquet River	Robert Zywicki	46° 54.9'	92° 21.2'	10	< 50	*	*	C
MN00887	Chez Dam	Talmadge River	Seymour Chez	46° 53.5'	91° 55.2'	24	6	*	*	C
MN00902	Canosia Wildlife Dam	Cloquet River	State of Minn.	46° 54.8'	92° 14.7'	14	< 50	*	*	C
MN00903	Canosia Wildlife Mgt.♯6	Cloquet River	State of Minn.	46° 54.8'	92° 14.9'	6	<100	*	*	C
MN00904	Canosia WMA 78	Cloquet River	State of Minn.	46° 55.0'	92° 15.0'	6	<100	*	*	C

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♯Indicate sites no longer producing power.

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SCOTT										
MN00278	Dvorak Wildlife Pond	Sand Creek-Offstream	Anton Dvorak	44° 33.8'	93° 27.7'	9	<100	*	*	C
MN00279	Jim Vallez Fish Pon	Sand Creek	James Vallez	44° 42.6'	93° 29.5'	21	< 30	*	*	C
MN00280	Pittit Wildlife Pond	Vermillion-Offstream	Duane Pettik	44° 36.8'	93° 19.8'	8	<100	*	*	C
MN00282	Thers-Bendzick Pond	Sand Creek	Gerald H.Bendzick	44° 41.3'	93° 34.7'	45				
MN00283	Ruehlings Pond	Minnesota River	Earl Ruehling	44° 37.9'	93° 43.5'	24	< 30	*	*	C
MN00284	Jeffers Wildlife Pond	Pikes Lake	Robert Jeffers	44° 44.6'	93° 26.6'	8	<100	*	*	C
MN00285	Jeffers Wildlife Pond	Pikes Lake	Robert Jefers	44° 44.3'	93° 26.7'	15	< 50	*	*	C
MN00399	Cedar Lake	Sand Creek	State of Minn.	44° 36.3'	93° 31.2'	11	6	*	*	C
MN00535	Sand Creek	Sand Creek	City of Jordan	44° 39.7'	93° 37.8'	13	235	46	43	B
MN00838	Hilgenberg Pond	Minnesota Lake	Wally Hilgenbeg	44° 40.8'	93° 19.3'	24	< 30	*	*	C
MN00839	Wallace Henry Pond	Vermillion River	Wallace Henry	44° 37.7'	93° 19.2'	11	< 50	*	*	C
MN00840	Steve Maza Pond	Vermillion	Steve Maza	44° 36.8'	93° 18.8'	13	< 50	*	*	C
SHERBURNE										
MN00357	Eagle Lake	Elk River	DNR-Sherburne Co.Hwy Dept.	45° 23.3'	93° 45.0'	10	9	*	*	C
MN00516t	Elk River	Elk River	City of Elk River	45° 18.2'	93° 35.1'	16	640	269	310	B
MN00615	Fox Pond	St. Francis River	DOI BSFW	45° 31.5'	93° 47.5'	9	<100	*	*	C
MN00693	Sherburne Nat'l Wildlife Ref.	Co Ditch #22-St. Francis	USDA FS	45° 31.5'	93° 49.3'	6	<100	*	*	C
MN00694	Sherburne Nat'l Wildlife Ref. Dike 6A	St. Francis River	USDA FS	45° 29.5'	93° 45.0'	7	<100	*	*	C
MN00695	Sherburne Ref. Pool 7A	St. Francis River	USDA FS	45° 31.0'	93° 42.6'	10	< 50	*	*	C
MN00696	Sherburne Ref. Pool 7B	St. Francis River	USDA FS	45° 29.7'	93° 42.0'	6	<100	*	*	C
MN00697	Sherburne Ref. Pool 14A	St. Francis River	USDA FS	45° 28.6'	93° 41.6'	13	< 50	*	*	C
MN00699	Sherburne Ref. Pool 17	St. Francis River	USDA FS	45° 27.5'	93° 43.0'	9	<100	*	*	C
MN00700	Sherburne Ref. Pool 18B	St. Francis River	USDA FS	45° 27.6'	93° 42.0'	11	< 50	*	*	C
MN00701	Sherburne Ref. Pool 19	St. Francis River	DOI BSFW	45° 27.7'	93° 41.0'	13	< 50	*	*	C
MN00702	Sherburne Ref. Pool 20	St. Francis River	USDA FS	45° 27.8'	93° 40.9'	8	<100	*	*	C
MN00703	Sherburne Ref. Pool 28	St. Francis River	USDA FS	45° 27.3'	93° 40.9'	6	<100	*	*	C

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SIBLEY										
MN00105	Titlow Lake	No. Br-Rush river	City of Gaylord	44° 34.3'	94° 11.4'	9	57	*	*	C
MN00819	High Island Creek	High Island Creek	State of Minn.	44° 34.5'	93° 59.7'	6	100	*	*	C
STEARNS										
MN00505†	Mississippi River	Mississippi River	St. Regis Paper Co.	45° 37.2'	94° 12.2'	23	12,450	4765	7895	A
MN00506≠	St. Cloud	Mississippi River	St. Cloud	45° 32.8'	94° 08.8'	18	13,320	5100	6460	A
MN00508	Sauk River	Sauk River	State of Minn.	45° 27.3'	94° 25.1'	8	860	270	156	B
MN00560	Sauk River	Sauk River	City of Sauk Center	45° 44.4'	94° 57.1'	11	367	110	87	C
MN00561	Sauk River	Sauk River	City of Melrose	45° 40.4'	94° 48.5'	12	360	170	147	B
MN00734	Mill Creek Dam	Mill Creek	State of Minn.	45° 28.0'	94° 19.9'	13	48	16	15	C
STEELE										
MN00336	Myron Standke	Straight R-Offstream	Myron Standke	43° 56.5'	93° 11.0'	6	100	*	*	C
MN00337	Donald Anderson	Turtle Crk-Offstream	Donald Anderson	43° 57.4'	93° 08.1'	13	50	*	*	C
MN00410	Beaver Lake	Straight River	State of Minn.	43° 53.4'	93° 20.6'	11	50	*	*	C
MN00525	Rice Lake	Maple Creek	Steele County	44° 05.4'	93° 04.9'	6	100	*	*	C
MN00568	Morehouse Park	Stdraight River	City of Owatonna	44° 05.0'	93° 13.9'	8	207	92	53	C
MN00733	Trotman Dam	Straight River	Thomas J. Trotman	43° 56.0'	93° 05.4'	7	100	*	*	C
STEVENS										
MN00167	Perkins Lake	Pomme de Terre River	State of Minn.	45° 41.4'	95° 51.9'	4	177	15 → 60	3 → 17	C
MN00168	Pomme de Terre River	Pomme de Terre River	State of Minn.	45° 34.2'	96° 53.0'	10	234	29	21	C
SWIFT										
MN00166	Pomme de Terre River	Pomme de Terre River	Village of Appleton	45° 12.2'	96° 01.1'	8	905	110	63	C
MN00289	Marquardt Dam	Pomme de Terre River	Byron Marquardt	45° 21.5'	95° 59.5'	11	50	*	*	C
MN00290	Elmer Schliep	Pomme de Terre R-Off	Elmer Schliep	45° 24.0'	95° 55.5'	26	30	*	*	C
MN00291	Berrthold Kposman	Pomme de Terre R-Off	Berthold Koosman	45° 20.2'	95° 59.5'	23	30	*	*	C
MN00292	Falk Wildlife Area	Chippewa	Wendall Falk	45° 20.7'	95° 22.5'	6	100	*	*	C
Mn00293	Drywood Fish Barrier	Pomme de Terre River	Ray Banker	45° 24.2'	96° 00.0'	13	50	*	*	C
MN00294	Frank Schlieman	Pomme de Terre River	Frank Schlieman	45° 21.7'	95° 57.5'	20	5	*	*	C
MN00367	Swift Falls	E. Br-Chippewa River	Swift County	45° 24.1'	95° 25.6'	11	104	12.5	10	C

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TODD										
MN00001	Big Birch Lake	Adley Creek	State of Minn.	45° 47.0'	94° 46.4'	6	35	10	4	C
MN00256	Bernasrd Fry Struc.	Prairie Brook	State of Minn.	45° 53.1'	94° 50.2'	8	<100	*	*	C
MN00258	Little Swan Lake	Swan River	Todd County	45° 55.8'	94° 41.2'	8	53	17	*	C
MN00261	D. Stoerzinger Pond	Little Elk River	Douglas Stoerzinger	46° 09.8'	94° 41.8'	10	< 50	*	*	C
MN00262	R. Biermeier Pond	Turtle Creek	Rudy Biermeier	46° 06.8'	94° 44.6'	11	< 50	*	*	C
MN00263	C. D. Johnson Pond	Little Elk River	Joe Dubbels	46° 11.2'	94° 39.0'	11	< 50	*	*	C
MN00264	L. Kaminek Pond	So. Br-Little Elk R	Westleg	46° 08.4'	94° 39.0'	10	< 50	*	*	C
MN00265	D. Stoerzinger Pond	Little Elk-Offstream	Douglas Stoerzinger	46° 09.2'	94° 41.5'	14	< 50	*	*	C
MN00266	H. Groschel Pond	Sauk River	Donald Bateman	45° 52.5'	94° 54.7'	15	< 50	*	*	C
MN00267	August Glockzin Pond	Adley Creek	James Matchinsky	45° 48.3'	94° 43.5'	9	<100	*	*	C
MN00271	D. Peschel Pond	Prairie Brook	Jim Burkett	45° 49.7'	94° 49.5'	15	< 50	*	*	C
Mn00674	Wing River	Wing River	--	46° 19.6'	95° 05.1'	6	125	45	19	C
MN00816	Staples WMA	Stony Brook	State of Minn.	46° 17.5'	94° 47.6'	6	<100	*	*	C
MN00826	Berscheid Struc.	Sauk River-Offstream	Edward Berscheid	45° 50.1'	94° 54.3'	13	< 50	*	*	C
MN00895	Kramer Dam	Wing River	Ray Kramer	46° 21.1'	95° 06.5'	22	< 30	*	*	C
TRAVERSE										
MN00575	Browns Valley Dike	Little Minnesota	DAEN NCS	45° 36.8'	96° 51.0'	11	147	55	44	C
MN00576	Reservation Hwy	Bois de Sioux	DAEN NCS	45° 45.9'	96° 38.4'	9	1120	77	49	C
MN00577	White Rock Dam	Bois de Sioux	DAEN NCS	45° 51.7'	96° 34.3'	8	1135	78	45	C
WABASHA										
MN00011#	Zumbro River	No. Fork-Zumbro Riv	Village of Mazeppa	44° 16.4'	92° 32.9'	12	250	115	99	B
MN00358t	Zumbro River	Zumbro River	City of Rochester	44° 12.8'	92° 28.7'	55	849	388	1537	A
MN00436	S. Hudell	Middle Creek	Art Melvin	44° 14.6'	92° 09.7'	26	< 30	*	*	C
Mn00437	Frank Pietsch Dam	Middle Creek	Frank Pietsch	44° 11.2'	92° 10.9'	20	< 30	*	*	C
MN00438	J. Sibley	Zumbro	Richard Sibley	44° 13.5'	92° 31.5'	22	< 30	*	*	C
MN00439	Sheehan-Stork	Snake Creek	Sheehan-Stork Gp	44° 15.3'	92° 02.1'	33	< 5	*	*	C
MN00440	L. Lyers	Spring Creek	Lloyd Meyers	44° 18.7'	92° 18.0'	23	< 30	*	*	C
MN00441	C. Jordan	Zumbro	Taylor Jordan	44° 18.5'	92° 05.3'	28	< 30	*	*	C

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WABASHA										
MN00442	J. Golhi	Miller Creek	J. Golhal	44° 23.8'	92° 16.3'	30	< 5	*	*	C
MN00443	Structure S-16A	Cold Creek	Harris Hink	44° 20.6'	92° 25.5'	27	< 30	*	*	C
MN00444	Structure S-21B	Cold Creek	Matt Miller	44° 18.8'	92° 30.3'	23	< 30	*	*	C
MN00445	Structure S-22B	Cold Creek	Gerald Thomforde	44° 20.6'	92° 30.3'	23	< 30	*	*	C
MN00446	L. Kackman	Trout Brook	Lewis Kackman	44° 20.3'	92° 12.2'	21	< 30	*	*	C
MN00447	Hunter Sprenger Pool	Whitewater	C. Hunter	44° 08.5'	92° 09.2	23	< 30	*	*	C
MN00448	Wilmer Schmidt	Whitewater	Wilmer Schmidt	44° 08.2'	92° 10.8'	30	< 5	*	*	C
MN00449	De Frang Pool Agreement	Zumbro River	Roy De Frang	44° 14.6'	92° 18.7'	21	< 30	*	*	C
MN00871	Watopa Twnshp. Str.#2	Snake Creek-Offstream	Ray Shiek & Watopa Twnshp	44° 14.2'	92° 04.0'	30	< 5	*	*	C
MN00872	Carlson Friermuth Detention No. 2	Zumbro River-Offstr.	Lee Nauss	44° 18.2'	92° 10.9'	26	< 30	*	*	C
MN00873	Ralph Lenz Det. Str.	Sugarloaf Creek-Offst.	Ralph Lenz	44° 27.1'	92° 19.2'	27	< 30	*	*	C
MN00874	Schowweiller-Speedling	Zumbro River-Offstr.	John Schowweiller	44° 17.2'	92° 05.9'	32	< 1	*	*	C
WADENA										
MN00676	Aldrich Dam	Partridge River	Village of Aldrich	46° 23.2'	94° 56.3'	6	89	32	14	C
MN00815	Yaeger Lake	Crow Wing R-St. Dth.30	Wadena County	46° 42.5'	94° 57.9'	6	<100	*	*	C
MN00828	Huntersville Imp. #3	Crow Wing River	Wadena County	46° 45.2'	94° 52.5'	8	<100	*	*	C
MN00829	Huntersville Imp. #4	Crow Wing River	Wadena County	46° 46.3'	94° 49.7'	8	<100	*	*	C
WASECA										
MN00108	Elysian Lake	Le Sueur	State of Minn.	44° 08.8'	93° 42.6'	6	33	*	*	C
MN00109	St. Olaf Lake	Le Sueur River	State of Minn.	43° 54.0'	93° 25.2'	6	<100	*	*	C
MN00110	Silver Lake	Bull Run Creek	State of Minn.	43° 58.5'	93° 38.6'	6	<100	*	*	C
MN00137	Buffalo Lake	Le Sueur River	State of Minn.	44° 04.0'	93° 42.9'	6	6	*	*	C
MN00555	Moonan Marsh	Crane Creek	Waseca Co.	44° 01.3'	93° 05.5'	9	7	*	*	C
MN00881	Watkins Lake	Crane Creek	State of Minn.	44° 06.6'	93° 26.5'	6	<100	*	*	C
WASHINGTON										
MN00482	Schuester Pond	Trout Brook	Ernest Schuester	44° 51.5'	92° 48.6'	20	< 30	*	*	C
MN00483	Couvette Gp Pond	Trout Brook-Offstream	Ronald Lamberg	44° 51.6'	92° 48.4'	28	< 30	*	*	C
MN00565	Bald Eagle Lake	Clearwater Creek	City of St. Paul	46° 08.2'	93° 00.9'	7	22	*	*	C
MN00712	Kelly Farms	St. Croix River	Kelly Land and Cattle	45° 10.3'	92° 53.3'	6	<100	*	*	C
WATONWAN										
MN00107	Mary Lake	Watonwan River	State of Minn.	43° 55.5'	94° 39.1'	6	<100	*	*	C

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WILKIN										
MN00220	Breckinridge Lake	Ottertail River	City of Breckenridge	46° 15.6'	96° 32.1'	13	229	27	23 → 98	C
WINONA										
MN00415	Pagel-Young Det. No. 1	So. Fork Whitewater R	William Pagel	43° 58.6'	92° 02.2'	24	<30	*	*	C
MN00416	Frank Hilke Deten.	Trout Run Creek	Carl Mundt	43° 55.5'	92° 04.3'	22	<30	*	*	C
MN00417	Lenard Greden Deten.	Trout Creek	Lenard Greden	44° 06.8'	91° 57.0'	20	<30	*	*	C
MN00418	Herb Speltz Det. #2	Speltz Creek	Herb Speltz	44° 07.2'	91° 52.1'	28	<30	*	*	C
MN00419	Victor Gunderson Marmsoler Deten.	Big Trout Creek	Gunderson and Marmsoler	43° 57.8'	91° 28.7'	31	< 5	4	8	C
MN00420	Blumentritt Deten.	Pine Creek	Irven Blumentritt	43° 52.5'	91° 26.5'	24	<30	*	*	C
MN00421	Little Trout Deten. #1	Little Trout Creek	Richard Hartwick	43° 56.5'	91° 27.2'	20	< 5	*	*	C
MN00422	Little Trout Deten. #2	Little Trout Creek	Richard Hartwick	43° 56.5'	91° 27.2'	29	< 5	*	*	C
MN00423	Stanley Harvey Stab.	Trout Run Creek	Stanley Harvey	43° 53.1'	92° 03.7'	26	<30	*	*	C
MN00424	Pleasant Vall. Site #7	Pleasant Valley Crk	Standley Girtler	43° 58.7'	91° 36.6'	27	<30	*	*	C
MN00425	Pleasant Vall. Site #8	Pleasant Valley Crk	Stanley Girtler	43° 58.2'	91° 36.0'	32	< 5	*	*	C
MN00426	Pleasant Vall. Site #12	Pleasant Valley Crk	Mrs. Ward Lucus	44° 00.9'	91° 30.9'	30	< 5	*	*	C
MN00427	Pleasant Vall. Site #10	Pleasant Valley Crk	Dr. Paul Heise	43° 59.4'	91° 36.5'	24	<30	*	*	C
MN00428	Pleasant Vall. Site #6	Pleasant Valley Crk	Stanley Girtler	43° 58.0'	91° 36.6'	28	<30	*	*	C
MN00429	Pleasant Vall. Site #3	Pleasant Valley Crk	Rudolph and Arthur Noeska	43° 57.7'	91° 36.3'	25	<30	*	*	C
MN00430	Judy	Pleasant Valley Crk	Privately Owned	43° 57.2'	91° 36.7'	30	0.7	5	<11	C
MN00431	Hundorf	Pleasant Valley Crk	Hunderf	43° 57.1'	91° 37.2'	34	1.5	5	<11	C
MN00519	Pickwick Dam	Big Trout Creek	Karland Leo Wershofer	43° 58.8'	91° 29.8'	33	11.74	3.75	9	C
MN00569	Boiler Pool	Rollingstone Creek	James Stevens	44° 03.7'	91° 48.3'	27	<30	*	*	C
MN00571	So. Wind Orchard	Dakota Creek	R. J. Wilkie	43° 54.5'	91° 22.4'	22	<30	*	*	C
MN00587	Lock & Dam No. 7	Mississippi River	DAEN NCS	43° 52.0'	91° 18.5'	7	62,340	27,800	13,690	A
MN00588	Lock & Dam No. 5A	Mississippi River	DAEN NCS	44° 05.3'	91° 40.2'	5	59.190	26,400	9280	A
MN00589	Lock & Dam No. 5	Mississippi River	DAEN NCS	44° 09.7'	91° 48.7'	8	58,854	26,250	15,100	A
MN00660	Jasson Park	So. Fork Whitewater R	City of St. Charles	43° 57.4'	92° 03.1'	28	0.3	<5	10	C
MN00875	Lloyd Haxton	BVear Creek-Offstream	Lloyd Haxton	44° 05.6'	91° 51.0'	26	<30	*	*	C
MN00876	Loyal Hoseck Det. #1	Cedar Creek-Offstream	Loyal Hoseck	43° 57.5'	91° 33.7'	33	< 5	*	*	C

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WINONA										
MN00877	Loyal Hoseck Det. #2	Cedar Creek-Offstream	Loyal Hoseck	43° 57.1'	91° 34.0'	31	5	*	*	C
MN00878	Clement Felix Det.Str.	Money Creek-Offstream	Clement Felix	43° 56.4'	91° 40.2'	32	5	*	*	C
MN00879	Stanley Harley	Trout Run-Offstream	Stanley Harley	43° 52.2'	92° 03.8'	28	30	*	*	C
MN00880	Wrren Twp Road Struc.	Rush Creek-Offstream	Charles Radate-Warren Twp	43° 57.8'	91° 50.2'	21	30	*	*	C
WRIGHT										
MN00307	6 Bernings Mill Dam	Crow River	Harold Peterson	45° 06.0'	93° 40.0'	10	50	*	*	C
MN00308	6 Bernings Mill Dam	Crow River	Village of St. Michael	45° 10.0'	93° 40.0'	10	50	*	*	C
MN00309	Russel Booth	Crow River-Offstream	Russel Booth	45° 08.0'	93° 45.0'	14	50	*	*	C
MN00310	Welter Bros.	Crow-River-Offstream	Welter Bros.	45° 12.0'	93° 38.8'	22	30	*	*	C
MN00311	Vokaty-Yonak	Otter Creek	Vokaty-Yonak Group	45° 15.0'	93° 54.0'	7	100	*	*	C
MN00402	Deer Lake	No. Fork-Crow River	State of Minn.	45° 08.3'	93° 54.5'	6	100	*	*	C
MN00403	Little Waverly	Twelve Mile Creek	State of Minn.	45° 04.7'	93° 59.3'	7	100	*	*	C
MN00404	Ramsey Lake	Mill Creek	State of Minn.	45° 12.3'	93° 59.3'	8	7	*	*	C
MN00406	Fairhaven Dam	Clearwater River	Stearns and Wright Co.	45° 15.0'	94° 12.8'	16	50	*	*	C
MN00530	Cedar Lake	Clearwater River	State of Minn.	45° 16.6'	94° 04.6'	6	15	*	*	C
MN00532	Swart Watts Lake	Clearwater River	State of Minn.	45° 13.9'	94° 04.0'	8	100	*	*	C
MN00533	Bertram Lake	Otter Creek	State of Minn.	45° 17.2'	93° 51.0'	6	100	*	*	C
MN00736	Mud Lake-Woodland WMA Dam	Judicial Ditch #2	State of Minn.	45° 03.1'	93° 53.5'	6	100	*	*	C
YELLOW MEDICINE										
MN00151	Canby Lake	Canby Creek	City of Canby	44° 42.4'	96° 16.6'	6	100	*	*	C
MN00152#	Minnesota River	Minnesota River	NSP	44° 47.2'	95° 30.0'	17	6370	705	860	A
MN00153	Timm Lake	Jud. Ditch #10 Wood Lake Creek	Yellow Medicine Co.	44° 33.1'	95° 31.7'	6	100	*	*	C
MN00510†	Minnesota River	Minnesotda River	Village of Granite Falls	44° 48.7'	95° 32.1'	18	6370	705	914	A
MN00846	Don Halverson Farm Pd	Minnesota River	Don Halverson	44° 54.1'	95° 43.0'	31	1	*	*	C

*Not computed due to small drainage area.
†Indicate sites that are currently producing power.
#Indicate sites no longer producing power.

APPENDIX B

Printout Results of the Computer

Program HYFEAS for all Dam Sites

Included in the Pre-Feasibility Studies

83/08/11. 15.28.03.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .20
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

SITE NAME: SAINT CLOUD
SITE NUMBER: MN00506
RIVER NAME: MISSISSIPPI RIVER

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	300.	979.1	962.0
95	1020.	979.4	962.2
90	1320.	979.6	962.2
85	1600.	979.7	962.3
80	1840.	979.7	962.3
75	2060.	979.8	962.4
70	2325.	979.8	962.4
65	2600.	979.9	962.5
60	2870.	979.9	962.5
55	3160.	980.1	962.6
50	3450.	980.2	962.7
45	3760.	980.2	962.7
40	4080.	980.3	962.8
35	4400.	980.4	962.9
30	4900.	980.6	963.0
25	5500.	980.7	963.1
20	6350.	980.9	963.3
15	7570.	981.2	963.5
10	9600.	981.7	963.9
5	13600.	982.6	964.8
0	19500.	983.7	965.8

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	3329.	3329.	0	368.	1113.	370.	0	0
95	0	10987.	10987.	8744.	711.	2855.	1242.	2.45	2.45
90	0	13934.	13934.	11083.	818.	3489.	1607.	2.57	3.16
85	0	16545.	16545.	13165.	905.	4041.	1936.	2.66	3.25
80	0	18603.	18603.	14805.	976.	4506.	2227.	2.70	3.06
75	0	20404.	20404.	16224.	1035.	4908.	2478.	2.73	3.08
70	0	22372.	22372.	17762.	1105.	5393.	2797.	2.73	2.77
65	0	24278.	24278.	19254.	1171.	5870.	3109.	2.73	2.75
60	0	25982.	25982.	20615.	1235.	6340.	3432.	2.72	2.54
55	0	27662.	27662.	21943.	1297.	6817.	3756.	2.70	2.46
50	0	29192.	29192.	23151.	1356.	7282.	4076.	2.68	2.31
45	0	30612.	30612.	23838.	1421.	7788.	4442.	2.59	1.20
40	0	31979.	31979.	24499.	1480.	8280.	4791.	2.51	1.20
35	0	33169.	33169.	25074.	1537.	8790.	5135.	2.43	1.01
30	0	34723.	34723.	25826.	1624.	9573.	5683.	2.31	.86

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 16.2 FT.

DESIGN DISCHARGE: 4400. CFS.

DESIGN CAPACITY: 5135. KW.

DESIGN PERCENT EXCEEDANCE: 35

EQUIPMENT COST ($1000): 3995.

TOTAL COST ($1000): 8790.

SITE FACTOR:2.20

35 YEARS BENEFIT-COST RATIO: 2.43

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 16.6 FT.

DESIGN DISCHARGE: 2600. CFS.

DESIGN CAPACITY: 3109. KW.

DESIGN PERCENT EXCEEDANCE: 65

EQUIPMENT COST ($1000): 2625.

TOTAL COST ($1000): 5870.

SITE FACTOR:2.24

35 YEARS BENEFIT-COST RATIO: 2.73

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	3329.	3329.	0	368.	680.	370.	0	0
95	0	10987.	10987.	8744.	711.	1863.	1242.	3.40	3.40
90	0	13934.	13934.	11083.	818.	2360.	1607.	3.49	3.87
85	0	16545.	16545.	13165.	905.	2803.	1936.	3.55	3.92
80	0	18603.	18603.	14805.	976.	3183.	2227.	3.56	3.64
75	0	20404.	20404.	16224.	1035.	3514.	2478.	3.57	3.64
70	0	22372.	22372.	17762.	1105.	3921.	2797.	3.53	3.23
65	0	24278.	24278.	19254.	1171.	4322.	3109.	3.51	3.19
60	0	25982.	25982.	20615.	1235.	4724.	3432.	3.46	2.92
55	0	27662.	27662.	21943.	1297.	5134.	3756.	3.41	2.82
50	0	29192.	29192.	23151.	1356.	5536.	4076.	3.36	2.62
45	0	30612.	30612.	23838.	1421.	5980.	4442.	3.22	1.35
40	0	31979.	31979.	24499.	1480.	6412.	4791.	3.10	1.35
35	0	33169.	33169.	25074.	1537.	6792.	5135.	3.01	1.32
30	0	34723.	34723.	25826.	1624.	7397.	5683.	2.86	1.09
25	0	36257.	36257.	26567.	1723.	8108.	6339.	2.70	.92

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 16.1 FT.

DESIGN DISCHARGE: 4900. CFS.

DESIGN CAPACITY: 5683. KW.

DESIGN PERCENT EXCEEDANCE: 30

EQUIPMENT COST ($1000): 4351.

TOTAL COST ($1000): 7397.

SITE FACTOR: 1.70

35 YEARS BENEFIT-COST RATIO: 2.86

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 16.7 FT.

DESIGN DISCHARGE: 2060. CFS.

DESIGN CAPACITY: 2478. KW.

DESIGN PERCENT EXCEEDANCE: 75

EQUIPMENT COST ($1000): 2175.

TOTAL COST ($1000): 3514.

SITE FACTOR: 1.62

35 YEARS BENEFIT-COST RATIO: 3.57

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	3329.	3329.	0	368.	1630.	370.	0	0
95	0	10987.	10987.	8744.	711.	3848.	1242.	1.92	1.92
90	0	13934.	13934.	11083.	818.	4617.	1607.	2.04	2.67
85	0	16545.	16545.	13165.	905.	5280.	1936.	2.13	2.78
80	0	18603.	18603.	14805.	976.	5829.	2227.	2.18	2.64
75	0	20404.	20404.	16224.	1035.	6301.	2478.	2.21	2.67
70	0	22372.	22372.	17762.	1105.	6866.	2797.	2.23	2.42
65	0	24278.	24278.	19254.	1171.	7417.	3109.	2.24	2.42
60	0	25982.	25982.	20615.	1235.	7956.	3432.	2.24	2.25
55	0	27662.	27662.	21943.	1297.	8500.	3756.	2.24	2.19
50	0	29192.	29192.	23151.	1356.	9027.	4076.	2.23	2.06
45	0	30612.	30612.	23838.	1421.	9597.	4442.	2.16	1.08
40	0	31979.	31979.	24499.	1480.	10148.	4791.	2.11	1.08
35	0	33169.	33169.	25074.	1537.	10787.	5135.	2.03	.83

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 16.3 FT.

DESIGN DISCHARGE: 4080. CFS.

DESIGN CAPACITY: 4791. KW.

DESIGN PERCENT EXCEEDANCE: 40

EQUIPMENT COST ($1000): 3766.

TOTAL COST ($1000): 10148.

SITE FACTOR: 2.69

35 YEARS BENEFIT-COST RATIO: 2.11

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 16.6 FT.

DESIGN DISCHARGE: 2870. CFS.

DESIGN CAPACITY: 3432. KW.

DESIGN PERCENT EXCEEDANCE: 60

EQUIPMENT COST ($1000): 2847.

TOTAL COST ($1000): 7956.

SITE FACTOR: 2.79

35 YEARS BENEFIT-COST RATIO: 2.24

CONCLUSION: THIS SITE HAS A VERY GOOD HYDROPOWER FEASIBILITY !

SRU 2.662 UNTS.

RUN COMPLETE.

83/08/11. 15.35.37.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: 0
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

SITE NAME: BYLLESBY
SITE NUMBER: MN00514
RIVER NAME: CANNON RIVER

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	30.	857.2	796.3
95	70.	857.2	796.6
90	80.	857.2	797.0
85	95.	857.2	797.3
80	110.	857.2	797.5
75	120.	857.2	797.7
70	135.	857.2	797.9
65	150.	857.2	798.2
60	160.	857.3	798.2
55	180.	857.3	798.3
50	195.	857.3	798.4
45	220.	857.3	798.5
40	240.	857.3	798.6
35	275.	857.3	798.7
30	320.	857.3	798.8
25	390.	857.4	799.2
20	490.	857.5	799.6
15	645.	857.6	800.0
10	880.	857.8	800.6
5	1450.	858.1	801.3
0	3980.	858.7	802.7

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	979.	979.	0	210.	249.	132.	0	0
95	0	2289.	2289.	1821.	332.	498.	306.	2.19	2.19
90	0	2624.	2624.	2088.	356.	554.	347.	2.30	3.35
85	0	3109.	3109.	2474.	390.	636.	410.	2.41	3.32
80	0	3565.	3565.	2837.	421.	716.	473.	2.49	3.25
75	0	3852.	3852.	3061.	441.	768.	514.	2.53	3.13
70	0	4253.	4253.	3375.	469.	845.	577.	2.57	3.00
65	0	4630.	4630.	3672.	495.	919.	637.	2.60	2.96
60	0	4857.	4857.	3844.	513.	969.	680.	2.60	2.56
55	0	5276.	5276.	4171.	546.	1066.	764.	2.59	2.50
50	0	5564.	5564.	4383.	570.	1137.	826.	2.57	2.22
45	0	5996.	5996.	4677.	608.	1255.	930.	2.51	1.90
40	0	6305.	6305.	4826.	637.	1346.	1013.	2.43	1.24
35	0	6779.	6779.	5056.	685.	1504.	1159.	2.31	1.11
30	0	7305.	7305.	5310.	743.	1702.	1346.	2.17	.99

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 58.5 FT.

DESIGN DISCHARGE: 275. CFS.

DESIGN CAPACITY: 1159. KW.

DESIGN PERCENT EXCEEDANCE: 35

EQUIPMENT COST ($1000): 752.

TOTAL COST ($1000): 1504.

SITE FACTOR:2.00

35 YEARS BENEFIT-COST RATIO: 2.31

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 59.0 FT.

DESIGN DISCHARGE: 150. CFS.

DESIGN CAPACITY: 637. KW.

DESIGN PERCENT EXCEEDANCE: 65

EQUIPMENT COST ($1000): 459.

TOTAL COST ($1000): 919.

SITE FACTOR:2.00

35 YEARS BENEFIT-COST RATIO: 2.60

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	979.	979.	0	210.	187.	132.	0	0
95	0	2289.	2289.	1821.	332.	373.	306.	2.58	2.58
90	0	2624.	2624.	2088.	356.	415.	347.	2.71	4.07
85	0	3109.	3109.	2474.	390.	477.	410.	2.85	4.04
80	0	3565.	3565.	2837.	421.	537.	473.	2.96	3.96
75	0	3852.	3852.	3061.	441.	576.	514.	3.01	3.83
70	0	4253.	4253.	3375.	469.	634.	577.	3.06	3.67
65	0	4630.	4630.	3672.	495.	689.	637.	3.10	3.63
60	0	4857.	4857.	3844.	513.	726.	680.	3.10	3.14
55	0	5276.	5276.	4171.	546.	800.	764.	3.10	3.07
50	0	5564.	5564.	4383.	570.	853.	826.	3.08	2.74
45	0	5996.	5996.	4677.	608.	941.	930.	3.02	2.34
40	0	6305.	6305.	4826.	637.	1010.	1013.	2.93	1.53
35	0	6779.	6779.	5056.	685.	1128.	1159.	2.79	1.38
30	0	7305.	7305.	5310.	743.	1276.	1346.	2.63	1.23
25	0	8002.	8002.	5647.	824.	1496.	1629.	2.43	1.12
20	0	8812.	8812.	6039.	929.	1798.	2033.	2.21	.96

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 58.0 FT.

DESIGN DISCHARGE: 390. CFS.

DESIGN CAPACITY: 1629. KW.

DESIGN PERCENT EXCEEDANCE: 25

EQUIPMENT COST ($1000): 998.

TOTAL COST ($1000): 1496.

SITE FACTOR:1.50

35 YEARS BENEFIT-COST RATIO: 2.43

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 59.0 FT.

DESIGN DISCHARGE: 160. CFS.

DESIGN CAPACITY: 680. KW.

DESIGN PERCENT EXCEEDANCE: 60

EQUIPMENT COST ($1000): 484.

TOTAL COST ($1000): 726.

SITE FACTOR:1.50

35 YEARS BENEFIT-COST RATIO: 3.10

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	979.	979.	0	210.	433.	132.	0	0
95	0	2289.	2289.	1821.	332.	797.	306.	1.61	1.61
90	0	2624.	2624.	2088.	356.	875.	347.	1.70	2.61
85	0	3109.	3109.	2474.	390.	990.	410.	1.79	2.61
80	0	3565.	3565.	2837.	421.	1099.	473.	1.87	2.57
75	0	3852.	3852.	3061.	441.	1169.	514.	1.90	2.49
70	0	4253.	4253.	3375.	469.	1272.	577.	1.94	2.40
65	0	4630.	4630.	3672.	495.	1371.	637.	1.97	2.38
60	0	4857.	4857.	3844.	513.	1437.	680.	1.97	2.07
55	0	5276.	5276.	4171.	546.	1564.	764.	1.98	2.03
50	0	5564.	5564.	4383.	570.	1657.	826.	1.97	1.82
45	0	5996.	5996.	4677.	608.	1808.	930.	1.94	1.56
40	0	6305.	6305.	4826.	637.	1925.	1013.	1.88	1.02
35	0	6779.	6779.	5056.	685.	2125.	1159.	1.80	.93

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 58.6 FT.

DESIGN DISCHARGE: 240. CFS.

DESIGN CAPACITY: 1013. KW.

DESIGN PERCENT EXCEEDANCE: 40

EQUIPMENT COST ($1000): 673.

TOTAL COST ($1000): 1925.

SITE FACTOR:2.86

35 YEARS BENEFIT-COST RATIO: 1.88

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 58.9 FT.

DESIGN DISCHARGE: 180. CFS.

DESIGN CAPACITY: 764. KW.

DESIGN PERCENT EXCEEDANCE: 55

EQUIPMENT COST ($1000): 533.

TOTAL COST ($1000): 1564.

SITE FACTOR:2.93

35 YEARS BENEFIT-COST RATIO: 1.98

CONCLUSION:THIS SITE HAS A VERY GOOD HYDROPOWER FEASIBILITY !

SRU 2.648 UNTS.

RUN COMPLETE.

83/05/23. 14.49.32.
MNFTS PROGRAM HYFEAS

VERY GOOD

SITE NAME:COON RAPIDS
SITE NUMBER:MN00507
RIVER NAME:MISSISSIPPI RIVER

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .80
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	600.	830.1	805.0
95	1350.	830.1	808.3
90	1750.	830.1	808.7
85	2150.	830.1	809.1
80	2550.	830.1	809.5
75	2800.	830.1	809.7
70	3350.	830.1	809.9
65	3650.	830.1	810.0
60	4000.	830.1	810.2
55	4300.	830.1	810.4
50	4750.	830.1	810.5
45	5150.	830.1	810.6
40	5650.	830.1	810.7
35	6250.	830.1	811.0
30	7100.	830.1	811.4
25	8300.	830.1	811.7
20	9950.	830.1	812.0
15	12125.	830.1	812.9
10	15500.	830.1	813.5
5	21375.	830.1	814.8
0	49000.	830.1	820.3

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	6406.	6406.	0	661.	3206.	1085.	0	0
95	0	15130.	15130.	11889.	951.	5375.	2120.	1.88	1.88
90	0	19436.	19436.	15302.	1084.	6402.	2698.	2.04	2.94
85	0	23541.	23541.	18499.	1200.	7344.	3252.	2.17	3.02
80	0	27446.	27446.	21484.	1302.	8219.	3784.	2.26	3.05
75	0	29722.	29722.	23311.	1363.	8745.	4115.	2.31	3.12
70	0	34273.	34273.	26700.	1494.	9880.	4875.	2.35	2.68
65	0	36571.	36571.	28536.	1561.	10622.	5285.	2.34	2.27
60	0	39094.	39094.	30475.	1632.	11396.	5734.	2.34	2.29
55	0	41097.	41097.	31740.	1688.	12035.	6102.	2.31	1.82
50	0	43702.	43702.	33611.	1777.	13027.	6706.	2.27	1.73
45	0	45780.	45780.	35296.	1852.	13887.	7234.	2.24	1.80
40	0	48059.	48059.	36564.	1942.	14947.	7896.	2.16	1.10
35	0	50543.	50543.	38374.	2034.	16118.	8599.	2.11	1.43
30	0	53556.	53556.	39863.	2155.	17718.	9564.	2.01	.87

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 19.1 FT.

DESIGN DISCHARGE: 6250. CFS.

DESIGN CAPACITY: 8599. KW.

DESIGN PERCENT EXCEEDANCE: 35

EQUIPMENT COST ($1000): 5757.

TOTAL COST ($1000): 16118.

SITE FACTOR: 2.80

35 YEARS BENEFIT-COST RATIO: 2.11

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 20.2 FT.

DESIGN DISCHARGE: 3350. CFS.

DESIGN CAPACITY: 4875. KW.

DESIGN PERCENT EXCEEDANCE: 70

EQUIPMENT COST ($1000): 3544.

TOTAL COST ($1000): 9880.

SITE FACTOR: 2.79

35 YEARS BENEFIT-COST RATIO: 2.35

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	6406.	6406.	0	661.	2400.	1085.	0	0
95	0	15130.	15130.	11889.	951.	4195.	2120.	2.31	2.31
90	0	19436.	19436.	15302.	1084.	5073.	2698.	2.49	3.37
85	0	23541.	23541.	18499.	1200.	5890.	3252.	2.61	3.43
80	0	27446.	27446.	21484.	1302.	6657.	3784.	2.70	3.43
75	0	29722.	29722.	23311.	1363.	7121.	4115.	2.75	3.48
70	0	34273.	34273.	26700.	1494.	8135.	4875.	2.77	2.96
65	0	36571.	36571.	28536.	1561.	8725.	5285.	2.77	2.80
60	0	39094.	39094.	30475.	1632.	9361.	5734.	2.77	2.74
55	0	41097.	41097.	31740.	1688.	9886.	6102.	2.74	2.18
50	0	43702.	43702.	33611.	1777.	10701.	6706.	2.69	2.07
45	0	45780.	45780.	35296.	1852.	11407.	7234.	2.66	2.16
40	0	48059.	48059.	36564.	1942.	12278.	7896.	2.57	1.32
35	0	50543.	50543.	38374.	2034.	13240.	8599.	2.51	1.72
30	0	53556.	53556.	39863.	2155.	14554.	9564.	2.39	1.04
25	0	56979.	56979.	41562.	2325.	16417.	11001.	2.22	.84

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 18.7 FT.

DESIGN DISCHARGE: 7100. CFS.

DESIGN CAPACITY: 9564. KW.

DESIGN PERCENT EXCEEDANCE: 30

EQUIPMENT COST ($1000): 6328.

TOTAL COST ($1000): 14554.

SITE FACTOR: 2.30

35 YEARS BENEFIT-COST RATIO: 2.39

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 20.1 FT.

DESIGN DISCHARGE: 3650. CFS.

DESIGN CAPACITY: 5285. KW.

DESIGN PERCENT EXCEEDANCE: 65

EQUIPMENT COST ($1000): 3793.

TOTAL COST ($1000): 8725.

SITE FACTOR: 2.30

35 YEARS BENEFIT-COST RATIO: 2.77

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	6406.	6406.	0	661.	4013.	1085.	0	0
95	0	15130.	15130.	11889.	951.	6555.	2120.	1.58	1.58
90	0	19436.	19436.	15302.	1084.	7730.	2698.	1.74	2.61
85	0	23541.	23541.	18499.	1200.	8797.	3252.	1.85	2.70
80	0	27446.	27446.	21484.	1302.	9781.	3784.	1.94	2.75
75	0	29722.	29722.	23311.	1363.	10369.	4115.	1.99	2.82
70	0	34273.	34273.	26700.	1494.	11625.	4875.	2.04	2.44
65	0	36571.	36571.	28536.	1561.	12518.	5285.	2.03	1.91
60	0	39094.	39094.	30475.	1632.	13431.	5734.	2.02	1.97
55	0	41097.	41097.	31740.	1688.	14184.	6102.	2.00	1.56
50	0	43702.	43702.	33611.	1777.	15354.	6706.	1.96	1.49
45	0	45780.	45780.	35296.	1852.	16367.	7234.	1.94	1.55
40	0	48059.	48059.	36564.	1942.	17616.	7896.	1.87	.95

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 19.5 FT.

DESIGN DISCHARGE: 5150. CFS.

DESIGN CAPACITY: 7234. KW.

DESIGN PERCENT EXCEEDANCE: 45

EQUIPMENT COST ($1000): 4960.

TOTAL COST ($1000): 16367.

SITE FACTOR:3.30

35 YEARS BENEFIT-COST RATIO: 1.94

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 20.2 FT.

DESIGN DISCHARGE: 3350. CFS.

DESIGN CAPACITY: 4875. KW.

DESIGN PERCENT EXCEEDANCE: 70

EQUIPMENT COST ($1000): 3544.

TOTAL COST ($1000): 11625.

SITE FACTOR:3.28

35 YEARS BENEFIT-COST RATIO: 2.04

CONCLUSION:THIS SITE HAS A VERY GOOD HYDROPOWER FEASIBILITY !

SRU 2.582 UNTS.

RUN COMPLETE.

83/08/15. 14.35.34.
MNFTS   PROGRAM   HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

SITE NAME:KETTLE RIVER
SITE NUMBER:MN00513
RIVER NAME:KETTLE RIVER

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: -.17
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000):   0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	40.	956.6	935.2
95	100.	956.7	935.4
90	120.	956.7	935.5
85	140.	956.8	935.6
80	155.	956.8	935.6
75	160.	956.8	935.7
70	180.	956.9	935.7
65	195.	956.9	935.7
60	210.	956.9	935.8
55	240.	957.0	935.9
50	270.	957.0	935.9
45	300.	957.1	936.0
40	360.	957.2	936.1
35	450.	957.4	936.3
30	540.	957.5	936.5
25	685.	957.7	936.7
20	890.	957.8	936.9
15	1250.	958.1	937.3
10	1800.	958.8	937.9
5	3000.	959.4	939.1
0	7000.	960.8	943.1

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	522.	522.	0	139.	145.	62.	0	0
95	0	1282.	1282.	1022.	228.	309.	153.	1.90	1.90
90	0	1523.	1523.	1214.	251.	362.	182.	1.98	2.50
85	0	1751.	1751.	1396.	272.	415.	212.	2.03	2.47
80	0	1909.	1909.	1522.	288.	454.	234.	2.05	2.31
75	0	1963.	1963.	1565.	292.	466.	241.	2.07	2.68
70	0	2147.	2147.	1712.	311.	517.	271.	2.07	2.07
65	0	2276.	2276.	1814.	325.	555.	294.	2.06	1.97
60	0	2399.	2399.	1913.	337.	592.	315.	2.06	2.02
55	0	2620.	2620.	2075.	362.	664.	358.	2.02	1.67
50	0	2818.	2818.	2193.	386.	737.	403.	1.95	1.22
45	0	3000.	3000.	2283.	407.	806.	445.	1.88	.99

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 20.7 FT.

DESIGN DISCHARGE: 270. CFS.

DESIGN CAPACITY: 403. KW.

DESIGN PERCENT EXCEEDANCE: 50

EQUIPMENT COST ($1000): 455.

TOTAL COST ($1000): 737.

SITE FACTOR:1.62

35 YEARS BENEFIT-COST RATIO: 1.95

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 20.9 FT.

DESIGN DISCHARGE: 180. CFS.

DESIGN CAPACITY: 271. KW.

DESIGN PERCENT EXCEEDANCE: 70

EQUIPMENT COST ($1000): 328.

TOTAL COST ($1000): 517.

SITE FACTOR:1.58

35 YEARS BENEFIT-COST RATIO: 2.07

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	522.	522.	0	139.	145.	62.	0	0
95	0	1282.	1282.	1022.	228.	305.	153.	1.92	1.92
90	0	1523.	1523.	1214.	251.	354.	182.	2.01	2.69
85	0	1751.	1751.	1396.	272.	401.	212.	2.07	2.67
80	0	1909.	1909.	1522.	288.	436.	234.	2.11	2.51
75	0	1963.	1963.	1565.	292.	446.	241.	2.12	2.92
70	0	2147.	2147.	1712.	311.	491.	271.	2.13	2.27
65	0	2276.	2276.	1814.	325.	525.	294.	2.14	2.17
60	0	2399.	2399.	1913.	337.	556.	315.	2.14	2.23
55	0	2620.	2620.	2075.	362.	619.	358.	2.11	1.86
50	0	2818.	2818.	2193.	386.	682.	403.	2.05	1.37
45	0	3000.	3000.	2283.	407.	742.	445.	1.99	1.11
40	0	3319.	3319.	2503.	449.	859.	532.	1.91	1.38
35	0	3741.	3741.	2707.	504.	1027.	658.	1.77	.91

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 20.5 FT.

DESIGN DISCHARGE: 360. CFS.

DESIGN CAPACITY: 532. KW.

DESIGN PERCENT EXCEEDANCE: 40

EQUIPMENT COST ($1000): 573.

TOTAL COST ($1000): 859.

SITE FACTOR: 1.50

35 YEARS BENEFIT-COST RATIO: 1.91

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 20.8 FT.

DESIGN DISCHARGE: 210. CFS.

DESIGN CAPACITY: 315. KW.

DESIGN PERCENT EXCEEDANCE: 60

EQUIPMENT COST ($1000): 371.

TOTAL COST ($1000): 556.

SITE FACTOR: 1.50

35 YEARS BENEFIT-COST RATIO: 2.14

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	522.	522.	0	139.	304.	62.	0	0
95	0	1282.	1282.	1022.	228.	599.	153.	1.24	1.24
90	0	1523.	1523.	1214.	251.	684.	182.	1.30	1.77
85	0	1751.	1751.	1396.	272.	766.	212.	1.34	1.76
80	0	1909.	1909.	1522.	288.	827.	234.	1.37	1.67
75	0	1963.	1963.	1565.	292.	845.	241.	1.38	1.91
70	0	2147.	2147.	1712.	311.	922.	271.	1.39	1.51
65	0	2276.	2276.	1814.	325.	979.	294.	1.39	1.45
60	0	2399.	2399.	1913.	337.	1033.	315.	1.40	1.49
55	0	2620.	2620.	2075.	362.	1139.	358.	1.38	1.24
50	0	2818.	2818.	2193.	386.	1244.	403.	1.35	.92

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 20.7 FT.

DESIGN DISCHARGE: 240. CFS.

DESIGN CAPACITY: 358. KW.

DESIGN PERCENT EXCEEDANCE: 55

EQUIPMENT COST ($1000): 413.

TOTAL COST ($1000): 1139.

SITE FACTOR:2.76

35 YEARS BENEFIT-COST RATIO: 1.38

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 20.8 FT.

DESIGN DISCHARGE: 210. CFS.

DESIGN CAPACITY: 315. KW.

DESIGN PERCENT EXCEEDANCE: 60

EQUIPMENT COST ($1000): 371.

TOTAL COST ($1000): 1033.

SITE FACTOR:2.79

35 YEARS BENEFIT-COST RATIO: 1.40

CONCLUSION:THIS SITE HAS A VERY GOOD HYDROPOWER FEASIBILITY !

SRU 2.518 UNTS.

RUN COMPLETE.

83/06/03. 14.14.18.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

SITE NAME:ST. ANTHONY FALL UPPER LOCK & DAM
SITE NUMBER:MN00590
RIVER NAME:MISSISSIPPI RIVER

EXISTING CAPACITY: 12500. KW
DESIGN DISCHARGE: 4060. CFS
OVERALL EFFICIENCY: .75

PROPOSED POWERPLANT

WEIGHTING FACTOR: .30
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	650.	100.0	52.0
95	1300.	100.0	51.9
90	1775.	100.0	51.9
85	2175.	100.0	51.8
80	2575.	100.0	51.8
75	2975.	100.0	51.7
70	3350.	100.0	51.7
65	3750.	100.0	51.6
60	4100.	100.0	51.6
55	4500.	100.0	51.5
50	4900.	100.0	51.5
45	5325.	100.0	51.4
40	5800.	100.0	51.4
35	6500.	100.0	51.3
30	7400.	100.0	51.2
25	8600.	100.0	51.1
20	10200.	100.0	50.9
15	12500.	100.0	50.7
10	16100.	100.0	50.3
5	22650.	100.0	49.8
0	40000.	100.0	49.0

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	94166.	17765.	0	0	0	0	0	I	0
95	94166.	35060.	0	0	0	0	0	I	0
90	94166.	47075.	0	0	0	0	0	I	0
85	94166.	56604.	0	0	0	0	0	I	0
80	94166.	65640.	0	0	0	0	0	I	0
75	94166.	74074.	0	0	0	0	0	I	0
70	94166.	81529.	0	0	0	0	0	I	0
65	94166.	88872.	0	0	0	0	0	I	0
60	94166.	94987.	821.	661.	221.	418.	145.	1.03	1.03
55	94166.	102343.	8177.	6604.	796.	2474.	1529.	2.02	2.26
50	94166.	109282.	15116.	12184.	1133.	4055.	2927.	2.35	2.91
45	94166.	116049.	21882.	15933.	1415.	5540.	4408.	2.29	2.12
40	94166.	123020.	28854.	19802.	1683.	7177.	6071.	2.23	2.03
35	94166.	132178.	38011.	24910.	2024.	9475.	8526.	2.17	1.94
30	94166.	142533.	48367.	30694.	2403.	12268.	11694.	2.09	1.82
25	94166.	154240.	60074.	37201.	2843.	15798.	15932.	2.00	1.64
20	94166.	166754.	72588.	43466.	3356.	20271.	21630.	1.84	1.26
15	94166.	180614.	86448.	50167.	3998.	26368.	29860.	1.65	.99

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 49.1 FT.

DESIGN DISCHARGE: 6140. CFS.

DESIGN CAPACITY: 21630. KW.

DESIGN PERCENT EXCEEDANCE: 20

EQUIPMENT COST ($1000): 8813.

TOTAL COST ($1000): 20271.

SITE FACTOR:2.30

35 YEARS BENEFIT-COST RATIO: 1.84

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 48.5 FT.

DESIGN DISCHARGE: 840. CFS.

DESIGN CAPACITY: 2927. KW.

DESIGN PERCENT EXCEEDANCE: 50

EQUIPMENT COST ($1000): 1717.

TOTAL COST ($1000): 4055.

SITE FACTOR:2.36

35 YEARS BENEFIT-COST RATIO: 2.35

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	94166.	17765.	0	0	0	0	0	I	0
95	94166.	35060.	0	0	0	0	0	I	0
90	94166.	47075.	0	0	0	0	0	I	0
85	94166.	56604.	0	0	0	0	0	I	0
80	94166.	65640.	0	0	0	0	0	I	0
75	94166.	74074.	0	0	0	0	0	I	0
70	94166.	81529.	0	0	0	0	0	I	0
65	94166.	88872.	0	0	0	0	0	I	0
60	94166.	94987.	821.	661.	221.	219.	145.	1.50	1.50
55	94166.	102343.	8177.	6604.	796.	1712.	1529.	2.63	2.87
50	94166.	109282.	15116.	12184.	1133.	3020.	2927.	2.93	3.39
45	94166.	116049.	21882.	15933.	1415.	4307.	4408.	2.78	2.39
40	94166.	123020.	28854.	19802.	1683.	5617.	6071.	2.71	2.45
35	94166.	132178.	38011.	24910.	2024.	7415.	8526.	2.64	2.39
30	94166.	142533.	48367.	30694.	2403.	9601.	11694.	2.56	2.25
25	94166.	154240.	60074.	37201.	2843.	12364.	15932.	2.45	2.03
20	94166.	166754.	72588.	43466.	3356.	15864.	21630.	2.26	1.56
15	94166.	180614.	86448.	50167.	3998.	20636.	29860.	2.04	1.24
10	94166.	196016.	101850.	57614.	4870.	27717.	42938.	1.77	.94

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 49.3 FT.

DESIGN DISCHARGE: 8440. CFS.

DESIGN CAPACITY: 29860. KW.

DESIGN PERCENT EXCEEDANCE: 15

EQUIPMENT COST ($1000):11464.

TOTAL COST ($1000): 20636.

SITE FACTOR:1.80

35 YEARS BENEFIT-COST RATIO: 2.04

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 48.5 FT.

DESIGN DISCHARGE: 840. CFS.

DESIGN CAPACITY: 2927. KW.

DESIGN PERCENT EXCEEDANCE: 50

EQUIPMENT COST ($1000): 1717.

TOTAL COST ($1000): 3020.

SITE FACTOR:1.76

35 YEARS BENEFIT-COST RATIO: 2.93

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	94166.	17765.	0	0	0	0	0	I	0
95	94166.	35060.	0	0	0	0	0	I	0
90	94166.	47075.	0	0	0	0	0	I	0
85	94166.	56604.	0	0	0	0	0	I	0
80	94166.	65640.	0	0	0	0	0	I	0
75	94166.	74074.	0	0	0	0	0	I	0
70	94166.	81529.	0	0	0	0	0	I	0
65	94166.	88872.	0	0	0	0	0	I	0
60	94166.	94987.	821.	661.	221.	628.	145.	.78	.78
55	94166.	102343.	8177.	6604.	796.	3235.	1529.	1.64	1.87
50	94166.	109282.	15116.	12184.	1133.	5090.	2927.	1.96	2.55
45	94166.	116049.	21882.	15933.	1415.	6772.	4408.	1.95	1.91
40	94166.	123020.	28854.	19802.	1683.	8737.	6071.	1.90	1.73
35	94166.	132178.	38011.	24910.	2024.	11535.	8526.	1.84	1.63
30	94166.	142533.	48367.	30694.	2403.	14935.	11694.	1.77	1.53
25	94166.	154240.	60074.	37201.	2843.	19233.	15932.	1.69	1.37
20	94166.	166754.	72588.	43466.	3356.	24678.	21630.	1.55	1.05
15	94166.	180614.	86448.	50167.	3998.	32100.	29860.	1.39	.83

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 49.1 FT.

DESIGN DISCHARGE: 6140. CFS.

DESIGN CAPACITY: 21630. KW.

DESIGN PERCENT EXCEEDANCE: 20

EQUIPMENT COST ($1000): 8813.

TOTAL COST ($1000): 24678.

SITE FACTOR:2.80

35 YEARS BENEFIT-COST RATIO: 1.55

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 48.5 FT.

DESIGN DISCHARGE: 840. CFS.

DESIGN CAPACITY: 2927. KW.

DESIGN PERCENT EXCEEDANCE: 50

EQUIPMENT COST ($1000): 1717.

TOTAL COST ($1000): 5090.

SITE FACTOR:2.96

35 YEARS BENEFIT-COST RATIO: 1.96

CONCLUSION:THIS SITE HAS A VERY GOOD HYDROPOWER FEASIBILITY !

SRU 2.574 UNTS.

RUN COMPLETE.

83/05/13. 12.06.35.
MNFTS   PROGRAM   HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

SITE NAME:RAPIDAN DAM
SITE NUMBER:MN00512
RIVER NAME:BLUE EARTH RIVER

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .09
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000):   0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	0	864.2	807.8
95	20.	864.3	809.0
90	30.	864.3	809.1
85	40.	864.3	809.1
80	50.	864.4	809.2
75	80.	864.4	809.3
70	110.	864.5	809.4
65	140.	864.5	809.5
60	180.	864.6	809.6
55	225.	864.6	809.7
50	275.	864.7	809.9
45	340.	864.8	810.0
40	425.	864.9	810.1
35	520.	864.9	810.3
30	630.	865.1	810.5
25	810.	865.3	810.7
20	1050.	865.4	811.0
15	1400.	865.7	811.4
10	1925.	866.1	812.0
5	3180.	866.6	813.0
0	9400.	869.1	816.3

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	618.	618.	492.	160.	196.	80.	1.38	1.38
90	0	927.	927.	739.	199.	270.	119.	1.58	2.18
85	0	1227.	1227.	977.	233.	339.	159.	1.71	2.32
80	0	1510.	1510.	1203.	262.	405.	198.	1.80	2.38
75	0	2306.	2306.	1837.	338.	587.	316.	1.98	2.45
70	0	3050.	3050.	2430.	402.	756.	434.	2.10	2.55
65	0	3742.	3742.	2979.	458.	915.	552.	2.17	2.55
60	0	4595.	4595.	3654.	524.	1117.	708.	2.23	2.52
55	0	5476.	5476.	4343.	591.	1334.	883.	2.26	2.43
50	0	6370.	6370.	5024.	658.	1563.	1076.	2.26	2.30
45	0	7415.	7415.	5598.	737.	1850.	1327.	2.16	1.57
40	0	8633.	8633.	6187.	832.	2209.	1656.	2.03	1.30
35	0	9833.	9833.	6767.	926.	2592.	2019.	1.92	1.22
30	0	11036.	11036.	7349.	1026.	3017.	2437.	1.82	1.11
25	0	12679.	12679.	8144.	1173.	3683.	3122.	1.68	.98

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 53.7 FT.

DESIGN DISCHARGE: 630. CFS.

DESIGN CAPACITY: 2437. KW.

DESIGN PERCENT EXCEEDANCE: 30

EQUIPMENT COST ($1000): 1426.

TOTAL COST ($1000): 3017.

SITE FACTOR:2.12

35 YEARS BENEFIT-COST RATIO: 1.82

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 54.3 FT.

DESIGN DISCHARGE: 275. CFS.

DESIGN CAPACITY: 1076. KW.

DESIGN PERCENT EXCEEDANCE: 50

EQUIPMENT COST ($1000): 726.

TOTAL COST ($1000): 1563.

SITE FACTOR:2.15

35 YEARS BENEFIT-COST RATIO: 2.26

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	618.	618.	492.	160.	128.	80.	1.71	1.71
90	0	927.	927.	739.	199.	178.	119.	1.96	2.75
85	0	1227.	1227.	977.	233.	226.	159.	2.13	2.94
80	0	1510.	1510.	1203.	262.	271.	198.	2.26	3.02
75	0	2306.	2306.	1837.	338.	398.	316.	2.50	3.12
70	0	3050.	3050.	2430.	402.	516.	434.	2.65	3.26
65	0	3742.	3742.	2979.	458.	628.	552.	2.74	3.27
60	0	4595.	4595.	3654.	524.	772.	708.	2.82	3.22
55	0	5476.	5476.	4343.	591.	926.	883.	2.86	3.12
50	0	6370.	6370.	5024.	658.	1089.	1076.	2.88	2.96
45	0	7415.	7415.	5598.	737.	1295.	1327.	2.75	2.01
40	0	8633.	8633.	6187.	832.	1554.	1656.	2.59	1.67
35	0	9833.	9833.	6767.	926.	1830.	2019.	2.46	1.57
30	0	11036.	11036.	7349.	1026.	2138.	2437.	2.32	1.43
25	0	12679.	12679.	8144.	1173.	2654.	3122.	2.13	1.20
20	0	14473.	14473.	9011.	1346.	3372.	4024.	1.91	.97

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 53.5 FT.

DESIGN DISCHARGE: 810. CFS.

DESIGN CAPACITY: 3122. KW.

DESIGN PERCENT EXCEEDANCE: 25

EQUIPMENT COST ($1000): 1749.

TOTAL COST ($1000): 2654.

SITE FACTOR:1.52

35 YEARS BENEFIT-COST RATIO: 2.13

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 54.3 FT.

DESIGN DISCHARGE: 275. CFS.

DESIGN CAPACITY: 1076. KW.

DESIGN PERCENT EXCEEDANCE: 50

EQUIPMENT COST ($1000): 726.

TOTAL COST ($1000): 1089.

SITE FACTOR:1.50

35 YEARS BENEFIT-COST RATIO: 2.88

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	618.	618.	492.	160.	337.	80.	.99	.99
90	0	927.	927.	739.	199.	449.	119.	1.14	1.63
85	0	1227.	1227.	977.	233.	551.	159.	1.25	1.76
80	0	1510.	1510.	1203.	262.	646.	198.	1.32	1.82
75	0	2306.	2306.	1837.	338.	902.	316.	1.48	1.91
70	0	3050.	3050.	2430.	402.	1132.	434.	1.58	2.02
65	0	3742.	3742.	2979.	458.	1344.	552.	1.65	2.05
60	0	4595.	4595.	3654.	524.	1608.	708.	1.71	2.04
55	0	5476.	5476.	4343.	591.	1886.	883.	1.75	2.00
50	0	6370.	6370.	5024.	658.	2176.	1076.	1.77	1.91
45	0	7415.	7415.	5598.	737.	2532.	1327.	1.71	1.32
40	0	8633.	8633.	6187.	832.	2971.	1656.	1.63	1.10
35	0	9833.	9833.	6767.	926.	3432.	2019.	1.55	1.05
30	0	11036.	11036.	7349.	1026.	3935.	2437.	1.48	.96

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 53.9 FT.

DESIGN DISCHARGE: 520. CFS.

DESIGN CAPACITY: 2019. KW.

DESIGN PERCENT EXCEEDANCE: 35

EQUIPMENT COST ($1000): 1220.

TOTAL COST ($1000): 3432.

SITE FACTOR:2.81

35 YEARS BENEFIT-COST RATIO: 1.55

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 54.3 FT.

DESIGN DISCHARGE: 275. CFS.

DESIGN CAPACITY: 1076. KW.

DESIGN PERCENT EXCEEDANCE: 50

EQUIPMENT COST ($1000): 726.

TOTAL COST ($1000): 2176.

SITE FACTOR:3.00

35 YEARS BENEFIT-COST RATIO: 1.77

CONCLUSION:THIS SITE HAS A VERY GOOD HYDROPOWER FEASIBILITY !

SRU 2.541 UNTS.

RUN COMPLETE.

83/06/10. 11.14.43.
MNFTS PROGRAM HYFEAS

GOOD

SITE NAME:LANESBORO
SITE NUMBER:MN00517
RIVER NAME:SOUTH BRANCH ROOT

INPUT DATA:
****

EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: -.50
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	35.	846.6	818.3
95	51.	846.7	818.7
90	59.	846.7	818.8
85	63.	846.7	818.9
80	67.	846.7	818.9
75	71.	846.7	819.0
70	78.	846.7	819.1
65	83.	846.7	819.2
60	90.	846.8	819.3
55	98.	846.8	819.4
50	102.	846.8	819.4
45	111.	846.8	819.5
40	120.	846.8	819.7
35	137.	846.8	819.9
30	150.	846.9	820.1
25	170.	846.9	820.3
20	202.	847.0	820.5
15	245.	847.1	820.8
10	355.	847.2	821.4
5	575.	847.4	821.9
0	700.	847.5	822.1

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	522.	522.	0	151.	148.	71.	0	0
95	0	764.	764.	609.	184.	200.	102.	1.59	1.59
90	0	885.	885.	703.	198.	225.	118.	1.66	2.38
85	0	944.	944.	749.	205.	237.	126.	1.69	2.44
80	0	999.	999.	791.	212.	249.	134.	1.71	2.19
75	0	1052.	1052.	834.	218.	261.	141.	1.74	2.38
70	0	1137.	1137.	900.	229.	282.	155.	1.76	2.08
65	0	1194.	1194.	946.	237.	296.	164.	1.78	2.16
60	0	1268.	1268.	1001.	247.	316.	177.	1.78	1.84
55	0	1344.	1344.	1061.	258.	338.	192.	1.78	1.78
50	0	1379.	1379.	1084.	264.	349.	200.	1.77	1.40
45	0	1450.	1450.	1142.	276.	373.	217.	1.76	1.60
40	0	1515.	1515.	1180.	286.	397.	233.	1.73	1.10
35	0	1620.	1620.	1231.	306.	441.	263.	1.65	.79

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 26.9 FT.

DESIGN DISCHARGE: 120. CFS.

DESIGN CAPACITY: 233. KW.

DESIGN PERCENT EXCEEDANCE: 40

EQUIPMENT COST ($1000): 264.

TOTAL COST ($1000): 397.

SITE FACTOR: 1.50

35 YEARS BENEFIT-COST RATIO: 1.73

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 27.2 FT.

DESIGN DISCHARGE: 98. CFS.

DESIGN CAPACITY: 192. KW.

DESIGN PERCENT EXCEEDANCE: 55

EQUIPMENT COST ($1000): 225.

TOTAL COST ($1000): 338.

SITE FACTOR: 1.50

35 YEARS BENEFIT-COST RATIO: 1.78

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	522.	522.	0	151.	148.	71.	0	0
95	0	764.	764.	609.	184.	200.	102.	1.59	1.59
90	0	885.	885.	703.	198.	225.	118.	1.66	2.38
85	0	944.	944.	749.	205.	237.	126.	1.69	2.44
80	0	999.	999.	791.	212.	249.	134.	1.71	2.19
75	0	1052.	1052.	834.	218.	261.	141.	1.74	2.38
70	0	1137.	1137.	900.	229.	282.	155.	1.76	2.08
65	0	1194.	1194.	946.	237.	296.	164.	1.78	2.16
60	0	1268.	1268.	1001.	247.	316.	177.	1.78	1.84
55	0	1344.	1344.	1061.	258.	338.	192.	1.78	1.78
50	0	1379.	1379.	1084.	264.	349.	200.	1.77	1.40
45	0	1450.	1450.	1142.	276.	373.	217.	1.76	1.60
40	0	1515.	1515.	1180.	286.	397.	233.	1.73	1.10
35	0	1620.	1620.	1231.	306.	441.	263.	1.65	.79

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 26.9 FT.

DESIGN DISCHARGE: 120. CFS.

DESIGN CAPACITY: 233. KW.

DESIGN PERCENT EXCEEDANCE: 40

EQUIPMENT COST ($1000): 264.

TOTAL COST ($1000): 397.

SITE FACTOR:1.50

35 YEARS BENEFIT-COST RATIO: 1.73

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 27.2 FT.

DESIGN DISCHARGE: 98. CFS.

DESIGN CAPACITY: 192. KW.

DESIGN PERCENT EXCEEDANCE: 55

EQUIPMENT COST ($1000): 225.

TOTAL COST ($1000): 338.

SITE FACTOR:1.50

35 YEARS BENEFIT-COST RATIO: 1.78

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	522.	522.	0	151.	197.	71.	0	0
95	0	764.	764.	609.	184.	267.	102.	1.35	1.35
90	0	885.	885.	703.	198.	300.	118.	1.41	1.96
85	0	944.	944.	749.	205.	316.	126.	1.44	2.01
80	0	999.	999.	791.	212.	333.	134.	1.45	1.81
75	0	1052.	1052.	834.	218.	348.	141.	1.47	1.96
70	0	1137.	1137.	900.	229.	375.	155.	1.49	1.71
65	0	1194.	1194.	946.	237.	394.	164.	1.50	1.77
60	0	1268.	1268.	1001.	247.	421.	177.	1.50	1.50
55	0	1344.	1344.	1061.	258.	450.	192.	1.50	1.46
50	0	1379.	1379.	1084.	264.	465.	200.	1.49	1.15
45	0	1450.	1450.	1142.	276.	498.	217.	1.48	1.30
40	0	1515.	1515.	1180.	286.	529.	233.	1.45	.90

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 27.1 FT.

DESIGN DISCHARGE: 111. CFS.

DESIGN CAPACITY: 217. KW.

DESIGN PERCENT EXCEEDANCE: 45

EQUIPMENT COST ($1000): 249.

TOTAL COST ($1000): 498.

SITE FACTOR: 2.00

35 YEARS BENEFIT-COST RATIO: 1.48

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 27.3 FT.

DESIGN DISCHARGE: 90. CFS.

DESIGN CAPACITY: 177. KW.

DESIGN PERCENT EXCEEDANCE: 60

EQUIPMENT COST ($1000): 210.

TOTAL COST ($1000): 421.

SITE FACTOR: 2.00

35 YEARS BENEFIT-COST RATIO: 1.50

CONCLUSION: THIS SITE HAS A GOOD HYDROPOWER FEASIBILITY !

SRU 2.629 UNTS.

RUN COMPLETE.

83/08/09. 11.08.36.
MNFTS PROGRAM HYFEAS

SITE NAME: ISLAND LAKE
SITE NUMBER: MN00612
RIVER NAME: CLOQUET

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .30
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	10.	37.0	0
95	37.	37.0	0
90	52.	37.0	0
85	67.	37.0	0
80	78.	37.0	0
75	86.	37.0	0
70	99.	37.0	0
65	115.	37.0	0
60	135.	37.0	0
55	160.	37.0	0
50	190.	37.0	0
45	227.	37.0	0
40	275.	37.0	0
35	337.	37.0	0
30	415.	37.0	0
25	515.	37.0	0
20	645.	37.0	0
15	825.	37.0	0
10	1150.	37.0	0
5	1735.	37.0	0
0	3190.	37.0	0

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	210.	210.	0	88.	218.	27.	0	0
95	0	777.	777.	621.	180.	345.	99.	1.18	1.18
90	0	1093.	1093.	872.	216.	445.	139.	1.32	1.84
85	0	1399.	1399.	1117.	248.	538.	179.	1.42	1.96
80	0	1611.	1611.	1286.	269.	603.	208.	1.47	1.96
75	0	1756.	1756.	1401.	284.	648.	229.	1.50	1.91
70	0	1976.	1976.	1577.	307.	721.	264.	1.53	1.85
65	0	2228.	2228.	1778.	333.	807.	307.	1.56	1.80
60	0	2520.	2520.	2011.	363.	910.	360.	1.58	1.74
55	0	2855.	2855.	2279.	398.	1034.	426.	1.59	1.68
50	0	3223.	3223.	2573.	437.	1177.	506.	1.59	1.61
45	0	3633.	3633.	2771.	481.	1347.	605.	1.52	.93

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 37.0 FT.

DESIGN DISCHARGE: 190. CFS.

DESIGN CAPACITY: 506. KW.

DESIGN PERCENT EXCEEDANCE: 50

EQUIPMENT COST ($1000): 448.

TOTAL COST ($1000): 1177.

SITE FACTOR:2.63

35 YEARS BENEFIT-COST RATIO: 1.59

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 37.0 FT.

DESIGN DISCHARGE: 190. CFS.

DESIGN CAPACITY: 506. KW.

DESIGN PERCENT EXCEEDANCE: 50

EQUIPMENT COST ($1000): 448.

TOTAL COST ($1000): 1177.

SITE FACTOR:2.63

35 YEARS BENEFIT-COST RATIO: 1.59

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	210.	210.	0	88.	101.	27.	0	0
95	0	777.	777.	621.	180.	176.	99.	1.75	1.75
90	0	1093.	1093.	872.	216.	232.	139.	1.95	2.71
85	0	1399.	1399.	1117.	248.	286.	179.	2.09	2.86
80	0	1611.	1611.	1286.	269.	324.	208.	2.17	2.85
75	0	1756.	1756.	1401.	284.	351.	229.	2.21	2.77
70	0	1976.	1976.	1577.	307.	394.	264.	2.25	2.66
65	0	2228.	2228.	1778.	333.	451.	307.	2.27	2.42
60	0	2520.	2520.	2011.	363.	521.	360.	2.28	2.32
55	0	2855.	2855.	2279.	398.	607.	426.	2.27	2.22
50	0	3223.	3223.	2573.	437.	708.	506.	2.25	2.10
45	0	3633.	3633.	2771.	481.	829.	605.	2.11	1.20
40	0	4110.	4110.	3001.	534.	983.	733.	1.98	1.11
35	0	4653.	4653.	3264.	596.	1177.	898.	1.84	1.02
30	0	5244.	5244.	3550.	668.	1415.	1106.	1.70	.93

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 37.0 FT.

DESIGN DISCHARGE: 337. CFS.

DESIGN CAPACITY: 898. KW.

DESIGN PERCENT EXCEEDANCE: 35

EQUIPMENT COST ($1000): 716.

TOTAL COST ($1000): 1177.

SITE FACTOR:1.64

35 YEARS BENEFIT-COST RATIO: 1.84

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 37.0 FT.

DESIGN DISCHARGE: 135. CFS.

DESIGN CAPACITY: 360. KW.

DESIGN PERCENT EXCEEDANCE: 60

EQUIPMENT COST ($1000): 338.

TOTAL COST ($1000): 521.

SITE FACTOR:1.54

35 YEARS BENEFIT-COST RATIO: 2.28

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	210.	210.	0	88.	359.	27.	0	0
95	0	777.	777.	621.	180.	529.	99.	.88	.88
90	0	1093.	1093.	872.	216.	670.	139.	.98	1.42
85	0	1399.	1399.	1117.	248.	799.	179.	1.07	1.52
80	0	1611.	1611.	1286.	269.	888.	208.	1.11	1.54
75	0	1756.	1756.	1401.	284.	950.	229.	1.14	1.50
70	0	1976.	1976.	1577.	307.	1047.	264.	1.16	1.46
65	0	2228.	2228.	1778.	333.	1162.	307.	1.19	1.43
60	0	2520.	2520.	2011.	363.	1299.	360.	1.21	1.39
55	0	2855.	2855.	2279.	398.	1462.	426.	1.23	1.35
50	0	3223.	3223.	2573.	437.	1647.	506.	1.23	1.31
45	0	3633.	3633.	2771.	481.	1864.	605.	1.18	.76

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 37.0 FT.

DESIGN DISCHARGE: 190. CFS.

DESIGN CAPACITY: 506. KW.

DESIGN PERCENT EXCEEDANCE: 50

EQUIPMENT COST ($1000): 448.

TOTAL COST ($1000): 1647.

SITE FACTOR:3.68

35 YEARS BENEFIT-COST RATIO: 1.23

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 37.0 FT.

DESIGN DISCHARGE: 190. CFS.

DESIGN CAPACITY: 506. KW.

DESIGN PERCENT EXCEEDANCE: 50

EQUIPMENT COST ($1000): 448.

TOTAL COST ($1000): 1647.

SITE FACTOR:3.68

35 YEARS BENEFIT-COST RATIO: 1.23

CONCLUSION:THIS SITE HAS A GOOD HYDROPOWER FEASIBILITY !

SRU 2.539 UNTS.

RUN COMPLETE.

83/06/08. 15.22.43.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

SITE NAME:ST ANTHONY FALLS LOWER LOCK AND DAM
SITE NUMBER:MN00591
RIVER NAME:MISSISSIPPI RIVER

EXISTING CAPACITY: 8000. KW
DESIGN DISCHARGE: 4750. CFS
OVERALL EFFICIENCY: .75

PROPOSED POWERPLANT

WEIGHTING FACTOR: 0
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	600.	100.0	75.0
95	1350.	100.0	75.0
90	1800.	100.0	75.0
85	2200.	100.0	75.0
80	2600.	100.0	75.0
75	2975.	100.0	75.0
70	3325.	100.0	74.2
65	3675.	100.0	73.8
60	4050.	100.0	73.6
55	4450.	100.0	73.4
50	4900.	100.0	73.5
45	5375.	100.0	73.6
40	5875.	100.0	73.7
35	6425.	100.0	74.0
30	7250.	100.0	74.3
25	8550.	100.0	74.7
20	10350.	100.0	75.2
15	12500.	100.0	76.0
10	15900.	100.0	76.9
5	22200.	100.0	78.4
0	38000.	100.0	82.0

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	52233.	8396.	0	0	0	0	0	I	0
95	52233.	18630.	0	0	0	0	0	I	0
90	52233.	24457.	0	0	0	0	0	I	0
85	52233.	29358.	0	0	0	0	0	I	0
80	52233.	33981.	0	0	0	0	0	I	0
75	52233.	38054.	0	0	0	0	0	I	0
70	52233.	41084.	0	0	0	0	0	I	0
65	52233.	44073.	0	0	0	0	0	I	0
60	52233.	47125.	0	0	0	0	0	I	0
55	52233.	50084.	0	0	0	0	0	I	0
50	52233.	53498.	1265.	1005.	320.	630.	286.	1.06	1.06
45	52233.	57249.	5016.	3360.	699.	2050.	1203.	1.22	1.31
40	52233.	60847.	8614.	5927.	961.	3317.	2161.	1.39	1.68
35	52233.	64521.	12288.	8686.	1191.	4608.	3211.	1.50	1.81
30	52233.	69283.	17050.	11472.	1473.	6374.	4746.	1.46	1.36
25	52233.	75578.	23346.	15171.	1833.	8917.	7100.	1.41	1.27
20	52233.	82441.	30208.	19927.	2237.	12133.	10248.	1.39	1.31
15	52233.	88603.	36371.	22907.	2624.	15617.	13748.	1.26	.77

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 24.8 FT.

DESIGN DISCHARGE: 5600. CFS.

DESIGN CAPACITY: 10248. KW.

DESIGN PERCENT EXCEEDANCE: 20

EQUIPMENT COST ($1000): 6066.

TOTAL COST ($1000): 12133.

SITE FACTOR:2.00

35 YEARS BENEFIT-COST RATIO: 1.39

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 26.0 FT.

DESIGN DISCHARGE: 1675. CFS.

DESIGN CAPACITY: 3211. KW.

DESIGN PERCENT EXCEEDANCE: 35

EQUIPMENT COST ($1000): 2304.

TOTAL COST ($1000): 4608.

SITE FACTOR:2.00

35 YEARS BENEFIT-COST RATIO: 1.50

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	52233.	8396.	0	0	0	0	0	I	0
95	52233.	18630.	0	0	0	0	0	I	0
90	52233.	24457.	0	0	0	0	0	I	0
85	52233.	29358.	0	0	0	0	0	I	0
80	52233.	33981.	0	0	0	0	0	I	0
75	52233.	38054.	0	0	0	0	0	I	0
70	52233.	41084.	0	0	0	0	0	I	0
65	52233.	44073.	0	0	0	0	0	I	0
60	52233.	47125.	0	0	0	0	0	I	0
55	52233.	50084.	0	0	0	0	0	I	0
50	52233.	53498.	1265.	1005.	320.	473.	286.	1.27	1.27
45	52233.	57249.	5016.	3360.	699.	1537.	1203.	1.50	1.63
40	52233.	60847.	8614.	5927.	961.	2488.	2161.	1.72	2.12
35	52233.	64521.	12288.	8686.	1191.	3456.	3211.	1.87	2.30
30	52233.	69283.	17050.	11472.	1473.	4787.	4746.	1.83	1.73
25	52233.	75578.	23346.	15171.	1833.	6688.	7100.	1.78	1.64
20	52233.	82441.	30208.	19927.	2237.	9100.	10248.	1.76	1.69
15	52233.	88603.	36371.	22907.	2624.	11713.	13748.	1.60	.99

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 24.8 FT.

DESIGN DISCHARGE: 5600. CFS.

DESIGN CAPACITY: 10248. KW.

DESIGN PERCENT EXCEEDANCE: 20

EQUIPMENT COST ($1000): 6066.

TOTAL COST ($1000): 9100.

SITE FACTOR: 1.50

35 YEARS BENEFIT-COST RATIO: 1.76

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 26.0 FT.

DESIGN DISCHARGE: 1675. CFS.

DESIGN CAPACITY: 3211. KW.

DESIGN PERCENT EXCEEDANCE: 35

EQUIPMENT COST ($1000): 2304.

TOTAL COST ($1000): 3456.

SITE FACTOR: 1.50

35 YEARS BENEFIT-COST RATIO: 1.87

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	52233.	8396.	0	0	0	0	0	I	0
95	52233.	18630.	0	0	0	0	0	I	0
90	52233.	24457.	0	0	0	0	0	I	0
85	52233.	29358.	0	0	0	0	0	I	0
80	52233.	33981.	0	0	0	0	0	I	0
75	52233.	38054.	0	0	0	0	0	I	0
70	52233.	41084.	0	0	0	0	0	I	0
65	52233.	44073.	0	0	0	0	0	I	0
60	52233.	47125.	0	0	0	0	0	I	0
55	52233.	50084.	0	0	0	0	0	I	0
50	52233.	53498.	1265.	1005.	320.	1015.	286.	.75	.75
45	52233.	57249.	5016.	3360.	699.	2885.	1203.	.94	1.05
40	52233.	60847.	8614.	5927.	961.	4432.	2161.	1.10	1.42
35	52233.	64521.	12288.	8686.	1191.	5950.	3211.	1.22	1.58
30	52233.	69283.	17050.	11472.	1473.	7961.	4746.	1.22	1.22
25	52233.	75578.	23346.	15171.	1833.	11147.	7100.	1.17	1.04
20	52233.	82441.	30208.	19927.	2237.	15166.	10248.	1.15	1.08
15	52233.	88603.	36371.	22907.	2624.	19521.	13748.	1.03	.63

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 24.8 FT.

DESIGN DISCHARGE: 5600. CFS.

DESIGN CAPACITY: 10248. KW.

DESIGN PERCENT EXCEEDANCE: 20

EQUIPMENT COST ($1000): 6066.

TOTAL COST ($1000): 15166.

SITE FACTOR: 2.50

35 YEARS BENEFIT-COST RATIO: 1.15

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 26.0 FT.

DESIGN DISCHARGE: 1675. CFS.

DESIGN CAPACITY: 3211. KW.

DESIGN PERCENT EXCEEDANCE: 35

EQUIPMENT COST ($1000): 2304.

TOTAL COST ($1000): 5950.

SITE FACTOR: 2.58

35 YEARS BENEFIT-COST RATIO: 1.22

CONCLUSION: THIS SITE HAS A GOOD HYDROPOWER FEASIBILITY !

SRU 2.453 UNTS.

RUN COMPLETE.

83/06/23. 15.06.49.
MNFTS PROGRAM HYFEAS

SITE NAME: KETTLE FALLS
SITE NUMBER: MN00 93
RIVER NAME: NAMAKOW RIVER

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .40
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 2229.

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	1000.	12.0	0
95	3200.	12.0	0
90	4000.	12.0	0
85	4550.	12.0	0
80	4950.	12.0	0
75	5280.	12.0	0
70	5575.	12.0	0
65	5930.	12.0	0
60	6280.	12.0	0
55	6650.	12.0	0
50	7010.	12.0	0
45	7400.	12.0	0
40	7940.	12.0	0
35	8650.	12.0	0
30	9600.	12.0	0
25	10870.	12.0	0
20	12550.	12.0	0
15	15000.	12.0	0
10	18850.	12.0	0
5	25100.	12.0	0
0	34170.	12.0	0

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	7572.	7572.	0	584.	7482.	864.	0	0
95	0	23815.	23815.	19009.	1099.	14718.	2766.	1.20	1.20
90	0	29418.	29418.	23481.	1240.	16986.	3458.	1.29	1.86
85	0	33062.	33062.	26390.	1330.	18481.	3933.	1.33	1.84
80	0	35561.	35561.	28384.	1392.	19540.	4279.	1.36	1.78
75	0	37498.	37498.	29930.	1442.	20398.	4564.	1.37	1.70
70	0	39117.	39117.	31223.	1485.	21154.	4819.	1.38	1.62
65	0	40932.	40932.	32671.	1536.	22172.	5126.	1.38	1.36
60	0	42588.	42588.	33993.	1584.	23132.	5428.	1.38	1.31
55	0	44199.	44199.	35279.	1634.	24137.	5748.	1.37	1.22
50	0	45630.	45630.	36421.	1682.	25104.	6059.	1.36	1.13
45	0	47033.	47033.	37100.	1732.	26143.	6397.	1.33	.62

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 12.0 FT.

DESIGN DISCHARGE: 7010. CFS.

DESIGN CAPACITY: 6059. KW.

DESIGN PERCENT EXCEEDANCE: 50

EQUIPMENT COST ($1000): 9531.

TOTAL COST ($1000): 25104.

SITE FACTOR:2.63

35 YEARS BENEFIT-COST RATIO: 1.36

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 12.0 FT.

DESIGN DISCHARGE: 5575. CFS.

DESIGN CAPACITY: 4819. KW.

DESIGN PERCENT EXCEEDANCE: 70

EQUIPMENT COST ($1000): 7899.

TOTAL COST ($1000): 21154.

SITE FACTOR:2.68

35 YEARS BENEFIT-COST RATIO: 1.38

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	7572.	7572.	0	584.	5742.	864.	0	0
95	0	23815.	23815.	19009.	1099.	11633.	2766.	1.49	1.49
90	0	29418.	29418.	23481.	1240.	13581.	3458.	1.58	2.14
85	0	33062.	33062.	26390.	1330.	14884.	3933.	1.63	2.09
80	0	35561.	35561.	28384.	1392.	15815.	4279.	1.65	2.01
75	0	37498.	37498.	29930.	1442.	16574.	4564.	1.66	1.91
70	0	39117.	39117.	31223.	1485.	17246.	4819.	1.67	1.81
65	0	40932.	40932.	32671.	1536.	18017.	5126.	1.67	1.76
60	0	42588.	42588.	33993.	1584.	18777.	5428.	1.67	1.63
55	0	44199.	44199.	35279.	1634.	19572.	5748.	1.66	1.52
50	0	45630.	45630.	36421.	1682.	20339.	6059.	1.65	1.40
45	0	47033.	47033.	37100.	1732.	21161.	6397.	1.62	.78

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 12.0 FT.

DESIGN DISCHARGE: 7010. CFS.

DESIGN CAPACITY: 6059. KW.

DESIGN PERCENT EXCEEDANCE: 50

EQUIPMENT COST ($1000): 9531.

TOTAL COST ($1000): 20339.

SITE FACTOR: 2.13

35 YEARS BENEFIT-COST RATIO: 1.65

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 12.0 FT.

DESIGN DISCHARGE: 5930. CFS.

DESIGN CAPACITY: 5126. KW.

DESIGN PERCENT EXCEEDANCE: 65

EQUIPMENT COST ($1000): 8309.

TOTAL COST ($1000): 18017.

SITE FACTOR: 2.17

35 YEARS BENEFIT-COST RATIO: 1.67

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	7572.	7572.	0	584.	9222.	864.	0	0
95	0	23815.	23815.	19009.	1099.	17802.	2766.	1.01	1.01
90	0	29418.	29418.	23481.	1240.	20391.	3458.	1.09	1.64
85	0	33062.	33062.	26390.	1330.	22078.	3933.	1.13	1.64
80	0	35561.	35561.	28384.	1392.	23265.	4279.	1.15	1.60
75	0	37498.	37498.	29930.	1442.	24223.	4564.	1.17	1.54
70	0	39117.	39117.	31223.	1485.	25063.	4819.	1.18	1.46
65	0	40932.	40932.	32671.	1536.	26326.	5126.	1.17	1.10
60	0	42588.	42588.	33993.	1584.	27487.	5428.	1.17	1.09
55	0	44199.	44199.	35279.	1634.	28701.	5748.	1.16	1.02
50	0	45630.	45630.	36421.	1682.	29870.	6059.	1.15	.94

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 12.0 FT.

DESIGN DISCHARGE: 6650. CFS.

DESIGN CAPACITY: 5748. KW.

DESIGN PERCENT EXCEEDANCE: 55

EQUIPMENT COST ($1000): 9128.

TOTAL COST ($1000): 28701.

SITE FACTOR:3.14

35 YEARS BENEFIT-COST RATIO: 1.16

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 12.0 FT.

DESIGN DISCHARGE: 5575. CFS.

DESIGN CAPACITY: 4819. KW.

DESIGN PERCENT EXCEEDANCE: 70

EQUIPMENT COST ($1000): 7899.

TOTAL COST ($1000): 25063.

SITE FACTOR:3.17

35 YEARS BENEFIT-COST RATIO: 1.18

CONCLUSION:THIS SITE HAS A GOOD HYDROPOWER FEASIBILITY !

SRU 2.492 UNTS.

RUN COMPLETE.

83/06/02. 13.29.15.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****

SITE NAME:FISH HOOK RIVER DAM
SITE NUMBER:MN00234
RIVER NAME:FISH HOOK RIVER

EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: -.13
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	30.	100.0	82.9
95	42.	100.0	83.1
90	48.	100.0	83.2
85	55.	100.0	83.3
80	60.	100.0	83.3
75	65.	100.0	83.4
70	68.	100.0	83.4
65	73.	100.0	83.5
60	76.	100.0	83.5
55	78.	100.0	83.6
50	82.	100.0	83.6
45	85.	100.0	83.7
40	92.	100.0	83.7
35	100.	100.0	83.8
30	110.	100.0	83.8
25	120.	100.0	83.9
20	130.	100.0	83.9
15	145.	100.0	84.1
10	180.	100.0	84.3
5	230.	100.0	84.9
0	400.	100.0	85.5

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	269.	269.	0	105.	132.	37.	0	0
95	0	379.	379.	301.	126.	137.	51.	1.15	1.15
90	0	435.	435.	345.	135.	154.	58.	1.20	1.71
85	0	498.	498.	395.	145.	173.	66.	1.24	1.70
80	0	539.	539.	428.	152.	187.	72.	1.26	1.60
75	0	579.	579.	460.	158.	200.	78.	1.28	1.64
70	0	601.	601.	477.	162.	208.	81.	1.29	1.48
65	0	636.	636.	504.	168.	221.	87.	1.30	1.42
60	0	655.	655.	519.	171.	229.	90.	1.30	1.31
55	0	668.	668.	528.	173.	233.	92.	1.30	1.41
50	0	689.	689.	544.	178.	244.	97.	1.29	1.08
45	0	704.	704.	552.	181.	251.	100.	1.28	.82

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 16.4 FT.

DESIGN DISCHARGE: 82. CFS.

DESIGN CAPACITY: 97. KW.

DESIGN PERCENT EXCEEDANCE: 50

EQUIPMENT COST ($1000): 153.

TOTAL COST ($1000): 244.

SITE FACTOR:1.59

35 YEARS BENEFIT-COST RATIO: 1.29

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 16.4 FT.

DESIGN DISCHARGE: 78. CFS.

DESIGN CAPACITY: 92. KW.

DESIGN PERCENT EXCEEDANCE: 55

EQUIPMENT COST ($1000): 147.

TOTAL COST ($1000): 233.

SITE FACTOR:1.58

35 YEARS BENEFIT-COST RATIO: 1.30

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	269.	269.	0	105.	132.	37.	0	0
95	0	379.	379.	301.	126.	135.	51.	1.16	1.16
90	0	435.	435.	345.	135.	150.	58.	1.21	1.82
85	0	498.	498.	395.	145.	167.	66.	1.27	1.82
80	0	539.	539.	428.	152.	180.	72.	1.29	1.72
75	0	579.	579.	460.	158.	191.	78.	1.32	1.76
70	0	601.	601.	477.	162.	198.	81.	1.32	1.60
65	0	636.	636.	504.	168.	210.	87.	1.33	1.54
60	0	655.	655.	519.	171.	217.	90.	1.34	1.42
55	0	668.	668.	528.	173.	221.	92.	1.34	1.52
50	0	689.	689.	544.	178.	230.	97.	1.33	1.17
45	0	704.	704.	552.	181.	236.	100.	1.32	.89

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 16.4 FT.

DESIGN DISCHARGE: 82. CFS.

DESIGN CAPACITY: 97. KW.

DESIGN PERCENT EXCEEDANCE: 50

EQUIPMENT COST ($1000): 153.

TOTAL COST ($1000): 230.

SITE FACTOR: 1.50

35 YEARS BENEFIT-COST RATIO: 1.33

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 16.4 FT.

DESIGN DISCHARGE: 78. CFS.

DESIGN CAPACITY: 92. KW.

DESIGN PERCENT EXCEEDANCE: 55

EQUIPMENT COST ($1000): 147.

TOTAL COST ($1000): 221.

SITE FACTOR: 1.50

35 YEARS BENEFIT-COST RATIO: 1.34

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	269.	269.	0	105.	303.	37.	0	0
95	0	379.	379.	301.	126.	301.	51.	.71	.71
90	0	435.	435.	345.	135.	331.	58.	.74	1.12
85	0	498.	498.	395.	145.	365.	66.	.77	1.13
80	0	539.	539.	428.	152.	389.	72.	.79	1.07
75	0	579.	579.	460.	158.	412.	78.	.81	1.09
70	0	601.	601.	477.	162.	426.	81.	.81	1.00
65	0	636.	636.	504.	168.	448.	87.	.82	.95
60	0	655.	655.	519.	171.	461.	90.	.82	.89
55	0	668.	668.	528.	173.	469.	92.	.82	.93
50	0	689.	689.	544.	178.	486.	97.	.82	.73
45	0	704.	704.	552.	181.	498.	100.	.81	.55
40	0	733.	733.	570.	189.	528.	108.	.79	.47
35	0	764.	764.	592.	197.	560.	117.	.78	.54
30	0	796.	796.	607.	207.	601.	128.	.75	.30
25	0	824.	824.	620.	217.	639.	139.	.72	.28
20	0	845.	845.	631.	226.	678.	151.	.70	.22
15	0	872.	872.	644.	239.	732.	166.	.66	.20
10	0	914.	914.	664.	266.	854.	204.	.59	.14
5	0	952.	952.	682.	298.	1008.	250.	.52	.10
0	0	992.	992.	702.	394.	1496.	418.	.37	.03

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION: THIS SITE HAS A GOOD HYDROPOWER FEASIBILITY !

SRU 2.548 UNTS.

RUN COMPLETE.

83/08/09. 09.49.16.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

SITE NAME: MINNESOTA ONE
SITE NUMBER: MN00152
RIVER NAME: MINNESOTA

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: -.06
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	60.	884.1	864.6
95	70.	884.1	864.6
90	80.	884.1	864.6
85	85.	884.1	864.7
80	90.	884.2	864.7
75	100.	884.2	864.7
70	120.	884.3	864.8
65	150.	884.3	864.8
60	180.	884.3	864.9
55	220.	884.4	865.0
50	270.	884.4	865.2
45	330.	884.5	865.3
40	410.	884.6	865.6
35	520.	884.7	865.8
30	680.	884.8	866.3
25	960.	885.0	867.1
20	1300.	885.2	868.2
15	1750.	885.4	869.4
10	2300.	885.7	870.6
5	2750.	885.9	871.3
0	3375.	886.2	872.5

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	600.	600.	0	165.	232.	84.	0	0
95	0	699.	699.	556.	179.	265.	98.	1.25	1.25
90	0	798.	798.	633.	193.	296.	112.	1.29	1.71
85	0	849.	849.	672.	199.	311.	119.	1.32	1.90
80	0	894.	894.	707.	205.	326.	126.	1.33	1.60
75	0	978.	978.	766.	217.	357.	140.	1.34	1.40
70	0	1136.	1136.	876.	239.	415.	167.	1.34	1.38
65	0	1351.	1351.	1036.	270.	500.	209.	1.34	1.37
60	0	1551.	1551.	1175.	297.	582.	249.	1.34	1.28
55	0	1791.	1791.	1337.	330.	687.	303.	1.31	1.17
50	0	2064.	2064.	1537.	367.	811.	368.	1.30	1.24
45	0	2351.	2351.	1759.	408.	958.	447.	1.29	1.18
40	0	2695.	2695.	1984.	455.	1140.	546.	1.24	.98

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 18.8 FT.

DESIGN DISCHARGE: 330. CFS.

DESIGN CAPACITY: 447. KW.

DESIGN PERCENT EXCEEDANCE: 45

EQUIPMENT COST ($1000): 512.

TOTAL COST ($1000): 958.

SITE FACTOR:1.87

35 YEARS BENEFIT-COST RATIO: 1.29

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 19.3 FT.

DESIGN DISCHARGE: 150. CFS.

DESIGN CAPACITY: 209. KW.

DESIGN PERCENT EXCEEDANCE: 65

EQUIPMENT COST ($1000): 272.

TOTAL COST ($1000): 500.

SITE FACTOR:1.84

35 YEARS BENEFIT-COST RATIO: 1.34

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	600.	600.	0	165.	193.	84.	0	0
95	0	699.	699.	556.	179.	219.	98.	1.39	1.39
90	0	798.	798.	633.	193.	245.	112.	1.45	1.98
85	0	849.	849.	672.	199.	256.	119.	1.48	2.22
80	0	894.	894.	707.	205.	269.	126.	1.49	1.87
75	0	978.	978.	766.	217.	293.	140.	1.50	1.63
70	0	1136.	1136.	876.	239.	339.	167.	1.52	1.62
65	0	1351.	1351.	1036.	270.	408.	209.	1.53	1.61
60	0	1551.	1551.	1175.	297.	472.	249.	1.53	1.52
55	0	1791.	1791.	1337.	330.	555.	303.	1.51	1.39
50	0	2064.	2064.	1537.	367.	653.	368.	1.51	1.48
45	0	2351.	2351.	1759.	408.	768.	447.	1.49	1.42
40	0	2695.	2695.	1984.	455.	911.	546.	1.45	1.19
35	0	3093.	3093.	2216.	515.	1102.	685.	1.37	.93

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 18.5 FT.

DESIGN DISCHARGE: 410. CFS.

DESIGN CAPACITY: 546. KW.

DESIGN PERCENT EXCEEDANCE: 40

EQUIPMENT COST ($1000): 607.

TOTAL COST ($1000): 911.

SITE FACTOR:1.50

35 YEARS BENEFIT-COST RATIO: 1.45

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 19.3 FT.

DESIGN DISCHARGE: 150. CFS.

DESIGN CAPACITY: 209. KW.

DESIGN PERCENT EXCEEDANCE: 65

EQUIPMENT COST ($1000): 272.

TOTAL COST ($1000): 408.

SITE FACTOR:1.50

35 YEARS BENEFIT-COST RATIO: 1.53

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	600.	600.	0	165.	443.	84.	0	0
95	0	699.	699.	556.	179.	495.	98.	.82	.82
90	0	798.	798.	633.	193.	546.	112.	.86	1.20
85	0	849.	849.	672.	199.	569.	119.	.88	1.34
80	0	894.	894.	707.	205.	593.	126.	.89	1.14
75	0	978.	978.	766.	217.	640.	140.	.89	1.00
70	0	1136.	1136.	876.	239.	730.	167.	.90	.99
65	0	1351.	1351.	1036.	270.	859.	209.	.92	1.00
60	0	1551.	1551.	1175.	297.	979.	249.	.92	.95
55	0	1791.	1791.	1337.	330.	1132.	303.	.91	.87
50	0	2064.	2064.	1537.	367.	1309.	368.	.92	.93
45	0	2351.	2351.	1759.	408.	1514.	447.	.92	.90
40	0	2695.	2695.	1984.	455.	1764.	546.	.89	.76
35	0	3093.	3093.	2216.	515.	2092.	685.	.85	.60
30	0	3588.	3588.	2455.	587.	2521.	872.	.79	.48
25	0	4301.	4301.	2800.	690.	3193.	1176.	.72	.44
20	0	5000.	5000.	3138.	785.	3892.	1489.	.67	.43
15	0	5683.	5683.	3468.	884.	4702.	1853.	.62	.36
10	0	6237.	6237.	3736.	979.	5568.	2237.	.57	.28
5	0	6467.	6467.	3847.	1048.	6226.	2536.	.53	.15
0	0	6564.	6564.	3894.	1110.	6973.	2820.	.48	.06

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION:THIS SITE HAS A GOOD HYDROPOWER FEASIBILITY !

SRU 2.672 UNTS.

RUN COMPLETE.

83/06/03. 13.53.20.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

SITE NAME:LOCK AND DAM #5
SITE NUMBER:MN00589
RIVER NAME:MISSISSIPPI RIVER

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: 0
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	4750.	10.0	2.0
95	8100.	10.0	2.0
90	9100.	10.0	2.0
85	10000.	10.0	2.0
80	11000.	10.0	2.0
75	11800.	10.0	2.0
70	12800.	10.0	2.1
65	13600.	10.0	2.2
60	14500.	10.0	2.3
55	15400.	10.0	2.4
50	16600.	10.0	2.5
45	18200.	10.0	2.5
40	20200.	10.0	2.6
35	22750.	10.0	2.7
30	26000.	10.0	2.8
25	30250.	10.0	3.0
20	35500.	10.0	3.5
15	42250.	10.0	4.1
10	52300.	10.0	5.1
5	69300.	10.0	6.9
0	100000.	10.0	9.0

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	19988.	19988.	0	1092.	13041.	2737.	0	0
95	0	33662.	33662.	26454.	1460.	20201.	4668.	1.22	1.22
90	0	37492.	37492.	29399.	1555.	22224.	5244.	1.24	1.39
85	0	40711.	40711.	31984.	1636.	24011.	5763.	1.25	1.38
80	0	44036.	44036.	34527.	1723.	25963.	6339.	1.25	1.25
75	0	46494.	46494.	36375.	1790.	27502.	6800.	1.24	1.15
70	0	49541.	49541.	38906.	1858.	29225.	7284.	1.25	1.41
65	0	51837.	51837.	40442.	1907.	30532.	7641.	1.25	1.13
60	0	54181.	54181.	42205.	1961.	31984.	8043.	1.24	1.17
55	0	56314.	56314.	43407.	2012.	33397.	8431.	1.23	.82

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 7.7 FT.

DESIGN DISCHARGE: 14500. CFS.

DESIGN CAPACITY: 8043. KW.

DESIGN PERCENT EXCEEDANCE: 60

EQUIPMENT COST ($1000):15992.

TOTAL COST ($1000): 31984.

SITE FACTOR:2.00

35 YEARS BENEFIT-COST RATIO: 1.24

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 7.9 FT.

DESIGN DISCHARGE: 12800. CFS.

DESIGN CAPACITY: 7284. KW.

DESIGN PERCENT EXCEEDANCE: 70

EQUIPMENT COST ($1000):14613.

TOTAL COST ($1000): 29225.

SITE FACTOR:2.00

35 YEARS BENEFIT-COST RATIO: 1.25

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	19988.	19988.	0	1092.	9781.	2737.	0	0
95	0	33662.	33662.	26454.	1460.	15151.	4668.	1.59	1.59
90	0	37492.	37492.	29399.	1555.	16668.	5244.	1.61	1.83
85	0	40711.	40711.	31984.	1636.	18009.	5763.	1.63	1.82
80	0	44036.	44036.	34527.	1723.	19472.	6339.	1.63	1.64
75	0	46494.	46494.	36375.	1790.	20626.	6800.	1.62	1.51
70	0	49541.	49541.	38906.	1858.	21919.	7284.	1.64	1.86
65	0	51837.	51837.	40442.	1907.	22899.	7641.	1.63	1.49
60	0	54181.	54181.	42205.	1961.	23988.	8043.	1.63	1.54
55	0	56314.	56314.	43407.	2012.	25048.	8431.	1.60	1.08
50	0	58811.	58811.	45440.	2081.	26472.	8968.	1.59	1.36
45	0	61501.	61501.	46994.	2187.	28547.	9833.	1.53	.71

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 7.5 FT.

DESIGN DISCHARGE: 16600. CFS.

DESIGN CAPACITY: 8968. KW.

DESIGN PERCENT EXCEEDANCE: 50

EQUIPMENT COST ($1000):17648.

TOTAL COST ($1000): 26472.

SITE FACTOR:1.50

35 YEARS BENEFIT-COST RATIO: 1.59

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 7.9 FT.

DESIGN DISCHARGE: 12800. CFS.

DESIGN CAPACITY: 7284. KW.

DESIGN PERCENT EXCEEDANCE: 70

EQUIPMENT COST ($1000):14613.

TOTAL COST ($1000): 21919.

SITE FACTOR:1.50

35 YEARS BENEFIT-COST RATIO: 1.64

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	19988.	19988.	0	1092.	17070.	2737.	0	0
95	0	33662.	33662.	26454.	1460.	25266.	4668.	.99	.99
90	0	37492.	37492.	29399.	1555.	27781.	5244.	1.00	1.13
85	0	40711.	40711.	31984.	1636.	30014.	5763.	1.01	1.12
80	0	44036.	44036.	34527.	1723.	32454.	6339.	1.01	1.01
75	0	46494.	46494.	36375.	1790.	34377.	6800.	1.01	.93

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 8.0 FT.

DESIGN DISCHARGE: 11000. CFS.

DESIGN CAPACITY: 6339. KW.

DESIGN PERCENT EXCEEDANCE: 80

EQUIPMENT COST ($1000):12982.

TOTAL COST ($1000): 32454.

SITE FACTOR:2.50

35 YEARS BENEFIT-COST RATIO: 1.01

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 8.0 FT.

DESIGN DISCHARGE: 10000. CFS.

DESIGN CAPACITY: 5763. KW.

DESIGN PERCENT EXCEEDANCE: 85

EQUIPMENT COST ($1000):12006.

TOTAL COST ($1000): 30014.

SITE FACTOR:2.50

35 YEARS BENEFIT-COST RATIO: 1.01

CONCLUSION:THIS SITE HAS A GOOD HYDROPOWER FEASIBILITY !

SRU 2.284 UNTS.

RUN COMPLETE.

83/06/02. 13.34.02.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

SITE NAME: MISSISSIPPI RIVER
SITE NUMBER: MN00505
RIVER NAME: MISSISSIPPI RIVER

EXISTING CAPACITY: 3200. KW
DESIGN DISCHARGE: 2440. CFS
OVERALL EFFICIENCY: .75

PROPOSED POWERPLANT

WEIGHTING FACTOR: .30
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	300.	1014.5	991.2
95	925.	1014.5	992.1
90	1200.	1014.5	992.6
85	1460.	1014.5	992.9
80	1700.	1014.5	993.1
75	1950.	1014.5	993.4
70	2200.	1014.5	993.7
65	2450.	1014.5	993.9
60	2690.	1014.5	994.0
55	2930.	1014.5	994.2
50	3200.	1014.5	994.4
45	3460.	1014.5	994.6
40	3770.	1014.5	994.8
35	4100.	1014.5	995.0
30	4550.	1014.5	995.3
25	5100.	1014.5	995.7
20	5830.	1014.5	996.0
15	6950.	1014.5	996.7
10	9000.	1014.5	997.5
5	12850.	1014.5	999.1
0	19200.	1014.5	1001.3

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	22240.	3047.	0	0	0	0	0	I	0
95	22240.	9372.	0	0	0	0	0	I	0
90	22240.	12087.	0	0	0	0	0	I	0
85	22240.	14491.	0	0	0	0	0	I	0
80	22240.	16563.	0	0	0	0	0	I	0
75	22240.	18622.	0	0	0	0	0	I	0
70	22240.	20555.	0	0	0	0	0	I	0
65	22240.	22332.	92.	73.	70.	277.	17.	.21	.21
60	22240.	24132.	1891.	1426.	374.	1165.	380.	.93	1.14
55	22240.	25850.	3610.	2661.	538.	1939.	742.	1.07	1.32
50	22240.	27644.	5404.	3973.	679.	2695.	1141.	1.18	1.46
45	22240.	29240.	7000.	5106.	793.	3358.	1518.	1.23	1.46
40	22240.	30948.	8708.	6377.	910.	4090.	1957.	1.28	1.50
35	22240.	32562.	10322.	7342.	1021.	4819.	2416.	1.26	1.15
30	22240.	34486.	12246.	8788.	1153.	5749.	3024.	1.27	1.36
25	22240.	36491.	14250.	10057.	1293.	6805.	3735.	1.24	1.06
20	22240.	38567.	16327.	11172.	1460.	8119.	4670.	1.17	.75

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 18.8 FT.

DESIGN DISCHARGE: 2660. CFS.

DESIGN CAPACITY: 3735. KW.

DESIGN PERCENT EXCEEDANCE: 25

EQUIPMENT COST ($1000): 2921.

TOTAL COST ($1000): 6805.

SITE FACTOR:2.33

35 YEARS BENEFIT-COST RATIO: 1.24

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 19.7 FT.

DESIGN DISCHARGE: 1330. CFS.

DESIGN CAPACITY: 1957. KW.

DESIGN PERCENT EXCEEDANCE: 40

EQUIPMENT COST ($1000): 1692.

TOTAL COST ($1000): 4090.

SITE FACTOR:2.42

35 YEARS BENEFIT-COST RATIO: 1.28

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	22240.	3047.	0	0	0	0	0	I	0
95	22240.	9372.	0	0	0	0	0	I	0
90	22240.	12087.	0	0	0	0	0	I	0
85	22240.	14491.	0	0	0	0	0	I	0
80	22240.	16563.	0	0	0	0	0	I	0
75	22240.	18622.	0	0	0	0	0	I	0
70	22240.	20555.	0	0	0	0	0	I	0
65	22240.	22332.	92.	73.	70.	123.	17.	.37	.37
60	22240.	24132.	1891.	1426.	374.	672.	380.	1.36	1.59
55	22240.	25850.	3610.	2661.	538.	1227.	742.	1.51	1.72
50	22240.	27644.	5404.	3973.	679.	1801.	1141.	1.60	1.83
45	22240.	29240.	7000.	5106.	793.	2322.	1518.	1.64	1.78
40	22240.	30948.	8708.	6377.	910.	2913.	1957.	1.67	1.80
35	22240.	32562.	10322.	7342.	1021.	3514.	2416.	1.62	1.36
30	22240.	34486.	12246.	8788.	1153.	4296.	3024.	1.61	1.58
25	22240.	36491.	14250.	10057.	1293.	5201.	3735.	1.55	1.21
20	22240.	38567.	16327.	11172.	1460.	6350.	4670.	1.43	.85

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 18.8 FT.

DESIGN DISCHARGE: 2660. CFS.

DESIGN CAPACITY: 3735. KW.

DESIGN PERCENT EXCEEDANCE: 25

EQUIPMENT COST ($1000): 2921.

TOTAL COST ($1000): 5201.

SITE FACTOR: 1.78

35 YEARS BENEFIT-COST RATIO: 1.55

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 19.7 FT.

DESIGN DISCHARGE: 1330. CFS.

DESIGN CAPACITY: 1957. KW.

DESIGN PERCENT EXCEEDANCE: 40

EQUIPMENT COST ($1000): 1692.

TOTAL COST ($1000): 2913.

SITE FACTOR: 1.72

35 YEARS BENEFIT-COST RATIO: 1.67

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	22240.	3047.	0	0	0	0	0	I	0
95	22240.	9372.	0	0	0	0	0	I	0
90	22240.	12087.	0	0	0	0	0	I	0
85	22240.	14491.	0	0	0	0	0	I	0
80	22240.	16563.	0	0	0	0	0	I	0
75	22240.	18622.	0	0	0	0	0	I	0
70	22240.	20555.	0	0	0	0	0	I	0
65	22240.	22332.	92.	73.	70.	465.	17.	.14	.14
60	22240.	24132.	1891.	1426.	374.	1658.	380.	.70	.90
55	22240.	25850.	3610.	2661.	538.	2651.	742.	.83	1.07
50	22240.	27644.	5404.	3973.	679.	3590.	1141.	.93	1.21
45	22240.	29240.	7000.	5106.	793.	4395.	1518.	.98	1.23
40	22240.	30948.	8708.	6377.	910.	5267.	1957.	1.03	1.28
35	22240.	32562.	10322.	7342.	1021.	6123.	2416.	1.03	1.00

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 19.7 FT.

DESIGN DISCHARGE: 1330. CFS.

DESIGN CAPACITY: 1957. KW.

DESIGN PERCENT EXCEEDANCE: 40

EQUIPMENT COST ($1000): 1692.

TOTAL COST ($1000): 5267.

SITE FACTOR:3.11

35 YEARS BENEFIT-COST RATIO: 1.03

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 19.7 FT.

DESIGN DISCHARGE: 1330. CFS.

DESIGN CAPACITY: 1957. KW.

DESIGN PERCENT EXCEEDANCE: 40

EQUIPMENT COST ($1000): 1692.

TOTAL COST ($1000): 5267.

SITE FACTOR:3.11

35 YEARS BENEFIT-COST RATIO: 1.03

CONCLUSION:THIS SITE HAS A GOOD HYDROPOWER FEASIBILITY !

SRU 2.559 UNTS.

RUN COMPLETE.

83/05/23. 14.15.32.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

SITE NAME: BLANCHARD
SITE NUMBER: MN00599
RIVER NAME: MISSISSIPPI RIVER

EXISTING CAPACITY: 13400. KW
DESIGN DISCHARGE: 4960. CFS
OVERALL EFFICIENCY: .75

PROPOSED POWERPLANT

WEIGHTING FACTOR: -.50
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	290.	1081.7	1035.1
95	840.	1081.7	1035.7
90	1120.	1081.7	1035.8
85	1350.	1081.7	1036.2
80	1580.	1081.7	1036.4
75	1775.	1081.7	1036.6
70	2030.	1081.7	1037.0
65	2260.	1081.7	1037.2
60	2500.	1081.7	1037.4
55	2620.	1081.7	1037.6
50	2950.	1081.7	1037.8
45	3180.	1081.7	1038.1
40	3450.	1081.7	1038.3
35	3780.	1081.7	1038.4
30	4160.	1081.7	1038.7
25	4650.	1081.7	1039.1
20	5375.	1081.7	1039.4
15	6540.	1081.7	1040.1
10	8400.	1081.7	1040.8
5	11800.	1081.7	1041.9
0	19500.	1081.7	1043.4

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	71813.	6817.	0	0	0	0	0	I	0
95	71813.	19514.	0	0	0	0	0	I	0
90	71813.	25625.	0	0	0	0	0	I	0
85	71813.	30454.	0	0	0	0	0	I	0
80	71813.	34960.	0	0	0	0	0	I	0
75	71813.	38556.	0	0	0	0	0	I	0
70	71813.	43009.	0	0	0	0	0	I	0
65	71813.	46697.	0	0	0	0	0	I	0
60	71813.	50257.	0	0	0	0	0	I	0
55	71813.	51930.	0	0	0	0	0	I	0
50	71813.	56001.	0	0	0	0	0	I	0
45	71813.	58626.	0	0	0	0	0	I	0
40	71813.	61328.	0	0	0	0	0	I	0
35	71813.	64181.	0	0	0	0	0	I	0
30	71813.	67076.	0	0	0	0	0	I	0
25	71813.	70233.	0	0	0	0	0	I	0
20	71813.	75202.	3388.	2066.	728.	1386.	1297.	.98	.98
15	71813.	83179.	11366.	7026.	1494.	4150.	4875.	1.24	1.40
10	71813.	91867.	20053.	12134.	2253.	7719.	10381.	1.22	1.18
5	71813.	100099.	28286.	16115.	3218.	13351.	20016.	.97	.60

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 40.9 FT.

DESIGN DISCHARGE: 3440. CFS.

DESIGN CAPACITY: 10381. KW.

DESIGN PERCENT EXCEEDANCE: 10

EQUIPMENT COST ($1000): 5146.

TOTAL COST ($1000): 7719.

SITE FACTOR: 1.50

35 YEARS BENEFIT-COST RATIO: 1.22

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 41.6 FT.

DESIGN DISCHARGE: 1580. CFS.

DESIGN CAPACITY: 4875. KW.

DESIGN PERCENT EXCEEDANCE: 15

EQUIPMENT COST ($1000): 2753.

TOTAL COST ($1000): 4150.

SITE FACTOR: 1.51

35 YEARS BENEFIT-COST RATIO: 1.24

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	71813.	6817.	0	0	0	0	0	I	0
95	71813.	19514.	0	0	0	0	0	I	0
90	71813.	25625.	0	0	0	0	0	I	0
85	71813.	30454.	0	0	0	0	0	I	0
80	71813.	34960.	0	0	0	0	0	I	0
75	71813.	38556.	0	0	0	0	0	I	0
70	71813.	43009.	0	0	0	0	0	I	0
65	71813.	46697.	0	0	0	0	0	I	0
60	71813.	50257.	0	0	0	0	0	I	0
55	71813.	51930.	0	0	0	0	0	I	0
50	71813.	56001.	0	0	0	0	0	I	0
45	71813.	58626.	0	0	0	0	0	I	0
40	71813.	61328.	0	0	0	0	0	I	0
35	71813.	64181.	0	0	0	0	0	I	0
30	71813.	67076.	0	0	0	0	0	I	0
25	71813.	70233.	0	0	0	0	0	I	0
20	71813.	75202.	3388.	2066.	728.	1386.	1297.	.98	.98
15	71813.	83179.	11366.	7026.	1494.	4129.	4875.	1.25	1.41
10	71813.	91867.	20053.	12134.	2253.	7719.	10381.	1.22	1.17
5	71813.	100099.	28286.	16115.	3218.	13351.	20016.	.97	.60

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 40.9 FT.

DESIGN DISCHARGE: 3440. CFS.

DESIGN CAPACITY: 10381. KW.

DESIGN PERCENT EXCEEDANCE: 10

EQUIPMENT COST ($1000): 5146.

TOTAL COST ($1000): 7719.

SITE FACTOR: 1.50

35 YEARS BENEFIT-COST RATIO: 1.22

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 41.6 FT.

DESIGN DISCHARGE: 1580. CFS.

DESIGN CAPACITY: 4875. KW.

DESIGN PERCENT EXCEEDANCE: 15

EQUIPMENT COST ($1000): 2753.

TOTAL COST ($1000): 4129.

SITE FACTOR: 1.50

35 YEARS BENEFIT-COST RATIO: 1.25

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	71813.	6817.	0	0	0	0	0	I	0
95	71813.	19514.	0	0	0	0	0	I	0
90	71813.	25625.	0	0	0	0	0	I	0
85	71813.	30454.	0	0	0	0	0	I	0
80	71813.	34960.	0	0	0	0	0	I	0
75	71813.	38556.	0	0	0	0	0	I	0
70	71813.	43009.	0	0	0	0	0	I	0
65	71813.	46697.	0	0	0	0	0	I	0
60	71813.	50257.	0	0	0	0	0	I	0
55	71813.	51930.	0	0	0	0	0	I	0
50	71813.	56001.	0	0	0	0	0	I	0
45	71813.	58626.	0	0	0	0	0	I	0
40	71813.	61328.	0	0	0	0	0	I	0
35	71813.	64181.	0	0	0	0	0	I	0
30	71813.	67076.	0	0	0	0	0	I	0
25	71813.	70233.	0	0	0	0	0	I	0
20	71813.	75202.	3388.	2066.	728.	1848.	1297.	.80	.80
15	71813.	83179.	11366.	7026.	1494.	5505.	4875.	1.00	1.12
10	71813.	91867.	20053.	12134.	2253.	10292.	10381.	.97	.92

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 41.6 FT.

DESIGN DISCHARGE: 1580. CFS.

DESIGN CAPACITY: 4875. KW.

DESIGN PERCENT EXCEEDANCE: 15

EQUIPMENT COST ($1000): 2753.

TOTAL COST ($1000): 5505.

SITE FACTOR:2.00

35 YEARS BENEFIT-COST RATIO: 1.00

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 41.6 FT.

DESIGN DISCHARGE: 1580. CFS.

DESIGN CAPACITY: 4875. KW.

DESIGN PERCENT EXCEEDANCE: 15

EQUIPMENT COST ($1000): 2753.

TOTAL COST ($1000): 5505.

SITE FACTOR:2.00

35 YEARS BENEFIT-COST RATIO: 1.00

CONCLUSION:THIS SITE HAS A GOOD HYDROPOWER FEASIBILITY !

SRU 2.410 UNTS.

RUN COMPLETE.

83/06/03. 13.50.04.
MNFTS   PROGRAM   HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: 0
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000):   0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

SITE NAME:LOCK AND DAM #2
SITE NUMBER:MN00594
RIVER NAME:MISSISSIPPI RIVER

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	750.	100.0	88.7
95	1800.	100.0	88.7
90	2500.	100.0	88.8
85	3000.	100.0	88.8
80	3400.	100.0	88.8
75	3800.	100.0	88.9
70	4000.	100.0	88.9
65	4400.	100.0	88.9
60	4800.	100.0	89.0
55	5400.	100.0	89.0
50	6000.	100.0	89.0
45	6800.	100.0	89.1
40	7600.	100.0	89.2
35	8800.	100.0	89.3
30	10000.	100.0	89.6
25	11800.	100.0	90.5
20	14200.	100.0	90.5
15	17300.	100.0	91.4
10	22500.	100.0	92.7
5	32000.	100.0	95.7
0	75000.	100.0	100.0

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	4521.	4521.	0	484.	3376.	610.	0	0
95	0	10663.	10663.	8453.	778.	6922.	1465.	1.10	1.10
90	0	14570.	14570.	11526.	925.	9024.	2017.	1.16	1.37
85	0	17152.	17152.	13541.	1022.	10479.	2420.	1.18	1.30
80	0	19077.	19077.	14935.	1094.	11612.	2743.	1.18	1.16
75	0	20936.	20936.	16410.	1156.	12667.	3038.	1.19	1.32
70	0	21761.	21761.	16876.	1189.	13212.	3198.	1.17	.81

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 11.1 FT.

DESIGN DISCHARGE: 3800. CFS.

DESIGN CAPACITY: 3038. KW.

DESIGN PERCENT EXCEEDANCE: 75

EQUIPMENT COST ($1000): 6334.

TOTAL COST ($1000): 12667.

SITE FACTOR:2.00

35 YEARS BENEFIT-COST RATIO: 1.19

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 11.1 FT.

DESIGN DISCHARGE: 3800. CFS.

DESIGN CAPACITY: 3038. KW.

DESIGN PERCENT EXCEEDANCE: 75

EQUIPMENT COST ($1000): 6334.

TOTAL COST ($1000): 12667.

SITE FACTOR:2.00

35 YEARS BENEFIT-COST RATIO: 1.19

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	4521.	4521.	0	484.	2532.	610.	0	0
95	0	10663.	10663.	8453.	778.	5192.	1465.	1.42	1.42
90	0	14570.	14570.	11526.	925.	6768.	2017.	1.50	1.78
85	0	17152.	17152.	13541.	1022.	7860.	2420.	1.52	1.70
80	0	19077.	19077.	14935.	1094.	8709.	2743.	1.52	1.51
75	0	20936.	20936.	16410.	1156.	9501.	3038.	1.54	1.73
70	0	21761.	21761.	16876.	1189.	9909.	3198.	1.52	1.06
65	0	23272.	23272.	17799.	1252.	10714.	3518.	1.49	1.06
60	0	24718.	24718.	19006.	1306.	11458.	3803.	1.49	1.51
55	0	26575.	26575.	20221.	1392.	12620.	4279.	1.44	.97

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 11.0 FT.

DESIGN DISCHARGE: 4800. CFS.

DESIGN CAPACITY: 3803. KW.

DESIGN PERCENT EXCEEDANCE: 60

EQUIPMENT COST ($1000): 7638.

TOTAL COST ($1000): 11458.

SITE FACTOR: 1.50

35 YEARS BENEFIT-COST RATIO: 1.49

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 11.1 FT.

DESIGN DISCHARGE: 3800. CFS.

DESIGN CAPACITY: 3038. KW.

DESIGN PERCENT EXCEEDANCE: 75

EQUIPMENT COST ($1000): 6334.

TOTAL COST ($1000): 9501.

SITE FACTOR: 1.50

35 YEARS BENEFIT-COST RATIO: 1.54

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	4521.	4521.	0	484.	5058.	610.	0	0
95	0	10663.	10663.	8453.	778.	9573.	1465.	.82	.82
90	0	14570.	14570.	11526.	925.	12131.	2017.	.88	1.14
85	0	17152.	17152.	13541.	1022.	13865.	2420.	.91	1.10
80	0	19077.	19077.	14935.	1094.	15197.	2743.	.92	.99
75	0	20936.	20936.	16410.	1156.	16433.	3038.	.93	1.14
70	0	21761.	21761.	16876.	1189.	17063.	3198.	.92	.70
65	0	23272.	23272.	17799.	1252.	18301.	3518.	.91	.71
60	0	24718.	24718.	19006.	1306.	19441.	3803.	.92	1.01
55	0	26575.	26575.	20221.	1392.	21200.	4279.	.90	.66
50	0	28224.	28224.	21237.	1474.	22909.	4754.	.87	.57
45	0	30220.	30220.	22625.	1570.	25300.	5339.	.84	.56
40	0	31947.	31947.	23532.	1659.	27596.	5913.	.80	.38
35	0	34104.	34104.	25072.	1788.	30986.	6783.	.77	.44
30	0	35995.	35995.	26023.	1887.	33953.	7492.	.73	.31
25	0	38575.	38575.	27335.	1965.	37269.	8075.	.70	.39
20	0	40618.	40618.	28392.	2173.	43379.	9717.	.62	.17
15	0	42814.	42814.	29568.	2292.	48673.	10717.	.58	.22
10	0	45008.	45008.	31352.	2419.	55902.	11832.	.54	.24
5	0	47007.	47007.	32318.	2197.	58187.	9912.	.54	.47
0	0	0	0	0	0	0	0	I	0

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION: THIS SITE HAS A MARGINAL HYDROPOWER FEASIBILITY !

SRU 2.510 UNTS.

RUN COMPLETE.

83/06/10. 13.28.02.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****

SITE NAME: THOMSON
SITE NUMBER: MN00604
RIVER NAME: SAINT LOUIS RIVER

EXISTING POWERPLANT

EXISTING CAPACITY: 68600. KW
DESIGN DISCHARGE: 3040. CFS
OVERALL EFFICIENCY: .75

PROPOSED POWERPLANT

WEIGHTING FACTOR: 1.00
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 12000.

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	200.	355.0	0
95	450.	355.0	0
90	600.	355.0	0
85	710.	355.0	0
80	820.	355.0	0
75	900.	355.0	0
70	980.	355.0	0
65	1050.	355.0	0
60	1110.	355.0	0
55	1200.	355.0	0
50	1300.	355.0	0
45	1400.	355.0	0
40	1510.	355.0	0
35	1660.	355.0	0
30	1850.	355.0	0
25	2200.	355.0	0
20	2750.	355.0	0
15	3600.	355.0	0
10	5100.	355.0	0
5	8150.	355.0	0
0	20000.	355.0	0

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	308636.	39531.	0	0	0	0	0	I	0
95	308636.	87710.	0	0	0	0	0	I	0
90	308636.	115135.	0	0	0	0	0	I	0
85	308636.	134160.	0	0	0	0	0	I	0
80	308636.	152097.	0	0	0	0	0	I	0
75	308636.	164352.	0	0	0	0	0	I	0
70	308636.	175816.	0	0	0	0	0	I	0
65	308636.	185155.	0	0	0	0	0	I	0
60	308636.	192567.	0	0	0	0	0	I	0
55	308636.	202796.	0	0	0	0	0	I	0
50	308636.	213173.	0	0	0	0	0	I	0
45	308636.	222562.	0	0	0	0	0	I	0
40	308636.	231802.	0	0	0	0	0	I	0
35	308636.	242920.	0	0	0	0	0	I	0
30	308636.	255125.	0	0	0	0	0	I	0
25	308636.	274150.	0	0	0	0	0	I	0
20	308636.	298610.	0	0	0	0	0	I	0
15	308636.	341456.	32820.	20393.	2683.	21436.	14324.	.85	.85
10	308636.	398584.	89948.	52435.	5442.	39452.	52682.	1.17	1.54
5	308636.	456987.	148351.	80674.	8912.	69822.	130676.	1.02	.83

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 355.0 FT.

DESIGN DISCHARGE: 2060. CFS.

DESIGN CAPACITY: 52682. KW.

DESIGN PERCENT EXCEEDANCE: 10

EQUIPMENT COST ($1000): 9151.

TOTAL COST ($1000): 39452.

SITE FACTOR: 4.31

35 YEARS BENEFIT-COST RATIO: 1.17

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 355.0 FT.

DESIGN DISCHARGE: 2060. CFS.

DESIGN CAPACITY: 52682. KW.

DESIGN PERCENT EXCEEDANCE: 10

EQUIPMENT COST ($1000): 9151.

TOTAL COST ($1000): 39452.

SITE FACTOR: 4.31

35 YEARS BENEFIT-COST RATIO: 1.17

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
**************.

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	308636.	39531.	0	0	0	0	0	I	0
95	308636.	87710.	0	0	0	0	0	I	0
90	308636.	115135.	0	0	0	0	0	I	0
85	308636.	134160.	0	0	0	0	0	I	0
80	308636.	152097.	0	0	0	0	0	I	0
75	308636.	164352.	0	0	0	0	0	I	0
70	308636.	175816.	0	0	0	0	0	I	0
65	308636.	185155.	0	0	0	0	0	I	0
60	308636.	192567.	0	0	0	0	0	I	0
55	308636.	202796.	0	0	0	0	0	I	0
50	308636.	213173.	0	0	0	0	0	I	0
45	308636.	222562.	0	0	0	0	0	I	0
40	308636.	231802.	0	0	0	0	0	I	0
35	308636.	242920.	0	0	0	0	0	I	0
30	308636.	255125.	0	0	0	0	0	I	0
25	308636.	274150.	0	0	0	0	0	I	0
20	308636.	298610.	0	0	0	0	0	I	0
15	308636.	341456.	32820.	20393.	2683.	19863.	14324.	.90	.90
10	308636.	398584.	89948.	52435.	5442.	34877.	52682.	1.30	1.80
5	308636.	456987.	148351.	80674.	8912.	60185.	130676.	1.17	.98

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 355.0 FT.

DESIGN DISCHARGE: 2060. CFS.

DESIGN CAPACITY: 52682. KW.

DESIGN PERCENT EXCEEDANCE: 10

EQUIPMENT COST ($1000): 9151.

TOTAL COST ($1000): 34877.

SITE FACTOR:3.81

35 YEARS BENEFIT-COST RATIO: 1.30

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 355.0 FT.

DESIGN DISCHARGE: 2060. CFS.

DESIGN CAPACITY: 52682. KW.

DESIGN PERCENT EXCEEDANCE: 10

EQUIPMENT COST ($1000): 9151.

TOTAL COST ($1000): 34877.

SITE FACTOR:3.81

35 YEARS BENEFIT-COST RATIO: 1.30

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	308636.	39531.	0	0	0	0	0	I	0
95	308636.	87710.	0	0	0	0	0	I	0
90	308636.	115135.	0	0	0	0	0	I	0
85	308636.	134160.	0	0	0	0	0	I	0
80	308636.	152097.	0	0	0	0	0	I	0
75	308636.	164352.	0	0	0	0	0	I	0
70	308636.	175816.	0	0	0	0	0	I	0
65	308636.	185155.	0	0	0	0	0	I	0
60	308636.	192567.	0	0	0	0	0	I	0
55	308636.	202796.	0	0	0	0	0	I	0
50	308636.	213173.	0	0	0	0	0	I	0
45	308636.	222562.	0	0	0	0	0	I	0
40	308636.	231802.	0	0	0	0	0	I	0
35	308636.	242920.	0	0	0	0	0	I	0
30	308636.	255125.	0	0	0	0	0	I	0
25	308636.	274150.	0	0	0	0	0	I	0
20	308636.	298610.	0	0	0	0	0	I	0
15	308636.	341456.	32820.	20393.	2683.	23008.	14324.	.79	.79
10	308636.	398584.	89948.	52435.	5442.	44027.	52682.	1.06	1.35
5	308636.	456987.	148351.	80674.	8912.	79459.	130676.	.91	.73

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 355.0 FT.

DESIGN DISCHARGE: 2060. CFS.

DESIGN CAPACITY: 52682. KW.

DESIGN PERCENT EXCEEDANCE: 10

EQUIPMENT COST ($1000): 9151.

TOTAL COST ($1000): 44027.

SITE FACTOR: 4.81

35 YEARS BENEFIT-COST RATIO: 1.06

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 355.0 FT.

DESIGN DISCHARGE: 2060. CFS.

DESIGN CAPACITY: 52682. KW.

DESIGN PERCENT EXCEEDANCE: 10

EQUIPMENT COST ($1000): 9151.

TOTAL COST ($1000): 44027.

SITE FACTOR: 4.81

35 YEARS BENEFIT-COST RATIO: 1.06

CONCLUSION: THIS SITE HAS A MARGINAL HYDROPOWER FEASIBILITY !

SRU 2.378 UNTS.

RUN COMPLETE.

83/05/25. 13.56.06.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .20
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

SITE NAME: RUM RIVER
SITE NUMBER: MN00549
RIVER NAME: RUM RIVER

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	30.	844.3	831.0
95	90.	844.4	831.0
90	110.	844.4	831.1
85	130.	844.4	831.1
80	145.	844.4	831.1
75	160.	844.4	831.1
70	190.	844.5	831.2
65	220.	844.5	831.2
60	250.	844.5	831.2
55	290.	844.6	831.3
50	330.	844.6	831.3
45	370.	844.6	831.3
40	420.	844.7	831.4
35	480.	844.7	831.5
30	550.	844.8	831.5
25	635.	844.9	831.6
20	760.	845.0	831.8
15	960.	845.2	832.0
10	1350.	845.5	832.2
5	2170.	846.1	833.4
0	3700.	847.0	834.7

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	237.	237.	0	92.	271.	29.	0	0
95	0	705.	705.	563.	167.	398.	86.	1.00	1.00
90	0	859.	859.	685.	186.	462.	105.	1.06	1.48
85	0	1002.	1002.	799.	203.	525.	124.	1.10	1.41
80	0	1103.	1103.	879.	216.	571.	138.	1.12	1.37
75	0	1196.	1196.	954.	227.	616.	152.	1.13	1.33
70	0	1376.	1376.	1098.	249.	700.	179.	1.16	1.36
65	0	1538.	1538.	1224.	269.	784.	208.	1.16	1.22
60	0	1687.	1687.	1343.	289.	865.	236.	1.16	1.18
55	0	1874.	1874.	1474.	312.	966.	272.	1.15	1.05
50	0	2040.	2040.	1589.	334.	1067.	309.	1.13	.93

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 13.0 FT.

DESIGN DISCHARGE: 290. CFS.

DESIGN CAPACITY: 272. KW.

DESIGN PERCENT EXCEEDANCE: 55

EQUIPMENT COST ($1000): 387.

TOTAL COST ($1000): 966.

SITE FACTOR:2.49

35 YEARS BENEFIT-COST RATIO: 1.15

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 13.1 FT.

DESIGN DISCHARGE: 250. CFS.

DESIGN CAPACITY: 236. KW.

DESIGN PERCENT EXCEEDANCE: 60

EQUIPMENT COST ($1000): 344.

TOTAL COST ($1000): 865.

SITE FACTOR:2.51

35 YEARS BENEFIT-COST RATIO: 1.16

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	237.	237.	0	92.	144.	29.	0	0
95	0	705.	705.	563.	167.	225.	86.	1.43	1.43
90	0	859.	859.	685.	186.	264.	105.	1.52	2.13
85	0	1002.	1002.	799.	203.	303.	124.	1.58	2.01
80	0	1103.	1103.	879.	216.	332.	138.	1.61	1.95
75	0	1196.	1196.	954.	227.	359.	152.	1.63	1.89
70	0	1376.	1376.	1098.	249.	412.	179.	1.66	1.94
65	0	1538.	1538.	1224.	269.	465.	208.	1.67	1.73
60	0	1687.	1687.	1343.	289.	516.	236.	1.67	1.67
55	0	1874.	1874.	1474.	312.	581.	272.	1.65	1.50
50	0	2040.	2040.	1589.	334.	646.	309.	1.62	1.31
45	0	2187.	2187.	1705.	356.	710.	346.	1.60	1.37
40	0	2356.	2356.	1787.	379.	784.	390.	1.54	.83

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 13.0 FT.

DESIGN DISCHARGE: 370. CFS.

DESIGN CAPACITY: 346. KW.

DESIGN PERCENT EXCEEDANCE: 45

EQUIPMENT COST ($1000): 473.

TOTAL COST ($1000): 710.

SITE FACTOR:1.50

35 YEARS BENEFIT-COST RATIO: 1.60

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 13.1 FT.

DESIGN DISCHARGE: 250. CFS.

DESIGN CAPACITY: 236. KW.

DESIGN PERCENT EXCEEDANCE: 60

EQUIPMENT COST ($1000): 344.

TOTAL COST ($1000): 516.

SITE FACTOR:1.50

35 YEARS BENEFIT-COST RATIO: 1.67

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	237.	237.	0	92.	469.	29.	0	0
95	0	705.	705.	563.	167.	641.	86.	.70	.70
90	0	859.	859.	685.	186.	736.	105.	.74	1.09
85	0	1002.	1002.	799.	203.	828.	124.	.78	1.04
80	0	1103.	1103.	879.	216.	893.	138.	.79	1.02
75	0	1196.	1196.	954.	227.	957.	152.	.81	.99
70	0	1376.	1376.	1098.	249.	1077.	179.	.83	1.02
65	0	1538.	1538.	1224.	269.	1194.	208.	.84	.92
60	0	1687.	1687.	1343.	289.	1306.	236.	.84	.90
55	0	1874.	1874.	1474.	312.	1445.	272.	.84	.81
50	0	2040.	2040.	1589.	334.	1582.	309.	.83	.72
45	0	2187.	2187.	1705.	356.	1715.	346.	.82	.76
40	0	2356.	2356.	1787.	379.	1870.	390.	.79	.46
35	0	2532.	2532.	1872.	406.	2048.	443.	.76	.41
30	0	2705.	2705.	1956.	437.	2254.	507.	.73	.35
25	0	2882.	2882.	2041.	471.	2488.	581.	.69	.32
20	0	3096.	3096.	2145.	515.	2808.	684.	.65	.28
15	0	3350.	3350.	2267.	579.	3292.	851.	.59	.22
10	0	3680.	3680.	2427.	691.	4163.	1177.	.50	.16
5	0	4075.	4075.	2618.	844.	5611.	1704.	.41	.12
0	0	4260.	4260.	2708.	1053.	7824.	2559.	.31	.04

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION:THIS SITE HAS A MARGINAL HYDROPOWER FEASIBILITY !

SRU 2.623 UNTS.

RUN COMPLETE.

83/05/24. 15.00.40.
MNFTS PROGRAM HYFEAS

SITE NAME: SAINT LOUIS RIVER
SITE NUMBER: MN00 94
RIVER NAME: SAINT LOUIS RIVER

INPUT DATA:
****

EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .70
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	30.	1320.1	1302.3
95	55.	1320.2	1302.4
90	75.	1320.3	1302.5
85	100.	1320.4	1302.7
80	115.	1320.4	1302.8
75	130.	1320.5	1302.8
70	145.	1320.5	1302.9
65	165.	1320.5	1303.0
60	185.	1320.6	1303.1
55	220.	1320.7	1303.3
50	260.	1320.8	1303.5
45	305.	1320.9	1303.6
40	360.	1321.0	1303.8
35	425.	1321.1	1304.0
30	515.	1321.2	1304.3
25	655.	1321.5	1304.7
20	880.	1321.8	1305.4
15	1140.	1322.1	1306.0
10	1510.	1322.5	1306.8
5	2110.	1323.1	1308.1
0	3700.	1324.5	1311.1

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	280.	280.	0	108.	409.	38.	0	0
95	0	511.	511.	407.	149.	502.	70.	.62	.62
90	0	696.	696.	553.	176.	623.	95.	.69	1.00
85	0	922.	922.	732.	205.	759.	125.	.76	1.09
80	0	1049.	1049.	832.	220.	835.	143.	.79	1.08
75	0	1165.	1165.	921.	235.	910.	162.	.80	.99
70	0	1276.	1276.	1003.	249.	980.	180.	.82	.98
65	0	1412.	1412.	1106.	266.	1071.	203.	.83	.95
60	0	1537.	1537.	1205.	282.	1158.	227.	.84	.96
55	0	1738.	1738.	1345.	308.	1303.	266.	.84	.82
50	0	1943.	1943.	1499.	335.	1459.	311.	.84	.84
45	0	2147.	2147.	1609.	364.	1629.	363.	.81	.55
40	0	2368.	2368.	1771.	396.	1822.	423.	.80	.72
35	0	2596.	2596.	1892.	431.	2039.	493.	.77	.48
30	0	2864.	2864.	2021.	473.	2319.	586.	.72	.40
25	0	3202.	3202.	2185.	532.	2723.	727.	.67	.35
20	0	3636.	3636.	2395.	608.	3298.	932.	.61	.32
15	0	3993.	3993.	2567.	685.	3902.	1158.	.56	.25
10	0	4319.	4319.	2725.	773.	4661.	1447.	.50	.19
5	0	4586.	4586.	2854.	876.	5693.	1824.	.43	.11
0	0	4737.	4737.	2927.	1017.	7645.	2399.	.34	.04

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	280.	280.	0	108.	241.	38.	0	0
95	0	511.	511.	407.	149.	307.	70.	.89	.89
90	0	696.	696.	553.	176.	388.	95.	.98	1.36
85	0	922.	922.	732.	205.	482.	125.	1.07	1.47
80	0	1049.	1049.	832.	220.	535.	143.	1.10	1.45
75	0	1165.	1165.	921.	235.	588.	162.	1.12	1.31
70	0	1276.	1276.	1003.	249.	638.	180.	1.13	1.30
65	0	1412.	1412.	1106.	266.	703.	203.	1.14	1.25
60	0	1537.	1537.	1205.	282.	765.	227.	1.15	1.25
55	0	1738.	1738.	1345.	308.	870.	266.	1.14	1.07
50	0	1943.	1943.	1499.	335.	984.	311.	1.14	1.09
45	0	2147.	2147.	1609.	364.	1111.	363.	1.09	.71

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 16.6 FT.

DESIGN DISCHARGE: 260. CFS.

DESIGN CAPACITY: 311. KW.

DESIGN PERCENT EXCEEDANCE: 50

EQUIPMENT COST ($1000): 397.

TOTAL COST ($1000): 984.

SITE FACTOR:2.48

35 YEARS BENEFIT-COST RATIO: 1.14

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 17.0 FT.

DESIGN DISCHARGE: 185. CFS.

DESIGN CAPACITY: 227. KW.

DESIGN PERCENT EXCEEDANCE: 60

EQUIPMENT COST ($1000): 304.

TOTAL COST ($1000): 765.

SITE FACTOR:2.52

35 YEARS BENEFIT-COST RATIO: 1.15

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	280.	280.	0	108.	577.	38.	0	0
95	0	511.	511.	407.	149.	697.	70.	.48	.48
90	0	696.	696.	553.	176.	857.	95.	.54	.79
85	0	922.	922.	732.	205.	1035.	125.	.59	.86
80	0	1049.	1049.	832.	220.	1135.	143.	.61	.86
75	0	1165.	1165.	921.	235.	1232.	162.	.63	.79
70	0	1276.	1276.	1003.	249.	1323.	180.	.64	.79
65	0	1412.	1412.	1106.	266.	1440.	203.	.65	.77
60	0	1537.	1537.	1205.	282.	1552.	227.	.66	.77
55	0	1738.	1738.	1345.	308.	1736.	266.	.66	.67
50	0	1943.	1943.	1499.	335.	1933.	311.	.66	.68
45	0	2147.	2147.	1609.	364.	2147.	363.	.64	.45
40	0	2368.	2368.	1771.	396.	2389.	423.	.64	.59
35	0	2596.	2596.	1892.	431.	2659.	493.	.61	.40
30	0	2864.	2864.	2021.	473.	3004.	586.	.58	.33
25	0	3202.	3202.	2185.	532.	3499.	727.	.54	.30
20	0	3636.	3636.	2395.	608.	4197.	932.	.50	.27
15	0	3993.	3993.	2567.	685.	4922.	1158.	.46	.22
10	0	4319.	4319.	2725.	773.	5826.	1447.	.41	.16
5	0	4586.	4586.	2854.	876.	7047.	1824.	.36	.10
0	0	4737.	4737.	2927.	1017.	9349.	2399.	.28	.03

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION:THIS SITE HAS A MARGINAL HYDROPOWER FEASIBILITY !

SRU 2.862 UNTS.

RUN COMPLETE.

83/06/10. 11.19.25.
MNFTS   PROGRAM   HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

SITE NAME:ELK RIVER
SITE NUMBER:MN00516
RIVER NAME:ELK RIVER

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: 0
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000):   0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	10.	871.3	855.3
95	55.	871.3	856.0
90	70.	871.3	856.2
85	78.	871.3	856.3
80	90.	871.3	856.4
75	100.	871.3	856.4
70	110.	871.3	856.5
65	120.	871.3	856.6
60	130.	871.3	856.7
55	142.	871.3	856.8
50	157.	871.3	856.8
45	173.	871.3	856.9
40	190.	871.3	857.0
35	212.	871.3	857.2
30	240.	871.3	857.3
25	273.	871.3	857.5
20	320.	871.3	857.7
15	395.	871.3	858.0
10	515.	871.3	858.5
5	800.	871.3	859.5
0	1870.	871.3	861.7

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	75.	75.	0	56.	180.	12.	0	0
95	0	420.	420.	333.	138.	214.	61.	.95	.95
90	0	538.	538.	426.	156.	259.	76.	1.02	1.46
85	0	600.	600.	472.	165.	282.	84.	1.06	1.46
80	0	686.	686.	540.	178.	316.	97.	1.09	1.44
75	0	752.	752.	591.	188.	345.	107.	1.11	1.31
70	0	815.	815.	641.	197.	372.	117.	1.13	1.37
65	0	873.	873.	685.	206.	398.	127.	1.13	1.27
60	0	928.	928.	724.	215.	424.	137.	1.13	1.14
55	0	987.	987.	769.	224.	454.	148.	1.13	1.11
50	0	1052.	1052.	816.	237.	493.	164.	1.12	.92

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 14.5 FT.

DESIGN DISCHARGE: 142. CFS.

DESIGN CAPACITY: 148. KW.

DESIGN PERCENT EXCEEDANCE: 55

EQUIPMENT COST ($1000): 227.

TOTAL COST ($1000): 454.

SITE FACTOR: 2.00

35 YEARS BENEFIT-COST RATIO: 1.13

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 14.6 FT.

DESIGN DISCHARGE: 130. CFS.

DESIGN CAPACITY: 137. KW.

DESIGN PERCENT EXCEEDANCE: 60

EQUIPMENT COST ($1000): 212.

TOTAL COST ($1000): 424.

SITE FACTOR: 2.00

35 YEARS BENEFIT-COST RATIO: 1.13

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	75.	75.	0	56.	135.	12.	0	0
95	0	420.	420.	333.	138.	160.	61.	1.12	1.12
90	0	538.	538.	426.	156.	194.	76.	1.21	1.78
85	0	600.	600.	472.	165.	212.	84.	1.25	1.79
80	0	686.	686.	540.	178.	237.	97.	1.30	1.77
75	0	752.	752.	591.	188.	259.	107.	1.32	1.61
70	0	815.	815.	641.	197.	279.	117.	1.35	1.69
65	0	873.	873.	685.	206.	299.	127.	1.36	1.56
60	0	928.	928.	724.	215.	318.	137.	1.36	1.41
55	0	987.	987.	769.	224.	341.	148.	1.36	1.37
50	0	1052.	1052.	816.	237.	370.	164.	1.35	1.14
45	0	1116.	1116.	850.	249.	399.	179.	1.31	.83

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 14.5 FT.

DESIGN DISCHARGE: 157. CFS.

DESIGN CAPACITY: 164. KW.

DESIGN PERCENT EXCEEDANCE: 50

EQUIPMENT COST ($1000): 247.

TOTAL COST ($1000): 370.

SITE FACTOR: 1.50

35 YEARS BENEFIT-COST RATIO: 1.35

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 14.5 FT.

DESIGN DISCHARGE: 142. CFS.

DESIGN CAPACITY: 148. KW.

DESIGN PERCENT EXCEEDANCE: 55

EQUIPMENT COST ($1000): 227.

TOTAL COST ($1000): 341.

SITE FACTOR: 1.50

35 YEARS BENEFIT-COST RATIO: 1.36

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	75.	75.	0	56.	403.	12.	0	0
95	0	420.	420.	333.	138.	402.	61.	.62	.62
90	0	538.	538.	426.	156.	476.	76.	.67	1.01
85	0	600.	600.	472.	165.	513.	84.	.70	1.02
80	0	686.	686.	540.	178.	567.	97.	.73	1.01
75	0	752.	752.	591.	188.	612.	107.	.74	.93
70	0	815.	815.	641.	197.	654.	117.	.75	.97
65	0	873.	873.	685.	206.	694.	127.	.76	.90
60	0	928.	928.	724.	215.	733.	137.	.76	.81
55	0	987.	987.	769.	224.	780.	148.	.77	.79
50	0	1052.	1052.	816.	237.	838.	164.	.76	.67
45	0	1116.	1116.	850.	249.	897.	179.	.74	.49
40	0	1176.	1176.	896.	261.	957.	196.	.74	.63
35	0	1246.	1246.	933.	275.	1030.	215.	.72	.43
30	0	1319.	1319.	970.	293.	1124.	242.	.68	.33
25	0	1394.	1394.	1020.	311.	1227.	271.	.66	.41
20	0	1477.	1477.	1070.	337.	1369.	313.	.63	.30
15	0	1579.	1579.	1119.	373.	1581.	378.	.57	.20
10	0	1693.	1693.	1174.	422.	1889.	475.	.51	.15
5	0	1848.	1848.	1249.	513.	2523.	680.	.41	.10
0	0	2022.	2022.	1333.	727.	4332.	1293.	.26	.04

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION:THIS SITE HAS A MARGINAL HYDROPOWER FEASIBILITY !

SRU 2.577 UNTS.

RUN COMPLETE.

83/05/25. 14.57.16.
MNFTS PROGRAM HYFEAS

SITE NAME: WINNIBIGOSHISH DAM
SITE NUMBER: MN00586
RIVER NAME: MISSISSIPPI RIVER

INPUT DATA:
****

EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .30
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	45.	1300.5	1283.2
95	100.	1300.5	1283.7
90	105.	1300.5	1283.8
85	108.	1300.5	1283.8
80	115.	1300.5	1283.9
75	145.	1300.5	1284.2
70	220.	1300.5	1284.8
65	280.	1300.5	1285.3
60	330.	1300.5	1285.7
55	435.	1300.5	1286.8
50	505.	1300.5	1286.9
45	615.	1300.5	1287.2
40	715.	1300.5	1287.6
35	790.	1300.5	1287.8
30	850.	1300.5	1287.9
25	895.	1300.5	1288.0
20	940.	1300.5	1288.1
15	985.	1300.5	1288.2
10	1050.	1300.5	1288.3
5	1150.	1300.5	1288.5
0	1950.	1300.5	1289.2

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	366.	366.	0	132.	295.	56.	0	0
95	0	811.	811.	615.	201.	530.	121.	.84	.84
90	0	850.	850.	646.	206.	548.	126.	.86	1.33
85	0	871.	871.	662.	209.	560.	130.	.86	1.12
80	0	918.	918.	701.	215.	585.	138.	.88	1.21
75	0	1104.	1104.	853.	242.	691.	170.	.91	1.15
70	0	1536.	1536.	1186.	297.	931.	249.	.97	1.13
65	0	1863.	1863.	1446.	333.	1102.	307.	1.01	1.26
60	0	2117.	2117.	1648.	359.	1233.	352.	1.04	1.28
55	0	2637.	2637.	2054.	399.	1472.	429.	1.10	1.45
50	0	2925.	2925.	2285.	431.	1642.	495.	1.10	1.14
45	0	3344.	3344.	2567.	474.	1889.	589.	1.09	.98

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 13.6 FT.

DESIGN DISCHARGE: 505. CFS.

DESIGN CAPACITY: 495. KW.

DESIGN PERCENT EXCEEDANCE: 50

EQUIPMENT COST ($1000): 624.

TOTAL COST ($1000): 1642.

SITE FACTOR:2.63

35 YEARS BENEFIT-COST RATIO: 1.10

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 13.6 FT.

DESIGN DISCHARGE: 505. CFS.

DESIGN CAPACITY: 495. KW.

DESIGN PERCENT EXCEEDANCE: 50

EQUIPMENT COST ($1000): 624.

TOTAL COST ($1000): 1642.

SITE FACTOR:2.63

35 YEARS BENEFIT-COST RATIO: 1.10

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	366.	366.	0	132.	144.	56.	0	0
95	0	811.	811.	615.	201.	274.	121.	1.30	1.30
90	0	850.	850.	646.	206.	284.	126.	1.32	2.04
85	0	871.	871.	662.	209.	291.	130.	1.33	1.70
80	0	918.	918.	701.	215.	305.	138.	1.35	1.85
75	0	1104.	1104.	853.	242.	366.	170.	1.40	1.74
70	0	1536.	1536.	1186.	297.	506.	249.	1.48	1.70
65	0	1863.	1863.	1446.	333.	616.	307.	1.52	1.78
60	0	2117.	2117.	1648.	359.	704.	352.	1.55	1.78
55	0	2637.	2637.	2054.	399.	864.	429.	1.63	2.02
50	0	2925.	2925.	2285.	431.	984.	495.	1.61	1.52
45	0	3344.	3344.	2567.	474.	1159.	589.	1.57	1.29
40	0	3699.	3699.	2787.	506.	1303.	664.	1.54	1.25
35	0	3931.	3931.	2899.	530.	1412.	723.	1.49	.84

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 12.9 FT.

DESIGN DISCHARGE: 715. CFS.

DESIGN CAPACITY: 664. KW.

DESIGN PERCENT EXCEEDANCE: 40

EQUIPMENT COST ($1000): 809.

TOTAL COST ($1000): 1303.

SITE FACTOR: 1.61

35 YEARS BENEFIT-COST RATIO: 1.54

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 13.7 FT.

DESIGN DISCHARGE: 435. CFS.

DESIGN CAPACITY: 429. KW.

DESIGN PERCENT EXCEEDANCE: 55

EQUIPMENT COST ($1000): 554.

TOTAL COST ($1000): 864.

SITE FACTOR: 1.56

35 YEARS BENEFIT-COST RATIO: 1.63

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	366.	366.	0	132.	467.	56.	0	0
95	0	811.	811.	615.	201.	804.	121.	.61	.61
90	0	850.	850.	646.	206.	830.	126.	.62	1.00
85	0	871.	871.	662.	209.	847.	130.	.63	.85
80	0	918.	918.	701.	215.	882.	138.	.64	.92
75	0	1104.	1104.	853.	242.	1030.	170.	.67	.87
70	0	1536.	1536.	1186.	297.	1357.	249.	.72	.87
65	0	1863.	1863.	1446.	333.	1587.	307.	.75	.98
60	0	2117.	2117.	1648.	359.	1762.	352.	.78	1.00
55	0	2637.	2637.	2054.	399.	2079.	429.	.83	1.14
50	0	2925.	2925.	2285.	431.	2301.	495.	.84	.91
45	0	3344.	3344.	2567.	474.	2618.	589.	.83	.78
40	0	3699.	3699.	2787.	506.	2877.	664.	.82	.76
35	0	3931.	3931.	2899.	530.	3067.	723.	.81	.52
30	0	4087.	4087.	2975.	549.	3219.	771.	.79	.44
25	0	4188.	4188.	3024.	562.	3327.	806.	.78	.40
20	0	4271.	4271.	3064.	575.	3433.	840.	.76	.34
15	0	4335.	4335.	3095.	587.	3537.	873.	.75	.27
10	0	4399.	4399.	3126.	605.	3688.	923.	.73	.18
5	0	4459.	4459.	3155.	630.	3906.	994.	.70	.12
0	0	4608.	4608.	3227.	813.	5528.	1587.	.51	.04

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION:THIS SITE HAS A MARGINAL HYDROPOWER FEASIBILITY !

SRU 2.714 UNTS.

83/06/03. 14.11.22.
MNFTS PROGRAM HYFEAS

SITE NAME:LOCK AND DAM #7
SITE NUMBER:MN00587
RIVER NAME:MISSISSIPPI RIVER

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .30
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	5000.	639.0	631.1
95	8500.	639.0	631.2
90	9750.	639.0	631.2
85	10600.	639.0	631.2
80	11500.	639.0	631.2
75	12500.	639.0	631.2
70	13400.	639.0	631.2
65	14250.	639.0	631.3
60	15200.	639.0	631.3
55	16200.	639.0	631.3
50	17400.	639.0	631.4
45	19200.	639.0	631.4
40	21250.	639.0	631.5
35	24000.	639.0	631.8
30	27500.	639.0	632.2
25	32000.	639.0	632.6
20	37500.	639.0	633.4
15	44500.	639.0	634.3
10	55100.	639.0	635.6
5	73500.	639.0	637.6
0	100000.	640.0	639.6

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	19813.	19813.	0	1116.	15992.	2845.	0	0
95	0	33451.	33451.	26512.	1478.	23861.	4776.	1.05	1.05
90	0	37970.	37970.	29977.	1592.	26726.	5478.	1.06	1.16
85	0	40834.	40834.	32092.	1666.	28622.	5956.	1.06	1.07
80	0	43645.	43645.	34070.	1741.	30600.	6461.	1.05	.96

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 7.8 FT.

DESIGN DISCHARGE: 10600. CFS.

DESIGN CAPACITY: 5956. KW.

DESIGN PERCENT EXCEEDANCE: 85

EQUIPMENT COST ($1000):12444.

TOTAL COST ($1000): 28622.

SITE FACTOR:2.30

35 YEARS BENEFIT-COST RATIO: 1.06

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 7.8 FT.

DESIGN DISCHARGE: 10600. CFS.

DESIGN CAPACITY: 5956. KW.

DESIGN PERCENT EXCEEDANCE: 85

EQUIPMENT COST ($1000):12444.

TOTAL COST ($1000): 28622.

SITE FACTOR:2.30

35 YEARS BENEFIT-COST RATIO: 1.06

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	19813.	19813.	0	1116.	11873.	2845.	0	0
95	0	33451.	33451.	26512.	1478.	18704.	4776.	1.31	1.31
90	0	37970.	37970.	29977.	1592.	20916.	5478.	1.33	1.49
85	0	40834.	40834.	32092.	1666.	22400.	5956.	1.33	1.36
80	0	43645.	43645.	34070.	1741.	23948.	6461.	1.33	1.22
75	0	46523.	46523.	36035.	1822.	25642.	7023.	1.31	1.11
70	0	48891.	48891.	37627.	1892.	27147.	7529.	1.30	1.01
65	0	51139.	51139.	39378.	1943.	28378.	7904.	1.30	1.37
60	0	53189.	53189.	40530.	2012.	29921.	8431.	1.27	.72

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 7.7 FT.

DESIGN DISCHARGE: 14250. CFS.

DESIGN CAPACITY: 7904. KW.

DESIGN PERCENT EXCEEDANCE: 65

EQUIPMENT COST ($1000):15766.

TOTAL COST ($1000): 28378.

SITE FACTOR:1.80

35 YEARS BENEFIT-COST RATIO: 1.30

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 7.8 FT.

DESIGN DISCHARGE: 10600. CFS.

DESIGN CAPACITY: 5956. KW.

DESIGN PERCENT EXCEEDANCE: 85

EQUIPMENT COST ($1000):12444.

TOTAL COST ($1000): 22400.

SITE FACTOR:1.80

35 YEARS BENEFIT-COST RATIO: 1.33

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	19813.	19813.	0	1116.	20111.	2845.	0	0
95	0	33451.	33451.	26512.	1478.	29019.	4776.	.87	.87
90	0	37970.	37970.	29977.	1592.	32536.	5478.	.88	.95
85	0	40834.	40834.	32092.	1666.	34844.	5956.	.88	.89
80	0	43645.	43645.	34070.	1741.	37252.	6461.	.87	.80
75	0	46523.	46523.	36035.	1822.	39888.	7023.	.86	.72
70	0	48891.	48891.	37627.	1892.	42228.	7529.	.85	.66
65	0	51139.	51139.	39378.	1943.	44144.	7904.	.85	.89
60	0	53189.	53189.	40530.	2012.	46543.	8431.	.83	.47
55	0	55104.	55104.	42105.	2083.	49039.	8986.	.82	.61
50	0	57301.	57301.	43640.	2150.	51680.	9526.	.81	.57
45	0	59899.	59899.	45100.	2268.	56025.	10511.	.77	.33
40	0	62536.	62536.	47151.	2379.	60507.	11480.	.75	.45
35	0	65699.	65699.	49078.	2486.	65586.	12447.	.72	.37
30	0	68998.	68998.	51253.	2595.	71388.	13470.	.69	.37
25	0	72154.	72154.	53192.	2726.	78563.	14753.	.65	.27
20	0	75318.	75318.	54974.	2764.	84032.	15127.	.63	.32
15	0	77993.	77993.	57246.	2758.	89050.	15066.	.62	.45
10	0	80333.	80333.	58531.	2598.	91124.	13495.	.62	.67
5	0	82017.	82017.	59876.	1876.	76055.	7412.	.77	-.09
0	0	0	0	0	0	0	0	I	0

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION: THIS SITE HAS A MARGINAL HYDROPOWER FEASIBILITY !

SRU 2.365 UNTS.

RUN COMPLETE.

83/05/25. 13.37.24.
MNFTS PROGRAM HYFEAS

SITE NAME:BRAINERD
SITE NUMBER:MN00597
RIVER NAME:MISSISSIPPI RIVER

INPUT DATA:
****
EXISTING POWERPLANT

EXISTING CAPACITY: 3700. KW
DESIGN DISCHARGE: 3080. CFS
OVERALL EFFICIENCY: .75

PROPOSED POWERPLANT

WEIGHTING FACTOR: -.50
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

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PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	250.	100.0	78.5
95	900.	100.0	79.0
90	1130.	100.0	79.2
85	1300.	100.0	79.4
80	1450.	100.0	79.6
75	1650.	100.0	79.8
70	1850.	100.0	80.0
65	2050.	100.0	80.2
60	2250.	100.0	80.4
55	2400.	100.0	80.6
50	2590.	100.0	80.8
45	2790.	100.0	81.0
40	3030.	100.0	81.2
35	3330.	100.0	81.5
30	3700.	100.0	81.7
25	4110.	100.0	82.0
20	4660.	100.0	82.5
15	5500.	100.0	83.0
10	6900.	100.0	84.0
5	9050.	100.0	85.5
0	15500.	100.0	88.5

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	23064.	2449.	0	0	0	0	0	I	0
95	23064.	8724.	0	0	0	0	0	I	0
90	23064.	10849.	0	0	0	0	0	I	0
85	23064.	12346.	0	0	0	0	0	I	0
80	23064.	13596.	0	0	0	0	0	I	0
75	23064.	15142.	0	0	0	0	0	I	0
70	23064.	16587.	0	0	0	0	0	I	0
65	23064.	17929.	0	0	0	0	0	I	0
60	23064.	19168.	0	0	0	0	0	I	0
55	23064.	20036.	0	0	0	0	0	I	0
50	23064.	21019.	0	0	0	0	0	I	0
45	23064.	21948.	0	0	0	0	0	I	0
40	23064.	22925.	0	0	0	0	0	I	0
35	23064.	24318.	1255.	759.	369.	664.	372.	.73	.73
30	23064.	25882.	2819.	1946.	588.	1345.	875.	1.01	1.32
25	23064.	27436.	4373.	2893.	765.	2014.	1420.	1.04	1.12
20	23064.	29195.	6131.	3976.	951.	2825.	2121.	1.05	1.09
15	23064.	31204.	8141.	5256.	1176.	3932.	3135.	1.03	.96

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 17.5 FT.

DESIGN DISCHARGE: 1580. CFS.

DESIGN CAPACITY: 2121. KW.

DESIGN PERCENT EXCEEDANCE: 20

EQUIPMENT COST ($1000): 1884.

TOTAL COST ($1000): 2825.

SITE FACTOR: 1.50

35 YEARS BENEFIT-COST RATIO: 1.05

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 17.5 FT.

DESIGN DISCHARGE: 1580. CFS.

DESIGN CAPACITY: 2121. KW.

DESIGN PERCENT EXCEEDANCE: 20

EQUIPMENT COST ($1000): 1884.

TOTAL COST ($1000): 2825.

SITE FACTOR: 1.50

35 YEARS BENEFIT-COST RATIO: 1.05

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	23064.	2449.	0	0	0	0	0	I	0
95	23064.	8724.	0	0	0	0	0	I	0
90	23064.	10849.	0	0	0	0	0	I	0
85	23064.	12346.	0	0	0	0	0	I	0
80	23064.	13596.	0	0	0	0	0	I	0
75	23064.	15142.	0	0	0	0	0	I	0
70	23064.	16587.	0	0	0	0	0	I	0
65	23064.	17929.	0	0	0	0	0	I	0
60	23064.	19168.	0	0	0	0	0	I	0
55	23064.	20036.	0	0	0	0	0	I	0
50	23064.	21019.	0	0	0	0	0	I	0
45	23064.	21948.	0	0	0	0	0	I	0
40	23064.	22925.	0	0	0	0	0	I	0
35	23064.	24318.	1255.	759.	369.	664.	372.	.73	.73
30	23064.	25882.	2819.	1946.	588.	1345.	875.	1.01	1.32
25	23064.	27436.	4373.	2893.	765.	2014.	1420.	1.04	1.12
20	23064.	29195.	6131.	3976.	951.	2825.	2121.	1.05	1.09
15	23064.	31204.	8141.	5256.	1176.	3932.	3135.	1.03	.96

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 17.5 FT.

DESIGN DISCHARGE: 1580. CFS.

DESIGN CAPACITY: 2121. KW.

DESIGN PERCENT EXCEEDANCE: 20

EQUIPMENT COST ($1000): 1884.

TOTAL COST ($1000): 2825.

SITE FACTOR: 1.50

35 YEARS BENEFIT-COST RATIO: 1.05

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 17.5 FT.

DESIGN DISCHARGE: 1580. CFS.

DESIGN CAPACITY: 2121. KW.

DESIGN PERCENT EXCEEDANCE: 20

EQUIPMENT COST ($1000): 1884.

TOTAL COST ($1000): 2825.

SITE FACTOR: 1.50

35 YEARS BENEFIT-COST RATIO: 1.05

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	23064.	2449.	0	0	0	0	0	I	0
95	23064.	8724.	0	0	0	0	0	I	0
90	23064.	10849.	0	0	0	0	0	I	0
85	23064.	12346.	0	0	0	0	0	I	0
80	23064.	13596.	0	0	0	0	0	I	0
75	23064.	15142.	0	0	0	0	0	I	0
70	23064.	16587.	0	0	0	0	0	I	0
65	23064.	17929.	0	0	0	0	0	I	0
60	23064.	19168.	0	0	0	0	0	I	0
55	23064.	20036.	0	0	0	0	0	I	0
50	23064.	21019.	0	0	0	0	0	I	0
45	23064.	21948.	0	0	0	0	0	I	0
40	23064.	22925.	0	0.	0	0	0	I	0
35	23064.	24318.	1255.	759.	369.	886.	372.	.60	.60
30	23064.	25882.	2819.	1946.	588.	1794.	875.	.82	1.05
25	23064.	27436.	4373.	2893.	765.	2685.	1420.	.84	.89
20	23064.	29195.	6131.	3976.	951.	3767.	2121.	.84	.85
15	23064.	31204.	8141.	5256.	1176.	5243.	3135.	.82	.75
10	23064.	33425.	10361.	6629.	1457.	7403.	4653.	.75	.56
5	23064.	35296.	12232.	7533.	1760.	10191.	6588.	.63	.29
0	23064.	36906.	13843.	8312.	2300.	16555.	10784.	.44	.11

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION:THIS SITE HAS A MARGINAL HYDROPOWER FEASIBILITY !

SRU 2.467 UNTS.

RUN COMPLETE.

83/06/20. 16.04.29.
MNFTS PROGRAM HYFEAS

SITE NAME:SHADY LAKE
SITE NUMBER:MN00365
RIVER NAME:MIDDLE FORK ZUMBRO RIVER

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .20
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	0	950.0	930.0
95	30.	950.0	930.0
90	42.	950.0	930.0
85	47.	950.0	930.0
80	54.	950.0	930.0
75	59.	950.0	930.0
70	65.	950.0	930.0
65	70.	950.0	930.0
60	75.	950.0	930.0
55	80.	950.0	930.0
50	87.	950.0	930.1
45	97.	950.0	930.1
40	107.	950.0	930.1
35	122.	950.0	930.1
30	141.	950.0	930.2
25	167.	950.0	930.3
20	203.	950.0	930.4
15	252.	950.0	930.5
10	330.	950.0	930.7
5	520.	950.0	931.0
0	1100.	950.0	932.0

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	334.	334.	267.	115.	229.	43.	.77	.77
90	0	468.	468.	373.	138.	263.	61.	.93	1.88
85	0	522.	522.	416.	147.	287.	68.	.96	1.34
80	0	594.	594.	473.	158.	319.	78.	.99	1.29
75	0	642.	642.	510.	166.	341.	85.	1.01	1.24
70	0	695.	695.	552.	175.	367.	94.	1.02	1.19
65	0	737.	737.	584.	182.	389.	101.	1.02	1.13
60	0	775.	775.	613.	189.	410.	108.	1.02	1.03
55	0	810.	810.	640.	196.	430.	115.	1.02	.98

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 20.0 FT.

DESIGN DISCHARGE: 75. CFS.

DESIGN CAPACITY: 108. KW.

DESIGN PERCENT EXCEEDANCE: 60

EQUIPMENT COST ($1000): 156.

TOTAL COST ($1000): 410.

SITE FACTOR:2.62

35 YEARS BENEFIT-COST RATIO: 1.02

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 20.0 FT.

DESIGN DISCHARGE: 75. CFS.

DESIGN CAPACITY: 108. KW.

DESIGN PERCENT EXCEEDANCE: 60

EQUIPMENT COST ($1000): 156.

TOTAL COST ($1000): 410.

SITE FACTOR:2.62

35 YEARS BENEFIT-COST RATIO: 1.02

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	334.	334.	267.	115.	125.	43.	1.11	1.11
90	0	468.	468.	373.	138.	146.	61.	1.32	2.42
85	0	522.	522.	416.	147.	160.	68.	1.36	1.90
80	0	594.	594.	473.	158.	179.	78.	1.40	1.83
75	0	642.	642.	510.	166.	193.	85.	1.42	1.76
70	0	695.	695.	552.	175.	209.	94.	1.44	1.68
65	0	737.	737.	584.	182.	222.	101.	1.45	1.60
60	0	775.	775.	613.	189.	235.	108.	1.45	1.45
55	0	810.	810.	640.	196.	247.	115.	1.44	1.38
50	0	857.	857.	674.	204.	264.	125.	1.44	1.33
45	0	915.	915.	709.	217.	289.	139.	1.40	.94

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 19.9 FT.

DESIGN DISCHARGE: 87. CFS.

DESIGN CAPACITY: 125. KW.

DESIGN PERCENT EXCEEDANCE: 50

EQUIPMENT COST ($1000): 176.

TOTAL COST ($1000): 264.

SITE FACTOR:1.50

35 YEARS BENEFIT-COST RATIO: 1.44

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 20.0 FT.

DESIGN DISCHARGE: 70. CFS.

DESIGN CAPACITY: 101. KW.

DESIGN PERCENT EXCEEDANCE: 65

EQUIPMENT COST ($1000): 148.

TOTAL COST ($1000): 222.

SITE FACTOR:1.50

35 YEARS BENEFIT-COST RATIO: 1.45

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	334.	334.	267.	115.	387.	43.	.53	.53
90	0	468.	468.	373.	138.	434.	61.	.65	1.52
85	0	522.	522.	416.	147.	470.	68.	.68	.98
80	0	594.	594.	473.	158.	517.	78.	.70	.95
75	0	642.	642.	510.	166.	551.	85.	.71	.91
70	0	695.	695.	552.	175.	589.	94.	.72	.88
65	0	737.	737.	584.	182.	621.	101.	.73	.84
60	0	775.	775.	613.	189.	651.	108.	.73	.76
55	0	810.	810.	640.	196.	681.	115.	.73	.73
50	0	857.	857.	674.	204.	721.	125.	.73	.70
45	0	915.	915.	709.	217.	778.	139.	.71	.50
40	0	967.	967.	741.	228.	834.	153.	.70	.48
35	0	1035.	1035.	774.	245.	914.	175.	.67	.34
30	0	1111.	1111.	811.	265.	1010.	201.	.64	.32
25	0	1198.	1198.	853.	289.	1135.	237.	.60	.28
20	0	1296.	1296.	901.	321.	1300.	287.	.56	.24
15	0	1400.	1400.	951.	360.	1511.	354.	.51	.20
10	0	1517.	1517.	1007.	414.	1820.	459.	.45	.16
5	0	1685.	1685.	1089.	526.	2493.	712.	.36	.10
0	0	1854.	1854.	1170.	767.	4151.	1426.	.24	.04

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION:THIS SITE HAS A MARGINAL HYDROPOWER FEASIBILITY !

SRU 2.561 UNTS.

RUN COMPLETE.

83/05/13. 12.38.08.
MNFTS PROGRAM HYFEAS

SITE NAME: WINTON
SITE NUMBER: MN00607
RIVER NAME: KAWISHIWI RIVER

INPUT DATA:
****
EXISTING POWERPLANT

EXISTING CAPACITY: 5000. KW
DESIGN DISCHARGE: 1140. CFS
OVERALL EFFICIENCY: .75

PROPOSED POWERPLANT

WEIGHTING FACTOR: -.50
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 256.

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	0	1388.0	1318.0
95	100.	1388.0	1318.1
90	180.	1388.0	1318.2
85	230.	1388.0	1318.2
80	275.	1388.0	1318.3
75	320.	1388.0	1318.3
70	360.	1388.0	1318.4
65	405.	1388.0	1318.4
60	450.	1388.0	1318.5
55	500.	1388.0	1318.5
50	555.	1388.0	1318.5
45	620.	1388.0	1318.7
40	690.	1388.0	1318.7
35	775.	1388.0	1318.8
30	895.	1388.0	1319.0
25	1050.	1388.0	1319.1
20	1250.	1388.0	1319.3
15	1675.	1388.0	1319.5
10	2345.	1388.0	1320.0
5	3560.	1388.0	1320.6
0	9500.	1388.0	1323.2

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	23888.	0	0	0	0	0	0	I	0
95	23888.	3729.	0	0	0	0	0	I	0
90	23888.	6562.	0	0	0	0	0	I	0
85	23888.	8233.	0	0	0	0	0	I	0
80	23888.	9656.	0	0	0	0	0	I	0
75	23888.	10987.	0	0	0	0	0	I	0
70	23888.	12099.	0	0	0	0	0	I	0
65	23888.	13256.	0	0	0	0	0	I	0
60	23888.	14333.	0	0	0	0	0	I	0
55	23888.	15426.	0	0	0	0	0	I	0
50	23888.	16522.	0	0	0	0	0	I	0
45	23888.	17707.	0	0	0	0	0	I	0
40	23888.	18832.	0	0	0	0	0	I	0
35	23888.	20043.	0	0	0	0	0	I	0
30	23888.	21527.	0	0	0	0	0	I	0
25	23888.	23137.	0	0	0	0	0	I	0
20	23888.	25335.	1447.	873.	459.	839.	555.	.67	.67
15	23888.	29620.	5732.	3457.	1075.	2365.	2658.	1.01	1.21
10	23888.	33819.	9932.	5504.	1663.	4343.	5938.	.92	.80

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 68.5 FT.

DESIGN DISCHARGE: 535. CFS.

DESIGN CAPACITY: 2658. KW.

DESIGN PERCENT EXCEEDANCE: 15

EQUIPMENT COST ($1000): 1406.

TOTAL COST ($1000): 2365.

SITE FACTOR: 1.68

35 YEARS BENEFIT-COST RATIO: 1.01

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 68.5 FT.

DESIGN DISCHARGE: 535. CFS.

DESIGN CAPACITY: 2658. KW.

DESIGN PERCENT EXCEEDANCE: 15

EQUIPMENT COST ($1000): 1406.

TOTAL COST ($1000): 2365.

SITE FACTOR: 1.68

35 YEARS BENEFIT-COST RATIO: 1.01

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	23888.	0	0	0	0	0	0	I	0
95	23888.	3729.	0	0	0	0	0	I	0
90	23888.	6562.	0	0	0	0	0	I	0
85	23888.	8233.	0	0	0	0	0	I	0
80	23888.	9656.	0	0	0	0	0	I	0
75	23888.	10987.	0	0	0	0	0	I	0
70	23888.	12099.	0	0	0	0	0	I	0
65	23888.	13256.	0	0	0	0	0	I	0
60	23888.	14333.	0	0	0	0	0	I	0
55	23888.	15426.	0	0	0	0	0	I	0
50	23888.	16522.	0	0	0	0	0	I	0
45	23888.	17707.	0	0	0	0	0	I	0
40	23888.	18832.	0	0	0	0	0	I	0
35	23888.	20043.	0	0	0	0	0	I	0
30	23888.	21527.	0	0	0	0	0	I	0
25	23888.	23137.	0	0	0	0	0	I	0
20	23888.	25335.	1447.	873.	459.	839.	555.	.67	.67
15	23888.	29620.	5732.	3457.	1075.	2365.	2658.	1.01	1.21
10	23888.	33819.	9932.	5504.	1663.	4343.	5938.	.92	.80

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 68.5 FT.

DESIGN DISCHARGE: 535. CFS.

DESIGN CAPACITY: 2658. KW.

DESIGN PERCENT EXCEEDANCE: 15

EQUIPMENT COST ($1000): 1406.

TOTAL COST ($1000): 2365.

SITE FACTOR:1.68

35 YEARS BENEFIT-COST RATIO: 1.01

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 68.5 FT.

DESIGN DISCHARGE: 535. CFS.

DESIGN CAPACITY: 2658. KW.

DESIGN PERCENT EXCEEDANCE: 15

EQUIPMENT COST ($1000): 1406.

TOTAL COST ($1000): 2365.

SITE FACTOR:1.68

35 YEARS BENEFIT-COST RATIO: 1.01

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	23888.	0	0	0	0	0	0	I	0
95	23888.	3729.	0	0	0	0	0	I	0
90	23888.	6562.	0	0	0	0	0	I	0
85	23888.	8233.	0	0	0	0	0	I	0
80	23888.	9656.	0	0	0	0	0	I	0
75	23888.	10987.	0	0	0	0	0	I	0
70	23888.	12099.	0	0	0	0	0	I	0
65	23888.	13256.	0	0	0	0	0	I	0
60	23888.	14333.	0	0	0	0	0	I	0
55	23888.	15426.	0	0	0	0	0	I	0
50	23888.	16522.	0	0	0	0	0	I	0
45	23888.	17707.	0	0	0	0	0	I	0
40	23888.	18832.	0	0	0	0	0	I	0
35	23888.	20043.	0	0	0	0	0	I	0
30	23888.	21527.	0	0	0	0	0	I	0
25	23888.	23137.	0	0	0	0	0	I	0
20	23888.	25335.	1447.	873.	459.	1034.	555.	.58	.58
15	23888.	29620.	5732.	3457.	1075.	3068.	2658.	.83	.98
10	23888.	33819.	9932.	5504.	1663.	5705.	5938.	.75	.63
5	23888.	38101.	14213.	7575.	2416.	9859.	11806.	.62	.42
0	23888.	44705.	20817.	10768.	4633.	26285.	39168.	.35	.17

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION: THIS SITE HAS A MARGINAL HYDROPOWER FEASIBILITY !

SRU 2.253 UNTS.

RUN COMPLETE.

83/05/24. 11.20.21.
MNFTS PROGRAM HYFEAS

MARGINAL

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .30
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

SITE NAME:RED LAKE TWO(CROOKSTON)
SITE NUMBER:MN00 8
RIVER NAME:RED LAKE RIVER

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	0	848.4	837.3
95	40.	848.5	837.7
90	60.	848.6	837.8
85	90.	848.7	838.0
80	125.	848.7	838.1
75	155.	848.8	838.2
70	195.	848.9	838.3
65	230.	848.9	838.4
60	275.	849.0	838.6
55	325.	849.0	838.7
50	375.	849.1	838.8
45	440.	849.2	839.0
40	505.	849.3	839.1
35	580.	849.4	839.3
30	675.	849.5	839.5
25	780.	849.6	839.7
20	940.	849.7	840.0
15	1200.	850.0	840.2
10	1675.	850.3	841.2
5	2475.	850.9	842.5
0	8500.	854.0	850.9

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	216.	216.	171.	96.	333.	31.	.40	.40
90	0	324.	324.	257.	119.	324.	46.	.58	6.19
85	0	483.	483.	381.	146.	405.	67.	.69	1.15
80	0	653.	653.	516.	174.	515.	93.	.75	.97
75	0	789.	789.	622.	194.	603.	114.	.78	.99
70	0	955.	955.	752.	219.	713.	142.	.81	.96
65	0	1089.	1089.	859.	238.	804.	166.	.82	.98
60	0	1249.	1249.	966.	260.	911.	194.	.82	.83
55	0	1406.	1406.	1084.	283.	1029.	227.	.83	.84
50	0	1546.	1546.	1166.	304.	1141.	259.	.81	.62
45	0	1709.	1709.	1284.	328.	1276.	298.	.80	.75
40	0	1849.	1849.	1352.	351.	1409.	338.	.77	.43
35	0	1988.	1988.	1420.	374.	1550.	380.	.74	.41
30	0	2133.	2133.	1491.	401.	1722.	433.	.70	.35
25	0	2261.	2261.	1553.	429.	1903.	489.	.67	.30
20	0	2414.	2414.	1629.	465.	2160.	569.	.62	.26
15	0	2573.	2573.	1707.	524.	2572.	709.	.55	.17
10	0	2758.	2758.	1798.	586.	3140.	869.	.48	.15
5	0	2852.	2852.	1846.	650.	3892.	1052.	.41	.06
0	0	2813.	2813.	0	0	0	0	I	0

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	216.	216.	171.	96.	155.	31.	.68	.68
90	0	324.	324.	257.	119.	156.	46.	.94	3.65
85	0	483.	483.	381.	146.	200.	67.	1.10	1.72
80	0	653.	653.	516.	174.	261.	93.	1.19	1.52
75	0	789.	789.	622.	194.	310.	114.	1.23	1.54
70	0	955.	955.	752.	219.	373.	142.	1.27	1.48
65	0	1089.	1089.	859.	238.	425.	166.	1.30	1.51
60	0	1249.	1249.	966.	260.	487.	194.	1.29	1.27
55	0	1406.	1406.	1084.	283.	556.	227.	1.29	1.28
50	0	1546.	1546.	1166.	304.	622.	259.	1.26	.94

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 9.7 FT.

DESIGN DISCHARGE: 325. CFS.

DESIGN CAPACITY: 227. KW.

DESIGN PERCENT EXCEEDANCE: 55

EQUIPMENT COST ($1000): 371.

TOTAL COST ($1000): 556.

SITE FACTOR: 1.50

35 YEARS BENEFIT-COST RATIO: 1.29

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 10.0 FT.

DESIGN DISCHARGE: 230. CFS.

DESIGN CAPACITY: 166. KW.

DESIGN PERCENT EXCEEDANCE: 65

EQUIPMENT COST ($1000): 283.

TOTAL COST ($1000): 425.

SITE FACTOR: 1.50

35 YEARS BENEFIT-COST RATIO: 1.30

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	216.	216.	171.	96.	544.	31.	.27	.27
90	0	324.	324.	257.	119.	518.	46.	.40	*****
85	0	483.	483.	381.	146.	635.	67.	.49	.87
80	0	653.	653.	516.	174.	794.	93.	.53	.72
75	0	789.	789.	622.	194.	918.	114.	.56	.74
70	0	955.	955.	752.	219.	1073.	142.	.58	.72
65	0	1089.	1089.	859.	238.	1199.	166.	.60	.74
60	0	1249.	1249.	966.	260.	1348.	194.	.60	.63
55	0	1406.	1406.	1084.	283.	1508.	227.	.61	.64
50	0	1546.	1546.	1166.	304.	1659.	259.	.59	.48
45	0	1709.	1709.	1284.	328.	1841.	298.	.59	.58
40	0	1849.	1849.	1352.	351.	2018.	338.	.57	.34
35	0	1988.	1988.	1420.	374.	2205.	380.	.55	.32
30	0	2133.	2133.	1491.	401.	2432.	433.	.53	.28
25	0	2261.	2261.	1553.	429.	2668.	489.	.50	.24
20	0	2414.	2414.	1629.	465.	3001.	569.	.47	.20
15	0	2573.	2573.	1707.	524.	3527.	709.	.42	.13
10	0	2758.	2758.	1798.	586.	4253.	869.	.37	.12
5	0	2852.	2852.	1846.	650.	5209.	1052.	.32	.05
0	0	2813.	2813.	0	0	0	0	I	0

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION:THIS SITE HAS A MARGINAL HYDROPOWER FEASIBILITY !

SRU 2.651 UNTS.

RUN COMPLETE.

83/05/24. 13.18.39.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .40
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

SITE NAME: GRAND FORKS EAST
SITE NUMBER: MN00550
RIVER NAME: RED RIVER OF THE NORTH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	5.	100.0	87.1
95	175.	100.4	87.3
90	220.	100.5	87.9
85	300.	100.6	88.7
80	400.	100.7	88.9
75	500.	100.9	89.2
70	600.	101.0	89.5
65	710.	101.1	89.9
60	825.	101.2	90.2
55	955.	101.3	90.6
50	1100.	101.5	90.9
45	1250.	101.6	91.2
40	1450.	101.7	91.8
35	1675.	101.9	92.2
30	1955.	102.1	93.0
25	2330.	102.4	93.7
20	2875.	102.7	95.0
15	3720.	103.2	96.8
10	5125.	104.0	99.7
5	8700.	105.7	105.6
0	12000.	107.0	106.9

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	27.	27.	0	34.	423.	5.	0	0
95	0	890.	890.	684.	234.	792.	160.	.67	.67
90	0	1117.	1117.	864.	258.	919.	192.	.73	1.19
85	0	1494.	1494.	1146.	294.	1125.	244.	.81	1.17
80	0	1890.	1890.	1445.	340.	1380.	320.	.84	.99
75	0	2253.	2253.	1700.	379.	1610.	389.	.85	.95
70	0	2580.	2580.	1937.	412.	1822.	454.	.87	.97
65	0	2905.	2905.	2192.	442.	2032.	517.	.89	1.06
60	0	3195.	3195.	2369.	471.	2245.	582.	.87	.73
55	0	3488.	3488.	2573.	499.	2461.	647.	.87	.84
50	0	3750.	3750.	2757.	529.	2698.	721.	.85	.69
45	0	3973.	3973.	2874.	557.	2928.	792.	.82	.46
40	0	4231.	4231.	3044.	581.	3179.	856.	.81	.62
35	0	4427.	4427.	3203.	612.	3470.	941.	.78	.49
30	0	4619.	4619.	3301.	627.	3730.	986.	.76	.36
25	0	4769.	4769.	3379.	652.	4077.	1057.	.71	.21
20	0	4885.	4885.	3442.	644.	4352.	1035.	.69	.24
15	0	4893.	4893.	3449.	582.	4423.	857.	.69	.79
10	0	4759.	4759.	3342.	191.	2242.	111.	1.37	.04
5	0	0	0	0	0	0	0	I	0
0	0	0	0	0	0	0	0	I	0

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	27.	27.	0	34.	145.	5.	0	0
95	0	890.	890.	684.	234.	435.	160.	1.02	1.02
90	0	1117.	1117.	864.	258.	517.	192.	1.12	1.71
85	0	1494.	1494.	1146.	294.	651.	244.	1.21	1.65
80	0	1890.	1890.	1445.	340.	825.	320.	1.24	1.36
75	0	2253.	2253.	1700.	379.	985.	389.	1.25	1.29
70	0	2580.	2580.	1937.	412.	1135.	454.	1.25	1.30
65	0	2905.	2905.	2192.	442.	1284.	517.	1.27	1.42
60	0	3195.	3195.	2369.	471.	1438.	582.	1.24	.97

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 10.1 FT.

DESIGN DISCHARGE: 710. CFS.

DESIGN CAPACITY: 517. KW.

DESIGN PERCENT EXCEEDANCE: 65

EQUIPMENT COST ($1000): 717.

TOTAL COST ($1000): 1284.

SITE FACTOR: 1.79

35 YEARS BENEFIT-COST RATIO: 1.27

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 10.1 FT.

DESIGN DISCHARGE: 710. CFS.

DESIGN CAPACITY: 517. KW.

DESIGN PERCENT EXCEEDANCE: 65

EQUIPMENT COST ($1000): 717.

TOTAL COST ($1000): 1284.

SITE FACTOR: 1.79

35 YEARS BENEFIT-COST RATIO: 1.27

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	27.	27.	0	34.	709.	5.	0	0
95	0	890.	890.	684.	234.	1148.	160.	.49	.49
90	0	1117.	1117.	864.	258.	1322.	192.	.55	.91
85	0	1494.	1494.	1146.	294.	1598.	244.	.61	.90
80	0	1890.	1890.	1445.	340.	1935.	320.	.64	.78
75	0	2253.	2253.	1700.	379.	2235.	389.	.65	.75
70	0	2580.	2580.	1937.	412.	2510.	454.	.66	.77
65	0	2905.	2905.	2192.	442.	2781.	517.	.68	.85
60	0	3195.	3195.	2369.	471.	3052.	582.	.67	.59
55	0	3488.	3488.	2573.	499.	3327.	647.	.67	.67
50	0	3750.	3750.	2757.	529.	3627.	721.	.66	.56
45	0	3973.	3973.	2874.	557.	3916.	792.	.64	.37
40	0	4231.	4231.	3044.	581.	4234.	856.	.63	.50
35	0	4427.	4427.	3203.	612.	4598.	941.	.61	.40
30	0	4619.	4619.	3301.	627.	4930.	986.	.59	.28
25	0	4769.	4769.	3379.	652.	5368.	1057.	.56	.17
20	0	4885.	4885.	3442.	644.	5737.	1035.	.54	.18
15	0	4893.	4893.	3449.	582.	5891.	857.	.53	.07
10	0	4759.	4759.	3342.	191.	3308.	111.	.96	.04
5	0	0	0	0	0	0	0	I	0
0	0	0	0	0	0	0	0	I	0

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION: THIS SITE HAS A MARGINAL HYDROPOWER FEASIBILITY !

SRU 2.568 UNTS.

RUN COMPLETE.

83/05/24. 15.09.32.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .50
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

SITE NAME: WHITE FACE LAKE
SITE NUMBER: MN00610
RIVER NAME: SKUNK/WHITE FACE RIVER

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	5.	34.0	0
95	9.	34.0	0
90	13.	34.0	0
85	16.	34.0	0
80	18.	34.0	0
75	21.	34.0	0
70	24.	34.0	0
65	27.	34.0	0
60	33.	34.0	0
55	35.	34.0	0
50	40.	34.0	0
45	45.	34.0	0
40	53.	34.0	0
35	56.	34.0	0
30	73.	34.0	0
25	95.	34.0	0
20	127.	34.0	0
15	181.	34.0	0
10	268.	34.0	0
5	350.	34.0	0
0	450.	34.0	0

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	97.	97.	0	58.	307.	12.	0	0
95	0	170.	170.	136.	79.	289.	22.	.37	.37
90	0	241.	241..	193.	95.	279.	31.	.52	9.56
85	0	313.	313.	250.	110.	271.	40.	.65	8.00
80	0	348.	348.	278.	117.	268.	45.	.72	7.27
75	0	385.	385.	307.	125.	266.	50.	.79	5.60
70	0	436.	436.	348.	135.	296.	58.	.81	1.01
65	0	482.	482.	385.	145.	324.	66.	.82	.98
60	0	560.	560.	447.	161.	372.	80.	.84	.96
55	0	587.	587.	469.	167.	390.	86.	.84	.92
50	0	644.	644.	514.	179.	429.	98.	.84	.87
45	0	698.	698.	540.	192.	469.	111.	.82	.50
40	0	763.	763.	572.	208.	522.	129.	.78	.46
35	0	787.	787.	583.	214.	543.	136.	.77	.42
30	0	911.	911.	643.	249.	664.	180.	.70	.39
25	0	1038.	1038.	705.	286.	800.	232.	.65	.35
20	0	1191.	1191.	779.	335.	985.	310.	.59	.32
15	0	1394.	1394.	877.	406.	1274.	442.	.52	.27
10	0	1627.	1627.	989.	503.	1696.	655.	.45	.22
5	0	1760.	1760.	1054.	581.	2062.	857.	.40	.14
0	0	1814.	1814.	1080.	667.	2477.	1102.	.34	.05

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	97.	97.	0	58.	138.	12.	0	0
95	0.	170.	170.	136.	79.	138.	22.	.63	.63
90	0	241.	241.	193.	95.	138.	31.	.83	3.45
85	0	313.	313.	250.	110.	138.	40.	1.01	3.86
80	0	348.	348.	278.	117.	138.	45.	1.09	3.96
75	0	385.	385.	307.	125.	139.	50.	1.17	3.69
70	0	436.	436.	348.	135.	157.	58.	1.19	1.43
65	0	482.	482.	385.	145.	174.	66.	1.21	1.39
60	0	560.	560.	447.	161.	204.	80.	1.23	1.34
55	0	587.	587.	469.	167.	215.	86.	1.23	1.28
50	0	644.	644.	514.	179.	240.	98.	1.23	1.20
45	0	698.	698.	540.	192.	266.	111.	1.18	.68

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 34.0 FT.

DESIGN DISCHARGE: 40. CFS.

DESIGN CAPACITY: 98. KW.

DESIGN PERCENT EXCEEDANCE: 50

EQUIPMENT COST ($1000): 120.

TOTAL COST ($1000): 240.

SITE FACTOR: 2.00

35 YEARS BENEFIT-COST RATIO: 1.23

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 34.0 FT.

DESIGN DISCHARGE: 35. CFS.

DESIGN CAPACITY: 86. KW.

DESIGN PERCENT EXCEEDANCE: 55

EQUIPMENT COST ($1000): 107.

TOTAL COST ($1000): 215.

SITE FACTOR: 2.00

35 YEARS BENEFIT-COST RATIO: 1.23

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	97.	97.	0	58.	477.	12.	0	0
95	0	170.	170.	136.	79.	440.	22.	.26	.26
90	0	241.	241.	193.	95.	419.	31.	.37	*****
85	0	313.	313.	250.	110.	404.	40.	.49	*****
80	0	348.	348.	278.	117.	398.	45.	.54	44.20
75	0	385.	385.	307.	125.	393.	50.	.59	11.63
70	0	436.	436.	348.	135.	435.	58.	.61	.78
65	0	482.	482.	385.	145.	474.	66.	.62	.76
60	0	560.	560.	447.	161.	541.	80.	.64	.75
55	0	587.	587.	469.	167.	565.	86.	.64	.72
50	0	644.	644.	514.	179.	619.	98.	.64	.68
45	0	698.	698.	540.	192.	673.	111.	.62	.39
40	0	763.	763.	572.	208.	744.	129.	.60	.36
35	0	787.	787.	583.	214.	773.	136.	.59	.33
30	0	911.	911.	643.	249.	934.	180.	.54	.31
25	0	1038.	1038.	705.	286.	1112.	232.	.50	.28
20	0	1191.	1191.	779.	335.	1353.	310.	.46	.26
15	0	1394.	1394.	877.	406.	1724.	442.	.41	.22
10	0	1627.	1627.	989.	503.	2252.	655.	.36	.18
5	0	1760.	1760.	1054.	581.	2704.	857.	.32	.12
0	0	1814.	1814.	1080.	667.	3208.	1102.	.28	.04

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION: THIS SITE HAS A MARGINAL HYDROPOWER FEASIBILITY !

SRU 2.950 UNTS.

RUN COMPLETE.

83/06/23. 12.12.48.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

SITE NAME:RAINY LAKE
SITE NUMBER:MN00653
RIVER NAME:RAINY RIVER

EXISTING CAPACITY: 10000. KW
DESIGN DISCHARGE: 5000. CFS
OVERALL EFFICIENCY: .75

PROPOSED POWERPLANT

WEIGHTING FACTOR: .30
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	1000.	1107.0	1074.8
95	1800.	1107.0	1075.0
90	2175.	1107.0	1075.2
85	2500.	1107.0	1075.3
80	2775.	1107.0	1075.4
75	3000.	1107.0	1075.5
70	3200.	1107.0	1075.6
65	3350.	1107.0	1075.6
60	3500.	1107.0	1075.7
55	3750.	1107.0	1075.7
50	3990.	1107.0	1075.8
45	4200.	1107.0	1075.8
40	4500.	1107.0	1075.9
35	4800.	1107.0	1076.0
30	5200.	1107.0	1076.2
25	5780.	1107.0	1076.4
20	6550.	1107.0	1076.6
15	7800.	1107.0	1077.1
10	9800.	1107.0	1077.4
5	12800.	1107.0	1078.7
0	19000.	1107.0	1080.8

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	64504.	16834.	0	0	0	0	0	I	0
95	64504.	30034.	0	0	0	0	0	I	0
90	64504.	35970.	0	0	0	0	0	I	0
85	64504.	40809.	0	0	0	0	0	I	0
80	64504.	44678.	0	0	0	0	0	I	0
75	64504.	47663.	0	0	0	0	0	I	0
70	64504.	50152.	0	0	0	0	0	I	0
65	64504.	51844.	0	0	0	0	0	I	0
60	64504.	53464.	0	0	0	0	0	I	0
55	64504.	55852.	0	0	0	0	0	I	0
50	64504.	57991.	0	0	0	0	0	I	0
45	64504.	59634.	0	0	0	0	0	I	0
40	64504.	61772.	0	0	0	0	0	I	0
35	64504.	63650.	0	0	0	0	0	I	0
30	64504.	66251.	0	0	0	0	0	I	0
25	64504.	70123.	1747.	1447.	456.	1333.	548.	.81	.81
20	64504.	74604.	5618.	3744.	884.	3364.	1854.	.88	.93
15	64504.	80715.	10100.	6465.	1260.	5544.	3559.	.95	1.06
10	64504.	87170.	16211.	10240.	1713.	8735.	6270.	.98	1.04
5	64504.	92425.	22665.	13919.	2269.	13398.	10518.	.89	.71
0	64504.	96043.	27921.	16460.	2884.	19557.	16365.	.73	.38
			31538.	18209.	3797.	30429.	27151.	.53	.15

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	64504.	16834.	0	0	0	0	0	I	0
95	64504.	30034.	0	0	0	0	0	I	0
90	64504.	35970.	0	0	0	0	0	I	0
85	64504.	40809.	0	0	0	0	0	I	0
80	64504.	44678.	0	0	0	0	0	I	0
75	64504.	47663.	0	0	0	0	0	I	0
70	64504.	50152.	0	0	0	0	0	I	0
65	64504.	51844.	0	0	0	0	0	I	0
60	64504.	53464.	0	0	0	0	0	I	0
55	64504.	55852.	0	0	0	0	0	I	0
50	64504.	57991.	0	0	0	0	0	I	0
45	64504.	59634.	0	0	0	0	0	I	0
40	64504.	61772.	0	0	0	0	0	I	0
35	64504.	63650.	0	0	0	0	0	I	0
30	64504.	66251.	1747.	1447.	456.	810.	548.	1.14	1.14
25	64504.	70123.	5618.	3744.	884.	2381.	1854.	1.15	1.15
20	64504.	74604.	10100.	6465.	1260.	4216.	3559.	1.18	1.23
15	64504.	80715.	16211.	10240.	1713.	6836.	6270.	1.20	1.23
10	64504.	87170.	22665.	13919.	2269.	10485.	10518.	1.09	.88

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 29.9 FT.

DESIGN DISCHARGE: 2800. CFS.

DESIGN CAPACITY: 6270. KW.

DESIGN PERCENT EXCEEDANCE: 15

EQUIPMENT COST ($1000): 3798.

TOTAL COST ($1000): 6836.

SITE FACTOR: 1.80

35 YEARS BENEFIT-COST RATIO: 1.20

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 29.9 FT.

DESIGN DISCHARGE: 2800. CFS.

DESIGN CAPACITY: 6270. KW.

DESIGN PERCENT EXCEEDANCE: 15

EQUIPMENT COST ($1000): 3798.

TOTAL COST ($1000): 6836.

SITE FACTOR: 1.80

35 YEARS BENEFIT-COST RATIO: 1.20

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	64504.	16834.	0	0	0	0	0	I	0
95	64504.	30034.	0	0	0	0	0	I	0
90	64504.	35970.	0	0	0	0	0	I	0
85	64504.	40809.	0	0	0	0	0	I	0
80	64504.	44678.	0	0	0	0	0	I	0
75	64504.	47663.	0	0	0	0	0	I	0
70	64504.	50152.	0	0	0	0	0	I	0
65	64504.	51844.	0	0	0	0	0	I	0
60	64504.	53464.	0	0	0	0	0	I	0
55	64504.	55852.	0	0	0	0	0	I	0
50	64504.	57991.	0	0	0	0	0	I	0
45	64504.	59634.	0	0	0	0	0	I	0
40	64504.	61772.	0	0	0	0	0	I	0
35	64504.	63650.	0	0	0	0	0	I	0
30	64504.	66251.	1747.	1447.	456.	1856.	548.	.63	.63
25	64504.	70123.	5618.	3744.	884.	4347.	1854.	.72	.79
20	64504.	74604.	10100.	6465.	1260.	6872.	3559.	.80	.94
15	64504.	80715.	16211.	10240.	1713.	10635.	6270.	.83	.90
10	64504.	87170.	22665.	13919.	2269.	16310.	10518.	.75	.59
5	64504.	92425.	27921.	16460.	2884.	23808.	16365.	.62	.31
0	64504.	96043.	31538.	18209.	3797.	37045.	27151.	.45	.12

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION: THIS SITE HAS A MARGINAL HYDROPOWER FEASIBILITY !

SRU 2.417 UNTS.

RUN COMPLETE.

83/05/13. 12.45.14.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

SITE NAME:LITTLE FALLS
SITE NUMBER:MN00600
RIVER NAME:MISSISSIPPI RIVER

EXISTING CAPACITY: 4600. KW
DESIGN DISCHARGE: 2990. CFS
OVERALL EFFICIENCY: .75

PROPOSED POWERPLANT

WEIGHTING FACTOR: .50
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	275.	1107.0	1079.2
95	820.	1107.0	1080.5
90	1080.	1107.0	1080.9
85	1310.	1107.0	1081.2
80	1550.	1107.0	1081.5
75	1750.	1107.0	1081.8
70	1980.	1107.0	1082.0
65	2200.	1107.0	1082.2
60	2425.	1107.0	1082.3
55	2650.	1107.0	1082.5
50	2880.	1107.0	1082.7
45	3130.	1107.0	1082.8
40	3390.	1107.0	1082.9
35	3660.	1107.0	1083.1
30	4050.	1107.0	1082.2
25	4625.	1107.0	1082.4
20	5350.	1107.0	1082.6
15	6250.	1107.0	1082.8
10	8175.	1107.0	1084.3
5	11750.	1107.0	1085.3
0	19300.	1107.0	1087.2

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	31570.	3535.	0	0	0	0	0	I	0
95	31570.	10576.	0	0	0	0	0	I	0
90	31570.	13803.	0	0	0	0	0	I	0
85	31570.	16511.	0	0	0	0	0	I	0
80	31570.	19187.	0	0	0	0	0	I	0
75	31570.	21311.	0	0	0	0	0	I	0
70	31570.	23560.	0	0	0	0	0	I	0
65	31570.	25573.	0	0	0	0	0	I	0
60	31570.	27445.	0	0	0	0	0	I	0
55	31570.	29207.	0	0	0	0	0	I	0
50	31570.	30856.	0	0	0	0	0	I	0
45	31570.	32652.	1081.	857.	294.	935.	245.	.70	.70
40	31570.	34528.	2958.	2025.	523.	2016.	704.	.80	.89
35	31570.	36342.	4772.	3074.	692.	2949.	1182.	.84	.95
30	31570.	38281.	6710.	4577.	879.	4015.	1836.	.94	1.20
25	31570.	41144.	9574.	6354.	1118.	5571.	2859.	.95	.99
20	31570.	44082.	12511.	8061.	1366.	7318.	4129.	.93	.86
15	31570.	46834.	15263.	9557.	1624.	9433.	5683.	.86	.63
10	31570.	50991.	19421.	11568.	2036.	13567.	8615.	.74	.44
5	31570.	55146.	23576.	13576.	2641.	20419.	13912.	.59	.27
0	31570.	58025.	26454.	14968.	3520.	32546.	23622.	.42	.11

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	31570.	3535.	0	0	0	0	0	I	0
95	31570.	10576.	0	0	0	0	0	I	0
90	31570.	13803.	0	0	0	0	0	I	0
85	31570.	16511.	0	0	0	0	0	I	0
80	31570.	19187.	0	0	0	0	0	I	0
75	31570.	21311.	0	0	0	0	0	I	0
70	31570.	23560.	0	0	0	0	0	I	0
65	31570.	25573.	0	0	0	0	0	I	0
60	31570.	27445.	0	0	0	0	0	I	0
55	31570.	29207.	0	0	0	0	0	I	0
50	31570.	30856.	0	0	0	0	0	I	0
45	31570.	32652.	1081.	857.	294.	572.	245.	I	0
40	31570.	34528.	2958.	2025.	523.	1364.	704.	.99	.99
35	31570.	36342.	4772.	3074.	692.	2092.	1182.	1.07	1.14
30	31570.	38281.	6710.	4577.	879.	2962.	1836.	1.10	1.17
25	31570.	41144.	9574.	6354.	1118.	4272.	2859.	1.19	1.42
20	31570.	44082.	12511.	8061.	1366.	5791.	4129.	1.18	1.15
								1.13	.97

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 24.6 FT.

DESIGN DISCHARGE: 1635. CFS.

DESIGN CAPACITY: 2859. KW.

DESIGN PERCENT EXCEEDANCE: 25

EQUIPMENT COST ($1000): 2136.

TOTAL COST ($1000): 4272.

SITE FACTOR: 2.00

35 YEARS BENEFIT-COST RATIO: 1.18

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 24.8 FT.

DESIGN DISCHARGE: 1060. CFS.

DESIGN CAPACITY: 1836. KW.

DESIGN PERCENT EXCEEDANCE: 30

EQUIPMENT COST ($1000): 1481.

TOTAL COST ($1000): 2962.

SITE FACTOR: 2.00

35 YEARS BENEFIT-COST RATIO: 1.19

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	31570.	3535.	0	0	0	0	0	I	0
95	31570.	10576.	0	0	0	0	0	I	0
90	31570.	13803.	0	0	0	0	0	I	0
85	31570.	16511.	0	0	0	0	0	I	0
80	31570.	19187.	0	0	0	0	0	I	0
75	31570.	21311.	0	0	0	0	0	I	0
70	31570.	23560.	0	0	0	0	0	I	0
65	31570.	25573.	0	0	0	0	0	I	0
60	31570.	27445.	0	0	0	0	0	I	0
55	31570.	29207.	0	0	0	0	0	I	0
50	31570.	30856.	0	0	0	0	0	I	0
45	31570.	32652.	1081.	857.	294.	1298.	245.	.54	.54
40	31570.	34528.	2958.	2025.	523.	2669.	704.	.63	.73
35	31570.	36342.	4772.	3074.	692.	3806.	1182.	.68	.80
30	31570.	38281.	6710.	4577.	879.	5069.	1836.	.77	1.04
25	31570.	41144.	9574.	6354.	1118.	6870.	2859.	.80	.87
20	31570.	44082.	12511.	8061.	1366.	8845.	4129.	.79	.77
15	31570.	46834.	15263.	9557.	1624.	11320.	5683.	.74	.55
10	31570.	50991.	19421.	11568.	2036.	16281.	8615.	.63	.37
5	31570.	55146.	23576.	13576.	2641.	24503.	13912.	.50	.23
0	31570.	58025.	26454.	14968.	3520.	39055.	23622.	.35	.09

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION: THIS SITE HAS A MARGINAL HYDROPOWER FEASIBILITY !

SRU 2.423 UNTS.

RUN COMPLETE.

INPUT DATA:
****
EXISTING POWERPLANT

SITE NAME:CANNON RIVER
SITE NUMBER:MN00356
RIVER NAME:CANNON RIVER

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .40
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	20.	101.1	88.7
95	45.	101.2	88.8
90	55.	101.2	88.9
85	65.	101.2	89.0
80	75.	101.3	89.0
75	83.	101.3	89.1
70	92.	101.3	89.1
65	101.	101.3	89.1
60	112.	101.4	89.2
55	124.	101.4	89.2
50	137.	101.4	89.3
45	153.	101.5	89.3
40	175.	101.5	89.4
35	200.	101.5	89.5
30	230.	101.6	89.6
25	277.	101.7	89.7
20	345.	101.8	89.9
15	440.	101.9	90.1
10	600.	102.1	90.4
5	1020.	102.5	91.1
0	2000.	103.4	92.3

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	134.	134.	0	71.	375.	18.	0	.0
95	0	300.	300.	239.	110.	349.	40.	.52	.52
90	0	367.	367.	293.	122.	344.	48.	.63	7.72
85	0	433.	433.	344.	133.	377.	57.	.68	1.18
80	0	493.	493.	393.	144.	418.	65.	.70	.92
75	0	540.	540.	429.	151.	449.	72.	.72	.96
70	0	587.	587.	466.	160.	484.	80.	.72	.85
65	0	631.	631.	501.	168.	518.	87.	.73	.81
60	0	682.	682.	540.	177.	557.	96.	.74	.82
55	0	731.	731.	575.	187.	600.	106.	.73	.66
50	0	781.	781.	612.	197.	643.	116.	.73	.70
45	0	835.	835.	653.	209.	697.	130.	.72	.62
40	0	901.	901.	685.	224.	767.	147.	.69	.38
35	0	969.	969.	718.	239.	843.	167.	.66	.35
30	0	1037.	1037.	751.	257.	931.	191.	.63	.31
25	0	1126.	1126.	794.	283.	1064.	227.	.59	.27
20	0	1230.	1230.	844.	316.	1242.	278.	.54	.24
15	0	1341.	1341.	898.	357.	1476.	349.	.49	.20
10	0	1467.	1467.	959.	416.	1835.	462.	.43	.15
5	0	1650.	1650.	1047.	535.	2647.	735.	.33	.09
0	0	1763.	1763.	1102.	719.	4150.	1268.	.23	.03

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	134.	134.	0	71.	152.	18.	0	0
95	0	300.	300.	239.	110.	159.	40.	.89	.89
90	0	367.	367.	293.	122.	161.	48.	1.03	3.81
85	0	433.	433.	344.	133.	181.	57.	1.10	1.70
80	0	493.	493.	393.	144.	204.	65.	1.13	1.39
75	0	540.	540.	429.	151.	222.	72.	1.15	1.45
70	0	587.	587.	466.	160.	243.	80.	1.16	1.27
65	0	631.	631.	501.	168.	263.	87.	1.16	1.20
60	0	682.	682.	540.	177.	287.	96.	1.16	1.22
55	0	731.	731.	575.	187.	313.	106.	1.15	.96

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 11.9 FT.

DESIGN DISCHARGE: 112. CFS.

DESIGN CAPACITY: 96. KW.

DESIGN PERCENT EXCEEDANCE: 60

EQUIPMENT COST ($1000): 170.

TOTAL COST ($1000): 287.

SITE FACTOR: 1.68

35 YEARS BENEFIT-COST RATIO: 1.16

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 11.9 FT.

DESIGN DISCHARGE: 112. CFS.

DESIGN CAPACITY: 96. KW.

DESIGN PERCENT EXCEEDANCE: 60

EQUIPMENT COST ($1000): 170.

TOTAL COST ($1000): 287.

SITE FACTOR: 1.68

35 YEARS BENEFIT-COST RATIO: 1.16

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	134.	134.	0	71.	599.	18.	0	0
95	0	300.	300.	239.	110.	539.	40.	.37	.37
90	0	367.	367.	293.	122.	527.	48.	.45	*****
85	0	433.	433.	344.	133.	573.	57.	.49	.90
80	0	493.	493.	393.	144.	632.	65.	.51	.69
75	0	540.	540.	429.	151.	675.	72.	.52	.72
70	0	587.	587.	466.	160.	725.	80.	.53	.64
65	0	631.	631.	501.	168.	773.	87.	.53	.61
60	0	682.	682.	540.	177.	827.	96.	.54	.62
55	0	731.	731.	575.	187.	887.	106.	.54	.50
50	0	781.	781.	612.	197.	947.	116.	.54	.53
45	0	835.	835.	653.	209.	1021.	130.	.53	.47
40	0	901.	901.	685.	224.	1117.	147.	.51	.29
35	0	969.	969.	718.	239.	1221.	167.	.49	.27
30	0	1037.	1037.	751.	257.	1339.	191.	.47	.24
25	0	1126.	1126.	794.	283.	1517.	227.	.44	.21
20	0	1230.	1230.	844.	316.	1754.	278.	.41	.19
15	0	1341.	1341.	898.	357.	2060.	349.	.37	.15
10	0	1467.	1467.	959.	416.	2526.	462.	.33	.12
5	0	1650.	1650.	1047.	535.	3555.	735.	.26	.08
0	0	1763.	1763.	1102.	719.	5410.	1268.	.18	.03

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION:THIS SITE HAS A MARGINAL HYDROPOWER FEASIBILITY !

SRU 2.782 UNTS.

RUN COMPLETE.

83/06/10. 11.33.04.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .20
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

SITE NAME:POKEGAMA LAKE
SITE NUMBER:MN00584
RIVER NAME:MISSISSIPPI RIVER

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	20.	9.6	0
95	210.	9.6	0
90	320.	9.6	0
85	460.	9.6	0
80	610.	9.6	0
75	740.	9.6	0
70	860.	9.6	0
65	970.	9.6	0
60	1100.	9.6	0
55	1225.	9.6	0
50	1345.	9.6	0
45	1465.	9.6	0
40	1575.	9.6	0
35	1680.	9.6	0
30	1785.	9.6	0
25	1880.	9.6	0
20	1970.	9.6	0
15	2070.	9.6	0
10	2400.	9.6	0
5	2600.	9.6	0
0	3600.	9.6	0

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	121.	121.	0	62.	318.	14.	0	0
95	0	1243.	1243.	992.	222.	1418.	145.	.61	.61
90	0	1860.	1860.	1484.	279.	1960.	221.	.66	.82
85	0	2602.	2602.	2077.	339.	2592.	318.	.71	.86
80	0	3351.	3351.	2675.	396.	3222.	422.	.74	.87
75	0	3962.	3962.	3162.	439.	3740.	512.	.76	.87
70	0	4489.	4489.	3583.	477.	4201.	595.	.77	.84
65	0	4939.	4939.	3942.	509.	4611.	671.	.77	.81
60	0	5431.	5431.	4335.	545.	5082.	761.	.77	.77
55	0	5866.	5866.	4682.	578.	5524.	847.	.77	.73
50	0	6248.	6248.	4987.	608.	5939.	930.	.76	.68
45	0	6593.	6593.	5154.	637.	6346.	1013.	.74	.38
40	0	6876.	6876.	5291.	662.	6713.	1089.	.72	.35
35	0	7115.	7115.	5406.	686.	7058.	1162.	.70	.31
30	0	7322.	7322.	5506.	709.	7398.	1234.	.68	.28
25	0	7480.	7480.	5583.	729.	7702.	1300.	.66	.24
20	0	7602.	7602.	5642.	748.	7986.	1362.	.65	.20
15	0	7709.	7709.	5693.	768.	8300.	1431.	.63	.15
10	0	7958.	7958.	5814.	832.	9311.	1660.	.57	.11
5	0	8049.	8049.	5858.	869.	9909.	1798.	.54	.07
0	0	8201.	8201.	5931.	1037.	12767.	2489.	.43	.02

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	121.	121.	0	62.	161.	14.	0	0
95	0	1243.	1243.	992.	222.	826.	145.	.95	.95
90	0	1860.	1860.	1484.	279.	1167.	221.	1.03	1.24
85	0	2602.	2602.	2077.	339.	1571.	318.	1.09	1.27
80	0	3351.	3351.	2675.	396.	1980.	422.	1.13	1.29
75	0	3962.	3962.	3162.	439.	2320.	512.	1.15	1.27
70	0	4489.	4489.	3583.	477.	2624.	595.	1.16	1.23
65	0	4939.	4939.	3942.	509.	2896.	671.	1.16	1.18
60	0	5431.	5431.	4335.	545.	3211.	761.	1.15	1.12
55	0	5866.	5866.	4682.	578.	3507.	847.	1.15	1.06
50	0	6248.	6248.	4987.	608.	3787.	930.	1.13	.98

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 9.6 FT.

DESIGN DISCHARGE: 1225. CFS.

DESIGN CAPACITY: 847. KW.

DESIGN PERCENT EXCEEDANCE: 55

EQUIPMENT COST ($1000): 2338.

TOTAL COST ($1000): 3507.

SITE FACTOR:1.50

35 YEARS BENEFIT-COST RATIO: 1.15

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 9.6 FT.

DESIGN DISCHARGE: 970. CFS.

DESIGN CAPACITY: 671. KW.

DESIGN PERCENT EXCEEDANCE: 65

EQUIPMENT COST ($1000): 1931.

TOTAL COST ($1000): 2896.

SITE FACTOR:1.50

35 YEARS BENEFIT-COST RATIO: 1.16

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	121.	121.	0	62.	575.	14.	0	0
95	0	1243.	1243.	992.	222.	2212.	145.	.41	.41
90	0	1860.	1860.	1484.	279.	2972.	221.	.46	.60
85	0	2602.	2602.	2077.	339.	3835.	318.	.50	.64
80	0	3351.	3351.	2675.	396.	4677.	422.	.53	.67
75	0	3962.	3962.	3162.	439.	5358.	512.	.55	.67
70	0	4489.	4489.	3583.	477.	5957.	595.	.56	.66
65	0	4939.	4939.	3942.	509.	6484.	671.	.56	.64
60	0	5431.	5431.	4335.	545.	7085.	761.	.57	.62
55	0	5866.	5866.	4682.	578.	7644.	847.	.57	.59
50	0	6248.	6248.	4987.	608.	8166.	930.	.57	.55
45	0	6593.	6593.	5154.	637.	8673.	1013.	.55	.31
40	0	6876.	6876.	5291.	662.	9129.	1089.	.54	.28
35	0	7115.	7115.	5406.	686.	9554.	1162.	.53	.26
30	0	7322.	7322.	5506.	709.	9973.	1234.	.52	.23
25	0	7480.	7480.	5583.	729.	10345.	1300.	.50	.19
20	0	7602.	7602.	5642.	748.	10693.	1362.	.49	.16
15	0	7709.	7709.	5693.	768.	11074.	1431.	.48	.13
10	0	7958.	7958.	5814.	832.	12296.	1660.	.44	.09
5	0	8049.	8049.	5858.	869.	13012.	1798.	.42	.06
0	0	8201.	8201.	5931.	1037.	16387.	2489.	.34	.02

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION:THIS SITE HAS A MARGINAL HYDROPOWER FEASIBILITY !

SRU 2.735 UNTS.

RUN COMPLETE.

83/06/08. 15.26.40.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

SITE NAME:LOCK AND DAM #1
SITE NUMBER:MN00593
RIVER NAME:MISSISSIPPI RIVER

EXISTING CAPACITY: 14400. KW
DESIGN DISCHARGE: 6970. CFS
OVERALL EFFICIENCY: .75

PROPOSED POWERPLANT

WEIGHTING FACTOR: .70
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	700.	100.0	65.0
95	1350.	100.0	65.0
90	1800.	100.0	64.5
85	2250.	100.0	64.7
80	2650.	100.0	65.0
75	3000.	100.0	65.5
70	3350.	100.0	65.9
65	3700.	100.0	66.2
60	4100.	100.0	66.5
55	4500.	100.0	66.9
50	4900.	100.0	67.2
45	5350.	100.0	67.4
40	5850.	100.0	67.5
35	6450.	100.0	67.5
30	7375.	100.0	67.6
25	8600.	100.0	67.6
20	10150.	100.0	67.7
15	12500.	100.0	67.7
10	16200.	100.0	68.9
5	22750.	100.0	71.2
0	39500.	100.0	75.0

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	84539.	12492.	0	0	0	0	0	I	0
95	84539.	23776.	0	0	0	0	0	I	0
90	84539.	30941.	0	0	0	0	0	I	0
85	84539.	37914.	0	0	0	0	0	I	0
80	84539.	43813.	0	0	0	0	0	I	0
75	84539.	48804.	0	0	0	0	0	I	0
70	84539.	53448.	0	0	0	0	0	I	0
65	84539.	57730.	0	0	0	0	0	I	0
60	84539.	62248.	0	0	0	0	0	I	0
55	84539.	66483.	0	0	0	0	0	I	0
50	84539.	70307.	0	0	0	0	0	I	0
45	84539.	74123.	0	0	0	0	0	I	0
40	84539.	77838.	0	0	0	0	0	I	0
35	84539.	81681.	0	0	0	0	0	I	0
30	84539.	87712.	3173.	2550.	621.	2570.	968.	.80	.80
25	84539.	96015.	11476.	7524.	1310.	6803.	3827.	.93	1.01
20	84539.	104744.	20205.	12742.	1881.	11489.	7444.	.95	.99
15	84539.	114414.	29875.	18223.	2536.	18048.	12912.	.89	.76
10	84539.	124749.	40210.	23221.	3301.	27229.	20979.	.76	.50
5	84539.	135316.	50778.	28330.	4255.	41043.	33486.	.63	.35
0	84539.	143596.	59057.	32333.	5837.	69520.	59944.	.43	.13

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	84539.	12492.	0	0	0	0	0	I	0
95	84539.	23776.	0	0	0	0	0	I	0
90	84539.	30941.	0	0	0	0	0	I	0
85	84539.	37914.	0	0	0	0	0	I	0
80	84539.	43813.	0	0	0	0	0	I	0
75	84539.	48804.	0	0	0	0	0	I	0
70	84539.	53448.	0	0	0	0	0	I	0
65	84539.	57730.	0	0	0	0	0	I	0
60	84539.	62248.	0	0	0	0	0	I	0
55	84539.	66483.	0	0	0	0	0	I	0
50	84539.	70307.	0	0	0	0	0	I	0
45	84539.	74123.	0	0	0	0	0	I	0
40	84539.	77838.	0	0	0	0	0	I	0
35	84539.	81681.	0	0	0	0	0	I	0
30	84539.	87712.	3173.	2550.	621.	1875.	968.	1.02	1.02
25	84539.	96015.	11476.	7524.	1310.	5463.	3827.	1.11	1.16
20	84539.	104744.	20205.	12742.	1881.	9362.	7444.	1.13	1.17
15	84539.	114414.	29875.	18223.	2536.	14706.	12912.	1.06	.91

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 32.3 FT.

DESIGN DISCHARGE: 3180. CFS.

DESIGN CAPACITY: 7444. KW.

DESIGN PERCENT EXCEEDANCE: 20

EQUIPMENT COST ($1000): 4255.

TOTAL COST ($1000): 9362.

SITE FACTOR:2.20

35 YEARS BENEFIT-COST RATIO: 1.13

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 32.3 FT.

DESIGN DISCHARGE: 3180. CFS.

DESIGN CAPACITY: 7444. KW.

DESIGN PERCENT EXCEEDANCE: 20

EQUIPMENT COST ($1000): 4255.

TOTAL COST ($1000): 9362.

SITE FACTOR:2.20

35 YEARS BENEFIT-COST RATIO: 1.13

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	84539.	12492.	0	0	0	0	0	I	0
95	84539.	23776.	0	0	0	0	0	I	0
90	84539.	30941.	0	0	0	0	0	I	0
85	84539.	37914.	0	0	0	0	0	I	0
80	84539.	43813.	0	0	0	0	0	I	0
75	84539.	48804.	0	0	0	0	0	I	0
70	84539.	53448.	0	0	0	0	0	I	0
65	84539.	57730.	0	0	0	0	0	I	0
60	84539.	62248.	0	0	0	0	0	I	0
55	84539.	66483.	0	0	0	0	0	I	0
50	84539.	70307.	0	0	0	0	0	I	0
45	84539.	74123.	0	0	0	0	0	I	0
40	84539.	77838.	0	0	0	0	0	I	0
35	84539.	81681.	0	0	0	0	0	I	0
30	84539.	87712.	3173.	2550.	621.	3266.	968.	.66	.66
25	84539.	96015.	11476.	7524.	1310.	8142.	3827.	.80	.89
20	84539.	104744.	20205.	12742.	1881.	13617.	7444.	.82	.86
15	84539.	114414.	29875.	18223.	2536.	21390.	12912.	.76	.65
10	84539.	124749.	40210.	23221.	3301.	32271.	20979.	.65	.43
5	84539.	135316.	50778.	28330.	4255.	48643.	33486.	.54	.29
0	84539.	143596.	59057.	32333.	5837.	82394.	59944.	.37	.11

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION: THIS SITE HAS A MARGINAL HYDROPOWER FEASIBILITY !

SRU 2.384 UNTS.

RUN COMPLETE.

83/05/13. 13.20.27.
MNFTS PROGRAM HYFEAS

SITE NAME: ORWELL DAM
SITE NUMBER: MN00574
RIVER NAME: OTTERTAIL RIVER

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: 1.00
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	5.	1057.2	1031.2
95	16.	1057.2	1031.4
90	24.	1057.2	1031.5
85	34.	1057.2	1031.6
80	54.	1057.2	1031.7
75	78.	1057.2	1031.8
70	106.	1057.2	1031.9
65	135.	1057.2	1032.1
60	160.	1057.2	1032.1
55	187.	1057.2	1032.2
50	212.	1057.2	1032.2
45	240.	1057.2	1032.3
40	275.	1057.2	1032.4
35	322.	1057.2	1032.4
30	368.	1057.2	1032.5
25	417.	1057.2	1032.6
20	470.	1057.2	1032.7
15	535.	1057.2	1032.8
10	627.	1057.2	1033.0
5	800.	1057.2	1033.3
0	1000.	1057.2	1033.6

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	69.	69.	0	50.	544.	9.	0	0
95	0	222.	222.	176.	94.	464.	30.	.32	.32
90	0	333.	333.	265.	117.	439.	44.	.48	*****
85	0	469.	469.	372.	141.	504.	63.	.58	1.21
80	0	724.	724.	575.	180.	690.	99.	.66	.90
75	0	1012.	1012.	803.	220.	885.	143.	.73	.97
70	0	1327.	1327.	1052.	259.	1089.	193.	.78	1.02
65	0	1633.	1633.	1294.	294.	1280.	244.	.82	1.07
60	0	1873.	1873.	1481.	322.	1437.	289.	.84	1.01
55	0	2115.	2115.	1666.	350.	1595.	337.	.86	.99
50	0	2316.	2316.	1818.	375.	1737.	382.	.86	.91
45	0	2523.	2523.	1964.	400.	1888.	430.	.86	.83
40	0	2754.	2754.	2076.	430.	2068.	491.	.83	.53
35	0	3023.	3023.	2206.	468.	2302.	575.	.80	.48
30	0	3253.	3253.	2317.	502.	2518.	655.	.77	.45
25	0	3461.	3461.	2418.	536.	2737.	739.	.74	.40
20	0	3645.	3645.	2507.	571.	2965.	829.	.71	.34
15	0	3819.	3819.	2591.	611.	3234.	940.	.67	.27
10	0	3996.	3996.	2676.	664.	3593.	1093.	.63	.21
5	0	4195.	4195.	2773.	752.	4223.	1377.	.56	.13
0	0	4272.	4272.	2810.	843.	4894.	1700.	.49	.05

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	69.	69.	0	50.	348.	9.	0	0
95	0	222.	222.	176.	94.	308.	30.	.44	.44
90	0	333.	333.	265.	117.	296.	44.	.64	8.36
85	0	469.	469.	372.	141.	344.	63.	.77	1.49
80	0	724.	724.	575.	180.	479.	99.	.87	1.16
75	0	1012.	1012.	803.	220.	623.	143.	.95	1.24
70	0	1327.	1327.	1052.	259.	776.	193.	1.02	1.29
65	0	1633.	1633.	1294.	294.	922.	244.	1.06	1.34
60	0	1873.	1873.	1481.	322.	1042.	289.	1.09	1.26
55	0	2115.	2115.	1666.	350.	1165.	337.	1.10	1.23
50	0	2316.	2316.	1818.	375.	1276.	382.	1.10	1.12
45	0	2523.	2523.	1964.	400.	1394.	430.	1.09	1.02
40	0	2754.	2754.	2076.	430.	1536.	491.	1.06	.65

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING INCREMENTAL B/C CRITERIA
****

DESIGN HEAD: 24.9 FT.

DESIGN DISCHARGE: 240. CFS.

DESIGN CAPACITY: 430. KW.

DESIGN PERCENT EXCEEDANCE: 45

EQUIPMENT COST ($1000): 450.

TOTAL COST ($1000): 1394.

SITE FACTOR:3.10

35 YEARS BENEFIT-COST RATIO: 1.09

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
USING MAX. B/C CRITERIA
****

DESIGN HEAD: 25.0 FT.

DESIGN DISCHARGE: 212. CFS.

DESIGN CAPACITY: 382. KW.

DESIGN PERCENT EXCEEDANCE: 50

EQUIPMENT COST ($1000): 407.

TOTAL COST ($1000): 1276.

SITE FACTOR:3.13

35 YEARS BENEFIT-COST RATIO: 1.10

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	69.	69.	0	50.	740.	9.	0	0
95	0	222.	222.	176.	94.	620.	30.	.25	.25
90	0	333.	333.	265.	117.	582.	44.	.38	-6.13
85	0	469.	469.	372.	141.	665.	63.	.46	1.02
80	0	724.	724.	575.	180.	901.	99.	.53	.73
75	0	1012.	1012.	803.	220.	1146.	143.	.59	.80
70	0	1327.	1327.	1052.	259.	1401.	193.	.63	.85
65	0	1633.	1633.	1294.	294.	1638.	244.	.67	.89
60	0	1873.	1873.	1481.	322.	1831.	289.	.69	.85
55	0	2115.	2115.	1666.	350.	2025.	337.	.70	.83
50	0	2316.	2316.	1818.	375.	2198.	382.	.71	.77
45	0	2523.	2523.	1964.	400.	2381.	430.	.71	.70
40	0	2754.	2754.	2076.	430.	2599.	491.	.69	.45
35	0	3023.	3023.	2206.	468.	2881.	575.	.66	.41
30	0	3253.	3253.	2317.	502.	3140.	655.	.64	.38
25	0	3461.	3461.	2418.	536.	3402.	739.	.61	.34
20	0	3645.	3645.	2507.	571.	3673.	829.	.59	.29
15	0	3819.	3819.	2591.	611.	3990.	940.	.56	.24
10	0	3996.	3996.	2676.	664.	4413.	1093.	.53	.18
5	0	4195.	4195.	2773.	752.	5149.	1377.	.47	.12
0	0	4272.	4272.	2810.	843.	5926.	1700.	.42	.04

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION: THIS SITE HAS A MARGINAL HYDROPOWER FEASIBILITY !

SRU 2.766 UNTS.

RUN COMPLETE.

83/05/13. 13.17.23.
MNFTS PROGRAM HYFEAS

POOR

INPUT DATA:
****
EXISTING POWERPLANT

SITE NAME:CLOQUET
SITE NUMBER:MN00598
RIVER NAME:SAINT LOUIS RIVER

EXISTING CAPACITY: 5510. KW
DESIGN DISCHARGE: 2320. CFS
OVERALL EFFICIENCY: .75

PROPOSED POWERPLANT

WEIGHTING FACTOR: -.50
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	200.	100.0	62.0
95	480.	100.0	62.0
90	620.	100.0	62.1
85	710.	100.0	62.1
80	800.	100.0	62.1
75	880.	100.0	62.2
70	940.	100.0	62.2
65	1000.	100.0	62.2
60	1090.	100.0	62.3
55	1150.	100.0	62.3
50	1230.	100.0	62.3
45	1340.	100.0	62.4
40	1450.	100.0	62.4
35	1610.	100.0	62.4
30	1800.	100.0	62.5
25	2110.	100.0	62.5
20	2680.	100.0	63.0
15	3550.	100.0	64.0
10	4950.	100.0	64.5
5	7800.	100.0	66.0
0	18000.	100.0	82.5

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	27534.	4048.	0	0	0	0	0	I	0
95	27534.	9566.	0	0	0	0	0	I	0
90	27534.	12193.	0	0	0	0	0	I	0
85	27534.	13779.	0	0	0	0	0	I	0
80	27534.	15269.	0	0	0	0	0	I	0
75	27534.	16528.	0	0	0	0	0	I	0
70	27534.	17397.	0	0	0	0	0	I	0
65	27534.	18203.	0	0	0	0	0	I	0
60	27534.	19334.	0	0	0	0	0	I	0
55	27534.	20015.	0	0	0	0	0	I	0
50	27534.	20838.	0	0	0	0	0	I	0
45	27534.	21871.	0	0	0	0	0	I	0
40	27534.	22774.	0	0	0	0	0	I	0
35	27534.	23920.	0	0	0	0	0	I	0
30	27534.	25096.	0	0	0	0	0	I	0
25	27534.	26670.	0	0	0	0	0	I	0
20	27534.	29940.	2406.	1489.	628.	1160.	986.	.83	.83
15	27534.	34472.	6937.	4274.	1207.	3144.	3288.	.98	1.09
10	27534.	38503.	10969.	6561.	1799.	5774.	6858.	.87	.71
5	27534.	42777.	15243.	8628.	2614.	10309.	13653.	.67	.39
0	27534.	46545.	19011.	10450.	3267.	18211.	20581.	.49	.21

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	27534.	4048.	0	0	0	0	0	I	0
95	27534.	9566.	0	0	0	0	0	I	0
90	27534.	12193.	0	0	0	0	0	I	0
85	27534.	13779.	0	0	0	0	0	I	0
80	27534.	15269.	0	0	0	0	0	I	0
75	27534.	16528.	0	0	0	0	0	I	0
70	27534.	17397.	0	0	0	0	0	I	0
65	27534.	18203.	0	0	0	0	0	I	0
60	27534.	19334.	0	0	0	0	0	I	0
55	27534.	20015.	0	0	0	0	0	I	0
50	27534.	20838.	0	0	0	0	0	I	0
45	27534.	21871.	0	0	0	0	0	I	0
40	27534.	22774.	0	0	0	0	0	I	0
35	27534.	23920.	0	0	0	0	0	I	0
30	27534.	25096.	0	0	0	0	0	I	0
25	27534.	26670.	0	0	0	0	0	I	0
20	27534.	29940.	2406.	1489.	628.	1160.	986.	.83	.83
15	27534.	34472.	6937.	4274.	1207.	3144.	3288.	.98	1.09
10	27534.	38503.	10969.	6561.	1799.	5774.	6858.	.87	.71
5	27534.	42777.	15243.	8628.	2614.	10309.	13653.	.67	.39
0	27534.	46545.	19011.	10450.	3267.	18211.	20581.	.49	.21

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	27534.	4048.	0	0	0	0	0	I	0
95	27534.	9566.	0	0	0	0	0	I	0
90	27534.	12193.	0	0	0	0	0	I	0
85	27534.	13779.	0	0	0	0	0	I	0
80	27534.	15269.	0	0	0	0	0	I	0
75	27534.	16528.	0	0	0	0	0	I	0
70	27534.	17397.	0	0	0	0	0	I	0
65	27534.	18203.	0	0	0	0	0	I	0
60	27534.	19334.	0	0	0	0	0	I	0
55	27534.	20015.	0	0	0	0	0	I	0
50	27534.	20838.	0	0	0	0	0	I	0
45	27534.	21871.	0	0	0	0	0	I	0
40	27534.	22774.	0	0	0	0	0	I	0
35	27534.	23920.	0	0	0	0	0	I	0
30	27534.	25096.	0	0	0	0	0	I	0
25	27534.	26670.	0	0	0	0	0	I	0
20	27534.	29940.	2406.	1489.	628.	1547.	986.	.68	.68
15	27534.	34472.	6937.	4274.	1207.	4192.	3288.	.79	.86
10	27534.	38503.	10969.	6561.	1799.	7698.	6858.	.69	.56
5	27534.	42777.	15243.	8628.	2614.	13745.	13653.	.53	.30
0	27534.	46545.	19011.	10450.	3267.	24281.	20581.	.38	.16

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION:THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 2.383 UNTS.

RUN COMPLETE.

83/05/24. 14.44.33.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: -.50
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

SITE NAME:MAZEPPA DAM
SITE NUMBER:MN00 11
RIVER NAME:ZUMBRO RIVER

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	0	11.5	0
95	22.	11.5	0
90	26.	11.5	0
85	30.	11.5	0
80	34.	11.5	0
75	37.	11.5	0
70	41.	11.5	0
65	44.	11.5	0
60	48.	11.5	0
55	52.	11.5	0
50	57.	11.5	0
45	62.	11.5	0
40	69.	11.5	0
35	78.	11.5	0
30	89.	11.5	0
25	108.	11.5	0
20	132.	11.5	0
15	165.	11.5	0
10	220.	11.5	0
5	320.	11.5	0
0	2700.	11.5	0

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	144.	144.	115.	72.	151.	18.	.51	.51
90	0	170.	170.	136.	79.	151.	22.	.59	3.06
85	0	195.	195.	156.	85.	151.	25.	.66	3.19
80	0	219.	219.	175.	91.	151.	28.	.72	3.20
75	0	236.	236.	188.	95.	151.	31.	.76	3.15
70	0	257.	257.	205.	101.	151.	34.	.81	3.08
65	0	272.	272.	217.	105.	151.	36.	.85	2.98
60	0	290.	290.	231.	110.	151.	40.	.89	2.86
55	0	307.	307.	245.	115.	151.	43.	.92	2.73
50	0	326.	326.	260.	120.	151.	47.	.96	2.60
45	0	343.	343.	268.	126.	155.	51.	.95	.93
40	0	364.	364.	279.	134.	169.	57.	.92	.48
35	0	389.	389.	291.	143.	187.	65.	.88	.44
30	0	415.	415.	303.	153.	208.	74.	.84	.39
25	0	453.	453.	321.	170.	244.	89.	.78	.35
20	0	492.	492.	340.	190.	288.	109.	.71	.30
15	0	534.	534.	361.	215.	345.	137.	.64	.25
10	0	584.	584.	385.	251.	437.	182.	.56	.19
5	0	638.	638.	411.	307.	595.	265.	.46	.12
0	0	1070.	1070.	620.	979.	3418.	2237.	.14	.06

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	144.	144.	115.	72.	151.	18.	.51	.51
90	0	170.	170.	136.	79.	151.	22.	.59	3.06
85	0	195.	195.	156.	85.	151.	25.	.66	3.19
80	0	219.	219.	175.	91.	151.	28.	.72	3.20
75	0	236.	236.	188.	95.	151.	31.	.76	3.15
70	0	257.	257.	205.	101.	151.	34.	.81	3.08
65	0	272.	272.	217.	105.	151.	36.	.85	2.98
60	0	290.	290.	231.	110.	151.	40.	.89	2.86
55	0	307.	307.	245.	115.	151.	43.	.92	2.73
50	0	326.	326.	260.	120.	151.	47.	.96	2.60
45	0	343.	343.	268.	126.	155.	51.	.95	.93
40	0	364.	364.	279.	134.	169.	57.	.92	.48
35	0	389.	389.	291.	143.	187.	65.	.88	.44
30	0	415.	415.	303.	153.	208.	74.	.84	.39
25	0	453.	453.	321.	170.	244.	89.	.78	.35
20	0	492.	492.	340.	190.	288.	109.	.71	.30
15	0	534.	534.	361.	215.	345.	137.	.64	.25
10	0	584.	584.	385.	251.	437.	182.	.56	.19
5	0	638.	638.	411.	307.	595.	265.	.46	.12
0	0	1070.	1070.	620.	979.	3418.	2237.	.14	.06

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	144.	144.	115.	72.	202.	18.	.42	.42
90	0	170.	170.	136.	79.	202.	22.	.48	3.06
85	0	195.	195.	156.	85.	202.	25.	.54	3.19
80	0	219.	219.	175.	91.	202.	28.	.60	3.20
75	0	236.	236.	188.	95.	202.	31.	.63	3.15
70	0	257.	257.	205.	101.	202.	34.	.68	3.08
65	0	272.	272.	217.	105.	202.	36.	.71	2.98
60	0	290.	290.	231.	110.	202.	40.	.74	2.86
55	0	307.	307.	245.	115.	202.	43.	.77	2.73
50	0	326.	326.	260.	120.	202.	47.	.81	2.60
45	0	343.	343.	268.	126.	206.	51.	.81	.82
40	0	364.	364.	279.	134.	225.	57.	.78	.39
35	0	389.	389.	291.	143.	249.	65.	.74	.36
30	0	415.	415.	303.	153.	278.	74.	.70	.32
25	0	453.	453.	321.	170.	325.	89.	.65	.28
20	0	492.	492.	340.	190.	384.	109.	.59	.24
15	0	534.	534.	361.	215.	461.	137.	.53	.20
10	0	584.	584.	385.	251.	583.	182.	.46	.15
5	0	638.	638.	411.	307.	793.	265.	.37	.10
0	0	1070.	1070.	620.	979.	4558.	2237.	.11	.05

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION:THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 2.949 UNTS.

RUN COMPLETE.

83/06/20. 12.05.58.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

EXISTING CAPACITY: 11800. KW
DESIGN DISCHARGE: 3560. CFS
OVERALL EFFICIENCY: .75

PROPOSED POWERPLANT

WEIGHTING FACTOR: .20
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 270.

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

SITE NAME:FON DU LAC
SITE NUMBER:MN00603
RIVER NAME:SAINT LOUIS RIVER

240

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	200.	658.6	603.0
95	500.	658.6	603.8
90	630.	658.6	604.0
85	710.	658.6	604.3
80	800.	658.6	604.4
75	880.	658.6	604.5
70	950.	658.6	604.6
65	1030.	658.6	604.7
60	1110.	658.6	604.7
55	1200.	658.6	604.8
50	1290.	658.6	604.9
45	1390.	658.6	605.0
40	1510.	658.6	605.1
35	1690.	658.6	605.3
30	1900.	658.6	605.4
25	2250.	658.6	605.6
20	2780.	658.6	606.2
15	3750.	658.6	606.7
10	4700.	658.6	607.3
5	8080.	658.6	609.2
0	17500.	658.6	612.0

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	47988.	5797.	0	0	0	0	0	I	0
95	47988.	14363.	0	0	0	0	0	I	0
90	47988.	17890.	0	0	0	0	0	I	0
85	47988.	19973.	0	0	0	0	0	I	0
80	47988.	22149.	0	0	0	0	0	I	0
75	47988.	23966.	0	0	0	0	0	I	0
70	47988.	25455.	0	0	0	0	0	I	0
65	47988.	27036.	0	0	0	0	0	I	0
60	47988.	28479.	0	0	0	0	0	I	0
55	47988.	29986.	0	0	0	0	0	I	0
50	47988.	31359.	0	0	0	0	0	I	0
45	47988.	32734.	0	0	0	0	0	I	0
40	47988.	34203.	0	0	0	0	0	I	0
35	47988.	36148.	0	0	0	0	0	I	0
30	47988.	38087.	0	0	0	0	0	I	0
25	47988.	40808.	0	0	0	0	0	I	0
20	47988.	44204.	0	0	0	0	0	I	0
15	47988.	49656.	1668.	1046.	536.	1559.	738.	.50	.50
10	47988.	55980.	7992.	5112.	1397.	5371.	4308.	.76	.87
5	47988.	65901.	17914.	10011.	2886.	15676.	16383.	.54	.42
0	47988.	73880.	25892.	13869.	5137.	37826.	47370.	.32	.16

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	47988.	5797.	0	0	0	0	0	I	0
95	47988.	14363.	0	0	0	0	0	I	0
90	47988.	17890.	0	0	0	0	0	I	0
85	47988.	19973.	0	0	0	0	0	I	0
80	47988.	22149.	0	0	0	0	0	I	0
75	47988.	23966.	0	0	0	0	0	I	0
70	47988.	25455.	0	0	0	0	0	I	0
65	47988.	27036.	0	0	0	0	0	I	0
60	47988.	28479.	0	0	0	0	0	I	0
55	47988.	29986.	0	0	0	0	0	I	0
50	47988.	31359.	0	0	0	0	0	I	0
45	47988.	32734.	0	0	0	0	0	I	0
40	47988.	34203.	0	0	0	0	0	I	0
35	47988.	36148.	0	0	0	0	0	I	0
30	47988.	38087.	0	0	0	0	0	I	0
25	47988.	40808.	0	0	0	0	0	I	0
20	47988.	44204.	0	0	0	0	0	I	0
15	47988.	49656.	1668.	1046.	536.	1083.	738.	.65	.65
10	47988.	55980.	7992.	5112.	1397.	4173.	4308.	.92	1.03
5	47988.	65901.	17914.	10011.	2886.	12175.	16383.	.66	.52
0	47988.	73880.	25892.	13869.	5137.	29290.	47370.	.40	.20

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	47988.	5797.	0	0	0	0	0	I	0
95	47988.	14363.	0	0	0	0	0	I	0
90	47988.	17890.	0	0	0	0	0	I	0
85	47988.	19973.	0	0	0	0	0	I	0
80	47988.	22149.	0	0	0	0	0	I	0
75	47988.	23966.	0	0	0	0	0	I	0
70	47988.	25455.	0	0	0	0	0	I	0
65	47988.	27036.	0	0	0	0	0	I	0
60	47988.	28479.	0	0	0	0	0	I	0
55	47988.	29986.	0	0	0	0	0	I	0
50	47988.	31359.	0	0	0	0	0	I	0
45	47988.	32734.	0	0	0	0	0	I	0
40	47988.	34203.	0	0	0	0	0	I	0
35	47988.	36148.	0	0	0	0	0	I	0
30	47988.	38087.	0	0	0	0	0	I	0
25	47988.	40808.	0	0	0	0	0	I	0
20	47988.	44204.	0	0	0	0	0	I	0
15	47988.	49656.	1668.	1046.	536.	2070.	738.	.40	.40
10	47988.	55980.	7992.	5112.	1397.	6570.	4308.	.64	.76
5	47988.	65901.	17914.	10011.	2886.	19177.	16383.	.45	.35
0	47988.	73880.	25892.	13869.	5137.	46361.	47370.	.27	.13

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION:THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 2.478 UNTS.

RUN COMPLETE.

83/05/25. 14.01.38.
MNFTS PROGRAM HYFEAS

SITE NAME:PELICAN RAPIDS
SITE NUMBER:MN00190
RIVER NAME:PELICAN RIVER

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .10
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	0	1305.6	1289.8
95	2.	1305.6	1289.9
90	6.	1305.7	1290.0
85	11.	1305.8	1290.0
80	15.	1305.9	1290.1
75	19.	1306.0	1290.1
70	24.	1306.1	1290.2
65	29.	1306.2	1290.2
60	34.	1306.3	1290.3
55	40.	1306.4	1290.3
50	46.	1306.5	1290.4
45	53.	1306.6	1290.4
40	61.	1306.8	1290.5
35	70.	1307.0	1290.6
30	78.	1307.1	1290.7
25	89.	1307.2	1290.8
20	101.	1307.3	1290.9
15	115.	1307.5	1291.0
10	135.	1307.7	1291.2
5	175.	1308.3	1291.4
0	340.	1308.9	1292.4

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	19.	19.	15.	23.	242.	2.	.06	.06
90	0	56.	56.	44.	42.	231.	7.	.16	3.66
85	0	100.	100.	79.	58.	226.	12.	.28	3.27
80	0	134.	134.	106.	69.	224.	17.	.36	3.18
75	0	165.	165.	130.	78.	222.	21.	.43	3.28
70	0	201.	201.	159.	88.	221.	27.	.51	3.20
65	0	234.	234.	185.	98.	219.	32.	.58	3.20
60	0	265.	265.	209.	106.	218.	37.	.64	3.09
55	0	298.	298.	234.	116.	217.	44.	.70	2.99
50	0	328.	328.	258.	125.	218.	50.	.75	2.50
45	0	359.	359.	273.	135.	244.	58.	.72	.42
40	0	390.	390.	288.	145.	271.	66.	.69	.40
35	0	421.	421.	303.	156.	302.	76.	.66	.36
30	0	444.	444.	315.	164.	328.	84.	.64	.32
25	0	471.	471.	327.	176.	362.	95.	.61	.28
20	0	495.	495.	339.	188.	399.	107.	.58	.23
15	0	515.	515.	349.	201.	441.	121.	.54	.18
10	0	535.	535.	358.	217.	497.	140.	.50	.14
5	0	558.	558.	370.	248.	607.	179.	.43	.08
0	0	583.	583.	382.	342.	994.	323.	.29	.03

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	19.	19.	15.	23.	136.	2.	.09	.09
90	0	56.	56.	44.	42.	136.	7.	.25	1.55
85	0	100.	100.	79.	58.	136.	12.	.41	2.16
80	0	134.	134.	106.	69.	136.	17.	.52	2.47
75	0	165.	165.	130.	78.	136.	21.	.61	2.60
70	0	201.	201.	159.	88.	137.	27.	.71	2.71
65	0	234.	234.	185.	98.	137.	32.	.79	2.71
60	0	265.	265.	209.	106.	137.	37.	.86	2.74
55	0	298.	298.	234.	116.	137.	44.	.93	2.62
50	0	328.	328.	258.	125.	138.	50.	.98	2.42
45	0	359.	359.	273.	135.	155.	58.	.94	.55
40	0	390.	390.	288.	145.	174.	66.	.91	.53
35	0	421.	421.	303.	156.	194.	76.	.87	.48
30	0	444.	444.	315.	164.	211.	84.	.84	.43
25	0	471.	471.	327.	176.	234.	95.	.80	.37
20	0	495.	495.	339.	188.	259.	107.	.76	.31
15	0	515.	515.	349.	201.	287.	121.	.71	.24
10	0	535.	535.	358.	217.	326.	140.	.66	.18
5	0	558.	558.	370.	248.	400.	179.	.57	.11
0	0	583.	583.	382.	342.	667.	323.	.38	.03

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	19.	19.	15.	23.	547.	2.	.03	.03
90	0	56.	56.	44.	42.	481.	7.	.08	-.62
85	0	100.	100.	79.	58.	448.	12.	.16	-2.08
80	0	134.	134.	106.	69.	433.	17.	.21	-6.29
75	0	165.	165.	130.	78.	421.	21.	.26	*****
70	0	201.	201.	159.	88.	411.	27.	.32	*****
65	0	234.	234.	185.	98.	403.	32.	.37	36.89
60	0	265.	265.	209.	106.	397.	37.	.42	10.07
55	0	298.	298.	234.	116.	389.	44.	.46	10.16
50	0	328.	328.	258.	125.	387.	50.	.50	3.93
45	0	359.	359.	273.	135.	427.	58.	.49	.29
40	0	390.	390.	288.	145.	471.	66.	.47	.28
35	0	421.	421.	303.	156.	518.	76.	.45	.26
30	0	444.	444.	315.	164.	558.	84.	.44	.23
25	0	471.	471.	327.	176.	611.	95.	.42	.20
20	0	495.	495.	339.	188.	667.	107.	.40	.17
15	0	515.	515.	349.	201.	729.	121.	.37	.13
10	0	535.	535.	358.	217.	813.	140.	.35	.10
5	0	558.	558.	370.	248.	973.	179.	.30	.06
0	0	583.	583.	382.	342.	1520.	323.	.20	.02

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION: THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 2.925 UNTS.

RUN COMPLETE.

83/06/14. 11.51.34.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

SITE NAME:CROW WING
SITE NUMBER:MN00608
RIVER NAME:CROW WING RIVER

EXISTING CAPACITY: 1500. KW
DESIGN DISCHARGE: 1100. CFS
OVERALL EFFICIENCY: .75

PROPOSED POWERPLANT

WEIGHTING FACTOR: -.50
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	90.	1199.3	1176.4
95	180.	1199.3	1176.7
90	230.	1199.3	1176.8
85	295.	1199.3	1176.9
80	340.	1199.3	1177.0
75	400.	1199.3	1177.1
70	445.	1199.3	1177.2
65	480.	1199.3	1177.2
60	520.	1199.3	1177.3
55	575.	1199.3	1177.4
50	650.	1199.3	1177.4
45	720.	1199.3	1177.5
40	800.	1199.3	1177.5
35	860.	1199.3	1177.6
30	995.	1199.3	1177.7
25	1140.	1199.3	1177.8
20	1350.	1199.3	1178.0
15	1625.	1199.3	1178.2
10	2040.	1199.3	1178.5
5	2800.	1199.3	1179.2
0	6500.	1199.3	1182.4

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	8005.	1058.	0	0	0	0	0	I	0
95	8005.	2101.	0	0	0	0	0	I	0
90	8005.	2650.	0	0	0	0	0	I	0
85	8005.	3325.	0	0	0	0	0	I	0
80	8005.	3768.	0	0	0	0	0	I	0
75	8005.	4321.	0	0	0	0	0	I	0
70	8005.	4711.	0	0	0	0	0	I	0
65	8005.	4987.	0	0	0	0	0	I	0
60	8005.	5287.	0	0	0	0	0	I	0
55	8005.	5663.	0	0	0	0	0	I	0
50	8005.	6119.	0	0	0	0	0	I	0
45	8005.	6511.	0	0	0	0	0	I	0
40	8005.	6901.	0	0	0	0	0	I	0
35	8005.	7166.	0	0	0	0	0	I	0
30	8005.	7670.	0	0	0	0	0	I	0
25	8005.	8184.	179.	107.	138.	142.	60.	.38	.38
20	8005.	9026.	1021.	618.	379.	656.	389.	.60	.68
15	8005.	9883.	1878.	1139.	564.	1202.	810.	.64	.71
10	8005.	10740.	2734.	1588.	768.	1926.	1431.	.59	.48
5	8005.	11610.	3605.	2008.	1041.	3087.	2506.	.49	.29
0	8005.	12792.	4787.	2580.	1777.	7351.	6707.	.28	.11

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	8005.	1058.	0	0	0	0	0	I	0
95	8005.	2101.	0	0	0	0	0	I	0
90	8005.	2650.	0	0	0	0	0	I	0
85	8005.	3325.	0	0	0	0	0	I	0
80	8005.	3768.	0	0	0	0	0	I	0
75	8005.	4321.	0	0	0	0	0	I	0
70	8005.	4711.	0	0	0	0	0	I	0
65	8005.	4987.	0	0	0	0	0	I	0
60	8005.	5287.	0	0	0	0	0	I	0
55	8005.	5663.	0	0	0	0	0	I	0
50	8005.	6119.	0	0	0	0	0	I	0
45	8005.	6511.	0	0	0	0	0	I	0
40	8005.	6901.	0	0	0	0	0	I	0
35	8005.	7166.	0	0	0	0	0	I	0
30	8005.	7670.	0	0	0	0	0	I	0
25	8005.	8184.	179.	107.	138.	142.	60.	.38	.38
20	8005.	9026.	1021.	618.	379.	656.	389.	.60	.68
15	8005.	9883.	1878.	1139.	564.	1202.	810.	.64	.71
10	8005.	10740.	2734.	1588.	768.	1926.	1431.	.59	.48
5	8005.	11610.	3605.	2008.	1041.	3087.	2506.	.49	.29
0	8005.	12792.	4787.	2580.	1777.	7351.	6707.	.28	.11

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	8005.	1058.	0	0	0	0	0	I	0
95	8005.	2101.	0	0	0	0	0	I	0
90	8005.	2650.	0	0	0	0	0	I	0
85	8005.	3325.	0	0	0	0	0	I	0
80	8005.	3768.	0	0	0	0	0	I	0
75	8005.	4321.	0	0	0	0	0	I	0
70	8005.	4711.	0	0	0	0	0	I	0
65	8005.	4987.	0	0	0	0	0	I	0
60	8005.	5287.	0	0	0	0	0	I	0
55	8005.	5663.	0	0	0	0	0	I	0
50	8005.	6119.	0	0	0	0	0	I	0
45	8005.	6511.	0	0	0	0	0	I	0
40	8005.	6901.	0	0	0	0	0	I	0
35	8005.	7166.	0	0	0	0	0	I	0
30	8005.	7670.	0	0	0	0	0	I	0
25	8005.	8184.	179.	107.	138.	189.	60.	.33	.33
20	8005.	9026.	1021.	618.	379.	875.	389.	.49	.55
15	8005.	9883.	1878.	1139.	564.	1603.	810.	.53	.57
10	8005.	10740.	2734.	1588.	768.	2568.	1431.	.48	.38
5	8005.	11610.	3605.	2008.	1041.	4115.	2506.	.39	.23
0	8005.	12792.	4787.	2580.	1777.	9801.	6707.	.22	.09

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION:THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 2.418 UNTS.

RUN COMPLETE.

83/06/02. 13.37.52.
MNFTS PROGRAM HYFEAS

SITE NAME: BLANDIN
SITE NUMBER: MN00602
RIVER NAME: MISSISSIPPI RIVER

INPUT DATA:
****
EXISTING POWERPLANT

EXISTING CAPACITY: 2100. KW
DESIGN DISCHARGE: 1630. CFS
OVERALL EFFICIENCY: .75

PROPOSED POWERPLANT

WEIGHTING FACTOR: .30
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	60.	1268.2	1244.3
95	220.	1268.2	1244.9
90	330.	1268.2	1245.3
85	480.	1268.2	1245.7
80	625.	1268.2	1245.9
75	760.	1268.2	1246.3
70	880.	1268.2	1246.5
65	1000.	1268.2	1246.7
60	1130.	1268.2	1247.0
55	1260.	1268.2	1247.1
50	1390.	1268.2	1247.4
45	1510.	1268.2	1247.6
40	1630.	1268.2	1247.8
35	1740.	1268.2	1248.0
30	1845.	1268.2	1248.3
25	1945.	1268.2	1248.4
20	2030.	1268.2	1248.5
15	2130.	1268.2	1248.7
10	2340.	1268.2	1249.0
5	2690.	1268.2	1249.6
0	3700.	1268.2	1250.9

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	13125.	653.	0	0	0	0	0	I	0
95	13125.	2372.	0	0	0	0	0	I	0
90	13125.	3506.	0	0	0	0	0	I	0
85	13125.	4970.	0	0	0	0	0	I	0
80	13125.	6293.	0	0	0	0	0	I	0
75	13125.	7481.	0	0	0	0	0	I	0
70	13125.	8453.	0	0	0	0	0	I	0
65	13125.	9359.	0	0	0	0	0	I	0
60	13125.	10284.	0	0	0	0	0	I	0
55	13125.	11103.	0	0	0	0	0	I	0
50	13125.	11885.	0	0	0	0	0	I	0
45	13125.	12528.	0	0	0	0	0	I	0
40	13125.	13104.	0	0	0	0	0	I	0
35	13125.	13730.	605.	448.	237.	623.	164.	.52	.52
30	13125.	14288.	1164.	884.	345.	1052.	327.	.63	.81
25	13125.	14731.	1606.	1145.	421.	1392.	473.	.63	.62
20	13125.	15056.	1931.	1339.	478.	1661.	597.	.63	.60
15	13125.	15388.	2263.	1542.	537.	1964.	741.	.62	.56
10	13125.	15934.	2809.	1889.	644.	2544.	1035.	.59	.51
5	13125.	16596.	3471.	2329.	788.	3411.	1501.	.55	.43
0	13125.	17488.	4364.	2851.	1088.	5494.	2716.	.43	.22

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	13125.	653.	0	0	0	0	0	I	0
95	13125.	2372.	0	0	0	0	0	I	0
90	13125.	3506.	0	0	0	0	0	I	0
85	13125.	4970.	0	0	0	0	0	I	0
80	13125.	6293.	0	0	0	0	0	I	0
75	13125.	7481.	0	0	0	0	0	I	0
70	13125.	8453.	0	0	0	0	0	I	0
65	13125.	9359.	0	0	0	0	0	I	0
60	13125.	10284.	0	0	0	0	0	I	0
55	13125.	11103.	0	0	0	0	0	I	0
50	13125.	11885.	0	0	0	0	0	I	0
45	13125.	12528.	0	0	0	0	0	I	0
40	13125.	13104.	0	0	0	0	0	I	0
35	13125.	13730.	605.	448.	237.	329.	164.	.79	.79
30	13125.	14288.	1164.	884.	345.	594.	327.	.94	1.17
25	13125.	14731.	1606.	1145.	421.	829.	473.	.92	.84
20	13125.	15056.	1931.	1339.	478.	1021.	597.	.89	.78
15	13125.	15388.	2263.	1542.	537.	1243.	741.	.87	.72
10	13125.	15934.	2809.	1889.	644.	1679.	1035.	.81	.64
5	13125.	16596.	3471.	2329.	788.	2355.	1501.	.74	.54
0	13125.	17488.	4364.	2851.	1088.	4058.	2716.	.55	.26

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	13125.	653.	0	0	0	0	0	I	0
95	13125.	2372.	0	0	0	0	0	I	0
90	13125.	3506.	0	0	0	0	0	I	0
85	13125.	4970.	0	0	0	0	0	I	0
80	13125.	6293.	0	0	0	0	0	I	0
75	13125.	7481.	0	0	0	0	0	I	0
70	13125.	8453.	0	0	0	0	0	I	0
65	13125.	9359.	0	0	0	0	0	I	0
60	13125.	10284.	0	0	0	0	0	I	0
55	13125.	11103.	0	0	0	0	0	I	0
50	13125.	11885.	0	0	0	0	0	I	0
45	13125.	12528.	0	0	0	0	0	I	0
40	13125.	13104.	0	0	0	0	0	I	0
35	13125.	13730.	605.	448.	237.	930.	164.	.38	.38
30	13125.	14288.	1164.	884.	345.	1511.	327.	.48	.63
25	13125.	14731.	1606.	1145.	421.	1956.	473.	.48	.50
20	13125.	15056.	1931.	1339.	478.	2302.	597.	.48	.48
15	13125.	15388.	2263.	1542.	537.	2686.	741.	.48	.46
10	13125.	15934.	2809.	1889.	644.	3409.	1035.	.47	.42
5	13125.	16596.	3471.	2329.	788.	4466.	1501.	.44	.37
0	13125.	17488.	4364.	2851.	1088.	6929.	2716.	.36	.19

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION: THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 2.594 UNTS.

RUN COMPLETE.

83/05/25. 14.48.11.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

SITE NAME:LEECH LAKE DAM
SITE NUMBER:MN00585
RIVER NAME:LEECH LAKE RIVER

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .50
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	47.	1295.8	1284.6
95	88.	1295.8	1285.0
90	97.	1295.8	1285.1
85	100.	1295.8	1285.1
80	105.	1295.8	1285.1
75	110.	1295.8	1285.2
70	120.	1295.8	1285.2
65	200.	1295.8	1285.9
60	275.	1295.8	1286.4
55	347.	1295.8	1286.9
50	433.	1295.8	1287.4
45	520.	1295.8	1288.0
40	610.	1295.8	1288.5
35	675.	1295.8	1288.8
30	710.	1295.8	1289.0
25	745.	1295.8	1289.1
20	783.	1295.8	1289.3
15	822.	1295.8	1289.4
10	865.	1295.8	1289.6
5	925.	1295.8	1289.8
0	1020.	1295.8	1290.1

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	192.	192.	0	107.	402.	38.	0	0
95	0	365.	365.	270.	147.	496.	68.	.42	.42
90	0	404.	404.	299.	155.	530.	75.	.44	.70
85	0	416.	416.	308.	157.	541.	77.	.44	.63
80	0	435.	435.	322.	161.	561.	81.	.45	.60
75	0	453.	453.	336.	165.	578.	84.	.45	.72
70	0	483.	483.	362.	173.	615.	92.	.46	.56
65	0	715.	715.	539.	220.	866.	143.	.50	.60
60	0	917.	917.	686.	254.	1069.	186.	.52	.62
55	0	1098.	1098.	830.	280.	1239.	222.	.55	.74
50	0	1296.	1296.	981.	306.	1423.	262.	.57	.72
45	0	1487.	1487.	1127.	324.	1580.	292.	.59	.83
40	0	1665.	1665.	1254.	341.	1731.	321.	.61	.76
35	0	1780.	1780.	1350.	352.	1833.	340.	.62	.84
30	0	1836.	1836.	1394.	356.	1881.	348.	.62	.86
25	0	1879.	1879.	1415.	363.	1937.	360.	.62	.33
20	0	1921.	1921.	1435.	367.	1986.	367.	.61	.39
15	0	1951.	1951.	1450.	373.	2045.	379.	.60	.22
10	0	1978.	1978.	1462.	377.	2097.	386.	.59	.23
5	0	1998.	1998.	1472.	384.	2174.	400.	.58	.12
0	0	2009.	2009.	1478.	394.	2289.	419.	.55	.04

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	192.	192.	0	107.	204.	38.	0	0
95	0	365.	365.	270.	147.	267.	68.	.65	.65
90	0	404.	404.	299.	155.	288.	75.	.67	1.03
85	0	416.	416.	308.	157.	295.	77.	.68	.91
80	0	435.	435.	322.	161.	307.	81.	.69	.87
75	0	453.	453.	336.	165.	318.	84.	.70	1.06
70	0	483.	483.	362.	173.	341.	92.	.70	.80
65	0	715.	715.	539.	220.	503.	143.	.75	.85
60	0	917.	917.	686.	254.	637.	186.	.77	.87
55	0	1098.	1098.	830.	280.	751.	222.	.81	1.03
50	0	1296.	1296.	981.	306.	877.	262.	.83	.99
45	0	1487.	1487.	1127.	324.	984.	292.	.86	1.16
40	0	1665.	1665.	1254.	341.	1087.	321.	.88	1.06
35	0	1780.	1780.	1350.	352.	1158.	340.	.89	1.16
30	0	1836.	1836.	1394.	356.	1191.	348.	.90	1.21
25	0	1879.	1879.	1415.	363.	1230.	360.	.89	.45
20	0	1921.	1921.	1435.	367.	1263.	367.	.88	.56
15	0	1951.	1951.	1450.	373.	1305.	379.	.86	.30
10	0	1978.	1978.	1462.	377.	1340.	386.	.85	.32
5	0	1998.	1998.	1472.	384.	1395.	400.	.83	.16
0	0	2009.	2009.	1478.	394.	1475.	419.	.79	.06

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	192.	192.	0	107.	600.	38.	0	0
95	0	365.	365.	270.	147.	724.	68.	.31	.31
90	0	404.	404.	299.	155.	771.	75.	.32	.53
85	0	416.	416.	308.	157.	788.	77.	.33	.48
80	0	435.	435.	322.	161.	814.	81.	.33	.46
75	0	453.	453.	336.	165.	838.	84.	.34	.55
70	0	483.	483.	362.	173.	889.	92.	.34	.43
65	0	715.	715.	539.	220.	1230.	143.	.37	.46
60	0	917.	917.	686.	254.	1501.	186.	.39	.48
55	0	1098.	1098.	830.	280.	1727.	222.	.41	.57
50	0	1296.	1296.	981.	306.	1970.	262.	.43	.56
45	0	1487.	1487.	1127.	324.	2177.	292.	.45	.65
40	0	1665.	1665.	1254.	341.	2374.	321.	.46	.60
35	0	1780.	1780.	1350.	352.	2509.	340.	.47	.66
30	0	1836.	1836.	1394.	356.	2572.	348.	.48	.66
25	0	1879.	1879.	1415.	363.	2644.	360.	.47	.26
20	0	1921.	1921.	1435.	367.	2708.	367.	.47	.30
15	0	1951.	1951.	1450.	373.	2785.	379.	.46	.17
10	0	1978.	1978.	1462.	377.	2853.	386.	.45	.18
5	0	1998.	1998.	1472.	384.	2954.	400.	.44	.09
0	0	2009.	2009.	1478.	394.	3104.	419.	.42	.03

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION:THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 3.024 UNTS.

RUN COMPLETE.

83/06/14. 11.46.31.
MNFTS   PROGRAM   HYFEAS

SITE NAME: SCANLON
SITE NUMBER: MN00605
RIVER NAME: SAINT LOUIS RIVER

INPUT DATA:
****

EXISTING POWERPLANT

EXISTING CAPACITY: 1500. KW
DESIGN DISCHARGE: 1480. CFS
OVERALL EFFICIENCY: .75

PROPOSED POWERPLANT

WEIGHTING FACTOR: .10
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	160.	1120.8	1104.3
95	470.	1120.8	1104.3
90	600.	1120.8	1104.4
85	700.	1120.8	1104.4
80	780.	1120.8	1104.4
75	830.	1120.8	1104.5
70	910.	1120.8	1104.5
65	980.	1120.8	1104.5
60	1050.	1120.8	1104.5
55	1150.	1120.8	1104.5
50	1230.	1120.8	1104.6
45	1330.	1120.8	1104.6
40	1450.	1120.8	1104.8
35	1580.	1120.8	1104.8
30	1760.	1120.8	1104.9
25	2100.	1120.8	1105.1
20	2620.	1120.8	1105.1
15	3490.	1120.8	1105.2
10	4850.	1120.8	1105.9
5	8000.	1120.8	1106.8
0	19000.	1120.8	1110.0

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	9786.	1386.	0	0	0	0	0	I	0
95	9786.	4001.	0	0	0	0	0	I	0
90	9786.	5053.	0	0	0	0	0	I	0
85	9786.	5807.	0	0	0	0	0	I	0
80	9786.	6374.	0	0	0	0	0	I	0
75	9786.	6722.	0	0	0	0	0	I	0
70	9786.	7218.	0	0	0	0	0	I	0
65	9786.	7620.	0	0	0	0	0	I	0
60	9786.	7990.	0	0	0	0	0	I	0
55	9786.	8474.	0	0	0	0	0	I	0
50	9786.	8841.	0	0	0	0	0	I	0
45	9786.	9236.	0	0	0	0	0	I	0
40	9786.	9686.	0	0	0	0	0	I	0
35	9786.	10186.	399.	234.	193.	404.	113.	.39	.39
30	9786.	10855.	1069.	631.	342.	931.	323.	.50	.59
25	9786.	11974.	2188.	1306.	526.	1752.	713.	.57	.67
20	9786.	13298.	3512.	2202.	729.	2829.	1301.	.62	.70
15	9786.	14811.	5024.	2951.	988.	4428.	2275.	.54	.40
10	9786.	16431.	6645.	3735.	1280.	6584.	3664.	.47	.32
5	9786.	18511.	8725.	4740.	1770.	10927.	6658.	.37	.21
0	9786.	20691.	10905.	5794.	2630.	21764.	13810.	.24	.09

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	9786.	1386.	0	0	0	0	0	I	0
95	9786.	4001.	0	0	0	0	0	I	0
90	9786.	5053.	0	0	0	0	0	I	0
85	9786.	5807.	0	0	0	0	0	I	0
80	9786.	6374.	0	0	0	0	0	I	0
75	9786.	6722.	0	0	0	0	0	I	0
70	9786.	7218.	0	0	0	0	0	I	0
65	9786.	7620.	0	0	0	0	0	I	0
60	9786.	7990.	0	0	0	0	0	I	0
55	9786.	8474.	0	0	0	0	0	I	0
50	9786.	8841.	0	0	0	0	0	I	0
45	9786.	9236.	0	0	0	0	0	I	0
40	9786.	9686.	0	0	0	0	0	I	0
35	9786.	10186.	399.	234.	193.	263.	113.	.51	.51
30	9786.	10855.	1069.	631.	342.	624.	323.	.65	.78
25	9786.	11974.	2188.	1306.	526.	1200.	713.	.76	.89
20	9786.	13298.	3512.	2202.	729.	1965.	1301.	.82	.92
15	9786.	14811.	5024.	2951.	988.	3115.	2275.	.72	.53
10	9786.	16431.	6645.	3735.	1280.	4858.	3664.	.61	.39
5	9786.	18511.	8725.	4740.	1770.	8325.	6658.	.47	.25
0	9786.	20691.	10905.	5794.	2630.	16582.	13810.	.30	.12

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	9786.	1386.	0	0	0	0	0	I	0
95	9786.	4001.	0	0	0	0	0	I	0
90	9786.	5053.	0	0	0	0	0	I	0
85	9786.	5807.	0	0	0	0	0	I	0
80	9786.	6374.	0	0	0	0	0	I	0
75	9786.	6722.	0	0	0	0	0	I	0
70	9786.	7218.	0	0	0	0	0	I	0
65	9786.	7620.	0	0	0	0	0	I	0
60	9786.	7990.	0	0	0	0	0	I	0
55	9786.	8474.	0	0	0	0	0	I	0
50	9786.	8841.	0	0	0	0	0	I	0
45	9786.	9236.	0	0	0	0	0	I	0
40	9786.	9686.	0	0	0	0	0	I	0
35	9786.	10186.	399.	234.	193.	672.	113.	.27	.27
30	9786.	10855.	1069.	631.	342.	1422.	323.	.36	.44
25	9786.	11974.	2188.	1306.	526.	2515.	713.	.43	.53
20	9786.	13298.	3512.	2202.	729.	3871.	1301.	.48	.57
15	9786.	14811.	5024.	2951.	988.	5799.	2275.	.43	.34
10	9786.	16431.	6645.	3735.	1280.	8310.	3664.	.39	.28
5	9786.	18511.	8725.	4740.	1770.	13529.	6658.	.31	.18
0	9786.	20691.	10905.	5794.	2630.	26946.	13810.	.20	.07

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION:THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 2.494 UNTS.

RUN COMPLETE.

83/05/25. 14.04.26.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

NONE

SITE NAME:PELICAN RIVER DAM
SITE NUMBER:MN00191
RIVER NAME:PELICAN RIVER

PROPOSED POWERPLANT

WEIGHTING FACTOR: .20
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	0	1227.0	1213.0
95	3.	1227.0	1213.0
90	8.	1227.1	1213.1
85	13.	1227.1	1213.2
80	18.	1227.2	1213.3
75	23.	1227.2	1213.4
70	28.	1227.3	1213.5
65	34.	1227.3	1213.6
60	40.	1227.4	1213.7
55	48.	1227.5	1213.8
50	56.	1227.6	1213.9
45	64.	1227.6	1214.0
40	74.	1227.7	1214.2
35	84.	1227.8	1214.4
30	95.	1227.9	1214.6
25	108.	1228.0	1214.8
20	123.	1228.1	1215.0
15	141.	1228.2	1215.2
10	161.	1228.4	1215.4
5	213.	1228.7	1216.0
0	408.	1229.5	1217.1

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	19.	19.	15.	25.	313.	3.	.04	.04
90	0	56.	56.	44.	44.	291.	8.	.13	*****
85	0	92.	92.	73.	58.	282.	12.	.21	5.51
80	0	126.	126.	100.	70.	277.	17.	.29	4.27
75	0	158.	158.	124.	80.	273.	22.	.35	3.89
70	0	190.	190.	150.	89.	271.	27.	.42	3.71
65	0	222.	222.	176.	99.	268.	33.	.48	3.57
60	0	253.	253.	200.	108.	266.	39.	.53	3.42
55	0	286.	286.	225.	118.	265.	45.	.59	3.14
50	0	321.	321.	251.	128.	275.	53.	.62	1.24
45	0	349.	349.	273.	137.	304.	60.	.62	.58
40	0	382.	382.	288.	147.	337.	68.	.60	.36
35	0	410.	410.	302.	156.	369.	76.	.58	.34
30	0	437.	437.	315.	166.	402.	85.	.55	.30
25	0	462.	462.	327.	176.	439.	94.	.53	.26
20	0	486.	486.	339.	187.	482.	106.	.51	.21
15	0	508.	508.	349.	200.	533.	120.	.48	.17
10	0	525.	525.	358.	213.	586.	135.	.45	.12
5	0	549.	549.	370.	240.	709.	168.	.39	.08
0	0	574.	574.	381.	323.	1120.	291.	.26	.02

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	19.	19.	15.	25.	141.	3.	.09	.09
90	0	56.	56.	44.	44.	142.	8.	.24	1.46
85	0	92.	92.	73.	58.	142.	12.	.36	1.99
80	0	126.	126.	100.	70.	142.	17.	.47	2.26
75	0	158.	158.	124.	80.	143.	22.	.56	2.43
70	0	190.	190.	150.	89.	143.	27.	.64	2.53
65	0	222.	222.	176.	99.	144.	33.	.72	2.59
60	0	253.	253.	200.	108.	144.	39.	.79	2.60
55	0	286.	286.	225.	118.	144.	45.	.86	2.47
50	0	321.	321.	251.	128.	151.	53.	.90	1.48
45	0	349.	349.	273.	137.	168.	60.	.89	.84
40	0	382.	382.	288.	147.	188.	68.	.86	.52
35	0	410.	410.	302.	156.	207.	76.	.83	.49
30	0	437.	437.	315.	166.	228.	85.	.80	.44
25	0	462.	462.	327.	176.	250.	94.	.77	.38
20	0	486.	486.	339.	187.	276.	106.	.73	.31
15	0	508.	508.	349.	200.	307.	120.	.69	.24
10	0	525.	525.	358.	213.	340.	135.	.65	.18
5	0	549.	549.	370.	240.	416.	168.	.56	.11
0	0	574.	574.	381.	323.	676.	291.	.38	.03

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	19.	19.	15.	25.	625.	3.	.02	.02
90	0	56.	56.	44.	44.	545.	8.	.08	-.50
85	0	92.	92.	73.	58.	513.	12.	.13	-1.58
80	0	126.	126.	100.	70.	494.	17.	.18	-3.38
75	0	158.	158.	124.	80.	481.	22.	.22	-6.98
70	0	190.	190.	150.	89.	470.	27.	.27	*****
65	0	222.	222.	176.	99.	460.	33.	.31	*****
60	0	253.	253.	200.	108.	452.	39.	.36	19.64
55	0	286.	286.	225.	118.	445.	45.	.40	11.30
50	0	321.	321.	251.	128.	458.	53.	.43	1.11
45	0	349.	349.	273.	137.	501.	60.	.43	.42
40	0	382.	382.	288.	147.	552.	68.	.41	.26
35	0	410.	410.	302.	156.	600.	76.	.40	.24
30	0	437.	437.	315.	166.	650.	85.	.39	.22
25	0	462.	462.	327.	176.	705.	94.	.37	.19
20	0	486.	486.	339.	187.	768.	106.	.35	.16
15	0	508.	508.	349.	200.	842.	120.	.34	.12
10	0	525.	525.	358.	213.	919.	135.	.32	.09
5	0	549.	549.	370.	240.	1095.	168.	.28	.06
0	0	574.	574.	381.	323.	1667.	291.	.19	.02

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION: THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 2.876 UNTS.

RUN COMPLETE.

83/05/25. 13.32.17.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

SITE NAME:KNIFE FALLS
SITE NUMBER:MN00606
RIVER NAME:SAINT LOUIS RIVER

EXISTING CAPACITY: 1900. KW
DESIGN DISCHARGE: 1630. CFS
OVERALL EFFICIENCY: .75

PROPOSED POWERPLANT

WEIGHTING FACTOR: .10
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	120.	1179.6	1160.9
95	460.	1179.6	1161.0
90	600.	1179.6	1161.0
85	710.	1179.6	1161.1
80	800.	1179.6	1161.1
75	850.	1179.6	1161.1
70	910.	1179.6	1161.2
65	1000.	1179.6	1161.2
60	1060.	1179.6	1161.2
55	1150.	1179.6	1161.2
50	1230.	1179.6	1161.2
45	1330.	1179.6	1161.3
40	1450.	1179.6	1161.3
35	1580.	1179.6	1161.3
30	1770.	1179.6	1161.3
25	2130.	1179.6	1161.4
20	2670.	1179.6	1161.4
15	3550.	1179.6	1161.5
10	4950.	1179.6	1161.8
5	7700.	1179.6	1162.7
0	18300.	1179.6	1164.3

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	11897.	1201.	0	0	0	0	0	I	0
95	11897.	4526.	0	0	0	0	0	I	0
90	11897.	5821.	0	0	0	0	0	I	0
85	11897.	6799.	0	0	0	0	0	I	0
80	11897.	7541.	0	0	0	0	0	I	0
75	11897.	7927.	0	0	0	0	0	I	0
70	11897.	8378.	0	0	0	0	0	I	0
65	11897.	8983.	0	0	0	0	0	I	0
60	11897.	9356.	0	0	0	0	0	I	0
55	11897.	9868.	0	0	0	0	0	I	0
50	11897.	10283.	0	0	0	0	0	I	0
45	11897.	10767.	0	0	0	0	0	I	0
40	11897.	11268.	0	0	0	0	0	I	0
35	11897.	11745.	0	0	0	0	0	I	0
30	11897.	12507.	610.	355.	254.	574.	187.	.43	.43
25	11897.	13898.	2001.	1178.	506.	1571.	663.	.57	.66
20	11897.	15594.	3697.	2183.	750.	2801.	1371.	.61	.68
15	11897.	17496.	5599.	3149.	1043.	4555.	2516.	.56	.47
10	11897.	19521.	7624.	4128.	1393.	7011.	4284.	.49	.35
5	11897.	21876.	9979.	5267.	1883.	11229.	7460.	.40	.24
0	11897.	24720.	12823.	6642.	3084.	24497.	18510.	.24	.10

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	11897.	1201.	0	0	0	0	0	I	0
95	11897.	4526.	0	0	0	0	0	I	0
90	11897.	5821.	0	0	0	0	0	I	0
85	11897.	6799.	0	0	0	0	0	I	0
80	11897.	7541.	0	0	0	0	0	I	0
75	11897.	7927.	0	0	0	0	0	I	0
70	11897.	8378.	0	0	0	0	0	I	0
65	11897.	8983.	0	0	0	0	0	I	0
60	11897.	9356.	0	0	0	0	0	I	0
55	11897.	9868.	0	0	0	0	0	I	0
50	11897.	10283.	0	0	0	0	0	I	0
45	11897.	10767.	0	0	0	0	0	I	0
40	11897.	11268.	0	0	0	0	0	I	0
35	11897.	11745.	0	0	0	0	0	I	0
30	11897.	12507.	610.	355.	254.	379.	187.	.56	.56
25	11897.	13898.	2001.	1178.	506.	1074.	663.	.75	.87
20	11897.	15594.	3697.	2183.	750.	1948.	1371.	.81	.90
15	11897.	17496.	5599.	3149.	1043.	3211.	2516.	.74	.62
10	11897.	19521.	7624.	4128.	1393.	5280.	4284.	.62	.40
5	11897.	21876.	9979.	5267.	1883.	8556.	7460.	.50	.30
0	11897.	24720.	12823.	6642.	3084.	18664.	18510.	.31	.12

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	11897.	1201.	0	0	0	0	0	I	0
95	11897.	4526.	0	0	0	0	0	I	0
90	11897.	5821.	0	0	0	0	0	I	0
85	11897.	6799.	0	0	0	0	0	I	0
80	11897.	7541.	0	0	0	0	0	I	0
75	11897.	7927.	0	0	0	0	0	I	0
70	11897.	8378.	0	0	0	0	0	I	0
65	11897.	8983.	0	0	0	0	0	I	0
60	11897.	9356.	0	0	0	0	0	I	0
55	11897.	9868.	0	0	0	0	0	I	0
50	11897.	10283.	0	0	0	0	0	I	0
45	11897.	10767.	0	0	0	0	0	I	0
40	11897.	11268.	0	0	0	0	0	I	0
35	11897.	11745.	0	0	0	0	0	I	0
30	11897.	12507.	610.	355.	254.	917.	187.	.30	.30
25	11897.	13898.	2001.	1178.	506.	2267.	663.	.42	.51
20	11897.	15594.	3697.	2183.	750.	3817.	1371.	.48	.56
15	11897.	17496.	5599.	3149.	1043.	5919.	2516.	.45	.40
10	11897.	19521.	7624.	4128.	1393.	8743.	4284.	.41	.31
5	11897.	21876.	9979.	5267.	1883.	13903.	7460.	.33	.20
0	11897.	24720.	12823.	6642.	3084.	30330.	18510.	.20	.08

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION:THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 2.541 UNTS.

RUN COMPLETE.

83/05/25. 13.45.52.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: -.50
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

SITE NAME: JACKSON DAM
SITE NUMBER: MN00117
RIVER NAME: DES MOINES RIVER

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	0	1300.7	1290.5
95	2.	1300.7	1290.5
90	5.	1300.7	1290.5
85	7.	1300.7	1290.5
80	10.	1300.7	1290.5
75	15.	1300.7	1290.5
70	20.	1300.7	1290.6
65	25.	1300.7	1290.7
60	30.	1300.7	1290.8
55	45.	1300.7	1290.9
50	60.	1300.7	1291.0
45	80.	1300.8	1291.0
40	105.	1300.8	1291.1
35	140.	1300.8	1291.2
30	190.	1300.8	1291.3
25	260.	1300.8	1291.4
20	370.	1300.9	1291.5
15	530.	1301.0	1292.3
10	770.	1301.2	1293.2
5	1220.	1301.6	1294.6
0	3040.	1303.0	1298.4

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	10.	10.	8.	18.	158.	1.	.05	.05
90	0	26.	26.	20.	30.	158.	4.	.11	1.03
85	0	36.	36.	28.	36.	158.	5.	.14	1.29
80	0	49.	49.	39.	44.	158.	7.	.19	1.41
75	0	71.	71.	56.	55.	158.	11.	.26	1.56
70	0	91.	91.	72.	64.	158.	15.	.32	1.70
65	0	110.	110.	85.	71.	159.	18.	.37	1.51
60	0	128.	128.	98.	78.	160.	21.	.41	1.81
55	0	175.	175.	128.	97.	160.	32.	.50	1.55
50	0	217.	217.	156.	113.	161.	42.	.57	1.67
45	0	267.	267.	189.	132.	176.	56.	.61	.98
40	0	323.	323.	217.	152.	219.	73.	.58	.43
35	0	389.	389.	249.	177.	276.	96.	.55	.40
30	0	469.	469.	303.	208.	353.	129.	.54	.50
25	0	559.	559.	346.	245.	454.	174.	.50	.32
20	0	667.	667.	398.	295.	603.	245.	.44	.26
15	0	788.	788.	457.	341.	776.	321.	.41	.27
10	0	906.	906.	514.	393.	999.	416.	.37	.21
5	0	1017.	1017.	568.	451.	1323.	536.	.32	.14
0	0	1073.	1073.	595.	436.	1768.	504.	.27	.06

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	10.	10.	8.	18.	158.	1.	.05	.05
90	0	26.	26.	20.	30.	158.	4.	.11	1.03
85	0	36.	36.	28.	36.	158.	5.	.14	1.29
80	0	49.	49.	39.	44.	158.	7.	.19	1.41
75	0	71.	71.	56.	55.	158.	11.	.26	1.56
70	0	91.	91.	72.	64.	158.	15.	.32	1.70
65	0	110.	110.	85.	71.	159.	18.	.37	1.51
60	0	128.	128.	98.	78.	160.	21.	.41	1.81
55	0	175.	175.	128.	97.	160.	32.	.50	1.55
50	0	217.	217.	156.	113.	161.	42.	.57	1.67
45	0	267.	267.	189.	132.	176.	56.	.61	.98
40	0	323.	323.	217.	152.	219.	73.	.58	.43
35	0	389.	389.	249.	177.	276.	96.	.55	.40
30	0	469.	469.	303.	208.	353.	129.	.54	.50
25	0	559.	559.	346.	245.	454.	174.	.50	.32
20	0	667.	667.	398.	295.	603.	245.	.44	.26
15	0	788.	788.	457.	341.	776.	321.	.41	.27
10	0	906.	906.	514.	393.	999.	416.	.37	.21
5	0	1017.	1017.	568.	451.	1323.	536.	.32	.14
0	0	1073.	1073.	595.	436.	1768.	504.	.27	.06

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	10.	10.	8.	18.	211.	1.	.04	.04
90	0	26.	26.	20.	30.	211.	4.	.08	1.03
85	0	36.	36.	28.	36.	211.	5.	.11	1.29
80	0	49.	49.	39.	44.	211.	7.	.15	1.41
75	0	71.	71.	56.	55.	211.	11.	.21	1.56
70	0	91.	91.	72.	64.	211.	15.	.26	1.67
65	0	110.	110.	85.	71.	212.	18.	.30	1.48
60	0	128.	128.	98.	78.	213.	21.	.34	1.77
55	0	175.	175.	128.	97.	214.	32.	.41	1.53
50	0	217.	217.	156.	113.	214.	42.	.48	1.65
45	0	267.	267.	189.	132.	235.	56.	.52	.86
40	0	323.	323.	217.	152.	292.	73.	.49	.35
35	0	389.	389.	249.	177.	368.	96.	.46	.33
30	0	469.	469.	303.	208.	470.	129.	.45	.40
25	0	559.	559.	346.	245.	605.	174.	.41	.25
20	0	667.	667.	398.	295.	804.	245.	.36	.21
15	0	788.	788.	457.	341.	1035.	321.	.33	.21
10	0	906.	906.	514.	393.	1333.	416.	.30	.16
5	0	1017.	1017.	568.	451.	1764.	536.	.26	.11
0	0	1073.	1073.	595.	436.	2357.	504.	.21	.05

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION:THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 2.871 UNTS.

RUN COMPLETE.

83/05/25. 13.43.00.
MNFTS   PROGRAM   HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .80
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000):   0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

SITE NAME:PINE RIVER
SITE NUMBER:MN00582
RIVER NAME:PINE RIVER

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	10.	1229.3	1215.8
95	32.	1229.3	1216.4
90	47.	1229.3	1216.5
85	60.	1229.3	1216.7
80	77.	1229.3	1216.8
75	92.	1229.3	1216.9
70	110.	1229.3	1217.0
65	128.	1229.3	1217.0
60	148.	1229.3	1217.1
55	169.	1229.3	1217.2
50	190.	1229.3	1217.3
45	215.	1229.3	1217.4
40	240.	1229.3	1217.5
35	267.	1229.3	1217.5
30	295.	1229.3	1217.6
25	325.	1229.3	1217.7
20	365.	1229.3	1217.8
15	423.	1229.3	1218.0
10	510.	1229.3	1218.2
5	720.	1229.3	1218.7
0	1600.	1229.3	1220.1

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	63.	63.	0	51.	582.	10.	0	0
95	0	206.	206.	163.	94.	512.	30.	.27	.27
90	0	303.	303.	239.	115.	489.	43.	.40	*****
85	0	388.	388.	306.	130.	512.	54.	.48	1.75
80	0	490.	490.	386.	148.	607.	69.	.51	.71
75	0	575.	575.	453.	163.	684.	82.	.53	.73
70	0	670.	670.	528.	179.	772.	97.	.55	.72
65	0	757.	757.	593.	194.	858.	113.	.56	.65
60	0	848.	848.	663.	209.	946.	130.	.57	.67
55	0	935.	935.	732.	223.	1034.	147.	.58	.68
50	0	1016.	1016.	784.	237.	1118.	164.	.58	.53
45	0	1101.	1101.	843.	252.	1215.	184.	.57	.53
40	0	1178.	1178.	881.	267.	1307.	204.	.56	.36
35	0	1248.	1248.	928.	283.	1407.	227.	.55	.41
30	0	1313.	1313.	971.	297.	1504.	249.	.54	.39
25	0	1372.	1372.	1000.	312.	1604.	272.	.52	.25
20	0	1434.	1434.	1030.	330.	1733.	302.	.50	.20
15	0	1505.	1505.	1064.	354.	1908.	344.	.47	.17
10	0	1579.	1579.	1100.	388.	2160.	408.	.43	.12
5	0	1683.	1683.	1150.	457.	2701.	550.	.36	.08
0	0	1818.	1818.	1215.	653.	4484.	1060.	.24	.03

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	63.	63.	0	51.	338.	10.	0	0
95	0	206.	206.	163.	94.	313.	30.	.40	.40
90	0	303.	303.	239.	115.	305.	43.	.57	5.89
85	0	388.	388.	306.	130.	323.	54.	.67	2.00
80	0	490.	490.	386.	148.	388.	69.	.72	.97
75	0	575.	575.	453.	163.	441.	82.	.75	.98
70	0	670.	670.	528.	179.	503.	97.	.77	.97
65	0	757.	757.	593.	194.	563.	113.	.78	.87
60	0	848.	848.	663.	209.	625.	130.	.79	.90
55	0	935.	935.	732.	223.	688.	147.	.80	.90
50	0	1016.	1016.	784.	237.	749.	164.	.79	.69
45	0	1101.	1101.	843.	252.	819.	184.	.79	.69
40	0	1178.	1178.	881.	267.	886.	204.	.76	.47
35	0	1248.	1248.	928.	283.	960.	227.	.75	.53
30	0	1313.	1313.	971.	297.	1031.	249.	.73	.50
25	0	1372.	1372.	1000.	312.	1105.	272.	.71	.32
20	0	1434.	1434.	1030.	330.	1202.	302.	.67	.26
15	0	1505.	1505.	1064.	354.	1333.	344.	.63	.22
10	0	1579.	1579.	1100.	388.	1524.	408.	.57	.16
5	0	1683.	1683.	1150.	457.	1940.	550.	.48	.10
0	0	1818.	1818.	1215.	653.	3352.	1060.	.30	.04

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	63.	63.	0	51.	827.	10.	0	0
95	0	206.	206.	163.	94.	710.	30.	.20	.20
90	0	303.	303.	239.	115.	673.	43.	.30	-4.67
85	0	388.	388.	306.	130.	701.	54.	.37	1.55
80	0	490.	490.	386.	148.	825.	69.	.40	.56
75	0	575.	575.	453.	163.	927.	82.	.42	.58
70	0	670.	670.	528.	179.	1042.	97.	.43	.57
65	0	757.	757.	593.	194.	1152.	113.	.44	.52
60	0	848.	848.	663.	209.	1266.	130.	.45	.54
55	0	935.	935.	732.	223.	1379.	147.	.46	.55
50	0	1016.	1016.	784.	237.	1487.	164.	.45	.42
45	0	1101.	1101.	843.	252.	1610.	184.	.45	.43
40	0	1178.	1178.	881.	267.	1728.	204.	.44	.29
35	0	1248.	1248.	928.	283.	1855.	227.	.43	.33
30	0	1313.	1313.	971.	297.	1976.	249.	.43	.32
25	0	1372.	1372.	1000.	312.	2102.	272.	.41	.20
20	0	1434.	1434.	1030.	330.	2264.	302.	.40	.17
15	0	1505.	1505.	1064.	354.	2483.	344.	.38	.14
10	0	1579.	1579.	1100.	388.	2795.	408.	.35	.10
5	0	1683.	1683.	1150.	457.	3462.	550.	.29	.07
0	0	1818.	1818.	1215.	653.	5617.	1060.	.19	.03

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION:THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 2.927 UNTS.

RUN COMPLETE.

83/05/24. 14.54.19.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .30
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

SITE NAME:PIKE RIVER
SITE NUMBER:MN00 92
RIVER NAME:PIKE RIVER

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	0	100.0	75.7
95	5.	100.0	75.9
90	6.	100.0	75.9
85	7.	100.0	75.9
80	9.	100.0	76.0
75	10.	100.0	76.0
70	12.	100.0	76.1
65	15.	100.0	76.2
60	17.	100.0	76.3
55	22.	100.1	76.4
50	27.	100.1	76.5
45	34.	100.1	76.7
40	42.	100.1	76.9
35	53.	100.2	77.2
30	67.	100.2	77.5
25	85.	100.2	77.8
20	110.	100.3	78.3
15	155.	100.4	79.0
10	232.	100.5	79.8
5	375.	100.7	80.8
0	850.	101.2	84.0

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	63.	63.	50.	48.	278.	9.	.15	.15
90	0	76.	76.	60.	53.	274.	10.	.18	13.43
85	0	88.	88.	69.	58.	271.	12.	.21	8.53
80	0	111.	111.	87.	66.	266.	16.	.26	5.69
75	0	122.	122.	95.	70.	263.	17.	.29	5.12
70	0	142.	142.	111.	77.	260.	21.	.33	4.15
65	0	170.	170.	132.	87.	256.	26.	.38	3.76
60	0	187.	187.	145.	93.	254.	29.	.42	3.61
55	0	226.	226.	172.	106.	249.	37.	.48	2.97
50	0	261.	261.	199.	118.	245.	46.	.55	3.13
45	0	306.	306.	224.	134.	270.	57.	.56	.63
40	0	351.	351.	257.	149.	315.	70.	.55	.54
35	0	406.	406.	285.	168.	372.	87.	.53	.36
30	0	465.	465.	313.	189.	441.	109.	.50	.32
25	0	529.	529.	344.	214.	524.	136.	.47	.29
20	0	601.	601.	379.	243.	630.	172.	.43	.26
15	0	699.	699.	427.	288.	804.	234.	.39	.22
10	0	816.	816.	483.	351.	1072.	338.	.34	.17
5	0	938.	938.	542.	443.	1508.	519.	.28	.11
0	0	1060.	1060.	601.	625.	2601.	980.	.19	.05

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	63.	63.	50.	48.	117.	9.	.30	.30
90	0	76.	76.	60.	53.	117.	10.	.35	1.97
85	0	88.	88.	69.	58.	117.	12.	.40	2.04
80	0	111.	111.	87.	66.	117.	16.	.48	2.14
75	0	122.	122.	95.	70.	117.	17.	.51	2.10
70	0	142.	142.	111.	77.	117.	21.	.57	2.10
65	0	170.	170.	132.	87.	117.	26.	.64	2.11
60	0	187.	187.	145.	93.	118.	29.	.69	2.27
55	0	226.	226.	172.	106.	118.	37.	.77	1.93
50	0	261.	261.	199.	118.	118.	46.	.84	2.20
45	0	306.	306.	224.	134.	132.	57.	.85	.86
40	0	351.	351.	257.	149.	156.	70.	.84	.82
35	0	406.	406.	285.	168.	188.	87.	.80	.55
30	0	465.	465.	313.	189.	226.	109.	.75	.48
25	0	529.	529.	344.	214.	273.	136.	.71	.43
20	0	601.	601.	379.	243.	334.	172.	.66	.39
15	0	699.	699.	427.	288.	436.	234.	.59	.33
10	0	816.	816.	483.	351.	608.	338.	.50	.24
5	0	938.	938.	542.	443.	910.	519.	.40	.15
0	0	1060.	1060.	601.	625.	1705.	980.	.26	.06

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	63.	63.	50.	48.	483.	9.	.09	.09
90	0	76.	76.	60.	53.	471.	10.	.11	-1.54
85	0	88.	88.	69.	58.	462.	12.	.13	-1.98
80	0	111.	111.	87.	66.	448.	16.	.17	-3.16
75	0	122.	122.	95.	70.	442.	17.	.19	-3.68
70	0	142.	142.	111.	77.	432.	21.	.22	-6.39
65	0	170.	170.	132.	87.	421.	26.	.26	*****
60	0	187.	187.	145.	93.	415.	29.	.29	*****
55	0	226.	226.	172.	106.	402.	37.	.34	30.64
50	0	261.	261.	199.	118.	392.	46.	.39	10.78
45	0	306.	306.	224.	134.	426.	57.	.40	.51
40	0	351.	351.	257.	149.	492.	70.	.40	.40
35	0	406.	406.	285.	168.	575.	87.	.38	.27
30	0	465.	465.	313.	189.	674.	109.	.36	.24
25	0	529.	529.	344.	214.	791.	136.	.34	.22
20	0	601.	601.	379.	243.	938.	172.	.32	.20
15	0	699.	699.	427.	288.	1177.	234.	.29	.17
10	0	816.	816.	483.	351.	1536.	338.	.26	.13
5	0	938.	938.	542.	443.	2107.	519.	.21	.09
0	0	1060.	1060.	601.	625.	3496.	980.	.15	.04

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION: THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 3.042 UNTS.

RUN COMPLETE.

83/05/25. 14.20.45.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .30
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

SITE NAME:SAUK RIVER ONE
SITE NUMBER:MN00508
RIVER NAME:SAUK RIVER

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	0	8.0	0
95	20.	8.0	0
90	30.	8.0	0
85	35.	8.0	0
80	40.	8.0	0
75	45.	8.0	0
70	50.	8.0	0
65	60.	8.0	0
60	70.	8.0	0
55	80.	8.0	0
50	90.	8.0	0
45	110.	8.0	0
40	130.	8.0	0
35	160.	8.0	0
30	200.	8.0	0
25	255.	8.0	0
20	325.	8.0	0
15	420.	8.0	0
10	590.	8.0	0
5	950.	8.0	0
0	1860.	8.0	0

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	91.	91.	73.	56.	400.	12.	.16	.16
90	0	136.	136.	109.	70.	387.	17.	.24	61.63
85	0	158.	158.	126.	76.	382.	20.	.28	13.91
80	0	179.	179.	143.	82.	378.	23.	.31	10.32
75	0	199.	199.	159.	87.	374.	26.	.34	8.49
70	0	217.	217.	173.	92.	371.	29.	.37	7.32
65	0	251.	251.	200.	102.	366.	35.	.43	6.35
60	0	283.	283.	226.	111.	361.	40.	.48	5.60
55	0	312.	312.	249.	119.	358.	46.	.52	5.04
50	0	338.	338.	270.	127.	365.	52.	.55	1.37
45	0	386.	386.	293.	141.	424.	63.	.52	.32
40	0	429.	429.	314.	155.	480.	75.	.49	.30
35	0	486.	486.	341.	173.	561.	92.	.47	.28
30	0	552.	552.	373.	196.	662.	115.	.43	.26
25	0	628.	628.	410.	223.	794.	147.	.40	.23
20	0	707.	707.	448.	255.	952.	187.	.37	.20
15	0	791.	791.	489.	293.	1155.	242.	.34	.17
10	0	899.	899.	541.	352.	1491.	340.	.29	.13
5	0	1035.	1035.	607.	456.	2134.	547.	.23	.09
0	0	1150.	1150.	662.	657.	3549.	1072.	.16	.03

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	91.	91.	73.	56.	172.	12.	.32	.32
90	0	136.	136.	109.	70.	172.	17.	.45	2.63
85	0	158.	158.	126.	76.	172.	20.	.51	2.89
80	0	179.	179.	143.	82.	172.	23.	.56	2.91
75	0	199.	199.	159.	87.	172.	26.	.61	2.90
70	0	217.	217.	173.	92.	172.	29.	.66	2.85
65	0	251.	251.	200.	102.	172.	35.	.73	2.84
60	0	283.	283.	226.	111.	172.	40.	.80	2.84
55	0	312.	312.	249.	119.	172.	46.	.86	2.79
50	0	338.	338.	270.	127.	177.	52.	.89	1.62
45	0	386.	386.	293.	141.	209.	63.	.84	.50
40	0	429.	429.	314.	155.	240.	75.	.80	.47
35	0	486.	486.	341.	173.	284.	92.	.75	.44
30	0	552.	552.	373.	196.	341.	115.	.70	.40
25	0	628.	628.	410.	223.	416.	147.	.64	.36
20	0	707.	707.	448.	255.	508.	187.	.59	.31
15	0	791.	791.	489.	293.	627.	242.	.53	.26
10	0	899.	899.	541.	352.	847.	340.	.45	.19
5	0	1035.	1035.	607.	456.	1297.	547.	.35	.12
0	0	1150.	1150.	662.	657.	2353.	1072.	.22	.04

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	91.	91.	73.	56.	684.	12.	.10	.10
90	0	136.	136.	109.	70.	649.	17.	.15	-1.69
85	0	158.	158.	126.	76.	636.	20.	.18	-2.60
80	0	179.	179.	143.	82.	625.	23.	.20	-3.18
75	0	199.	199.	159.	87.	616.	26.	.23	-3.82
70	0	217.	217.	173.	92.	607.	29.	.25	-4.54
65	0	251.	251.	200.	102.	593.	35.	.29	-5.96
60	0	283.	283.	226.	111.	581.	40.	.33	-8.98
55	0	312.	312.	249.	119.	572.	46.	.36	*****
50	0	338.	338.	270.	127.	580.	52.	.38	1.29
45	0	386.	386.	293.	141.	666.	63.	.36	.23
40	0	429.	429.	314.	155.	748.	75.	.35	.22
35	0	486.	486.	341.	173.	864.	92.	.33	.20
30	0	552.	552.	373.	196.	1008.	115.	.31	.19
25	0	628.	628.	410.	223.	1193.	147.	.29	.17
20	0	707.	707.	448.	255.	1411.	187.	.27	.15
15	0	791.	791.	489.	293.	1686.	242.	.25	.13
10	0	899.	899.	541.	352.	2135.	340.	.22	.10
5	0	1035.	1035.	607.	456.	2972.	547.	.18	.07
0	0	1150.	1150.	662.	657.	4745.	1072.	.12	.03

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION:THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 2.910 UNTS.

RUN COMPLETE.

83/05/25. 14.45.28.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .30
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

SITE NAME:SOUTH BRANCH ZUMBRO RIVER
SITE NUMBER:MN00515
RIVER NAME:SOUTH BRANCH ZUMBRO RIVER

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	0	101.0	87.4
95	15.	101.0	88.0
90	22.	101.0	88.2
85	25.	101.0	88.3
80	28.	101.0	88.4
75	31.	101.1	88.5
70	33.	101.2	88.5
65	35.	101.2	88.6
60	38.	101.2	88.6
55	41.	101.2	88.7
50	44.	101.2	88.7
45	48.	101.2	88.8
40	53.	101.2	88.9
35	60.	101.3	89.0
30	68.	101.3	89.1
25	78.	101.3	89.3
20	93.	101.4	89.5
15	113.	101.4	89.7
10	147.	101.5	90.0
5	240.	101.6	90.6
0	400.	101.9	91.0

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	100.	100.	79.	62.	332.	14.	.20	.20
90	0	147.	147.	117.	76.	324.	20.	.29	6.59
85	0	167.	167.	132.	81.	322.	23.	.33	5.39
80	0	186.	186.	148.	86.	320.	25.	.36	5.14
75	0	204.	204.	161.	91.	318.	28.	.39	4.47
70	0	215.	215.	170.	94.	317.	30.	.41	5.57
65	0	225.	225.	178.	96.	316.	31.	.43	3.56
60	0	238.	238.	188.	101.	314.	34.	.45	4.33
55	0	252.	252.	197.	104.	313.	36.	.47	3.19
50	0	263.	263.	206.	109.	312.	39.	.49	3.52
45	0	277.	277.	216.	113.	311.	42.	.51	2.70
40	0	293.	293.	228.	119.	309.	46.	.53	2.74
35	0	312.	312.	237.	127.	317.	52.	.53	.60
30	0	330.	330.	246.	135.	347.	58.	.51	.23
25	0	350.	350.	256.	144.	381.	66.	.49	.22
20	0	374.	374.	267.	157.	432.	77.	.45	.18
15	0	398.	398.	279.	173.	496.	92.	.42	.15
10	0	427.	427.	293.	197.	597.	116.	.37	.11
5	0	472.	472.	315.	249.	843.	180.	.29	.07
0	0	495.	495.	326.	322.	1217.	288.	.21	.02

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	100.	100.	79.	62.	145.	14.	.38	.38
90	0	147.	147.	117.	76.	146.	20.	.53	2.57
85	0	167.	167.	132.	81.	146.	23.	.58	2.81
80	0	186.	186.	148.	86.	147.	25.	.63	2.93
75	0	204.	204.	161.	91.	147.	28.	.68	2.73
70	0	215.	215.	170.	94.	147.	30.	.70	2.76
65	0	225.	225.	178.	96.	148.	31.	.73	2.62
60	0	238.	238.	188.	101.	148.	34.	.76	2.32
55	0	252.	252.	197.	104.	148.	36.	.78	2.28
50	0	263.	263.	206.	109.	148.	39.	.80	2.03
45	0	277.	277.	216.	113.	148.	42.	.82	1.95
40	0	293.	293.	228.	119.	149.	46.	.85	1.98
35	0	312.	312.	237.	127.	154.	52.	.85	.72
30	0	330.	330.	246.	135.	170.	58.	.81	.36
25	0	350.	350.	256.	144.	188.	66.	.77	.35
20	0	374.	374.	267.	157.	216.	77.	.72	.28
15	0	398.	398.	279.	173.	251.	92.	.66	.23
10	0	427.	427.	293.	197.	308.	116.	.58	.17
5	0	472.	472.	315.	249.	448.	180.	.45	.11
0	0	495.	495.	326.	322.	675.	288.	.33	.04

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	100.	100.	79.	62.	563.	14.	.13	.13
90	0	147.	147.	117.	76.	539.	20.	.19	-3.91
85	0	167.	167.	132.	81.	532.	23.	.22	-8.89
80	0	186.	186.	148.	86.	527.	25.	.24	*****
75	0	204.	204.	161.	91.	522.	28.	.26	*****
70	0	215.	215.	170.	94.	517.	30.	.28	-8.02
65	0	225.	225.	178.	96.	515.	31.	.29	11.74
60	0	238.	238.	188.	101.	510.	34.	.31	-9.69
55	0	252.	252.	197.	104.	507.	36.	.32	12.51
50	0	263.	263.	206.	109.	502.	39.	.34	*****
45	0	277.	277.	216.	113.	499.	42.	.35	9.24
40	0	293.	293.	228.	119.	494.	46.	.37	9.03
35	0	312.	312.	237.	127.	503.	52.	.38	.55
30	0	330.	330.	246.	135.	547.	58.	.36	.17
25	0	350.	350.	256.	144.	598.	66.	.34	.16
20	0	374.	374.	267.	157.	672.	77.	.32	.13
15	0	398.	398.	279.	173.	764.	92.	.30	.11
10	0	427.	427.	293.	197.	908.	116.	.27	.08
5	0	472.	472.	315.	249.	1252.	180.	.21	.05
0	0	495.	495.	326.	322.	1760.	288.	.16	.02

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION:THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 2.972 UNTS.

RUN COMPLETE.

83/08/09. 10.58.46.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

SITE NAME:MINNESOTA TWO (GRANITE FALLS)
SITE NUMBER:MN00510
RIVER NAME:MINNESOTA

EXISTING CAPACITY: 580. KW
DESIGN DISCHARGE: 435. CFS
OVERALL EFFICIENCY: .75

PROPOSED POWERPLANT

WEIGHTING FACTOR: -.10
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	0	903.2	884.0
95	40.	903.3	884.1
90	60.	903.3	884.1
85	65.	903.3	884.1
80	75.	903.4	884.1
75	85.	903.4	884.1
70	110.	903.5	884.2
65	140.	903.5	884.2
60	180.	903.5	884.2
55	220.	903.6	884.3
50	270.	903.6	884.4
45	335.	903.7	884.6
40	410.	903.7	884.7
35	500.	903.8	884.8
30	655.	903.8	885.0
25	935.	904.2	885.5
20	1300.	904.4	886.0
15	1710.	904.6	886.5
10	2240.	904.9	887.1
5	3220.	905.3	887.9
0	4100.	905.6	888.6

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	2513.	0	0	0	0	0	0	I	0
95	2513.	373.	0	0	0	0	0	I	0
90	2513.	558.	0	0	0	0	0	I	0
85	2513.	603.	0	0	0	0	0	I	0
80	2513.	688.	0	0	0	0	0	I	0
75	2513.	767.	0	0	0	0	0	I	0
70	2513.	953.	0	0	0	0	0	I	0
65	2513.	1157.	0	0	0	0	0	I	0
60	2513.	1408.	0	0	0	0	0	I	0
55	2513.	1638.	0	0	0	0	0	I	0
50	2513.	1900.	0	0	0	0	0	I	0
45	2513.	2209.	0	0	0	0	0	I	0
40	2513.	2522.	9.	4.	20.	128.	2.	.03	.03
35	2513.	2908.	396.	217.	199.	295.	118.	.44	.62
30	2513.	3495.	982.	546.	342.	700.	323.	.52	.60
25	2513.	4358.	1845.	975.	512.	1329.	677.	.53	.54
20	2513.	5239.	2726.	1400.	671.	2053.	1117.	.51	.48
15	2513.	5992.	3479.	1764.	811.	2788.	1584.	.49	.42
10	2513.	6678.	4165.	2096.	958.	3656.	2149.	.45	.33
5	2513.	7365.	4853.	2429.	1175.	5115.	3131.	.39	.20
0	2513.	7558.	5046.	2522.	1328.	6286.	3921.	.33	.07

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	2513.	0	0	0	0	0	0	I	0
95	2513.	373.	0	0	0	0	0	I	0
90	2513.	558.	0	0	0	0	0	I	0
85	2513.	603.	0	0	0	0	0	I	0
80	2513.	688.	0	0	0	0	0	I	0
75	2513.	767.	0	0	0	0	0	I	0
70	2513.	953.	0	0	0	0	0	I	0
65	2513.	1157.	0	0	0	0	0	I	0
60	2513.	1408.	0	0	0	0	0	I	0
55	2513.	1638.	0	0	0	0	0	I	0
50	2513.	1900.	0	0	0	0	0	I	0
45	2513.	2209.	0	0	0	0	0	I	0
40	2513.	2522.	9.	4.	20.	128.	2.	.03	.03
35	2513.	2908.	396.	217.	199.	261.	118.	.47	.68
30	2513.	3495.	982.	546.	342.	595.	323.	.58	.69
25	2513.	4358.	1845.	975.	512.	1104.	677.	.60	.63
20	2513.	5239.	2726.	1400.	671.	1680.	1117.	.60	.58
15	2513.	5992.	3479.	1764.	811.	2260.	1584.	.57	.51
10	2513.	6678.	4165.	2096.	958.	2940.	2149.	.54	.40
5	2513.	7365.	4853.	2429.	1175.	4076.	3131.	.46	.25
0	2513.	7558.	5046.	2522.	1328.	4983.	3921.	.40	.09

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	2513.	0	0	0	0	0	0	I	0
95	2513.	373.	0	0	0	0	0	I	0
90	2513.	558.	0	0	0	0	0	I	0
85	2513.	603.	0	0	0	0	0	I	0
80	2513.	688.	0	0	0	0	0	I	0
75	2513.	767.	0	0	0	0	0	I	0
70	2513.	953.	0	0	0	0	0	I	0
65	2513.	1157.	0	0	0	0	0	I	0
60	2513.	1408.	0	0	0	0	0	I	0
55	2513.	1638.	0	0	0	0	0	I	0
50	2513.	1900.	0	0	0	0	0	I	0
45	2513.	2209.	0	0	0	0	0	I	0
40	2513.	2522.	9.	4.	20.	412.	2.	.01	.01
35	2513.	2908.	396.	217.	199.	557.	118.	.29	.66
30	2513.	3495.	982.	546.	342.	1169.	323.	.36	.44
25	2513.	4358.	1845.	975.	512.	2041.	677.	.38	.41
20	2513.	5239.	2726.	1400.	671.	2987.	1117.	.38	.39
15	2513.	5992.	3479.	1764.	811.	3913.	1584.	.37	.34
10	2513.	6678.	4165.	2096.	958.	4976.	2149.	.35	.27
5	2513.	7365.	4853.	2429.	1175.	6712.	3131.	.31	.17
0	2513.	7558.	5046.	2522.	1328.	8075.	3921.	.27	.06

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION: THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 2.637 UNTS.

RUN COMPLETE.

83/05/25. 12.53.42.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

SITE NAME: ZUMBRO LAKE
SITE NUMBER: MN00358
RIVER NAME: ZUMBRO RIVER

EXISTING CAPACITY: 2200. KW
DESIGN DISCHARGE: 580. CFS
OVERALL EFFICIENCY: .75

PROPOSED POWERPLANT

WEIGHTING FACTOR: -.50
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	35.	915.0	855.0
95	70.	915.0	855.0
90	85.	915.0	855.0
85	90.	915.0	855.0
80	105.	915.0	855.0
75	120.	915.0	855.0
70	130.	915.0	855.0
65	135.	915.0	855.0
60	150.	915.0	855.0
55	165.	915.0	855.0
50	180.	915.0	855.0
45	190.	915.0	855.0
40	210.	915.0	855.0
35	240.	915.0	855.1
30	275.	915.0	855.1
25	325.	915.0	855.1
20	395.	915.0	855.1
15	500.	915.0	855.1
10	650.	915.0	855.2
5	1040.	915.0	855.2
0	4875.	915.0	856.1

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	7833.	1050.	0	0	0	0	0	I	0
95	7833.	2100.	0	0	0	0	0	I	0
90	7833.	2550.	0	0	0	0	0	I	0
85	7833.	2696.	0	0	0	0	0	I	0
80	7833.	3109.	0	0	0	0	0	I	0
75	7833.	3496.	0	0	0	0	0	I	0
70	7833.	3738.	0	0	0	0	0	I	0
65	7833.	3850.	0	0	0	0	0	I	0
60	7833.	4163.	0	0	0	0	0	I	0
55	7833.	4450.	0	0	0	0	0	I	0
50	7833.	4712.	0	0	0	0	0	I	0
45	7833.	4870.	0	0	0	0	0	I	0
40	7833.	5153.	0	0	0	0	0	I	0
35	7833.	5529.	0	0	0	0	0	I	0
30	7833.	5908.	0	0	0	0	0	I	0
25	7833.	6365.	0	0	0	0	0	I	0
20	7833.	6888.	0	0	0	0	0	I	0
15	7833.	7498.	0	0	0	0	0	I	0
10	7833.	8389.	555.	357.	328.	369.	299.	.51	.51
5	7833.	10017.	2184.	1254.	916.	1736.	1979.	.47	.46
0	7833.	13807.	5973.	3086.	3059.	10785.	18237.	.22	.16

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	7833.	1050.	0	0	0	0	0	I	0
95	7833.	2100.	0	0	0	0	0	I	0
90	7833.	2550.	0	0	0	0	0	I	0
85	7833.	2696.	0	0	0	0	0	I	0
80	7833.	3109.	0	0	0	0	0	I	0
75	7833.	3496.	0	0	0	0	0	I	0
70	7833.	3738.	0	0	0	0	0	I	0
65	7833.	3850.	0	0	0	0	0	I	0
60	7833.	4163.	0	0	0	0	0	I	0
55	7833.	4450.	0	0	0	0	0	I	0
50	7833.	4712.	0	0	0	0	0	I	0
45	7833.	4870.	0	0	0	0	0	I	0
40	7833.	5153.	0	0	0	0	0	I	0
35	7833.	5529.	0	0	0	0	0	I	0
30	7833.	5908.	0	0	0	0	0	I	0
25	7833.	6365.	0	0	0	0	0	I	0
20	7833.	6888.	0	0	0	0	0	I	0
15	7833.	7498.	0	0	0	0	0	I	0
10	7833.	8389.	555.	357.	328.	369.	299.	.51	.51
5	7833.	10017.	2184.	1254.	916.	1736.	1979.	.47	.46
0	7833.	13807.	5973.	3086.	3059.	10785.	18237.	.22	.16

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	7833.	1050.	0	0	0	0	0	I	0
95	7833.	2100.	0	0	0	0	0	I	0
90	7833.	2550.	0	0	0	0	0	I	0
85	7833.	2696.	0	0	0	0	0	I	0
80	7833.	3109.	0	0	0	0	0	I	0
75	7833.	3496.	0	0	0	0	0	I	0
70	7833.	3738.	0	0	0	0	0	I	0
65	7833.	3850.	0	0	0	0	0	I	0
60	7833.	4163.	0	0	0	0	0	I	0
55	7833.	4450.	0	0	0	0	0	I	0
50	7833.	4712.	0	0	0	0	0	I	0
45	7833.	4870.	0	0	0	0	0	I	0
40	7833.	5153.	0	0	0	0	0	I	0
35	7833.	5529.	0	0	0	0	0	I	0
30	7833.	5908.	0	0	0	0	0	I	0
25	7833.	6365.	0	0	0	0	0	I	0
20	7833.	6888.	0	0	0	0	0	I	0
15	7833.	7498.	0	0	0	0	0	I	0
10	7833.	8389.	555.	357.	328.	492.	299.	.44	.44
5	7833.	10017.	2184.	1254.	916.	2315.	1979.	.39	.37
0	7833.	13807.	5973.	3086.	3059.	14379.	18237.	.18	.13

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION: THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 2.388 UNTS.

RUN COMPLETE.

83/06/10. 11.08.22.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .30
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

SITE NAME:WILLOW RIVER
SITE NUMBER:MN00544
RIVER NAME:WILLOW RIVER

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	3.	1034.0	1019.0
95	6.	1034.1	1019.0
90	9.	1034.1	1019.1
85	12.	1034.2	1019.1
80	14.	1034.2	1019.2
75	16.	1034.3	1019.2
70	18.	1034.3	1019.3
65	20.	1034.3	1019.3
60	24.	1034.4	1019.4
55	29.	1034.4	1019.4
50	36.	1034.4	1019.5
45	45.	1034.5	1019.5
40	57.	1034.5	1019.6
35	70.	1034.5	1019.8
30	88.	1034.6	1020.0
25	109.	1034.6	1020.3
20	137.	1034.8	1020.6
15	176.	1035.0	1021.0
10	295.	1035.3	1021.5
5	410.	1036.0	1022.9
0	800.	1037.5	1025.3

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	24.	24.	0	28.	358.	3.	0	0
95	0	49.	49.	39.	41.	337.	6.	.10	.10
90	0	73.	73.	58.	51.	326.	10.	.15	*****
85	0	97.	97.	77.	60.	319.	13.	.20	22.77
80	0	111.	111.	88.	64.	316.	15.	.23	6.34
75	0	125.	125.	99.	69.	312.	17.	.26	7.44
70	0	138.	138.	109.	74.	310.	19.	.28	4.47
65	0	150.	150.	118.	78.	307.	21.	.31	5.31
60	0	172.	172.	135.	86.	304.	25.	.35	4.07
55	0	197.	197.	151.	95.	299.	30.	.38	3.47
50	0	229.	229.	175.	106.	295.	38.	.44	3.23
45	0	265.	265.	200.	120.	290.	47.	.49	2.88
40	0	308.	308.	223.	136.	328.	59.	.48	.44
35	0	349.	349.	243.	151.	380.	72.	.46	.29
30	0	397.	397.	266.	170.	448.	89.	.43	.27
25	0	444.	444.	289.	188.	521.	108.	.41	.25
20	0	493.	493.	313.	211.	613.	132.	.38	.21
15	0	544.	544.	338.	238.	730.	165.	.35	.17
10	0	645.	645.	386.	308.	1059.	266.	.28	.12
5	0	701.	701.	413.	345.	1293.	328.	.25	.10
0	0	744.	744.	434.	435.	1940.	501.	.18	.03

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	24.	24.	0	28.	138.	3.	0	0
95	0	49.	49.	39.	41.	138.	6.	.22	.22
90	0	73.	73.	58.	51.	138.	10.	.31	1.89
85	0	97.	97.	77.	60.	138.	13.	.39	2.16
80	0	111.	111.	88.	64.	139.	15.	.44	2.19
75	0	125.	125.	99.	69.	139.	17.	.47	2.15
70	0	138.	138.	109.	74.	139.	19.	.51	2.15
65	0	150.	150.	118.	78.	139.	21.	.54	2.08
60	0	172.	172.	135.	86.	139.	25.	.60	2.11
55	0	197.	197.	151.	95.	139.	30.	.65	1.77
50	0	229.	229.	175.	106.	140.	38.	.71	1.99
45	0	265.	265.	200.	120.	140.	47.	.77	1.82
40	0	308.	308.	223.	136.	161.	59.	.75	.64
35	0	349.	349.	243.	151.	189.	72.	.72	.46
30	0	397.	397.	266.	170.	226.	89.	.67	.42
25	0	444.	444.	289.	188.	267.	108.	.63	.38
20	0	493.	493.	313.	211.	319.	132.	.59	.32
15	0	544.	544.	338.	238.	386.	165.	.54	.26
10	0	645.	645.	386.	308.	580.	266.	.44	.18
5	0	701.	701.	413.	345.	730.	328.	.38	.14
0	0	744.	744.	434.	435.	1164.	501.	.27	.04

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	24.	24.	0	28.	649.	3.	0	0
95	0	49.	49.	39.	41.	592.	6.	.06	.06
90	0	73.	73.	58.	51.	563.	10.	.09	-1.02
85	0	97.	97.	77.	60.	542.	13.	.13	-1.52
80	0	111.	111.	88.	64.	533.	15.	.15	-2.82
75	0	125.	125.	99.	69.	524.	17.	.17	-2.40
70	0	138.	138.	109.	74.	518.	19.	.18	-5.03
65	0	150.	150.	118.	78.	511.	21.	.20	-3.33
60	0	172.	172.	135.	86.	501.	25.	.23	-6.83
55	0	197.	197.	151.	95.	488.	30.	.26	-5.80
50	0	229.	229.	175.	106.	477.	38.	.30	*****
45	0	265.	265.	200.	120.	463.	47.	.34	*****
40	0	308.	308.	223.	136.	517.	59.	.34	.34
35	0	349.	349.	243.	151.	593.	72.	.33	.22
30	0	397.	397.	266.	170.	692.	89.	.31	.20
25	0	444.	444.	289.	188.	796.	108.	.29	.18
20	0	493.	493.	313.	211.	926.	132.	.28	.16
15	0	544.	544.	338.	238.	1090.	165.	.25	.13
10	0	645.	645.	386.	308.	1538.	266.	.21	.09
5	0	701.	701.	413.	345.	1856.	328.	.19	.08
0	0	744.	744.	434.	435.	2715.	501.	.14	.02

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION:THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 2.948 UNTS.

RUN COMPLETE.

83/05/13. 12.29.36.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

SITE NAME:LAC QUI PARLE
SITE NUMBER:MN00580
RIVER NAME:MINNESOTA RIVER

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .30
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	0	931.2	919.0
95	25.	931.2	919.8
90	30.	931.2	919.8
85	40.	931.2	920.0
80	45.	931.2	920.1
75	50.	931.2	920.3
70	60.	931.2	920.4
65	75.	931.2	920.5
60	100.	931.2	920.8
55	130.	931.2	921.0
50	170.	931.2	921.2
45	210.	931.2	921.5
40	250.	931.2	921.7
35	330.	931.2	922.0
30	450.	931.2	922.5
25	625.	931.2	923.2
20	1000.	931.2	924.6
15	1275.	931.2	925.5
10	1650.	931.2	926.8
5	2700.	931.2	930.0
0	8800.	931.2	931.1

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	111.	111.	85.	77.	337.	21.	.21	.21
90	0	133.	133.	103.	85.	332.	25.	.25	5.59
85	0	177.	177.	135.	98.	327.	32.	.32	3.92
80	0	198.	198.	150.	104.	325.	36.	.35	3.62
75	0	217.	217.	166.	109.	325.	39.	.38	3.26
70	0	251.	251.	190.	120.	322.	47.	.43	3.22
65	0	297.	297.	221.	134.	358.	58.	.45	.60
60	0	367.	367.	261.	155.	438.	75.	.44	.40
55	0	441.	441.	310.	177.	529.	96.	.44	.44
50	0	526.	526.	363.	202.	641.	122.	.43	.38
45	0	603.	603.	409.	223.	742.	147.	.42	.38
40	0	666.	666.	441.	242.	838.	171.	.41	.28
35	0	768.	768.	514.	277.	1019.	219.	.40	.34
30	0	892.	892.	578.	318.	1258.	282.	.37	.23
25	0	1030.	1030.	645.	363.	1557.	360.	.34	.20
20	0	1248.	1248.	753.	422.	2053.	475.	.30	.19
15	0	1358.	1358.	808.	445.	2324.	524.	.29	.19
10	0	1442.	1442.	852.	445.	2542.	523.	.29	.20
5	0	1513.	1513.	918.	287.	2182.	233.	.37	-.13
0	0	1525.	1525.	928.	141.	1965.	63.	.44	-.03

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	111.	111.	85.	77.	152.	21.	.37	.37
90	0	133.	133.	103.	85.	152.	25.	.43	2.14
85	0	177.	177.	135.	98.	153.	32.	.54	2.28
80	0	198.	198.	150.	104.	153.	36.	.58	2.36
75	0	217.	217.	166.	109.	154.	39.	.63	2.65
70	0	251.	251.	190.	120.	155.	47.	.69	2.13
65	0	297.	297.	221.	134.	175.	58.	.71	.87
60	0	367.	367.	261.	155.	219.	75.	.70	.63
55	0	441.	441.	310.	177.	269.	96.	.70	.69
50	0	526.	526.	363.	202.	332.	122.	.68	.60
45	0	603.	603.	409.	223.	389.	147.	.67	.59
40	0	666.	666.	441.	242.	444.	171.	.64	.43
35	0	768.	768.	514.	277.	549.	219.	.62	.52
30	0	892.	892.	578.	318.	695.	282.	.57	.34
25	0	1030.	1030.	645.	363.	892.	360.	.51	.28
20	0	1248.	1248.	753.	422.	1223.	475.	.46	.28
15	0	1358.	1358.	808.	445.	1403.	524.	.44	.27
10	0	1442.	1442.	852.	445.	1535.	523.	.43	.34
5	0	1513.	1513.	918.	287.	1182.	233.	.63	-.13
0	0	1525.	1525.	928.	141.	968.	63.	.84	-.03

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	111.	111.	85.	77.	561.	21.	.13	.13
90	0	133.	133.	103.	85.	548.	25.	.16	-3.33
85	0	177.	177.	135.	98.	532.	32.	.21	*****
80	0	198.	198.	150.	104.	526.	36.	.24	81.34
75	0	217.	217.	166.	109.	524.	39.	.26	6.45
70	0	251.	251.	190.	120.	514.	47.	.30	28.40
65	0	297.	297.	221.	134.	565.	58.	.32	.46
60	0	367.	367.	261.	155.	682.	75.	.31	.29
55	0	441.	441.	310.	177.	813.	96.	.31	.32
50	0	526.	526.	363.	202.	972.	122.	.31	.29
45	0	603.	603.	409.	223.	1114.	147.	.31	.28
40	0	666.	666.	441.	242.	1248.	171.	.30	.21
35	0	768.	768.	514.	277.	1497.	219.	.29	.26
30	0	892.	892.	578.	318.	1821.	282.	.27	.18
25	0	1030.	1030.	645.	363.	2222.	360.	.25	.15
20	0	1248.	1248.	753.	422.	2882.	475.	.23	.15
15	0	1358.	1358.	808.	445.	3244.	524.	.22	.14
10	0	1442.	1442.	852.	445.	3549.	523.	.21	.14
5	0	1513.	1513.	918.	287.	3194.	233.	.26	-.13
0	0	1525.	1525.	928.	141.	3089.	63.	.29	-.04

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION:THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 2.815 UNTS.

RUN COMPLETE.

83/05/25. 13.35.01.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

SITE NAME:SYLVAN
SITE NUMBER:MN00601
RIVER NAME:CROW WING RIVER

EXISTING CAPACITY: 1900. KW
DESIGN DISCHARGE: 1360. CFS
OVERALL EFFICIENCY: .75

PROPOSED POWERPLANT

WEIGHTING FACTOR: .10
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	0	22.0	0
95	210.	22.0	0
90	290.	22.0	0
85	325.	22.0	0
80	360.	22.0	0
75	400.	22.0	0
70	445.	22.0	0
65	490.	22.0	0
60	530.	22.0	0
55	575.	22.0	0
50	630.	22.0	0
45	700.	22.0	0
40	780.	22.0	0
35	880.	22.0	0
30	980.	22.0	0
25	1120.	22.0	0
20	1290.	22.0	0
15	1540.	22.0	0
10	1920.	22.0	0
5	2750.	22.0	0
0	12180.	22.0	0

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	9044.	0	0	0	0	0	0	I	0
95	9044.	2508.	0	0	0	0	0	I	0
90	9044.	3414.	0	0	0	0	0	I	0
85	9044.	3790.	0	0	0	0	0	I	0
80	9044.	4143.	0	0	0	0	0	I	0
75	9044.	4523.	0	0	0	0	0	I	0
70	9044.	4923.	0	0	0	0	0	I	0
65	9044.	5295.	0	0	0	0	0	I	0
60	9044.	5601.	0	0	0	0	0	I	0
55	9044.	5918.	0	0	0	0	0	I	0
50	9044.	6272.	0	0	0	0	0	I	0
45	9044.	6679.	0	0	0	0	0	I	0
40	9044.	7095.	0	0	0	0	0	I	0
35	9044.	7555.	0	0	0	0	0	I	0
30	9044.	7953.	0	0	0	0	0	I	0
25	9044.	8424.	0	0	0	0	0	I	0
20	9044.	8893.	0	0	0	0	0	I	0
15	9044.	9700.	655.	407.	319.	751.	284.	.38	.38
10	9044.	10753.	1708.	1070.	592.	1853.	887.	.44	.48
5	9044.	11943.	2899.	1665.	971.	3825.	2202.	.35	.25
0	9044.	15427.	6383.	3349.	2958.	20261.	17146.	.14	.09

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	9044.	0	0	0	0	0	0	I	0
95	9044.	2508.	0	0	0	0	0	I	0
90	9044.	3414.	0	0	0	0	0	I	0
85	9044.	3790.	0	0	0	0	0	I	0
80	9044.	4143.	0	0	0	0	0	I	0
75	9044.	4523.	0	0	0	0	0	I	0
70	9044.	4923.	0	0	0	0	0	I	0
65	9044.	5295.	0	0	0	0	0	I	0
60	9044.	5601.	0	0	0	0	0	I	0
55	9044.	5918.	0	0	0	0	0	I	0
50	9044.	6272.	0	0	0	0	0	I	0
45	9044.	6679.	0	0	0	0	0	I	0
40	9044.	7095.	0	0	0	0	0	I	0
35	9044.	7555.	0	0	0	0	0	I	0
30	9044.	7953.	0	0	0	0	0	I	0
25	9044.	8424.	0	0	0	0	0	I	0
20	9044.	8893.	0	0	0	0	0	I	0
15	9044.	9700.	655.	407.	319.	502.	284.	.50	.50
10	9044.	10753.	1708.	1070.	592.	1275.	887.	.57	.63
5	9044.	11943.	2899.	1665.	971.	2689.	2202.	.45	.33
0	9044.	15427.	6383.	3349.	2958.	15437.	17146.	.18	.11

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	9044.	0	0	0	0	0	0	I	0
95	9044.	2508.	0	0	0	0	0	I	0
90	9044.	3414.	0	0	0	0	0	I	0
85	9044.	3790.	0	0	0	0	0	I	0
80	9044.	4143.	0	0	0	0	0	I	0
75	9044.	4523.	0	0	0	0	0	I	0
70	9044.	4923.	0	0	0	0	0	I	0
65	9044.	5295.	0	0	0	0	0	I	0
60	9044.	5601.	0	0	0	0	0	I	0
55	9044.	5918.	0	0	0	0	0	I	0
50	9044.	6272.	0	0	0	0	0	I	0
45	9044.	6679.	0	0	0	0	0	I	0
40	9044.	7095.	0	0	0	0	0	I	0
35	9044.	7555.	0	0	0	0	0	I	0
30	9044.	7953.	0	0	0	0	0	I	0
25	9044.	8424.	0	0	0	0	0	I	0
20	9044.	8893.	0	0	0	0	0	I	0
15	9044.	9700.	655.	407.	319.	1160.	284.	.28	.28
10	9044.	10753.	1708.	1070.	592.	2613.	887.	.33	.38
5	9044.	11943.	2899.	1665.	971.	5023.	2202.	.28	.21
0	9044.	15427.	6383.	3349.	2958.	25085.	17146.	.12	.08

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION:THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 2.463 UNTS.

RUN COMPLETE.

83/05/25. 14.23.12.
MNFTS   PROGRAM   HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: 0
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000):   0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

SITE NAME:SAUK RIVER THREE
SITE NUMBER:MN00561
RIVER NAME:SAUK RIVER

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	0	1199.0	1186.1
95	4.	1199.0	1186.1
90	6.	1199.0	1186.1
85	8.	1199.0	1186.1
80	9.	1199.0	1186.1
75	10.	1199.0	1186.1
70	12.	1199.0	1186.1
65	13.	1199.0	1186.1
60	14.	1199.0	1186.1
55	16.	1199.0	1186.1
50	19.	1199.0	1186.1
45	22.	1199.0	1186.1
40	27.	1199.0	1186.1
35	33.	1199.1	1186.2
30	42.	1199.1	1186.2
25	53.	1199.1	1186.2
20	68.	1199.2	1186.2
15	88.	1199.2	1186.3
10	124.	1199.3	1186.4
5	174.	1199.4	1186.6
0	350.	1199.7	1187.2

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	29.	29.	23.	30.	194.	4.	.10	.10
90	0	44.	44.	35.	38.	194.	6.	.15	1.56
85	0	58.	58.	46.	44.	194.	7.	.19	1.78
80	0	65.	65.	52.	47.	194.	8.	.21	1.83
75	0	71.	71.	57.	50.	194.	9.	.23	1.81
70	0	83.	83.	66.	55.	194.	11.	.26	1.79
65	0	88.	88.	70.	57.	194.	12.	.28	1.76
60	0	93.	93.	74.	60.	194.	13.	.29	1.68
55	0	103.	103.	82.	64.	194.	15.	.32	1.63
50	0	115.	115.	91.	71.	194.	18.	.34	1.48
45	0	127.	127.	98.	76.	194.	20.	.36	1.16
40	0	144.	144.	106.	85.	194.	25.	.38	.91
35	0	162.	162.	115.	95.	195.	30.	.40	.89
30	0	185.	185.	126.	108.	195.	39.	.42	.85
25	0	210.	210.	138.	123.	195.	49.	.43	.80
20	0	236.	236.	150.	141.	234.	63.	.40	.22
15	0	264.	264.	164.	161.	288.	81.	.36	.18
10	0	298.	298.	181.	193.	380.	113.	.32	.14
5	0	327.	327.	195.	230.	498.	155.	.27	.09
0	0	359.	359.	210.	327.	864.	298.	.18	.03

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	29.	29.	23.	30.	145.	4.	.13	.13
90	0	44.	44.	35.	38.	145.	6.	.19	1.56
85	0	58.	58.	46.	44.	145.	7.	.24	1.78
80	0	65.	65.	52.	47.	145.	8.	.27	1.83
75	0	71.	71.	57.	50.	145.	9.	.29	1.81
70	0	83.	83.	66.	55.	145.	11.	.33	1.79
65	0	88.	88.	70.	57.	145.	12.	.35	1.76
60	0	93.	93.	74.	60.	145.	13.	.36	1.68
55	0	103.	103.	82.	64.	145.	15.	.39	1.63
50	0	115.	115.	91.	71.	145.	18.	.42	1.48
45	0	127.	127.	98.	76.	145.	20.	.44	1.16
40	0	144.	144.	106.	85.	145.	25.	.46	.91
35	0	162.	162.	115.	95.	146.	30.	.48	.90
30	0	185.	185.	126.	108.	146.	39.	.50	.85
25	0	210.	210.	138.	123.	146.	49.	.51	.80
20	0	236.	236.	150.	141.	176.	63.	.48	.27
15	0	264.	264.	164.	161.	216.	81.	.43	.22
10	0	298.	298.	181.	193.	285.	113.	.38	.17
5	0	327.	327.	195.	230.	374.	155.	.32	.11
0	0	359.	359.	210.	327.	648.	298.	.22	.04

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	29.	29.	23.	30.	492.	4.	.04	.04
90	0	44.	44.	35.	38.	471.	6.	.07	-.81
85	0	58.	58.	46.	44.	456.	7.	.09	-1.36
80	0	65.	65.	52.	47.	450.	8.	.10	-1.81
75	0	71.	71.	57.	50.	445.	9.	.11	-2.09
70	0	83.	83.	66.	55.	436.	11.	.13	-2.60
65	0	88.	88.	70.	57.	432.	12.	.14	-3.22
60	0	93.	93.	74.	60.	429.	13.	.15	-3.60
55	0	103.	103.	82.	64.	423.	15.	.17	-4.46
50	0	115.	115.	91.	71.	415.	18.	.19	-6.42
45	0	127.	127.	98.	76.	408.	20.	.20	*****
40	0	144.	144.	106.	85.	400.	25.	.22	42.95
35	0	162.	162.	115.	95.	393.	30.	.24	3.64
30	0	185.	185.	126.	108.	383.	39.	.26	3.24
25	0	210.	210.	138.	123.	374.	49.	.28	2.16
20	0	236.	236.	150.	141.	439.	63.	.26	.15
15	0	264.	264.	164.	161.	526.	81.	.24	.12
10	0	298.	298.	181.	193.	671.	113.	.21	.09
5	0	327.	327.	195.	230.	852.	155.	.18	.06
0	0	359.	359.	210.	327.	1385.	298.	.12	.02

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION: THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 2.936 UNTS.

RUN COMPLETE.

83/06/14. 11.49.07.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .20
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

SITE NAME:MAYOWOOD LAKE
SITE NUMBER:MN00364
RIVER NAME:SOUTH FORK ZUMBRO

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	0	100.0	85.0
95	8.	100.0	85.4
90	12.	100.1	85.5
85	13.	100.1	85.6
80	14.	100.1	85.7
75	15.	100.1	85.7
70	16.	100.1	85.8
65	18.	100.1	85.8
60	19.	100.1	85.9
55	21.	100.1	85.9
50	23.	100.1	86.0
45	26.	100.1	86.1
40	28.	100.1	86.1
35	32.	100.2	86.2
30	36.	100.2	86.3
25	42.	100.2	86.4
20	49.	100.2	86.6
15	60.	100.3	86.8
10	80.	100.3	87.1
5	140.	100.5	87.6
0	250.	100.7	88.1

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	62.	62.	49.	47.	284.	8.	.15	.15
90	0	93.	93.	74.	59.	277.	13.	.22	5.19
85	0	100.	100.	80.	61.	276.	13.	.24	3.47
80	0	108.	108.	85.	63.	276.	14.	.25	3.28
75	0	114.	114.	90.	66.	275.	15.	.27	4.25
70	0	121.	121.	96.	68.	274.	16.	.28	2.96
65	0	132.	132.	104.	72.	272.	18.	.30	3.47
60	0	138.	138.	109.	74.	272.	19.	.31	2.62
55	0	147.	147.	116.	78.	270.	21.	.33	2.98
50	0	156.	156.	122.	82.	270.	23.	.35	2.13
45	0	169.	169.	131.	87.	269.	26.	.37	2.21
40	0	176.	176.	136.	91.	267.	28.	.38	1.95
35	0	188.	188.	142.	97.	266.	32.	.39	1.19
30	0	199.	199.	147.	103.	265.	36.	.40	1.07
25	0	213.	213.	154.	112.	263.	41.	.41	.95
20	0	226.	226.	160.	121.	262.	47.	.42	.80
15	0	241.	241.	167.	134.	291.	57.	.39	.18
10	0	262.	262.	177.	154.	359.	74.	.35	.11
5	0	296.	296.	194.	204.	542.	125.	.26	.07
0	0	316.	316.	204.	274.	831.	214.	.18	.03

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	62.	62.	49.	47.	139.	8.	.26	.26
90	0	93.	93.	74.	59.	140.	13.	.37	2.09
85	0	100.	100.	80.	61.	140.	13.	.40	2.23
80	0	108.	108.	85.	63.	140.	14.	.42	2.20
75	0	114.	114.	90.	66.	140.	15.	.44	2.12
70	0	121.	121.	96.	68.	141.	16.	.46	2.14
65	0	132.	132.	104.	72.	141.	18.	.49	1.89
60	0	138.	138.	109.	74.	141.	19.	.50	2.05
55	0	147.	147.	116.	78.	141.	21.	.53	1.76
50	0	156.	156.	122.	82.	141.	23.	.55	1.55
45	0	169.	169.	131.	87.	142.	26.	.57	1.59
40	0	176.	176.	136.	91.	142.	28.	.58	1.29
35	0	188.	188.	142.	97.	142.	32.	.59	.89
30	0	199.	199.	147	103.	142.	36.	.60	.83
25	0	213.	213.	154.	112.	143.	41.	.60	.73
20	0	226.	226.	160.	121.	144.	47.	.61	.67
15	0	241.	241.	167.	134.	161.	57.	.57	.25
10	0	262.	262.	177.	154.	201.	74.	.50	.16
5	0	296.	296.	194.	204.	313.	125.	.38	.10
0	0	316.	316.	204.	274.	494.	214.	.27	.04

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	62.	62.	49.	47.	529.	8.	.08	.08
90	0	93.	93.	74.	59.	504.	13.	.13	-1.89
85	0	100.	100.	80.	61.	501.	13.	.14	-6.17
80	0	108.	108.	85.	63.	498.	14.	.15	-8.40
75	0	114.	114.	90.	66.	494.	15.	.16	-2.79
70	0	121.	121.	96.	68.	491.	16.	.17	*****
65	0	132.	132.	104.	72.	484.	18.	.19	-3.21
60	0	138.	138.	109.	74.	483.	19.	.20	17.94
55	0	147.	147.	116.	78.	477.	21.	.21	-4.07
50	0	156.	156.	122.	82.	473.	23.	.22	*****
45	0	169.	169.	131.	87.	467.	26.	.24	*****
40	0	176.	176.	136.	91.	463.	28.	.24	-7.01
35	0	188.	188.	142.	97.	457.	32.	.26	12.74
30	0	199.	199.	147.	103.	452.	36.	.26	5.20
25	0	213.	213.	154.	112.	445.	41.	.28	3.94
20	0	226.	226.	160.	121.	440.	47.	.29	1.79
15	0	241.	241.	167.	134.	482.	57.	.27	.14
10	0	262.	262.	177.	154.	584.	74.	.24	.08
5	0	296.	296.	194.	204.	853.	125.	.18	.05
0	0	316.	316.	204.	274.	1262.	214.	.13	.02

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION: THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 2.814 UNTS.

RUN COMPLETE.

83/05/23. 14.36.58.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

SITE NAME: RED LAKE ONE(THIEF RIVER)
SITE NUMBER: MN00502
RIVER NAME: RED LAKE RIVER

EXISTING CAPACITY: 550. KW
DESIGN DISCHARGE: 570. CFS
OVERALL EFFICIENCY: .75

PROPOSED POWERPLANT

WEIGHTING FACTOR: .76
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	0	1115.8	1098.4
95	10.	1115.8	1098.4
90	20.	1115.8	1098.5
85	40.	1115.8	1098.6
80	70.	1115.8	1098.7
75	120.	1115.8	1098.9
70	185.	1115.8	1099.0
65	235.	1115.8	1099.2
60	295.	1115.8	1099.5
55	365.	1115.8	1099.7
50	440.	1115.8	1099.9
45	540.	1115.8	1100.2
40	645.	1115.8	1100.5
35	765.	1115.8	1100.7
30	900.	1115.8	1101.0
25	1050.	1115.8	1101.2
20	1220.	1115.8	1101.5
15	1430.	1115.8	1101.8
10	1710.	1115.8	1102.3
5	2120.	1115.8	1103.1
0	4000.	1115.8	1104.8

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	2872.	0	0	0	0	0	0	I	0
95	2872.	73.	0	0	0	0	0	I	0
90	2872.	146.	0	0	0	0	0	I	0
85	2872.	288.	0	0	0	0	0	I	0
80	2872.	487.	0	0	0	0	0	I	0
75	2872.	799.	0	0	0	0	0	I	0
70	2872.	1173.	0	0	0	0	0	I	0
65	2872.	1443.	0	0	0	0	0	I	0
60	2872.	1745.	0	0	0	0	0	I	0
55	2872.	2065.	0	0	0	0	0	I	0
50	2872.	2375.	0	0	0	0	0	I	0
45	2872.	2751.	0	0	0	0	0	I	0
40	2872.	3164.	292.	168.	161.	386.	80.	.31	.31
35	2872.	3596.	724.	497.	273.	810.	214.	.46	.61
30	2872.	4023.	1151.	751.	362.	1208.	359.	.48	.52
25	2872.	4417.	1545.	964.	441.	1599.	515.	.47	.45
20	2872.	4789.	1918.	1144.	515.	2001.	685.	.45	.38
15	2872.	5145.	2273.	1316.	593.	2457.	887.	.43	.32
10	2872.	5490.	2618.	1483.	678.	3007.	1136.	.40	.26
5	2872.	5796.	2925.	1631.	776.	3716.	1457.	.36	.18
0	2872.	6196.	3324.	1824.	1101.	6411.	2777.	.24	.06

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	2872.	0	0	0	0	0	0	I	0
95	2872.	73.	0	0	0	0	0	I	0
90	2872.	146.	0	0	0	0	0	I	0
85	2872.	288.	0	0	0	0	0	I	0
80	2872.	487.	0	0	0	0	0	I	0
75	2872.	799.	0	0	0	0	0	I	0
70	2872.	1173.	0	0	0	0	0	I	0
65	2872.	1443.	0	0	0	0	0	I	0
60	2872.	1745.	0	0	0	0	0	I	0
55	2872.	2065.	0	0	0	0	0	I	0
50	2872.	2375.	0	0	0	0	0	I	0
45	2872.	2751.	0	0	0	0	0	I	0
40	2872.	3164.	292.	168.	161.	609.	80.	.22	.22
35	2872.	3596.	724.	497.	273.	1206.	214.	.34	.46
30	2872.	4023.	1151.	751.	362.	1743.	359.	.36	.41
25	2872.	4417.	1545.	964.	441.	2255.	515.	.36	.36
20	2872.	4789.	1918.	1144.	515.	2773.	685.	.35	.30
15	2872.	5145.	2273.	1316.	593.	3349.	887.	.33	.26
10	2872.	5490.	2618.	1483.	678.	4033.	1136.	.31	.22
5	2872.	5796.	2925.	1631.	776.	4904.	1457.	.29	.15
0	2872.	6196.	3324.	1824.	1101.	8110.	2777.	.20	.05

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	2872.	0	0	0	0	0	0	I	0
95	2872.	73.	0	0	0	0	0	I	0
90	2872.	146.	0	0	0	0	0	I	0
85	2872.	288.	0	0	0	0	0	I	0
80	2872.	487.	0	0	0	0	0	I	0
75	2872.	799.	0	0	0	0	0	I	0
70	2872.	1173.	0	0	0	0	0	I	0
65	2872.	1443.	0	0	0	0	0	I	0
60	2872.	1745.	0	0	0	0	0	I	0
55	2872.	2065.	0	0	0	0	0	I	0
50	2872.	2375.	0	0	0	0	0	I	0
45	2872.	2751.	0	0	0	0	0	I	0
40	2872.	3164.	292.	168.	161.	832.	80.	.17	.17
35	2872.	3596.	724.	497.	273.	1602.	214.	.26	.37
30	2872.	4023.	1151.	751.	362.	2278.	359.	.28	.33
25	2872.	4417.	1545.	964.	441.	2912.	515.	.29	.30
20	2872.	4789.	1918.	1144.	515.	3544.	685.	.28	.26
15	2872.	5145.	2273.	1316.	593.	4240.	887.	.27	.22
10	2872.	5490.	2618.	1483.	678.	5059.	1136.	.26	.18
5	2872.	5796.	2925.	1631.	776.	6093.	1457.	.24	.13
0	2872.	6196.	3324.	1824.	1101.	9809.	2777.	.17	.05

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION: THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 2.510 UNTS.

RUN COMPLETE.

83/05/13. 12.14.02.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .40
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

SITE NAME: BRONSON LAKE
SITE NUMBER: MN00 17
RIVER NAME: TWO RIVERS SOUTH BRANCH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	0	972.5	943.5
95	0.	972.5	943.5
90	1.	972.5	943.5
85	2.	972.5	943.5
80	3.	972.5	943.5
75	3.	972.5	943.5
70	4.	972.5	943.5
65	5.	972.5	943.5
60	6.	972.5	943.5
55	7.	972.5	943.5
50	7.	972.5	943.5
45	8.	972.5	943.5
40	9.	972.5	943.5
35	10.	972.5	943.5
30	15.	972.5	943.5
25	25.	972.5	943.5
20	47.	972.5	943.5
15	95.	972.5	943.5
10	210.	972.5	944.0
5	480.	972.5	945.0
0	1800.	973.0	947.0

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	3.	3.	3.	9.	411.	0.	.01	.01
90	0	16.	16.	13.	22.	346.	2.	.04	-.20
85	0	29.	29.	23.	30.	326.	4.	.06	-.84
80	0	41.	41.	33.	37.	314.	5.	.09	-1.84
75	0	52.	52.	42.	43.	305.	7.	.12	-3.60
70	0	63.	63.	50.	48.	299.	9.	.14	-7.56
65	0	72.	72.	58.	53.	294.	10.	.17	*****
60	0	81.	81.	65.	58.	290.	12.	.19	31.14
55	0	90.	90.	70.	62.	286.	14.	.20	10.00
50	0	97.	97.	76.	66.	283.	15.	.22	6.63
45	0	104.	104.	80.	69.	280.	17.	.23	4.52
40	0	110.	110.	84.	73.	278.	19.	.24	3.85
35	0	117.	117.	87.	77.	275.	21.	.25	2.13
30	0	146.	146.	101.	96.	264.	31.	.28	1.60
25	0	194.	194.	125.	127.	261.	52.	.32	.85
20	0	281.	281.	167.	179.	414.	98.	.28	.21
15	0	427.	427.	238.	263.	694.	198.	.25	.19
10	0	675.	675.	357.	400.	1237.	431.	.22	.18
5	0	1020.	1020.	524.	615.	2249.	951.	.18	.14
0	0	1555.	1555.	783.	1210.	5846.	3306.	.11	.06

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	3.	3.	3.	9.	110.	0.	.02	.02
90	0	16.	16.	13.	22.	110.	2.	.10	.81
85	0	29.	29.	23.	30.	110.	4.	.17	1.21
80	0	41.	41.	33.	37.	110.	5.	.22	1.41
75	0	52.	52.	42.	43.	110.	7.	.27	1.53
70	0	63.	63.	50.	48.	110.	9.	.32	1.60
65	0	72.	72.	58.	53.	110.	10.	.36	1.62
60	0	81.	81.	65.	58.	110.	12.	.38	1.33
55	0	90.	90.	70.	62.	111.	14.	.41	1.11
50	0	97.	97.	76.	66.	112.	15.	.43	1.13
45	0	104.	104.	80.	69.	113.	17.	.44	.99
40	0	110.	110.	84.	73.	113.	19.	.45	1.01
35	0	117.	117.	87.	77.	114.	21.	.46	.65
30	0	146.	146.	101.	96.	117.	31.	.48	.65
25	0	194.	194.	125.	127.	124.	52.	.50	.62
20	0	281.	281.	167.	179.	214.	98.	.42	.30
15	0	427.	427.	238.	263.	392.	198.	.36	.27
10	0	675.	675.	357.	400.	766.	431.	.31	.23
5	0	1020.	1020.	524.	615.	1520.	951.	.25	.17
0	0	1555.	1555.	783.	1210.	4478.	3306.	.14	.07

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	3.	3.	3.	9.	743.	0.	.00	.00
90	0	16.	16.	13.	22.	596.	2.	.02	-.08
85	0	29.	29.	23.	30.	550.	4.	.04	-.27
80	0	41.	41.	33.	37.	523.	5.	.06	-.47
75	0	52.	52.	42.	43.	504.	7.	.08	-.69
70	0	63.	63.	50.	48.	490.	9.	.09	-.93
65	0	72.	72.	58.	53.	478.	10.	.11	-1.17
60	0	81.	81.	65.	58.	469.	12.	.12	-1.33
55	0	90.	90.	70.	62.	461.	14.	.13	-1.42
50	0	97.	97.	76.	66.	454.	15.	.15	-1.71
45	0	104.	104.	80.	69.	447.	17.	.15	-1.77
40	0	110.	110.	84.	73.	442.	19.	.16	-2.14
35	0	117.	117.	87.	77.	436.	21.	.17	-1.66
30	0	146.	146.	101.	96.	412.	31.	.20	-3.35
25	0	194.	194.	125.	127.	399.	52.	.24	1.36
20	0	281.	281.	167.	179.	615.	98.	.21	.16
15	0	427.	427.	238.	263.	997.	198.	.19	.15
10	0	675.	675.	357.	400.	1708.	431.	.17	.14
5	0	1020.	1020.	524.	615.	2979.	951.	.15	.11
0	0	1555.	1555.	783.	1210.	7214.	3306.	.09	.05

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION:THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 2.766 UNTS.

RUN COMPLETE.

83/05/25. 13.40.12.
MNFTS PROGRAM HYFEAS

SITE NAME: SANDY LAKE LOCK & DAM
SITE NUMBER: MN00583
RIVER NAME: SANDY RIVER

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .20
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	0	1218.5	1207.2
95	5.	1218.5	1207.3
90	10.	1218.5	1207.4
85	15.	1218.5	1207.6
80	20.	1218.5	1207.9
75	38.	1218.5	1208.4
70	52.	1218.5	1208.7
65	70.	1218.5	1209.3
60	88.	1218.5	1209.8
55	105.	1218.5	1210.2
50	120.	1218.5	1210.6
45	137.	1218.5	1211.1
40	155.	1218.5	1211.4
35	185.	1218.5	1212.2
30	230.	1218.5	1213.2
25	303.	1218.5	1214.7
20	415.	1218.5	1216.8
15	570.	1218.5	1218.4
10	805.	1218.5	1218.4
5	1180.	1218.5	1218.4
0	1760.	1218.5	1218.4

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	15.	15.	11.	32.	327.	4.	.03	.03
90	0	31.	31.	22.	46.	313.	8.	.06	47.90
85	0	46.	46.	33.	57.	307.	12.	.09	2.27
80	0	60.	60.	43.	65.	305.	15.	.12	1.53
75	0	104.	104.	71.	90.	299.	28.	.18	1.51
70	0	134.	134.	91.	105.	297.	37.	.23	1.50
65	0	170.	170.	110.	119.	300.	46.	.26	1.14
60	0	202.	202.	127.	131.	328.	55.	.28	.42
55	0	228.	228.	145.	141.	368.	63.	.28	.36
50	0	247.	247.	159.	147.	399.	68.	.29	.39
45	0	266.	266.	175.	153.	430.	73.	.30	.42
40	0	280.	280.	183.	160.	464.	79.	.29	.20
35	0	298.	298.	192.	165.	506.	84.	.29	.20
30	0	316.	316.	201.	169.	556.	88.	.28	.17
25	0	333.	333.	211.	164.	598.	83.	.28	.26
20	0	345.	345.	231.	125.	546.	51.	.34	-.22
15	0	350.	350.	235.	32.	1705.	4.	.14	.00
10	0	352.	352.	237.	39.	1665.	6.	.14	-.04
5	0	354.	354.	238.	47.	1622.	8.	.14	-.04
0	0	355.	355.	239.	59.	1580.	13.	.15	-.02

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	15.	15.	11.	32.	153.	4.	.06	.06
90	0	31.	31.	22.	46.	153.	8.	.11	.74
85	0	46.	46.	33.	57.	154.	12.	.16	.93
80	0	60.	60.	43.	65.	156.	15.	.19	.98
75	0	104.	104.	71.	90.	158.	28.	.29	1.03
70	0	134.	134.	91.	105.	160.	37.	.34	1.18
65	0	170.	170.	110.	119.	164.	46.	.39	1.07
60	0	202.	202.	127.	131.	181.	55.	.41	.58
55	0	228.	228.	145.	141.	205.	63.	.42	.54
50	0	247.	247.	159.	147.	223.	68.	.43	.59
45	0	266.	266.	175.	153.	241.	73.	.44	.65
40	0	2P0.	280.	183.	160.	262.	79.	.43	.29
35	0	298.	298.	192.	165.	286.	84.	.43	.32
30	0	316.	316.	201.	169.	315.	88.	.42	.28
25	0	333.	333.	211.	164.	338.	83.	.42	.54
20	0	345.	345.	231.	125.	300.	51.	.54	-.26
15	0	350.	350.	235.	32.	797.	4.	.28	.01
10	0	352.	352.	237.	39.	797.	6.	.28	.22
5	0	354.	354.	238.	47.	797.	8.	.28	.16
0	0	355.	355.	239.	59.	797.	13.	.28	.06

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	15.	15.	11.	32.	636.	4.	.02	.02
90	0	31.	31.	22.	46.	586.	8.	.03	-.30
85	0	46.	46.	33.	57.	561.	12.	.05	-.82
80	0	60.	60.	43.	65.	549.	15.	.07	-2.52
75	0	104.	104.	71.	90.	519.	28.	.12	-5.38
70	0	134.	134.	91.	105.	506.	37.	.15	7.58
65	0	170.	170.	110.	119.	503.	46.	.18	1.73
60	0	202.	202.	127.	131.	544.	55.	.19	.32
55	0	228.	228.	145.	141.	606.	63.	.19	.25
50	0	247.	247.	159.	147.	654.	68.	.20	.27
45	0	266.	266.	175.	153.	701.	73.	.20	.29
40	0	280.	280.	183.	160.	753.	79.	.20	.14
35	0	298.	298.	192.	165.	818.	84.	.20	.13
30	0	316.	316.	201.	169.	896.	88.	.19	.11
25	0	333.	333.	211.	164.	968.	83.	.19	.14
20	0	345.	345.	231.	125.	911.	51.	.22	-.21
15	0	350.	350.	235.	32.	3310.	4.	.07	.00
10	0	352.	352.	237.	39.	3169.	6.	.07	-.01
5	0	354.	354.	238.	47.	3021.	8.	.08	-.01
0	0	355.	355.	239.	59.	2873.	13.	.08	-.01

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION: THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 2.853 UNTS.

RUN COMPLETE.

83/05/25. 13.48.52.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .60
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

SITE NAME: NEW LONDON
SITE NUMBER: MN00 62
RIVER NAME: MIDDLE FORK CROW

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	0	1203.6	1185.5
95	0.	1203.6	1185.5
90	0.	1203.6	1185.5
85	1.	1203.6	1185.5
80	1.	1203.6	1185.5
75	2.	1203.6	1185.6
70	3.	1203.6	1185.6
65	5.	1203.6	1185.7
60	7.	1203.6	1185.8
55	10.	1203.6	1185.9
50	14.	1203.6	1186.0
45	19.	1203.6	1186.2
40	25.	1203.6	1186.4
35	31.	1203.6	1186.5
30	38.	1203.6	1186.7
25	46.	1203.6	1186.9
20	54.	1203.6	1187.1
15	65.	1203.6	1187.3
10	80.	1203.6	1187.5
5	107.	1203.6	1187.9
0	180.	1203.6	1188.6

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	1.	1.	1.	5.	743.	0.	.00	.00
90	0	3.	3.	2.	9.	647.	0.	.00	-.02
85	0	5.	5.	4.	12.	607.	1.	.01	-.04
80	0	10.	10.	8.	18.	551.	1.	.01	-.08
75	0	17.	17.	14.	25.	513.	3.	.03	-.19
70	0	25.	25.	19.	31.	489.	4.	.04	-.32
65	0	38.	38.	30.	40.	462.	6.	.06	-.60
60	0	54.	54.	42.	50.	442.	9.	.09	-1.14
55	0	71.	71.	55.	60.	426.	13.	.11	-2.12
50	0	92.	92.	70.	71.	412.	18.	.14	-4.39
45	0	116.	116.	87.	83.	399.	24.	.18	*****
40	0	141.	141.	99.	95.	390.	30.	.20	5.17
35	0	164.	164.	110.	107.	381.	38.	.23	3.71
30	0	188.	188.	122.	118.	374.	46.	.25	2.24
25	0	210.	210.	132.	131.	397.	55.	.25	.31
20	0	228.	228.	141.	142.	443.	64.	.24	.16
15	0	248.	248.	151.	156.	503.	76.	.23	.13
10	0	268.	268.	160.	174.	584.	93.	.21	.10
5	0	288.	288.	170.	200.	709.	120.	.19	.06
0	0	305.	305.	179.	260.	1012.	194.	.14	.02

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	1.	1.	1.	5.	267.	0.	.00	.00
90	0	3.	3.	2.	9.	251.	0.	.01	-.13
85	0	5.	5.	4.	12.	245.	1.	.01	-.38
80	0	10.	10.	8.	18.	235.	1.	.03	-1.33
75	0	17.	17.	14.	25.	229.	3.	.05	6.29
70	0	25.	25.	19.	31.	225.	4.	.08	2.86
65	0	38.	38.	30.	40.	221.	6.	.11	2.00
60	0	54.	54.	42.	50.	218.	9.	.16	1.85
55	0	71.	71.	55.	60.	216.	13.	.20	1.76
50	0	92.	92.	70.	71.	214.	18.	.25	1.66
45	0	116.	116.	87.	83.	212.	24.	.29	1.61
40	0	141.	141.	99.	95.	211.	30.	.32	1.09
35	0	164.	164.	110.	107.	210.	38.	.35	1.06
30	0	188.	188.	122.	118.	209.	46.	.37	1.00
25	0	210.	210.	132.	131.	225.	55.	.37	.39
20	0	228.	228.	141.	142.	254.	64.	.36	.22
15	0	248.	248.	151.	156.	293.	76.	.34	.18
10	0	268.	268.	160.	174.	346.	93.	.31	.13
5	0	288.	288.	170.	200.	428.	120.	.27	.09
0	0	305.	305.	179.	260.	636.	194.	.20	.03

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	1.	1.	1.	5.	1218.	0.	.00	.00
90	0	3.	3.	2.	9.	1042.	0.	.00	-.01
85	0	5.	5.	4.	12.	969.	1.	.00	-.02
80	0	10.	10.	8.	18.	866.	1.	.01	-.04
75	0	17.	17.	14.	25.	797.	3.	.02	-.09
70	0	25.	25.	19.	31.	752.	4.	.02	-.15
65	0	38.	38.	30.	40.	703.	6.	.04	-.26
60	0	54.	54.	42.	50.	666.	9.	.06	-.44
55	0	71.	71.	55.	60.	636.	13.	.08	-.66
50	0	92.	92.	70.	71.	610.	18.	.10	-.95
45	0	116.	116.	87.	83.	587.	24.	.13	-1.63
40	0	141.	141.	99.	95.	569.	30.	.15	-1.90
35	0	164.	164.	110.	107.	552.	38.	.17	-2.49
30	0	188.	188.	122.	118.	539.	46.	.18	-9.80
25	0	210.	210.	132.	131.	568.	55.	.19	.26
20	0	228.	228.	141.	142.	632.	64.	.18	.12
15	0	248.	248.	151.	156.	714.	76.	.17	.10
10	0	268.	268.	160.	174.	822.	93.	.16	.07
5	0	288.	288.	170.	200.	989.	120.	.14	.05
0	0	305.	305.	179.	260.	1388.	194.	.11	.02

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION: THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 2.951 UNTS.

RUN COMPLETE.

83/05/25. 13.53.22.
MNFTS PROGRAM HYFEAS

SITE NAME:HIGHWAY 75 DAM
SITE NUMBER:MN00581
RIVER NAME:MINNESOTA RIVER

INPUT DATA:
****

EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .80
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	0	956.2	943.5
95	1.	956.2	943.5
90	2.	956.2	943.5
85	3.	956.2	943.5
80	4.	956.2	943.5
75	5.	956.2	943.5
70	7.	956.2	943.5
65	9.	956.2	943.5
60	13.	956.2	943.5
55	18.	956.2	943.5
50	26.	956.2	943.5
45	37.	956.2	943.5
40	49.	956.2	943.5
35	67.	956.2	943.6
30	93.	956.2	943.6
25	128.	956.2	943.7
20	173.	956.2	943.7
15	227.	956.2	943.8
10	340.	956.2	944.0
5	620.	956.2	944.2
0	1100.	956.2	944.4

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	7.	7.	6.	14.	813.	1.	.01	.01
90	0	14.	14.	11.	21.	742.	2.	.01	-.09
85	0	21.	21.	17.	26.	703.	3.	.02	-.16
80	0	28.	28.	22.	30.	677.	4.	.03	-.24
75	0	34.	34.	27.	34.	657.	5.	.04	-.30
70	0	45.	45.	36.	41.	629.	6.	.05	-.42
65	0	56.	56.	44.	47.	608.	8.	.07	-.57
60	0	75.	75.	59.	57.	580.	12.	.09	-.83
55	0	98.	98.	76.	68.	556.	16.	.12	-1.32
50	0	130.	130.	101.	83.	530.	24.	.17	-2.29
45	0	171.	171.	125.	101.	506.	34.	.21	-3.80
40	0	210.	210.	144.	117.	488.	45.	.24	*****
35	0	263.	263.	169.	138.	552.	61.	.24	.30
30	0	328.	328.	201.	165.	693.	84.	.23	.19
25	0	403.	403.	237.	196.	862.	115.	.22	.18
20	0	480.	480.	274.	230.	1062.	156.	.21	.16
15	0	552.	552.	309.	266.	1279.	203.	.20	.14
10	0	661.	661.	362.	328.	1684.	299.	.18	.11
5	0	820.	820.	439.	451.	2541.	536.	.15	.08
0	0	910.	910.	482.	610.	3765.	935.	.11	.03

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	7.	7.	6.	14.	427.	1.	.01	.01
90	0	14.	14.	11.	21.	400.	2.	.03	-.28
85	0	21.	21.	17.	26.	385.	3.	.04	-.58
80	0	28.	28.	22.	30.	376.	4.	.05	-.94
75	0	34.	34.	27.	34.	368.	5.	.07	-1.37
70	0	45.	45.	36.	41.	358.	6.	.09	-2.34
65	0	56.	56.	44.	47.	350.	8.	.11	-4.91
60	0	75.	75.	59.	57.	339.	12.	.15	*****
55	0	98.	98.	76.	68.	330.	16.	.19	8.67
50	0	130.	130.	101.	83.	321.	24.	.25	4.70
45	0	171.	171.	125.	101.	312.	34.	.30	2.68
40	0	210.	210.	144.	117.	305.	45.	.34	1.94
35	0	263.	263.	169.	138.	351.	61.	.35	.38
30	0	328.	328.	201.	165.	448.	84.	.33	.25
25	0	403.	403.	237.	196.	566.	115.	.31	.24
20	0	480.	480.	274.	230.	710.	156.	.29	.21
15	0	552.	552.	309.	266.	867.	203.	.27	.18
10	0	661.	661.	362.	328.	1167.	299.	.24	.14
5	0	820.	820.	439.	451.	1823.	536.	.19	.10
0	0	910.	910.	482.	610.	2793.	935.	.14	.04

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	7.	7.	6.	14.	1199.	1.	.00	.00
90	0	14.	14.	11.	21.	1083.	2.	.01	-.05
85	0	21.	21.	17.	26.	1020.	3.	.02	-.09
80	0	28.	28.	22.	30.	978.	4.	.02	-.14
75	0	34.	34.	27.	34.	946.	5.	.03	-.17
70	0	45.	45.	36.	41.	899.	6.	.04	-.23
65	0	56.	56.	44.	47.	866.	8.	.05	-.31
60	0	75.	75.	59.	57.	820.	12.	.07	-.42
55	0	98.	98.	76.	68.	781.	16.	.09	-.61
50	0	130.	130.	101.	83.	739.	24.	.12	-.92
45	0	171.	171.	125.	101.	700.	34.	.16	-1.11
40	0	210.	210.	144.	117.	671.	45.	.18	-1.50
35	0	263.	263.	169.	138.	754.	61.	.19	.24
30	0	328.	328.	201.	165.	938.	84.	.18	.15
25	0	403.	403.	237.	196.	1158.	115.	.17	.14
20	0	480.	480.	274.	230.	1415.	156.	.17	.13
15	0	552.	552.	309.	266.	1691.	203.	.16	.11
10	0	661.	661.	362.	328.	2200.	299.	.14	.09
5	0	820.	820.	439.	451.	3260.	536.	.12	.07
0	0	910.	910.	482.	610.	4738.	935.	.09	.03

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION: THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 2.910 UNTS.

RUN COMPLETE.

83/05/25. 14.50.55.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

SITE NAME: FISH LAKE
SITE NUMBER: MN00614
RIVER NAME: BEAVER RIVER

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .80
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 114.

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	0	18.0	0
95	2.	18.0	0
90	3.	18.0	0
85	4.	18.0	0
80	5.	18.0	0
75	5.	18.0	0
70	7.	18.0	0
65	8.	18.0	0
60	10.	18.0	0
55	13.	18.0	0
50	15.	18.0	0
45	17.	18.0	0
40	19.	18.0	0
35	24.	18.0	0
30	30.	18.0	0
25	47.	18.0	0
20	50.	18.0	0
15	69.	18.0	0
10	115.	18.0	0
5	170.	18.0	0
0	220.	18.0	0

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	20.	20.	16.	25.	741.	3.	.02	.02
90	0	31.	31.	24.	31.	708.	4.	.03	-.31
85	0	41.	41.	32.	36.	686.	5.	.04	-.47
80	0	45.	45.	36.	39.	677.	6.	.05	-.59
75	0	50.	50.	40.	41.	669.	6.	.06	-.64
70	0	62.	62.	50.	47.	651.	8.	.07	-.79
65	0	74.	74.	59.	53.	636.	10.	.09	-1.05
60	0	88.	88.	70.	60.	621.	13.	.10	-1.38
55	0	104.	104.	83.	67.	607.	16.	.12	-1.90
50	0	119.	119.	95.	74.	595.	19.	.14	-2.63
45	0	130.	130.	100.	80.	587.	22.	.15	-2.07
40	0	139.	139.	105.	85.	581.	25.	.16	-2.56
35	0	159.	159.	114.	95.	568.	30.	.17	-4.00
30	0	183.	183.	126.	108.	554.	39.	.19	*****
25	0	236.	236.	151.	138.	602.	61.	.20	.33
20	0	243.	243.	155.	143.	624.	65.	.20	.14
15	0	281.	281.	173.	170.	751.	89.	.19	.12
10	0	346.	346.	205.	225.	1021.	149.	.16	.10
5	0	393.	393.	228.	278.	1304.	220.	.14	.07
0	0	407.	407.	234.	320.	1537.	285.	.13	.02

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	20.	20.	16.	25.	457.	3.	.03	.03
90	0	31.	31.	24.	31.	445.	4.	.05	-1.33
85	0	41.	41.	32.	36.	436.	5.	.07	-2.62
80	0	45.	45.	36.	39.	433.	6.	.08	-4.17
75	0	50.	50.	40.	41.	430.	6.	.08	-5.64
70	0	62.	62.	50.	47.	423.	8.	.11	*****
65	0	74.	74.	59.	53.	418.	10.	.12	37.24
60	0	88.	88.	70.	60.	412.	13.	.15	9.52
55	0	104.	104.	83.	67.	407.	16.	.18	5.82
50	0	119.	119.	95.	74.	402.	19.	.20	4.43
45	0	130.	130.	100.	80.	399.	22.	.21	2.24
40	0	139.	139.	105.	85.	397.	25.	.22	1.93
35	0	159.	159.	114.	95.	392.	30.	.23	1.65
30	0	183.	183.	126.	108.	387.	39.	.25	1.42
25	0	236.	236.	151.	138.	424.	61.	.27	.38
20	0	243.	243.	155.	143.	439.	65.	.27	.19
15	0	281.	281.	173.	170.	527.	89.	.25	.16
10	0	346.	346.	205.	225.	719.	149.	.22	.13
5	0	393.	393.	228.	278.	924.	220.	.19	.09
0	0	407.	407.	234.	320.	1097.	285.	.17	.03

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	20.	20.	16.	25.	1025.	3.	.02	.02
90	0	31.	31.	24.	31.	971.	4.	.02	-.17
85	0	41.	41.	32.	36.	936.	5.	.03	-.26
80	0	45.	45.	36.	39.	921.	6.	.04	-.31
75	0	50.	50.	40.	41.	909.	6.	.04	-.34
70	0	62.	62.	50.	47.	878.	8.	.05	-.41
65	0	74.	74.	59.	53.	855.	10.	.06	-.52
60	0	88.	88.	70.	60.	830.	13.	.08	-.65
55	0	104.	104.	83.	67.	807.	16.	.10	-.82
50	0	119.	119.	95.	74.	788.	19.	.11	-1.01
45	0	130.	130.	100.	80.	775.	22.	.12	-.71
40	0	139.	139.	105.	85.	764.	25.	.12	-.77
35	0	159.	159.	114.	95.	744.	30.	.14	-.91
30	0	183.	183.	126.	108.	721.	39.	.15	-1.23
25	0	236.	236.	151.	138.	781.	61.	.16	.29
20	0	243.	243.	155.	143.	809.	65.	.16	.11
15	0	281.	281.	173.	170.	975.	89.	.15	.09
10	0	346.	346.	205.	225.	1324.	149.	.13	.08
5	0	393.	393.	228.	278.	1683.	220.	.12	.05
0	0	407.	407.	234.	320.	1976.	285.	.10	.02

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION: THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 2.958 UNTS.

RUN COMPLETE.

83/05/25. 14.40.29.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .80
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

SITE NAME:BRAWNER LAKE
SITE NUMBER:MN00120
RIVER NAME:REDWOOD RIVER

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	0	1444.5	1420.0
95	1.	1444.5	1420.0
90	1.	1444.5	1420.0
85	2.	1444.5	1420.0
80	2.	1444.5	1420.0
75	3.	1444.5	1420.0
70	3.	1444.5	1420.0
65	4.	1444.5	1420.0
60	4.	1444.5	1420.1
55	5.	1444.6	1420.1
50	6.	1444.6	1420.1
45	8.	1444.6	1420.2
40	10.	1444.7	1420.2
35	13.	1444.8	1420.2
30	18.	1444.9	1420.4
25	25.	1445.0	1420.6
20	36.	1445.2	1421.3
15	54.	1445.4	1422.0
10	85.	1445.6	1423.0
5	166.	1446.2	1425.0
0	380.	1448.5	1427.6

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	11.	11.	9.	18.	610.	1.	.01	.01
90	0	16.	16.	13.	22.	578.	2.	.02	-.16
85	0	23.	23.	18.	27.	552.	3.	.03	-.24
80	0	26.	26.	21.	29.	540.	4.	.04	-.32
75	0	32.	32.	26.	33.	524.	4.	.05	-.39
70	0	38.	38.	30.	37.	512.	5.	.05	-.45
65	0	43.	43.	33.	40.	502.	6.	.06	-.53
60	0	48.	48.	37.	43.	492.	7.	.07	-.68
55	0	57.	57.	44.	49.	477.	9.	.08	-.68
50	0	63.	63.	48.	53.	468.	11.	.09	-.98
45	0	76.	76.	57.	61.	454.	14.	.11	-1.33
40	0	89.	89.	64.	70.	439.	18.	.13	-1.16
35	0	106.	106.	72.	82.	424.	23.	.14	-1.99
30	0	129.	129.	83.	97.	408.	32.	.16	*****
25	0	155.	155.	96.	115.	393.	43.	.19	4.31
20	0	188.	188.	111.	136.	439.	59.	.19	.24
15	0	231.	231.	132.	168.	580.	88.	.18	.12
10	0	280.	280.	156.	210.	782.	132.	.16	.10
5	0	352.	352.	191.	287.	1203.	233.	.13	.07
0	0	404.	404.	216.	416.	2035.	463.	.09	.03

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	11.	11.	9.	18.	326.	1.	.03	.03
90	0	16.	16.	13.	22.	314.	2.	.04	-.57
85	0	23.	23.	18.	27.	304.	3.	.05	-1.02
80	0	26.	26.	21.	29.	299.	4.	.06	-1.55
75	0	32.	32.	26.	33.	294.	4.	.08	-2.21
70	0	38.	38.	30.	37.	289.	5.	.09	-3.38
65	0	43.	43.	33.	40.	285.	6.	.10	-5.77
60	0	48.	48.	37.	43.	282.	7.	.12	33.26
55	0	57.	57.	44.	49.	276.	9.	.13	19.64
50	0	63.	63.	48.	53.	273.	11.	.15	7.06
45	0	76.	76.	57.	61.	267.	14.	.17	3.50
40	0	89.	89.	64.	70.	262.	18.	.19	1.87
35	0	106.	106.	72.	82.	256.	23.	.21	1.47
30	0	129.	129.	83.	97.	250.	32.	.24	1.16
25	0	155.	155.	96.	115.	245.	43.	.27	1.00
20	0	188.	188.	111.	136.	278.	59.	.27	.29
15	0	231.	231.	132.	168.	375.	88.	.24	.16
10	0	280.	280.	156.	210.	518.	132.	.21	.13
5	0	352.	352.	191.	287.	822.	233.	.17	.09
0	0	404.	404.	216.	416.	1447.	463.	.12	.03

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	11.	11.	9.	18.	894.	1.	.01	.01
90	0	16.	16.	13.	22.	842.	2.	.01	-.09
85	0	23.	23.	18.	27.	800.	3.	.02	-.14
80	0	26.	26.	21.	29.	781.	4.	.03	-.18
75	0	32.	32.	26.	33.	755.	4.	.03	-.21
70	0	38.	38.	30.	37.	735.	5.	.04	-.24
65	0	43.	43.	33.	40.	719.	6.	.04	-.28
60	0	48.	48.	37.	43.	703.	7.	.05	-.34
55	0	57.	57.	44.	49.	679.	9.	.06	-.34
50	0	63.	63.	48.	53.	664.	11.	.07	-.46
45	0	76.	76.	57.	61.	640.	14.	.08	-.56
40	0	89.	89.	64.	70.	616.	18.	.09	-.44
35	0	106.	106.	72.	82.	591.	23.	.11	-.59
30	0	129.	129.	83.	97.	566.	32.	.13	-1.05
25	0	155.	155.	96.	115.	541.	43.	.15	-1.87
20	0	188.	188.	111.	136.	599.	59.	.15	.20
15	0	231.	231.	132.	168.	785.	88.	.14	.10
10	0	280.	280.	156.	210.	1047.	132.	.12	.08
5	0	352.	352.	191.	287.	1584.	233.	.10	.06
0	0	404.	404.	216.	416.	2623.	463.	.07	.02

FEASIBILTTY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION:THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 2.935 UNTS.

RUN COMPLETE.

83/05/24. 14.57.07.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .60
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 0

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

SITE NAME: SAND CREEK
SITE NUMBER: MN00535
RIVER NAME: SAND CREEK

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	0	13.2	0
95	1.	13.2	0
90	2.	13.2	0
85	2.	13.2	0
80	2.	13.2	0
75	3.	13.2	0
70	3.	13.2	0
65	4.	13.2	0
60	4.	13.2	0
55	6.	13.2	0
50	9.	13.2	0
45	14.	13.2	0
40	20.	13.2	0
35	28.	13.2	0
30	38.	13.2	0
25	52.	13.2	0
20	69.	13.2	0
15	96.	13.2	0
10	150.	13.2	0
5	200.	13.2	0
0	240.	13.2	0

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	7.	7.	6.	14.	647.	1.	.01	.01
90	0	13.	13.	10.	19.	606.	2.	.02	-.12
85	0	15.	15.	12.	21.	594.	2.	.02	-.17
80	0	16.	16.	12.	22.	590.	2.	.02	-.19
75	0	20.	20.	16.	25.	570.	3.	.03	-.22
70	0	21.	21.	17.	26.	565.	3.	.03	-.26
65	0	24.	24.	19.	29.	555.	3.	.03	-.28
60	0	29.	29.	23.	32.	540.	4.	.04	-.33
55	0	37.	37.	29.	38.	520.	6.	.05	-.44
50	0	50.	50.	40.	48.	496.	9.	.07	-.70
45	0	67.	67.	48.	59.	473.	13.	.09	-.76
40	0	90.	90.	59.	74.	452.	19.	.11	-1.58
35	0	115.	115.	71.	88.	434.	27.	.14	-4.84
30	0	142.	142.	85.	104.	419.	36.	.16	13.56
25	0	175.	175.	100.	124.	405.	49.	.19	3.34
20	0	206.	206.	115.	144.	490.	66.	.18	.15
15	0	246.	246.	134.	172.	619.	91.	.17	.12
10	0	302.	302.	162.	220.	849.	143.	.15	.10
5	0	333.	333.	177.	257.	1042.	190.	.14	.07
0	0	342.	342.	181.	283.	1186.	228.	.12	.02

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	7.	7.	6.	14.	268.	1.	.02	.02
90	0	13.	13.	10.	19.	261.	2.	.04	-2.12
85	0	15.	15.	12.	21.	259.	2.	.04	-8.54
80	0	16.	16.	12.	22.	259.	2.	.04	*****
75	0	20.	20.	16.	25.	255.	3.	.06	12.99
70	0	21.	21.	17.	26.	255.	3.	.06	5.51
65	0	24.	24.	19.	29.	253.	3.	.07	4.06
60	0	29.	29.	23.	32.	250.	4.	.08	2.96
55	0	37.	37.	29.	38.	247.	6.	.10	2.31
50	0	50.	50.	40.	48.	243.	9.	.14	1.96
45	0	67.	67.	48.	59.	239.	13.	.16	1.09
40	0	90.	90.	59.	74.	236.	19.	.19	1.05
35	0	115.	115.	71.	88.	233.	27.	.22	1.02
30	0	142.	142.	85.	104.	230.	36.	.25	.97
25	0	175.	175.	100.	124.	228.	49.	.28	.92
20	0	206.	206.	115.	144.	282.	66.	.27	.21
15	0	246.	246.	134.	172.	366.	91.	.25	.17
10	0	302.	302.	162.	220.	520.	143.	.22	.13
5	0	333.	333.	177.	257.	653.	190.	.19	.09
0	0	342.	342.	181.	283.	754.	228.	.17	.03

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	7.	7.	6.	14.	1025.	1.	.01	.01
90	0	13.	13.	10.	19.	950.	2.	.01	-.06
85	0	15.	15.	12.	21.	929.	2.	.01	-.09
80	0	16.	16.	12.	22.	922.	2.	.01	-.09
75	0	20.	20.	16.	25.	885.	3.	.02	-.11
70	0	21.	21.	17.	26.	876.	3.	.02	-.12
65	0	24.	24.	19.	29.	857.	3.	.02	-.13
60	0	29.	29.	23.	32.	830.	4.	.03	-.16
55	0	37.	37.	29.	38.	794.	6.	.04	-.20
50	0	50.	50.	40.	48.	749.	9.	.05	-.30
45	0	67.	67.	48.	59.	706.	13.	.06	-.28
40	0	90.	90.	59.	74.	667.	19.	.08	-.45
35	0	115.	115.	71.	88.	636.	27.	.10	-.72
30	0	142.	142.	85.	104.	608.	36.	.12	-1.14
25	0	175.	175.	100.	124.	581.	49.	.14	-2.03
20	0	206.	206.	115.	144.	697.	66.	.14	.11
15	0	246.	246.	134.	172.	872.	91.	.13	.09
10	0	302.	302.	162.	220.	1178.	143.	.12	.08
5	0	333.	333.	177.	257.	1430.	190.	.10	.05
0	0	342.	342.	181.	283.	1617.	228.	.10	.02

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION:THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 3.134 UNTS.

RUN COMPLETE.

83/05/25. 14.38.01.
MNFTS PROGRAM HYFEAS

INPUT DATA:
****
EXISTING POWERPLANT

NONE

PROPOSED POWERPLANT

WEIGHTING FACTOR: .50
OVERALL EFFICIENCY: .85
OTHER CONSTRUCTION COSTS ($1000): 118.

ECONOMIC-ASSUMPTIONS

DISCOUNT RATE: .08
ESCALATION RATE: .06
AMORTIZATION PERIOD: 20 YEARS
VALUE OF ENERGY: 1.90 CENTS PER KWH
BASE CAPACITY INCOME: 2.70 CENTS PER KWH

SITE NAME:MUSTINKA RIVER
SITE NUMBER:MNOO 26
RIVER NAME:MUSTINKA RIVER

PERCENT EXCEEDANCE	DISCHARGE (CFS)	HEADWATER ELEVATION (FT)	TAILWATER ELEVATION (FT)
100	0	13.1	0
95	0	13.1	0
90	0	13.1	0
85	0	13.1	0
80	0	13.1	0
75	0	13.1	0
70	0.	13.1	0
65	0.	13.1	0
60	0.	13.1	0
55	0.	13.1	0
50	0.	13.1	0
45	0.	13.1	0
40	1.	13.1	0
35	1.	13.1	0
30	2.	13.1	0
25	4.	13.1	0
20	7.	13.1	0
15	11.	13.1	0
10	19.	13.1	0
5	50.	13.1	0
0	180.	13.1	0

BEST WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	0	0	0	0	0	0	I	0
90	0	0	0	0	0	0	0	I	0
85	0	0	0	0	0	0	0	I	0
80	0	0	0	0	0	0	0	I	0
75	0	0	0	0	0	0	0	I	0
70	0	1.	1.	0.	4.	872.	0.	.00	.00
65	0	1.	1.	0.	4.	872.	0.	.00	0
60	0	1.	1.	1.	6.	811.	0.	.00	-.01
55	0	2.	2.	1.	7.	778.	0.	.00	-.01
50	0	2.	2.	1.	7.	778.	0.	.00	0
45	0	2.	2.	1.	9.	756.	0.	.00	-.01
40	0	2.	2.	2.	10.	739.	0.	.00	-.01
35	0	4.	4.	2.	14.	691.	1.	.00	-.02
30	0	5.	5.	3.	19.	660.	2.	.00	-.03
25	0	10.	10.	5.	28.	614.	3.	.01	-.06
20	0	15.	15.	8.	40.	581.	6.	.01	-.12
15	0	22.	22.	11.	54.	553.	11.	.02	-.25
10	0	31.	31.	15.	72.	529.	18.	.03	-.62
5	0	50.	50.	24.	120.	490.	47.	.04	.99
0	0	76.	76.	37.	241.	1008.	170.	.03	.02

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

LOW WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	0	0	0	0	0	0	I	0
90	0	0	0	0	0	0	0	I	0
85	0	0	0	0	0	0	0	I	0
80	0	0	0	0	0	0	0	I	0
75	0	0	0	0	0	0	0	I	0
70	0	1.	1.	0.	4.	310.	0.	.00	.00
65	0	1.	1.	0.	4.	310.	0.	.00	0
60	0	1.	1.	1.	6.	310.	0.	.00	.22
55	0	2.	2.	1.	7.	310.	0.	.00	.26
50	0	2.	2.	1.	7.	310.	0.	.00	0
45	0	2.	2.	1.	9.	310.	0.	.00	.15
40	0	2.	2.	2.	10.	310.	0.	.01	.15
35	0	4.	4.	2.	14.	310.	1.	.01	.17
30	0	5.	5.	3.	19.	310.	2.	.01	.19
25	0	10.	10.	5.	28.	310.	3.	.02	.21
20	0	15.	15.	8.	40.	310.	6.	.02	.24
15	0	22.	22.	11.	54.	310.	11.	.03	.24
10	0	31.	31.	15.	72.	310.	18.	.04	.22
5	0	50.	50.	24.	120.	310.	47.	.06	.19
0	0	76.	76.	37.	241.	643.	170.	.04	.03

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

HIGH WEIGHTING FACTOR ESTIMATE

OUTPUT DATA:
****

PERCENT EXCEEDANCE	EXISTING ENERGY (MWH/YEAR)	NEW ENERGY (MWH/YEAR)	INCREMENTAL ENERGY (MWH/YEAR)	TOTAL BENEFIT ($1000)	OPERATION & MAINTENACE ($1000)	PROJECT COST ($1000)	DESIGN CAPACITY (KW)	BENEFIT-COST RATIO	INCREMENTAL B/C
100	0	0	0	0	0	0	0	I	0
95	0	0	0	0	0	0	0	I	0
90	0	0	0	0	0	0	0	I	0
85	0	0	0	0	0	0	0	I	0
80	0	0	0	0	0	0	0	I	0
75	0	0	0	0	0	0	0	I	0
70	0	1.	1.	0.	4.	1433.	0.	.00	.00
65	0	1.	1.	0.	4.	1433.	0.	.00	0
60	0	1.	1.	1.	6.	1311.	0.	.00	-.00
55	0	2.	2.	1.	7.	1246.	0.	.00	-.01
50	0	2.	2.	1.	7.	1246.	0.	.00	0
45	0	2.	2.	1.	9.	1201.	0.	.00	-.00
40	0	2.	2.	2.	10.	1168.	0.	.00	-.01
35	0	4.	4.	2.	14.	1071.	1.	.00	-.01
30	0	5.	5.	3.	19.	1010.	2.	.00	-.01
25	0	10.	10.	5.	28.	917.	3.	.01	-.03
20	0	15.	15.	8.	40.	851.	6.	.01	-.05
15	0	22.	22.	11.	54.	796.	11.	.01	-.08
10	0	31.	31.	15.	72.	748.	18.	.02	-.13
5	0	50.	50.	24.	120.	669.	47.	.03	-.31
0	0	76.	76.	37.	241.	1373.	170.	.02	.02

FEASIBILITY PARAMETERS
FOR THE PROPOSED POWERPLANT
****

SITE IS NOT FEASIBLE AT
THIS WEIGHTING FACTOR

CONCLUSION: THIS SITE HAS A POOR HYDROPOWER FEASIBILITY !

SRU 2.744 UNTS.

RUN COMPLETE.