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GRID CONNECTED INTEGRATED COMMUNITY ENERGY SYSTEM

Phase II, Final Stage 2 Report

Finance Plan, Capital Costs and Institutional Analysis

March 22, 1978

Work Performed Under Contract No. EC-77-C-02-4210

University of Minnesota
Physical Plant
Minneapolis, Minnesota

and

Helmick & Lutz Company
Engineers
Minneapolis, Minnesota

U. S. DEPARTMENT OF ENERGY

Division of Buildings and Community Systems

MASTER

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GRID CONNECTED INTEGRATED COMMUNITY ENERGY SYSTEM

PHASE II FINAL STAGE 2 REPORT

FINANCE PLAN, CAPITAL COSTS
AND
INSTITUTIONAL ANALYSIS

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March 22, 1978

UNIVERSITY OF MINNESOTA PHYSICAL PLANT
319 15th AVE. S.E.
MINNEAPOLIS, MINNESOTA 55455
612-373-4521

Prepared For
The U.S. Department of Energy
Under Contract No. EC-77-C-02-4210

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South East Generating Station

Helmick & Lutz

VOLUME 2

FINANCE PLAN, CAPITAL COSTS

AND INSTITUTIONAL ANALYSIS

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FINANCIAL PROGRAM

The following materials represents the official University capital funding program and request assistance from D.O.E. for the Grid ICES.

As a part of D.O.E.'s review on April 6, 1978 a definitive funding program was requested. These materials were subsequently transmitted on April 24, 1978.

UNIVERSITY OF MINNESOTA

Office of the Vice President for Finance
301 Morrill Hall
100 Church Street S.E.
Minneapolis, Minnesota 55455
(612) 373-5940

April 24, 1978

Mr. John Rodousakis, Program Manager
Buildings and Community Systems
U. S. Department of Energy
Mail Station: 2221C
Washington, D. C. 20545

RE: Attached University of Minnesota Capital Funding Program
for Phases III and IV, Grid-Connected Integrated Community
Energy System, Contract No. EC-77-C-02-4210

Dear Mr. Rodousakis:

As an authorized representative of the University Board of Regents, I am submitting the University's proposed capital funding program for the Grid-Connected Integrated Community Energy System.

At my request, Assistant Vice President C. T. Johnson, Assistant Vice President C. L. Carlson, W. E. Soderberg and the Physical Plant staff have assisted in preparing the enclosed cost sharing program.

The development of this community project presents possible future opportunities for cost benefits, but at this time, the University can only emphasize the significant conservation of energy associated with this program. The more efficient method of generating electricity, the adding on of community loads to the University's coal-fired plants, and the improved method of disposing of critical solid waste all will show significant energy gains for the community. The program estimates a reduction of 2,600,000 gallons of oil or equivalent natural gas, fuels which are rapidly becoming extremely critical. In addition, there will be an offsetting of approximately 40,000 tons of coal as a result of the co-generation of electricity and the waste-heat recovery from the disposal of solid waste.

The primary obstacle to implementation of ICES, whether it is in Minnesota or elsewhere, is the breaking down of capital, regulatory and socioeconomic barriers. The University has overcome the regulatory and socioeconomic barriers. The program is capital intensive and will require the University to obtain loans for design and construction as the project progresses.

April 24, 1978

Large loan commitments are not new to the University of Minnesota. Housing, Student Unions and other self-support units normally cover their facility expansions by establishing some type of debt service. The cost sharing proposed in the capital funding program obligates the University to undertake a debt of over \$11,000,000, which is a sizeable undertaking, since all previous capital funding requirements at the Minneapolis Campus Heating Plant were provided by State appropriations.

In addition to the \$431,888 grant already received, we are requesting a total of \$9,795,604 from the Department of Energy to assist the University in funding the Basic Plan and Options I, II and III as outlined in the attached documentation. In reviewing this project, we feel that this is exactly the type of activity that the Department of Energy ought to be encouraging and supporting if you are to carry out the mandate of Congress and the American people to encourage innovative approaches to the energy problem. There are, I am sure, few projects which are submitted for your consideration which have been as carefully developed and as widely supported by the community and by the appropriate State officials as the University's Grid-ICES proposal. While we have very much appreciated the support which you have given to the various feasibility studies, it is our considered opinion that at this time it is very appropriate that you provide us with the assistance necessary to allow this project to be completed so that it may serve as a singular illustration of how a large institution can effectively address the energy problems of this country.

We will be looking forward to receiving a favorable response to the funding program, and as always, my staff will be available to meet with you at any time to further discuss or negotiate cost sharing in Phases III and IV.

Very truly yours,

Donald P. Brown
Vice President for Finance

DPB/pj

Attachment

cc: H. Miller, DOE
Jess Pascual, DOE
C. T. Johnson
C. L. Carlson
W. E. Soderberg

COST SUMMARY

The funding requirements and the cash flow program developed for this Phase II report were influenced by the descriptive material on cost sharing in the RFP and by institutional framework and restraints of the University. The University of Minnesota's understanding of the DOE program on Grid-ICES is that assistance beyond Phase II is negotiable and negotiable probably only in the areas of program inclusions that the DOE wants or parts of the program that involve high risks.

The question of risk is difficult to address. Whenever a not-for-profit institution enters into unrelated areas of activity, such as the generation of electricity, the sale of steam to nonaffiliated customers, or the disposal of community waste, it exposes the institution to risks involving capital recovery that are not generated by institutional needs.

Since we were not able to determine areas of risk that were specifically compatible to the DOE's RFP, our preliminary proposal included no funding assistance other than add-on instrumentation. The funding requirements and cash flow have been modified to show needed cost sharing in the following segments:

	<u>Cost</u>
1. Normal Heating Plant expansion	\$14,829,520
2. Add-on cost for the Basic Program	4,885,280
3. Add-on cost for Option I	1,828,000
4. Add-on cost for Option II	7,700,800
5. Add-on cost for Option III	1,930,000
Construction Cost Total, Phases III and IV	<u>\$31,173,600</u>
Phases I and II (DOE)	431,888
Cash Flow Assistance	<u>1,058,984</u>
Total	<u>\$32,664,472</u>

The University strongly supports its entire Grid-ICES Program. Briefly, the energy gains are as follows.

The Basic Plan is a 50 percent plus improvement over the normal method of generating electricity; Option I is a very cost effective way of converting gas/oil fired units to coal; Option II is an improved and acceptable method of disposing of health care material whereby waste normally disposed of in landfill will be converted to a burnable low BTU gas; and Option III is an improved method of transporting thermal energy for a cogeneration system. With these gains in mind, the Federal Government should be making every effort to assist in the funding of projects such as the University of Minnesota's Grid-ICES so that they may meet the time restraints of being on line in the 1980's.

The conclusion is that without the new proposed cost sharing program, the University of Minnesota should continue its normal plant expansion, programmed to the Grid-ICES Basic Plan and Options. As unit prices on energy approach our projections and the risks are better defined, ICES can be phased into normal plant expansion.

In the Phase II, Stage I final report, a funding program with low interest loans was developed. Since HEW funds are not presently available, a funding program based on grants or low interest loans is not viable at this time. The University will continue in its attempt to obtain funding assistance from the various Federal, State and local agencies. 4

HEATING PLANT EXPANSION (WITH OR WITHOUT GRID-ICES)

2.0.2

I. Requirements:

	Cost - 1977 Price Index
A. Heating Plants	
1. Pollution Control, University of Minnesota Plant	\$ 2,600,000
2. Southeast Plant Acquisition.	500,000
3. Plant Interconnecting and Coal Handling.	4,799,160
4. Southeast Utilities	270,000
5. Southeast Fuel Systems	1,863,000
6. Southeast Plant Systems.	3,134,160
7. Southeast Remodeling.	991,000
8. Southeast Instrumentation	339,200
9. Demolition, Surveys, etc.	170,000
B. Upgrading of Incinerator	<u>163,000</u>
Total	\$14,829,520

II. Cash Flow:

<u>Year</u>	<u>Requirement</u>	<u>Cost</u>
1977	A-1, A-2	\$ 3,100,000
1978	A-9, B	333,000
	Part of A-3	1,573,000
1979	A-3 through A-8	5,749,190
1980	Completion and startup	4,074,330

III. Project Funding:

Legislature.	\$11,422,190
Operating Funds	333,000
Loan	<u>3,074,330</u>
Total	\$14,829,520

Labor

5 Principal Operating Engineers	at \$22,630	\$113,150
5 Sr. Operating Engineers	at 21,730	108,650
5 Operating Engineers	at 20,840	104,200
10 Jr. Operating Engineers	at 19,947	199,470
Chief Engineer	at 28,000	28,000
Asst. Chief Engineer	at 25,000	25,000
Crane Operator	at 21,320	21,320
M & O Mechanic	at 20,850	20,850
Trades and Contract Labor.		<u>50,000</u>
		\$670,640
Custodial		<u>10,000</u>
	1978	\$680,640
	1979	\$735,091
	1980	\$793,898
	1981	\$857,410

Fuel

20.78 ton x 146,489 =	\$3,044,041
<u>Ash.</u>	87,120
<u>Administration</u>	124,000
<u>Utilities.</u>	292,820
<u>Supplies, Chemicals, Lubricants, etc.</u>	163,500
<u>Miscellaneous Insurance, Parts, Equipment Adjustments, etc</u>	194,000

Debt Service

\$3,074,330 x .0996256.	306,282
---------------------------------	---------

Depreciation

\$20,000,000 x .04	<u>800,000</u>
------------------------------	----------------

Total \$5,869,173/yr.

Steam Cost

1,946,834 x 10³ lbs./yr.

Cost/MLbs. \$3.01/MLbs.

Tunnel Maintenance

\$150,000 ÷ 1,946,83408

10 percent Line Loss30

Steam Cost at Buildings \$3.39/MLbs.

BASIC PROGRAM

I. Additional Requirements:

A. Heating Plants

1. Low Pressure Piping	\$ 343,840
2. Primary Electric	268,800
3. Southeast Boilers, Nos. 1 and 3 Rehabilitation	225,200
4. Condensate and Makeup Water Treatment	416,640
5. Baghouse	672,000
6. Computer and Interface	324,800

B. Turbine - Generator 2,634,000

Total \$4,885,280

II. Cost Sharing and Cash Flow:

<u>Loan Payments</u>	<u>Year</u>	<u>Requirement</u>	<u>U of M</u>	<u>Requirement</u>	<u>DOE</u>
	1978-79		-0-	Phase III Design, 10%	\$ 488,528
\$ 80,446	1979-80	(A-3,A-5) 90 percent	\$ 807,480	(A-1,A-2, A-4,A-6) 90 percent	1,218,672
				Cash flow assistance	80,446
316,618	1980-81	B - 90 percent	2,370,600	Cash flow assistance	<u>316,618</u>
			<u>\$3,178,080</u>		<u>\$2,104,264</u>

III. Additional Yearly: Cost and Recovery

A. SteamFuel

20.78 tons x 10,888 \$ 226,253

Labor

5 Operating Engineers. 131,313

Ash

1,089 x \$6.00 \$ 6,534

Administration

No change

Supplies

No change

Miscellaneous

No change

Debt Service

3,178,080 x .0996256. 316,618

Depreciation

4,560,480 x .025 114,012

Total Addition \$ 794,730/yr.

Added Recovery, Electrical (28 mils). 1,137,387/yr.

Gain \$ 342,657/yr.

Note: At 22 mils credit and \$26.00 coal, there is no gain.

OPTION I

I. Additional Requirements:

C. Tunnel and Piping

1. Design.	\$ 182,800
2. Construct Tunnel and Piping.	1,630,080
3. Computer Interface.	<u>15,120</u>
Total	\$1,828,000

II. Cost Sharing and Cash Flow:

<u>Loan</u> <u>Payments</u>	<u>Year</u>	<u>Requirement</u>	<u>U of M</u>	<u>Requirement</u>	<u>DOE</u>
	1978-79		-0-	Phase III (C-1)	\$ 182,800
\$ 81,199	1979-80	1/2 (C-2)	\$ 815,040	(C-3)	15,120
				Cash flow assistance	81,199
162,398	1980-81	1/2 (C-2)	815,040	Cash flow assistance	<u>162,398</u>
			<u>\$1,630,080</u>		\$ 441,517

III. Additional Yearly: Cost and Recovery

A. Steam317,132 x 10³ lbs./yr.Fuel

24,549 tons at \$20.78. \$ 510,128

Ash

2,455 x \$6.00 14,730

Debt Service

1,630,080 x .0996256 162,398

Depreciation1,811,200 x .025 45,280

Total Additional Costs. \$ 732,536/yr.

Added Recovery, Electrical \$ 117,450

Steam Sales

*3.57 x 317,132 1,132,161

Total Recovery \$1,249,611/yr.

Gain. \$ 517,075

*\$162,398 + 317,132. . Debt Service \$.51

45,280 + 317,132. . Depreciation14

.65

2.92

\$3.57/Mlbs.

2.0.5

OPTION II

I. Additional Requirements:

D. Pyrolysis

1. Design.	\$ 770,000
2. Pyrolysis - Waste System.	<u>6,930,800</u>
Total	\$7,700,800

II. Cost Sharing and Cash Flow:

<u>Loan Payments</u>	<u>Year</u>	<u>Requirement</u>	<u>U of M</u>	<u>Requirement</u>	<u>DOE</u>
	1978-79		-0-	Phase III Design	\$ 770,000
\$ 96,178	1979-80	Part of D-2	\$ 965,400	Part of D-2	2,500,000
				Cash flow assistance	96,178
192,357	1980-81	Complete D-2	965,400	Complete D-2	2,500,000
				Cash flow assistance	<u>192,357</u>
			<u>\$1,930,800</u>		\$6,058,535

III. Additional Yearly Cost and Recovery:

Debt Service

1,930,800 x .0996256 \$ 192,357

Depreciation

7,000,000 x .04. 280,000

Total Operation

46,200 x 17.40 803,880

Total Yearly Cost \$1,276,237

Steam Credit

301,920 x 10⁶ x 2.11 \$ 637,051

Electric Credit

3,458,000 x .028 96,824

Drop Charge Credit

18,900 x 4.00 (Phoenix Industries.	\$ 75,600
27,300 x 17.10 (Hospitals)	<u>466,830</u>
Total Yearly Credit.	\$1,276,305

OPTION III

I. Additional Requirements:

E. Hot Water Loop

1. Design.	\$ 193,000
2. Hot Water Loop and Modifications	<u>1,737,000</u>
Total	\$1,930,000

II. Cost Sharing and Cash Flow:

<u>Loan Payments</u>	<u>Year</u>	<u>Requirement</u>	<u>U of M</u>	<u>Requirement</u>	<u>DOE</u>
	1978-79		-0-	Phase III Design 10%	\$ 193,000
\$ 43,263	1979-80	1/4(E-2) 90 percent	\$ 434,250	1/4(E-2) 90 percent	434,250
				Cash flow assistance	43,263
\$ 86,525	1980-81	1/4(E-2) 90 percent	434,250	1/4(E-2) 90 percent	434,250
				Cash flow assistance	<u>86,525</u>
			<u>\$ 868,500</u>		<u>\$1,191,288</u>

III. Additional Yearly Cost and Recovery:

Fuel

1,749 tons at \$20.78 \$ 36,344

Debt Service

868,500 x .0996256. 86,525

Depreciation

1,700,000 x .025 42,500

Total Additional Costs. \$ 165,369/yr.

Recovery - Electric

5,802,000 x .028 \$ 162,456/yr.

2.0.7

PROPOSED COST SHARING

	<u>University of Minnesota</u>	<u>DOE</u>	<u>TOTAL</u>
Without Grid-ICES	\$14,829,520	\$ 431,888	\$15,261,408
Basic Plan	3,178,080	2,104,264	5,282,344
Option I	1,630,080	441,517	2,071,597
Option II	1,930,800	6,058,535	7,989,335
Option III	<u>868,500</u>	<u>1,191,288</u>	<u>2,059,788</u>
	\$22,436,980	\$10,227,492	\$32,664,472

2.0.8

PROPOSED CASH FLOW

<u>Year</u>	<u>Program</u>	<u>U of M</u>	<u>Program</u>	<u>DOE</u>
1977-78	Expansion	\$3,100,000	Expansion	-0-
	Ph. I and Ph.II	-0-	Ph.I and PH.II	\$ 431,888
1978-79	Expansion	1,906,000	Basic, Ph.III	488,528
			Opt.I, Ph.III	182,800
			Opt.II, Ph.III	770,000
			Opt.III, Ph.III	193,000
1979-80	Expansion	5,749,190	Expansion	-0-
	Basic, Ph.IV	807,480	Basic, Ph.IV	1,299,118
	Opt.I, Ph.IV	815,040	Opt.I, Ph.IV	96,319
	Opt.II, Ph.IV	965,400	Opt.II, Ph.IV	2,596,178
	Opt.III, Ph.IV	434,250	Opt.III, Ph.IV	477,513
1980-81	Expansion	4,074,330	Expansion	-0-
	Basic, Ph.IV	2,370,600	Basic, Ph.IV	316,618
	Opt.I, Ph.IV	815,040	Opt.I, Ph.IV	162,398
	Opt.II, Ph.IV	965,400	Opt.II, Ph.IV	2,692,357
	Opt.III, Ph.IV	<u>434,250</u>	Opt.III, Ph.IV	<u>520,775</u>
Total Cost, Phases I to IV		\$22,436,980		\$10,227,492

-- Note 1: Expansion is the normal required Heating Plant expansion.

Note 2: Phases I, II, III and IV are the Grid-ICES Program.

COST OR CREDIT BY YEARS

<u>Year</u>	<u>Basic Plan</u>	<u>Option I</u>	<u>Option II</u>	<u>Option III</u>	<u>Total</u>
1978-79	- \$48,670	- \$18,132	- \$76,712	- \$19,227	- \$162,741
1979-80	- 267,846	- 117,757	- 398,502	- 99,626	- 883,731
1980-81	- 454,341	- 180,442	- 767,196	- 192,277	- 1,594,256
1981-82	+ 118,004	+ 681,841	- 496,873	- 108,665	+ 194,307

Note: 1981/82 first year of income or credit.

OPERATIONAL BENEFITS

<u>Year</u>	<u>Basic Plan</u>	<u>Basic Plan + Option I</u>	<u>Basic Plan + Options I & III</u>	<u>Basic Plan + Options I, II, & III</u>
Total Incurred Loan Payments	- \$770,857	- \$1,087,188	- \$2,329,598	- \$2,640,728
1981-82	+ 118,004	+ 799,845	+ 302,972	+ 194,307
1982-83	+ 118,004	+ 287,343	+ 302,972	+ 194,307
1983-84	+ 118,004		+ 302,972	+ 194,307
1984-85	+ 118,004		+ 302,972	+ 194,307
1985-86	+ 118,004		+ 302,972	+ 194,307
1986-87	+ 118,004		+ 302,972	+ 194,307
1987-88	+ 72,833		+ 302,972	+ 194,307
1988-89			+ 208,794	+ 194,307
1989-90				+ 194,307
1990-91				+ 194,307
1991-92				+ 194,307
1992-93				+ 194,307
1993-94				+ 194,307
1994-95				+ 114,737
Steam Cost Changes Cost/MLBS.	U of M \$3.39 → \$3.33	U of M \$3.39 → \$2.94 *Hospitals \$4.10 → \$3.65	U of M \$3.39 → \$3.17 **Hospitals \$4.10 → \$3.88	U of M \$3.39 → \$3.28 Hospitals \$4.10 → \$3.99
*\$4.10 → \$3.65				
**\$4.10 → \$3.88				

2.1

PROJECT CAPITAL COST ESTIMATE

The following materials represent the capital costs for the total Grid ICES program. The overall capital cost budget was prepared by Helmick and Lutz Company.

Major equipment items were identified and specified for competitive pricing. Prices were received for all items based on current (1978) purchase. Selection of appropriate equipment was made and included in the budget.

All preliminary project drawings were reviewed and construction costs estimated based on current (1978) construction unit costs. Estimates were separately made for General, Mechanical and Electric Construction within each project design sub-task.

The following capital cost budget summarizes the project cost content in each work category and for each project Option.

The indicated total costs are for 1978 construction. Projected costs to 1981 assume annual escalation of 7%.

It should be noted that Option I, Tunnel Construction and Lighting, was designed and estimated by the University of Minnesota Engineering and Construction Department.

PHASE II - STAGE 2 - CAPITAL COST BUDGET
UNIVERSITY OF MINNESOTA - GRID ICES

	<u>Equipment</u>	<u>Construction</u>			<u>Total</u>
		<u>General</u>	<u>Mechanical</u>	<u>Electrical</u>	
A. Basic Plan - Steam Generation					
1. Plant Interconnections					
a. Piping					
(1) High Pressure (180#)			440,500		440,500
(2) Low Pressure (20#)			307,000		307,000
(3) Condensate			315,500		315,500
b. Fuel Oil Line			35,000		35,000
c. Coal Handling	704,000	525,000	15,000	160,000	1,404,000
d. Pipe & Conveyor Gallery		1,730,000		30,000	1,760,000
e. Railroad Track Work		330,000			330,000
f. Primary Electric Tie				240,000	240,000
Sub-Total	704,000	2,585,000	1,113,000	430,000	4,832,000
Engineering & Contingencies (12%)					579,800
2. Southeast Station Utilities					
a. Water Main			91,000		91,000
b. Sewers	50,000	80,000	10,000	10,000	150,000
Sub-Total	50,000	80,000	101,000	10,000	241,000
Engineering & Contingencies (12%)					29,000

3. Southeast Fuel Systems

	<u>Equipment</u>	<u>General</u>	<u>Construction Mechanical</u>	<u>Electrical</u>	<u>Total</u>
a. Coal Storage Remodeling		690,000			690,000
b. Coal Retrieval System	388,000	270,000			658,000
c. Coal Truck Loading	10,000	31,000			41,000
d. Bunker Conveyors, Scales and Feeders	120,000	51,000		50,000	221,000
e. Fuel Oil Storage and In-Plant Changes	20,000	20,000	10,000	3,000	53,000
Sub-Total	538,000	1,062,000	10,000	53,000	1,663,000
Engineering & Contingencies (12%)					200,000

Equipment	Construction			
	General	Mechanical	Electrical	Total
		60,000		60,000
	10,000	140,000		150,000
	10,000	75,000		85,000
54,000		35,000		89,000
131,000	77,000	75,000		283,000
89,000		35,000		124,000
83,000		750,000		833,000
90,000			515,000	605,000
			25,000	25,000
818,000	318,000	32,000	55,000	1,223,000
179,000	230,000	5,000		414,000
70,000	10,000			80,000
1,514,000	655,000	1,207,000	595,000	3,971,000
				477,000

5. Southeast Remodeling

	<u>Equipment</u>	<u>General</u>	<u>Construction Mechanical</u>	<u>Electrical</u>	<u>Total</u>
a. Exterior Work		800,000		15,000	815,000
b. Roof Repair		60,000	10,000		70,000
Sub-Total		860,000	10,000	15,000	885,000
Engineering & Contingencies (12%)					106,000

6. Southeast Plant Instrumentation

a. Boiler and System Control	127,000	22,000	10,000	60,000	219,000
b. Air Piping and Compressor	24,000		30,000		54,000
c. Electric Wiring				30,000	30,000
d. Computer Interface	40,000			25,000	65,000
e. Computer MIS	200,000			25,000	225,000
Sub-Total	391,000	22,000	40,000	140,000	593,000
Engineering & Contingencies (12%)					71,000

	<u>Equipment</u>	<u>General</u>	<u>Construction Mechanical</u>	<u>Electrical</u>	<u>Total</u>
7. Total Equipment Costs					3,197,000
8. Total General Construction Costs					5,264,000
9. Total Mechanical Construction Costs					2,481,000
10. Total Electrical Construction Costs					1,243,000
11. Total Expected Contract Costs					12,185,000
12. Engineering & Contingencies (12%)					1,463,000
13. University Heating Plant Pollution Control (Under Contract)					2,600,000
14. Southeast Plant Acquisition					500,000
15. Site Survey and Borings					20,000
16. Site Demolition					150,000
Total, Steam Generation					16,918,000

25

	<u>Equipment</u>	<u>General</u>	<u>Construction</u> <u>Mechanical</u>	<u>Electrical</u>	<u>Total</u>
B. Basic Plan - Electric Generation					
1. Turbine-Generator	1,550,000				1,550,000
a. Foundation		50,000			50,000
b. Erection		150,000			150,000
c. Piping	5,000		265,000		270,000
2. Switchgear and Wiring	200,000			105,000	305,000
3. Instrumentation	12,000				12,000
4. Computer Interface	10,000			5,000	15,000
Sub-Total	1,777,000	200,000	265,000	110,000	2,352,000
Engineering & Contingencies 12%					282,000
					2,634,000
C. Basic Plan - Summary					
			Total Electric Generation		
1. Steam Generation	3,197,000	5,264,000	2,481,000	1,243,000	12,185,000
2. Electric Generation	1,777,000	200,000	265,000	110,000	2,352,000
Sub-Total	4,974,000	5,464,000	2,746,000	1,353,000	14,537,000
3. Engineering & Contingencies 12%					1,744,000
4. Site Acquisition & Contracted Costs					3,270,000
			Total, Basic Plan		19,551,000

Construction				
<u>Equipment</u>	<u>General</u>	<u>Mechanical</u>	<u>Electrical</u>	<u>Total</u>
	830,000			830,000
		374,000		374,000
	830,000	374,000		1,204,000
				145,000
4,000		2,000		
4,000		2,000		
4,000		2,000		
4,500		2,000	3,000	
5,000			10,000	
21,500		8,000	13,000	42,500
				5,100
	40,000	85,000		125,000
8,500	150,000	102,000		260,500
8,500	190,000	187,000		385,500
				1,632,000
				196,000
				1,828,000

	<u>Equipment</u>	<u>General</u>	<u>Construction</u>		<u>Total</u>
			<u>Mechanical</u>	<u>Electrical</u>	

E. Option II, Pyrolysis

1. Andco System Delivered & Erected
(Includes Engineering & Contingencies)

a. Gasifier	241,000	162,537	16,673	4,000	424,210
b. Secondary Combustion Chamber	234,000	179,400	6,170		419,570
c. Regenerative Towers	530,000	150,000	11,480		691,480
d. Duct Work	218,000	130,000	32,380	23,300	403,680
e. Slag Handling System	60,000	50,000	4,000	2,000	116,000
f. Electrical	215,400	75,000	2,000	76,770	369,170
g. Instrumentation	158,900	55,000	3,000	18,000	234,900
h. Air Moving Equipment	55,460	18,500	12,000	8,000	93,960
i. Piping & Cooling Water Systems	95,000	172,500	12,640		280,140
j. Refuse Feed System	24,000	19,200	2,270		45,470
k. Auxiliary Fuel Systems	54,120	30,000	8,000	3,000	95,120
l. Secondary Air Preheat	25,000	16,000	5,000	3,000	49,000
m. Slag Silo	20,000	10,000	6,000	800	36,800
n. Stairs & Platforms	85,000	57,500			142,500
o. Grout	1,800	4,500			6,300
p. Paint	12,000	26,450			38,450
q. Communication System	8,000	4,600			12,600
r. CO Monitor	12,150	4,000			16,150
Sub-Total	2,049,830	1,165,187	121,613	138,870	3,475,500
Field Management		171,100			171,100
Field Office	12,700		1,000	2,000	15,700
Storage Building	58,000	60,200	2,800	4,000	125,000
Construction Support		57,500			57,500
Spare Parts	140,000				140,000
Contingencies	175,000	175,000	10,000	15,000	375,000
Sub-Total	385,700	463,800	13,800	21,000	884,300
ANDCO TOTAL	2,435,530	1,628,987	135,413	159,870	4,359,800

		Construction				
		<u>Equipment</u>	<u>General</u>	<u>Mechanical</u>	<u>Electrical</u>	<u>Total</u>
2.	Auxiliary Equipment & Andco Connections					
a.	Waste Heat Boiler	351,000	9,000	90,000	20,000	470,000
b.	I.D. Fan and V.S. Drive	67,000	4,000	8,500	12,500	92,000
c.	Instruments & Controls	30,000		25,000		55,000
d.	Pollution Control Addition	561,000	90,000	20,000	32,500	703,500
e.	Refuse Crane	120,000	13,000		1,500	134,500
f.	Contaminated Material Conveyor	50,000			1,500	51,500
g.	Ash System Addition	15,000	8,000	3,500		26,500
h.	Equipment Erection	233,000				233,000
i.	Andco Connections			45,000	57,000	102,000
3.	Related Construction					
a.	General Construction					
	(1) Stack Removal		47,000			47,000
	(2) Building Construction		820,000			820,000
b.	Mechanical Construction			40,000		40,000
c.	Electrical Construction				45,000	45,000
4.	Up-Grade Incinerators	<u>88,000</u>	<u>35,000</u>	<u>35,000</u>	<u>5,000</u>	<u>163,000</u>
	Sub-Total	1,515,000	1,026,000	267,000	175,000	2,983,000
	Engineering & Contingencies (12%)					358,000
	Total, Option II					7,700,800

	<u>Equipment</u>	<u>General</u>	<u>Construction</u> <u>Mechanical</u>	<u>Electrical</u>	<u>Total</u>
F. Option III, Hot Water Distribution					
1. Add-On Steam Piping Cost			106,000		106,000
2. Hot Water Heat Exchangers, Tankage and Pumps	104,000	26,000	100,000	20,000	250,000
3. Hot Water Loop			818,000		818,000
4. System Controls	12,000		10,000	26,000	48,000
5. Building System Retrofit			501,000		501,000
Sub-Total	116,000	26,000	1,535,000	46,000	1,723,000
Engineering & Contingencies (12%)					207,000
Total, Option III					1,930,000

All of the institutional requirements have been answered in the Phase II, Stage I report. The University has determined that it can successfully construct, own, operate and maintain all parts of ICES.

The purpose of this documentation is to establish the necessary format for construction and operation of ICES.

Accordingly the following procedures and draft documents are presented.

The various permits for construction will be secured prior to the end of Phase III.

2.2.1

PERMITS AND EASEMENTS

Easements will be provided by Fairview and St. Mary's Hospitals for that portion of the tunnel that will lie under their properties. Attached are drafts of these easements.

Permits will be obtained from the City of Minneapolis for the tunnel that lies under City right-of-way. A permit will also be obtained from the City for the installation of Steam and return lines in City right-of-way that will serve Augsburg College from the meter chamber at St. Mary's Hospital.

The procedure for obtaining these permits from the City is to write a letter, requesting the permit, to the City Council. Included with the letter will be a site plan showing the facility and the desired area to be included in the permit. The request is sent to the Council Transportation and Property Services Committee for their recommendation. From there it is returned to the full Council for their action. We expect to get Council approval based on past experience.

The University has been designated as a municipality, therefore it is not subject to the City of Minneapolis zoning requirements. We have, as a matter of courtesy, informed the City of Minneapolis of our intended use of the steam generating plant.

Permits for the intended use of the coal handling and conveyor assembly where it crosses under city, county and state bridges are routinely obtained by forwarding a request for permit along with site drawings.

Pollution permits will be secured in a routine manner from the MPCA.

Solid waste disposal permits will be obtained from Hennepin County.

An easement for the steam line to Augsburg is not required since under our present plan, the responsibility for the steam line ends at the Augsburg property line.

ST. MARY'S Hospital

2414 SOUTH SEVENTH STREET, MINNEAPOLIS, MINNESOTA 55454

EXECUTIVE OFFICES

October 28, 1977

Mr. James O'Gara
Principal Plant Engineer
Department of Physical Plant
University of Minnesota
200 Shops Building
319 15th Avenue
Minneapolis, Minnesota 55455

Dear Mr. O'Gara:

As per our conversation, the steam flow meters and steam lines supplying steam to Fairview Hospital are owned by St. Mary's Hospital up to the Fairview property line. Fairview owns all steam lines and related equipment on their property.

This letter is to confirm our willingness to give Fairview Hospital enough of the existing steam lines to permit direct hook-up to the University of Minnesota's steam supply. We are also willing to negotiate the sale of existing meters should you desire to reuse them.

If you have any questions, please do not hesitate to call me.

Sincerely yours,

Marlyn K. Ervasti

Marlyn K. Ervasti
Vice President

MKE:se

cc: Mr. Vern Knutson
Sister Mary Madonna
Mr. Al Rawlings

Fairview Hospital

125 East Washington Street, Minneapolis, Minnesota 55454

612-326-0242

Stephen A. Gregg Administrator

November 7, 1977

Mr. James O'Gara, Principal Plant Engineer
Department of Physical Plant
University of Minnesota
200 Shops Building
319-15 Avenue S.E.
Minneapolis, Minnesota 55455

Re: Temporary Construction Easement Grid-Connected ICES Project

Dear Mr. O'Gara:

This letter is to confirm the willingness of Fairview Hospital to enter into a temporary construction easement for an access shaft site as part of the proposed heat tunnel to the Fairview/St. Mary's complex.

It is our understanding that the temporary easement will involve an area, approximately 10,000 sq. ft., or less, at the southeast corner of 22nd Street and Locust in our employee parking lot for a period of about three months.

In addition to covering such standard items as insurance, site protection, nuisance factors, damages, restoration, etc., the easement will need to make provision for reasonably convenient replacement parking for the parking spaces "lost" during the construction easement.

Please keep us fully advised of the time requirements for this temporary easement.

Sincerely,

Stephen A. Gregg, Administrator

SAG/gs

cc: Marlyn Ervasti
cc: Vern Knutson
cc: Bernt Westernen

Fairview Hospital

2312 South Sixth Street, Minneapolis, Minnesota 55454
Telephone (612) 332-0282

Stephen A. Gregg Administrator

November 14, 1977

Mr. James O'Gara, Principal Plant Engineer
Department of Physical Plant
University of Minnesota
200 Shops Building
319 - 15 Avenue Southeast
Minneapolis, Minnesota 55455

Re: Permanent Easement for Heat Tunnel
Grid-Connected ICES Project

Dear Mr. O'Gara:

This letter is to confirm our intent to enter into a permanent easement, approximately 20 ft. wide, for the Proposed Heat Tunnel to Fairview/St. Mary's Hospitals, as shown in your preliminary Dwg. No. 15451, Sheet 2.

We will require, as part of subject easement, that certain future building capabilities be retained within the easement limits.

Sincerely yours,

Stephen A. Gregg, Administrator

SAG/gs

cc: Marlyn Ervasti
cc: Vern Knutson
cc: Bernt Westernen

Minnegasco
Minnesota Gas Company
733 marquette avenue, minneapolis, minnesota 55402

January 24, 1978

Mr. James C. O'Car
University of Minnesota
Room 110-Shops
319 SE 15th Avenue
Minneapolis, Minn 55455

Dear Sir:

In response to your request for 2000 CFH of Firm gas for a solid waste Pyrolysis system at 600 SE Main street.

The requirement falls within the limitations set for added Firm gas; therefore, we can accommodate you at this time.

Respectfully,

Donald J. McArthur
Ind./Com'l Representative

THIS INDENTURE, made this _____ day of _____, 1978, by and between ST. MARY'S HOSPITAL, a corporation duly organized and existing under the laws of the State of Minnesota, party of the first part, and the REGENTS OF THE UNIVERSITY OF MINNESOTA, a corporation duly organized and existing under and by virtue of the laws of the State of Minnesota, party of the second part.

WITNESSETH: That the party of the first part, in consideration of the sum of ONE DOLLAR (\$1.00), to it in hand paid, and other good and valuable consideration, the receipt whereof is hereby acknowledged does hereby grant, bargain, sell and convey unto said party of the second part, its successors and assigns, forever, a perpetual right and easement to lay, relay, construct, reconstruct, repair, operate, maintain and remove the utility hereinafter specified, within the following described tracts or parcels of land, situated in the City of Minneapolis, County of Hennepin, State of Minnesota, to-wit:

A 30.00 foot perpetual easement for the purpose of constructing, operating, maintaining and repairing a utility tunnel having inside dimensions of 7'-6" wide and 7'-9" high, between the approximate planes of elevation of 742.00 and 756.00 feet, 1929 U.S.C. and G.S. datum, in, under, along and through that part of 24th Avenue South, now vacated, Town of Minneapolis, Minnesota, according to the recorded plat thereof, lying within 15.00 feet on each side of the following described center line:

Commencing at the intersection of the center line of 22nd Avenue South and the center line of 5th Street South, all in the said town of Minneapolis; thence northerly along the center line of said 22nd Avenue South a distance

of 91.91 feet; thence easterly, deflecting right 90 degrees 00 minutes 00 seconds a distance of 50.00 feet; thence deflecting right 21 degrees 30 minutes 53 seconds a distance of 893.23 feet and there terminating.

Together with a 35.00 foot wide perpetual easement for constructing, operating, maintaining and repairing a steam metering chamber and heat shaft, lying between the approximate plane of elevation of 742.00 feet, 1929 U.S.C. and G.S. datum, and the surface of the ground, in, under, along and through that part of 24th Avenue South, now vacated, Town of Minneapolis, lying within lines 15.00 feet southerly of and 20.00 feet northerly of the following described line:

Beginning at the terminus of the center line of the above described 30.00 foot strip; thence northwesterly along said center line to the westerly line of 24th Avenue South, now vacated, and there terminating, the side lines of the said 35.00 foot wide easement to be lengthened and shortened as necessary to terminate on the westerly line of said 24th Avenue, now vacated.

Together with a temporary construction easement described as:

All of the northerly 150.00 feet of the southerly 275.00 feet of vacated 24th Avenue South lying adjacent to Sulley's Subdivision in Block 183, Town of Minneapolis, Minnesota, according to the recorded plat thereof; and also all of the westerly 20.00 feet, excepting the southerly 125.00 feet, of said Sulley's Subdivision in Block 183, Town of Minneapolis, Minnesota, according to the recorded plat thereof. Said temporary construction easement to expire upon completion of all construction contracts relating to the construction of the Grid Connected Integrated Community Energy System.

As represented on Exhibit "C".

TO HAVE AND TO HOLD, exercise and enjoy the easement and rights herein granted to said REGENTS OF THE UNIVERSITY OF MINNESOTA, its successors and

assigns, forever. And ST. MARY'S HOSPITAL, party of the first part, for itself, its successors and assigns, does covenant with the said party of the second part, its successors and assigns, that it is well seized in fee of the lands and premises aforesaid and has good right to sell and convey the same in manner and form aforesaid, and that the same are free from all encumbrances. And the above bargained lands and premises, in the quiet and peaceable possession of said party of the second part, its successors and assigns, against all persons lawfully claiming or to claim the whole or any part thereof, the said party of the first part will warrant and defend.

IN TESTIMONY WHEREOF, the said party of the first part has caused these presents to be executed in its corporate name by its _____ and _____, and its corporate seal to be hereunto affixed the day and year first written above.

IN PRESENCE OF:

REGENTS OF THE UNIVERSITY
OF MINNESOTA

By _____
Its _____

By _____
Its _____

STATE OF MINNESOTA)
)
)
COUNTY OF HENNEPIN)

On this _____ day of _____, 19____, before
me, a notary public, within and for said County and State, personally
appeared _____ and _____,
to me personally known, who, being each by me duly sworn, did say that
they are respectively the _____ and _____
of the corporation named in the foregoing instrument, and that the seal
affixed to said instrument is the corporate seal of said corporation, and
that said instrument was signed and sealed in behalf of said corporation
by authority of its Board of Regents, and said _____
and _____ acknowledged said instrument to be the free
act and deed of said corporation.

Notary Public, Hennepin County, Minnesota

My commission expires:

PRELIMINARY DRAFTEASEMENT DEED

THIS INDENTURE, made this _____ day of _____, 1978 by and between FAIRVIEW COMMUNITY HOSPITALS, a non-profit corporation duly organized and existing under the laws of the State of Minnesota, party of the first part, and the REGENTS OF THE UNIVERSITY OF MINNESOTA, a corporation duly organized and existing under and by virtue of the laws of the State of Minnesota, party of the second part.

WITNESSETH: That the party of the first part, in consideration of the sum of ONE DOLLAR (\$1.00), to it in hand paid, and other good and valuable consideration, the receipt whereof is hereby acknowledged does hereby grant, bargain, sell and convey unto said party of the second part, its successors and assigns, forever, a perpetual right and easement to lay, relay, construct, reconstruct, repair, operate, maintain and remove the utility hereinafter specified, within the following described tracts or parcels of land, situated in the City of Minneapolis, County of Hennepin, State of Minnesota, to wit:

A 30.00 foot perpetual easement for the purpose of constructing, operating, maintaining and repairing a utility tunnel having inside dimensions of 7'-6" wide and 7'-9" high, between the approximate planes of elevation of 742.00 and 756.00 feet, 1929 U.S.C. and G.S. datum, in, under, along and through that part of the City of Minneapolis, Minnesota, according to the recorded plat thereof, lying within 15.00 feet on each side of the following described center line:

Commencing at the intersection of the center line of 22nd Avenue South and the center line of 5th Street South, all in the said town of Minneapolis;

thence northerly along the center line of said 22nd Avenue South a distance of 91.91 feet; thence easterly, deflecting right 90 degrees 00 minutes 00 seconds a distance of 50.00 feet, to a point hereinafter referred to as point "B"; thence northwesterly, deflecting left 121 degrees 00 minutes 16 seconds to the easterly line of 22nd Avenue South, the point of beginning of the strip of land being described, the sidelines of said 30.00 foot easement to be lengthened or shortened to begin on the easterly line of 22nd Avenue South and the southerly line of Locust Street South respectively; thence southeasterly, deflecting 180 degrees 00 minutes 00 seconds to said point "B"; thence southeasterly, deflecting left 37 degrees 28 minutes 51 seconds to the westerly line of 24th Avenue South now vacated, and there terminating, the side lines of said 30.00 foot easement to be lengthened and shortened as necessary to terminate on the westerly line of said 24th Avenue South now vacated.

Together with three parcels of land, 45.00 feet in width, lying southerly of and adjacent to the above described 30.00 foot strip, described as follows:

The first described 45.00 foot parcel lying between the distances of 132.00 feet easterly of and 162.00 feet easterly of said point "B".

The second described 45.00 foot parcel lying between the distances of 425.00 feet easterly of and 455.00 feet easterly of said point "B".

The third described 45.00 foot parcel lying between the distances of 719.00 feet easterly of and 749.00 feet easterly of said point "B", all distances measured parallel with and at right angles to the center line of the above described 30.00 foot strip.

Excepting that part of said 30.00 foot strip lying within the right of way of existing 23rd Avenue South as platted.

Together with a temporary easement for construction purposes, lying in the City of Minneapolis, Minnesota, according to the recorded plat thereof, described as follows:

Beginning at the intersection of the center line of 22nd Avenue South with the center line of Locust Street South; thence southerly along the center line of 22nd Avenue South a distance of 115.00 feet; thence easterly deflecting left 90 degrees 00 minutes 00 seconds a distance of 110.00 feet; thence northerly deflecting left 90 degrees 00 minutes 00 seconds to the center line of Locust Street South; thence southwesterly along the center line of Locust Street South to the point of beginning and there terminating. Reserving that part of 22nd Avenue South and Locust Street South for roadway purposes. Said temporary easement to expire upon completion of all construction contracts relating to the construction of the Grid Connected Integrated Community Energy System.

Together with a temporary construction easement described as all of the easterly 7.00 feet of the northerly 125.00 feet of the southerly 275.00 feet of Block 183, City of Minneapolis, according to the recorded plat thereof.

As represented on Exhibit "B".

TO HAVE AND TO HOLD, exercise and enjoy the easement and rights herein granted to said REGENTS OF THE UNIVERSITY OF MINNESOTA, its successors and assigns, forever. And FAIRVIEW COMMUNITY HOSPITALS, party of the first part, for itself, its successors and assigns, does covenant with the said party of the second part, its successors and assigns, that it is well seized in fee of the lands and premises aforesaid and has good right to sell and convey the same in manner and form aforesaid, and that the same are free from all encumbrances. And the above bargained lands and premises, in the quiet and peaceable possession of said party of the second part, its successors and

assigns, against all persons lawfully claiming or to claim the whole or any part thereof, the said party of the first part will warrant and defend.

IN TESTIMONY WHEREOF, the said party of the first part has caused these presents to be executed in its corporate name by its _____ and _____, and its corporate seal to be hereunto affixed the day and year first written above.

IN PRESENCE OF:

REGENTS OF THE UNIVERSITY
OF MINNESOTA

By _____

Its _____

By _____

Its _____

STATE OF MINNESOTA)
)
)
COUNTY OF HENNEPIN)

On this _____ day of _____, 19____, before me, a notary public, within and for said County and State, personally appeared _____ and _____, to me personally known, who, being each by me duly sworn, did say that they are respectively the _____ and _____ of the corporation named in the foregoing instrument, and that the seal affixed to said instrument is the corporate seal of said corporation, and that said instrument was signed and sealed in behalf of said corporation by authority

of its Board of Regents, and said _____ and
_____ acknowledged said instrument to be the
free act and deed of said corporation.

Notary Public, Hennepin County, Minnesota

My commission expires:

2.2.4 DRAFT EASEMENTS BETWEEN U OF M, AUGSBURG OR CITY OF MINNEAPOLIS

The following drawings represent the permit routing required from the City of Minneapolis. The procedures for obtaining these permits are very routine and are an on-going University trouble-free experience.

PRELIMINARY

UNIVERSITY
OF
MINNESOTA

STAGE 2 - PHASE 2
GRID CONNECTED INTEGRATED COMMUNITY ENERGY SYSTEM
UNIVERSITY OF MINNESOTA TO ADD ON CUSTOMERS INTERCONNECTING HEAT TUNNEL

EASEMENT FROM
AUGSBURG COLLEGE

EXHIBIT "A"

PERPETUAL EASEMENT

UNIVERSITY
OF
MINNESOTA

STAGE 2-PHASE 2
GRID CONNECTED INTEGRATED COMMUNITY ENERGY SYSTEM
UNIVERSITY OF MINNESOTA TO ADD ON CUSTOMERS INTERCONNECTING HEAT TUNNEL

EASEMENT FROM
CITY OF MINNEAPOLIS

UNIVERSITY
OF
MINNESOTA

STAGE 2-PHASE 2
GRID CONNECTED INTEGRATED COMMUNITY ENERGY SYSTEM
UNIVERSITY OF MINNESOTA TO ADD ON CUSTOMERS INTERCONNECTING HEAT TUNNEL

EASEMENT FROM
MINNEAPOLIS

The following agreement between the University of Minnesota and Northern States Power Company and the associated letters from N.S.P. and the University attorney relative to power transactions between a utility and state institution were presented in the Phase II - Stage 1 report.

During the course of work for Stage 1 and Stage 2, the University and Northern States Power Company examined several alternatives to selling power to the N.S.P. pool. The alternatives studied were as follows:

1. A wheeling agreement with N.S.P. Company at \$.85 per kva and demand assessment.
2. Sale of excess generation as proposed in the Phase II - Stage 1 report.
3. Sale of all generation by connection of Southeast Plant to existing campus feeders.
4. A wheeling agreement with N.S.P. on a one turbine-generator basis and and a two-turbine generator basis.

The results of these above studies which were transmitted to DOE indicate that Alternatives 2 and 3 above are the most cost effective in-so-far as the add-on cost for connection of Southeast Steam to the existing campus distribution, but it does provide additional reliability for the central plants of the ICES system. The results of alternative #4 indicate that an add-on cost for the second turbine generator of \$1,550,000 and additional cash flow requirements make the plan prohibitive.

However, as evidenced by letters from N.S.P. as the state of present day economics changes, the University will continue to explore the above or other alternatives.

The University, at this time, is electing Alternative #3, and the draft contract and pool credits presented in this section.

The subject of cogeneration rate structures is complicated. However, the University and N.S.P. cannot negotiate rates that are more favorable to cogeneration. The University and N.S.P. must operate within present regulations and corporate constraints in determining the best available rate. The rate of commercialization of ICES is not a University or N.S.P. burden. It is in fact a federal burden wherein, hopefully, the University and N.S.P. can show a significant rate of return and overall cost effectiveness within today's economic constraints or projected to some date, to move the federal and state governments to change rate structures enhancing the rate of commercialization.

UNIVERSITY OF MINNESOTA
TWIN CITIES

Office of the University Attorney
330 Morrill Hall
100 Church Street S.E.
Minneapolis, Minnesota 55455
(612) 373-3446

RECEIVED
JAN 11 2 29 PM '78
UNIV. OF MINN.
PHYSICAL PLANT

January 10, 1978

Warren Soderberg
200 Shops Building
Minneapolis Campus

Re: ERDA Contract for Grid-Connected ICES

Dear Warren:

I reviewed the case of Federal Power Commission v. Florida Power & Light Co., 404 U. S. 453 (1972). According to you, a Mr. Pete Donnelly of Argonne National Laboratory cited this case as affecting the tax exempt status of interest paid by the University in the event it secured a loan for the above captioned project.

This case has nothing to do with taxation. Rather, it merely held that the FPC had jurisdiction over the utility under the interstate commerce provisions of the Federal Power Act. The utility distributed some electric energy to a consortium of other intrastate utilities, which consortium in turn periodically distributed to a Georgia utility. This subject is addressed on page two of my August 24, 1977 letter to you wherein I pointed out that even if the electric energy sold by the University to NSP were to be distributed outside Minnesota by NSP the University would nevertheless not be subject to FPC jurisdiction because the Federal Power Act does not apply to state agencies and instrumentalities.

Because the University's law library has been closed since December 16th, I had to go to the Hennepin County Law Library to obtain the case. I incurred about 1 1/4 hours in doing so for your billing purposes.

Very truly yours,

Jeffrey G. Lalla
Associate University Attorney

JGL:mg

The following information outlines Alternative 4 which has been presented at the DOE review on February 17, 1978.

This arrangement does not represent the University's choice for power/credit interchange. The original agreements (feeding all power to N.S.P. for credit via its Main Street substation) is the University's present choice for the crediting structure.

N O R T H E R N S T A T E S P O W E R C O M P A N Y

February 15, 1978

Mr Warren Soderberg
University of Minnesota
University Physical Plant
Room 200, Shops Bldg
Minneapolis MN 55455

Re: Rates for Electric Energy from
Southeast Steam Plant

Dear Warren

You have requested information on the basis for a rate schedule for electric power from your generator at Southeast Steam Plant if the generator fed directly into your distribution system, thereby reducing the demand and energy requirements of the present NSP service to the University of Minnesota at 4th Street Sub.

Included with this letter is an established rate system which could be offered to any large general service customer on our lines. There would be no need of approval from any governmental regulating body.

The basis for this offer is that the electric energy supplied from your generator would feed into the Main St bus and then be carried to 4th Street Sub on a pair of NSP cables.

NSP recognizes the need for flexibility in determining the optimum demand requirements for the total U of M system and generator rating. These parameters may be changed after your generator is working and some sort of stabilized condition reached.

Metering: NSP will install, own and maintain all metering facilities necessary to totalize the output of the SE plant with the main campus load. The one time charge to the U of M for this additional metering equipment is \$55,000.

Rate: The Large General Service Rate with the Standby and Supplementary Service provision (copies attached) will be applied to the totalized electric demand and energy of the SE plant and Main Campus. The agreed standby demand will depend upon the output of the generator and at this time appears to be 12,000 kva.

NORTHERN STATES POWER COMPANY

Facilities Charge: A monthly facilities charge will be billed to the U of M reflecting the NSP investment in conduit line and underground cable necessary to supply part of the Main Campus load from the SE generator. This monthly charge will be \$600 plus \$.75 per peak kVa of generator output supplied to the Main Campus during each billing period.

Parallel Operation: NSP will allow the U of M SE generator to parallel with the NSP system as long as proper switching, synchronizing and relaying facilities are installed at the SE plant. No additional electrical facilities will be required at the U of M Fourth Street Switching Station.

If you have any questions please let me know.

Yours very truly

A handwritten signature in dark ink, appearing to read "John C. Pearce". The signature is fluid and cursive, with the first name "John" and last name "Pearce" clearly distinguishable.

John C Pearce, Assistant to
Director Planning & Research

NORTHERN STATES POWER COMPANY LARGE GENERAL SERVICE

Availability: Available to any customer for general service.

Kind of Service: Alternating current at the following nominal voltages:

- (a) Secondary Voltage: single or three phase at 208V or higher.
- (b) Primary Distribution Voltage: three phase at 2,400V or higher.
- (c) Transmission Line Voltage: three phase at 34,500V or higher. Service voltage available in any given case is dependent upon voltage and capacity of Company lines in vicinity of customer's premises.

Rate:

		Oct-May	June-Sept
Demand Charge per Month for			
Service at Secondary Voltage:			
First 50 kW or less		\$232.50	\$277.50
Next 50 kW - per kW		4.45	5.35
Excess kW - per kW		4.30	5.20

Demand Charge per Month for

Service at Primary Distribution Voltage:

The Demand Charge per Month for Service at Secondary Voltage less \$.15 per month per kW of demand.

Demand Charge per Month for

Service at Transmission Line Voltage:

The Demand Charge per Month for Service at Secondary Voltage less \$.25 per month per kW of demand.

Energy Charge:

First 20 000 kWh per month - per kWh	2.03¢
Next 80 000 kWh per month - per kWh	1.95¢
Next 900 000 kWh per month - per kWh	1.80¢
Excess kWh per month - per kWh	1.45¢

Fuel Clause: There shall be added to or deducted from the net monthly bill 0.001¢ per kilowatt-hour for each 0.001¢ increase above or decrease below 0.554¢ in the Fuel Cost per kilowatt-hour sales.

The Fuel Cost shall be the sum of the following for the most recent two month period:

1. The fossil and nuclear fuel consumed in the Company's generating stations as recorded in Accounts 151 and 518.
2. The net energy cost of energy purchases as recorded in Account 555 exclusive of capacity or demand charges, when such energy is purchased on an economic dispatch basis.
3. The actual identifiable fossil and nuclear fuel costs associated with energy purchased for reasons other than identified in (2) above, less
4. The fuel-related costs recovered through intersystem sales.

The kilowatt-hour sales shall be all kilowatt-hours sold excluding intersystem sales.

Prompt Payment Provision: A charge of 5% will be added to net bill which charge shall constitute a discount from gross bill for payment within the discount period.

Surcharge: A surcharge of 8.7% will be included in the gross and net monthly bills computed under this rate schedule.

Determination of Demand: The demand in kilowatts for billing purposes shall be determined by dividing the maximum demand in kilowatts by the power factor expressed in percent but by not more than a 95% power factor and multiplying the quotient so obtained by 90% and rounding to the nearest whole kW. In no month shall the demand to be billed be considered as less than the largest of the following:

1. During the billing months of October through May - 80% of the greatest demand in kW billed during the preceding months of June through September.
2. 30% of the greatest demand in kW billed during the preceding eleven months.
3. 50 kW.

Maximum Demand: The maximum demand in kilowatts shall be the greatest 15-minute load during the month for which bill is rendered.

Power Factor: The power factor for the month may be determined by permanently installed metering equipment or by periodic test under normal operating conditions.

Minimum Demand To Be Billed: The monthly minimum billing demand shall not be less than provided above, whether or not energy is used.

**NORTHERN STATES POWER COMPANY
LARGE GENERAL SERVICE (Com.)**

Standby and Supplementary Service

Availability: Available at 12,400V or higher to any large commercial or industrial customer who normally supplies part or all of his electric power requirements from another independent source of power for which the Company's service may be substituted wholly or in part. Customer shall contract for capacity adequate to supply the entire electric requirements for which Company's service may be used which capacity shall equal or exceed the agreed kW demand for standby to customer's other source of power. Company shall not be obligated to supply capacity in excess of that contracted for.

Rate: The billing shall be in accordance with Company's Large General Service rate schedule for Service at Primary Distribution Voltage except that the paragraph, Determination of Demand, shall be as follows:

Determination of Demand: The demand in kilowatts for billing purposes shall be determined by dividing the maximum demand in kilowatts by the power factor expressed in percent but by not more than a 90% power factor and multiplying the quotient so obtained by 90% and rounding to the nearest whole kW. In no month shall the demand to be billed be considered as less than the largest of the following:

1. The agreed standby demand plus 80% of the greatest excess demand in kW over such agreed standby demand billed during the preceding eleven months.
2. 1000 kW.

Maximum Demand: The maximum demand in kilowatts shall be the greatest 15-minute load during the month for which bill is rendered.

Minimum Demand To Be Billed: The monthly minimum billing demand shall not be less than provided above, whether or not energy is used.

Facilities Charge: Customer will pay a monthly facilities charge, in addition to the regular billing, based on the additional Company investment required to provide facilities capable of meeting standby requirement.

The agreed standby demand is _____ kW.

Parallel Operation: Interconnection and parallel operation of customer's independent source of power (customer's system) and Company's service (Company's system) will be permitted by Company under the following conditions:

- a. The interconnection between the systems must be at 12,400V or higher at a point on Company's system where customer's operations will not interfere with the quality of Company's service to any of its other customers.
- b. Customer agrees to provide the necessary equipment as approved by Company to enable customer to operate its generating equipment in parallel with Company's system. Since the power factor and the voltage at which Company's system and customer's system are operated will vary, each party agrees to operate its system at such power factor and voltage as is conducive to best operating standards and in such manner as to absorb its share of the reactive power.
- c. Company reserves the right to disconnect service in the event service to customer results in trouble on Company's system such as interruptions, grounds, radio or telephone interference, surges or objectionable voltage fluctuations, where such trouble is caused by negligence of customer if, after giving notice in writing to customer of such trouble, customer fails to remedy the causes thereof within a reasonable time.
- d. Company's meters will be ratcheted to measure the flow of power and energy from Company to customer only. Reverse flow, if any, will be ignored unless the amount is substantial in which event it will be a matter for negotiation and further agreement between the parties.

- (1) 1-8 CIRCUIT SST-3 RELAY
 (2) 2-2 CIRCUIT SST-3 RELAY
 (3) 1-4 TRACK RECORDING METER
 (4) 6-12 WIRE UNDERGROUND CONDUIT

TRACK NO. 1 TIME
 TRACK NO. 2 KWH (U of M)
 TRACK NO. 3 KWH (GEN.)
 TRACK NO. 4 BLANK

PRELIMINARY DESIGN - PHASE II - STAGE 2
 GRID-CONNECTED INTEGRATED COMMUNITY ENERGY SYSTEM
 METER TOTALIZING

BY	BUILDING	SCALE	SHEET
GDM			
CHECKED	DATE	REVISED	DRAWING
JCO	227-78		

The following materials represent the investigation and conclusions of the method of electric power interchange for ICES. At this time the University supports the conclusion that all generated power should be sold to the utility.

UNIVERSITY OF MINNESOTA

GRID CONNECTED INTEGRATED COMMUNITY ENERGY SYSTEM

ELECTRIC GRID CONNECTION

I. GENERAL

Four modes of operation were considered for the electric connection of the by-product generated power.

- A. Parallel operation with Northern States Power Company with synchronizing at the existing 4th Street Switching Station (main service point of the East Bank Campus).
- B. Parallel operation with Northern States Power Company with synchronizing to the Main Street Substation, with the Southeast Station on the synchronized bus only. (Sale of surplus power.)
- C. Parallel operation with Northern States Power Company, including a wheelage agreement from Main Street to 4th Street and simultaneous demand interval metering. (Self use of all generated power.)
- D. Parallel operation of the generator only to Main Street. (Sale of all generated power.)

II. EXISTING EAST BANK ELECTRIC SYSTEM

All power to the East Bank (Main) Campus of the University of Minnesota is received at the 4th Street Switching Station from two separate Northern States Power sources. There are many occasions that these sources cannot be operated in parallel.

Each University of Minnesota 13.8 KV feeder is bifurcated to permit source selection as well as primary selective switching. The Hospital and Health Science feeders must provide ultimate service reliability.

All feeders are run in underground concrete duct banks, are branched to numerous loads and are tapered in the load direction. Few spare duct runs exist. No existing feeder cable has the capacity to carry the proposed electric generator.

The existing East Bank 4th Street Switching Station, with the last addition of power factor capacitors, completely occupies the space available. It is located approximately 6000 feet from the Southeast Generating Station.

III. TECHNICAL AND PHYSICAL CONSIDERATIONS

Parallel operation into the East Bank 4th Street Switching Station is not recommended from a technical standpoint. To accomodate operation by selective paralleling to two different Utility sources based on system loading will require dual breakers for each twin bussed service gear. Considering that relay coordination may vary, source to source, there will be difficulty in relay setting and system stability. Add to this the remote location and extreme length of generator feed, one can state that the cost of the installation, on top of operating difficulties, is too high for further consideration.

The original Southeast Plant was a generating station for Northern States Power. The existing electric tie from Southeast to the Main Street Substation still

exists and was designed for synchronizing. Therefore, connection of the new generator and switchgear is simply a matter of connecting to the existing cables. Relaying and synchronizing are with known conditions.

IV. ECONOMICS

Northern States Power Company contract with the University of Minnesota is a 'Large General Service' GKO 25 rate schedule. Current basic charges are as follow:

A. <u>Demand</u>	<u>Oct. - May</u>	<u>June - Sept.</u>
Excess	\$4.15/KW	\$5.05/KW

B. <u>Energy</u>	
First 1000 MWH	\$18.20/MWH
Excess MWH	\$14.50/MWH

C. Determination of Demand

1. Normal service - 15 min. interval, with minimum demand established at 80% of peak demand occurrence during June thru September.
2. Parallel service (Standby or Supplementary) - 15 min. interval, with minimum demand equivalent to 80% of greatest excess demand over the agreed standby demand occurring in the previous eleven months.

On the basis of the above, the East Bank Campus loading was projected by month to include the effects of the Southeast Generating Station on total load and typical billings projected at current rates.

Results of these billing calculations are as follow:

A. Parallel Operation at 4th Street (not recommended)

1. Lowest possible annual bill - \$1,900,000. This assumes no turbine outages.
2. Probable billing range with one turbine outage each year.
 - a. Outage at min. demand - \$2,133,000
 - b. Outage at max. demand - \$2,254,000

B. Parallel Operation at Southeast Station

Probable billing range

Min. - \$2,208,000

Max. - \$2,210,000

C. Parallel Operation with Wheelage Agreement

Probable billing range

Min. - \$2,199,000

Max. - \$2,320,000

D. Sale of all Generated Power

Total purchase cost - \$2,892,000

Total sales - \$ 742,000

Annual cost - \$2,150,000

V. CONCLUSIONS

On the basis of economics, simplicity of operation, and in conformance with existing rate schedules, the sale of all generated power is recommended.

It should be pointed out that this electrical arrangement does not preclude changing the mode of operation in the future. Should there be dramatic rate changes that would favor a wheelage agreement or other service agreements, they could be implemented at a future date.

HELMICK & LUTZ COMPANY
ENGINEERS
1315 GLENWOOD AVENUE
MINNEAPOLIS, MINNESOTA 55405

By

George W. Burke

April 4, 1978

UNIVERSITY OF MINNESOTA

1981 EAST BANK LOAD
GENERATION WHEELED BY N.S.P.

	MONTHLY BILLING			GENERATOR OUTAGE PENALTIES	
	<u>Net Load</u>	<u>Wheel</u>	<u>Total</u>	<u>Min Demand</u>	<u>Max Demand</u>
J	\$ 125,805	\$ 6,225	\$ 132,030	\$ 26,560	\$ 36,188
F	115,760	5,700	121,460	28,220	35,358
M	133,880	5,625	139,505	25,315	34,943
A	156,740	5,325	162,065	21,580	31,208
M	172,810	5,025	177,835	12,035	21,663
J	201,400	5,025	206,425	9,960	24,485
J	193,575	5,175	198,750	10,790	20,418
A	195,760	5,475	201,235	12,450	22,078
S	176,665	5,025	181,690	19,920	29,548
O	156,865	5,250	162,115	21,165	30,743
N	139,315	5,775	145,090	24,070	36,698
D	<u>126,510</u>	<u>6,150</u>	<u>132,660</u>	<u>26,145</u>	<u>35,773</u>
TOTAL	\$1,895,085	\$65,775	\$1,960,860	\$238,210	\$359,103

BILLING RANGE

Net Load-----	\$1,960,860	\$1,960,860
Penalty-----	<u>238,210</u>	<u>359,103</u>
Total-----	\$2,199,070	\$2,319,963

UNIVERSITY OF MINNESOTA

1981 EAST BANK LOAD

	<u>MONTHLY BILLING</u>		<u>GENERATOR OUTAGE PENALTIES</u>	
	<u>TOTAL LOAD</u>	<u>NET LOAD</u>	<u>MIN DEMAND</u>	<u>MAX DEMAND</u>
J	\$ 228,560	\$ 125,805	\$ 26,560	\$ 36,188
F	203,720	115,760	28,220	35,358
M	226,485	133,880	25,315	34,943
A	225,370	156,740	21,580	31,208
M	236,445	172,810	12,035	21,663
J	273,970	201,400	9,960	24,485
J	275,710	193,575	10,790	20,418
A	281,510	195,760	12,450	22,078
S	247,350	176,665	19,920	29,548
O	234,360	156,865	21,165	30,743
N	229,720	139,315	24,070	36,698
D	228,560	126,510	26,145	35,773
TOTAL	\$2,891,760	\$1,895,085	\$238,210	\$359,103

NET RETURN \$ 742,300 (1978 Rate)

NET COST \$2,149,460

BILLING RANGE

NET LOAD	\$1,895,085
MIN PENALTY	<u>238,210</u>
TOTAL	\$2,133,295
NET LOAD	\$1,895,085
MAX PENALTY	<u>359,103</u>
TOTAL	\$2,254,188

UNIVERSITY OF MINNESOTA

1981 EAST BANK CAMPUS LOAD

<u>MONTH</u>	<u>CAMPUS LOAD</u>		<u>ADD SE LOAD</u>		<u>TOTAL LOAD</u>		<u>SE GEN</u>		<u>NET LOAD</u>	
	<u>MWH</u>	<u>DEMAND</u>	<u>MWH</u>	<u>DEMAND</u>	<u>MWH</u>	<u>DEMAND</u>	<u>MWH</u>	<u>PEAK KW</u>	<u>MWH</u>	<u>DEMAND</u>
J	8700	19700	740	1500	9440	21200	4940	7500	4500	13700
F	7200	19200	670	1500	7870	20700	4120	6800	3750	13900
M	8700	19200	740	1500	9440	20700	4400	6700	5040	14000
A	8500	19700	720	1500	9220	21200	2930	6300	6290	14900
M	8700	21600	740	1500	9440	23100	2700	5900	6740	17200
J	9700	22100	720	1500	10420	23600	2950	5900	7470	17700*
J	9800	22100	740	1500	10540	23600	3540	6100	7000	17500
A	10200	22100	740	1500	10940	23600	3650	6500	7290	17100
S	8700	19700	720	1500	9420	21200	2820	5900	6600	15300
O	9100	19700	740	1500	9840	21200	3570	6200	6270	15000
N	8800	19700	720	1500	9520	21200	4260	6900	5260	14300
D	8700	19700	740	1500	9440	21200	4920	7400	4520	13800
TOTAL					115,530		44,800		70,730	

*Min. Billing Demand = 14,160

DISTANCES

S.E. Steam Plant to N.S.P. Main Street Substation—2000ft.

S.E. Steam Plant to U.of.M. Steam Plant—3400ft.

U. of M. Steam Plant to U. of M. Switchgear Via
Railroad Right of Way—2400ft.

U. of M. Steam Plant to U. of M. Switchgear Via
Existing Ductbank—3500ft.

Note: All Distances Are Scaled Distances.

GRID I.C.E.S. STUDY

DRAWN <u>MSC</u>				HELMICK & LUTZ ENGINEERS				MINNEAPOLIS MINNESOTA									
CHECKED _____																	
APPROVED _____																	
REVISIONS	DATE	DWN	APP.	DATE	3-30-78												
UNIVERSITY OF MINNESOTA MINNEAPOLIS, MINNESOTA						ELECTRICAL GRID CONNECTION PLOT PLAN						SCALE <u>1" = 100'</u>		NO. <u>625</u> <u>ESK-1</u>		REV. <u>0</u>

NOTE:

UE - Denotes Underground
Electrical Ductbank

4th Street S.E.				GRID - I.C.E.S. STUDY			
DRAWN <u>MSC</u> CHECKED _____ APPROVED _____				HELMICK & LUTZ ENGINEERS			
REVISIONS DATE DWN APP. DATE <u>3-30-78</u>				MINNEAPOLIS		MINNESOTA	
UNIVERSITY OF MINNESOTA MINNEAPOLIS, MINNESOTA				ELECTRICAL GRID CONNECTION OUTDOOR SWITCHGEAR PLAN		SCALE 1" = 20' NO 625 ESK-2	
						REV. 0

				DRAWN <u>MSC</u>		HELMICK & LUTZ ENGINEERS					
				CHECKED _____							
				APPROVED _____							
REVISIONS		DATE	OWN	APP.	DATE <u>3-30-78</u>	MINNEAPOLIS		MINNESOTA			
UNIVERSITY OF MINNESOTA						ELECTRICAL GRID CONNECTION				SCALE <u>NONE</u>	
MINNEAPOLIS, MINNESOTA						ALT. 13.8KV. DISTR. L/D — 4th ST.				NO <u>625</u> <u>ESK-3</u>	
										REV. <u>0</u>	

NOTES:

- A. Solid lines show switchgear and feeder additions required to use by-product electricity internally.
- B. Dotted lines show existing switchgear and feeders plus equipment for the Basic Plan.

GRID I.C.E.S. STUDY

				DRAWN <u>MSC</u>	HELMICK & LUTZ			
				CHECKED	ENGINEERS			
				APPROVED				
REVISIONS	DATE	DWN	APP.	DATE <u>3-30-78</u>	MINNEAPOLIS		MINNESOTA	
UNIVERSITY OF MINNESOTA MINNEAPOLIS, MINNESOTA					ELECTRICAL GRID CONNECTION ALT. 13.8KV. DISTR. L/D - S.E. PLT.		SCALE NONE	
							NO 625 ESK-4	REV. 0

DISTANCES

S.E. Steam Plant to N.S.P. Main Street Substation— 2000ft.

S.E. Steam Plant to U. of M. Steam Plant— 3400ft.

Note: Distances Are Scaled.

				DRAWN <u>MSC</u>				HELMICK & LUTZ ENGINEERS												MINNEAPOLIS				MINNESOTA																			
				CHECKED _____																																							
				APPROVED _____																																							
REVISIONS				DATE	OWN	APP.	DATE	<u>4-18-78</u>				UNIVERSITY OF MINNESOTA MINNEAPOLIS, MINNESOTA												ELECTRICAL GRID CONNECTION 73 PLOT PLAN												SCALE <u>1" = 1'</u>							
																																				NO 625				REV. 0			
																																				ESK-5							

HELMICK & LUTZ COMPANY
ENGINEERS
1315 GLENWOOD AVENUE
MINNEAPOLIS, MINNESOTA 55405
TELEPHONE 377-5070

February 16, 1978

University of Minnesota
Physical Plant Maintenance & Operations
Room 200 Shops Building
319 15th Avenue Southeast
Minneapolis, Minnesota 55455

Attention: Mr. W.E. Soderberg

Re: Grid ICES
Generation Utilization

Gentlemen:

The attached analysis is based on 1981 Steam Load for Option I distribution system.

Presented are the following:

- I. Electric Load - Southeast Station
- II. 1981 East Bank Load
 - a. Combined Campus and Southeast Load
 - b. Monthly billing at current contract rate
- III. 1981 East Bank Load, Full Generation Credit (wheelage agreement metering)
 - a. Net Load with generator credit
 - b. Monthly billing at current contract rate (without demand penalty and at 100% generator availability).
- IV. Demand Charge Penalty (one generator)
 - a. Maximum based on generator outage at peak demand.
 - b. Minimum based on generator outage at minimum demand and including minimum demand charge for June peak.

V. Demand Charge Penalty (two generators)

Based on second generator being an efficiently loaded
180 psig SNC machine.

VI. Summary

- a. Cost of total purchase per case II
- b. Expected revenue from full cogeneration sale based on 95% availability of generation.
- c. Net cost, a-b
- d. Wheelage agreement costs
 1. These costs assume 100% availability of generation (MWH) and would involve a \$55,000 one time totalizing metering charge.
 2. A second turbine generator would cost approximately \$1,500,000.

Probable cost with two turbines and a wheelage agreement would exceed probable cost on a total sale basis without consideration of tax implications.

Yours very truly,

HELMICK & LUTZ COMPANY

George W. Burke

GWB:jmn w/enc.

cc: J.C. O'Gara w/enc.

UNIVERSITY OF MINNESOTA
GRID ICES
SOUTHEAST GENERATING STATION

GENERATION ANALYSIS

ELECTRIC LOAD

	<u>HP</u>	<u>Demand Factor</u>	<u>Load Factor</u>	<u>KW Demand</u>	<u>KW Load</u>
A. Coal Handling					
1. Conveyor to Storage	130	.8	.16	78	13
2. Bunker Feed System	156	.8	.16	94	15
	<u>286 HP</u>			<u>172</u>	<u>28</u>
B. Water Systems					
1. Condensate Pumps	45	.5	.9	17	15
2. Treatment Pumps	50	.5	.9	19	17
3. Boiler Feed Pumps	450	.6	.85	202	172
	<u>545 HP</u>			<u>238</u>	<u>204</u>
C. Boiler Auxiliaries					
1. Feeder & Scales	12	.9	.5	8	4
2. #3 Boiler	450	.9	.8	304	243
3. #4 Boiler	340	.9	.8	230	184
4. Baghouse	460	.9	.7	311	218
	<u>1262 HP</u>			<u>853</u>	<u>649</u>
D. Miscellaneous					
1. Control & Lights	100 KW	1.0	.8	100	80
2. Air Compressors	115 HP	.8	.33	69	23
3. Sump Pumps	15 HP	.8	.33	7	2
4. Vents & Others	40 HP	.8	.6	24	15
	<u>270 HP</u>			<u>200</u>	<u>120</u>
Total					
2363 HP, Equivalent					
Total Demand				1463 KW	
Average Load					1001 KW

II. 1981 EAST BANK LOAD

	<u>Campus Load</u>		<u>SE Load</u>		<u>Total</u>	
	<u>MWH</u>	<u>Demand</u>	<u>MWH</u>	<u>Demand</u>	<u>MWH</u>	<u>Demand</u>
Jan	8700	19700	740	1500	9440	21200
Feb	7200	19200	670	1500	7870	20700
Mar	8700	19200	740	1500	9440	20700
Apr	8500	19700	720	1500	9220	21200
May	8700	21600	740	1500	9440	23100
Jun	9700	22100	720	1500	10420	23600
Jul	9800	22100	740	1500	10540	23600
Aug	10200	22100	740	1500	10940	23600
Sep	8700	19700	720	1500	9420	21200
Oct	9100	19700	740	1500	9840	21200
Nov	8800	19700	720	1500	9520	21200
Dec	8700	19700	740	1500	9440	21200
					<u>115,530 MWH</u>	

<u>Monthly Billing</u>		<u>Billing Basis</u>	
Jan	\$ 228,560	1. Demand	
Feb	203,720	Oct - May	\$4.15
Mar	226,485	Jun - Sep	5.05
Apr	225,370	2. Energy	
May	236,445	1st 1,000 MWH @	\$18.20
Jun	273,970	Excess MWH @	\$14.50
Jul	275,710		
Aug	281,510		
Sep	247,350		
Oct	234,360		
Nov	229,720		
Dec	228,560		
Total	<u>\$2,891,760</u>	Average Cost	\$.025

III. 1981 EAST BANK LOAD, FULL GENERATION CREDIT

	<u>Total Load</u>		<u>SE Generation</u>		<u>Net Load</u>	
	<u>MWH</u>	<u>Demand</u>	<u>MWH</u>	<u>Peak KW</u>	<u>MWH</u>	<u>Demand</u>
Jan	9440	21200	4940	7500	4500	13700
Feb	7870	20700	4120	6800	3750	13900
Mar	9440	20700	4400	6700	5040	14000
Apr	9220	21200	2930	6300	6290	14900
May	9440	23100	2700	5900	6740	17200
Jun	10420	23600	2950	5900	7470	17700 *
Jul	10540	23600	3540	6100	7000	17500
Aug	10940	23600	3650	6500	7290	17100
Sep	9420	21200	2820	5900	6600	15300
Oct	9840	21200	3570	6200	6270	15000
Nov	9520	21200	4260	6900	5260	14300
Dec	9440	21200	4920	7400	4520	13800

70,730 MWH

* Min Demand = 14,160 KW

	<u>Monthly Billing</u>			
	<u>Demand</u>	<u>MWH</u>	<u>Wheel</u>	<u>Total</u>
Jan	\$ 56,855	\$ 68,950	\$ 6,225	\$ 132,030
Feb	57,685	58,075	5,700	121,460
Mar	58,100	75,780	5,625	139,505
Apr	61,835	94,905	5,325	162,065
May	71,380	101,430	5,025	177,835
Jun	89,385	112,015	- 5,025	206,425
Jul	88,375	105,200	5,175	198,750
Aug	86,355	109,405	5,475	201,235
Sep	77,265	99,400	5,025	181,690
Oct	62,250	94,615	5,250	162,115
Nov	59,345	79,970	5,775	145,090
Dec	57,270	69,240	6,150	132,660
Total	\$826,100	\$1,068,985	\$65,775	\$1,960,860

IV. DEMAND CHARGE PENALTY (One Generator)

	<u>Max Demand Penalty</u>	<u>Min Demand Penalty</u>
Jan	5200 x 4.15 = \$ 21,580	460 x 4.15 = \$ 1,909
Feb	5000 x 4.15 = 20,750	260 x 4.15 = 1,079
Mar	4900 x 4.15 = 20,335	160 x 4.15 = 664
Apr	4000 x 4.15 = 16,600	0
May	2700 x 4.15 = 11,205	5900 x 4.15 = 24,485
Jun	5900 x 5.05 = 29,795	0
Jul	1400 x 5.05 = 7,070	0
Aug	1700 x 5.05 = 8,585	0
Sep	3600 x 5.05 = 18,180	0
Oct	3900 x 4.15 = 16,185	0
Nov	4600 x 4.15 = 19,090	0
Dec	5100 x 4.15 = 21,165	360 x 4.15 = 1,494
	<u>\$210,540</u>	<u>\$29,431</u>

V. DEMAND CHARGE PENALTY (Two Generators)

	<u>Max Demand Penalty</u>	<u>Min Demand Penalty</u>
Jan	1100 x 4.15 = \$ 4,565	460 x 4.15 = \$ 1,909
Feb	900 x 4.15 = 3,735	260 x 4.15 = 1,079
Mar	800 x 4.15 = 3,320	160 x 4.15 = 664
Apr	0	0
May	0	700 x 4.15 = 2,905
Jun	800 x 5.05 = 4,040	0
Jul	0	0
Aug	0	0
Sep	0	0
Oct	0	0
Nov	500 x 4.15 = 2,075	0
Dec	1000 x 4.15 = 4,150	360 x 4.15 = 1,494
	<u>\$ 21,885</u>	<u>\$ 8,051</u>

VI. SUMMARY (1978 Rate Base)

A. Total Cost, All Purchased \$2,891,760

B. Revenue Return, Sales of All Generated Power

1. Capacity Credit

7.0 MW @ \$64,000 = \$448,000

2. Energy Credit, 95% Availability

44775 MWH @ \$11 x .95 = 468,000

Total Return = \$916,000

C. Net Cost, Electric Power = \$1,975,760

D. Wheelage Agreement Costs

1. One Turbine-Generator

<u>Min.</u>	<u>Max.</u>
\$1,960,860	\$1,960,860
29,431	210,540
<hr/> \$1,990,291	<hr/> \$2,171,400

2. Two Turbine-Generators

<u>Min.</u>	<u>Max.</u>
\$1,960,860	\$1,960,860
8,051	21,885
<hr/> \$1,968,911	<hr/> \$1,982,745

The following letters attest to the spirit of cooperation that N.S.P. is giving to the University of Minnesota and their willingness to help make a viable ICES.

The Draft electric power and energy transaction for Alternative #3 is included.

The Draft agreement will be signed at the conclusion of Phase III, but before transmittal of the draft report to D.O.E.

N O R T H E R N S T A T E S P O W E R C O M P A N Y

February 21, 1978

RECEIVED
UNIVERSITY OF MINN.
PHYSICAL PLANT

FEB 24 1 04 PM '78

Mr Warren Soderberg
University of Minnesota
University Physical Plant
Room 200, Shops Bldg
Minneapolis MN 55455

Dear Warren

NSP has provided the U of M with several alternative methods for distributing the electric energy from the Southeast Steam Plant. The company will sign a contract with the U of M after a decision has been made on the best alternative. We understand and agree that you would like to do this during Phase III or Final Engineering which will be in June 1978.

Whichever method you choose, the company recognizes the need for a shakedown period for the determination of demand, accredited generator capacity, or what have you. Flexibility will be expected so that the U of M can operate in the optimum fashion but consistent with company constraints.

It is our understanding that you expect to have your generation equipment in service in December 1981. We will have no problem in completing our work in that time frame.

Yours very truly,

A handwritten signature in cursive script that reads "John C. Pearce".

John C Pearce, Assistant to
Director Planning & Research

ELECTRIC POWER AND ENERGY TRANSACTION
between
NORTHERN STATES POWER COMPANY
and the
UNIVERSITY OF MINNESOTA

THIS AGREEMENT, made this _____ day of _____, 19____,
between Northern States Power Company, a Minnesota corporation, herein-
after called "NSP", and the University of Minnesota, a Minnesota corpora-
tion, hereinafter called "U of M",

WITNESSETH:

WHEREAS NSP is an electric utility engaged primarily in the business
of generating, transmitting, and distributing electric power and energy in
the States of Minnesota, North Dakota, and South Dakota; and

WHEREAS the U of M provides steam heat for certain buildings located
on the U of M properties in southeast Minneapolis, MN; and

WHEREAS the U of M will provide steam for such purposes by operating
steam generating facilities located on the east side of the Mississippi
River in the vicinity of 6th Avenue S.E.; and

WHEREAS the U of M will install a 10 megawatt electric generator at
the site of the aforesaid steam generating facilities, hereinafter called
"SE Generating Plant", to utilize the excess steam to generate electric
power and energy; and

WHEREAS NSP is willing to purchase such electric power and energy
generated by the SE Generating Plant under the terms and conditions set
forth hereinafter;

NOW THEREFORE, the parties hereto agree as follows:

ARTICLE I

POWER AND ENERGY TRANSACTION

1.01 Service Condition

a. NSP agrees to purchase from the U of M, and the U of M agrees to sell to NSP all the power and energy generated by the SE Generating Plant.

b. Power and energy from the SE Generating Plant will be delivered to NSP at 13.8 KV where NSP's 138 KV feeder connects to the U of M's substation located adjacent to the SE Generating Plant.

c. Scheduled maintenance outages of the SE Generating Plant shall be coordinated with NSP's System Operation Department so as to cause a minimum of inconvenience to NSP's operations.

1.02 Payment

NSP shall purchase the entire electrical output of the SE Generating Plant under the following conditions:

a. The U of M shall provide 5 megawatts of capacity from the SE Generating Plant for NSP's use which shall be continuously available except during temporary outages for maintenance.

i. NSP shall pay the U of M a monthly capacity charge of \$ _____

ii. NSP shall pay the U of M monthly for the associated energy at the rate of _____.

b. The U of M shall supply NSP the entire energy output of the SE Generating Plant that is not associated with the capacity purchase set forth above as Excess Energy.

i. NSP shall pay the U of M monthly for all such energy at the rate of _____.

ARTICLE II

METERING AND BILLING

2.01 Metering Facilities

a. The transfer of power and energy from the U of M to NSP

shall be measured at the U of M substation by metering equipment consisting of a recording 15-minute integrated demand watt-hour meter and a var-hour meter or by digital metering equipment of equivalent capability. Meters and associated metering equipment shall be provided, owned, and maintained by the U of M.

b. The U of M shall read the aforesaid meters monthly at a time mutually agreed upon and promptly forward a duplicate copy of such meter readings to NSP. Metering records shall be available at all reasonable times to authorized agents and employees of either party for the purpose of this Agreement.

2.02 Meter Calibration and Adjustments

a. Each meter used hereunder shall, by comparison with accurate standards, be tested and calibrated by the party owning the meter at approximate intervals of 12 months. If a meter shall be found inaccurate, it shall be restored to accurate conditions or an accurate meter substituted.

b. Either party shall have the right to request that a special test of metering equipment be made at any time. If any test, made at a party's request, discloses that the metering equipment tested is registering within two percent of normal, the party requesting the test shall bear the expense thereof. The expense of all other tests shall be borne by the party owning the metering equipment.

c. The result of all tests and calibrations shall be open to examination by both parties, and a report of every test shall be furnished immediately to each party. Any meter tested and found to be not more than two percent above or below normal shall be considered to be accurate. If, as a result of any test, any meter is found to register in excess of two percent either above or below normal, then the readings of such meter

previously taken shall be corrected according to the percentage of inaccuracy found, but no such correction shall extend beyond 60 days previous to the day on which inaccuracy is discovered by such test.

d. Should any such metering equipment at any time fail to register or should the registration thereof be so erratic so as to be meaningless, the power and energy delivered shall be determined from the best information available.

2.03 Payment of Bills

Bills for services hereunder shall be rendered monthly and shall be payable within 15 days from the date of the bill. If such due date falls on a Sunday or holiday, the bill shall be due on the next working day following each Sunday or holiday. In the event NSP disputes all or any part of the charges submitted by the U of M, it shall nevertheless pay the full amount of the charges when due and give notice to the U of M in writing within 30 days from the date of the receipt of the statement setting forth the grounds on which the charges are disputed and the amount in dispute. NSP will not be entitled to any adjustment on account of any disputed charges which are not submitted to the U of M within the time and the manner herein specified.

ARTICLE III

CONTINUITY OF SERVICE

3.01 Continuity of Service

a. In the event that either party is prevented from delivering or receiving the electric service herein contracted for, in whole or in part, by any cause beyond its control including, but not limited to acts of God, strikes, injunctions, breakdown, or for the purpose of making

repairs, neither party hereto shall be liable to the other by reason thereof. Both parties shall be prompt and diligent in removing and overcoming the cause or causes of any interruption, but nothing herein contained shall be construed as permitting either party to refuse to deliver, or to receive, respectively, electric service after the cause of interruption has been removed.

b. Each party reserves the right to disconnect service in the event service to the other party results in trouble on its system including but not limited to interruptions, grounds, radio or telephone interference, surges or objectionable voltage fluctuations, where such trouble is caused by the operation or facilities of the receiving party if, after giving notice in writing to the receiving party of such trouble, the receiving party fails to remedy the causes thereof within a reasonable time.

c. Neither party guarantees that the supply of electric service hereunder will be free from interruption, and it is agreed that interruption of either party's service, occasioned by any of the causes mentioned in the foregoing paragraphs, shall not constitute a breach of this Agreement on the part of either party, and such party shall not be liable to the other party for damages resulting therefrom. In the event of a service interruption the parties will act to restore service as soon as it can reasonably be accomplished. The parties will at all times exert themselves toward the end of supplying as nearly constant service as is reasonably practicable. In case of impaired or defective service, the receiving party shall immediately give notice to the other party by telephone and confirm such notice in writing within 24 hours.

ARTICLE IV
ARBITRATION

4.01 Arbitration

Any controversy, claim, counterclaim, dispute, difference, or misunderstanding arising out of or relating to this Agreement, or the breach thereof, excluding contribution, indemnification, or damages based on tortious conduct, shall be settled by arbitration before an arbitrator selected by the American Arbitration Association. The party desiring arbitration shall demand such arbitration by giving written notice to the other party setting forth the point or points in dispute. The arbitration shall be conducted in accordance with the Commercial Arbitration Rules of the American Arbitration Association then in effect, subject further to the qualification that the arbitrator named under said rules shall be competent by virtue of education experience in the particular matter subject to arbitration. The arbitrator shall have jurisdiction and authority only to interpret or determine compliance with the provisions of this Agreement insofar as shall be necessary to the determination of issues properly appealed to the arbitrator. The arbitrator shall not have jurisdiction or authority to add to, detract from, or alter in any way the provisions of this Agreement. This provision shall survive the termination of this Agreement. Costs incurred in connection with the arbitration shall be paid in equal parts by the parties involved in the arbitration unless the award shall specify a different division of costs.

ARTICLE V
GENERAL

5.01 Limitation of Liability

Neither party shall be held responsible or liable for any loss

or damage resulting from failure to perform its obligations hereunder as a result of any cause beyond its control, including but not limited to; acts of God, strikes, injunctions, or breakdown. Both parties shall be prompt and diligent in removing the cause of such failure to perform, but nothing herein contained shall be construed as permitting either party to continue to fail to perform after said cause has been removed.

5.02 Indemnity

Each party agrees to defend, indemnify and hold harmless the other party against any and all claims, liability, loss, damage, or expense caused by or resulting from the negligent act or omissions of the indemnifying party, its employees or agents.

5.03 Right of Access

Each of the parties will give authorized agents and employees of the other party the right to enter its premises at all reasonable times for the purpose of reading or checking meters, for constructing, testing, repairing, renewing, exchanging or removing any or all of its equipment which may be located on the property of the other party or performing any work incident to rendering the service hereby contracted.

5.04 Successors and Assigns

This Agreement shall be binding upon the respective parties, their successors and assigns, on and after the effective date hereof.

5.05 Notices

Any notices, demands, or requests required or authorized by this Agreement shall be deemed properly given if mailed postage prepaid to the President, Northern States Power Company, Minneapolis, Minnesota, on behalf of NSP, and to the _____

_____, on behalf of the U of M. The

designation of the persons to be notified or the address of such person may be changed at any time by similar notice.

5.06 Terms of Agreement

This Agreement shall continue in effect for a period of 10 years commencing _____, and if not then terminated by at least 48 months' prior written notice given by either party to the other, shall continue in full force and effect until so terminated.

IN WITNESS WHEREOF, the parties have caused this Agreement to be duly executed as of the day and year first above written.

ATTEST

NORTHERN STATES POWER COMPANY
A Minnesota Corporation

THE UNIVERSITY OF MINNESOTA
A Minnesota Corporation

DRAFT RATE AGREEMENT

The following rate will be applied to determining pool credits to the University of Minnesota for its electric generation.

N O R T H E R N S T A T E S P O W E R C O M P A N Y

May 11, 1977

Mr W E Soderberg, Director
Physical Plant
University of Minnesota
Physical Plant Maintenance and Operations
200 Shops Building
Minneapolis MN 55455

Dear Mr Soderberg

Re: Purchase of electricity from University of Minnesota

To further the conservation of natural resources, NSP will encourage non-utility generation of electricity by either governmental agencies or business entities when it is produced in conjunction with process steam, district heating from steam, solid waste disposal or other similar activities, unless natural gas or oil is the primary energy source.

NSP will purchase such electricity at a price fully reflecting both its energy value and its effective capacity value to the NSP system, (reflecting costs for additional capital investment). If such electricity is used to supply the party's own electrical requirements, NSP's standby charge will be designed to encourage such generation without penalizing its other customers.

The attached memorandum is a guide that may be used to determine the price NSP can pay for electricity from a cogeneration unit.

All of the costs included in the memo are in 1977 dollars and are estimated figures. The final price structure will be based on capital revenue requirements, and operating costs that will be determined at the time the cogeneration unit comes on line.

Because there is no precedent experience with cogeneration units, it is expected that the accreditable generator megawatt capacity described in the memo will be made flexible to allow a suitable operating period for the cogeneration unit to establish the optimum rate for the owner.

NORTHERN STATES POWER COMPANY

We are anticipating an exchange of information in our relationship with you on this project that will pave the way for other units that will certainly be coming on our lines.

Yours very truly

A handwritten signature in cursive script, reading "John C. Pearce". The signature is written in dark ink and is positioned above the printed name and title.

John C Pearce, Assistant to
Director Planning & Research

MEMORANDUM

This outline of a proposal for NSP's purchase of electric energy from a new cogeneration unit is intended to have built in flexibility realizing that the patterns of generation from a new facility are not known at this time. An agreement between the owners and NSP can be reached on the following principles, and for the advantage of both parties the alternative methods of pricing should be examined. It is expected that some adjustments in the chosen method will be made after the plant is in operation to allow for optimum generation cycles.

The first step is to determine a reliable generator KW capacity that will be accreditable to the Pool. It is understood that a unit of this type must be out of service a month or more each year for maintenance. The probabilities are assured that the unit will be down periodically because of trouble. This typically can be for another month or more every year, therefore a total down time of about 25% should be expected.

NSP proposes that a portion of the plant be identified as equivalent to typical base load generation. This would be accomplished by first calculating the capacity of the generator on an average and on a peak basis, and taking the lesser of the two to be the accreditable capacity. Energy associated with that capacity would be purchased as base load energy -- the remainder as economy energy. Economy energy is defined as excess energy purchased and sold by MAPP Pool members. The differential of production costs between two companies conducting an economy energy transaction determines the price. In 1976, for those transactions in which NSP was involved, this cost differential was about 20%. Therefore, we have used 80% of NSP's costs for the economy energy rates listed below.

Accreditable generator megawatt capacity

$$\frac{\text{Annual energy output (MW hr)}}{\text{Hours in a year X capacity factor}} = \text{MW}$$

The peak accredited generator capacity is determined by taking the plant output at time of NSP system summer and winter peak. This would be calculated by taking the average generator output at time of highest five peaks in each season. The capacity factor is the ratio of the MW hrs generated in a given period of time to the MW hrs that could be generated during the same period of time at maximum rating.

Capacity Rate

NSP will pay \$64.00/KW for the accreditable megawatt generating capacity. This figure represents the cost per KW of installing a large coal fired generator in 1977. Actual rate would be a function of the year the unit was installed.

Sample calculations for a new 40 MW maximum rated generator:

- a) Estimated annual output 197,100 MW hrs

$$\frac{197,100 \text{ MW hrs}}{8760 \text{ hrs} \times .75} = 30 \text{ MW}$$

- b) Estimated 35 MW generation at the time of NSP peak.

Plant accreditable capacity is the lesser of the two or 30 MW.

NSP will pay:

$$30 \text{ MW} \times \frac{\$64.00}{\text{KW}} \times \frac{1000 \text{ KW}}{1 \text{ MW}} = \$1,920,000 \text{ annually for the capital investment of the cogeneration unit}$$

Putting this in terms of MW hr compensation so that it may be added to the energy compensation:

$$\frac{\$64.00 \times 1000}{8760 \times .75} = \$9.74/\text{MW hr}$$

Energy Rates

NSP will pay for energy (MW hrs) on two basis: first as base load energy and second, as excess or economy energy. Base load energy rates are constant through the day and year. Economy energy rates will vary on the same cycle as NSP's load. During off peak hours base generating units that produce electricity at least cost are run. As the load increases to peak, the more expensive operating units are added until at peak time, peaking plants come on line. These last units have low capital costs but very high operating or fuel costs. Winter economy rates are higher because NSP schedules efficient machines out for maintenance during this period, leaving more expensive units to run.

	On Peak - 40% of Total Year-Weekdays excluding Holidays <u>8:00 AM - 10:00 PM</u>	Off Peak - 60% of Total Year-Weekdays 10:00 PM - 8:00 AM <u>Weekends - Holidays</u>
1. Base Load Energy Rates	\$11.00/MW hrs	\$11.00/MW hrs
2. Economy Energy Rates		
1977 Summer May 1-Oct 31	\$11.20/MW hrs	\$7.20/MW hrs
1977 Winter Nov 1-Apr 30	\$16.00/MW hrs	\$8.00/MW hrs

Some conditions for these rates are:

1. Of the base load energy supplied by the unit, no more than 60% may be supplied in off peak hours.
2. Regardless of time of day, the base load energy for the accredited capacity is purchased at \$11.00/MW hr.

3. Any excess energy over the base load energy is purchased at the existing hourly economy energy rate.
4. The compensation rate for capital investment and the base load energy is based upon the accredited capacity at which the unit is operating.

Sample calculations of total payments on an annual basis that NSP will pay for capacity and energy from an accredited 30 MW unit with generation on a base of 197,100 MW hrs.

a) Machine operates at 100% of accredited base load			
Capacity	<u>On Peak</u>	<u>Off Peak</u>	<u>Total</u>
.40 X 197,100 X 9.74	\$768,000		
.60 X 197,100 X 9.74		\$1,152,000	
			\$1,920,000
Energy base			
.40 X 197,100 X 11.00	\$868,000		
.60 X 197,100 X 11.00		\$1,300,000	
			<u>\$2,168,000</u>
			\$4,088,000

Average Annual Energy Rate for 197,100 MW hrs
 $\frac{2,168,000}{197,100} = \$11.00/\text{MW hr}$

Total Annual Capacity and Energy Rate
 $\frac{4,088,000}{197,100} = \$20.74/\text{MW hr}$

b) Machine operates at 133% of accredited base load			
Capacity	<u>On Peak</u>	<u>Off Peak</u>	<u>Total</u>
.40 X 197,100 X 9.74	\$768,000		
.60 X 197,100 X 9.74		\$1,152,000	
			\$1,920,000
Energy base			
.40 X 197,100 X 11.00	\$868,000		
.60 X 197,100 X 11.00		\$1,300,000	
			\$2,168,000
Economy-Summer			
.40 X 32,850 X 11.20	\$147,000		
.60 X 32,850 X 7.20		\$142,000	
			\$289,000
Economy-Winter			
.40 X 32,850 X 16.00	\$210,000		
.60 X 32,850 X 8.00		\$158,000	
			<u>\$368,000</u>
			\$4,745,000

Average annual Base and Economy Energy rate for 295,650 MW hrs
 $\frac{\$2,25,000}{295,650 \text{ MW hrs}} = \$10.75/\text{MW hr}$

Total Annual Capacity and energy rates for 295,650 MW hrs
 $\frac{\$4,745,000}{262,800 \text{ MW hrs}} = \$18.05/\text{MW hr}$

- c) Machine operates at 133% of base load. (Assume energy split even between Summer & Winter, 80% on peak, 20% off peak.)

Capacity	<u>On Peak</u>	<u>Off Peak</u>	<u>Total</u>
.80 X 197,100 X 9.74	\$1,536,000		
.20 X 197,100 X 9.74		\$384,000	
			\$1,920,000
Energy base			
.80 X 197,100 X 11.00	\$1,734,400		
.20 X 197,100 X 11.00		\$433,600	
			\$2,168,000
Economy-Summer			
.80 X 32,850 X 11.20	\$294,300		
.20 X 32,850 X 7.20		\$47,300	
			\$341,600
Economy-Winter			
.80 X 32,850 X 16.00	\$420,500		
.20 X 32,850 X 8.00		\$52,600	
			<u>\$473,100</u>
			\$4,902,700

Average annual Base and Economy energy rate for 295,650 MW hrs
 $\frac{2,982,700}{262,800} = \$11.35/\text{MW hr}$

$\frac{4,902,700}{262,800} = \$18.65/\text{MW hr}$

-NOTE-

See letter in the cost analysis section from N.S.P. on rate increases for electricity pool credits to 1981. The aforementioned rates of this section are 1977.

The following contracts are final drafts of the sale of steam between the University of Minnesota and the State Board of Health, St. Mary's Hospital, Fairview Hospital and Augsburg College. A contract for University Hospitals is not required, since it is a part of the University system. The hospital is a part of the University System acting under the authority of the Board of Regents. The present contract for sales of steam to the State Board of Health will be replaced by this final draft.

Associated with any contract is the negotiated (beginning) cost of steam. As evidenced by the 1981 calculated cost of steam for ICES, Option I and the steam costs St. Mary's, Fairview and Augsburg have forecasted for 1981 using their existing facilities there is adequate benefit spread between the costs to allow for a successful negotiation. Letters attesting to their projected 1981 steam costs follow.

The range of steam costs is developed by the finance plan and the cost effectiveness analysis and the forecast rates of the add-on customers. Implementation of the steam sale contracts is appropriate when the following decisions have been reached.

1. Final Phase III Construction Budget
2. Amount of DOE cost sharing
3. Amount of St. Mary's-Fairview-Augsburg cost sharing - commitment during Phase III - negotiated
4. Final commitment by governing Board of St. Mary's-Fairview and Augsburg
5. Final negotiated steam cost basis
6. Legal opinion (contract draft only)
7. Signing of contracts between University of Minnesota, St. Mary's, Fairview and Augsburg near the end of Phase III after items 1 through 6 are resolved.

The comments referred to in St. Mary's letter dated February 3, 1978 have been taken into consideration and are included in the draft contracts presented here.

ST. MARY'S Hospital

2414 SOUTH SEVENTH STREET, MINNEAPOLIS, MINNESOTA 55454

EXECUTIVE OFFICES

January 24, 1978

Mr. James O'Gara
Principal Plant Engineer
Department of Physical Plant
University of Minnesota
200 Shops Building
319 15th Avenue
Minneapolis, Minnesota 55455

Dear Mr. O'Gara:

Per your request, we have tried to project our steam production costs in 1981. As you know, the price of energy is very unpredictable. Therefore, we had to make some assumptions on future energy costs. Based on our best estimates, in 1981 we would be willing to pay in the range of \$4.00 to \$4.40 per thousand pounds of steam. The above price range includes the surcharge for construction of the steam tunnel to our Complex.

The above prices are to be used for planning guidance only. We understand the actual steam price is subject to negotiation later. We are ready to start negotiations at any time.

We would also like to confirm our continued interest and support of the proposed Integrated Community Energy System (ICES) demonstration project.

Sincerely yours,

ST. MARY'S HOSPITAL

Marlyn K. Ervasti
Vice President

FAIRVIEW HOSPITAL

Steve Gregg
Administrator

ST. MARY'S Hospital

2414 SOUTH SEVENTH STREET, MINNEAPOLIS, MINNESOTA 55454

EXECUTIVE OFFICES

February 3, 1978

Mr. James O'Gara
Principal Plant Engineer
Department of Physical Plant
University of Minnesota
200 Shops Building
319 15th Avenue
Minneapolis, Minnesota 55455

Dear Mr. O'Gara:

Per your request, representatives of Fairview and St. Mary's Hospitals reviewed the proposed ICES Steam Contract between the University of Minnesota and the Hospitals. In general, the contract embodies the "spirit" of our previous discussions. We are referring the contracts to our respective legal counsels for their review.

The following represent our initial comments on the preliminary contract:

- (1) We believe a five year contract, with one five year option is too short and therefore not acceptable. A short term steam contract could adversely affect our ability to obtain long term financing for future capital expenditures, etc.
- (2) Clarification is needed on paragraphs 4, 5, 6, 7, and 8. It might simplify matters if the University of Minnesota owned all steam piping up to and including the meters. The Hospitals would pay the initial acquisition cost of the meters. We believe we can reuse the present meters between Fairview and St. Mary's. Following installation, the University would be responsible for repair and replacement of the steam meters. This provides incentive for preventive maintenance and repair as opposed to replacement.
- (3) To maintain good communications and input, paragraph 11 should provide for review and comment by the Hospitals on any capital expenditures necessary to increase the steam generating capacity of the steam plant.

Do you have a target date for signing of the contracts?

Mr. James O'Gara
Page Two
February 3, 1978

If you have any questions, please do not hesitate to call us.

Sincerely yours,

ST. MARY'S HOSPITAL

Marlyn K. Ervasti

Marlyn K. Ervasti
Vice President

FAIRVIEW HOSPITAL

Steve Gregg
Steve Gregg
Administrator

MKE:se

cc: Sister Mary Madonna
Mr. Vern Knutson
Mr. Al Rawlings
Mr. John Kenefick

Augsburg College
731 21st Avenue South
Minneapolis, Minnesota 55454
(612) 332-5181

Office of the President

RECEIVED
FEB 13 11 55 AM '78
PHYSICAL PLANT

February 9, 1978

Mr. Warren Soderberg, Director
Department of Physical Plant
University of Minnesota
200 Shops Building
319 - 15th Avenue S. E.
Minneapolis, Minnesota 55455

Dear Mr. Soderberg:

We have now completed a study to project the costs to us of producing steam at our headers in 1981. This cost is the equivalent of approximately \$4.25 per thousand pounds of steam, give or take 5%. We have assumed in this projection that by 1981 natural gas will no longer be available to us. We have escalated present oil costs using the pricing factors in the Federal Register dated June 29, 1977. Our other costs, labor, consumables, repair and replacement parts, have been escalated from current costs by 6% per year.

On the basis of this study, I believe our Board of Regents would look favorably toward a contract to purchase steam from the University of Minnesota's proposed GRID-ICES system at a price of about \$4.25 per thousand pounds of steam, $\pm$ 5%. It is presumed that this price would be steam furnished at our headers and would include service charges on the costs for piping steam to our headers and the return of condensate and metering as required.

Sincerely,

B. P. Fosse
Director of Planning and
Facility Development

bpf/ajo

BETWEEN THE UNIVERSITY OF MINNESOTA ANDTHE STATE OF MINNESOTA DEPARTMENT OF HEALTH

THIS AGREEMENT, made this _____ day of _____, 19____, by and between the Regents of the University of Minnesota hereinafter referred to as "University of Minnesota", and the State of Minnesota Department of Health, hereinafter referred to as "Department of Health".

WITNESSETH:

WHEREAS, The University of Minnesota is the owner of and operates in connection with its Campuses in Minneapolis, Minnesota, a steam plant and the Department of Health is the owner and operator of a building located in Minneapolis, Minnesota; and

WHEREAS, the Department of Health desires to purchase steam from the University of Minnesota and the University of Minnesota desires to sell the same to the Department of Health, all on terms and conditions hereinafter set forth.

NOW THEREFORE, in consideration of the foregoing and of the agreements hereinafter set forth, the parties hereto agree as follows:

(1) University of Minnesota agrees to furnish the Department of Health all of the Department of Health's annual requirements of steam for all uses in the operation of its facility at 717 Southeast Delaware, Minneapolis, Minnesota, including the proposed expansion of these facilities, for all uses that require 125 psig. maximum steam pressure at the existing metering point located at the Department of

Health under terms and conditions set forth on Exhibit A and Exhibit A-1 which is attached hereto and by reference made a part hereof, and the Department of Health agrees to use steam to meet all such steam requirements and to purchase the steam from the University of Minnesota at rates set forth on said Exhibits A and A-1, except as Exhibit A-1 may be revised by the installation of additional steam generating equipment as hereinafter provided.

(2) University of Minnesota to furnish and deliver such steam for a period of ten (10) years commencing on the date when steam is first delivered to the Department of Health under this contract, upon which date the contract year shall begin, and all subsequent contract years shall commence on the anniversary of said date.

Department of Health shall have the right to renew said contract for an additional period of ten (10) years by giving the University of Minnesota at least two years written notice before the expiration of the original ten (10) year period and its intention to renew said contract for an additional ten (10) year period.

(3) University of Minnesota agrees to furnish and deliver such steam to the existing metering point located at the Department of Health.

(4) The University of Minnesota agrees to pay for all work, labor and material performed and furnished in the installation and repair of the equipment necessary to perform this contract up to the existing metering point located at the Department of Health and the condensate returned to the University of Minnesota at the existing metering point at the Department of Health.

(5) The Department of Health agrees to install and maintain on its property exclusive of steam flow and condensate meters all equipment deemed reasonably necessary by the University of Minnesota to permit an efficient delivery and return of said steam and condensate. All such material and equipment shall be of the same general character and quality as that used in the University of Minnesota steam plant and steam distribution systems. The steam system shall be a closed system with necessary condensing units and pumps to return said condensate to the University of Minnesota; provided that all contaminated condensate shall be trapped by the Department of Health to the sewer of the Department of Health.

(6) Department of Health agrees that the initial steam flow and/or condensate meters installed by the University of Minnesota at the service point in the service line to the Department of Health will be used to determine the steam consumption under this contract. During any period in which the metering devices are not connected, are bypassed for maintenance or fail wholly or partially to measure the amount of steam consumed by the Department of Health or condensate returned from the Department of Health to the University of Minnesota, the bill for such period shall be based upon a fair estimate of the steam actually used, or metered condensate returned, or based upon average meter readings thereof during an equal period of similar outside temperatures, and such other information as may be available.

(7) The Department of Health shall have the right to test the University of Minnesota metering devices at its own expense by first giving the University of Minnesota ten days written notice.

Each party shall have the right to inspect the metering devices on the property of the other at reasonable times. A Hagen Model _____ or Bailey Model _____ integrader steam flow meter shall be installed by the University of Minnesota in the steam line serving the facility in accordance with the manufacturer's recommendation. If winter and summer design steam load is not within the range of a single orifice, dual orifices shall be installed for the meter. A means of isolating or changing the orifice(s) shall be installed. A Cadillac condensate meter shall be installed by the University of Minnesota in the condensate return line from the building. The University of Minnesota will purchase and install the initial meters at the expense of the State Board of Health. The meters shall be serviced and maintained by the University of Minnesota during the full term of this agreement. Replacement meters due to malfunction will be paid for by the Department of Health and installed by the University of Minnesota at the University of Minnesota's expense.

(8) The Department of Health shall assume all construction and maintenance expense in connection with the installation necessary to service their facility from the service point, and the Department of Health agrees that any connections to existing services of the University of Minnesota in the deep tunnel will be made in accordance with the requirements and with the approval of the University of Minnesota.

(9) The Department of Health agrees that in the event the steam consumption of all users of the University of Minnesota's

steam is less than 1,500,000,000 or more than 2,500,000,000 pounds per contract year, the rates provided for in this agreement shall be revised by agreement of the parties and if the parties are unable to agree, the rates shall be fixed by arbitration as herein provided.

(10) The University of Minnesota agrees that during the period specified herein, 125 psig maximum steam will be furnished at the existing metering point and delivered under all weather conditions which can reasonably be anticipated and that the University of Minnesota's plant will be so maintained that reasonable standby service will be available to enable the University of Minnesota to provide an emergency supply of steam notwithstanding a failure of one production unit or unavailability of one type of fuel. The Department of Health agrees that when its heating system have been shut down for any reason, then in order to produce a normal pickup period, steam shall be taken into the Department of Health lines only upon notice to the University of Minnesota and at times and in amounts scheduled by the University of Minnesota.

(11) The Department of Health agrees that at such time as the University of Minnesota deems it necessary to increase the steam generating capacity of its steam plant for the sole purpose of guaranteeing the reliability of steam service to all University of Minnesota customers and at such time as the actual cost of such increased steam generating capacity has been established and such capacity installed, the University of Minnesota may thereupon revise Exhibit A-1 so as to include the amortization of such total cost over

the then remaining contract life, (including the ten (10) year extension, if the option has then been exercised) at the interest rate prevailing at that time.

The State Board of Health shall have the right to review and comment on any proposed capital expenditures deemed necessary to increase steam generating capacity.

(12) The University of Minnesota shall have the right temporarily to shut off the supply of steam whenever necessary to make expansions of or repairs to the boilers, mains, pipes or other equipment except the supply shall not be shut off between the hours of 7:00 A.M. and 10:00 P.M. of any day except in the case of an emergency requiring immediate attention. The University of Minnesota shall give ten days advance notice to the Department of Health before shutting off the supply of steam. No notice need be given when due to emergency causes.

(13) The University of Minnesota shall not be liable to the Department of Health for failure to supply steam because of any unforeseeable accident or because of any strike or other cause beyond the reasonable control of the University of Minnesota. In the event of any failure to supply steam from any causes other than those attributable to the Department of Health equipment, the University of Minnesota shall proceed promptly with such repairs and replacements as may be necessary to enable the University of Minnesota to restore said supply of steam. To the extent such repairs or replacements are made necessary by reason of the willful act or negligence of the

Department of Health, its agents, guests or employees, the Department of Health shall reimburse the University of Minnesota for the reasonable cost of such repairs and replacements.

(14) The Department of Health agrees to indemnify the University of Minnesota of and from any liability for injuries to or death of persons, or damage to property, occurring upon the property of the University of Minnesota resulting from the performance of, or failure to perform, this contract.

(15) The University of Minnesota shall read the aforesaid metering devices on or about the last day of each month. Itemized bills for all charges since the last monthly billing shall be submitted to the Department of Health on or before the 10th day of the next calendar month and shall be payable when billed. Until the total annual steam consumption under this contract is established at the end of the first contract year the University of Minnesota shall bill and the Department of Health shall pay the University of Minnesota on the of basis of \$_____ per 1,000 pounds of steam consumed each month. This beginning basis is a part of Exhibit A-1.

The rate shall be reviewed every year and shall be subject to change at each review, any change to be dependent on fuel costs, labor costs, maintenance costs, insurance costs, capital costs and other relevant factors supporting the manufacture and distribution of steam energy to the consumer.

(16) In event of noncompliance with or violation of the terms, covenants or conditions of this contract by the Department of Health, the University of Minnesota shall have the right to declare

this contract terminated, provided however, that no default, except default in the payment of monthly bills for steam consumed, shall be deemed to have occurred on the part of the Department of Health until thirty days after written notice specifying the nature of such default shall have been given to the Department of Health, and no default in the payment of monthly bills shall be deemed to have occurred on the part of the Department of Health until fifteen days after written notice specifying the amount in default shall have been given the Department of Health and unless within such thirty day period the Department of Health shall have failed to remedy such default, other than the default in payment of monthly billings, or to take reasonable steps to remedy the same, or unless within such fifteen day period the Department of Health shall have failed to pay such monthly billings.

(17) In the event of noncompliance with or violation of the terms, covenants or conditions of this contract by the University of Minnesota, the Department of Health shall have the right to declare this contract terminated upon one year's written notice in which such default shall be fully described, provided however, that if such default is remedied within three months after service of said notice, the agreement shall be reinstated and continue in full force and effect. In case of notice of termination by the Department of Health under this clause, the University of Minnesota shall nevertheless be required to continue to furnish steam to the Department of Health during said one year period.

(18) In event of curtailment in the production of steam under emergency conditions, the steam available shall be divided between the parties in the proportion of the loads existing immediately prior to the curtailment.

(19) In the event there are any matters affecting the interpretation of this contract that cannot be amicably settled by the parties, including any matter which this contract expressly provides may be submitted to arbitration, either party shall have the right to demand that such disputed matter be submitted to arbitration by a board of arbitrators composed of three members. Each party shall appoint one arbitrator and the two so appointed shall select a third; their decision on any disputed matter shall be final. Either party demanding arbitration shall notify the other in writing of its demand for arbitration, specifying the matter to be submitted to arbitration and the name of the arbitrator selected by it. Upon receipt of such written notice the other party shall have thirty (30) days within which to select its arbitrator and to notify the other party in writing of such selection and the two so selected shall have thirty (30) days in which to select the third arbitrator. In the event the third arbitrator is not selected within said thirty (30) days, then such third arbitrator shall be appointed by the District Court of Hennepin County, Minnesota, upon application by either party after at least 8 days written notice to the other party of the hearing on such application.

(20) Wherever in this agreement it shall be required or permitted that notice or demand be given or served by either party

to this agreement to or on the other, such notice or demand shall be given or served and shall not be deemed to have been duly given or served unless in writing and forwarded by registered or certified mail, postage prepaid, addressed as follows:

To University of Minnesota at: 319 19th Avenue S.E.

Rm. 200 Shops Building

Minneapolis, Minnesota 55455

To State of Minnesota

717 Southeast Delaware

Department of Health:

Minneapolis, Minnesota 55414

Such addresses may be changed from time to time by either party by serving notices as above provided.

(21) This agreement shall inure to the benefit of and shall be binding upon the successors and assigns of the parties hereto and subsequent owners of the buildings being serviced hereunder.

(22) All previous agreements between the parties hereto, covering the subject matter hereof, if there be any, are hereby cancelled and terminated as of the effective date hereof.

IN WITNESS WHEREOF, The Regents of the University of Minnesota and the Department of Health have caused this instrument to be duly executed the day and year first above written.

In Presence of:

Regents of University of Minnesota

Witness

BY _____

Its _____

Witness

And _____

Its _____

State of Minnesota, Department of Health

BY _____

Witness

Its _____

And _____

Witness

Its _____

DRAFT

EXHIBIT "A"

There will be no drawing of the metering arrangement for this contract.

There are one each steam and condensate meters existing and connected in use at the service point for the State Board of Health from the University's existing steam distribution system.

DRAFT

EXHIBIT A-1

ANALYSIS OF STEAM COST - BASIC PLAN

FOR THE STATE OF MINNESOTA, DEPARTMENT OF HEALTH AND UNIVERSITY OF
MINNESOTA FACILITIES

As part of the contract for sale of steam to the Department of Health located at 717 Southeast Delaware, Minneapolis, Minnesota, this Exhibit A-1 shall be deemed to establish the contractual cost of steam basis as part of the aforementioned contract for sale of steam between the University of Minnesota and the Department of Health and this Exhibit A-1 shall be revised to reflect changes in costs to provide steam to the Department of Health by the University of Minnesota on an annual basis no later than the end of the 12th month after the effective date of the contract for the sale of steam by the University of Minnesota to the Department of Health.

COST BENEFITS - COMPARISON I.A.2(b)

Eastern Coal Vs. Western Coal, $i = 5 \frac{3}{4}\%$, $n = 15$ years

<u>Expense Item</u>	Normal Combined Plant Expansion	<u>Cogeneration Expansion</u>	
		<u>Elec. Gen.</u>	<u>Steam Gen.</u>
Capital Budget - 1978	\$14,829,760	\$2,634,240	\$16,917,800
Escalated Budget - 1979	15,867,845	2,818,635	18,102,045
Cost Sharing			
DOE	-0-	15,000	324,800
Legisl.	11,422,190	-0-	11,422,190
Total Cost Sharing	\$11,422,190	\$ 15,000	\$11,476,990
Loan (U of M)	\$ 4,445,655	\$2,803,635	\$ 6,355,055
Capital Recovery	\$ 450,300	\$ 283,980	\$ 643,704
Depreciation	1,001,430	78,700	1,063,810
Total Owning	\$ 1,451,730	\$ 362,680	\$ 1,707,514
<u>Operating Expenses</u>			
(End of 1981)			
Insurance	\$ 9,408	\$ 2,108	\$ 39,200
Purchased Utilities	343,904	7,000	381,424
Administration	99,000	24,800	132,000
Labor Supplies, Maint.	983,076	38,720	1,625,662
Fuel-Community	5,364,286	-0-	3,044,041
Fuel-Generator	-0-	-0-	226,252
Ash Handling & Landfill	74,098	-0-	92,160
Turbine Steam Purch.	-0-	485,367	-0-
Total Operating Expense	\$ 6,874,592	\$ 557,995	\$ 5,540,739
Gross Owning & Operating	\$ 8,326,322	\$ 920,675	\$ 7,248,253
Gross Production Expense			
Steam, \$/1000 lbs.	4.153	-	3.615
Electricity, \$/KWh	-	.02269	-
Community Steam Charge	4.153	-	3.373
Revenue (Steam)			
a. Community Usage	\$ 7,517,748	-	\$ 6,106,138
b. Community Line Loss	566,002	-	459,723
c. Blowdown Allocation	242,572	-	197,025
d. T-G Steam	-0-	-	485,367
Total Steam Revenue	\$ 8,326,322		\$ 7,248,253
Revenue (Elec. Gen.)			
a. Capacity	-	\$ 569,463	-
b. Energy	-	567,924	-
Total Elec. Gen. Revenue		\$1,137,387	

<u>Expense Item</u>	<u>Normal Combined Plant Expansion</u>	<u>Cogeneration Expansion</u>	
		<u>Elec. Gen.</u>	<u>Steam Gen.</u>
Gross Plant Income	\$ 8,326,322	\$1,137,387	\$ 7,248,253
Plant Cash Flow (one year operation)	-0-	\$ 216,712	-0-
Const. Cash Flow (Debt) (1979 through 1980)	\$ 828,552	\$ 522,523	\$ 1,184,415
Net Plant Cash Flow at end of 1981	(\$ 828,552)	(\$ 305,811)	(\$ 1,184,415)
Cash Flow Deficit at end of 1981	(\$ 828,552)	(\$ 305,811)	(\$ 1,184,415)

DRAFT ICES STEAM SALES CONTRACT AND AGREEMENT OF INTENT
BETWEEN THE UNIVERSITY OF MINNESOTA AND ST. MARY'S HOSPITAL

THIS AGREEMENT, MADE THIS _____ day of _____, 19____, by and between the Regents of the University of Minnesota hereinafter referred to as "University of Minnesota", and St. Mary's Hospital, a Minnesota corporation, hereinafter referred to as "St. Mary's Hospital".

WITNESSETH:

WHEREAS, The University of Minnesota is the owner of and operates in connection with its Campuses in Minneapolis, Minnesota, a steam plant and St. Mary's Hospital is the owner and operator of a hospital located in Minneapolis, Minnesota; and

WHEREAS, St. Mary's Hospital desires to purchase steam from the University of Minnesota and the University of Minnesota desires to sell the same to St. Mary's Hospital, all on terms and conditions as hereinafter set forth.

NOW THEREFORE, in consideration of the foregoing and of the agreements hereinafter set forth, the parties hereto agree as follows:

(1) University of Minnesota agrees to furnish St. Mary's Hospital all of St. Mary's Hospital annual requirements of steam for all uses in the operation of its hospital at 2414 South Seventh Street, Minneapolis, Minnesota, including the proposed expansion of these facilities, for all uses that require 125 psig maximum steam pressure at the metering point located at St. Mary's Hospital

under terms and conditions set forth on Exhibit A and Exhibit A-1 which is attached hereto and by reference made a part hereof, and St. Mary's Hospital agrees to use steam to meet all such steam requirements and to purchase the steam from the University of Minnesota at rates set forth on said Exhibits A and A-1, except as Exhibit A-1 may be revised by the installation of additional steam generating equipment as hereinafter provided.

(2) University of Minnesota to furnish and deliver such steam for a period of ten (10) years commencing on the date when steam is first delivered to St. Mary's Hospital under this contract, upon which date the contract year shall begin, and all subsequent contract years shall commence on the anniversary of said date. St. Mary's Hospital shall have the right to renew said contract for an additional period of ten (10) years by giving the University of Minnesota at least two years written notice before the expiration of the original ten (10) year period of its intention to renew said contract for an additional ten (10) year period.

(3) University of Minnesota agrees to furnish and deliver such steam to the metering point located at St. Mary's Hospital.

(4) The University of Minnesota agrees to pay for all work, labor and material performed and furnished in the installation and repair of the equipment necessary to perform this contract up to the existing metering point located at St. Mary's Hospital and the condensate returned to the University of Minnesota at the existing metering point at St. Mary's Hospital.

(5) St. Mary's Hospital agrees to install and maintain on its property exclusive of steam flow and condensate meters all equipment deemed reasonably necessary by the University of Minnesota to permit an efficient delivery and return of said steam and condensate. All such material and equipment shall be of the same general character and quality as that used in the University of Minnesota steam plant and steam distribution systems. The steam system shall be a closed system with necessary condensing units and pumps to return said condensate to the University of Minnesota; provided that all contaminated condensate shall be trapped by St. Mary's Hospital to the sewer of St. Mary's Hospital.

(6) St. Mary's Hospital agrees that the initial steam flow and/or condensate meters installed by the University of Minnesota at the service point in the service line to St. Mary's Hospital will be used to determine the steam consumption under this contract. During any period in which the metering devices are not connected, are bypassed for maintenance or fail wholly or partially to measure the amount of steam consumed by St. Mary's Hospital or condensate returned from St. Mary's Hospital to University of Minnesota, the bill for such period shall be based upon a fair estimate of the steam actually used, or metered condensate returned, or based upon average meter readings thereof during an equal period of similar outside temperatures and such other information as may be available.

(7) St. Mary's Hospital shall have the right to test the University of Minnesota metering devices at its own expense by first giving the University of Minnesota ten days written notice. Each

party shall have the right to inspect the metering devices on the property of the other at reasonable times. A Hagen Model _____ or Bailey Model _____ integrader steam flow meter shall be installed by the University of Minnesota in the steam line serving the facility in accordance with the manufacturer's recommendation. If winter and summer design steam load is not within the range of a single orifice, dual orifices shall be installed for the meter. A means of isolating or changing the orifice(s) shall be installed. A Cadillac condensate meter shall be installed by the University of Minnesota in the condensate return line from the building. The University of Minnesota will purchase and install the initial meters at the expense of St. Mary's Hospital. The meters shall be serviced and maintained by the University of Minnesota during the full term of this agreement. Replacement meters due to malfunction will be paid for by St. Mary's Hospital and installed by the University of Minnesota at the University of Minnesota's expense.

(8) St. Mary's Hospital shall assume all construction and maintenance expense in connection with the installation necessary to serve their facility from the service point, and St. Mary's Hospital agrees that any connections to existing services of the University of Minnesota will be made in accordance with the requirements and with the approval of the University of Minnesota.

(9) St. Mary's Hospital agrees that in the event the steam consumption of all users of the University of Minnesota's steam is less than 1,500,000,000 or more than 2,500,000,000 pounds per contract year, the rates provided for in this agreement shall be revised by agreement of the parties and if the parties are unable to agree, the rates shall be fixed by arbitration as herein provided.

(10) The University of Minnesota agrees that during the period specified herein, 125 psig maximum steam will be furnished at the metering point located at St. Mary's Hospital and delivered under all weather conditions which can reasonably be anticipated and that the University of Minnesota's plant will be so maintained that reasonable standby service will be available to enable the University of Minnesota to provide an emergency supply of steam notwithstanding a failure of one production unit or unavailability of one type of fuel. St. Mary's Hospital agrees that when its heating systems have been shut down for any reason, then in order to produce a normal pickup period, steam shall be taken into St. Mary's Hospital lines only upon notice to the University of Minnesota and at times and in amounts scheduled by the University of Minnesota.

(11) St. Mary's Hospital agrees that at such time as the University of Minnesota deems it necessary to increase the steam generating capacity of its steam plant for the sole purpose of guaranteeing the reliability of steam service to all University of Minnesota customers and at such time as the actual cost of such increased steam generating capacity has been established and such capacity installed, the University of Minnesota may thereupon revise Exhibit A-1 so as to include the amortization of such total cost over the then remaining contract life, (including the ten (10) year extension, if the option has then been exercised) at the interest rate prevailing at that time.

St. Mary's Hospital shall have the right to review and comment on any proposed capital expenditures deemed necessary to increase steam generating capacity.

(12) The University of Minnesota shall have the right temporarily to shut off the supply of steam whenever necessary to make expansions of or repairs to the boilers, mains, pipes or other equipment except the supply shall not be shut off between the hours of 7:00 A.M. and 10:00 P.M. of any day except in the case of an emergency requiring immediate attention. The University of Minnesota shall give ten days advance notice to St. Mary's Hospital before shutting off the supply of steam. No notice need be given when due to emergency causes.

(13) The University of Minnesota shall not be liable to St. Mary's Hospital for failure to supply steam because of any unforeseeable accident or because of any strike or other cause beyond the reasonable control of the University of Minnesota. In the event of any failure to supply steam from any causes other than those attributable to St. Mary's Hospital equipment, the University of Minnesota shall proceed promptly with such repairs and replacements as may be necessary to enable the University of Minnesota to restore said supply of steam. To the extent such repairs or replacements are made necessary by reason of the willful act or negligence of St. Mary's Hospital, its agents, guests or employees, St. Mary's Hospital shall reimburse the University of Minnesota for the reasonable cost of such repairs and replacements.

(14) St. Mary's Hospital agrees to indemnify the University of Minnesota of and from any liability for injuries to or death of persons, or damage of property, occurring upon the property of the University of Minnesota resulting from the performance of, or failure to perform, this contract.

(15) The University of Minnesota shall read the aforesaid metering devices on or about the last day of each month. Itemized bills for all charges since the last monthly billing shall be submitted to St. Mary's Hospital on or before the 10th day of the next calendar month and shall be payable when billed. Until the total annual steam consumption under this contract is established at the end of the first contract year the University of Minnesota shall bill and St. Mary's Hospital shall pay the University of Minnesota on the contract beginning basis of \$_____ per 1,000 pounds of steam consumed each month. This beginning basis is a part of Exhibit A-1.

The rate shall be reviewed every year and shall be subject to change at each review, any change to be dependent on fuel costs, labor costs, maintenance costs, insurance costs, capital costs and other relevant factors supporting the manufacture and distribution of steam energy to the consumer.

St. Mary's Hospital will allow University of Minnesota, Fairview Hospital and Augsburg College reasonable access to steam and condensate meters located on its property and installed solely for purpose of determining steam usage of St. Mary's and Fairview Hospitals, and Augsburg College.

(16) In the event of noncompliance with or violation of the terms, covenants or conditions of this contract by St. Mary's Hospital, the University of Minnesota shall have the right to declare this contract terminated, provided however, that no default, except default in the payment of monthly bills for steam consumed, shall be deemed to have occurred on the part of St. Mary's Hospital until thirty days after written notice specifying the nature of such default shall have been given to St. Mary's

Hospital, and no default in the payment of monthly bills shall be deemed to have occurred on the part of St. Mary's Hospital until fifteen days after written notice specifying the amount of default shall have been given St. Mary's Hospital and unless within such thirty day period St. Mary's Hospital shall have failed to remedy such default, other than the default in payment of monthly billings, or to take reasonable steps to remedy the same, or unless with such fifteen day period St. Mary's Hospital shall have failed to pay such monthly billings.

(17) In the event of noncompliance with or violation of the terms, covenants or conditions of this contract by the University of Minnesota, St. Mary's Hospital shall have the right to declare this contract terminated upon one year's written notice in which such default shall be fully described, provided however, that if such default is remedied within three months after service of said notice, the agreement shall be reinstated and continue in full force and effect. In case of notice of termination by St. Mary's Hospital under this clause, the University of Minnesota shall nevertheless be required to continue to furnish steam to St. Mary's Hospital during said one year period.

(18) In the event of curtailment in the production of steam under emergency conditions, the steam available shall be divided between the parties in the proportion of the loads existing immediately prior to the curtailment.

(19) In the event there are any matters affecting the interpretation of this contract that cannot be amicably settled by the parties, including any matter which this contract expressly provides may be submitted to arbitration, either party shall have the right to demand that such disputed matter be submitted to arbitration by a board of arbitrators composed of three members. Each party shall appoint one arbitrator

and the two so appointed shall select a third; their decision on any disputed matter shall be final. Either party demanding arbitration shall notify the other in writing of its demand for arbitration, specifying the matter to be submitted to arbitration and the name of the arbitrator selected by it. Upon receipt of such written notice the other party shall have thirty (30) days within which to select its arbitrator and to notify the other party in writing of such selection and the two so selected shall have thirty (30) days in which to select a third arbitrator. In the event the third arbitrator is not selected within said thirty (30) days, then such third arbitrator shall be appointed by the District Court of Hennepin County, Minnesota, upon application by either party after at least 8 days written notice to the other party of the hearing on such application.

(20) Wherever in this agreement it shall be required or permitted that notice or demand be given or served on either party to this agreement to or on the other, such notice or demand shall be given or served and shall not be deemed to have been duly given or served unless in writing and forwarded by registered or certified mail, postage prepaid, addressed as follows:

To University of Minnesota at: 319 15th Avenue Southeast
Rm. 200 Shops Building
Minneapolis, Minnesota 55455

To St. Mary's Hospital at: 2414 South Seventh Street
Minneapolis, Minnesota 55454

Such addresses may be changed from time to time by either party by serving notices as above provided.

(21) This agreement shall inure to the benefit of and shall be binding upon the successors and assigns of the parties hereto and subsequent owners of the building being serviced hereunder.

(22) All previous agreements between the parties hereto, covering the subject matter hereof, if there be any, are hereby cancelled and terminated as of the effective date hereof.

IN WITNESS WHEREOF, The Regents of the University of Minnesota and St. Mary's Hospital have caused this instrument to be duly executed the day and year first above written.

In Presence of:

Regents of University of Minnesota

Witness

BY _____

Its _____

Witness

And _____

Its _____

St. Mary's Hospital

Witness

BY _____

Its _____

Witness

And _____

Its _____

FOR REPORT 11-17-33		DRAWN <u>SES</u>
		CHECKED _____
REVISIONS	DATE	APPROVED _____
	DATE 19 OCT 17	
UNIV OF MINN Mpls Campus - GAIDICES		
MINNEAPOLIS		
HELMICK & LUTZ ENGINEERS		
STEAM & CONDENSATE PIPING & METRINGS ADD-ON CUSTOMERS		
SCALE NONE		NO. 625-FS-BA
		REV.

INSTRUMENT KEY:

①, ②, & ③ ORIFICE PLATE WITH 120" H₂O DIFFERENTIAL,
ELECTRONIC TRANSMITTERS - BAILEY TYPE CC 1253 A,
TRANSMITTING TO A STRIP CHART RECORDER -
BAILEY TYPE SR 1310

④, ⑤, & ⑥ CADILLAC CONDENSATE METERS

"EXHIBIT A"

DRAFT

EXHIBIT A-1

ANALYSIS OF STEAM COST - BASIC PLAN

FOR ST. MARY'S HOSPITAL AND THE UNIVERSITY OF MINNESOTA FACILITIES

As part of the contract for sale of steam to St. Mary's Hospital, located at 2414 South Seventh Street, Minneapolis, Minnesota, this Exhibit A-1 shall be deemed to establish the contractual cost of steam basis as part of the aforementioned contract for sale of steam between the University of Minnesota and St. Mary's Hospital and this Exhibit A-1 shall be revised to reflect changes in costs to provide steam to St. Mary's Hospital by the University of Minnesota on an annual basis no later than the end of the 12th month after the effective date of the contract for the sale of steam by the University of Minnesota to St. Mary's Hospital.

EXHIBIT A-1

COST BENEFITS - COMPARISON I.A.2(b)

Eastern Coal Vs. Western Coal, $i = 5 \frac{3}{4}\%$, $n = 15$ years

<u>Expense Item</u>	<u>Normal Combined Plant Expansion</u>	<u>Cogeneration Expansion</u>	
		<u>Elec. Gen.</u>	<u>Steam Gen.</u>
Capital Budget - 1978	\$14,829,760	\$2,634,240	\$16,917,800
Escalated Budget - 1979	15,867,845	2,818,635	18,102,045
Cost Sharing			
DOE	-0-	15,000	324,800
Legisl.	11,422,190	-0-	11,422,190
Total Cost Sharing	\$11,422,190	\$ 15,000	\$11,476,990
Loan (U of M)	\$ 4,445,655	\$2,803,635	\$ 6,355,055
Capital Recovery	\$ 450,300	\$ 283,980	\$ 643,704
Depreciation	1,001,430	78,700	1,063,810
Total Owning	\$ 1,451,730	\$ 362,680	\$ 1,707,514
<u>Operating Expenses</u>			
(End of 1981)			
Insurance	\$ 9,408	\$ 2,108	\$ 39,200
Purchased Utilities	343,904	7,000	381,424
Administration	99,000	24,800	132,000
Labor Supplies, Maint.	983,076	38,720	1,625,662
Fuel-Community	5,364,286	-0-	3,044,041
Fuel-Generator	-0-	-0-	226,252
Ash Handling & Landfill	74,098	-0-	92,160
Turbine Steam Purch.	-0-	485,367	-0-
Total Operating Expense	\$ 6,874,592	\$ 557,995	\$ 5,540,739
Gross Owning & Operating	\$ 8,326,322	\$ 920,675	\$ 7,248,253
Gross Production Expense			
Steam, \$/1000 lbs.	4.153	-	3.615
Electricity, \$/KWh	-	.02269	-
Community Steam Charge	4.153	-	3.373
Revenue (Steam)			
a. Community Usage	\$ 7,517,748	-	\$ 6,106,138
b. Community Line Loss	566,002	-	459,723
c. Blowdown Allocation	242,572	-	197,025
d. T-G Steam	-0-	-	485,367
Total Steam Revenue	\$ 8,326,322		\$ 7,248,253
Revenue (Elec. Gen.)			
a. Capacity	-	\$ 569,463	-
b. Energy	-	567,924	-
Total Elec. Gen. Revenue		\$1,137,387	

<u>Expense Item</u>	Normal Combined Plant <u>Expansion</u>	<u>Cogeneration Expansion</u>	
		<u>Elec. Gen.</u>	<u>Steam Gen.</u>
Gross Plant Income	\$ 8,326,322	\$1,137,387	\$ 7,248,253
Plant Cash Flow (one year operation)	-0-	\$ 216,712	-0-
Const. Cash Flow (Debt) (1979 through 1980)	\$ 828,552	\$ 522,523	\$ 1,184,415
Net Plant Cash Flow at end of 1981	(\$ 828,552)	(\$ 305,811)	(\$ 1,184,415)
Cash Flow Deficit at end of 1981	(\$ 828,552)	(\$ 305,811)	(\$ 1,184,415)

COST BENEFIT COMPARISON II.A.2.(b)

EASTERN COAL VS. WESTERN COAL

i = 5 3/4% n = 15 years

INCREMENTAL COSTS (STEAM SIDE OF PLANTS)

	NORMAL EXPANSION WITH OPTION I					COGENERATION EXPANSION WITH OPTION I					
	Total	SHARED EXPENSES			NON-SHARED	Total	SHARED EXPENSES			NON-SHARED	Elec.
	Main Tunnel	St. Mary's	Fairview	Augsburg	Augsburg Pri. & Sec	Main Tunnel	St. Mary's	Fairview	Augsburg	Augsburg Pri. & Sec	Generation
Capital Budget - 1978	\$1,359,640				\$431,760	\$1,359,640				\$431,760	-0-
Escalated Budget - 1979	1,454,815				461,983	1,454,815				461,983	-0-
Cost Sharing - DOE	16,800				-0-	16,800				-0-	
- Legis.	-0-				-0-	-0-				-0-	-0-
- St. Mary's	-0-	(\$ 6,720) out-of-pocket expense				-0-	(\$ 6,720) out-of-pocket expense				-0-
- Fairview	-0-		(\$ 6,720) out-of-pocket			-0-		(\$ 6,720) out-of-pocket			-0-
- Augsburg	-0-			(\$ 6,720)"		-0-			(\$ 6,720)"		-0-
- U of M	10,640				-0-	10,640				-0-	-0-
Total	(\$ 27,440)				-0-	(\$ 27,440)				-0-	-0-
Total Loan	\$1,427,375				\$461,983	\$1,427,375				\$461,983	-0-
Capital Recovery	\$ 144,579	\$ 75,369	\$ 36,253	\$ 32,957	\$ 46,794	\$ 144,579	\$ 75,369	\$ 36,253	\$ 32,957	\$ 46,794	-0-
Depreciation (20 year)	35,468	18,489	8,894	8,085	11,268	11,268	18,489	8,894	8,085	11,268	-0-
(1) Total Tunnel Owning	\$ 180,047	\$ 93,858	\$ 45,147	\$ 41,042	\$ 58,062	\$ 180,047	\$ 93,858	\$ 45,147	\$ 41,042	\$ 58,062	-0-
<u>Tunnel Operating Expenses</u>											
Insurance	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-
Purch. Utilities	\$ 10,671	\$ 5,563	\$ 2,676	\$ 2,432	-0-	\$ 10,671	\$ 5,563	\$ 2,676	\$ 2,432	-0-	-0-
Administration	4,000	2,085	1,003	912	-0-	4,000	2,085	1,003	912	-0-	-0-
Labor, Supplies, Maint.	9,680	5,046	2,427	2,207	-0-	9,680	5,046	2,427	2,207	-0-	-0-
Total Tunnel Operating	\$ 24,351	\$ 12,694	\$ 6,106	\$ 5,551	\$ -0-	\$ 24,351	\$ 12,694	\$ 6,106	\$ 5,551	-0-	-0-
Total Owning & Operating	204,398	106,552	51,253	46,593	58,062	204,398	106,552	51,253	46,593		
(2) Owning & Operating Surcharge (\$ per 1000 lbs)	.6295	.32816	.15785	.14349	.78445	.6295	.32816	.15785	.14349		
<u>Augsburg Pri Add-On Operating Expense</u>											
Insurance	-0-				-0-	-0-				-0-	-0-
Purch. Utilities	-0-				-0-	-0-				-0-	-0-
Administration	-0-				830	-0-				830	-0-
Labor, Supplies, Maint.	-0-				3,000	-0-				3,000	-0-
Total Augsburg, Steam Operating	-0-	-0-	-0-	-0-	\$ 3,830	-0-	-0-	-0-	-0-	\$ 3,830	-0-
Gross Augsburg Add-On Costs	-0-	-0-	-0-	-0-	61,892	-0-	-0-	-0-	-0-	61,892	
Owning & Operating Surcharge (\$ per 1000 lbs)	-0-	-0-	-0-	-0-	.83619	-0-	-0-	-0-	-0-	.83619	

COST BENEFIT COMPARISON II.A.2.(b) (Cont'd)

EASTERN COAL VS. WESTERN COAL

i = 5 3/4% n = 15 years

INCREMENTAL COSTS (STEAM SIDE OF PLANTS)

134

Plant Operating
 Community Fuel
 T-G Fuel
 Community Ash
 T-G Ash
 Turbine-Steam

 Total Plant Operating
 (3) Plant Operating Surcharge
 (\$ per 1000 lbs)
 Base University Charge
 (\$ per 1000 lbs)
 Gross Steam Cost Surcharge
 (\$ per 1000 lbs)
 Gross Steam Cost
 Augsburg Surcharge for
 Distribution Add-On
 (St. Mary's to Augsburg
 and Augsburg Reconnect)
 Gross Augsburg Steam Cost
 (\$ per 1000 lbs)

	NORMAL EXPANSION WITH OPTION I					COGENERATION EXPANSION WITH OPTION I					
	Total Main Tunnel	SHARED EXPENSES			NON-SHARED Augsburg Pri & Sec	Main Tunnel	SHARED EXPENSES			NON-SHARED Augsburg Pri & Sec.	Elec. Generation
		St. Mary's	Fairview	Augsburg			St. Mary's	Fairview	Augsburg		
Plant Operating											
Community Fuel	\$ 868,495	\$452,743	\$217,776	\$197,975	-0-	\$ 510,357	\$266,047	\$127,973	\$116,337	-0-	-0-
T-G Fuel	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-
Community Ash	12,129	6,323	3,041	2,765	-0-	16,177	8,433	4,056	3,688	-0-	-0-
T-G Ash	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-
Turbine-Steam	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	\$ 18,112
Total Plant Operating	\$ 880,624	\$459,066	\$220,817	\$200,740	-0-	\$ 526,534	\$274,480	\$132,029	\$120,025	-0-	\$ 18,112
(3) Plant Operating Surcharge (\$ per 1000 lbs)	.37799	.19704	.09478	.08616	-0-	(4) .22098	(5) .11519	.05541	.05037	-0-	-0-
Base University Charge (\$ per 1000 lbs)	4.15300	4.15300	4.15300	4.15300	-0-	3.37290	3.37290	3.37290	3.37290	-0-	-0-
Gross Steam Cost Surcharge (\$ per 1000 lbs)	1.00749	.52520	.25263	.22966	-0-	.85048	.44335	.213259	.19387	-0-	-0-
Gross Steam Cost	5.16050	4.67820	4.40563	4.38266	-0-	4.22338	3.81630	3.586200	3.56680	-0-	-0-
Augsburg Surcharge for Distribution Add-On (St. Mary's to Augsburg and Augsburg Reconnect)	-0-	-0-	-0-	-0-	.83619	-0-	-0-	-0-	.83619	-0-	-0-
Gross Augsburg Steam Cost (\$ per 1000 lbs)	-0-	-0-	-0-	-0-	5.21885	-0-	-0-	-0-	4.20299	-0-	-0-

COST BENEFIT COMPARISON II.A.2.(b) (cont.)
EASTERN COAL VS. WESTERN COAL
(STEAM SIDE OF PLANTS)

135

Cost Item (Incremental)	NORMAL PLANT EXPANSION WITH OPTION I INCREMENTAL EXPENSE SUMMARY (AUGSBURG AMORTIZES ITS PRIMARY & SECONDARY DIST. CAPITAL)						COGENERATION EXPANSION WITH OPTION I INCREMENTAL EXPENSE SUMMARY (AUGSBURG AMORTIZES ITS PRIMARY & SECONDARY DIST. CAPITAL)						
	Tunnel	SHARED EXPENSES			AUGS. DIST.		Tunnel	SHARED EXPENSES			AUGS. DIST.		Elec. Gen.
	Surcharge	St. Mary's	Fairview	Augsburg	Dist.	Total	Surcharge	St. Mary's	Fairview	Augsburg	Dist.	Total	
Owning	\$ 180,047	\$ 93,858	\$ 45,147	\$ 41,042	\$58,062	\$ 92,232	\$180,047	\$ 93,858	\$ 45,147	\$ 41,042	\$58,062	\$ 99,104	-0-
Tunnel Operating	24,351	12,694	6,106	5,551	-0-	5,551	24,351	12,694	6,106	5,551	-0-	-0-	-0-
Plant Operating	880,624	459,066	220,817	200,740	-0-	200,740	526,534	274,480	132,029	120,025	-0-	-0-	-0-
Augsburg Operating	-0-	-0-	-0-	-0-	3,830	3,830	-0-	-0-	-0-	-0-	3,830	3,830	-0-
Turbine Gen.	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	\$ 58,926
Total Owning-Operating	\$1,085,022	\$565,618	\$231,440	\$247,333	\$61,892	\$302,353	\$730,932	\$381,032	\$183,282	\$115,618	\$61,892	\$102,934	\$ 58,926
Gross Steam Surcharge (\$ per 1000 lbs)	1.00749	.5252	.25263	.22966	.83619	1.06585	.85048	.44335	.213259	.19387	.83619	1.03006	-0-
University Base Cost (\$ per 1000 lbs) See I.A.2(b)	4.15300	4.1530	4.15300	4.15300	-0-	4.15300	3.37290	3.37290	3.372900	3.37290	-0-	3.37290	-0-
Gross Steam Charge (\$ per 1000 lbs)	\$ 5.16050	\$ 4.6782	\$4.40563	\$4.38266	-0-	\$5.21885	\$4.22338	\$3.81630	\$3.586200	\$3.56680	-0-	\$4.40296	-0-
INCREMENTAL EXPENSE SUMMARY (ALL DISTRIBUTION ADD-ON COSTS ARE SHARED)						INCREMENTAL EXPENSE SUMMARY (ALL DISTRIBUTION ADD-ON COSTS ARE SHARED)							
Owning	\$ 180,047	\$ 93,858	\$ 45,147	\$ 41,042	-0-	-0-	\$180,047	\$ 93,858	\$ 45,147	\$ 41,042	-0-	-0-	-0-
Add-on (Augsburg)	46,794	24,394	11,734	10,667	-0-	-0-	46,794	24,394	11,734	10,667	-0-	-0-	-0-
Tunnel Operating	24,351	12,694	6,106	5,551	-0-	-0-	24,351	12,694	6,106	5,551	-0-	-0-	-0-
Plant Operating	880,624	459,066	220,817	200,740	-0-	-0-	526,534	274,480	132,029	120,025	-0-	-0-	-0-
Augsburg Operating	-0-	-0-	-0-	-0-	\$ 3,830	\$ 3,830	-0-	-0-	-0-	-0-	\$ 3,830	\$ 3,830	-0-
Turbine Gen.	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	\$ 56,287
Total Owning & Operating	\$1,131,816	\$565,618	\$283,804	\$258,000	\$ 3,830	\$ 3,830	\$777,732	\$405,426	\$ 195,016	\$177,285	\$ 3,830	\$ 3,830	\$ 56,287
Total Steam Surcharge (\$ per 1000 lbs)	1.15159	.6003	.28876	.26250	.051700	.05170	.99460	.51850	.249400	.22670	.051700	.05170	-0-
University Base Cost (\$ per 1000 lbs)	4.15300	4.1530	4.15300	4.15300	-0-	-0-	3.37290	3.37290	3.372900	3.37290	-0-	-0-	-0-
Gross Steam Charge (\$ per 1000 lbs)	\$ 5.30460	\$ 4.7533	\$4.44176	\$4.41550	-0-	-0-	\$4.36750	\$3.89140	\$3.622300	\$3.59960	-0-	-0-	-0-
Augsburg Operation (\$ per 1000 lbs)	-0-	-0-	-0-	.05170	-0-	-0-	-0-	-0-	-0-	.05170	-0-	-0-	-0-
Gross Augsburg Cost (\$ per 1000 lbs)	-0-	-0-	-0-	\$4.46720	-0-	-0-	-0-	-0-	-0-	\$3.65130	-0-	-0-	-0-

COST BENEFIT COMPARISON II, A.2(b) (Cont'd)

EASTERN COAL VS. WESTERN COAL

i = 5 3/4% n = 15 years

NORMAL PLANT EXPANSION WITH OPTION I
INCREMENTAL SUMMARY (AUGSBURG AMORTIZES)
ITS PRIMARY AND SECONDARY DISTRIBUTION CAPITAL)

Item (Incremental)	St. Mary's	Fairview	Augsburg	Augsburg Dist.	Total
Steam Revenues					
a. Community Usage	\$714,604	\$323,768	\$292,757	\$ 55,857	\$1,386,926
b. Community Loss	54,075	24,495	22,141	4,224	104,935
c. Community Blowdown	23,176	10,499	9,488	1,810	44,972
d. Turbine Generator	-0-	-0-	-0-	-0-	-0-
Total Steam Revenues	\$791,854	\$358,702	\$324,386	\$ 61,891	\$1,536,833
Gross Plant Owning & Operating	\$791,854	\$358,702	\$324,386	\$ 61,891	\$1,536,833
Net Plant Income (Steam Generation)	-0-	-0-	-0-	-0-	-0-

COGENERATION EXPANSION WITH OPTION I
INCREMENTAL SUMMARY (AUGSBURG AMORTIZES)
ITS PRIMARY AND SECONDARY DISTRIBUTION CAPITAL)

Item (Incremental)	St. Mary's	Fairview	Augsburg	Augsburg Dist.	Elec. Gen.	Total
Steam Revenues						
a. Community Usage	\$582,947	\$263,500	\$238,259	\$ 55,857	\$ -0-	\$1,140,563
b. Community Loss	44,113	19,940	18,019	4,224	-0-	86,296
c. Community Blowdown	18,906	8,546	7,722	1,810	-0-	36,984
d. Turbine Generator	-0-	-0-	-0-	-0-	58,844	58,844
Total Steam Revenues	\$645,966	\$291,986	\$264,000	\$ 61,891	\$ 58,844	\$1,322,687
Gross Plant Owning & Operating	\$645,966	\$291,986	\$264,000	\$ 61,891	\$ 18,112	\$1,281,955
Net Plant Income (Steam Generation)	-0-	-0-	-0-	-0-	-0-	\$ 40,732

INCREMENTAL SUMMARY
(ALL DISTRIBUTION ADD-ON COSTS ARE SHARED)

Item (Incremental)	St. Mary's	Fairview	Augsburg	Augsburg Dist.	Total
Steam Revenues					
a. Community Usage	\$726,076	\$326,363	\$294,951	\$ 3,454	\$1,350,844
b. Community Loss	54,943	24,696	22,307	261	102,207
c. Community Blowdown	23,548	10,585	9,560	112	43,805
d. Turbine Generator	-0-	-0-	-0-	-0-	-0-
Total Steam Revenues	\$804,567	\$361,644	\$326,818	\$ 3,827	\$1,496,856
Gross Plant Owning & Operating (Steam)	\$804,567	\$361,644	\$326,818	\$ 3,827	\$1,496,856
Net Plant Income (Steam Generation)	\$ -0-	\$ -0-	\$ -0-	\$ -0-	\$ -0-

INCREMENTAL SUMMARY
(ALL DISTRIBUTION ADD-ON COSTS ARE SHARED)

Item (Incremental)	St. Mary's	Fairview	Augsburg	Augsburg Dist.	Elec. Gen.	Total
Steam Revenues						
a. Community Usage	\$594,419	\$266,152	\$240,450	\$ 3,454	\$ -0-	\$1,104,475
b. Community Loss	44,981	20,140	18,185	261	-0-	185,774
c. Community Blowdown	19,278	8,631	7,793	112	-0-	35,814
d. Turbine Generator	-0-	-0-	-0-	-0-	56,287	56,287
Total Steam Revenues	\$658,678	\$294,923	\$266,428	\$ 3,827	\$ 56,287	\$1,382,350
Gross Plant Owning & Operating	\$658,678	\$294,923	\$266,428	\$ 3,827	\$ 18,112	\$1,241,968
Net Plant Income (Steam Generation)	\$ -0-	\$ -0-	\$ -0-	\$ -0-	\$ -0-	\$ 140,382

COST BENEFIT COMPARISON II.A.2(b) - (Cont.)
EASTERN COAL VS. WESTERN COAL
i = 5 3/4%, *n* = 15 years

TURBINE-GENERATOR SIDE
(AUGSBURG AMORTIZES ITS PRIMARY & SECONDARY DISTRIBUTION)

Elec. Gen. Revenues (Incremental)	
a. Capacity	\$ 9,877
b. Energy	<u>58,926</u>
Total Elec. Gen. Revenues	<u>\$68,803</u>
Incremental Operating	<u>\$58,844</u>
Net Gain (End of 1981)	\$ 9,959

TURBINE-GENERATOR SIDE
(AUGSBURG ADD-ON IS COST SHARED BY PARTNERS)

Total Elec. Gen. Revenues (Incremental)	\$68,803
Incremental Operating	<u>\$56,287</u>
Net Gain (End of 1981)	\$12,516

SUMMARY - COST BENEFIT COMPARISON II.A.2(b)
EASTERN COAL VS. WESTERN COAL

	NORMAL PLANT EXPANSION WITH OPTION I (AUGSBURG AMORTIZES ITS PRIMARY AND SECONDARY)			COGENERATION EXPANSION WITH OPTION I (AUGSBURG AMORTIZES ITS PRIMARY AND SECONDARY)					
	Normal Expansion			Elec. Gen.			Steam Gen.		
	Base Cost (I.A.2(b))	Incremental II.A.2(b)	Total	Base Cost (I.A.2(b))	Incremental II.A.2(b)	Subtotal	Base Cost I.A.2(b)	Incremental II.A.2(b)	Subtotal Total
Gross Owning & Operating	\$8,326,322	\$1,536,833	\$9,863,155	\$ 920,675	\$58,844	\$ 979,519	\$7,248,253	\$1,281,955	\$8,530,208 \$9,509,727
Revenues	8,326,322	1,536,833	9,863,833	1,137,387	68,803	1,206,190	7,248,253	1,322,687	8,570,940 9,777,130
Annual Gain	-0-	-0-	-0-	\$ 216,712	\$ 9,959	\$ 226,671	-0-	\$ 40,732	\$ 40,732 \$ 267,403

SUMMARY - COST BENEFIT COMPARISON II.A.2(b)
EASTERN COAL VS. WESTERN COAL

	NORMAL PLANT EXPANSION WITH OPTION I (ALL DISTRIBUTION ADD-ON COSTS ARE SHARED)			COGENERATION EXPANSION WITH OPTION I (ALL DISTRIBUTION ADD-ON COSTS ARE SHARED)					
	Normal Expansion			Elec. Gen.			Steam Gen.		
	Base Cost (I.A.2(b))	Incremental II.A.2(b)	Total	Base Cost (I.A.2(b))	Incremental II.A.2(b)	Subtotal	Base Cost I.A.2(b)	Incremental II.A.2(b)	Subtotal Total
Gross Owning & Operating	\$8,326,322	\$1,536,833	\$9,863,155	\$ 920,675	\$56,287	\$ 976,962	\$7,248,253	\$1,241,968	\$8,490,221 \$9,407,183
Revenues	8,326,322	1,536,833	9,863,155	1,137,387	68,803	1,206,190	7,248,253	1,382,350	8,630,603 9,836,793
Annual Gain	-0-	-0-	-0-	\$ 216,712	\$12,516	\$ 229,228	-0-	\$ 140,382	\$ 140,382 \$ 369,610

DRAFT ICES STEAM SALES CONTRACT AND AGREEMENT OF INTENT
BETWEEN THE UNIVERSITY OF MINNESOTA AND FAIRVIEW HOSPITAL

THIS AGREEMENT, made this _____ day of _____,
19__ by and between the Regents of the University of Minnesota here-
inafter referred to as "University of Minnesota", and Fairview Hospital,
a Minnesota corporation, hereinafter referred to as "Fairview Hospital".

WITNESSETH:

WHEREAS, The University of Minnesota is the owner of and
operates in connection with its Campuses in Minneapolis, Minnesota,
a steam plant and Fairview Hospital is the owner and operator of a
hospital located in Minneapolis, Minnesota; and

WHEREAS, Fairview Hospital desires to purchase steam from
the University of Minnesota and the University of Minnesota desires
to sell the same to Fairview Hospital, all on terms and conditions
as hereinafter set forth.

NOW THEREFORE, in consideration of the foregoing and of the
agreements hereinafter set forth, the parties hereto agree as follows:

(1) University of Minnesota agrees to furnish Fairview
Hospital all of Fairview Hospital's annual requirements of steam
for all uses in the operation of its hospital at 2312 South Sixth
Street, Minneapolis, Minnesota, including the proposed expansion
of these facilities, for all uses that require 125 psig maximum
steam pressure at the metering point located at St. Mary's Hospital
under terms and conditions set forth on Exhibit A and Exhibit A-1

which is attached hereto and by reference made a part hereof, and Fairview Hospital agrees to use steam to meet all such steam requirements and to purchase the steam from the University of Minnesota at rates set forth on said Exhibits A and A-1, except as Exhibit A-1 may be revised by the installation of additional steam generating equipment as hereinafter provided.

(2) University of Minnesota to furnish and deliver such steam for a period of ten (10) years commencing on the date when steam is first delivered to Fairview Hospital under this contract, upon which date the contract year shall begin, and all subsequent contract years shall commence on the anniversary of said date. Fairview Hospital shall have the right to renew said contract for an additional period of ten (10) years by giving the University of Minnesota at least two years written notice before the expiration of the original ten (10) year period of its intention to renew said contract for an additional ten (10) year period.

(3) University of Minnesota agrees to furnish and deliver such steam to the metering point established for Fairview Hospital located at St. Mary's Hospital.

(4) The University of Minnesota agrees to pay for all work, labor and material performed and furnished in the installation and repair of the equipment necessary to perform this contract up to the established metering point located at St. Mary's Hospital and the condensate returned to the University of Minnesota at the established metering point at St. Mary's Hospital.

(5) Fairview Hospital agrees to install and maintain on its property exclusive of steam flow and condensate meters all equipment deemed reasonably necessary by the University of Minnesota to permit an efficient delivery and return of said steam and condensate. All such material and equipment shall be of the same general character and quality as that used in the University of Minnesota steam plant and steam distribution systems. The steam system shall be a closed system with necessary condensing units and pumps to return said condensate to the University of Minnesota; provided that all contaminated condensate shall be trapped by Fairview Hospital to the sewer of Fairview Hospital.

(6) Fairview Hospital agrees that the initial steam flow and/or condensate meters installed by the University of Minnesota at the service point in the service line to Fairview Hospital will be used to determine the steam consumption under this contract. During any period in which the metering devices are not connected, are bypassed for maintenance or fail wholly or partially to measure the amount of steam consumed by Fairview Hospital or condensate returned from Fairview Hospital to University of Minnesota, the bill for such period shall be based upon a fair estimate of the steam actually used, or metered condensate returned, or based upon average meter readings thereof during an equal period of similar outside temperatures, and such other information as may be available.

(7) Fairview Hospital shall have the right to test the University of Minnesota metering devices at its own expense by first giving the University of Minnesota ten days written notice. Each party shall have the right to inspect the metering devices on the

property of the other at reasonable times. A Hagen Model _____ or a Bailey Model _____ integrader steam flow meter shall be installed by the University of Minnesota in the steam line serving the facility in accordance with the manufacturer's recommendation. If winter and summer design steam load is not within the range of a single orifice, dual orifices shall be installed for the meter. A means of isolating or changing the orifice(s) shall be installed. A Cadillac condensate meter shall be installed by the University of Minnesota in the condensate return line from the building. The University of Minnesota will purchase and install the initial meters at the expense of Fairview Hospital. The meters shall be serviced and maintained by the University of Minnesota during the full term of this agreement. Replacement meters due to malfunction will be paid for by Fairview Hospital and installed by the University of Minnesota at the University of Minnesota's expense.

(8) Fairview Hospital shall assume all construction and maintenance expense in connection with the installation necessary to service their facility from the service point, and Fairview Hospital agrees that any connections to existing services of the University of Minnesota will be made in accordance with the requirements and with the approval of the University of Minnesota.

(9) Fairview Hospital agrees that in the event the steam consumption of all users of the University of Minnesota's steam is less than 1,500,000,000 or more than 2,500,000,000 pounds per contract year, the rates provided for in this agreement shall be revised by agreement of the parties and if the parties are unable to agree, the rates shall be fixed by arbitration as herein provided.

(10) The University of Minnesota agrees that during the period specified herein, 125 psig maximum steam will be furnished at the metering point located at St. Mary's Hospital and delivered under all weather conditions which can reasonably be anticipated and that the University of Minnesota's plant will be so maintained that reasonable standby service will be available to enable the University of Minnesota to provide an emergency supply of steam notwithstanding a failure of one production unit or unavailability of one type of fuel. Fairview Hospital agrees that when its heating systems have been shut down for any reason, then in order to produce a normal pickup period, steam shall be taken into Fairview Hospital lines only upon notice to the University of Minnesota and at times and in amounts scheduled by the University of Minnesota.

(11) Fairview Hospital agrees that at such time as the University of Minnesota deems it necessary to increase the steam generating capacity of its steam plant for the sole purpose of guaranteeing the reliability of steam service to all University of Minnesota customers and at such time as the actual cost of such increased steam generating capacity has been established and such capacity installed, the University of Minnesota may hereupon revise Exhibit A-1 so as to include the amortization of such total cost over the then remaining contract life, (including the ten (10) year extension, if the option has then been exercised) at the interest rate prevailing at that time.

Fairview Hospital shall have the right to review and comment on any proposed capital expenditures deemed necessary to increase steam generating capacity.

(12) The University of Minnesota shall have the right temporarily to shut off the supply of steam whenever necessary to make expansion of or repairs to the boilers, mains, pipes or other equipment except the supply shall not be shut off between the hours of 7:00 A.M. and 10:00 P.M. of any day except in the case of an emergency requiring immediate attention. The University of Minnesota shall give ten days advance notice to Fairview Hospital before shutting off the supply of steam. No notice need be given when due to emergency causes.

(13) The University of Minnesota shall not be liable to Fairview Hospital for failure to supply steam because of any unforeseeable accident or because of any strike or other cause beyond the reasonable control of the University of Minnesota. In the event of any failure to supply steam from any causes other than those attributable to Fairview Hospital equipment, the University of Minnesota shall proceed promptly with such repairs and replacements as may be necessary to enable the University of Minnesota to restore said supply of steam. To the extent such repairs or replacements are made necessary by reason of the willful act or negligence of Fairview Hospital, its agents, guests or employees, Fairview Hospital shall reimburse the University of Minnesota for the reasonable cost of such repairs and replacements.

(14) Fairview Hospital agrees to indemnify the University of Minnesota of and from any liability for injuries to or death of persons, or damage to property, occurring upon the property of the University of Minnesota resulting from the performance of, or failure to perform, this contract.

(15) The University of Minnesota shall read the aforesaid metering devices on or about the last day of each month. Itemized bills for all charges since the last monthly billing shall be submitted to Fairview Hospital on or before the 10th day of the next calendar month and shall be payable when billed. Until the total annual steam consumption under this contract is established at the end of the first contract year the University of Minnesota shall bill and Fairview Hospital shall pay the University of Minnesota on the contract beginning basis of \$ _____ per 1,000 pounds of steam consumed each month. This beginning basis is a part of Exhibit A-1.

The rate shall be reviewed every year and shall be subject to change at each review, any change to be dependent on fuel costs, labor costs, maintenance costs, insurance costs, capital costs and other relevant factors supporting the manufacture and distribution of steam energy to the consumer.

(16) In the event of noncompliance with or violation of the terms, covenants or conditions of this contract by Fairview Hospital, the University of Minnesota shall have the right to declare this contract terminated, provided however, that no default, except default in the payment of monthly bills for steam consumed, shall be deemed to have occurred on the part of Fairview Hospital until thirty days after written notice specifying the nature of each default shall have been given to Fairview Hospital, and no default in the payment of monthly bills shall be deemed to have occurred on the part of Fairview Hospital until fifteen days after written notice specifying

the amount in default shall have been given Fairview Hospital and unless within such thirty day period Fairview Hospital shall have failed to remedy such default, other than the default in payment of monthly billings, or to take reasonable steps to remedy the same, or unless with such fifteen day period Fairview Hospital shall have failed to pay such monthly billings.

(17) In the event of noncompliance with or violation of the terms, covenants or conditions of this contract by the University of Minnesota, Fairview Hospital shall have the right to declare this contract terminated upon one year's written notice in which such default shall be fully described, provided however, that if such default is remedied within three months after service of said notice, the agreement shall be reinstated and continue in full force and effect. In case of notice of termination by Fairview Hospital under this clause the University of Minnesota shall nevertheless be required to continue to furnish steam to Fairview Hospital during said one year period.

(18) In the event there are any matters affecting the interpretation of this contract that cannot be amicably settled by the parties, including any matter which this contract expressly provides may be submitted to arbitration, either party shall have the right to demand that such disputed matter be submitted to arbitration by a board of arbitrators composed of three members. Each party shall appoint one arbitrator and the two so appointed shall select a third; their decision on any disputed matter shall be final. Either party demanding arbitration shall notify the other in writing of its

demand for arbitration, specifying the matter to be submitted to arbitration and the name of the arbitrator selected by it. Upon receipt of such written notice the other party shall have thirty (30) days within which to select its arbitrator and to notify the other party in writing of such selection and the two so selected shall have thirty (30) days in which to select the third arbitrator. In the event the third arbitrator is not selected within said thirty (30) days, then such third arbitrator shall be appointed by the District Court of Hennepin County, Minnesota, upon application by either party after at least 8 days written notice to the other party of the hearing of such application.

(20) Wherever in this agreement it shall be required or permitted that notice or demand be given or served by either party to this agreement to or on the other, such notice or demand shall be given or served and shall not be deemed to have been duly given or served unless in writing and forwarded by registered or certified mail, postage prepaid, addressed as follows:

To University of Minnesota at:	319 15th Avenue Southeast
	Rm. 200 Shops Building
	Minneapolis, Minnesota 55455
To Fairview Hospital at:	2312 South Sixth Street
	Minneapolis, Minnesota 55454

Such addresses may be changed from time to time by either party by serving notices as above provided.

(21) This agreement shall inure to the benefit of and shall be binding upon the successors and assigns of the parties hereto and subsequent owners of the building being serviced hereunder.

(22) All previous agreements between the parties hereto, covering the subject matter hereof, if there be any, are hereby cancelled and terminated as of the effective date hereof.

IN WITNESS WHEREOF, The Regents of the University of Minnesota and Fairview Hospital have caused this instrument to be duly executed the day and year first above written.

In Presence of:

Regents of University of Minnesota

Witness

BY _____

Its _____

Witness

And _____

Its _____

Fairview Hospital

Witness

BY _____

Its _____

Witness

And _____

Its _____

FOR REPORT		DATE	11-17-57
DRAWN		CHECKED	149
REVISIONS		DATE	190017
UNIV OF MINN		APPROVED	149
Mpls Campus - GAIDICES		DATE	190017
STEAM & CONDENSATE PIPING & METRNG		MINNEAPOLIS	HELMICK & LUTZ ENGINEERS
ADD-ON CUSTOMERS		MINNESOTA	SCALE NONE
NO 625-FS-8A		REV.

"EXHIBIT A"

INSTRUMENT KEY:

①, ②, & ③ ORIFICE PLATE WITH 120" H₂O DIFFERENTIAL,
ELECTRONIC TRANSMITTERS - BAILEY TYPE CC 1253 A,
TRANSMITTING TO A STRIP CHART RECORDER -
BAILEY TYPE SR 1310

④, ⑤, & ⑥ CADILLAC CONDENSATE METERS

DRAFT

EXHIBIT A-1

ANALYSIS OF STEAM COST - BASIC PLAN

FOR FAIRVIEW HOSPITAL AND THE UNIVERSITY OF MINNESOTA FACILITIES

As part of the contract for sale of steam to Fairview Hospital located at 2312 South Sixth Street, Minneapolis, Minnesota, this Exhibit A-1 shall be deemed to establish the contractual cost of steam basis as part of the aforementioned contract for sale of steam between the University of Minnesota and Fairview Hospital and this Exhibit A-1 shall be revised to reflect changes in costs to provide steam to Fairview Hospital by the University of Minnesota on an annual basis no later than the end of the 12th month after the effective date of the contract for the sale of steam by the University of Minnesota to Fairview Hospital.

EXHIBIT A-1

COST BENEFITS - COMPARISON I.A.2(b)

Eastern Coal Vs. Western Coal, $i = 5 \frac{3}{4}\%$, $n = 15$ years

<u>Expense Item</u>	<u>Normal Combined Plant Expansion</u>	<u>Cogeneration Expansion</u>	
		<u>Elec. Gen.</u>	<u>Steam Gen.</u>
Capital Budget - 1978	\$14,829,760	\$2,634,240	\$16,917,800
Escalated Budget - 1979	15,867,845	2,818,635	18,102,045
Cost Sharing			
DOE	-0-	15,000	324,800
Legisl.	11,422,190	-0-	11,422,190
Total Cost Sharing	\$11,422,190	\$ 15,000	\$11,476,990
Loan (U of M)	\$ 4,445,655	\$2,803,635	\$ 6,355,055
Capital Recovery	\$ 450,300	\$ 283,980	\$ 643,704
Depreciation	1,001,430	78,700	1,063,810
Total Owning	\$ 1,451,730	\$ 362,680	\$ 1,707,514
<u>Operating Expenses</u> (End of 1981)			
Insurance	\$ 9,408	\$ 2,108	\$ 39,200
Purchased Utilities	343,904	7,000	381,424
Administration	99,000	24,800	132,000
Labor Supplies, Maint.	983,076	38,720	1,625,662
Fuel-Community	5,364,286	-0-	3,044,041
Fuel-Generator	-0-	-0-	226,252
Ash Handling & Landfill	74,098	-0-	92,160
Turbine Steam Purch.	-0-	485,367	-0-
Total Operating Expense	\$ 6,874,592	\$ 557,995	\$ 5,540,739
Gross Owning & Operating	\$ 8,326,322	\$ 920,675	\$ 7,248,253
Gross Production Expense			
Steam, \$/1000 lbs.	4.153	-	3.615
Electricity, \$/KWh	-	.02269	-
Community Steam Charge	4.153	-	3.373
Revenue (Steam)			
a. Community Usage	\$ 7,517,748	-	\$ 6,106,138
b. Community Line Loss	566,002	-	459,723
c. Blowdown Allocation	242,572	-	197,025
d. T-G Steam	-0-	-	485,367
Total Steam Revenue	\$ 8,326,322		\$ 7,248,253
Revenue (Elec. Gen.)			
a. Capacity	-	\$ 569,463	-
b. Energy	-	567,924	-
Total Elec. Gen. Revenue		\$1,137,387	

<u>Expense Item</u>	Normal Combined Plant Expansion	<u>Cogeneration Expansion</u>	
		<u>Elec. Gen.</u>	<u>Steam Gen.</u>
Gross Plant Income	\$ 8,326,322	\$1,137,387	\$ 7,248,253
Plant Cash Flow (one year operation)	-0-	\$ 216,712	-0-
Const. Cash Flow (Debt) (1979 through 1980)	\$ 828,552	\$ 522,523	\$ 1,184,415
Net Plant Cash Flow at end of 1981	(\$ 828,552)	(\$ 305,811)	(\$ 1,184,415)
Cash Flow Deficit at end of 1981	(\$ 828,552)	(\$ 305,811)	(\$ 1,184,415)

COST BENEFIT COMPARISON II.A.2.(b)

EASTERN COAL VS. WESTERN COAL

i = 5 3/4% n = 15 years

INCREMENTAL COSTS (STEAM SIDE OF PLANTS)

	NORMAL EXPANSION WITH OPTION I					COGENERATION EXPANSION WITH OPTION I					
	Total Main Tunnel	SHARED EXPENSES			NON-SHARED Augsburg Pri & Sec	Main Tunnel	SHARED EXPENSES			NON-SHARED Augsburg Pri & Sec	Elec. Generation
		St. Mary's	Fairview	Augsburg			St. Mary's	Fairview	Augsburg		
Capital Budget - 1978	\$1,359,640				\$431,760	\$1,359,640				\$431,760	-0-
Escalated Budget - 1979	1,454,815				461,983	1,454,815				461,983	-0-
Cost Sharing - DOE	16,800				-0-	16,800				-0-	
- Legis.	-0-				-0-	-0-				-0-	
- St. Mary's	-0-	(\$ 6,720) out-of-pocket expense			-0-	-0-	(\$ 6,720) out-of-pocket expense			-0-	-0-
- Fairview	-0-				-0-	-0-				-0-	-0-
- Augsburg	-0-				-0-	-0-				-0-	-0-
- U of M	-0-				-0-	-0-				-0-	-0-
Total	10,640				-0-	10,640				-0-	-0-
	(\$ 27,440)					(\$ 27,440)				-0-	-0-
Total Loan	\$1,427,375				\$461,983	\$1,427,375				\$461,983	-0-
Capital Recovery	\$ 144,579	\$ 75,369	\$ 36,253	\$ 32,957	\$ 46,794	\$ 144,579	\$ 75,369	\$ 36,253	\$ 32,957	\$ 46,794	-0-
Depreciation (20 year)	35,468	18,489	8,894	8,085	11,268	11,268	18,489	8,894	8,085	11,268	-0-
(1) Total Tunnel Owning	\$ 180,047	\$ 93,858	\$ 45,147	\$ 41,042	\$ 58,062	\$ 180,047	\$ 93,858	\$ 45,147	\$ 41,042	\$ 58,062	-0-
<u>Tunnel Operating Expenses</u>											
Insurance	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-
Purch. Utilities	\$ 10,671	\$ 5,563	\$ 2,676	\$ 2,432	-0-	\$ 10,671	\$ 5,563	\$ 2,676	\$ 2,432	-0-	-0-
Administration	4,000	2,085	1,003	912	-0-	4,000	2,085	1,003	912	-0-	-0-
Labor, Supplies, Maint.	9,680	5,046	2,427	2,207	-0-	9,680	5,046	2,427	2,207	-0-	-0-
Total Tunnel Operating	\$ 24,351	\$ 12,694	\$ 6,106	\$ 5,551	\$ -0-	\$ 24,351	\$ 12,694	\$ 6,106	\$ 5,551	-0-	-0-
Total Owning & Operating	204,398	106,552	51,253	46,593	58,062	204,398	106,552	51,253	46,593		
(2) Owning & Operating Surcharge (\$ per 1000 lbs)	.6295	.32816	.15785	.14349	.78445	.6295	.32816	.15785	.14349		
<u>Augsburg Pri Add-On Operating Expense</u>											
Insurance	-0-				-0-	-0-				-0-	-0-
Purch. Utilities	-0-				-0-	-0-				-0-	-0-
Administration	-0-				830	-0-				830	-0-
Labor, Supplies, Maint.	-0-				3,000	-0-				3,000	-0-
Total Augsburg, Steam Operating	-0-	-0-	-0-	-0-	\$ 3,830	-0-	-0-	-0-	-0-	\$ 3,830	-0-
Gross Augsburg Add-On Co's	-0-	-0-	-0-	-0-	61,892	-0-	-0-	-0-	-0-	61,892	-0-
Owning & Operating Surcharge (\$ per 1000 lbs)	-0-	-0-	-0-	-0-	.83619	-0-	-0-	-0-	-0-	.83619	

COST BENEFIT COMPARISON II.A.2.(b) (Cont'd)

EASTERN COAL VS. WESTERN COAL

i = 5 3/4% n = 15 years

INCREMENTAL COSTS (STEAM SIDE OF PLANTS)

Plant Operating
Community Fuel
T-G Fuel
Community Ash
T-G Ash
Turbine-Steam

Total Plant Operating
(3) Plant Operating Surcharge
(\$ per 1000 lbs)
Base University Charge
(\$ per 1000 lbs)
Gross Steam Cost Surcharge
(\$ per 1000 lbs)
Gross Steam Cost
Augsburg Surcharge for
Distribution Add-On
(St. Mary's to Augsburg
and Augsburg Reconnect)
Gross Augsburg Steam Cost
(\$ per 1000 lbs)

	NORMAL EXPANSION WITH OPTION I					COGENERATION EXPANSION WITH OPTION I					
	Total Main Tunnel	SHARED EXPENSES			NON-SHARED Augsburg Pri & Sec	Main Tunnel	SHARED EXPENSES			NON-SHARED Augsburg Pri & Sec.	Elec. Generation
		St. Mary's	Fairview	Augsburg			St. Mary's	Fairview	Augsburg		
	\$ 868,495	\$452,743	\$217,776	\$197,975	-0-	\$ 510,357	\$266,047	\$127,973	\$116,337	-0-	-0-
	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-
	12,129	6,323	3,041	2,765	-0-	16,177	8,433	4,056	3,688	-0-	-0-
	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-
	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	\$ 18,112
	\$ 880,624	\$459,066	\$220,817	\$200,740	-0-	\$ 526,534	\$274,480	\$132,029	\$120,025	-0-	\$ 18,112
	.37799	.19704	.09478	.08616	-0-	(4) .22098	(5) .11519	.05541	.05037	-0-	-0-
	4.15300	4.15300	4.15300	4.15300	-0-	3.37290	3.37290	3.37290	3.37290	-0-	-0-
	1.00749	.52520	.25263	.22966	-0-	.85048	.44335	.213259	.19387	-0-	-0-
	5.16050	4.67820	4.40563	4.38266	-0-	4.22338	3.81630	3.586200	3.56680	-0-	-0-
	-0-	-0-	-0-	-0-	.83619	-0-	-0-	-0-	.83619	-0-	-0-
	-0-	-0-	-0-	-0-	5.21885	-0-	-0-	-0-	4.20299	-0-	-0-

COST BENEFIT COMPARISON II.A.2.(b) (cont.)
EASTERN COAL VS. WESTERN COAL
(STEAM SIDE OF PLANTS)

Cost Item (Incremental)	NORMAL PLANT EXPANSION WITH OPTION I INCREMENTAL EXPENSE SUMMARY (AUGSBURG AMORTIZES ITS PRIMARY & SECONDARY DIST. CAPITAL)					
	SHARED EXPENSES				AUGS. DIST.	
	Tunnel Surcharge	St. Mary's	Fairview	Augsburg	Dist.	Total
Owning	\$ 180,047	\$ 93,858	\$ 45,147	\$ 41,042	\$58,062	\$ 92,232
Tunnel Operating	24,351	12,694	6,106	5,551	-0-	5,551
Plant Operating	880,624	459,066	220,817	200,740	-0-	200,740
Augsburg Operating	-0-	-0-	-0-	-0-	3,830	3,830
Turbine Gen.	-0-	-0-	-0-	-0-	-0-	-0-
Total Owning-Operating	\$1,085,022	\$565,618	\$231,440	\$247,333	\$61,892	\$302,353
5)Gross Steam Surcharge (\$ per 1000 lbs)	1.00749	.5252	.25263	.22966	.83619	1.06585
University Base Cost (\$ per 1000 lbs) See I.A.2(b)	4.15300	4.1530	4.15300	4.15300	-0-	4.15300
Gross Steam Charge (\$ per 1000 lbs)	\$ 5.16050	\$ 4.6782	\$4.40563	\$4.38266	-0-	\$5.21885

COGENERATION EXPANSION WITH OPTION I INCREMENTAL EXPENSE SUMMARY (AUGSBURG AMORTIZES ITS PRIMARY & SECONDARY DIST. CAPITAL)							
Tunnel Surcharge	SHARED EXPENSES			AUGS. DIST.		Elec. Gen.	
	St. Mary's	Fairview	Augsburg	Dist.	Total		
\$180,047	\$ 93,858	\$ 45,147	\$ 41,042	\$58,062	\$ 99,104	-0-	
24,351	12,694	6,106	5,551	-0-	-0-	-0-	
526,534	274,480	132,029	120,025	-0-	-0-	-0-	
-0-	-0-	-0-	-0-	3,830	3,830	-0-	
-0-	-0-	-0-	-0-	-0-	-0-	\$ 58,926	
\$730,932	\$381,032	\$183,282	\$116,618	\$61,892	\$102,934	\$ 58,926	
.85048	.44335	.213259	.19387	.83619	1.03006	-0-	
3.37290	3.37290	3.372900	3.37290	-0-	3.37290	-0-	
\$4.22338	\$3.81630	\$3.586200	\$3.56680	-0-	\$4.40296	-0-	

INCREMENTAL EXPENSE SUMMARY (ALL DISTRIBUTION ADD-ON COSTS ARE SHARED)						
Owning	\$ 180,047	\$ 93,858	\$ 45,147	\$ 41,042	-0-	-0-
Add-on (Augsburg)	46,794	24,394	11,734	10,667	-0-	-0-
Tunnel Operating	24,351	12,694	6,106	5,551	-0-	-0-
Plant Operating	880,624	459,066	220,817	200,740	-0-	-0-
Augsburg Operating	-0-	-0-	-0-	-0-	\$ 3,830	\$ 3,830
Turbine Gen.	-0-	-0-	-0-	-0-	-0-	-0-
Total Owning & Operating	\$1,131,816	\$565,618	\$283,804	\$258,000	\$ 3,830	\$ 3,830
Total Steam Surcharge (\$ per 1000 lbs)	1.15159	.6003	.28876	.26250	.051700	.05170
University Base Cost (\$ per 1000 lbs)	4.15300	4.1530	4.15300	4.15300	-0-	-0-
Gross Steam Charge (\$ per 1000 lbs)	\$ 5.30460	\$ 4.7533	\$4.44176	\$4.41550	-0-	-0-
Augsburg Operation (\$ per 1000 lbs)	-0-	-0-	-0-	.05170	-0-	-0-
Gross Augsburg Cost (\$ per 1000 lbs)	-0-	-0-	-0-	\$4.46720	-0-	-0-

INCREMENTAL EXPENSE SUMMARY (ALL DISTRIBUTION ADD-ON COSTS ARE SHARED)						
\$180,047	\$ 93,858	\$ 45,147	\$ 41,042	-0-	-0-	-0-
46,794	24,394	11,734	10,667	-0-	-0-	-0-
24,357	12,694	6,106	5,551	-0-	-0-	-0-
526,534	274,480	132,029	120,025	-0-	-0-	-0-
-0-	-0-	-0-	-0-	\$ 3,830	\$ 3,830	-0-
-0-	-0-	-0-	-0-	-0-	-0-	\$ 56,287
\$777,732	\$405,426	\$ 195,016	\$177,285	\$ 3,830	\$ 3,830	\$ 56,287
.99460	.51850	.249400	.22670	.051700	.05170	-0-
<u>3.37290</u>	<u>3.37290</u>	<u>3.372900</u>	<u>3.37290</u>	<u>-0-</u>	<u>-0-</u>	<u>-0-</u>
\$4.36750	\$3.89140	\$3.622300	\$3.59960	-0-	-0-	-0-
-0-	-0-	-0-	<u>.05170</u>	-0-	-0-	-0-
-0-	-0-	-0-	\$3.65130	-0-	-0-	-0-

COST BENEFIT COMPARISON II, A.2(b) (Cont'd)
EASTERN COAL VS. WESTERN COAL
i = 5 3/4% n = 15 years

NORMAL PLANT EXPANSION WITH OPTION I
INCREMENTAL SUMMARY (AUGSBURG AMORTIZES)
ITS PRIMARY AND SECONDARY DISTRIBUTION CAPITAL)

Item (Incremental)	St. Mary's	Fairview	Augsburg	Augsburg Dist.	Total
Steam Revenues					
a. Community Usage	\$714,604	\$323,708	\$292,757	\$ 55,857	\$1,386,926
b. Community Loss	54,075	24,495	22,141	4,224	104,935
c. Community Blowdown	23,176	10,499	9,488	1,810	44,972
d. Turbine Generator	-0-	-0-	-0-	-0-	-0-
Total Steam Revenues	\$791,854	\$358,702	\$324,386	\$ 61,891	\$1,536,833
Gross Plant Owning & Operating	\$791,854	\$358,702	\$324,386	\$ 61,891	\$1,536,833
Net Plant Income (Steam Generation)	-0-	-0-	-0-	-0-	-0-

COGENERATION EXPANSION WITH OPTION I
INCREMENTAL SUMMARY (AUGSBURG AMORTIZES)
ITS PRIMARY AND SECONDARY DISTRIBUTION CAPITAL)

St. Mary's	Fairview	Augsburg	Augsburg Dist.	Elec. Gen.	Total
\$582,947	\$263,500	\$238,259	\$ 55,357	\$ -0-	\$1,140,563
44,113	19,940	18,019	4,224	-0-	86,296
18,906	8,546	7,722	1,810	-0-	36,984
-0-	-0-	-0-	-0-	58,844	58,844
\$645,966	\$291,986	\$264,000	\$ 61,891	\$ 58,844	\$1,322,687
\$645,966	\$291,986	\$264,000	\$ 61,891	\$ 18,112	\$1,281,955
-0-	-0-	-0-	-0-	-0-	\$ 40,732

INCREMENTAL SUMMARY
(ALL DISTRIBUTION ADD-ON COSTS ARE SHARED)

Item (Incremental)	St. Mary's	Fairview	Augsburg	Augsburg Dist.	Total
Steam Revenues					
a. Community Usage	\$726,076	\$326,363	\$294,951	\$ 3,454	\$1,350,844
b. Community Loss	54,943	24,696	22,307	261	102,207
c. Community Blowdown	23,548	10,585	9,560	112	43,805
d. Turbine Generator	-0-	-0-	-0-	-0-	-0-
Total Steam Revenues	\$804,567	\$361,644	\$326,818	\$ 3,827	\$1,496,856
Gross Plant Owning & Operating (Steam)	\$804,567	\$361,644	\$326,818	\$ 3,827	\$1,496,856
Net Plant Income (Steam Generation)	\$ -0-	\$ -0-	\$ -0-	\$ -0-	\$ -0-

INCREMENTAL SUMMARY
(ALL DISTRIBUTION ADD-ON COSTS ARE SHARED)

St. Mary's	Fairview	Augsburg	Augsburg Dist.	Elec. Gen.	Total
\$594,419	\$266,152	\$240,450	\$ 3,454	\$ -0-	\$1,104,475
44,981	20,140	18,185	261	-0-	185,774
19,278	8,631	7,793	112	-0-	35,814
-0-	-0-	-0-	-0-	56,287	56,287
\$658,678	\$294,923	\$266,428	\$ 3,827	\$ 56,287	\$1,382,350
\$658,678	\$294,923	\$266,428	\$ 3,827	\$ 18,112	\$1,241,968
\$ -0-	\$ -0-	\$ -0-	\$ -0-	\$ -0-	\$ 140,382

COST BENEFIT COMPARISON II.A.2(b) - (Cont.)
EASTERN COAL VS. WESTERN COAL
i = 5 3/4%, *n* = 15 years

TURBINE-GENERATOR SIDE
(AUGSBURG AMORTIZES ITS PRIMARY & SECONDARY DISTRIBUTION)

Elec. Gen. Revenues (Incremental)	
a. Capacity	\$ 9,877
b. Energy	58,926
Total Elec. Gen. Revenues	<u>\$68,803</u>
Incremental Operating	<u>\$58,844</u>
Net Gain (End of 1981)	\$ 9,959

TURBINE-GENERATOR SIDE
(AUGSBURG ADD-ON IS COST SHARED BY PARTNERS)

Total Elec. Gen. Revenues (Incremental)	\$68,803
Incremental Operating	<u>\$56,287</u>
Net Gain (End of 1981)	\$12,516

SUMMARY - COST BENEFIT COMPARISON II.A.2(b)
EASTERN COAL VS. WESTERN COAL

	NORMAL PLANT EXPANSION WITH OPTION I (AUGSBURG AMORTIZES ITS PRIMARY AND SECONDARY)			COGENERATION EXPANSION WITH OPTION I (AUGSBURG AMORTIZES ITS PRIMARY AND SECONDARY)						
	Normal Expansion			Elec. Gen.			Steam Gen.			
	Base Cost (I.A.2(b))	Incremental II.A.2(b)	Total	Base Cost (I.A.2(b))	Incremental II.A.2(b)	Subtotal	Base Cost I.A.2(b)	Incremental II.A.2(b)	Subtotal	Total
Gross Owning & Operating	\$8,326,322	\$1,536,833	\$9,863,155	\$ 920,675	\$58,844	\$ 979,519	\$7,248,253	\$1,281,955	\$8,530,208	\$9,509,727
Revenues	8,326,322	1,536,833	9,863,833	1,137,387	68,803	1,206,190	7,248,253	1,322,687	8,570,940	9,777,130
Annual Gain	-0-	-0-	-0-	\$ 216,712	\$ 9,959	\$ 226,671	-0-	\$ 40,732	\$ 40,732	\$ 267,403

SUMMARY - COST BENEFIT COMPARISON II.A.2(b)
EASTERN COAL VS. WESTERN COAL

	NORMAL PLANT EXPANSION WITH OPTION I (ALL DISTRIBUTION ADD-ON COSTS ARE SHARED)			COGENERATION EXPANSION WITH OPTION I (ALL DISTRIBUTION ADD-ON COSTS ARE SHARED)						
	Normal Expansion			Elec. Gen.			Steam Gen.			
	Base Cost (I.A.2(b))	Incremental II.A.2(b)	Total	Base Cost (I.A.2(b))	Incremental II.A.2(b)	Subtotal	Base Cost I.A.2(b)	Incremental II.A.2(b)	Subtotal	Total
Gross Owning & Operating	\$8,326,322	\$1,536,833	\$9,863,155	\$ 920,675	\$56,287	\$ 976,962	\$7,248,253	\$1,241,968	\$8,490,221	\$9,467,183
Revenues	8,326,322	1,536,833	9,863,155	1,137,387	68,803	1,206,190	7,248,253	1,382,350	8,630,603	9,836,793
Annual Gain	-0-	-0-	-0-	\$ 216,712	\$12,516	\$ 229,228	-0-	\$ 140,382	\$ 140,382	\$ 369,610

DRAFT ICES STEAM SALES CONTRACT AND AGREEMENT OF INTENT
BETWEEN THE UNIVERSITY OF MINNESOTA AND AUGSBURG COLLEGE

THIS AGREEMENT, made this _____ day of _____, 19____,
by and between the Regents of the University of Minnesota hereinafter
referred to as "University of Minnesota", and Augsburg College, a
corporation, hereinafter referred to as "Augsburg College".

WITNESSETH:

WHEREAS, The University of Minnesota is the owner of and
operates in connection with its Campuses in Minneapolis, Minnesota, a
steam plant and Augsburg College is the owner and operator of a
college campus located in Minneapolis, Minnesota; and

WHEREAS, Augsburg College desires to purchase steam from the
University of Minnesota and the University of Minnesota desires to
sell the same to Augsburg College, all on terms and conditions as
hereinafter set forth.

NOW THEREFORE, in consideration of the foregoing and of
the agreements hereinafter set forth, the parties hereto agree as
follows:

(1) University of Minnesota agrees to furnish Augsburg
College all of Augsburg College's annual requirements of steam for
all uses in the operation of its campus at 731 21st Avenue South,
Minneapolis, Minnesota, including the proposed expansion of these
facilities, for all uses that require 125 psig maximum steam pressure
at the metering point located at St. Mary's Hospital under terms and
conditions set forth on Exhibit A and Exhibit A-1 which is attached

hereto and by reference made a part hereof, and Augsburg College agrees to use steam to meet all such steam requirements and to purchase the steam from the University of Minnesota at rates set forth on said Exhibits A and A-1, except as Exhibit A-1 may be revised by the installation of additional steam generating equipment as hereinafter provided.

(2) University of Minnesota to furnish and deliver such steam for a period of ten (10) years commencing on the date when steam is first delivered to Augsburg College under this contract, upon which date the contract year shall begin, and all subsequent contract years shall commence on the anniversary of said date. Augsburg College shall have the right to renew said contract for an additional ten (10) years by giving the University of Minnesota at least two years written notice before the expiration of the original ten (10) year period of its intention to renew said contract for an additional ten (10) year period.

(3) University of Minnesota agrees to furnish and deliver such steam to the metering point established for Augsburg College located at St. Mary's Hospital.

(4) The University of Minnesota agrees to pay for all work, labor and material performed and furnished in the installation and repair of the equipment necessary to perform this contract up to the established metering point located at St. Mary's Hospital and the condensate returned to the University of Minnesota at the established metering point at St. Mary's Hospital.

(5) Augsburg College agrees to install and maintain on its property exclusive of steam flow and condensate meters all equipment deemed reasonably necessary by the University of Minnesota to permit an efficient delivery and return of said steam and condensate. All such material and equipment shall be of the same general character and quality as that used in the University of Minnesota steam plant and steam distribution systems. The steam system shall be a closed system with necessary condensing units and pumps to return said condensate to the University of Minnesota; provided that all contaminated condensate shall be trapped by Augsburg College to the sewer of Augsburg College.

(6) Augsburg College agrees that the initial steam flow and/or condensate meters installed by the University of Minnesota at the service point in the service line to Augsburg College will be used to determine the steam consumption under this contract. During any period in which the metering devices are not connected, are bypassed for maintenance or fail wholly or partially to measure the amount of steam consumed by Augsburg College or condensate returned from Augsburg College to University of Minnesota, the bill for such period shall be based upon a fair estimate of the steam actually used, or metered condensate returned, or based upon average meter readings thereof during an equal period of similar outside temperatures, and such other information as may be available.

(7) Augsburg College shall have the right to test the University of Minnesota metering devices at its own expense by first

giving the University of Minnesota ten days written notice. Each party shall have the right to inspect the metering devices on the property of the other at reasonable times. A Hagen Model ____ or a Bailey Model ____ integrader steam flow meter shall be installed by the University of Minnesota in the steam line serving the facility in accordance with the manufacturer's recommendation. If winter and summer design steam load is not within the range of a single orifice, dual orifices shall be installed for the meter. A means of isolating or changing the orifice(s) shall be installed. A Cadillac condensate meter shall be installed by the University of Minnesota in the condensate return line from the building. Both meters shall be furnished and installed at the expense of Augsburg College. The University of Minnesota will purchase and install the initial meters at the expense of Augsburg College. The meters shall be serviced and maintained by the University of Minnesota during the full term of this agreement. Replacement meters due to malfunction will be paid for by Augsburg College and installed by the University of Minnesota at the University of Minnesota's expense.

(8) Augsburg College shall assume all construction and maintenance expense in connection with the installation necessary to service their facility from the service point, and Augsburg College agrees that any connections to existing services of the University of Minnesota will be made in accordance with the requirements and with the approval of the University of Minnesota.

(9) Augsburg College agrees that in the event the steam consumption of all users of the University of Minnesota's steam is less than 1,500,000,000 and more than 2,500,000,000 pounds per contract year, the rates provided for in this agreement shall be revised by agreement of the parties and if the parties are unable to agree, the rates shall be fixed by arbitration as herein provided.

(10) The University of Minnesota agrees that during the period specified herein, 125 psig maximum steam will be furnished at the metering point located at St. Mary's Hospital and delivered under all weather conditions which can reasonably be anticipated and that the University of Minnesota's plant will be so maintained that reasonable standby service will be available to enable the University of Minnesota to provide an emergency supply of steam notwithstanding a failure of one production unit or unavailability of one type of fuel. Augsburg College agrees that when its heating systems have been shut down for any reason, then in order to produce a normal pick-up period, steam shall be taken into Augsburg College lines only upon notice to the University of Minnesota and at times and in amounts scheduled by the University of Minnesota.

(11) Augsburg College agrees that at such time as the University of Minnesota deems it necessary to increase the steam generating capacity of its steam plant for the sole purpose of guaranteeing the reliability of steam service to all University of Minnesota customers and at such time as the actual cost of such increased steam generating capacity has been established and such

capacity installed, the University of Minnesota may thereupon revise Exhibit A-1 so as to include the amortization of such total cost over the then remaining contract life, (including the ten (10) year extension, if the option has then been exercised) at the interest rate prevailing at that time.

Augsburg College shall have the right to review and comment on any proposed capital expenditures deemed necessary to increase steam generating capacity.

(12) The University of Minnesota shall have the right temporarily to shut off the supply of steam whenever necessary to make expansions of or repairs to the boilers, mains, pipes or other equipment except the supply shall not be shut off between the hours of 7:00 A.M. and 10:00 P.M. of any day except in the case of an emergency requiring immediate attention. The University of Minnesota shall give ten days advance notice to Augsburg College before shutting off the supply of steam. No notice need be given when due to emergency causes.

(13) The University of Minnesota shall not be liable to Augsburg College for failure to supply steam because of any unforeseeable accident or because of any strike or other cause beyond the reasonable control of the University of Minnesota. In the event of any failure to supply steam for any causes other than those attributable to Augsburg College equipment, the University of Minnesota shall proceed promptly with such repairs and replacements as may be necessary to enable the University of Minnesota to restore said supply of steam. To the extent such repairs or replacements are made necessary

by reason of the willful act or negligence of Augsburg College, its agents, guests, or employees, Augsburg College shall reimburse the University of Minnesota for the reasonable cost of such repairs and replacements.

(14) Augsburg College agrees to indemnify the University of Minnesota of and from any liability for injuries to or death of persons, or damage to property, occurring upon the property of the University of Minnesota resulting from the performance of, or failure to perform, this contract.

(15) The University of Minnesota shall read the aforesaid metering devices on or about the last day of each month. Itemized bills for all charges since the last monthly billing shall be submitted to Augsburg College on or before the 10th day of the next calendar month and shall be payable when billed. Until the total annual steam consumption under this contract is established at the end of the first contract year the University of Minnesota shall bill and Augsburg College shall pay the University of Minnesota on the contract beginning basis of \$_____ per 1,000 pounds of steam consumed each month. This beginning basis is a part of Exhibit A-1.

The rate shall be reviewed every year and shall be subject to change at each review, any change to be dependent on fuel costs, labor costs, maintenance costs, insurance costs, capital costs and other relevant factors supporting the manufacture and distribution of steam energy to the consumer.

(16) In the event of noncompliance with or violation of the terms, covenants or conditions of this contract by Augsburg College,

the University of Minnesota shall have the right to declare this contract terminated, provided however, that no default, except default in the payment of monthly bills for steam consumed, shall be deemed to have occurred on the part of Augsburg College until thirty days after written notice specifying the nature of such default shall have been given to Augsburg College, and no default in the payment of monthly bills shall be deemed to have occurred on the part of Augsburg College until fifteen days after written notice specifying the amount in default shall have been given Augsburg College and unless within such thirty day period Augsburg College shall have failed to remedy such default, other than the default in payment of monthly billings, or to take reasonable steps to remedy the same, or unless within such fifteen day period Augsburg College shall have failed to pay such monthly billings.

(17) In the event of noncompliance with or violation of the terms, covenants or conditions of this contract by the University of Minnesota, Augsburg College shall have the right to declare this contract terminated upon one year's written notice in which such default shall be fully described, provided however, that if such default is remedied within three months after service of said notice, the agreement shall be reinstated and continue in full force and effect. In case of notice of termination by Augsburg College under this clause, the University of Minnesota shall nevertheless be required to continue to furnish steam to Augsburg College during said one year period.

(18) In the event of curtailment in the production of steam under emergency conditions, the steam available shall be

divided between the parties in the proportion of the loads existing immediately prior to the curtailment.

(19) In the event there are any matters affecting the interpretation of this contract that cannot be amicably settled by the parties, including any matter which this contract expressly provides may be submitted to arbitration, either party shall have the right to demand that such disputed matter be submitted to arbitration by a board of arbitrators composed of three members. Each party shall appoint one arbitrator and the two so appointed shall select a third; their decision on any disputed matter shall be final. Either party demanding arbitration shall notify the other in writing of its demand for arbitration, specifying the matter to be submitted to arbitration and the name of the arbitrator selected by it. Upon receipt of such written notice the other party shall have thirty (30) days within which to select its arbitrator and to notify the other party in writing of such selection and the two so selected shall have thirty (30) days in which to select the third arbitrator. In the event the third arbitrator is not selected within said thirty (30) days, then such third arbitrator shall be appointed by the District Court of Hennepin County, Minnesota, upon application by either party after at least 8 days written notice to the other party of the hearing of such application.

(20) Wherever in this agreement it shall be required or permitted that notice or demand be given or served by either party to this agreement to or on the other, such notice or demand shall

be given or served and shall not be deemed to have been duly given or served unless in writing and forwarded by registered or certified mail, postage prepaid, addressed as follows:

To University of Minnesota at: 319 15th Avenue Southeast
Rm. 200 Shops Building
Minneapolis, Minnesota 55455

To Augsburg College at: 731 21st Avenue South
Minneapolis, Minnesota 55454

Such addresses may be changed from time to time by either party by serving notices as above provided.

(21) This agreement shall inure to the benefit of and shall be binding upon the successors and assigns of the parties hereto and subsequent owners of the building being serviced hereunder.

(22) All previous agreements between the parties hereto, covering the subject matter hereof, if there be any, are hereby cancelled and terminated as of the effective date hereof.

IN WITNESS WHEREOF, The Regents of the University of Minnesota and Augsburg College have caused this instrument to be duly executed the day and year first above written.

In Presence of: Regents of University of Minnesota

Witness _____ BY _____

Its _____

Witness _____ And _____

Its _____

Augsburg College

Witness _____ BY _____

Its _____

Witness _____ And _____

Its _____

UNIV. OF MINN. Mpls Campus - GAIDICES		FOR REPORT 11-17-35		DRAWN <u>SES</u>
		CHECKED _____		
STEAM & CONDENSATE PIPING & METERING ADD-ON CUSTOMERS		REVISIONS		APPROVED _____
		DATE OWN APR. DATE 190017		
169		MINNEAPOLIS		HELMICK & LUTZ ENGINEERS
SCALE NONE		MINNESOTA		
NO. 625-FS-BA		REV.

"EXHIBIT A"

INSTRUMENT KEY:

①, ②, & ③ ORIFICE PLATE WITH 120" H₂O DIFFERENTIAL, ELECTRONIC TRANSMITTERS - BAILEY TYPE CC1253A, TRANSMITTING TO A STRIP CHART RECORDER - BAILEY TYPE SR1310.

④, ⑤, & ⑥ CADILLAC CONDENSATE METERS

DRAFT

EXHIBIT A-1

ANALYSIS OF STEAM COST - BASIC PLAN

FOR AUGSBURG COLLEGE AND THE UNIVERSITY OF MINNESOTA FACILITIES

As part of the contract for sale of steam to Augsburg College located at 731 21st Avenue South, Minneapolis, Minnesota, this Exhibit A-1 shall be deemed to establish the contractual cost of steam basis as part of the aforementioned contract for sale of steam between the University of Minnesota and Augsburg College and this Exhibit A-1 shall be revised to reflect changes in costs to provide steam to Augsburg College by the University of Minnesota on an annual basis no later than the end of the 12th month after the effective date of the contract for the sale of steam by the University of Minnesota to Augsburg College.

EXHIBIT A-1

COST BENEFITS - COMPARISON I.A.2(b)

Eastern Coal Vs. Western Coal, $i = 5 \frac{3}{4}\%$, $n = 15$ years

<u>Expense Item</u>	<u>Normal Combined Plant Expansion</u>	<u>Cogeneration Expansion</u>	
		<u>Elec. Gen.</u>	<u>Steam Gen.</u>
Capital Budget - 1978	\$14,829,760	\$2,634,240	\$16,917,800
Escalated Budget - 1979	15,867,845	2,818,635	18,102,045
Cost Sharing			
DOE	-0-	15,000	324,800
Legisl.	11,422,190	-0-	11,422,190
Total Cost Sharing	\$11,422,190	\$ 15,000	\$11,476,990
Loan (U of M)	\$ 4,445,655	\$2,803,635	\$ 6,355,055
Capital Recovery	\$ 450,300	\$ 283,980	\$ 643,704
Depreciation	1,001,430	78,700	1,063,810
Total Owning	\$ 1,451,730	\$ 362,680	\$ 1,707,514
<u>Operating Expenses</u> (End of 1981)			
Insurance	\$ 9,408	\$ 2,108	\$ 39,200
Purchased Utilities	343,904	7,000	381,424
Administration	99,000	24,800	132,000
Labor Supplies, Maint.	983,076	38,720	1,625,662
Fuel-Community	5,364,286	-0-	3,044,041
Fuel-Generator	-0-	-0-	226,252
Ash Handling & Landfill	74,098	-0-	92,160
Turbine Steam Purch.	-0-	485,367	-0-
Total Operating Expense	\$ 6,874,592	\$ 557,995	\$ 5,540,739
Gross Owning & Operating	\$ 8,326,322	\$ 920,675	\$ 7,248,253
Gross Production Expense			
Steam, \$/1000 lbs.	4.153	-	3.615
Electricity, \$/KWh	-	.02269	-
Community Steam Charge	4.153	-	3.373
Revenue (Steam)			
a. Community Usage	\$ 7,517,748	-	\$ 6,106,138
b. Community Line Loss	566,002	-	459,723
c. Blowdown Allocation	242,572	-	197,025
d. T-G Steam	-0-	-	485,367
Total Steam Revenue	\$ 8,326,322		\$ 7,248,253
Revenue (Elec. Gen.)			
a. Capacity	-	\$ 569,463	-
b. Energy	-	567,924	-
Total Elec. Gen. Revenue		\$1,137,387	

<u>Expense Item</u>	Normal Combined Plant <u>Expansion</u>	<u>Cogeneration Expansion</u>	
		<u>Elec. Gen.</u>	<u>Steam Gen.</u>
Gross Plant Income	\$ 8,326,322	\$1,137,387	\$ 7,248,253
Plant Cash Flow (one year operation)	-0-	\$ 216,712	-0-
Const. Cash Flow (Debt) (1979 through 1980)	\$ 828,552	\$ 522,523	\$ 1,184,415
Net Plant Cash Flow at end of 1981	(\$ 828,552)	(\$ 305,811)	(\$ 1,184,415)
Cash Flow Deficit at end of 1981	(\$ 828,552)	(\$ 305,811)	(\$ 1,184,415)

COST BENEFIT COMPARISON II.A.2.(b)

EASTERN COAL VS. WESTERN COAL

1 = 5 3/4% n = 15 years

INCREMENTAL COSTS (STEAM SIDE OF PLANTS)

	NORMAL EXPANSION WITH OPTION I					COGENERATION EXPANSION WITH OPTION I					
	SHARED EXPENSES				NON-SHARED	SHARED EXPENSES				NON-SHARED	
	Total Main Tunnel	St. Mary's	Fairview	Augsburg	Augsburg Pri & Sec	Main Tunnel	St. Mary's	Fairview	Augsburg	Augsburg Pri & Sec	Elec. Generation
Capital Budget - 1978	\$1,359,640				\$431,760	\$1,359,640				\$431,760	-0-
Escalated Budget - 1979	1,454,815				461,983	1,454,815				461,983	-0-
Cost Sharing - DOE	16,500				-0-	16,800				-0-	
- Legis.	-0-				-0-	-0-				-0-	-0-
- St. Mary's	-0-	(\$ 6,720)	out-of-pocket expense		-0-	-0-	(\$ 6,720)	out-of-pocket expense		-0-	-0-
- Fairview	-0-		(\$ 6,720) out-of-pocket		-0-	-0-		(\$ 6,720) out-of-pocket		-0-	-0-
- Augsburg	-0-			(\$ 6,720)"	-0-	-0-			(\$ 6,720)"	-0-	-0-
- U of M	10,640				-0-	10,640				-0-	-0-
Total	(\$ 27,440)					(\$ 27,440)				-0-	-0-
Total Loan	\$1,427,375				\$461,983	\$1,427,375				\$461,983	-0-
Capital Recovery	\$ 144,579	\$ 75,369	\$ 36,253	\$ 32,957	\$ 46,794	\$ 144,579	\$ 75,369	\$ 36,253	\$ 32,957	\$ 46,794	-0-
Depreciation (20 year)	35,468	18,489	8,894	8,085	11,268	11,268	18,489	8,894	8,085	11,268	-0-
(1) Total Tunnel Owning	\$ 180,047	\$ 93,858	\$ 45,147	\$ 41,042	\$ 58,062	\$ 180,047	\$ 93,858	\$ 45,147	\$ 41,042	\$ 58,062	-0-
<u>Tunnel Operating Expenses</u>											
Insurance	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-
Purch. Utilities	\$ 10,671	\$ 5,563	\$ 2,676	\$ 2,432	-0-	\$ 10,671	\$ 5,563	\$ 2,676	\$ 2,432	-0-	-0-
Administration	4,000	2,085	1,003	912	-0-	4,000	2,085	1,003	912	-0-	-0-
Labor, Supplies, Maint.	9,680	5,046	2,427	2,207	-0-	9,680	5,046	2,427	2,207	-0-	-0-
Total Tunnel Operating	\$ 24,351	\$ 12,694	\$ 6,106	\$ 5,551	\$ -0-	\$ 24,351	\$ 12,694	\$ 6,106	\$ 5,551	-0-	-0-
Total Owning & Operating	204,398	106,552	51,253	46,593	58,062	204,398	106,552	51,253	46,593		
(2) Owning & Operating Surcharge (\$ per 1000 lbs)	.6295	.32816	.15785	.14349	.78445	.6295	.32816	.15785	.14349		
<u>Augsburg Pri Add-On Operating Expense</u>											
Insurance	-0-				-0-	-0-				-0-	-0-
Purch. Utilities	-0-				-0-	-0-				-0-	-0-
Administration	-0-				830	-0-				830	-0-
Labor, Supplies, Maint.	-0-				3,000	-0-				3,000	-0-
Total Augsburg, Steam Operating	-0-	-0-	-0-	-0-	\$ 3,830	-0-	-0-	-0-	-0-	\$ 3,830	-0-
Gross Augsburg Add-On Costs	-0-	-0-	-0-	-0-	61,892	-0-	-0-	-0-	-0-	61,892	
Owning & Operating Surcharge (\$ per 1000 lbs)	-0-	-0-	-0-	-0-	.83619	-0-	-0-	-0-	-0-	.83619	

COST BENEFIT COMPARISON II.A.2.(b) (Cont'd)

EASTERN COAL VS. WESTERN COAL

i = 5 3/4% n = 15 years

INCREMENTAL COSTS (STEAM SIDE OF PLANTS)

	NORMAL EXPANSION WITH OPTION I					COGENERATION EXPANSION WITH OPTION I					
	SHARED EXPENSES				NON-SHARED	SHARED EXPENSES				NON-SHARED	
	Total Main Tunnel	St. Mary's	Fairview	Augsburg	Augsburg Pri & Sec	Main Tunnel	St. Mary's	Fairview	Augsburg	Augsburg Pri & Sec.	Elec. Generation
Plant Operating											
Community Fuel	\$ 868,495	\$452,743	\$217,776	\$197,975	-0-	\$ 510,357	\$266,047	\$127,973	\$116,337	-0-	-0-
T-G Fuel	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-
Community Ash	12,129	6,323	3,041	2,765	-0-	16,177	8,433	4,056	3,588	-0-	-0-
T-G Ash	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-
Turbine-Steam	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	\$ 18,112
Total Plant Operating	\$ 880,624	\$459,066	\$220,817	\$200,740	-0-	\$ 526,534	\$274,480	\$132,029	\$120,025	-0-	\$ 18,112
(3) Plant Operating Surcharge (\$ per 1000 lbs)	.37799	.19704	.09478	.08616	-0-	(4) .22098	(5) .11519	.05541	.05037	-0-	-0-
Base University Charge (\$ per 1000 lbs)	4.15300	4.15300	4.15300	4.15300	-0-	3.37290	3.37290	3.37290	3.37290	-0-	-0-
Gross Steam Cost Surcharge (\$ per 1000 lbs)	1.00749	.52520	.25263	.22966	-0-	.85048	.44335	.213259	.19387	-0-	-0-
Gross Steam Cost	5.16050	4.67820	4.40563	4.38266	-0-	4.22338	3.81630	3.586200	3.56680	-0-	-0-
Augsburg Surcharge for Distribution Add-On (St. Mary's to Augsburg and Augsburg Reconnect)	-0-	-0-	-0-	-0-	.83619	-0-	-0-	-0-	.83619	-0-	-0-
Gross Augsburg Steam Cost (\$ per 1000 lbs)	-0-	-0-	-0-	-0-	5.21885	-0-	-0-	-0-	4.20299	-0-	-0-

COST BENEFIT COMPARISON II.A.2.(b) (cont.)

EASTERN COAL VS. WESTERN COAL
(STEAM SIDE OF PLANTS)

NORMAL PLANT EXPANSION WITH OPTION I
INCREMENTAL EXPENSE SUMMARY (AUGSBURG AMORTIZES
ITS PRIMARY & SECONDARY DIST. CAPITAL)

COGENERATION EXPANSION WITH OPTION I
INCREMENTAL EXPENSE SUMMARY (AUGSBURG AMORTIZES
ITS PRIMARY & SECONDARY DIST. CAPITAL)

Cost Item (Incremental)	NORMAL PLANT EXPANSION WITH OPTION I						COGENERATION EXPANSION WITH OPTION I						
	Tunnel Surcharge	SHARED EXPENSES			AUGS. DIST.		Tunnel Surcharge	SHARED EXPENSES			AUGS. DIST.		Elec. Gen.
		St. Mary's	Fairview	Augsburg	Dist.	Total		St. Mary's	Fairview	Augsburg	Dist.	Total	
Owning	\$ 180,047	\$ 93,858	\$ 45,147	\$ 41,042	\$58,062	\$ 92,232	\$180,047	\$ 93,858	\$ 45,147	\$ 41,042	\$58,062	\$ 99,104	-0-
Tunnel Operating	24,351	12,694	6,106	5,551	-0-	5,551	24,351	12,694	6,106	5,551	-0-	-0-	-0-
Plant Operating	880,624	459,066	220,817	200,740	-0-	200,740	526,534	274,480	132,029	120,025	-0-	-0-	-0-
Augsburg Operating	-0-	-0-	-0-	-0-	3,830	3,830	-0-	-0-	-0-	-0-	3,830	3,830	-0-
Turbine Gen.	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	\$ 58,926
Total Owning-Operating	\$1,085,022	\$565,618	\$231,440	\$247,333	\$61,892	\$302,353	\$730,932	\$381,032	\$183,282	\$116,618	\$61,892	\$102,934	\$ 58,926
(6)Gross Steam Surcharge (\$ per 1000 lbs)	1.00749	.5252	.25263	.22966	.83619	1.06585	.85048	.44335	.213259	.19387	.83619	1.03006	-0-
University Base Cost (\$ per 1000 lbs) See I.A.2(b)	4.15300	4.1530	4.15300	4.15300	-0-	4.15300	3.37290	3.37290	3.372900	3.37290	-0-	3.37290	-0-
Gross Steam Charge (\$ per 1000 lbs)	\$ 5.16050	\$ 4.6782	\$4.40563	\$4.38266	-0-	\$5.21885	\$4.22338	\$3.81630	\$3.586200	\$3.56680	-0-	\$4.40296	-0-
INCREMENTAL EXPENSE SUMMARY (ALL DISTRIBUTION ADD-ON COSTS ARE SHARED)							INCREMENTAL EXPENSE SUMMARY (ALL DISTRIBUTION ADD-ON COSTS ARE SHARED)						
Owning	\$ 180,047	\$ 93,858	\$ 45,147	\$ 41,042	-0-	-0-	\$180,047	\$ 93,858	\$ 45,147	\$ 41,042	-0-	-0-	-0-
Add-on (Augsburg)	46,794	24,394	11,734	10,667	-0-	-0-	46,794	24,394	11,734	10,667	-0-	-0-	-0-
Tunnel Operating	24,351	12,694	6,106	5,551	-0-	-0-	24,351	12,694	6,106	5,551	-0-	-0-	-0-
Plant Operating	880,624	459,066	220,817	200,740	-0-	-0-	526,534	274,480	132,029	120,025	-0-	-0-	-0-
Augsburg Operating	-0-	-0-	-0-	-0-	\$ 3,830	\$ 3,830	-0-	-0-	-0-	-0-	\$ 3,830	\$ 3,830	-0-
Turbine Gen.	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	\$ 56,287
Total Owning & Operating	\$1,131,816	\$565,618	\$283,804	\$258,000	\$ 3,830	\$ 3,830	\$777,732	\$405,426	\$ 195,016	\$177,285	\$ 3,830	\$ 3,830	\$ 56,287
Total Steam Surcharge (\$ per 1000 lbs)	1.15159	.6003	.28876	.26250	.051700	.05170	.99460	.51850	.249400	.22670	.051700	.05170	-0-
University Base Cost (\$ per 1000 lbs)	4.15300	4.1530	4.15300	4.15300	-0-	-0-	3.37290	3.37290	3.372900	3.37290	-0-	-0-	-0-
Gross Steam Charge (\$ per 1000 lbs)	\$ 5.30460	\$ 4.7533	\$4.44176	\$4.41550	-0-	-0-	\$4.36750	\$3.89140	\$3.622300	\$3.59960	-0-	-0-	-0-
Augsburg Operation (\$ per 1000 lbs)	-0-	-0-	-0-	.05170	-0-	-0-	-0-	-0-	-0-	.05170	-0-	-0-	-0-
Gross Augsburg Cost (\$ per 1000 lbs)	-0-	-0-	-0-	\$4.46720	-0-	-0-	-0-	-0-	-0-	\$3.65130	-0-	-0-	-0-

COST BENEFIT COMPARISON II, A.2(b) (Cont'd)
EASTERN COAL VS. WESTERN COAL
i = 5 3/4% n = 15 years

NORMAL PLANT EXPANSION WITH OPTION I
INCREMENTAL SUMMARY (AUGSBURG AMORTIZES)
ITS PRIMARY AND SECONDARY DISTRIBUTION CAPITAL)

Item (Incremental)	St. Mary's	Fairview	Augsburg	Augsburg Dist.	Total
Steam Revenues					
a. Community Usage	\$714,604	\$323,708	\$292,757	\$ 55,857	\$1,386,926
b. Community Loss	54,075	24,495	22,141	4,224	104,935
c. Community Blowdown	23,176	10,499	9,488	1,810	44,972
d. Turbine Generator	-0-	-0-	-0-	-0-	-0-
Total Steam Revenues	\$791,854	\$358,702	\$324,386	\$ 61,891	\$1,536,833
Gross Plant Owning & Operating Net Plant Income (Steam Generation)	\$791,854	\$358,702	\$324,386	\$ 61,891	\$1,536,833
	-0-	-0-	-0-	-0-	-0-

COGENERATION EXPANSION WITH OPTION I
INCREMENTAL SUMMARY (AUGSBURG AMORTIZES)
ITS PRIMARY AND SECONDARY DISTRIBUTION CAPITAL)

Item (Incremental)	St. Mary's	Fairview	Augsburg	Augsburg Dist.	Elec. Gen.	Total
Steam Revenues						
a. Community Usage	\$582,947	\$263,500	\$238,259	\$ 55,957	\$ -0-	\$1,140,563
b. Community Loss	44,113	19,940	18,019	4,224	-0-	86,296
c. Community Blowdown	18,906	8,546	7,722	1,810	-0-	36,984
d. Turbine Generator	-0-	-0-	-0-	-0-	58,844	58,844
Total Steam Revenues	\$645,966	\$291,986	\$264,000	\$ 61,891	\$ 58,844	\$1,322,687
Gross Plant Owning & Operating Net Plant Income (Steam Generation)	\$645,966	\$291,986	\$264,000	\$ 61,891	\$ 18,112	\$1,281,955
	-0-	-0-	-0-	-0-	-0-	\$ 40,732

INCREMENTAL SUMMARY
(ALL DISTRIBUTION ADD-ON COSTS ARE SHARED)

Item (Incremental)	St. Mary's	Fairview	Augsburg	Augsburg Dist.	Total
Steam Revenues					
a. Community Usage	\$726,076	\$326,363	\$294,951	\$ 3,454	\$1,350,844
b. Community Loss	54,943	24,696	22,307	261	102,207
c. Community Blowdown	23,548	10,585	9,560	112	43,805
d. Turbine Generator	-0-	-0-	-0-	-0-	-0-
Total Steam Revenues	\$804,567	\$361,644	\$326,818	\$ 3,827	\$1,496,856
Gross Plant Owning & Operating (Steam)	\$804,567	\$361,644	\$326,818	\$ 3,827	\$1,496,856
Net Plant Income (Steam Generation)	\$ -0-	\$ -0-	\$ -0-	\$ -0-	\$ -0-

INCREMENTAL SUMMARY
(ALL DISTRIBUTION ADD-ON COSTS ARE SHARED)

Item (Incremental)	St. Mary's	Fairview	Augsburg	Augsburg Dist.	Elec. Gen.	Total
Steam Revenues						
a. Community Usage	\$594,419	\$266,152	\$240,450	\$ 3,454	\$ -0-	\$1,104,475
b. Community Loss	44,981	20,140	18,185	261	-0-	155,774
c. Community Blowdown	19,278	8,631	7,793	112	-0-	35,814
d. Turbine Generator	-0-	-0-	-0-	-0-	56,287	56,287
Total Steam Revenues	\$658,678	\$294,923	\$266,428	\$ 3,827	\$ 56,287	\$1,352,350
Gross Plant Owning & Operating (Steam)	\$658,678	\$294,923	\$266,428	\$ 3,827	\$ 18,112	\$1,251,953
Net Plant Income (Steam Generation)	\$ -0-	\$ -0-	\$ -0-	\$ -0-	\$ -0-	\$ 140,332

COST BENEFIT COMPARISON II.A.2(b) - (Cont.)
EASTERN COAL VS. WESTERN COAL
i = 5 3/4%, n = 15 years

TURBINE-GENERATOR SIDE
(AUGSBURG AMORTIZES ITS PRIMARY & SECONDARY DISTRIBUTION)

Elec. Gen. Revenues (Incremental)	
a. Capacity	\$ 9,877
b. Energy	<u>58,926</u>
Total Elec. Gen. Revenues	<u>\$68,803</u>
Incremental Operating	<u>\$58,844</u>
Net Gain (End of 1981)	\$ 9,959

TURBINE-GENERATOR SIDE
(AUGSBURG ADD-ON IS COST SHARED BY PARTNERS)

Total Elec. Gen. Revenues (Incremental)	\$68,803
Incremental Operating	<u>\$56,287</u>
Net Gain (End of 1981)	\$12,516

SUMMARY - COST BENEFIT COMPARISON II.A.2(b)
EASTERN COAL VS. WESTERN COAL

	NORMAL PLANT EXPANSION WITH OPTION I (AUGSBURG AMORTIZES ITS PRIMARY AND SECONDARY)			COGENERATION EXPANSION WITH OPTION I (AUGSBURG AMORTIZES ITS PRIMARY AND SECONDARY)						
	Normal Expansion			Elec. Gen.			Steam Gen.			
	Base Cost (I.A.2(b))	Incremental II.A.2(b)	Total	Base Cost (I.A.2(b))	Incremental II.A.2(b)	Subtotal	Base Cost I.A.2(b)	Incremental II.A.2(b)	Subtotal	Total
Gross Owing & Operating	\$8,326,322	\$1,536,833	\$9,863,155	\$ 920,675	\$58,844	\$ 979,519	\$7,248,253	\$1,281,955	\$8,530,208	\$9,509,727
Revenues	<u>8,326,322</u>	<u>1,536,833</u>	<u>9,863,833</u>	<u>1,137,387</u>	<u>68,803</u>	<u>1,206,190</u>	<u>7,248,253</u>	<u>1,322,687</u>	<u>8,570,940</u>	<u>9,777,130</u>
Annual Gain	-0-	-0-	-0-	\$ 216,712	\$ 9,959	\$ 226,671	-0-	\$ 40,732	\$ 40,732	\$ 267,403

SUMMARY - COST BENEFIT COMPARISON II.A.2(b)
EASTERN COAL VS. WESTERN COAL

	NORMAL PLANT EXPANSION WITH OPTION I (ALL DISTRIBUTION ADD-ON COSTS ARE SHARED)			COGENERATION EXPANSION WITH OPTION I (ALL DISTRIBUTION ADD-ON COSTS ARE SHARED)						
	Normal Expansion			Elec. Gen.			Steam Gen.			
	Base Cost (I.A.2(b))	Incremental II.A.2(b)	Total	Base Cost (I.A.2(b))	Incremental II.A.2(b)	Subtotal	Base Cost I.A.2(b)	Incremental II.A.2(b)	Subtotal	Total
Gross Owing & Operating	\$8,326,322	\$1,536,833	\$9,863,155	\$ 920,675	\$56,287	\$ 976,962	\$7,248,253	\$1,241,968	\$8,490,221	\$9,437,183
Revenues	<u>8,326,322</u>	<u>1,536,833</u>	<u>9,863,155</u>	<u>1,137,387</u>	<u>68,803</u>	<u>1,206,190</u>	<u>7,248,253</u>	<u>1,382,350</u>	<u>8,630,603</u>	<u>9,836,793</u>
Annual Gain	-0-	-0-	-0-	\$ 216,712	\$12,516	\$ 229,228	-0-	\$ 140,382	\$ 140,382	\$ 369,610

During Stage 1 and Stage 2 of Phase II, the University began negotiation with the Burlington-Northern Railway, and Northern States Power Company to increase the size of unit train delivery of coal from the Westmoreland Mine in Montana from 70 cars to 105 cars.

Preliminary meetings on this concept culminated in a special purchase of Westmoreland coal that came to a barge transfer point in the Twin Cities via Northern States Power Company's unit train. The cost of coal under this arrangement was approximately \$17 per ton at the University. Of this total cost barge transfer cost was \$1.50 per ton.

The University, since the aforementioned shipment, has now completed negotiations related to straight-through unit trains from Westmoreland to the University bypassing the barge transfer and eliminating the \$1.50 per ton. Under this plan the University will negotiate mine costs, and the Burlington-Northern will add the the transport tariff. Northern States Power Company's unit trains will increase from 70 cars to 105 cars with 35 cars being split off in Minneapolis and shuttled to the University.

The University has designed car coal handling to bottom dump and turn around a 35 car unit train in 10 hours. Besides elimination of the barge transfer operation (\$1.50 per ton), utilization of 13,000 tons of additional storage at Southeast Steam and some increased storage at its St. Paul Plant, the University will also eliminate \$3 per ton off campus storage charges of coal. This occurs because with the existing storage facilities and discontinuance of barged coal up the Mississippi during peak winter heating months the University could not store enough coal on-site to get through the winter. With a unit train the University will have the capacity to burn its requirements and keep on-site storage up to capacity and eliminate off campus storage.

Pertinent letters to the University's negotiations are included in this section.

UNIVERSITY OF MINNESOTA
TWIN CITIES

Physical Plant Maintenance and Operations
200 Shops Building
319 15th Avenue S.E.
Minneapolis, Minnesota 55455

January 30, 1978

Mr. Richard Sandgren
Director of Pricing
Energy and Metallics
Burlington-Northern Railroad
176 East Fifth Street
St. Paul, Minnesota 55101

RE: Tariff Structure of Partial Unit Train Deliveries of Western Coal

Dear Mr. Sandgren:

Recalling some previous meetings we had in your offices regarding the splitting of full unit train deliveries of coal between Northern States Power and the University it was decided that some engineering studies should be undertaken before a tariff estimate to the University could be determined. Since our last meeting the following information has become available.

1. Track usage, operating limits, construction standards, spur arrangement, property realignment, coal transfer facility, and Burlington-Northern review at the University appears acceptable to the Burlington-Northern. Enclosed are preliminary engineering drawings of the arrangement. Mr. Al Wirkler of the Burlington-Northern has been present at all meetings and can fill you in on any questions you may have. There is a problem with track-to-track or track-to-personnel working clearance which Mr. Wirkler is resolving with Burlington-Northern officials.
2. The design of coal unloading will allow the University to turn around 40-100 ton cars in any 10 hour period.

January 30, 1978

TO: Richard Sandgren

RE: Tariff Structure of Partial Unit Train Deliveries of Western Coal

3. Our expected partial unit train delivery (35 car basis) by month for the fiscal year 1980 is as follows:

January	10
February	6
March	5
April	4
May	4
June	4
July	5
August	4
September	4
October	5
November	6
December	<u>9</u>

Annual Requirement = 66-35 Car Trains

or 231,000 Tons Western Coal

Based upon the above data please determine the University's tariff. Because of our interaction on this project with D.O.E. (Final report due March 8, 1978) and Northern States Power, I would appreciate your expediting the tariff estimate determination by February 15, 1978, so that we can make our final cost analysis prior to the submittal. We would also hope to have a meeting between Burlington-Northern, Northern States Power and the University once your determination is made. This meeting is necessary so that we can get a letter of intent (For D.O.E. purposes) from Northern States Power for our final March 8, 1978 submittal to D.O.E.

We have appreciated the fine cooperation the Burlington-Northern has shown the University and their understanding shown to our timing problems. Thanks again. Please call me at 376-3455 if you need more information.

Sincerely yours,

James C. O'Gara
Principal Plant Engineer

JCO:skl

cc: A. Wirkler
W. Soderberg
O. J. Nelson
G. Burke
J. Roback

Enclosure: 4 Drawings

UNIVERSITY OF MINNESOTA
TWIN CITIES

Physical Plant Maintenance and Operations
200 Shops Building
319 15th Avenue S.E.
Minneapolis, Minnesota 55455

October 4, 1977

Mr. Robert James
PUrchasing Dept.

Dear Mr. James:

As you know, last May we requested bids for 80,000 Tons of coal per barge delivery for Minneapolis and St. Paul Campus Heating Plants.

The low bidder was C. Reiss Coal Co. The past month or so, we have met several times with them, relative to the rate of coal delivery. The attached letter, dated September 28, 1977, explains the reason for their inability to deliver the 80,000 Tons of coal prior to the close of this season's river shipping. At our last meeting, they indicated that the C. Reiss Coal Co. wishes to acknowledge their contract and will fulfill their obligation next spring when river navigation opens. This is agreeable with us.

To replace the approximately 25,000 Tons of coal yet required for the coming heating season, we made several inquiries relative to the availability of barge delivery of either a Western or Eastern high BTU coal.

The United Coal Co. would be unable to supply any coal at this time.

The Great Lakes Coal Co. indicates that an Eastern coal was available for barge delivery at a cost of \$42.00 per ton. The next day they called and indicated the cost had increased to \$52.00 per ton. They indicated they do have a Montana coal which is available. The cost of this coal, at our dock would be \$17.2247 per ton. A breakdown of costs is as follows:

The price of the coal at the mine per ton (see letter of September 23, 1977)	\$ 7.85
Rail and transfer charges per NSP letter dated October 3, 1977 would be	7.7747
Barge delivery re Bolander's letter dated October 3, 1977 and J. Weeks' letter dated October 3, 1977	1.60
	<hr/> \$17.2247

Mr. Robert James
October 4, 1977
Page 2

The Westmoreland Resources also have a Montana coal at a price of \$7.85 per ton at the mine cost, (see their letter dated September 28, 1977). The cost for rail charges, transfer, shipping, barge, etc., is identical to that of Great Lakes making the cost per ton at our dock \$17.2247.

Also included is a submittal from Northlake Materials Inc. dated October 3, 1977 at a cost alongside our dock of \$16.97 per ton. In confirming the cost method of billing with both N.S.P and Northlake, it was apparant that NSP would be billed for the freight and handling charges directly. Northlake submitted another letter dated October 3, 1977 confirming this and also indicated that NSP will bill the University directly for freight charges. Also in the letter, they indicated that they had received an escalation clause effective September 1, 1977 at an increase of \$.102 per ton which would reflect back to their previous letter. The total cost of coal at our dock from the Northlake Materials Inc. without the escalation would be \$9.29 for the coal and barging: \$7.7747 for NSP's charges for a total of \$17.0647 per ton at our dock. An addition of \$.102 for the escalation charges makes the cost \$17.1667 per ton.

It is recommended we place an order for 25,000 Tons of coal with Northlake at the escalation cost of \$9.392 per Ton or \$234,800.00. It is also recommended we place a Purchase Order with NSP for freight charges in the handling of the 25,000 Tons of coal at \$7.7747 for \$194,367.00

Yours truly,

Joseph J. Roback
Heating Plants Superintendentn

JJR/mt
Enc.
cc: W.E. Soderberg

BURLINGTON NORTHERN

PRICING AND ENERGY DIVISION
MARKETING DEPARTMENT

176 East Fifth Street
St. Paul, Minnesota 55101
Telephone (612) 298-2121

Mr. James C. O'Gara
Principal Plant Engineer
University of Minnesota
319 - 15th Ave. SE
Minneapolis, MN 55455

March 29, 1978

Dear Mr. O'Gara:

This confirms quotation of 1000¢ per net ton tendered you during the course of our meeting March 27 to cover movement of coal from Kuehn or Colstrip, MT to the University of Minnesota. This assumes such tonnage will be handled as a part of the 105 car unit trains loaded for NSP with 35 cars being delivered to the U of M trackage and the remaining 70 cars to be delivered to NSP.

As explained the 1000¢ reflects the current 761¢ net ton rate published in BN Volume Tariff 269 under which NSP operates plus an additive of 239¢ net ton for U of M tonnage. The additive will also be escalated each July 1 with the first escalation occurring July 1, 1979. The formula presently being used to determine the amount of escalation in connection with the rate in BN 269 will also be used to determine the amount of escalation to apply to the additive.

Sincerely,

G. W. Brown
Director of Pricing

File: 2000 U of M
cc: 2000 NSP

cc: Mr. Warren Soderberg, University of Minnesota, 221 Church St. SE, Minneapolis, MN 55455
Mr. R. J. Kermes, Fuel Engineer, Northern States Power Co., 414 Nicollet Mall, Minneapolis, MN 55401
Mr. M. M. Donahue, BN Inc. - St. Paul (ATTN: Al Wirkler)

UNIVERSITY OF MINNESOTA
TWIN CITIES

Engineering and Construction Division
Physical Planning Office
26 Folwell Hall
9 Pleasant Street S.E.
Minneapolis, Minnesota 55455

February 2, 1978

Mr. David A. Oleson, Assistant Manager
Industrial Development and Properties
Burlington Northern
17 Washington Avenue North
Minneapolis, Minnesota 55401

Re: University Grid I.C.E.S.
Program for Handling Carloads
of Coal for our Minneapolis
Campus Heating Plant, Building
No. 34 and No. 59.

Dear Mr. Oleson:

The University of Minnesota Physical Plant Department and the Engineering and Construction Department have had several meetings with your office to discuss the physical layout for 35 to 40 car train loads of Western Coal, to be handled by rail into University property. As you know, the University hired a Registered Land Surveyor to locate the common property line between Burlington Northern and the University. This shows that the coal storage and handling, as currently proposed, would be both on your property and the University's. This raises a number of questions. Some of those questions are as follows:

- A) Should the University own the land for the proposed storage and coal handling operation? If so, will Burlington Northern sell the necessary land to the University?
- B) Will Burlington Northern build the additional trackage for the University, or will it be necessary to contract with an outside source?
- C) Would we have to define common usage of the trackage?
- D) Would common switches be acceptable? If so, would there be a labor union problem or a safety problem?
- E) The University intends to own and operate a switch engine. What would be the safety problems, and how might they be alleviated with the University operating this engine in conjunction with the Burlington Northern trackage?
- F) Would the University be able to rent a switch engine from Burlington Northern for a short period of time during emergency repairs to our own switch engine?

Mr. David A. Oleson
February 2, 1978
Page Two

- G) What signals would be required between the University trackage and Burlington Northern?
- H) What type of roadbed, switches, ties, tie plates, and weight of rail would be recommended for our trackage?
- I) Type of and size of switch engine required?

Enclosed are five copies of our drawings showing the site with trackage, coal unloading facilities, coal conveyors and land surveyors' property line location. If there are any other items that we have missed, please let us know of your concern.

We have appreciated the fine cooperation given us in all of our contacts with the Burlington Northern. We need one more favor from you and the Burlington Northern Staff. Because of our involvement with the U.S. Department of Energy and their competitive and contractual deadline in reporting for this program, we require that the above questions be answered by March 1, 1978. Thanks again.

Very truly yours,

O. J. Nelson, P.E.
Assistant Supervising Engineer

OJN:mn

Enclosures

cc: Clinton N. Hewitt
Paul E. Kopietz
Warren E. Soderberg
✓ James C. O'Gara
R. Joel Tierney
George W. Burke, Helmick and Lutz Company
Charles G. Brummer, Helmick and Lutz Company

BURLINGTON NORTHERN

INDUSTRIAL DEVELOPMENT AND
PROPERTY MANAGEMENT DEPARTMENT

17 Washington Avenue North
Minneapolis, Minnesota 55401

Mr. O. J. Nelson, P.E.
Assistant Supervising Engineer
Engineering & Construction Division
University of Minnesota
26 Folwell Hall
9 Pleasant St. SE
Minneapolis, MN 55455

February 27, 1978

Dear Mr. Nelson:

Upon receipt of your February 2 letter and subsequent receipt of applicable prints, we called for and had a meeting with our Director of Property Management and our Manager of Contracts, as well as a joint meeting of our Operations personnel, to review and answer the questions you raised, as follows:

- A) We do not wish to sell our ownership in the vicinity of the proposed trackage and unloading system. Use of the subject property will be through lease arrangements. A standard indefinite term lease would cover the land underlying your unloading shed and that portion of the conveyor system placed upon our property. The right-of-way beneath the proposed trackage would be covered under our standard spur track agreement, within which we would set a charge of 3.8¢ per track foot per annum for use of that right-of-way.
- B) Our Operations group prefers the University arrange for construction of the required trackage with the exception of any portion connecting to our existing track, which must be done by our forces. Also, a certain portion of our existing trackage will be sold to the University to alleviate disjoint ownerships. Additional switch connections will be required at the most northerly end of the double storage trackage for servicing reasons, and these connections, as well as other pertinent track detail, will be more clearly presented with prints and cost estimates now being prepared by our Engineering Department, which should be available soon.

- C) Our standard spur track agreement will cover the construction, maintenance, ownership and operation of the trackage.
- D) Again, the spur track agreement will define.
- E) Our Yard Master at Union Yard will coordinate with a University of Minnesota designee as to switching of the storage tracks. You should advise as soon as decided as to the individual or office at the University such coordination will be handled with. Our Terminal Superintendent requests that the cars be handled with air in the braking systems at all times.
- F) We would attempt to accommodate a request for rental of a switch engine on an availability basis. We are sorry a more definite response to this particular question cannot be made, but I think you can understand our situation in not knowing what power we would have available at any given time, therefore, prefer not to make a firm commitment.
- G) One of the additional switch connections mentioned in answer "B" will be in auto block signal territory and the placement and cost for applicable signal will be arranged by our forces and included in the cost analysis. At the point of switch off our "western lead" a derail and appropriate marking will be required, which will also be included in the cost analysis for track work.
- H) Our people recommend 112-lb. rail with rock ballast, #4 ties, #11 turnouts, 8-inch x 11-inch tie plates and abundant track anchors. Further discussion on this recommendation can be had with our Terminal Superintendent if clarification is required.
- I) A 1,000 horsepower switch engine should be considered.

The present condition of our "western lead" between our switch at 15th Ave. and the switch connection to your trackage will not be acceptable for the extensive coal movement contemplated. In situations similar to this, we require participation by the Industry in the cost of upgrading the trackage involved. Our standard terms call for the University to assume the cost of the labor and Burlington Northern to assume cost of materials. These costs will be available for our review, along with the other costing data being prepared by our Engineering Department.

We trust the above will provide sufficient information for continuing your study. There are a few commitments we must obtain from our Labor Relations office and the preliminary reaction seems to be favorable. This we should have confirmed shortly.

Very truly yours,

B. A. Olson
Assistant Manager

cc: Mr. James C. O'Gara

RELCO EQUIPMENT

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Relco Equipment, Inc. would be pleased to discuss our service with you. Please call us.

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George F. Bachman
President

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