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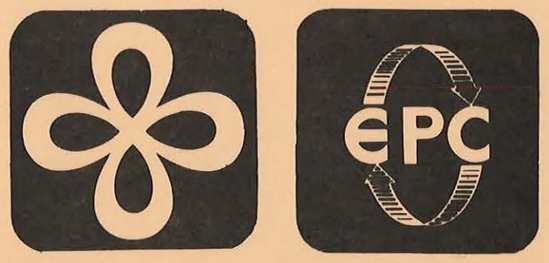
BOILER CO-UTILIZATION STUDY

Iowa Energy Policy Council



BROWN ENGINEERING COMPANY

DEWILD GRANT RECKERT AND ASSOCIATES COMPANY

IOWA ENERGY POLICY COUNCIL
BOILER CO-UTILIZATION STUDY

The financial support of the Iowa Energy Policy Council is acknowledged, but Brown Engineering Company and DeWild Grant Reckert and Associates Company assume complete responsibility for the contents.

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF IOWA.

Jay R Read Aug 21 19 81

JAY R. READ, P. E. IOWA REG. NO. 5509

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF IOWA.

Arthur B DeWild Aug 21, 1981

IOWA REG. NO. 7156

BROWN ENGINEERING COMPANY

DeWILD GRANT RECKERT AND ASSOCIATES COMPANY

August, 1981

BROWN ENGINEERING COMPANY

1001 OFFICE PARK ROAD SUITE 300
WEST DES MOINES, IOWA 50265
515/225-6900

August 28, 1981

Iowa Energy Policy Council
State Capitol Complex
Des Moines, IA 50319

Subject: Boiler Co-Utilization Study

Dear Council Members:

This report presents the results of a study of sixteen existing boiler plants in Iowa. The study investigated the feasibility of using excess steam capacity from existing plants to provide energy for new grain ethanol plants or other appropriate applications.

The report indicates that co-utilization of steam would be feasible for five of the plants. For the remaining plants construction of new coal-fired boilers would be more economically feasible than co-utilization.

The report was prepared by the undersigned of Brown Engineering Company and Mr. Arthur deWit of DeWild Grant Reckert and Associates Company, assisted by other staff members. We wish to thank the Iowa Energy Policy Council staff for valuable assistance in the report preparation.

Respectfully submitted,

BROWN ENGINEERING COMPANY

Jay R. Read, P.E.
Partner

JRR:sp

Enclosure

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

The Iowa Energy Policy Council (EPC) retained the consulting engineering team of Brown Engineering Company, West Des Moines, Iowa, and DeWild Grant Reckert and Associates Company, Rock Rapids, Iowa, to study sixteen existing steam plants in Iowa. The purpose of the study was to determine the feasibility of using excess steam capacity, from these plants, as an energy source for new grain ethanol plants or for other applications. This report presents the findings of that study. Due to limitations of funding available to EPC, the study did not consider overall economics of ethanol production but only compared energy costs of the co-utilization of existing steam plants with construction of new steam plants.

The study was conducted in two phases. Phase I investigated steam plant condition; steam quantity and availability; availability of land, water and utilities; availability of feedstocks, transportation and storage; availability of product and by-product transportation and utilization; environmental constraints; reduction of energy requirements; and feasibility of other applications. Phase II included an economic evaluation for those facilities not excluded after Phase I evaluation. The economic evaluation included estimates for cost of modification, back-up energy systems, purchased price of steam, operation of steam system, steam cost per gallon of ethanol produced over a ten year period, and comparison of steam cost per gallon for co-utilization versus installation of a coal-fired boiler. In addition, risks to implementation were identified.

The study included investigation of the following existing facilities:

Boone Valley Cooperative, Eagle Grove, Iowa

Chemplex Company, Clinton, Iowa

Corn Belt Power Cooperative, Windom Station, Spencer, Iowa

Corn Belt Power Cooperative, Humboldt, Iowa

Eastern Iowa Light and Power Cooperative, Montpelier, Iowa

Iowa Electric Light and Power Company, Sutherland Station, Marshalltown, Iowa

Iowa Illinois Gas and Electric Company, Bettendorf, Iowa

Iowa Power and Light Company, Des Moines Power Station, Des Moines, Iowa

Iowa Public Service Company, Carroll, Iowa

Iowa Public Service Company, Neal Station, Sioux City, Iowa

Iowa Public Service Company, Hawkeye Station, Storm Lake, Iowa

Iowa Public Service Company, Maynard Station, Waterloo, Iowa

Iowa Southern Utilities Company, Burlington, Iowa

Muscatine Power and Water, Muscatine, Iowa

Northern Natural Gas (Inter North), Ogden Compressor Station, Ogden, Iowa

Rath Packing Company, Waterloo, Iowa.

The following six facilities were excluded from further study, after Phase I analysis, for the reasons noted:

1. Boone Valley Cooperative, Eagle Grove, Iowa

   No excess steam is available at this time.

2. Chemplex Company, Clinton, Iowa

   No excess steam is available at this time.

3. Iowa Illinois Gas and Electric Company, Bettendorf, Iowa
   Remaining useful life is not adequate to support construction of a new ethanol plant.

4. Iowa Public Service Company, Carroll, Iowa
   Remaining useful life is not adequate to support construction of a new ethanol plant.

5. Iowa Public Service Company, Storm Lake, Iowa
   Two ethanol plants are already planned for this area and useful life is questionable.

6. Muscatine Power and Water, Muscatine, Iowa
   Remaining useful life is not adequate to support construction of a new ethanol plant.

The remaining ten sites were subjected to Phase II analysis. Economic evaluations indicated that co-utilization of steam would result in lower cost than construction of new coal-fired boilers at the following facilities:

1. Corn Belt Power Cooperative, Spencer, Iowa
2. Eastern Iowa Light and Power Cooperative, Montpelier, Iowa
3. Iowa Electric Light and Power Company, Sutherland Station, Marshalltown, Iowa
4. Iowa Power and Light Company, Des Moines Power Station, Des Moines, Iowa
   Ethanol facilities are planned for this site.
5. Iowa Public Service Company, Neal Station, Sioux City, Iowa.
   Ethanol facilities are planned for this site.

For the remaining five sites, installation of a new coal-fired boiler with gas-fired back-up boilers would be more economical than co-utilization.

The facilities in this category include:

1. Corn Belt Power Cooperative, Humboldt, Iowa
2. Iowa Public Service Company, Waterloo, Iowa
3. Iowa Southern Utilities, Burlington, Iowa
4. Northern Natural Gas, Ogden Compressor Station, Ogden, Iowa
5. Rath Packing Company, Waterloo, Iowa.

STUDY ASSUMPTIONS

STUDY ASSUMPTIONS

(1) Hours of Operation: 340 days per year, 24 hours per day

(2) Feedstock: Yellow Dent Corn, 15.5% moisture, 56 pounds per bushel

(3) Process: Whole Corn Milling (dry) to optimize starch yield.

(4) Products: 2.5 gallons 200° proof ethanol per bushel of corn
6.7 lb DDG at 10% moisture, per gallon of 200° proof ethanol
6.0 lb CO_2 per gallon of ethanol

(5) Steam Consumption:

50,000 Btu per gallon of ethanol

(6) Electric Power Consumption:

2.0 KwH per gallon of ethanol

(7) Steam Supply:

Minimum pressure 100 psig, saturated, delivered to ethanol plant.

(8) Distribution of Heat in Process:

Mashing and Cooking	20%
Distillation	43%
DDG Recovery	4%
Drying of DDG	33%
	100%

(9) Condensate Returned from Alcohol Process: 75%
25% make-up provided at alcohol plant.

(10) Process Make-up Water for Ethanol Plant:

5.5 gallon make-up per gallon ethanol

(11) Cooling Water for Ethanol Plant:

Circulate 150 gpm at 85° maximum per million gallon per year of ethanol produced
Example for 20 million gallon plant:

(150 gpm) (20) = 3000 gpm @ 85° Max.

(12) Wastewater to Treatment:

5 gallon wastewater per gallon ethanol produced

(13) Construction Costs (1981):

Coal fired steam plant, complete: $60/lb steam
Gas/oil package boiler plant, complete: $30/lb steam

(14) Inflation Rates:

Construction and Labor: 10% per year
Coal Cost: 12% per year
Oil Cost: 15% per year
Natural Gas Cost: 20% per year

(15) Land Area Required for Ethanol Plant Including Grain Storage:

5 million gal/yr plant - 10 acres
20 million gal/yr plant - 15 acres
50 million gal/yr plant - 20 acres

(16) 1981 Fuel

#2 oil: $7.14 per million Btu.
Firm Natural Gas: $2.90 per million Btu
Washed Iowa Coal: $36 per ton + $.08 per ton-mile
10,500 Btu per pound
Mine at Centerville, IA
Mines near Lovilia, IA

(17) Existing plants use boiler steam in reboiler to generate 150 psig, saturated steam for alcohol plant.

(18) Condensate returned from alcohol plant at 100°F.

(19) Steam delivered to alcohol plant at not less than 100 psi saturated.

(20) Steam generated by back-up boilers or new coal fired boilers to be 150 psig saturated using 100°F condensate as feedwater.

(21) Fixed charge rate based on 20 year life and 10% interest.

$$\frac{A}{P} = \frac{i}{1-(1+i)^{-n}} = \frac{.1}{1-(1.1)^{-20}} = .1175$$

Add insurance @ .005

Annual Fixed charge Rate = .123

(22) Labor, maintenance, supplies, station power costs.

Coal fired boiler: $.60 per 1000 lb. steam
Gas/oil fired boiler: $.20 per 1000 lb. steam

(23) Estimated corn supply, potential DDG market, and Potential Alcohol Market are based on the county in which the plant is located with the exception of the Iowa Public Service Company, Sioux City, Iowa plant which is based on both Woodbury and Plymouth counties.

(24) Boilers over 30 years in age rejected for Phase II analysis.

(25) Feed water to existing boilers assumed to be same condition as reboiler condensate; 250 psig, 406°F saturated liquid.

(26) If coal cost at existing plant is less than current Iowa coal cost (item 16) plant coal cost is used for new boiler installations.

(27) Demineralizer backwash water is 16% of demineralized water required.

(28) Cooling towers used at all sites except Montpelier, Burlington and Sioux City which use once through cooling with river water.

(39) Cooling tower make-up is 3% of cooling tower flow.

(30) All plants use steam directly from boiler, not reheat or turbine extraction.

TABLES

TABLE 1 - SITE SURVEY DATA

SITE	Corn Belt Power Cooperative	Iowa Public Service Co.	Iowa Public Service Company
LOCATION	Humbolt, IA	Carroll, IA	Storm Lake, IA
HOURS OPERATED	300-400/yr Peaking only	0-plant closed in 1980	200/yr peaking only
STEAM PRESSURE	#1,2,3-600 psig #4-850 psig	420 psig	600 psig
STEAM TEMPERATURE	#1,2,3-825·F #4-900·F	750·F	825 psig
CAPACITY	#1 & 2-90,000 #/hr #3-125,000 #/hr #4-165,000 #/hr	#1 & 2-60,000 #/hr	#1-100,000 #/hr #2-125,000 #/hr
BUILT	#1 & 2-1950 #3-1952 #4-1954	1951	#1-1948 #2-1953
FIRED BY	Traveling grate stoker	Traveling grate stoker	Traveling grate stoker
GENERAL CONDITION	Very good	Fair	Fair
WATER TREATMENT CAPACITY	Approximately 20 GPM	Approximately 200 GPM	160 - 170 GPM
AIR POLLUTION CONTROL & EQUIP.	#1 & 2 - MC* #3 & 4 - MC w/ESP	MC	MC
OIL STORAGE AVAILABLE	None	On adjoining property	None
NATURAL GAS AVAILABLE	On site	At site	Near site
ELECTRICAL SERVICE AVAILABLE	Substation on site	Substation at site	Substation and transformers site
RAIL SERVICE	Chicago-Northwestern	Chicago-Northwestern	Illinois-Central
RAIL CONDITION	Excellent-new ribbon rail installed in last two years	Excellent	Good
ROADS	Excellent-served by State Hwy 3 & 169	Excellent U.S. Hwy 30 & 71	Good-State Hwy 5 & U.S. 71
AREA UNEMPLOYMENT	3.4%	5.1%	1.8% - 3.5%
LAND AVAILABLE	Over 20 acres at power plant site	20 acres +, 1 mile + from plant	More than 20 acres
WATER AVAILABILITY	Large amounts available	1300 GPM	2 wells on site, 1 operable-6" line to Storm Lake
ESTIMATED SIZE ETHANOL PLANT	30 million gal/yr.	None-plant eliminated due to age	None-Plant eliminated due to age & two alcohol plants already in same area

*MC - Mechanical Collector
ESP- Electrostatic Precipitator

TABLE 1 - SITE SURVEY DATA

SITE	Corn Belt Power Cooperative	Iowa Public Service Co.	Boone Valley Coop
LOCATION	Spencer, IA	Sioux City, IA	Eagle Grove, IA
HOURS OPERATED	200 or less Peaking only	#1-Peaking #2 & 3-Continuous	Continuous
STEAM PRESSURE	875 psig	#1-1850 psig #2 & 3-2400 psig	650 psig to turbine 150 to process
STEAM TEMPERATURE	900·F	Superheated	850·F to turbine
CAPACITY	370,000 #/hr	#1-1,050,000 #/hr #2-2,320,000 #/hr #3-3,805,000 #/hr	200,000 #/hr with new boiler being installed
BUILT	1959	#1-1963 #2 & 3-1972	1949, new boiler under construction
FIRED BY	Pulverized coal	#1-Cyclone #2 & 3 Pulv. Coal	Traveling Grate Stoker
GENERAL CONDITION	Excellent	Excellent	Currently being rebuilt
WATER TREATMENT CAPACITY	25-30 GPM, treated to 0 calcium & hardness	Operating at full capacity	Will have 465 GPM capacity
AIR POLLUTION CONTROL & EQUIP.	ESP	ESP	Baghouse
OIL STORAGE AVAILABLE	Very limited amount	None	None
NATURAL GAS AVAILABLE	Gas line to Storm Lake at north end of site	Available nearby	Nearby in limited amounts
ELECTRICAL SERVICE AVAILABLE	Substation at site	Substation at site	Substation at site
RAIL SERVICE	Chicago-Milwaukee St. Paul & Pacific	Chicago-Northwestern	Chicago-Northwestern
RAIL CONDITION	Good	Excellent	Excellent-new ribbon rail installed
ROADS	Good - U.S. Hwy. 71 & 18	Excellent I-29, U.S. 75,20,73	Excellent State Hwy. 17, 3 I-35 nearby
AREA UNEMPLOYMENT	4.2%	Not known at this time	3.3%
LAND AVAILABLE	Over 20 acres nearby on site	Sufficient for 50 mill gal/yr. plant nearby	Limited-less than 10 acres at site
WATER	1 well at plant, 3 others nearby-600 GPM capacity	Sufficient available for large plant	1300 GPM
ESTIMATED SIZE ETHANOL PLANT	50 million gal/yr	50 million gal/yr	None-excess steam not available at this time

*MC - Mechanical Collector
ESP- Electrostatic Precipitator

TABLE 1 - SITE SURVEY DATA

SITE	Iowa Electric Light and Power	Rath Packing Company	Iowa Public Service Company
LOCATION	Marshalltown, IA	Waterloo, IA	Waterloo, IA
HOURS OPERATED	Continuous	Continuous	Peaking only
STEAM PRESSURE	#1 & 2-980 psig #3-1500 psig	410 psig	#1-900 psig #2-1470 psig
STEAM TEMPERATURE	#1 & 2-910·F #3-1000·F	675·F	1000·F
CAPACITY	#1 & 2-300,000 #/hr #3-575,000 #/hr	#6-75,000 #/hr #7 & 8-125,000 #/hr	#1-100,000 #/hr #2-300,000 #/hr
BUILT	#1 & 2-1955 #3-1961	#6-1940 #7-1945 #8-1956	#1-1951 #2-1958
FIRED BY	#1 & 2 Pulverized coal #3-cyclone	#6 & 7 Stoker #8-Pulverized coal	#1-Stoker (removed) & gas #2-Pulverized
GENERAL CONDITION	Good	Good	Good
WATER TREATMENT CAPACITY	Unknown-not at full capacity	None	25 GPM ea of 2 trains
AIR POLLUTION CONTROL & EQUIP.	ESP	#6 & 7-none #8-MC	#1-none #2-ESP
OIL STORAGE AVAILABLE	2,500,000 Gals.	None	Available on site
NATURAL GAS AVAILABLE	Available on site	Available on site	Available on site
ELECTRICAL SERVICE AVAILABLE	Substation at site	13.8 KV west of site	Substation on site
RAIL SERVICE	Chicago-Northwestern	Chicago-Northwestern	Waterloo-Cedar Falls Branch from Illinois Central
RAIL CONDITION	Excellent	Excellent	Good
ROADS	Excellent U.S. Highway 30 State Hwy 14	Excellent U.S. Hwy. 63, 20, 218	Excellent U.S. Hwy 63, 20, 218
AREA UNEMPLOYMENT	4.2%	5.5%	5.5%
LAND AVAILABLE	220 acres 3600 ft. from power plant	25 acres 3800 ft. from plant	Greater than 15 acres-3.3 miles from plant
WATER AVAILABILITY	6" line-650 gpm future 12" line to west side of ethanol site	6" line 3950 GPM	12" line 980 GPM
ESTIMATED SIZE ETHANOL PLANT	53 million gal/yr	4.7 million gal/yr	18 million gal/yr

*MC - Mechanical Collector
ESP- Electrostatic Precipitator

TABLE 1 - SITE SURVEY DATA

SITE	Eastern Iowa Light & Power Cooperative	Iowa Power and Light	Iowa Southern Utilities
LOCATION	Montpelier, IA	Des Moines, IA	Burlington, IA
HOURS OPERATED	Continuous	Continuous	Continuous
STEAM PRESSURE	850 psig	#6 & #9-1250 psig #10-1450 psig #11-1800 psig	2000 psig
STEAM TEMPERATURE	900·F	950·F	1005·F
CAPACITY	#1-230,000 #/hr #2-380,000 #/hr	#6-630,00 #/hr #9-400,000 #/hr #10-425,000 #/hr #11-790,000	1,425,000 #/hr
BUILT	1-1958 #2-1967	#6-1963 #9-1950 #10-1954 #11-1964	1967
FIRED BY	Pulverized coal	#6-gas/oil #9-gas was PC #10 & 11-Pulverized	Pulverized coal
GENERAL CONDITION	Good	Good	Good
WATER TREATMENT CAPACITY	Unknown	60 GPM	Unknown
AIR POLLUTION CONTROL & EQUIP.	MC & ESP	ESP on 10 & 11	ESP
OIL STORAGE AVAILABLE	Approximately 18,000 Gal.	5,300,000 at or near site	Available on site
NATURAL GAS AVAILABLE	Available on site	Available on site	None
ELECTRICAL SERVICE AVAILABLE	Substation on site	Substation on site	Substation on site
RAIL SERVICE	Chicago-Rock Island & Pacific	Burlington-Northern	Burlington-Northern
RAIL CONDITION	Excellent	Excellent	Excellent
ROADS	Good-State Hwy 22	Excellent-State Hwy. 46,163,5, US. Hwy. 65 69-I-235 nearby	Good-US. Hwy 34, 534, 61 nearby-County rds. to ethanol site
AREA UNEMPLOYMENT	Draw employees from Muscatine & Quad Cities. 5.8% average	4.4%	6.9%
LAND AVAILABLE	150 acres 2000 ft. from power plant-zoned agricultural	168 acres 4000 ft. from power plant	500± acres 3000 ft. from power plant
WATER AVAILABILITY	Mississippi River available	8" north & 8" east of ethanol site 1200 GPM Future 24" line	Mississippi River available
ESTIMATED SIZE ETHANOL PLANT	17 million gal/yr	137 million gal/yr	76 million gal/yr

*MC - Mechanical Collector
ESP- Electrostatic Precipitator

TABLE 1 - SITE SURVEY DATA

SITE	Chemplex Company	Iowa-Illinois Gas & Electric	Muscatine Power & Water
LOCATION	Clinton, IA	Bettendorf, IA	Muscatine, IA
HOURS OPERATED	Continuous	Peaking Unit	#7 & 8 Continuous #5-1500 hr/yr #6-3000 hr/yr
STEAM PRESSURE	600 psig	800 psig	650 psig
STEAM TEMPERATURE	Superheated	900·F	700·F
CAPACITY	1,292,360 #/hr	Total about 1,000,000 #/hr	#5-85,000 #/hr #6-125,000 #/hr #7-214,000 #/hr #8-680,000 #/hr
BUILT	14 units-1969 1-1975 2-1980	1937, 1942 1949, 1949	#5-1943 #6-1948 #7-1958 #8-1969
FIRED BY	Gas/Oil	Pulverized Coal	Stokers #5 & 6
GENERAL CONDITION	Good	Fair-Showing Age	Good
WATER TREATMENT CAPACITY	Unknown	100 GPM per train	Unknown
AIR POLLUTION CONTROL & EQUIP.	None	ESP	#5 & 6 - MC #7 & 8 - ESP
OIL STORAGE AVAILABLE	Available on site	5,000,000 Gal.	200,000 Gal. at new plant
NATURAL GAS AVAILABLE	Available on site	Available on site	Available on site
ELECTRICAL SERVICE AVAILABLE	----------	Substation on site	Substation on site
RAIL SERVICE	Chicago-Northwestern	Davenport-Rock Island & Northwestern	Chicago-Milwaukee St. Paul & Pacific
RAIL CONDITION	Excellent	Excellent	Excellent
ROADS	Good-U.S. Hwy 30, 67 State Hwy 291	Excellent-U.S. Hwy 67, 6 I-80 & I-74 Nearby	Excellent-U.S. Hwy 61 State Hwy. 92, 22 38
AREA UNEMPLOYMENT	5.0%	7.4%	4.2%
LAND AVAILABLE	Possible 700 acre site south of plant or agricultural land nearby	Approx. 12 acres 3600 ft. from power plant	70 acres 4.5 miles from power plant
WATER AVAILABILITY	8" line 2 miles east of plant, wells on Chemplex property	12" line in Hwy 67 R.O.W. 5MGD avail.	Wells supply 6" or 8" line on ethanol site and 30" city line
ESTIMATED SIZE ETHANOL PLANT	None-Plant presently steam limited	None-Plant eliminated due to age	None-Plant eliminated due to age #5 & #6

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TABLE 1 - SITE SURVEY DATA

SITE	Northern Natural Gas Ogden Compressor Sta.		
LOCATION	Odgen, IA		
HOURS OPERATED	Continuous		
STEAM PRESSURE	150 psig		
STEAM TEMPERATURE	365·F		
CAPACITY	50,000 #/hr- NNG Estimate		
BUILT	Not availabe		
FIRED BY	Natural gas engine One V-16 One V-20		
GENERAL CONDITION	Excellent		
WATER TREATMENT CAPACITY	None		
AIR POLLUTION CONTROL & EQUIP.	None		
OIL STORAGE AVAILABLE	None		
NATURAL GAS AVAILABLE	On site		
ELECTRICAL SERVICE AVAILABLE	161 KV, 115KV near site		
RAIL SERVICE	Chicago-Northwestern		
RAIL CONDITION	Excellent		
ROADS	Excellent-U.S. Hwy 30, 169, I-35 - 30 miles away		
AREA UNEMPLOYMENT	Not available		
LAND AVAILABLE	More than 20 acres		
WATER AVAILABILITY	Wells would have to be drilled		
ESTIMATED SIZE ETHANOL PLANT	10 million gal/yr.		

*MC - Mechanical Collector
ESP- Electrostatic Precipitator

TABLE 2
PURCHASED STEAM COST

SITE	IOWA ELECTRIC LIGHT AND POWER COMPANY	RATH PACKING COMPANY	IOWA PUBLIC SERVICE COMPANY	EASTERN IOWA REC	IOWA POWER AND LIGHT COMPANY	IOWA SOUTHERN UTILITIES	CORN BELT POWER COOPERATIVE	CORN BELT POWER COOPERATIVE	IOWA PUBLIC SERVICE COMPANY	NORTHERN NATURAL GAS
LOCATION	Marshalltown, IA	Waterloo, IA	Waterloo, IA	Montpelier IA	Des Moines, IA	Burlington, IA	Humboldt, IA	Spencer, IA	Sioux City, IA	Ogden, IA
FIXED COSTS $/1000 LB. STEAM	.31	2.58	1.69	.36	.20	.56				
OPERATING COSTS $/1000 LB. STEAM	.60	.60	.60	.60	.60	.60				
FUEL COSTS $/1000 LB STEAM	2.40	3.28	2.60	1.85	2.40	2.02				
WATER COSTS $/1000 LB. STEAM	.003	.002	.002	.002	.003	.002				
TOTAL COST $/1000 LB STEAM	3.31	6.46	4.89	2.81	3.20	3.18				

EXPLANATION FOR TABLE 2 - PURCHASED STEAM COST

All calculations are based on the Study Assumptions, shown previously. Fixed costs are based on the annual fixed charge rate of 0.123 and the estimated plant modification costs shown in Table 3, following. The fixed cost per thousand pounds of steam is based on the estimated annual purchased steam.

Operating costs are assumed to be a constant $0.60 per thousand pounds of steam for coal-firing. This figure includes labor, maintenance, supplies and station power.

Fuel costs per thousand pounds of steam is based on actual fuel cost at the facilities, where available. Where fuel price is not available an assumption of coal cost is made. In all cases, it is assumed that a reboiler would be installed between the steam plant and the ethanol plant, to separate the steam and condensate systems. This may not be a requirement in all cases, but is considered to be good design to avoid contamination of power plant systems. The resulting fuel cost takes into account the efficiencies of the steam generators and the reboilers, as well as steam line losses.

Water costs include the cost of water and chemicals to provide make-up in the amount of 25% of the steam purchased. Make-up water and treatment could be provided at either the ethanol plant or power plant site.

The total cost per thousand pounds is the sum of the items shown above. It should be noted that the total does <u>not</u> include the cost of land acquisition or easements for constructing steam lines. Also it does not include any mark-up or profit that may be required by the steam plant owner. All cost items have been estimated at incremental cost rates, and may not reflect the actual cost charged by the steam plant.

TABLE 3
COST ESTIMATES

SITE	IOWA ELECTRIC LIGHT AND POWER COMPANY	RATH PACKING COMPANY	IOWA PUBLIC SERVICE COMPANY	EASTERN IOWA REC	IOWA POWER AND LIGHT COMPANY	IOWA SOUTHERN UTILITIES	CORN BELT POWER COOPERATIVE	CORN BELT POWER COOPERATIVE	IOWA PUBLIC SERVICE COMPANY	NORTHERN NATURAL GAS
LOCATION	Marshalltown, IA	Waterloo, IA	Waterloo, IA	Montpelier IA	Des Moines, IA	Burlington, IA	Humboldt, IA	Spencer, IA	Sioux City, IA	Ogden, IA
MODIFICATION COSTS	$5,840,410	$1,767,741	$11,242,871	$2,291,884	$10,004,179	$6,212,187	$1,153,672	$3,015,780	$6,586,125	$2,873,521
BACK-UP ENERGY PRODUCTION SYSTEM	Note 1	$ 774,000	Note 1	Note 1	$ 3,528,000	$12,513,000	Note 1	$8,723,280	Note 1	$1,200,000
PURCHASE PRICE OF STEAM	15¢/Gal. Alcohol	29¢/Gal. Alcohol	22¢/Gal. Alcohol	12¢/Gal. Alcohol	14¢/Gal. Alcohol	14¢/Gal. Alcohol	27¢/Gal Alcohol	18¢/Gal Alcohol	17¢/Gal Alcohol	20¢/Gal Alcohol
BACK-UP SYSTEM OPERATION COST	15¢/Gal. Alcohol	22¢/Gal. Alcohol	28¢/Gal. Alcohol (Note 2)	12¢/Gal. Alcohol	21¢/Gal. Alcohol (note 2)	22¢/Gal. Alcohol (note 2)	27¢/Gal Alcohol	21¢/Gal Alcohol (note 2)	17¢/Gal Alcohol	21¢/Gal Alcohol
AVERAGE STEAM COST OVER 10 YR PERIOD	24.0¢/Gal. Alcohol	47.4¢/Gal. Alcohol	31.7¢/Gal. Alcohol	19.9¢/Gal. Alcohol	26.4¢/Gal. Alcohol	39.9¢/Gal. Alcohol	45¢/Gal Alcohol	32¢/Gal Alcohol	28¢/Gal Alcohol	49¢/Gal Alcohol
NEW COAL FIRED BOILER CONSTRUCTION COST WITH BACK-UP	$26,079,000	$2,356,800	$9,120,500	$8,684,000	$68,154,000	$38,026,200	$13,908,420	$23,180,760	$23,180,760	$4,500,000
NEW COAL FIRED BOILER STEAM COST	20¢/Gal. Alcohol	22¢/Gal. Alcohol	20¢/Gal. Alcohol	12¢/Gal. Alcohol	20¢/Gal. Alcohol	18¢/Gal. Alcohol	22¢/Gal Alcohol	22¢/Gal Alcohol	20¢/Gal Alcohol	20¢/gal Alcohol
AVERAGE STEAM COST OVER 10 YR PERIOD NEW COAL FIRED BOILER	28.9¢/Gal. Alcohol	32.9¢/Gal. Alcohol	29.4¢/Gal. Alcohol	24.6¢/Gal. Alcohol	28.9¢/Gal. Alcohol	26.0¢/Gal. Alcohol	32.9¢/Gal Alcohol	32.9¢/Gal Alcohol	28.9¢/Gal Alcohol	28.9¢/Gal Alcohol

Notes: 1. Second boiler at plant is available for back-up steam. Therefore, no additional back-up is required
2. Back-up boiler would be fired with natural gas rather than coal.

EXPLANATION FOR TABLE 3 - COST ESTIMATES

The modification cost estimates include the installation of a reboiler at the power plant plus the piping, control valves, metering and other modifications required for a co-utilization system. The costs also include steam transmission lines from the power plant to the proposed ethanol plant site, based on the peak steam demand the power plant can provide. Also included in this cost is the condensate return and make-up water treatment system.

The back-up energy production system includes gas and oil-fired package boilers, where required. In some cases no back-up boilers are needed. It has been assumed that the back-up boilers would be located at the ethanol plant site. No land acquisition costs are included in the cost estimate.

The purchased price of steam per gallon of ethanol production is based on the total steam costs shown in Table 2. The cost per gallon is for the ethanol production that can be obtained using power plant steam.

The cost per gallon of ethanol using the back-up system, reflects the difference in cost for construction and the gas and oil-fired fuel costs of back-up boilers, compared to the power plant steam. The cost per gallon for both the purchased steam and the back-up system is for present day cost, therefore the differences are not great. In one case, Rath Packing Company, the back-up system is actually cheaper due to the high coal cost at this plant.

The average steam cost over a ten year period, per gallon of ethanol produced, reflects the mixed operation of purchased steam and back-up systems.

The inflation factors, shown previously, have been used to project these costs over the ten year period.

The estimates for new coal fired boilers have been made for comparison with the purchased steam option. In all cases it has been assumed that the new boilers would be constructed at the ethanol plant site, avoiding the cost of steam transmission lines. These costs do not include land acquisition cost or easements. The estimates are based on coal-fired installations for the base load requirements, with gas and oil-fired package boilers for back-up steam.

The steam cost per gallon of ethanol using new coal-fired boilers is based on burning Iowa coal, trucked to the respective sites. Although the fixed charges for the gas and oil-fired back-up is included, the fuel cost is based on coal-firing only.

The bottom line on Table 3 shows the average steam cost over a ten year period, using new coal-fired boilers rather than purchased steam. Inflation factors have applied to all costs to project the ten year average. These figures may be compared with the average purchased steam cost over ten years to determine where co-utilization is feasible. In some cases, it is less expensive to construct new boilers than to purchase steam using co-utilization.

Sample calculations for the estimates shown in Table 3 are included in the Appendix.

TABLE 4
RESOURCES AND PRODUCTS

SITE	IOWA ELECTRIC LIGHT AND POWER COMPANY	RATH PACKING COMPANY	IOWA PUBLIC SERVICE COMPANY	EASTERN IOWA REC	IOWA POWER AND LIGHT COMPANY	IOWA SOUTHERN UTILITIES	CORN BELT POWER COOPERATIVE	CORN BELT POWER COOPERATIVE	IOWA PUBLIC SERVICE COMPANY	NORTHERN NATURAL GAS
LOCATION	Marshallton, IA	Waterloo, IA	Waterloo, IA	Montplier, IA	Des Moines, IA	Burlington, IA	Humbolt, IA	Spencer, IA	Sioux City, IA	Ogden, IA
ALCOHOL PLANT CAPACITY (MILLION GAL/YEAR)	53	4.7	18	17	137	76	30	50	50	10
DDG GENERATED (MILLION POUND/ YEAR)	355.1	31.49	120.6	113.9	917.9	509.2	201	335	335	67
CORN REQUIRED (MILLION BU/YR)	21.2	1.88	7.2	6.8	54.8	30.4	12	20	20	4
POTENTIAL LOCAL ALCOHOL MARKET (MILLION GAL/YEAR)	2.3	7.0	7.0	2.2	1.5	2.5	0.8	1.1	6.0	1.5
POTENTIAL LOCAL DDG MARKET (MILLION LBS/YR)	227	190	190	169	72	125	122	231	1,109	188
ESTIMATED LOCAL CORN AVAILABLE (MILLION BU/YEAR)	15.0	11.6	11.6	6.1	9.9	8.2	11.6	9.2	18.3	14.2

EXPLANATION FOR TABLE 4 - RESOURCES AND PRODUCTS

For each of the facilities subjected to Phase II analysis, the alcohol plant capacity shown is based on the size that could be supported by the steam plant. For five of the facilities this size is based on using back-up boilers at the existing facilities. For these cases, the ethanol plant size could obviously be larger by constructing new back-up boilers. The sizes selected are considered to be the most reasonable approach for each facility.

The remaining estimates of DDG generated, corn required, local ethanol market, local DDG market and local corn available are based on the Study Assumptions, shown previously, plus the sample calculations shown in the Appendix. In each case "local" means the county area in which the plant is located, with the exception of Sioux City, which is based on both Woodbury and Plymouth Counties.

Consumption of DDG is based on 1979 statistics for cattle, poultry and swine feeding. Ethanol market consumption is based 10% of gasoline sales, which is somewhat less than the current average of 13%.

Estimated local corn available is based on 1980 statistics on corn available for transport, by county.

The potential of local feedstock supply and local absorption of product may be determined by comparing the bottom three lines on the table with the three lines above. In most cases, the alcohol plant capacity would greatly exceed the local market.

SUMMARY AND CONCLUSIONS

SUMMARY AND CONCLUSIONS

Chemplex Company, Clinton, Iowa

This plant is currently steam limited and has no excess steam for sale. The facility has no immediate plans to increase steam capacity, therefore, the facility was rejected after Phase I analysis.

Eastern Iowa Light and Power Cooperative, Montpelier, Iowa

This facility is in good condition and is operated continuously. A supply of steam is available all of the time and could support an ethanol plant of approximately seventeen million gallons per year. One drawback of this plant is that a potential ethanol plant site is located across the highway and railroad from the boiler plant. This would create additional problem and expense in the construction of a steam line. The highway is located between the railroad and plant site, which would require a highway crossing for new rail siding. In addition, the Chicago, Rock Island and Pacific Railway is out of service, leaving future rail service in doubt.

The corn required is fairly well matched with corn locally available and the potention DDG market should absorb the grains generated. Local market use of ethanol is not adequate for the plant capacity, but consumption in the Quad Cities would be much greater.

It is estimated that plant modification costs would be approximately $2.3 million.

Iowa Electric Light and Power Company, Marshalltown, Iowa

This plant is in excellent condition and is operated continuously. Upon completion of several major power plants, this plant will go on stand-by operation and most of the steam capacity will be available for sale. Co-utilization appears to be feasible for this facility. The estimated ethanol plant size of 53 million gallons per year is based on using one of the older boilers for ethanol steam supply, the second old boiler as back-up and re-serving the newest boiler for power plant use.

One disadvantage to this site is the presently full loading of the city wastewater treatment plant. This would require construction of a wastewater plant along with the ethanol plant.

The area is served by the Chicago and Northwestern Railroad. Local corn production is slightly less than that required by the ethanol facility and local consumption of DDG would be less than that generated. Ethanol production would be far in excess of local market absorption. Overall, the facility offers excellent opportunities for ethanol plant siting.

Iowa Illinois Gas and Electric Company, Bettendorf, Iowa

This plant is quite old with four boilers ranging from 32 to 44 years in age. It is used as a peaking facility but also operates continuously in suppling steam to a nearby Alcoa plant. Discussions have been held to determine the feasibility of installing a solid waste burning plant at this site. A new ethanol plant would be a potential user of excess steam gener-

ated from solid waste combustion. Under the present conditions, the remaining life of the existing boilers is not adequate to support construction of a new ethanol plant.

Approximately twelve acres of land is available at a distance of 3600' from the power plant.

Iowa Power and Light Company, Des Moines Power Station, Des Moines, Iowa

Co-utilization of steam from this facility would be feasible. Ethanol plant capacity would be 137 million gallons per year for more, depending on the usable percentage of steam generated by oil-firing. Supply of corn required and local absorption of grains and ethanol are not matched to ethanol plant requirements; however, excellent transportation opportunities exist for shipment in and out of the facility.

Iowa Light and Power Company has been negotiating with Archer Daniels Midland for sale of steam for ethanol production. Discussions have also taken place previously for the Agri Grain Power project. Therefore, opportunities for additional ethanol plants, at this location, may not exist.

Iowa Public Service Company, Waterloo, Iowa

This plant is used as a peaking facility, is in good condition and has excess steam available. The major disadvantage for co-utilization is the 3.3 mile distance to the nearest potential alcohol plant site. Steam line routing would be through residential and industrial areas and parks and would

have to cross Highway U.S. #20. If land closer to the plant could be purchased, co-utilization would be feasible. Some space exists in an existing building owned by IPS, but space is not adequate to support the eighteen million gallon ethanol plant size.

Local supply and consumption of corn, DDG and ethanol are reasonably matched. Approximately 60% of ethanol production would require shipment away from the local area.

Iowa Southern Utilities Company, Burlington, Iowa

This plant is fairly new and is excellent condition. Another firm has purchased land in this area and is planning a barge loading facility which would greatly aid grain, ethanol and by-product shipments.

The boiler plant could support ethanol production of approximately 76 million gallons per year; however, only one boiler is available and excess steam is available only 40% of the time. The cost of back-up steam, firing gas and oil, is therefore expensive compared to a new coal-fired boiler installation. For this reason, co-utilization does not appear feasible. The initial cost for plant modification and for back-up boilers is far less than for new coal-fired boilers; however, new boilers would provide a much lower cost per gallon over the life of the plant.

Muscatine Power and Water, Muscatine, Iowa

This plant will be replaced by a new power plant presently under construction. After completion of the new plant, the two newest boilers at the

existing plant will be placed on stand-by and the two older boilers will be retired. The older boilers were built in 1943 and 1948 and their remaining useful life will not be compatible with the life of a new ethanol facility. Also, the City of Muscatine is negotiating terms to sell steam from the older boilers to a local grain processing company.

The nearest available ethanol plant site is over four miles away and this area is served by the Chicago, Rock Island and Pacific Railroad plus the Chicago, Milwaukee, St. Paul and Pacific Railroad.

Rath Packing Company, Waterloo, Iowa

This plant is in good condition and is presently used to generate electricity. Extraction and exhaust steam from the turbines are used for plant processes. Excess steam is available only 40% of the time. Therefore, back-up boiler fuel cost makes co-utilization economically unattractive compared to new coal-fired boilers.

Adequate land is available for ethanol plant siting and is presently owned by Rath. Steam line routing could be on Rath property, except for one road crossing.

The steam plant could support a 4.7 million gallon per year ethanol plant and local corn production should be adequate. Chicago Northwestern Railroad and highway facilities are excellent.

Corn Belt Power Cooperative, Earl F. Windom Station, Spencer, Iowa

This plant is used as a peaking facility, is in excellent condition, and has excess steam available. The only disadvantage to the site is that it is several miles from a major highway and that a wastewater treatment facility will be necessary. The advantages are the availability of land on site and adjoining the plant site, and the availability of resources in the immediate area, and the rural area in which the plant is located. The grain resources of the county in conjunction with the surrounding counties is sufficient for the plant. As with any large plant, the local consumption of the products and by-products will not meet the amount produced. Because of the rail service available, the products can be exported to distant markets.

Iowa Public Service Company, Hawkeye Plant, Storm Lake, Iowa

This facility is in fair condition and is used as a peaking facility and has excess steam available. The major disadvantages for co-utilization are the plans by IPS to phase the plant out of operation in 1982, and the two fuel alcohol plants that are in production or under construction in Storm Lake, and the age of the boiler plant. The major advantages of the plant site are the availability of land adjacent to the lant site, the plant being located in a rural area, and the transportation and grain handling facilities available nearby.

Because of the plans to phase out the plant in 1982, co-utilization of the plant would not be feasible.

Iowa Public Service Company, Carroll Plant, Carroll, Iowa

This facility is no longer in service and is in the process of being retired. Besides not being in operation, the major disadvantage of the plant is the necessity to run a steam line through residential and industrial areas and under several roads and highways to get to a suitable alcohol plant site. Considerable amount of work would be necessary to get the plant operational. This coupled with the age of the plant and other factors make the plant infeasible for co-utilization.

Corn Belt Power Cooperative, Humboldt Plant, Humboldt, Iowa

This plant is older with the four boilers ranging from 29 to 31 years in age. It is used as a peaking facility at this time. Due to the limited number of hours the plant is on line, a great deal of preventative maintenance is underway. The major disadvantage to this location is the access to a major highway and the fact that a wastewater treatment facility may be necessary. The advantages of the site are that plenty of land is nearby, water is available from the Des Moines River, the site is served by new "ribbon rail", and the plant is in a rural setting. Because of the lower cost of installing new coal fired boilers, however, co-utilization would not be feasible.

Boone Valley Cooperative, Steam Generating Plant, Eagle Grove, Iowa

This plant is currently increasing its steam capacity but will have a very limited amount, if any, steam for sale at this time. Therefore, the facility was rejected after the Phase I analysis.

Northern Natural Gas, Ogden Compressor Station, Ogden, Iowa

The source of heat in this plant is two natural gas fired internal combustion engines. The engines are in excellent condition and are overhauled annually. The engines run continuously. Potential sites for the alcohol plant are available on land adjacent to the compressor station. Major disadvantages of this site are the need to develope a water supply and also waste treatment facilities. Advantages to the site are good access to major highways and good rail nearby.

Because the cost, per gallon of ethanol, for recovered heat from this facility is higher than for new coal-fired boilers, over a ten year period, co-utiliziation does not appear to be feasible.

Iowa Public Service, Neal Station, Sioux City, Iowa

This plant is in excellent condition and is operated continuously. The plant is a base generating plant which means that all boilers are operating continuously at part load and will be operated at the required capacity to meet the electrical generation requirements up to full capacity of the plant. The major disadvantage to this site is that a back up system will

be required to operate the fuel alcohol plant whenever the power plants require all the steam available. Also, at this time, two companies are interested in purchasing steam from the power station. One of the possible customers is Terra Chemical Company located on adjacent property and the other is Alcohol, Inc., which had plans to construct a 50 MGY plant. At the present time all work on the Alcohol, Inc., project has halted. An advantage of the site is the availability of water and transportation.

Corn availability is matched fairly well with the requirements for a 50 MGY plant. Local consumption does not meet the proposed production levels so transporting the products to distant markets will be required. Overall, the facility is suitable for co-utilization.

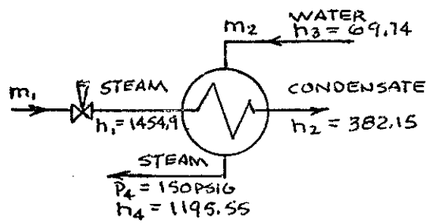
IOWA ENERGY POLICY COUNCIL
BOILER CO-UTILIZATION STUDY

APPENDIX

SAMPLE CALCULATIONS
FOR
SUTHERLAND STATION, IOWA ELECTRIC LIGHT AND POWER COMPANY, MARSHALLTOWN AND MARSHALL COUNTY, IOWA

1. Steam Generated in Evaporator

300,000 PPH @ 980 psig, 910°F



$m_1(h_1-h_2) = m_2(h_4-h_3)$

$300,000\ (1454.9 - 382.15) = m_2(1195.55 - 69.74)$

m_2=285,900 #/hr

2. Alcohol manufacturing capability

24 hr/day, 340 d/yr

Total steam = $285,900 \times 24 \times 340 = 2.3329 \times 10^9$ lb/hr.

50,000 Btu/gal alcohol

1125.81 Btu/lb steam

$$\frac{2.3329 \times 10^9 \times 1125.81}{50,000} = 52,529,034 \text{ gal/yr}$$

3. Line Sizing - Steam

150 psig sat. steam
V = 2.752 cu. ft./lb

Line length = 3600 ft.
Assume velocity = 7000 ft./min.

$$285,900 \text{ \#/hr} \times \frac{2.752}{60} = 13,113 \text{ cu. ft./min.} = 4765 \text{ \#/min}$$

$$A = \frac{\text{flow}}{\text{Velocity}} = \frac{13,113}{7000} = 1.87 \text{ sq. ft.}$$

D = 1.54 ft. or approximately 18" pipe (I.D. = 17.25")

Pressure drop - Use Darcy's formula

$\triangle P$ = 37.8 psi

Assume maximum P = 20 psi

D= 19.59"

Use 24" standard weight pipe

4. Line Sizing - Condensate

100·F condensate

V = .016130 cu. ft./lb

285,900 lb/hr = 575 GPM

D = .45 ft. = 5.4 inches

Use 6" pipe (I.D. = 5.761")

$\triangle P$ = 43 psi

If use 8" pipe (I.D. = 7.625)

$\triangle P$ = 11 psi

5. Modification Costs

A. Evaporator - $523,240

B. Piping Modifications - $2,032,000

C. Undergroung Piping - $2,917,170

D. Condensate Return Set - $20,000

Total $5,492,410

6. Water Treatment System = $348,000

7. Water Cost

25% of condensate = 144 GPM x 60 x 24 = 207,360 GPD

Average gal/month = 5,875,200 gal/mon.

= 785,455 cu. ft. mon.

Cost - 1st 500	cu. ft.	= 12.50
Next 5500	cu. ft. @ 1.10/100	= 60.50
Next 44,000	cu. ft. @ .73/100	= 321.20
Next 250,000	cu. ft. @ .66/100	= 1650.00
Next 485,455	cu. ft. @ .50/100	= 2427.28
	Total	= 4471.48/month
		= $.76/1000 gal

Chemical Cost - based on UNI @ $.63/1000 gal

Total = $1.39/1000 gal.

= $.003/1000# steam

8. Fuel Cost

$38/ton 10,500 Btu/lb, 85% eff.

$$\frac{300{,}000\ (1454.9 - 382.15)\ (38)}{.85(285.9)\ (10{,}500)(2000)} = \$2.40/1000\#\ \text{Steam}$$

9. Steam Cost - Purchase

$$\text{Fixed charges} = \frac{\text{Annual Fixed Charge Rate (Fixed Charges)}}{\text{Annual Steam Generated}}$$

$$\frac{.123\ (5{,}840{,}410)}{285.9\ (24)(340)} = \$.31/1000\ \text{lb}$$

Water & treatment Chemicals	= $.003/1000 lb
Maintenance	= $.60/1000 lb
Fuel	= $2.40 lb
Total	= $3.31/1000 lb

$$\frac{50{,}000\ \text{Btu/gal}}{1125.81\ \text{Btu/lb}} \times \frac{\$3.31}{1000\ \text{lb}} = \$.15/\text{gal alcohol}$$

10. Average Cost - 10 years - Purchase Steam

Escalation Factors

Labor & Materials	= 1.473
Coal	= 1.755
Natural Gas	= 2.596

Fixed Charges	= $.31/1000 lb
Maintanance = .60 x 1.473	= $.88/1000 lb
Fuel = 2.40 (1.755)	= 4.21/1000 lb
Total	= $5.40/1000 lb
	= $.240/gal alcohol

11. New Coal Fired Boiler Installation Costs

285,900 #/hr @ $60/lb = $17,154,000
Back-up @ $30/lb = $ 8,577,000

Total = $25,731,000

Fixed Cost - $\frac{.123\ (25,731,000)}{285.9\ (24)(340)}$ = $1.36/1000#

Water Treatment = $\frac{.123\ (4666)}{(24)(340)}$ = $.07/1000#

Fuel = $\frac{1000\ (1125.81)(38)}{.85(10,500)(2000)}$ = $2.40/1000#

Maintenance = $.60/1000#
Water & Treatment Chemicals = $.003/1000#

Total = $4.43/1000#

= $.20/gal alcohol

12. Average Cost - 10 years - New Boiler

Same escalation factors as Item 10

Fixed costs = 1.36/1000#
Water Treatment = .07/1000#
Fuel = 2.40 x 1.755 = 4.21/1000#
Maintenance = .60 x 1.473 = .88/1000#

Total = $6.52/1000#

= $.289/gal alcohol

13. Land Required

At 52.5 million gals/year the land required is slightly greater than 20 acres.

Land available at Marshalltown - 220 AC

220>20 acres ∴ adequate

14. Corn Required

From assumptions

Product = 2.5 gals ethanol per bushel corn

$$\text{Bushels} = \frac{52,529,034}{2.5} = 21,011,614 \text{ Bu.}$$

15. Process Water Required

From assumptions

$$\text{Process make-up water} = \frac{5.5 \text{ gal}}{\text{Gal ethanol}}$$

Maximum = 5.5 x 52,529,034

= 288,910,000 gal/yr water = 590 gpm

16. Condensate Make-Up Water

From steam usage calculations: Make-up water for condensate return (25% loss)
Sutherland station requires 144 gpm

plus 16% for demin. backwash = 23 gpm

17. Ethanol Plant Cooling Water

Cooling water for ethanol plant requires 150 gpm at 85° max. per million gals per year of ethanol produced.

Assume cooling tower used, use 3% loss for cooling tower

150 gpm x 3% x 52.529
= 236 gpm

18. Total Water Required

590 + 144 + 23 + 236 = 993 gpm

19. Check Water Available

Required = 993 gpm = 1.430 MGD exist. 6" line
capacity = 650 gpm but city would construct
12" line

Treatment capacity = 10 MGD
Average daily use = 5 MGD

City water is available

20. Wastewater Generated

From assumptions

5 gals wastewater per gal ethanol produced

Wastewater = 5 x 52,529,034
= 262,645,170 gal/yr
= 772,486 gal/day
= 1.19 c.f.s.

21. Check Wastewater Plant Capacity

Treatment Plant Capacity = 5.5 MGD
Present Hydraulic Loads = 6.2 MGD
B.O.D. Capacity = 18,000 lbs/day
present B.O.D. loads = 25,000 lbs/day
Next year a covered anaerobic lagoon to be
added to aid B.O.D. loads
But plant is hydraulically loaded

22. Potential Local DDG Market

Assume Mature cattle can consume 7.0 lbs DDG per day
Calves can consume 4.9 lbs DDG per day
Poultry can consume 0.05 lbs DDG per day
Swine can consume 2.8 lbs DDG per day
All cattle and calves - (beef cows + milk cows + cattle marketed) = calves
Marketed cattle has fed one full year at full ration (7 lbs DDG per day)

Calves have fed one full year at partial ration
(4.9 lbs DDG per day)
Sows farrow twice yearly
Pigs eat at full ration (2.8 lbs DDG per day) for 17.3 weeks

Statistics and calculations for 1979

Cattle 63,000 cattle and calves
18,500 beef cows
900 milk cows
26,000 cattle marketed
63,000 - (18,500 + 900 + 26,000) = 17,600
17,600(4.9) + 45,400(7) = 404,040 lbs DDG per day

404,040 x 365 = 147,474,600

$= 1.475 \times 10^8$ lbs DDG per year

Poultry 51,000 head x .05 x 365 = 930,750 lbs DDG per year

Swine (26,500 sows + 2/3 (181,00 pigs)) 2.8 $(\frac{365}{2})$ = 75,202,166.7

$= 7.520 \times 10^7$ lbs DDG per year

Total for 1979, Cattle + Poultry + Swine = 2.236×10^8 lbs DDG per year

Statistics and calculations for 1980

Cattle 65,000 cattle and calves
20,500 beef cows
800 milk cows
24,000 cattle marketed

65,000 - (20,500 + 800 + 24,000) = 19,700

19,700(4.9) + 45,300(7) = 413,630 lbs DDG per day

413,630 x 365 = 150,974,950

$= 1.510 \times 10^8$ lbs DDG per year

Poultry 50,000 head x .05 x 365 = 912,500 lbs DDG per year

Swine (26,000 sows x 2/3 (194,000 pigs)) 2.8 $(\frac{365}{2})$ = 79,375,333

$= 7.938 \times 10^7$ lbs DDG per year

Totals for 1980, Cattle + Poultry + Swine = 2.313×10^8 lbs DDG per year

Average 1979 = 2.274×10^8 lbs DDG per year
= 227 million lbs DDG per year

Equivalent alcohol production = $2.274 \times 10^8 - 6.7 = 33.94 \times 10^6$ gal.

23. Potential Local Alcohol Market

Assumptions: Alcohol market = 10% gasoline consumption

Total Iowa Consumption of gasoline, 1980 = 36,418,250 bl.

$$36{,}418{,}250 \text{ bl} \times 42 \frac{\text{gal}}{\text{bl}} = 1{,}529{,}566{,}500 \text{ gal}$$

Total Iowa Motor Vehicle Registrations, 1980: 2,925,619

$$1{,}529{,}566{,}500 \text{ gal} \div 2{,}925{,}619 \text{ reg.} = 522.818 \frac{\text{gal}}{\text{reg}}$$

Marshall CO reg: 44,144.

44,144(522.818) = 23,079,281 gal gasoline
= 2.31×10^7 gal gasoline

$.10(2.31 \times 10^7) = 2.31 \times 10^6$ gal, potential alcohol market

24. Surface Water Chemical Costs

If city water not available at site, either river or well water must be treated for process and steam generating.

Process water treatment chemicals

Alum: $\frac{0.17 \text{ lbs}}{1000 \text{ gal}}$ x \$19/100 lb = \$.032/1000 gal.

Lime: $\frac{1.53 \text{ lbs}}{1000 \text{ gal}}$ x \$3/50 lb = \$.092/1000 gal.

H_2SO_4: $\frac{0.15 \text{ lbs}}{1000 \text{ gal}}$ x $\frac{\$4.56}{100 \text{ lbs}}$ = \$.007/1000 gal.

Steam generating treatment chemicals

H_2SO_4: $\frac{5.425 \text{ lbs}}{1000 \text{ gal}} \times \frac{\$4.56}{100 \text{ lbs}} = \$.247/1000 \text{ gal.}$

NaOH: $\frac{6.4 \text{ lbs}}{1000 \text{ gal}} \times \frac{\$12}{100 \text{ lbs}} = \$.768/1000 \text{ gal.}$

As water used for steam generating must be pretreated by process water treatment equipment, total chemical cost includes all of above.

Total cost = \$1.146/1000 gal.

= \$.002/1000# steam

PETROLEUM STORAGE FACILITIES
IN IOWA

Area of State	Storage Capacity (Gallons)
Northwest (LeMars, Spencer, Rock Rapids)	17.5 million
North Central (Fort Dodge)	5.5 million
Omaha-Council Bluffs	83 million
Sioux City	35 million
Mason City	26 million
Des Moines	90 million
Iowa City	30 million
Waterloo	16.5 million
Dubuque	42 million (12 mill.- barge)
Quad Cities	56.5 million (16 mill.- barge)
Cedar Rapids	2 million
Ottumwa	4 million
Sioux City	5 million
Burlington	5 million (barge)
Clinton	12 million (barge)

IOWA ENERGY POLICY COUNCIL

BOILER CO-UTILIZATION STUDY

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IOWA PUBLIC SERVICE COMPANY

NEAL STATION

LOCATION - SIOUX CITY, IOWA

HOURS OPERATED - BOILER #1-PEAKING ONLY, BOILER #2 AND #3 CONTINUOUS

STEAM PRESSURE - #1-1850 PSIG; #2 AND #3 - 2400 PSIG

STEAM TEMPERATURE- SUPERHEATED

CAPACITY- #1 - 1,050,000#/HR; #2-2,320,000#/HR; #3-3,805,000#/HR

BUILT- #1-1963; #2, #3 - 1972

FIRED BY- #1 - CYCLONE BURNERS; #2, #3 CIRCULAR BURNERS (PULVERIZED COAL)

GENERAL CONDITION - EXCELLENT

WATER TREATMENT CAPACITY - CURRENTLY OPERATING AT MAXIMUM CAPACITY

AIR POLLUTION CONTROL & EQUIP. - ELECTROSTATIC PRECIPITATORS

OIL STORAGE AVAILABLE - NONE

NATURAL GAS AVAILABLE - AVAILABLE NEARBY

ELECTRICAL SERVICE AVAILABLE - SUBSTATION AT PLANT

RAIL SERVICE - CHICAGO NORTHWESTERN

RAIL CONDITION - EXCELLENT

ROADS - EXCELLENT - SERVED BY I-29, U.S. HIWAY 75, 20, 73.

AREA UNEMPLOYMENT - NOT KNOWN AT THIS TIME

LAND AVAILABLE - ENOUGH FOR A 50 MILLION GALLON PER YEAR PLANT NEARBY

TAXES - APPROX. $27.03 PER $1000 ASSESSED VALUE

GRAIN RESOURCES (3 YEAR AVERAGE) - 25,635,333 BU. CORN HARVESTED FOR GRAIN

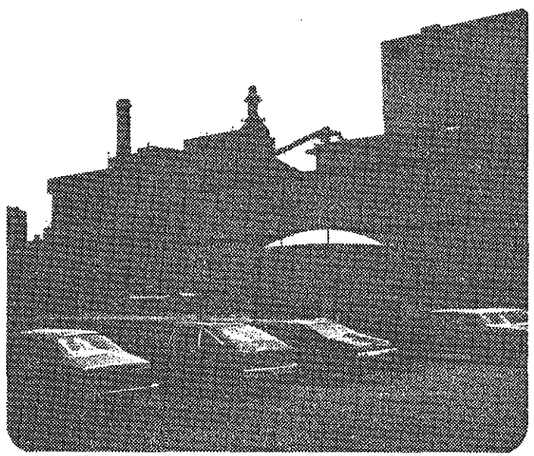
DATA BASE AREA - PLYMOUTH AND WOODBURY COUNTIES; 1734 SQ. MILES OR 1,109,760 ACRES

WATER AVAILABILITY - SUFFICIENT WATER AVAILABLE FOR A LARGE PLANT

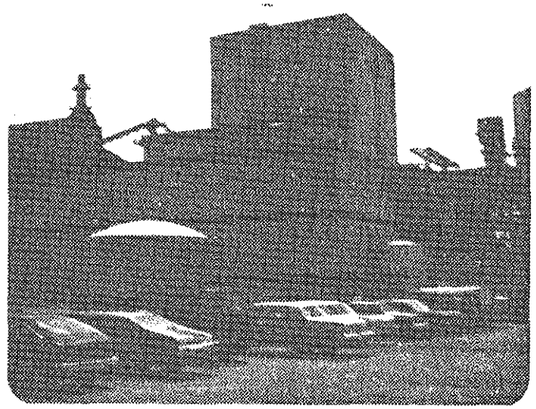
ESTIMATED SIZE ETHONAL PLANT - 50 MILLION GALLON PER YEAR

NOTES:

A FIRM CALLED ALCOHOL INC. HAD PLANS TO BUILD A 50 MILLION GALLON PER YEAR PLANT AT SIOUX CITY UTILIZING EXCESS STEAM FROM THE NEAL PLANT. AT THIS TIME, WORK ON THE PLANT HAS STOPPED FOR AN UNDETERMINED LENGTH OF TIME.



EAST ELEVATION



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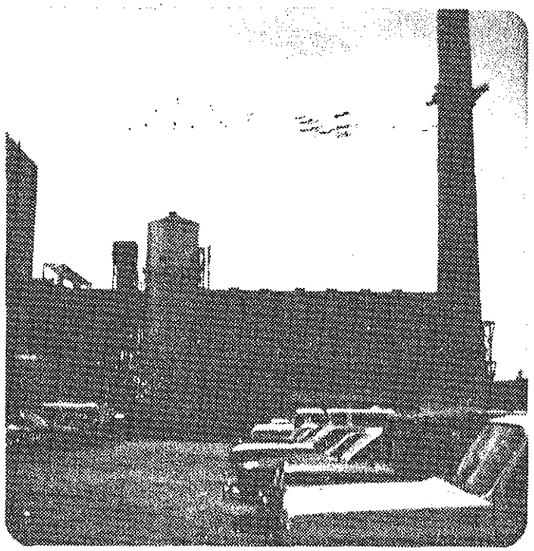
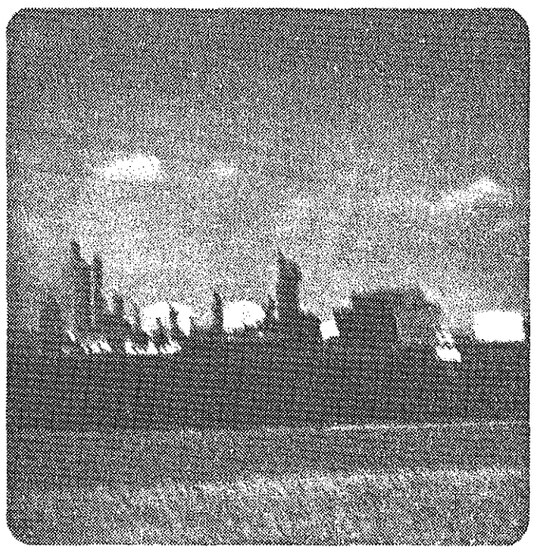
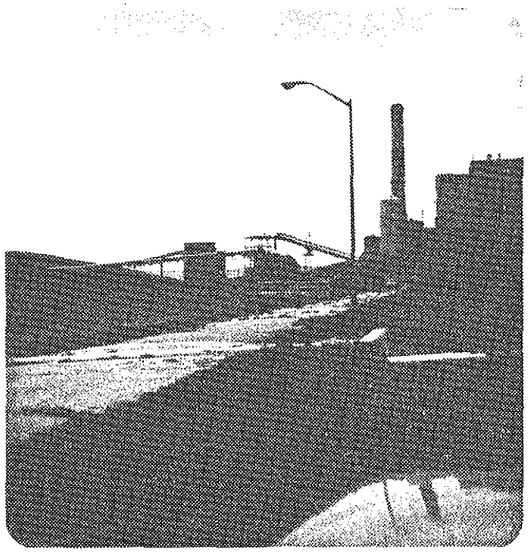
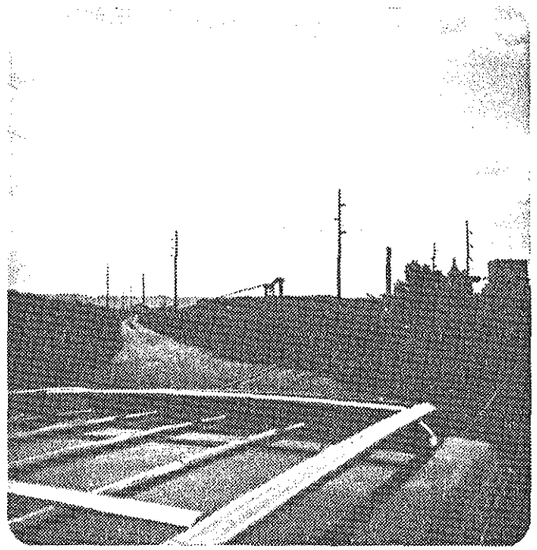


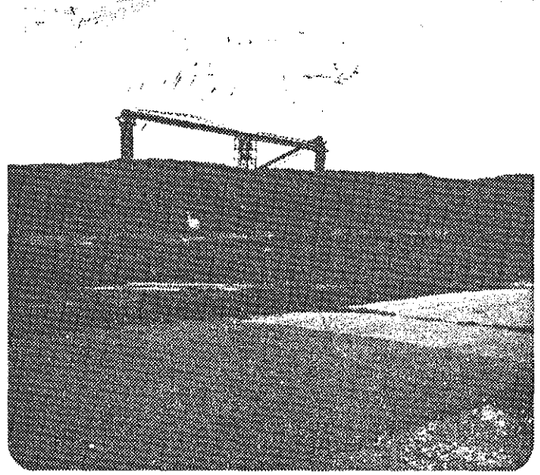
ELECTROSTATIC PRECIPITATOR



TERRA CHEMICAL PLANT





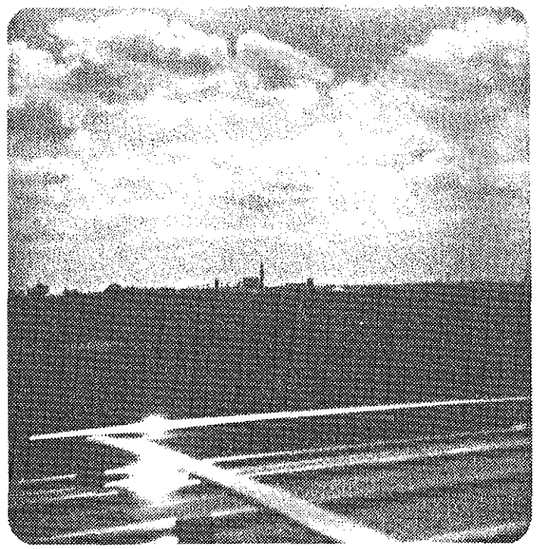


COAL UNLOADING HANDLING EQUIPMENT

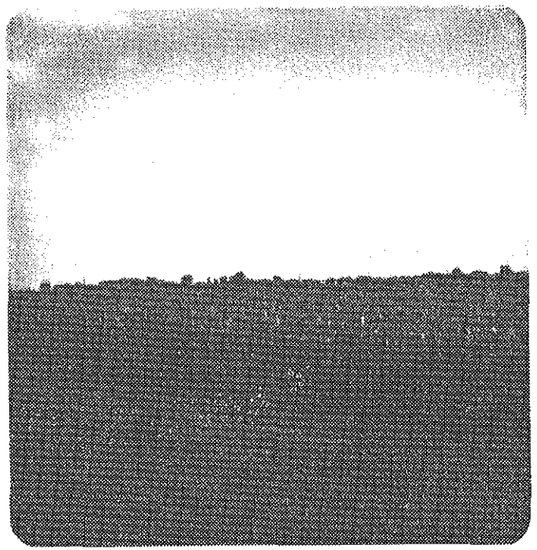
IPS - NEAL

SITE FOR ALCOHOL INC.
FUEL ALCOHOL PLANT

POSSIBLE SITE

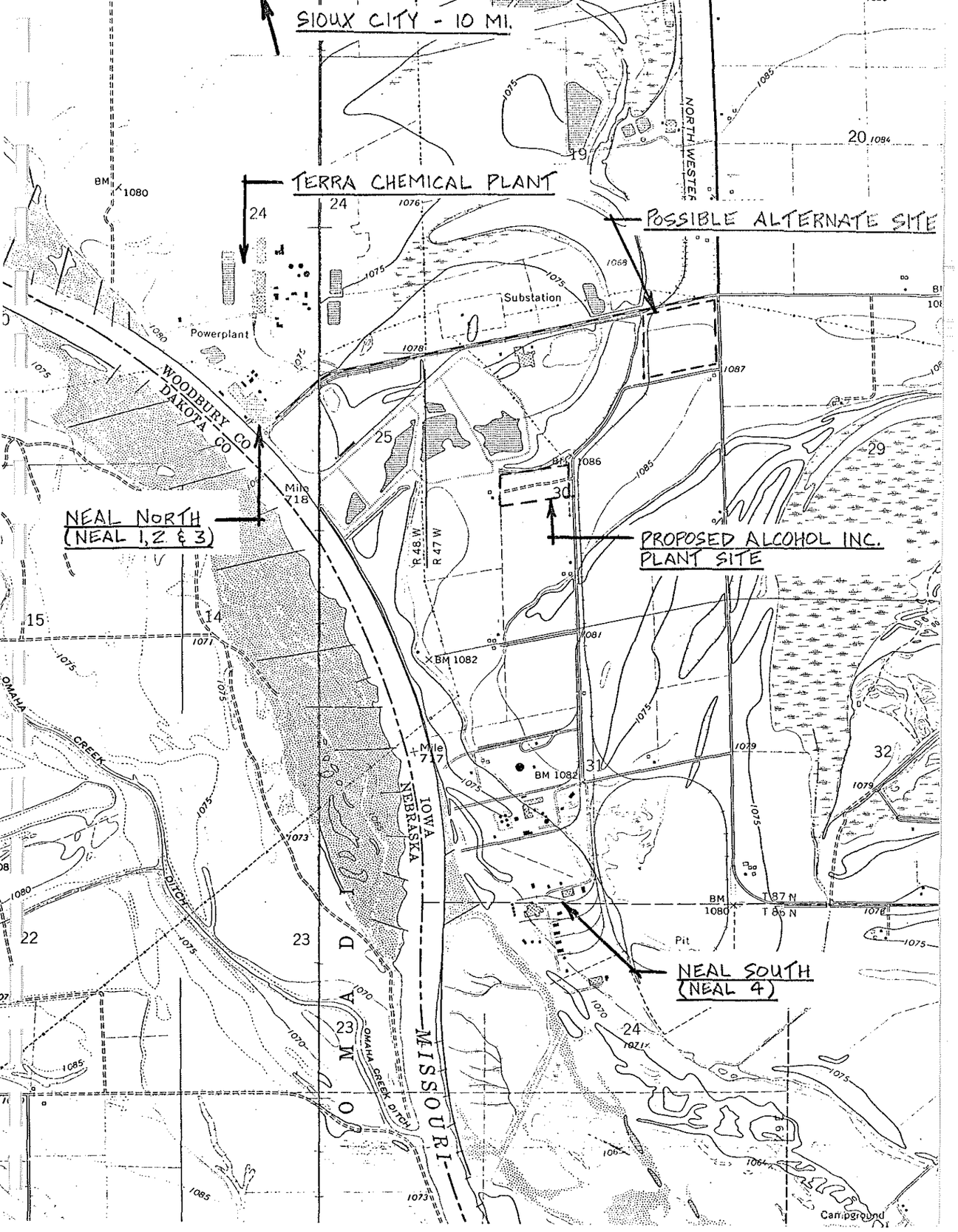


POSSIBLE SITE



POSSIBLE SITE

IPS-NEAL


SIOUX CITY - 10 MI.
TERRA CHEMICAL PLANT
POSSIBLE ALTERNATE SITE
NEAL NORTH
(NEAL 1, 2 & 3)
PROPOSED ALCOHOL INC.
PLANT SITE
NEAL SOUTH
(NEAL 4)
Substation
Powerplant
Pit
Campground
WOODBURY CO
DAKOTA CO
IOWA
NEBRASKA
MISSOURI
OMAHA CREEK DITCH
NORTHWESTERN
BM 1080
BM 1082
BM 1086
T87 N
T86 N
R48 W
R47 W
Mile 718
Mile 717

CORN BELT POWER COOPERATIVE

HUMBOLDT POWER PLANT

LOCATION - HUMBOLDT, IOWA

HOURS OPERATED - 300-400 HRS - USED AS PEAKING PLANT ONLY

STEAM PRESSURE - BOILER # 1,2&3 - 600 PSIG, BOILER # 4 - 850 PSIG

STEAM TEMPERATURE- # 1,2&3 - 825^0 F # 4 - 900^0 F

CAPACITY- # 1 & 2 - 90,000 # PER HR; # 3 - 125,000 # PER HR; # 4 - 165,000 # PER HR

BUILT- # 1 & 2 - 1950, # 3 - 1952, # 4 - 1954

FIRED BY- TRAVELING GRATE STOKER

GENERAL CONDITION - VERY GOOD

WATER TREATMENT CAPACITY - APPROXIMATELY 20 GPM

AIR POLLUTION CONTROL & EQUIP. - # 1&2 MECH. CYCLONE; # 3&4 CYCLONE W/ELECTROSTATIC PRECIPITATOR

OIL STORAGE AVAILABLE - NONE

NATURAL GAS AVAILABLE - AVAILABLE ON SITE

ELECTRICAL SERVICE AVAILABLE - SUBSTATION SITE

RAIL SERVICE - CHICAGO NORTHWESTERN RAILROAD

RAIL CONDITION - EXCELLENT NEW RIBBON RAIL INSTALLED IN LAST TWO YEARS

ROADS - EXCELLENT - SERVED BY STATE HWY 3 AND 169

AREA UNEMPLOYMENT - 3.4%

LAND AVAILABLE - OVER 20 ACRES AT POWER PLANT SITE

TAXES - $17.94 PER $1,000 OF ASSESSED VALUATION

GRAIN RESOURCES (3 YEAR AVERAGE) - 14,497,000 BU. CORN HARVESTED FOR GRAIN

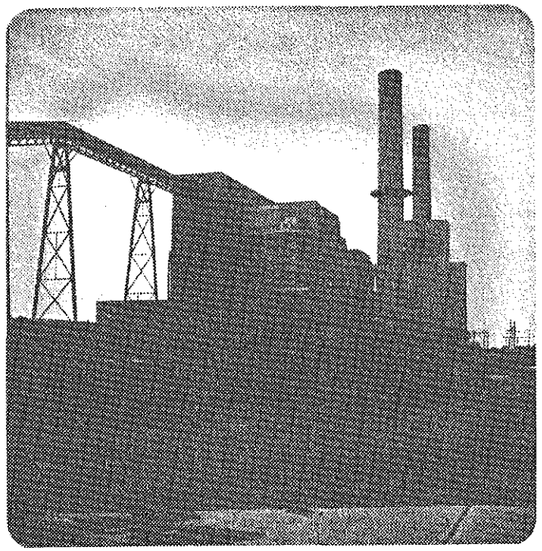
DATA BASE AREA - HUMBOLDT COUNTY - 435 SQ. MILES OR 278,400 ACRES

WATER AVAILABILITY - LARGE AMOUNTS AVAILABLE

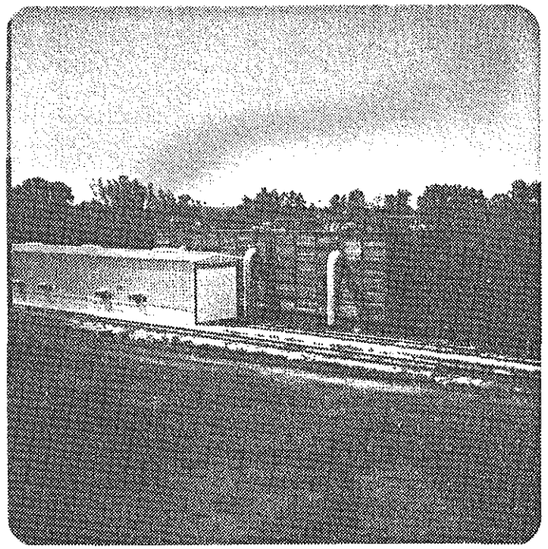
ESTIMATED SIZE ETHONAL PLANT - 30 MILLION GALLON/YEAR PLANT

NOTES:

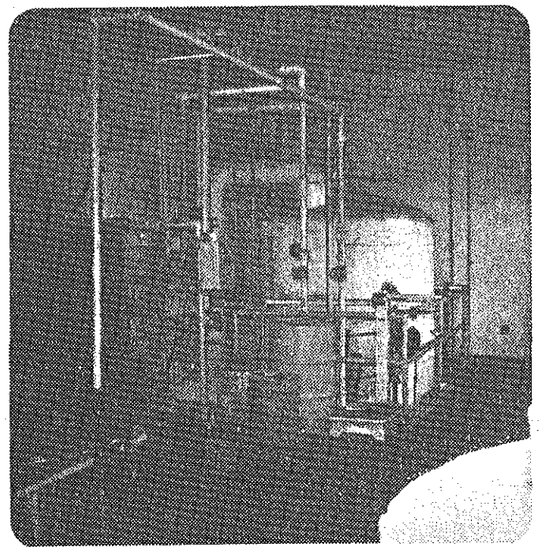
4 BOILER IS MOST EFFICIENT OF THE 4 BOILERS. THE PLANT IS IN GOOD TO EXCELLENT CONDITION WITH THE EXCEPTION OF THE ASH HANDLING SYSTEM. CORN BELT POWER HAS PLANS TO UPGRADE THE ASH SYSTEM IN THE NEAR FUTURE. A GREAT DEAL OF PREVENTIVE MAINTENANCE IS BEING DONE ON THE PLANT SINCE IT IS NOT LINE VERY OFTEN. BOILERS # 1&2 WERE REFRACTORED COMPLETELY IN THE LAST YEAR, # 3 WAS PARTIALLY REFRACTORED, AND # 4 DID REQUIRE ANY WORK. COMBUSTION CONTROLS ARE IN GOOD CONDITION BUT ARE OBSOLETE AND HARD TO GET PARTS FOR. PLANT HAS A TOTAL GENERATING CAPACITY OF 52 MW. FUEL COST HAS BEEN RUNNING AT APPROXIMATELY $50 PER TON OF COAL. PLANT IS LOCATED APPROXIMATELY 5 MILES FROM CITY ON THE BANK OF THE DES MOINES RIVER. CITY OF HUMBOLDT IS ACTIVE IN TRYING TO OBTAIN NEW BUSINESS IN HUMBOLDT. FOR THIS REASON THE HUMBOLDT RAIL IMPROVEMENT CORPORATION WAS FORMED. THIS CORPORATION SPENT $ 1.8 MILLION TO UPGRADE THE RAIL SYSTEM AND IS CHIEFLY RESPONSIBLE FOR HAVING " RIBBON " RAIL INSTALLED ON THE RAIL LINE.



NORTH ELEVATION

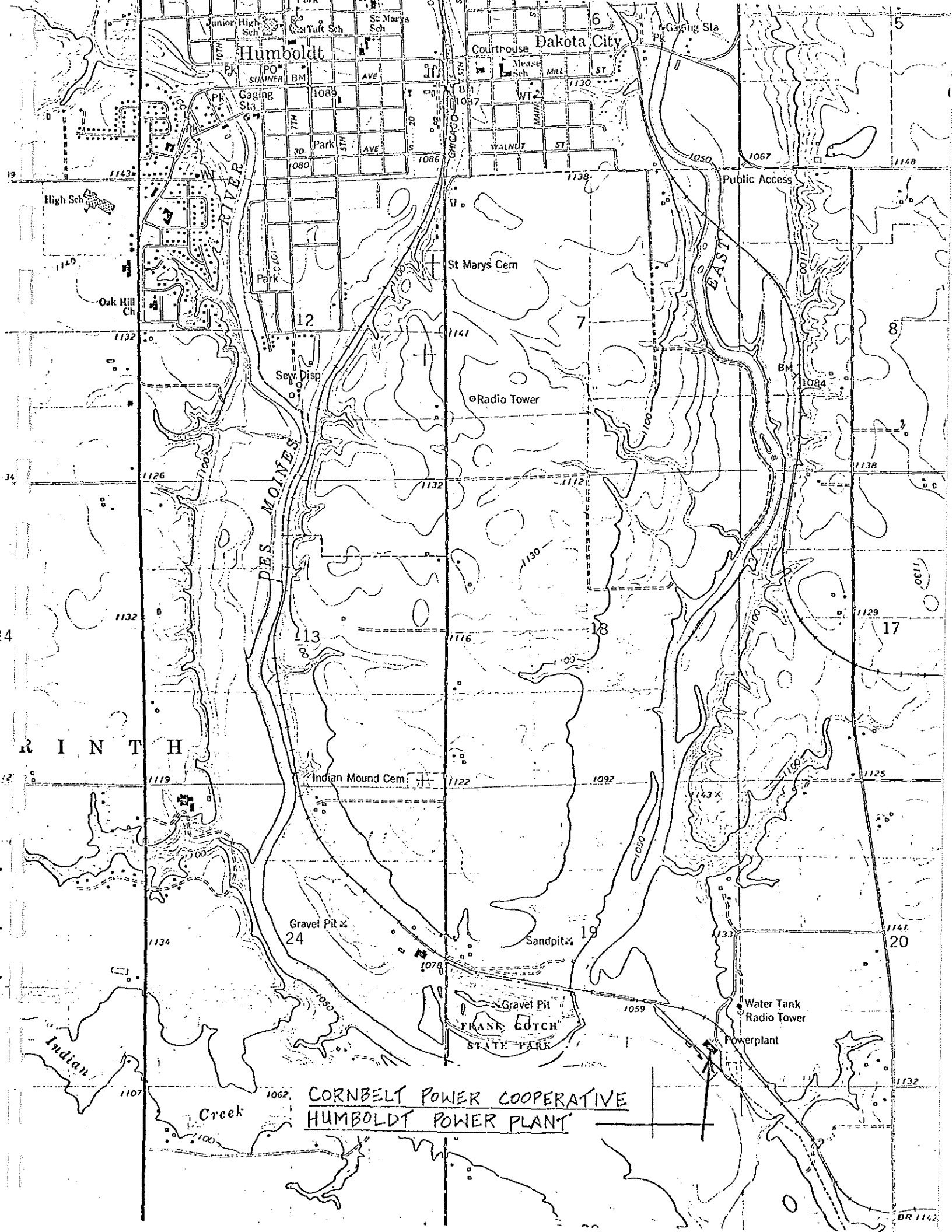


RAIL CAR THAWING
BUILDING & COOLING TOWER



WATER TREATMENT
FACILITIES

CORE DEPT. HUMBOLDT


Humboldt
Dakota City
Courthouse
Junior High Sch
Taft Sch
St Marys Sch
Gaging Sta
Park
PO
SUMNER
BM
AVE
10TH
7TH
5TH
3D
2D
S
CHICAGO
MAIN
MILL
ST
WALNUT
WT
1089
1087
1086
1080
1067
1050
1148
1143
1138
1130
Public Access
High Sch
RIVER
DES MOINES
EAST
St Marys Cem
Oak Hill Ch
Park
12
7
8
Sew Disp
Radio Tower
BM
1084
1140
1132
1141
1100
1126
1112
1129
17
18
13
1116
1092
1122
1119
Indian Mound Cem
1125
1143
1134
Gravel Pit
24
Sandpit
19
20
1078
1059
Gravel Pit
FRANK GOTCH
STATE PARK
Water Tank
Radio Tower
Powerplant
Indian
Creek
1107
1062
CORNBELT POWER COOPERATIVE
HUMBOLDT POWER PLANT

BOONE VALLEY COOP

STEAM GENERATING PLANT

LOCATION - EAGLE GROOVE, IOWA

HOURS OPERATED - 24 HOURS PER DAY, 7 DAYS PER WEEK

STEAM PRESSURE - 650 PSIG THRU TURBINE, 150 PSIG TO PROCESS

STEAM TEMPERATURE- 850 ^{0}F AT TURBINE

CAPACITY- 200,000 # PER HOUR WITH NEW BOILER BEING INSTALLED

BUILT- 1949, NEW BOILER UNDER CONSTRUCTION

FIRED BY- TRAVELING GRATE STOKER

GENERAL CONDITION - CURRENTLY BEING REBUILT

WATER TREATMENT CAPACITY - WILL HAVE 465 GPM CAPACITY

AIR POLLUTION CONTROL & EQUIP. - BAGHOUSE

OIL STORAGE AVAILABLE - NONE

NATURAL GAS AVAILABLE - NEARBY, IN LIMITED AMOUNTS

ELECTRICAL SERVICE AVAILABLE - SUBSTATION AT PLANT

RAIL SERVICE - CHICAGO NORTHWESTERN

RAIL CONDITION - EXCELLENT- NEW RIBBON RAIL INSTALLED

ROADS - EXCELLENT - SERVED BY STATE HIWAY 17, HIWAY 3 AND I-35 NEARBY

AREA UNEMPLOYMENT - 3.3%

LAND AVAILABLE - VERY LIMITED AMOUNTS - NOT MORE THEN 10 ACRES AT SITE

TAXES - $27.94534 PER $1000 ASSESSED VALUE

GRAIN RESOURCES (3 YEAR AVERAGE) -21,074,667 BU. CORN HARVESTED FOR GRAIN

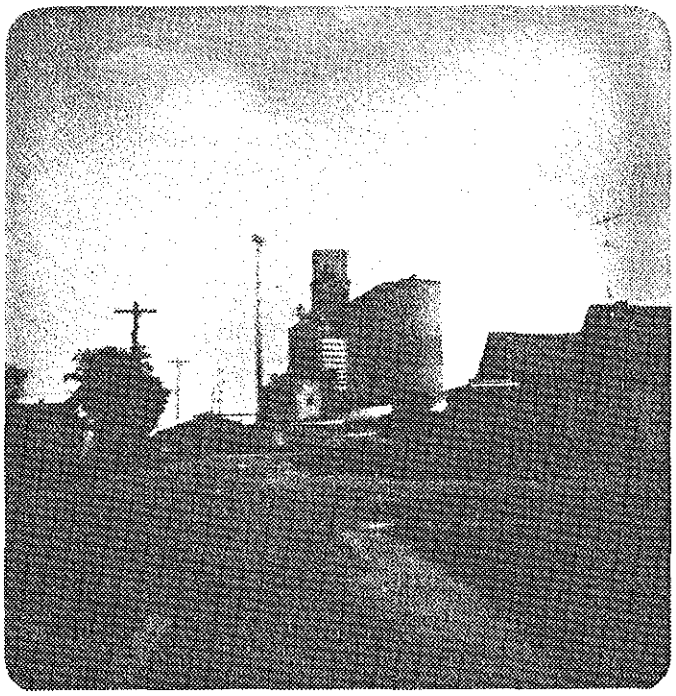
DATA BASE AREA - WRIGHT COUNTY- 577 SQ. MILES OR 369280 ACRES

WATER AVAILABILITY - LARGE AMOUNTS AVAILABLE (1300 GPM)

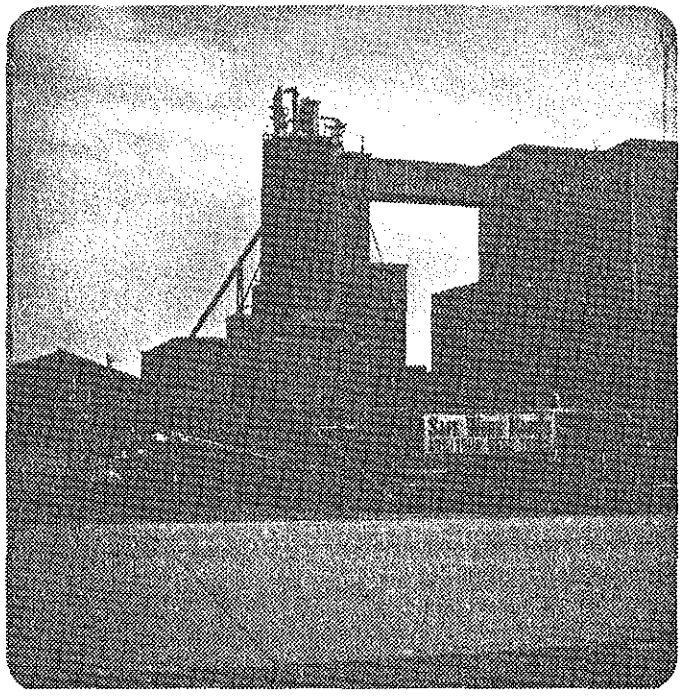
ESTIMATED SIZE ETHONAL PLANT - N/A - SEE NOTES NEXT PAGE

NOTES:

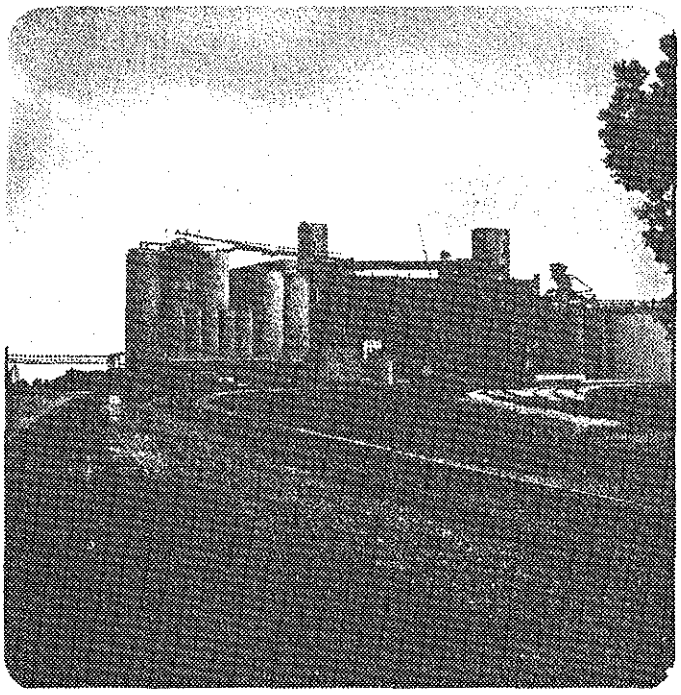
AT THIS TIME BOONE VALLEY COOP DOES NOT KNOW HOW MUCH EXCESS CAPACITY THEY WILL HAVE OR FOR HOW LONG THEY WILL HAVE IT IF IT IS AVAILABLE. THE ALCOHOL PLANT, IF STEAM WOULD BE AVAILABLE, WOULD ONLY NEED THE ACTUAL FEMENTATION DISTILLATION, AND ON SITE FUEL STORAGE SINCE AN EXISTING ELEVATOR IS OPERATING NEAR BY AND AN ABANDONED ELEVATOR IS ON THE POSSIBLE SITE ALONG WITH TWO METAL STORAGE BUILDINGS. THERE IS NOT ROOM FOR A SEPARATE BOILER PLANT. BOONE VALLEY IS CURRENTLY COMPLETELY REBUILDING THE EXISTING BOILER COMPLETELY AND ALSO BUILDING A NEW BOILER. THE TIME FRAME BEFORE THE BOILERS WILL BE ON LINE IS 1½ YEARS. A LOCAL TRUCKING FIRM IS AVAILABLE TO HANDLE ANY HAULING OF FUEL, RAW MATERIALS, AND BY-PRODUCTS. THIS FIRM HAS OVER 300 UNITS. AN INDUSTRIAL PARK IS AVAILABLE AT THE NORTH END OF TOWN BUT A SEPERATE BOILER WOULD BE REQUIRED.



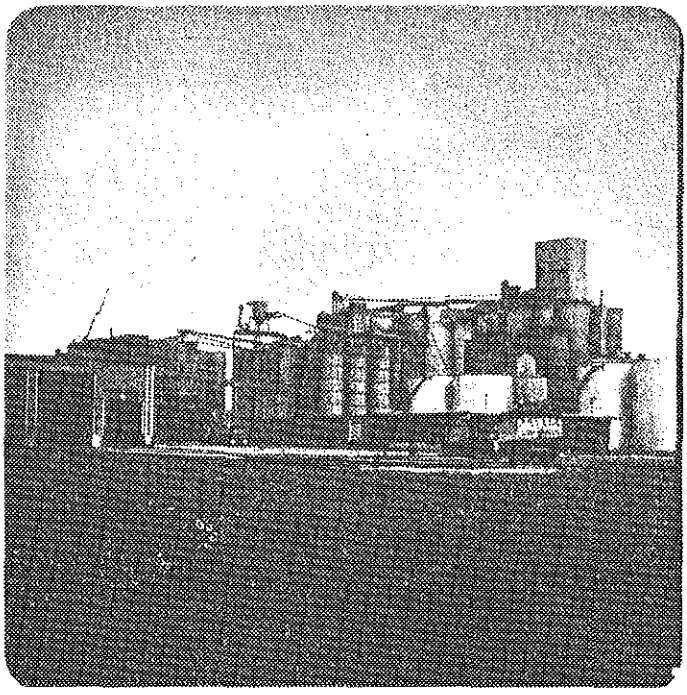
EXISTING CORN ELEVATOR



NORTH ELEVATION
BOILER PLANT

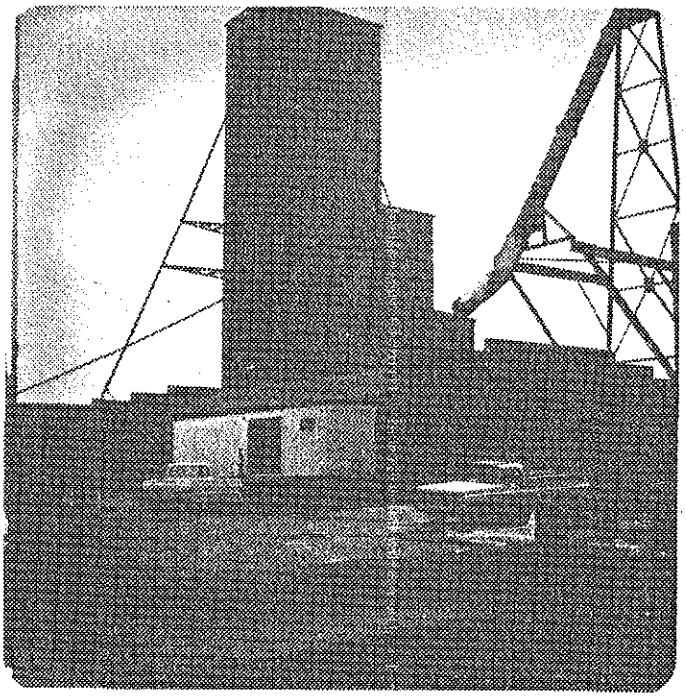


BOONE VALLEY PROCESSING PLANT
SOUTH ELEVATION

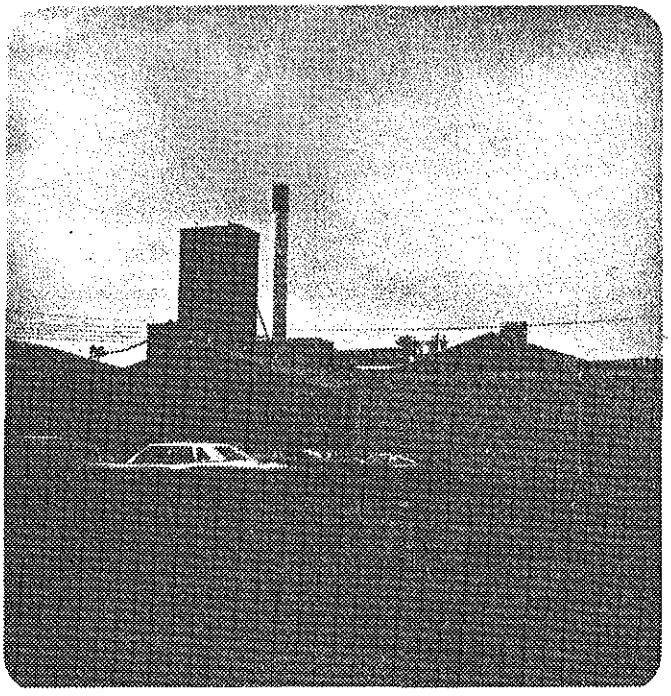


BOONE VALLEY
PROCESSING PLANT
NORTH ELEVATION

FEED MILL

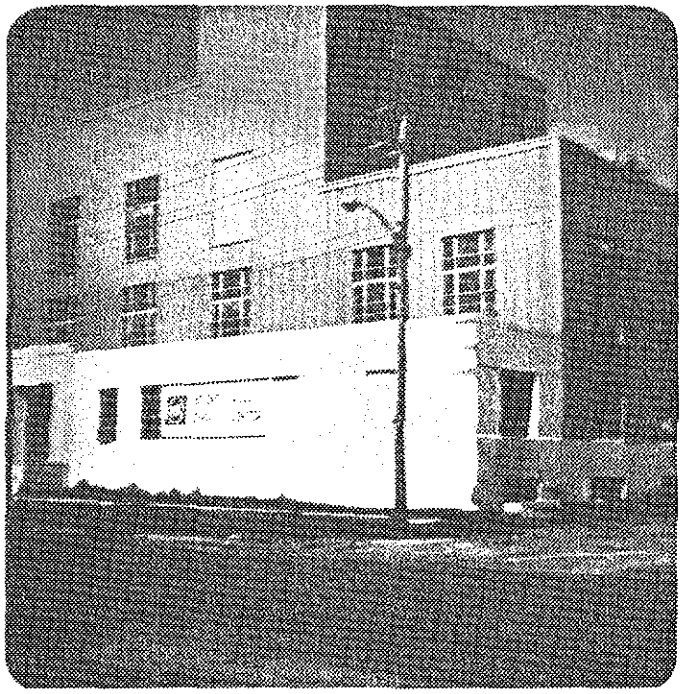


EXISTING ABANDONED GRAIN ELEVATOR

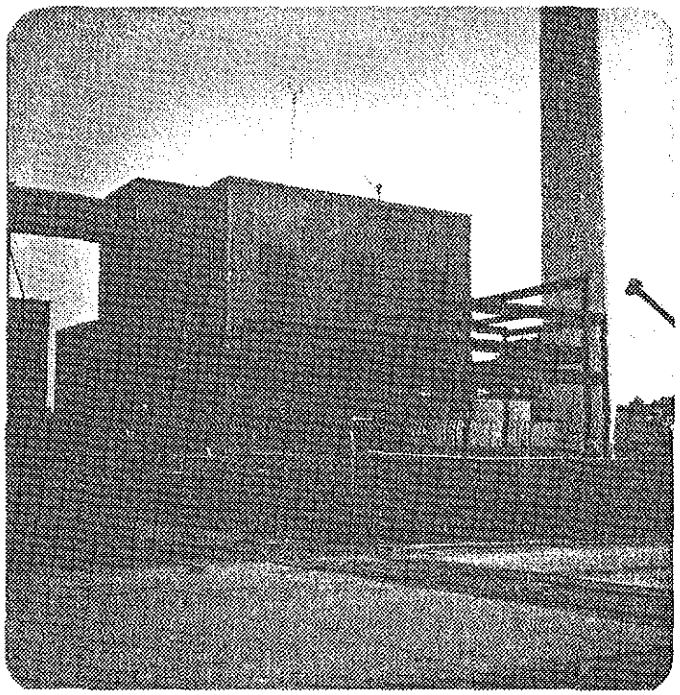


SOUTH ELEVATION
AVAILABLE METAL BLDGS.

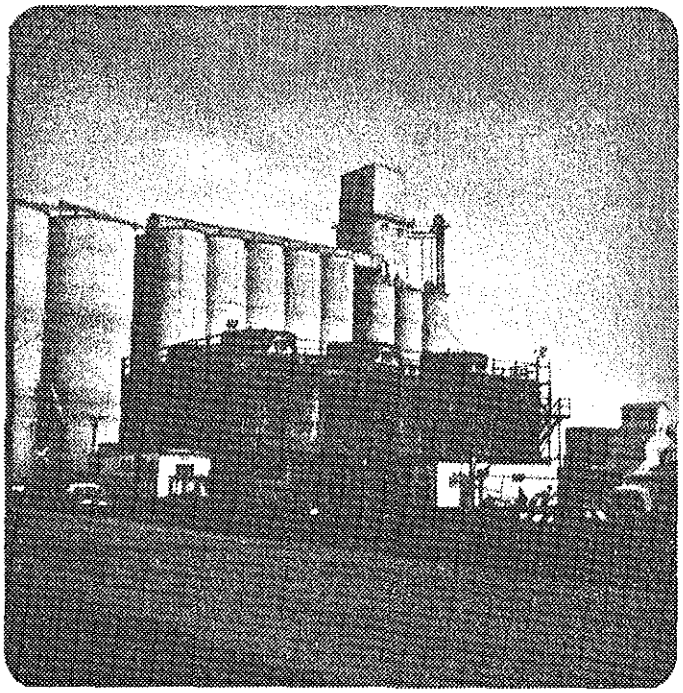
NORTH ELEVATION
AVAILABLE METAL BLDGS.



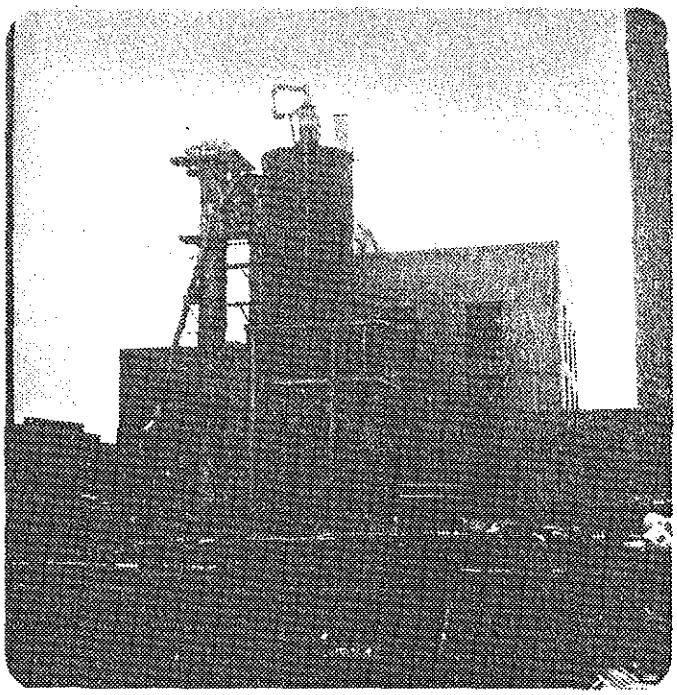
West Elevation
Power Plant



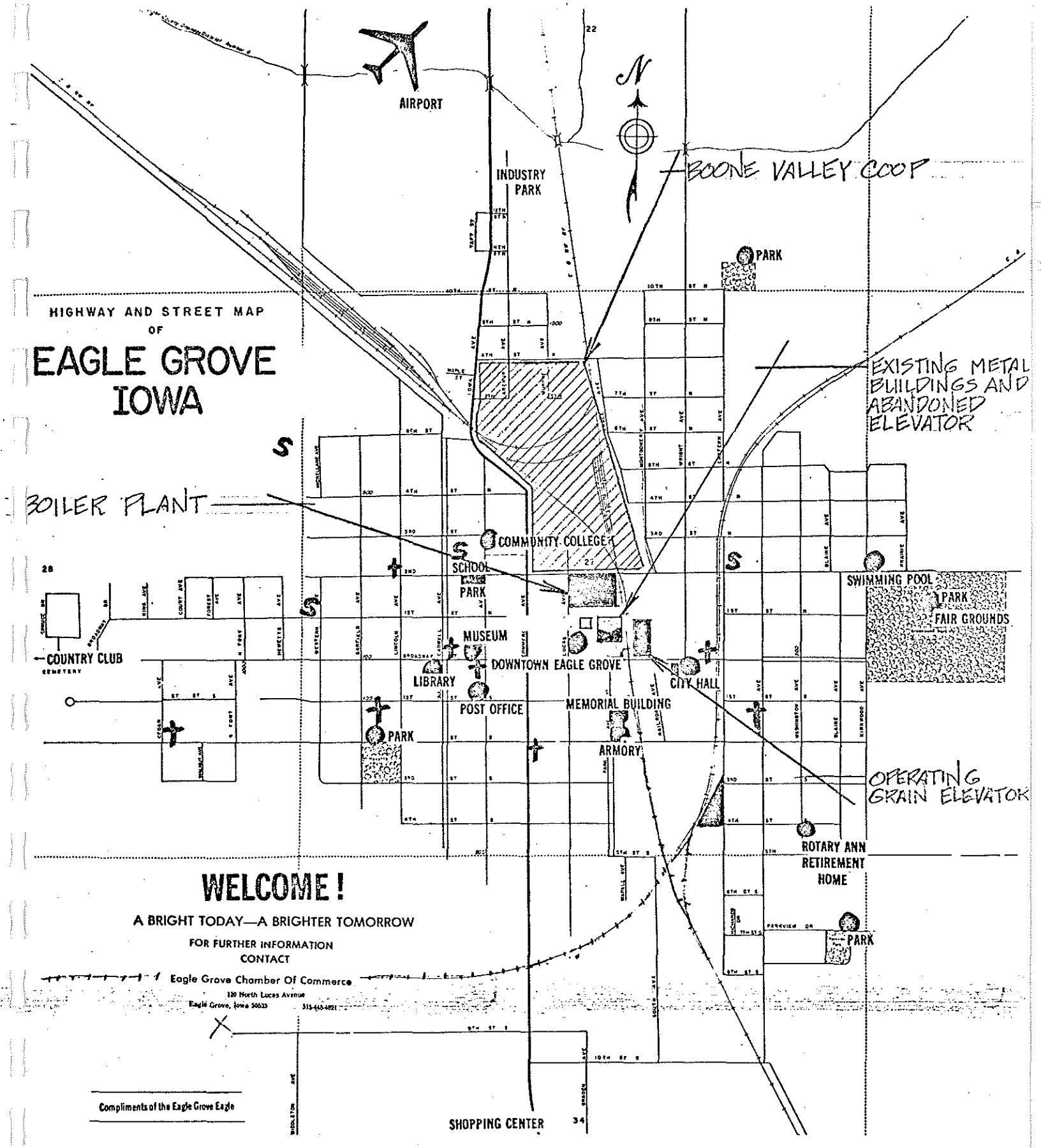
North Elevation
Power Plant



Cooling Tower &
Corn Elevator



East Elevation
Power Plant


HIGHWAY AND STREET MAP
OF
EAGLE GROVE
IOWA
AIRPORT
INDUSTRY PARK
BOONE VALLEY COOP
PARK
EXISTING METAL BUILDINGS AND ABANDONED ELEVATOR
BOILER PLANT
COMMUNITY COLLEGE
SCHOOL
PARK
SWIMMING POOL
PARK
FAIR GROUNDS
COUNTRY CLUB
CEMETERY
MUSEUM
DOWNTOWN EAGLE GROVE
LIBRARY
POST OFFICE
CITY HALL
MEMORIAL BUILDING
PARK
ARMORY
OPERATING GRAIN ELEVATOR
ROTARY ANN RETIREMENT HOME
PARK
WELCOME!
A BRIGHT TODAY—A BRIGHTER TOMORROW
FOR FURTHER INFORMATION CONTACT
Eagle Grove Chamber Of Commerce
120 North Lucas Avenue
Eagle Grove, Iowa 50533
515-448-4021
Compliments of the Eagle Grove Eagle
SHOPPING CENTER

NORTHERN NATURAL GAS

OGDEN COMPRESSOR STATION

LOCATION - OGDEN, IOWA

HOURS OPERATED - 24 HR/DAY, 7 DAYS/WEEK

STEAM PRESSURE - 150 PSIG

STEAM TEMPERATURE- SATURATED STEAM - 365^{0} F

CAPACITY- 50,000 #/HR - NORTHERN NATURAL GAS CO. ESTIMATES

BUILT- N/A

FIRED BY- NATURAL GAS ENGINES; ONE V-16 engine and one V-20 ENGINE

GENERAL CONDITION - EXCELLENT

WATER TREATMENT CAPACITY - NONE

AIR POLLUTION CONTROL & EQUIP. - NONE

OIL STORAGE AVAILABLE - NONE

NATURAL GAS AVAILABLE - ON SITE

ELECTRICAL SERVICE AVAILABLE - 161 KV 115 KV LINE NEAR TIME

RAIL SERVICE - CHICAGO NORTHWESTERN

RAIL CONDITION - EXCELLENT

ROADS - EXCELLENT - SERVED BY U.S. HWY 30, 169, I-35 30 MILES AWAY

AREA UNEMPLOYMENT - NOT AVAILABLE

LAND AVAILABLE - MORE THAN 20 ACRES

TAXES - $22.04 PER $1,000 ASSESSED VALUE

GRAIN RESOURCES (3 YEAR AVERAGE) - 15,024,667 BU. CORN HARVESTED FOR GRAIN

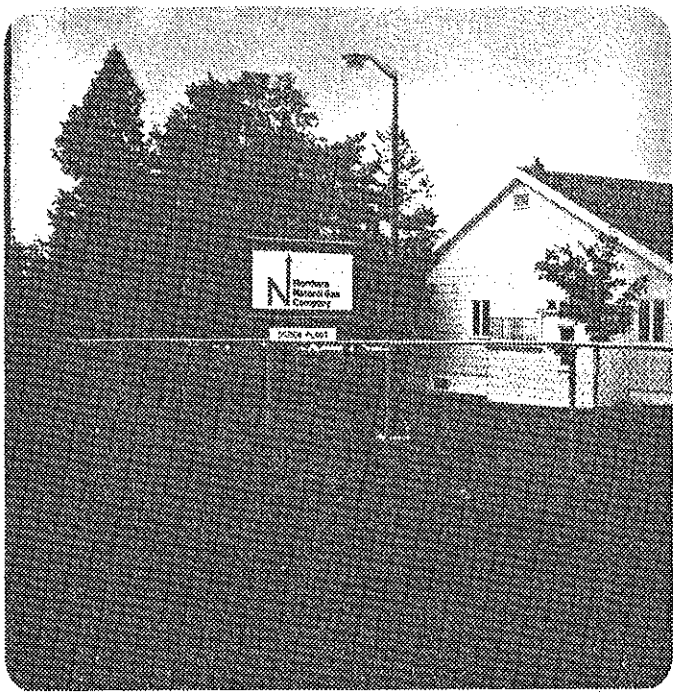
DATA BASE AREA - BOONE COUNTY - 573 SQ. MILES OR 366,720 ACRES

WATER AVAILABILITY - WELLS WOULD HAVE TO BE DRILLED

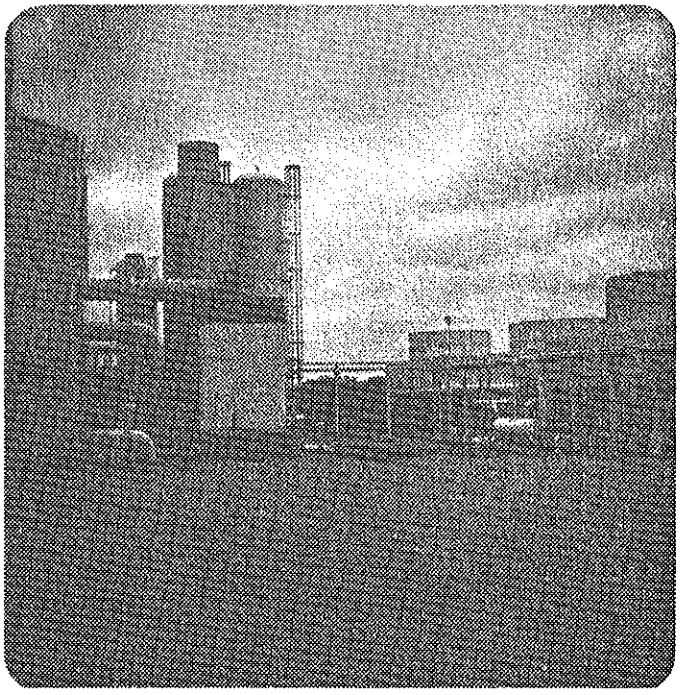
ESTIMATED SIZE ETHONAL PLANT - 10 MILLION GALLON PER YEAR

NOTES:

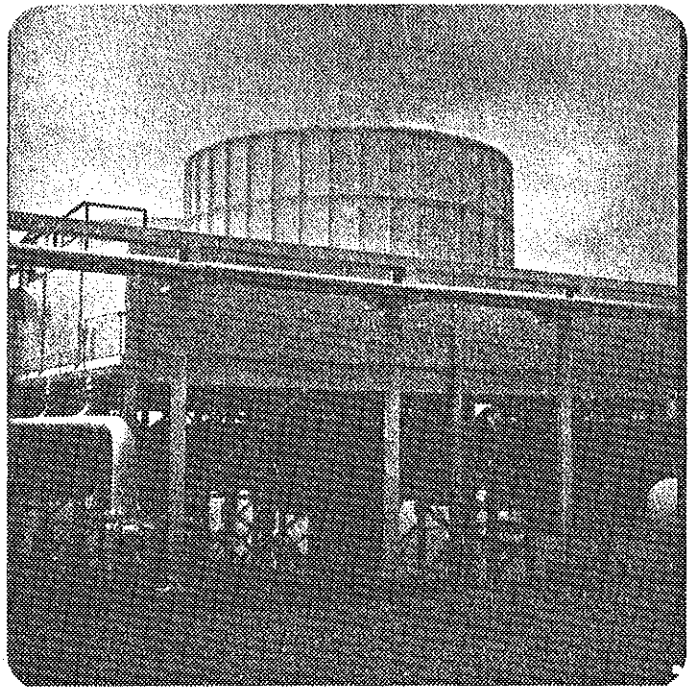
CAPACITY OF PLANT IS BASED ON 40% RECOVERY OF EXHAUST HEAT WHEN ALL UNITS ARE OPERATED AT 90% CAPACITY. ENGINES ARE USUALLY DOWN FOR SEVERAL HOURS EVERY TWO WEEKS FOR CHANGE ON PLUGS. UNITS ARE ALSO DOWN TWICE A YEAR FOR PREVENTITIVE MAINTENANCE, 1 WEEK EACH TIME. THIS PERIOD IS USUALLY IN JUNE AND NOVEMBER. ANOTHER SOURCE OF LOW TEMPERATURE HEAT IS THE COOLING WATER FOR THE ENGINES. COOLING WATER IS NOW PUMPED TO COOLING TOWERS VIA 10 and 12" PIPE. THE WATER TEMPERATURE IS USUALLY BETWEEN 130 - 140^0 F. THE FLOW RATE IS NOT KNOWN. IF A FUEL ALCOHOL PLANT IS BUILT AT THIS LOCATION, AN AUXILARY BOILER MAY BE REQUIRED. WASTEWATER WILL HAVE TO BE TREATED ON SITE SINCE THE CITY'S SYSTEM IS CURRENTLY AT FULL CAPACITY. AMPLE SPACE FOR FUEL ALCOHOL PLANT.



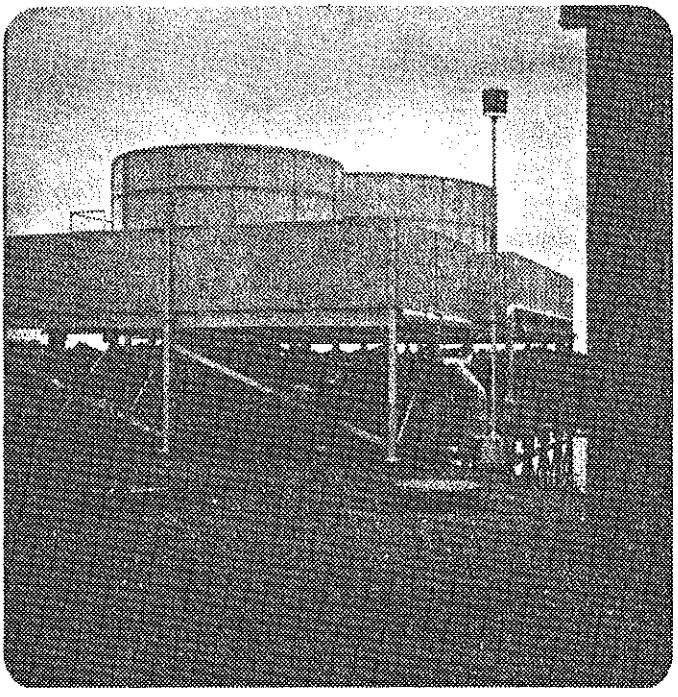
PLANT ENTRANCE



WEST ELEVATION

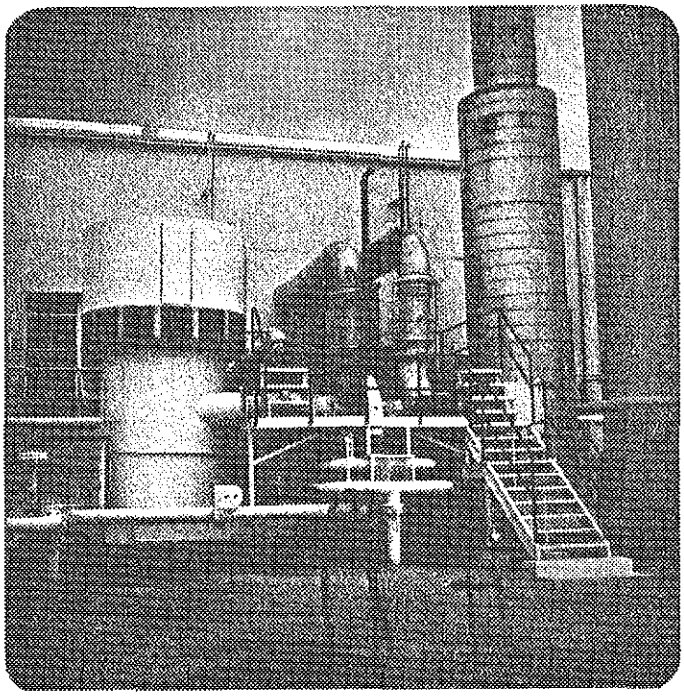


WEST COOLING TOWER

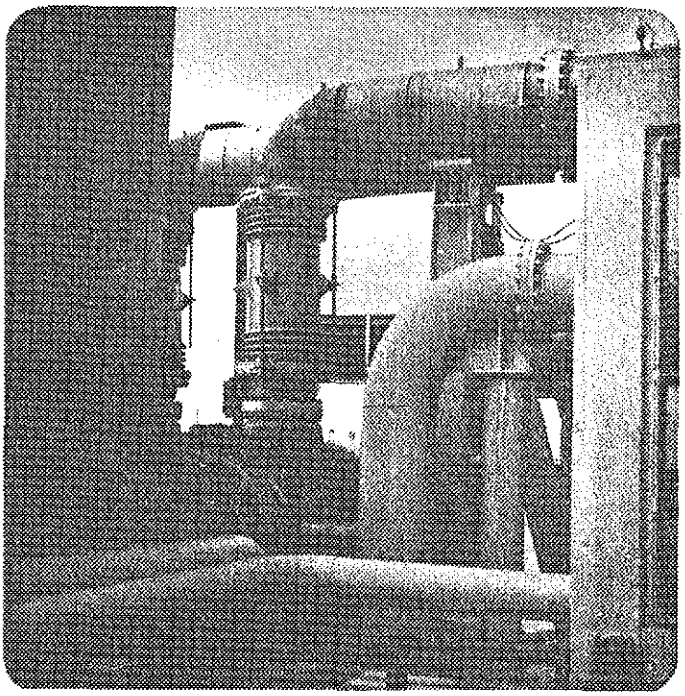


EAST COOLING TOWER

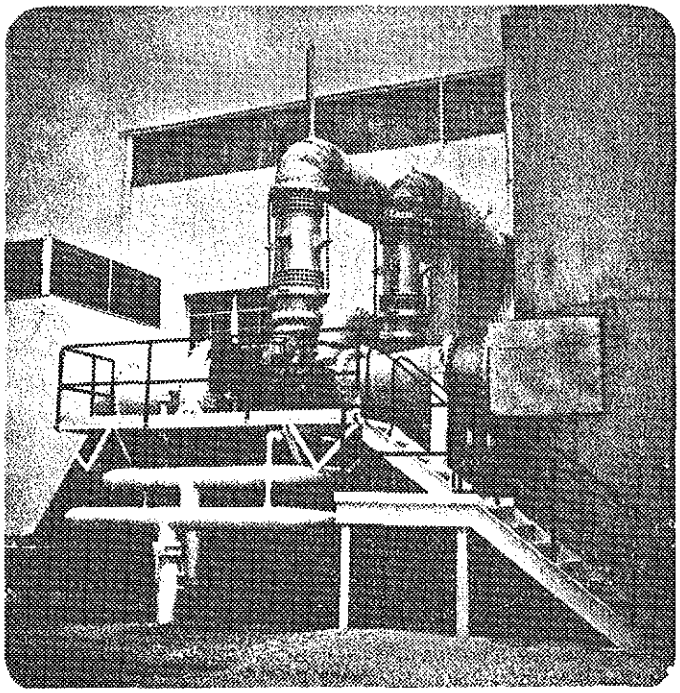
ODEN COMPRES. STA.



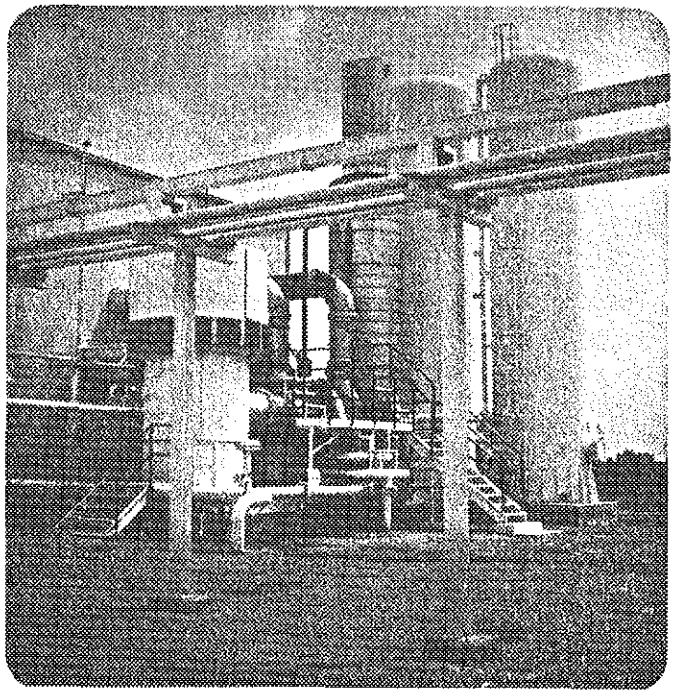
V-16 Exhaust & Turbine Compressors



Exhaust Piping

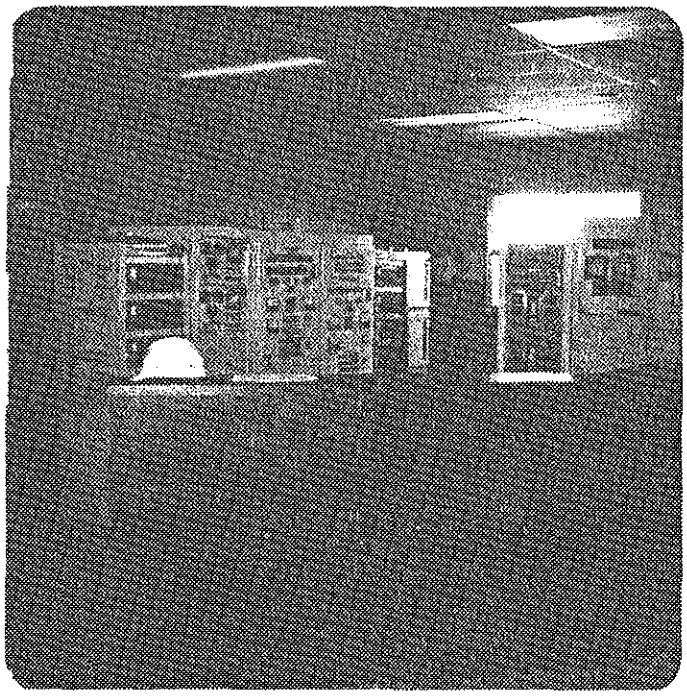


V-20 Exhaust & Turbine Compressors

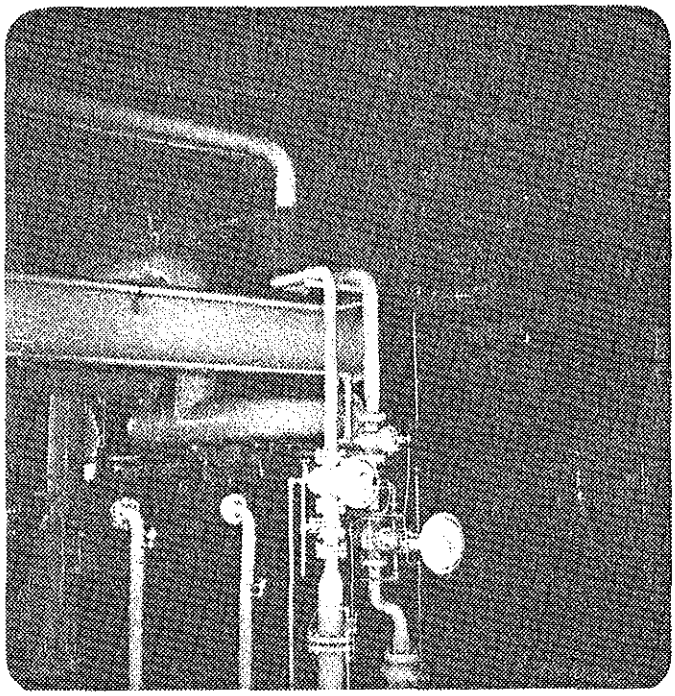


Engine Muffler, Turbine & Exhaust Stack

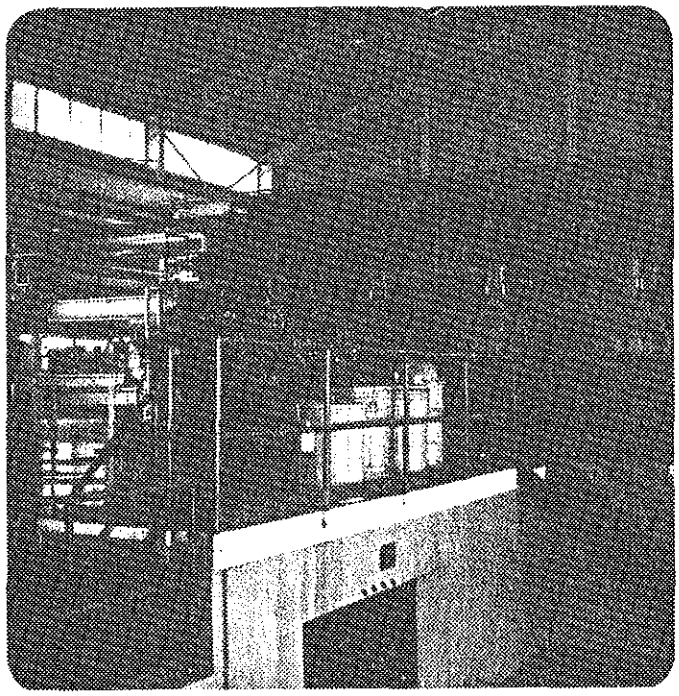
Ogden Compress. Sta.



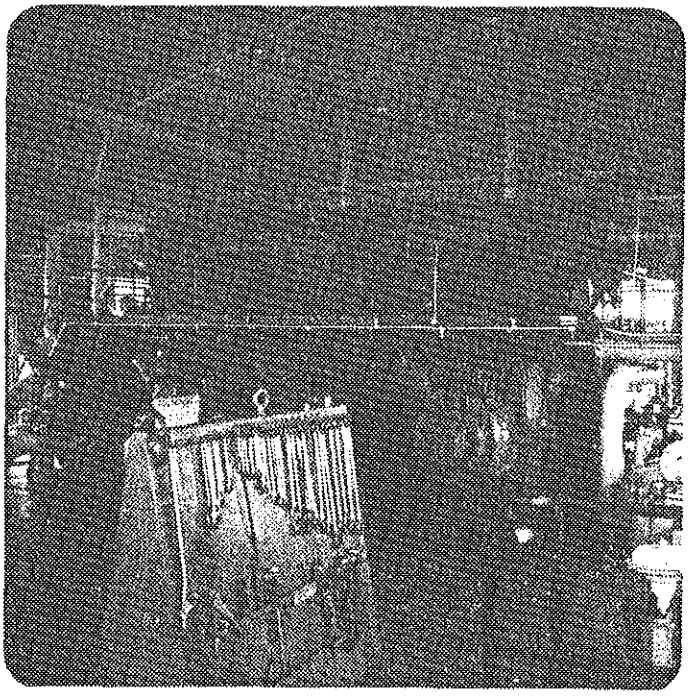
ENGINE & COMPRESSED GAS CONTROL CENTER



EXHAUST FROM V-20 ENGINE

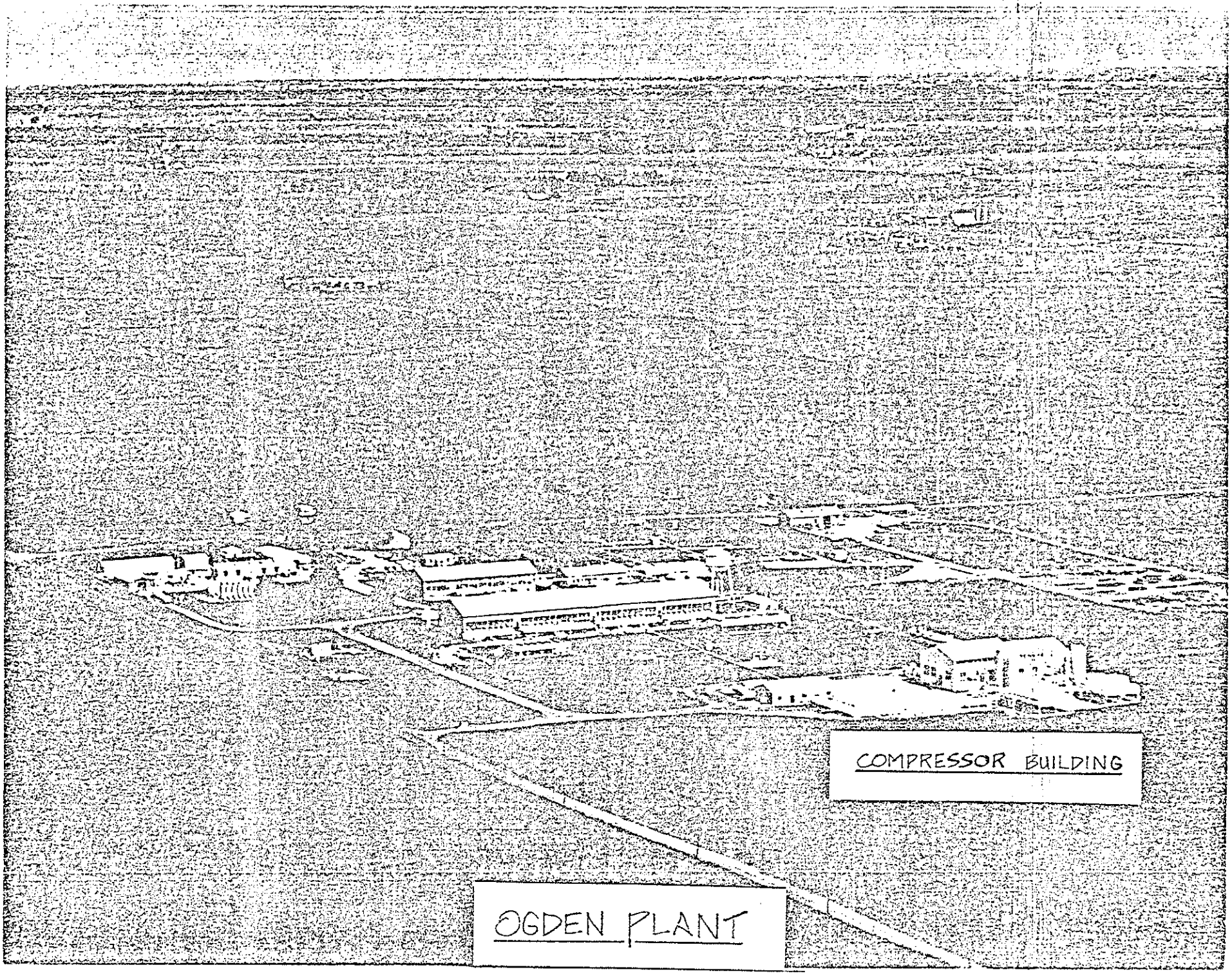


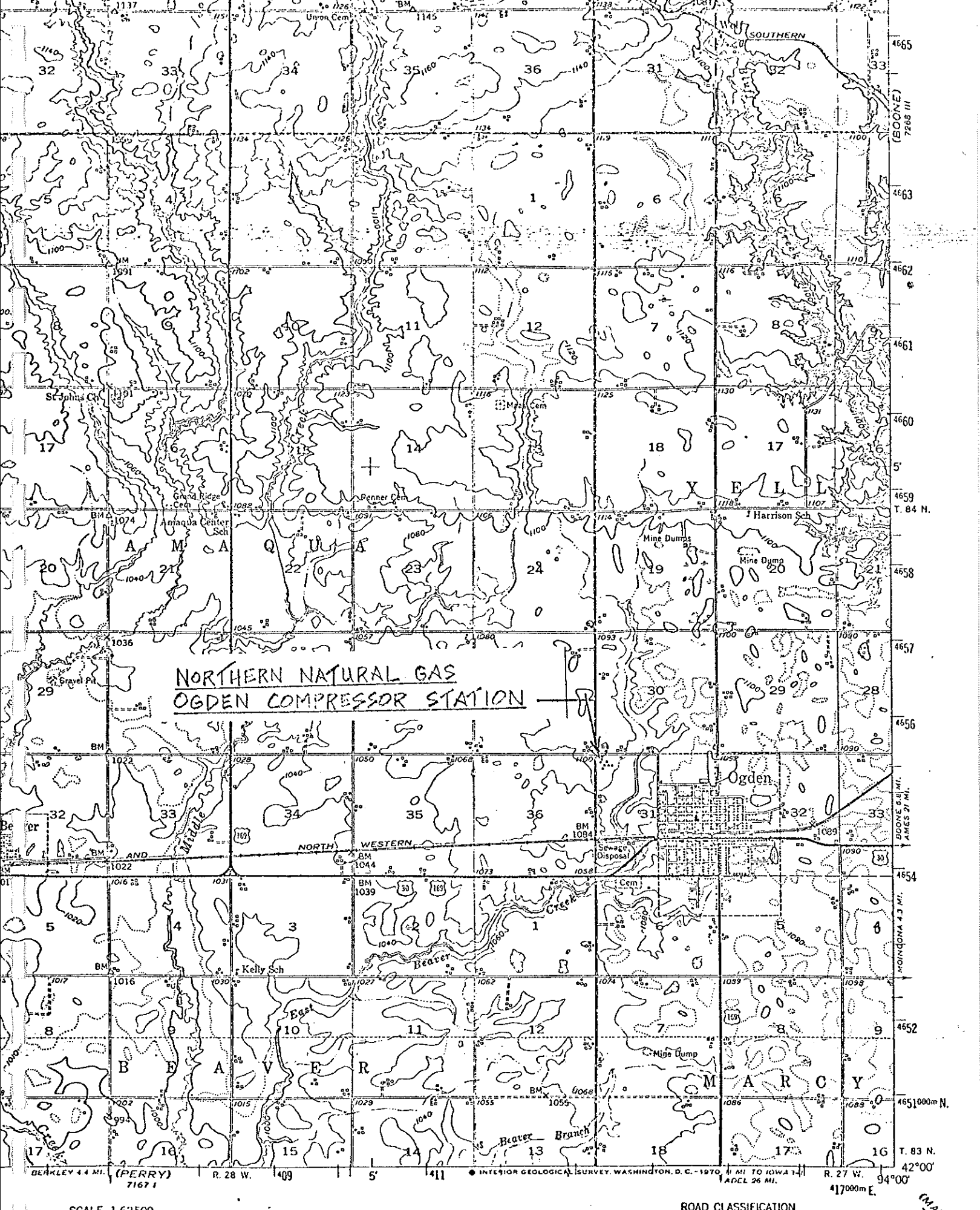
V-20 ENGINE



V-16 ENGINE

OGDEN COMPRESS. STA.


COMPRESSOR BUILDING
OGDEN PLANT


NORTHERN NATURAL GAS
OGDEN COMPRESSOR STATION
Ogden
Union Cem
SOUTHERN
St Johns Ch
Mack Cem
Grand Ridge Cem
Penner Cem
Amaqua Center Sch
Harrison Sch
Mine Dumps
Mine Dump
Gravel Pit
Sewage Disposal
Cem
Kelly Sch
Middle
East
Beaver
Creek
Branch
NORTH WESTERN
AND
BEAVER
MARCY
AMAQUA
YELL
BERKLEY 4.4 MI.
(PERRY)
7167 I
R. 28 W.
R. 27 W.
T. 84 N.
T. 83 N.
42°00'
94°00'
417000m E.
4651000m N.
BOONE 6 MI.
AMES 27 MI.
MOINDONA 4.3 MI.
(BOONE)
7268 III
(MADRID)
7267 IV
SCALE 1 62500
4 MILES
21000 FEET
5 KILOMETERS
ROAD CLASSIFICATION
Heavy-duty
Medium-duty
4 LANE - 4 LANE
Light-duty
Unimproved dirt
U.S. Route
State Route

IOWA PUBLIC SERVICE COMPANY

CARROLL ELECTRIC PLANT

LOCATION - CARROLL, IOWA

HOURS OPERATED - 0 - PLANT CLOSED DOWN DECEMBER 1980

STEAM PRESSURE - 420 PSIG

STEAM TEMPERATURE- 750^{0} F

CAPACITY- BOILER # 1 - 60,000 # PER HR, BOILER # 2 - 60,000 # PER HR

BUILT- 1951

FIRED BY- TRAVELING GRATE STOKERS

GENERAL CONDITION - FAIR

WATER TREATMENT CAPACITY - APPROXIMATELY 200 GPM (ACCORDING TO PLANT PERSONNEL)

AIR POLLUTION CONTROL & EQUIP. - MECHANICAL CYCLONE SEPERATOR

OIL STORAGE AVAILABLE - OIL STORAGE ON ADJOINING PROPERTY

NATURAL GAS AVAILABLE - AT SITE

ELECTRICAL SERVICE AVAILABLE - SUBSTATION ON SITE

RAIL SERVICE - CHICAGO NORTHWESTERN RAILROAD

RAIL CONDITION - EXCELLENT

ROADS - EXCELLENT - SERVED BY U.S. HWY 30 AND 71

AREA UNEMPLOYMENT - 5.1%

LAND AVAILABLE - MORE THAN 20 ACRES - OVER 1 MILE AWAY FROM PLANT

TAXES - $24.83 PER $1,000 ASSESSED VALUATION

GRAIN RESOURCES (3 YEAR AVERAGE) - 14,250,333 BU. CORN HARVESTED FOR GRAIN

DATA BASE AREA - CARROLL COUNTY - 574 SQ. MILES OR 367,360 ACRES

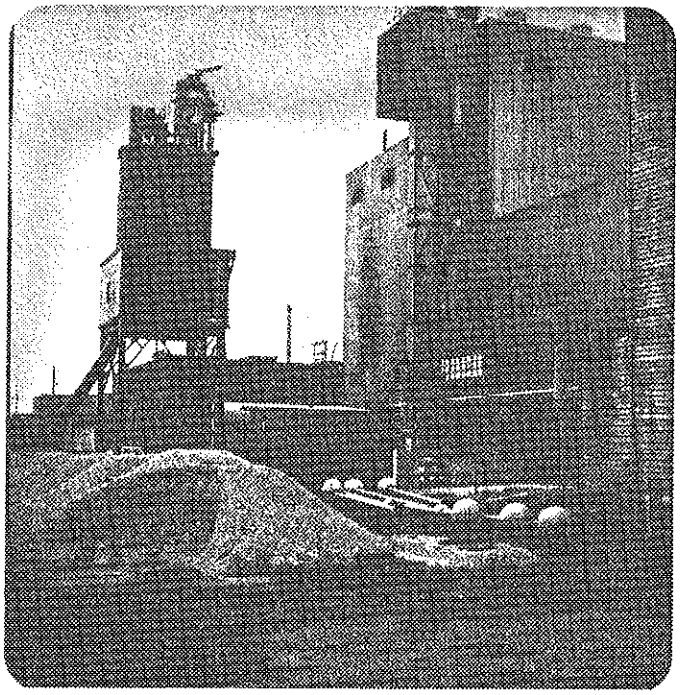
WATER AVAILABILITY - 1,300 GPM

ESTIMATED SIZE ETHONAL PLANT - NOT TO EXCEED 20 MILLION GALLONS PER YEAR

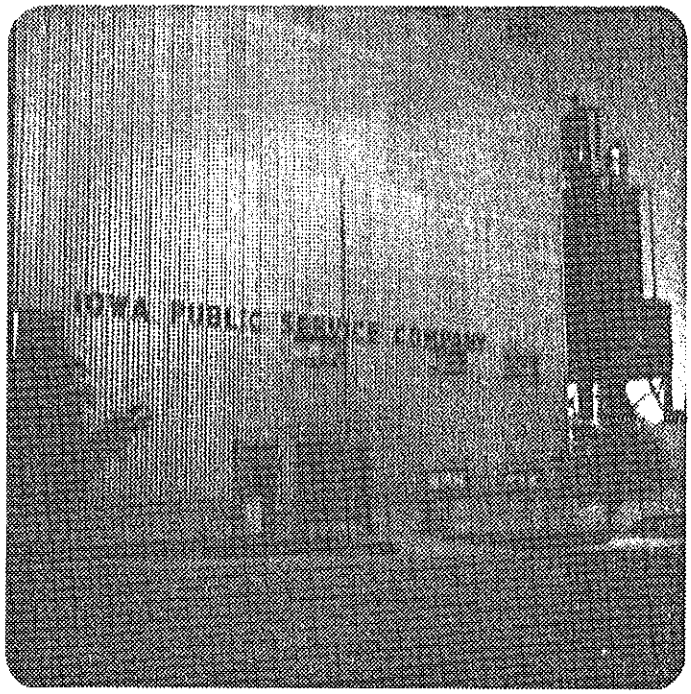
NOTES:

PLANT HAS HAD PACKING REMOVED FROM FEED WATER PUMPS. MUCH WORK AND UNDETERMINED COST WOULD BE NEEDED TO BRING THE PLANT BACK ON LINE. THIS FACT IN COMBINATION WITH THE AGE OF THE BOILERS AND THE LACK OF A SITE NEARBY TEND TO MAKE THE FEASIBILITY OF USING THE EXISTING BOILER NOT GOOD. PLANT PERSONNEL BELIEVED THAT THE PLANT COULD NOT MEET AIR POLLUTION CONTROL STANDARD AT FULL LOAD.

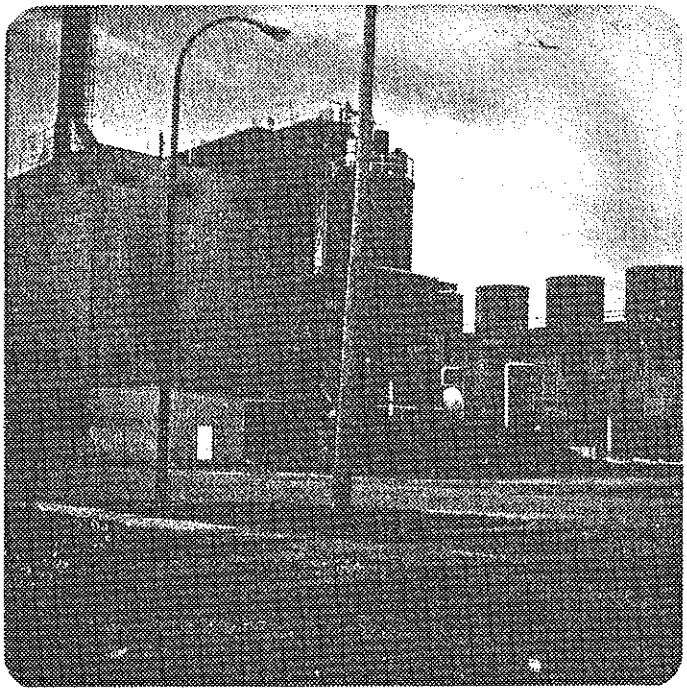
AVAILABLE SITE TO EAST OF CITY IS LARGE ENOUGH FOR BUILDING COMPLETE NEW PLANT WITH BOILER (65 ACRES).



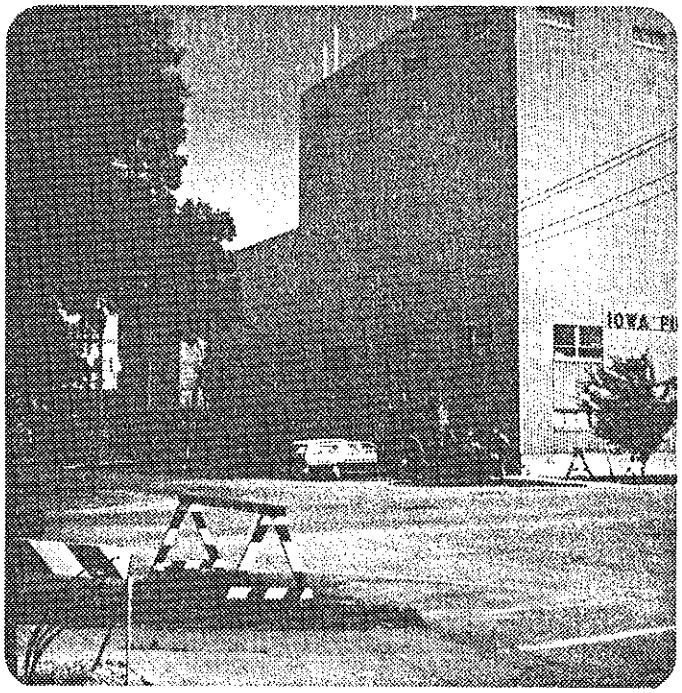
SOUTHWEST ELEVATION



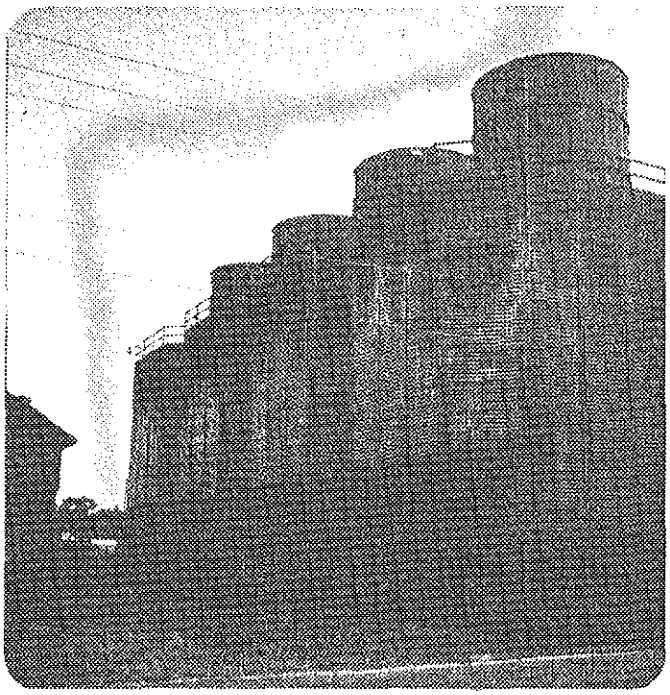
WEST ELEVATION



SOUTHEAST ELEVATION



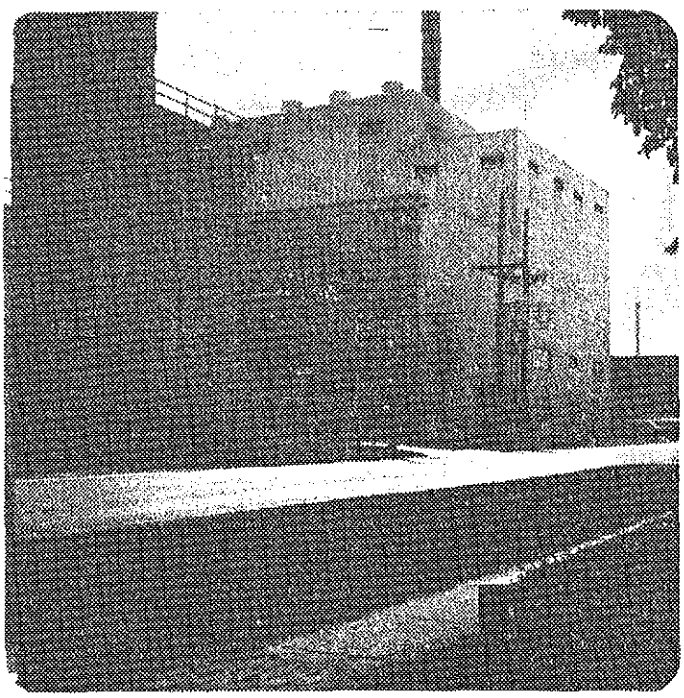
NORTHWEST ELEVATION



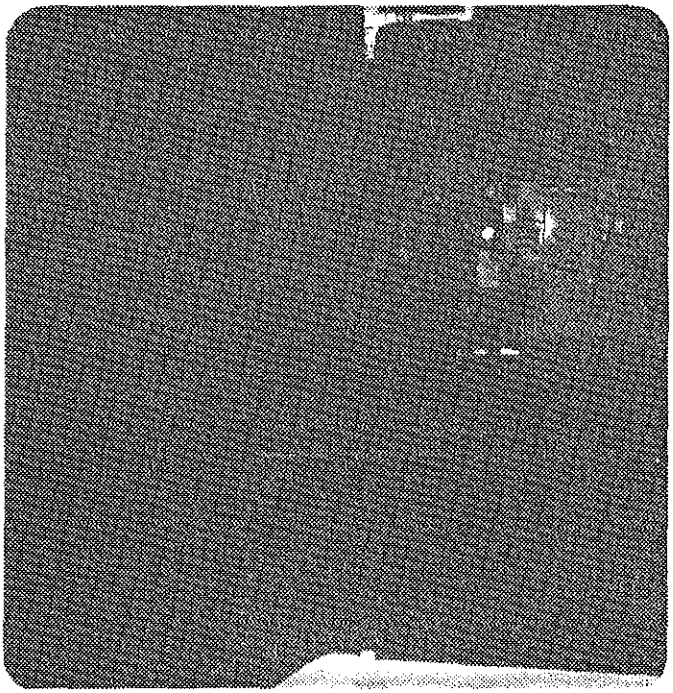
Cooling Tower
Northeast Elevation

Cooling Tower
Southwest Elevation

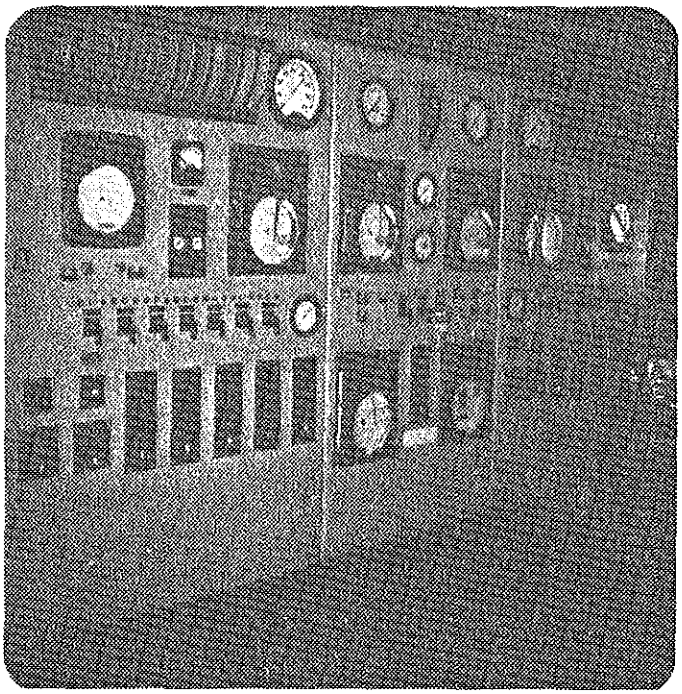
Main Coal
Storage Area



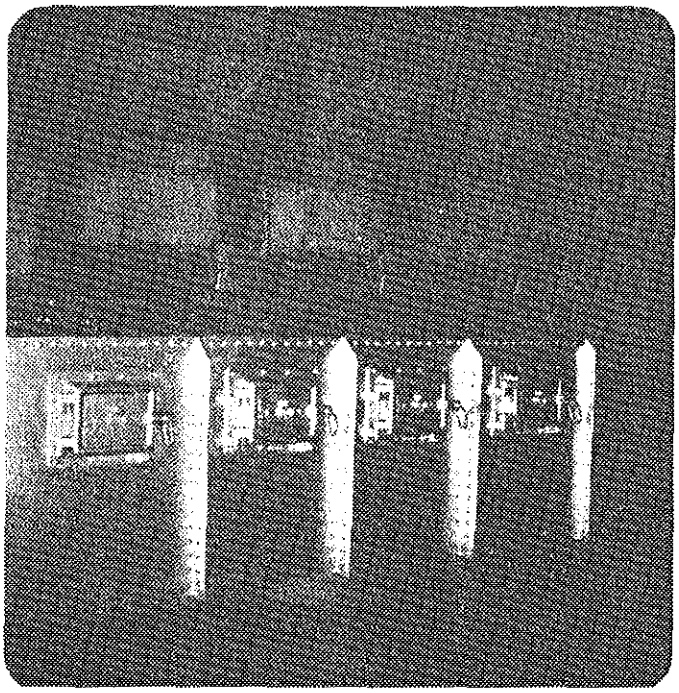
Northeast Elevation



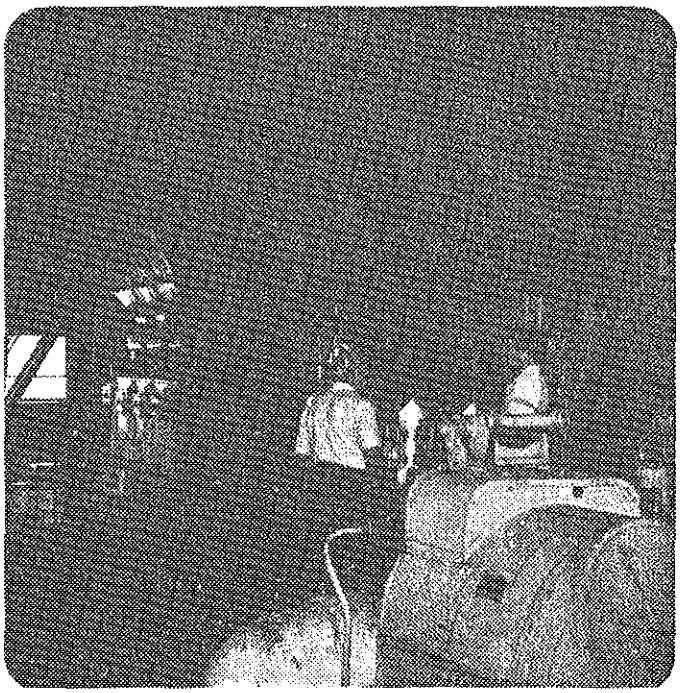
GENERATING EQUIP. CONTROLS



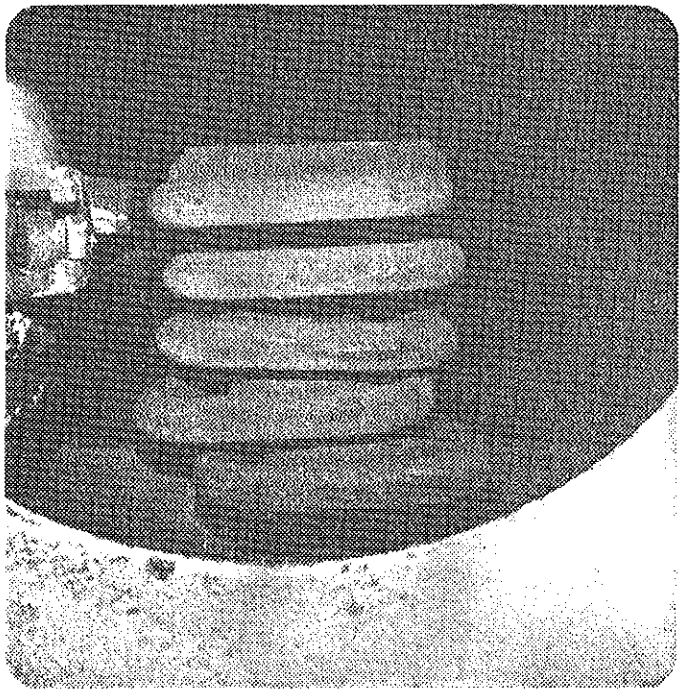
BOILER COMBUSTION CONTROLS



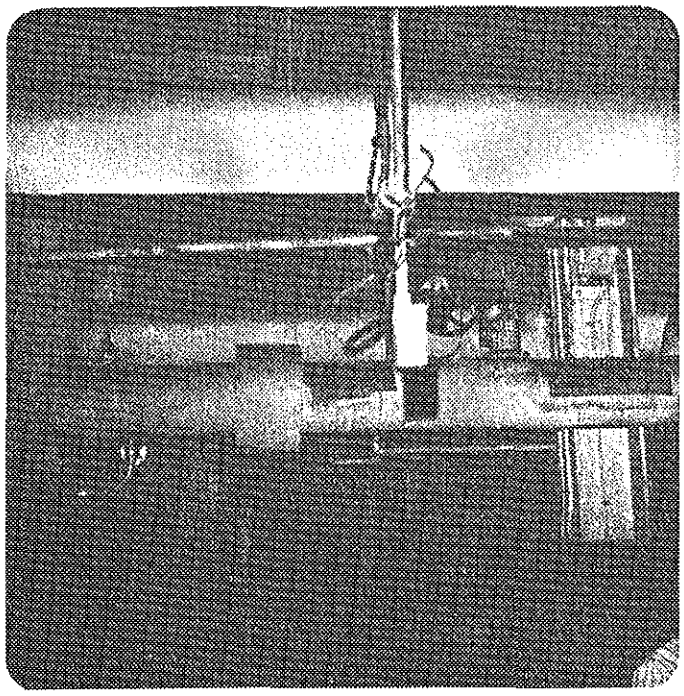
BOILER STOKER



BOILER STOKERS



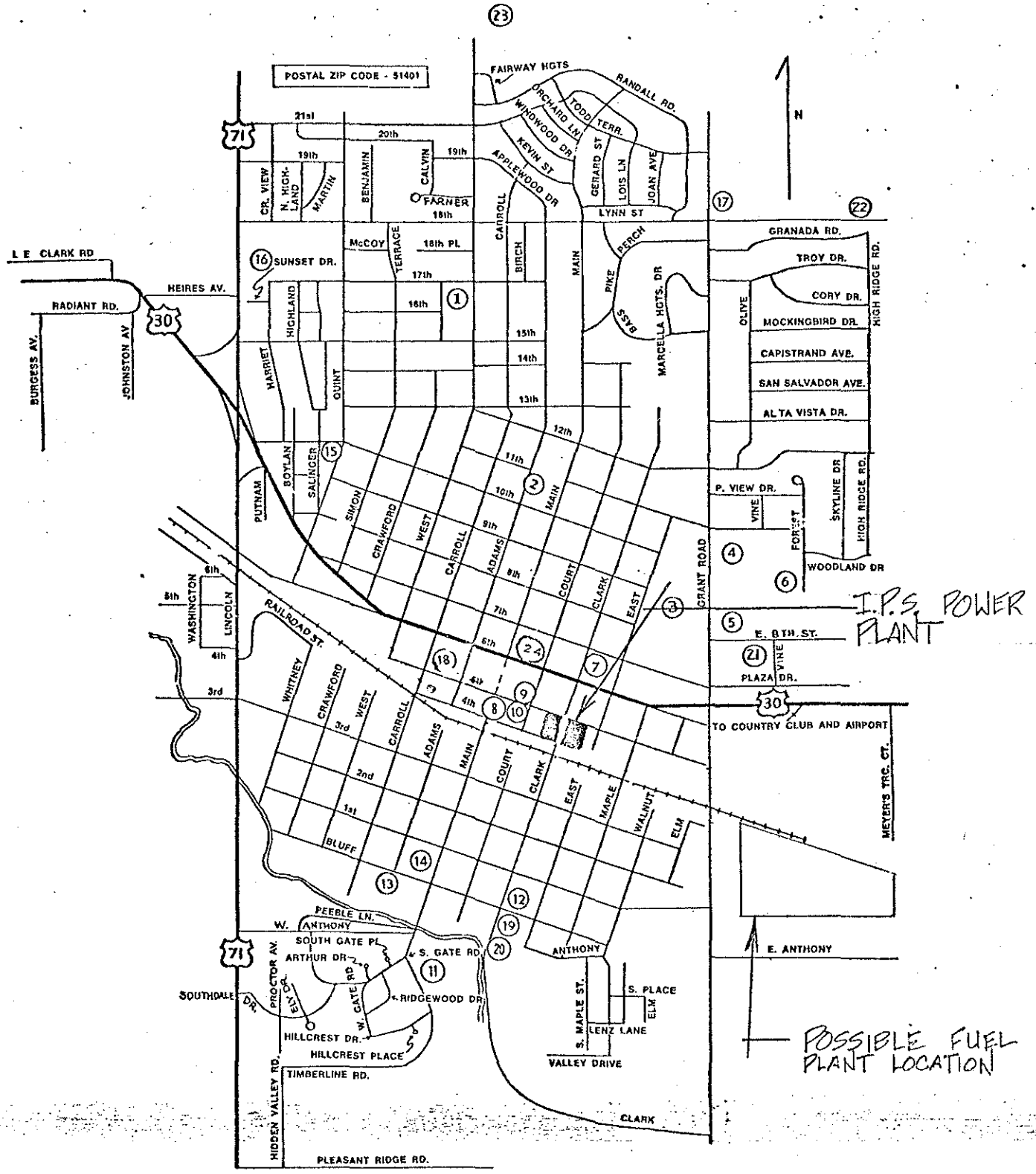
STEAM DRUM



TURBINE EXHAUST LINES

IDS - CARROLL

City of Carroll, Iowa



1—St. Lawrence School
2—Carroll High School
3—Graham Park
4—Swimming Pool
5—High School Athletic Field
6—Baseball Field
7—Post Office
8—Public Library
9—Court House
10—City Hall & Fire Station
11—Rolling Hills Park
12—Kuemper Catholic High School
13—Water Works Park
14—South Side Park
15—Minchen Park
16—North Side Park
17—Fairview Elementary School
18—Chamber of Commerce
19—Holy Spirit School
20—St. Anthony Hospital
21—Carroll Recreation Center
22—New Hope Village
23—Municipal Golf Course
24—Historical Museum

IOWA PUBLIC SERVICE COMPANY

HAWKEYE PLANT

LOCATION - STORM LAKE, IOWA

HOURS OPERATED - 200 - USED ONLY AS PEAKING PLANT

STEAM PRESSURE - 600 PSIG

STEAM TEMPERATURE- 825^{0} F

CAPACITY- BOILER # 1 - 100,000 # PER HR., BOILER #2 - 125,000 # PER HR.

BUILT- #1 - 1948, #2 - 1953

FIRED BY- TRAVELING GRATE STOKERS

GENERAL CONDITION - FAIR

WATER TREATMENT CAPACITY - 160 - 170 GPM (ACCORDING T PLANT PERSONELL

AIR POLLUTION CONTROL & EQUIP. - MECHANICAL CYCLONE

OIL STORAGE AVAILABLE - NONE

NATURAL GAS AVAILABLE - NEAR SITE

ELECTRICAL SERVICE AVAILABLE - SUBSTATION & TRANSFORMERS ON SITE

RAIL SERVICE - ILLINOIS CENTRAL RAILROAD

RAIL CONDITION - GOOD

ROADS - GOOD - SERVED BY STATE HWY 5 & U.S. HWY 71 @ STORM LAKE

AREA UNEMPLOYMENT - FLUCTUATES BETWEEN 1.8 AND 3.5%

LAND AVAILABLE - MORE THAN 20 ACRES

TAXES - $ 19.88 PER $1,000 OF ASSESSED VALUE

GRAIN RESOURCES (3 YEAR AVERAGE) - 20,174,666 BU. CORN HARVESTED FOR GRAIN

DATA BASE AREA - BUENA VISTA COUNTY - 572 SQ. MILES OR 366,080 ACRES

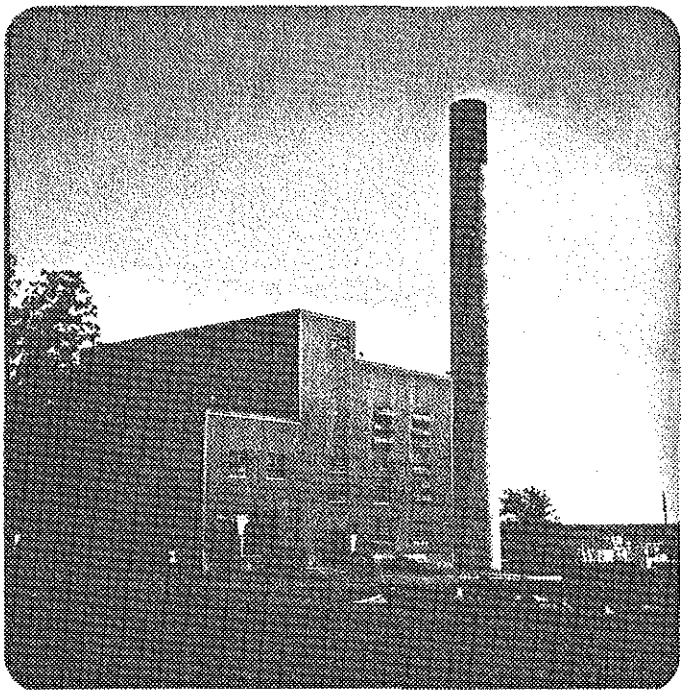
WATER AVAILABILITY - 2 WELLS ON SITE, 1 OPERABLE, 6" LINE TO STORM LAKE

ESTIMATED SIZE ETHONAL PLANT - 5 TO 10 MILLION GALLONS PER YEAR *

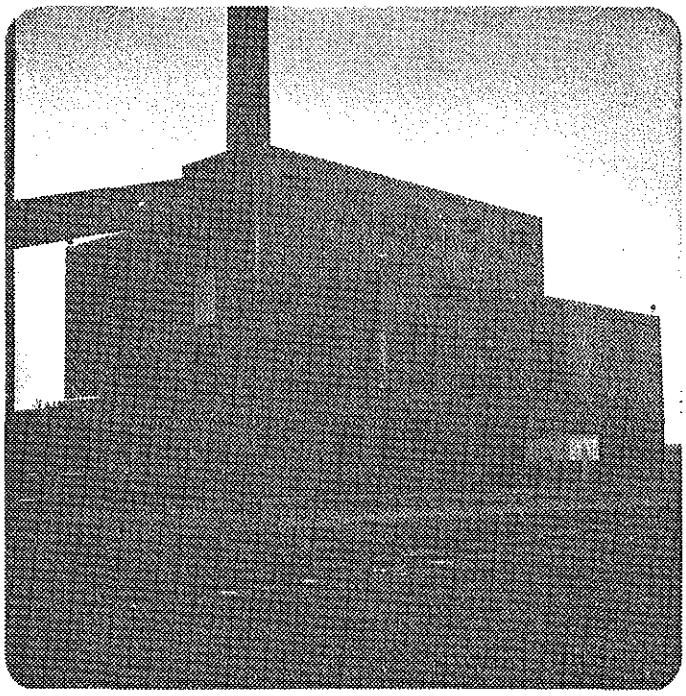
* WELL CAPACITY NOT KNOWN BUT ASSUME MINIMUM OF 100 GPM

NOTES:

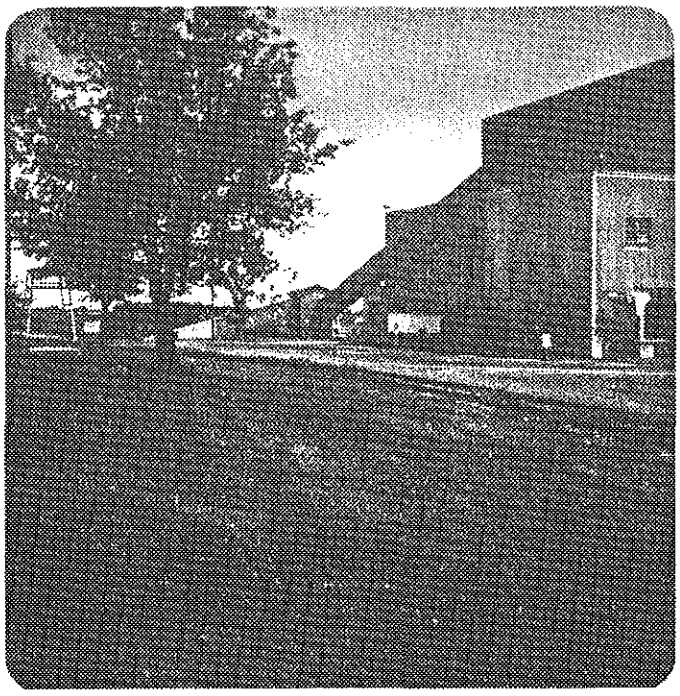
PLANT TO CLOSE IN 1982. MANY OF THE CONTROLS ARE OBSOLETE. THE RELIABILITY OF THE PLANT IS QUESTIONABLE DUE TO THE AGE OF THE PLANT. TWO ALCOHOL PLANTS ARE CURRENTLY BEING BUILT OR IN OPERATION IN STORM LAKE. ONE PLANT PRODUCES 300,000 GALLONS OF LOW GRADE FUEL ALCOHOL (90% ALCOHOL) AND THE OTHER PRODUCES 2½ MILLION GALLONS OF ANHYDROUS ALCOHOL PER YEAR INITIALLY WITH PLANS TO EXPAND TO 4 MILLION GALLONS PER YEAR IN THE NEAR FUTURE.



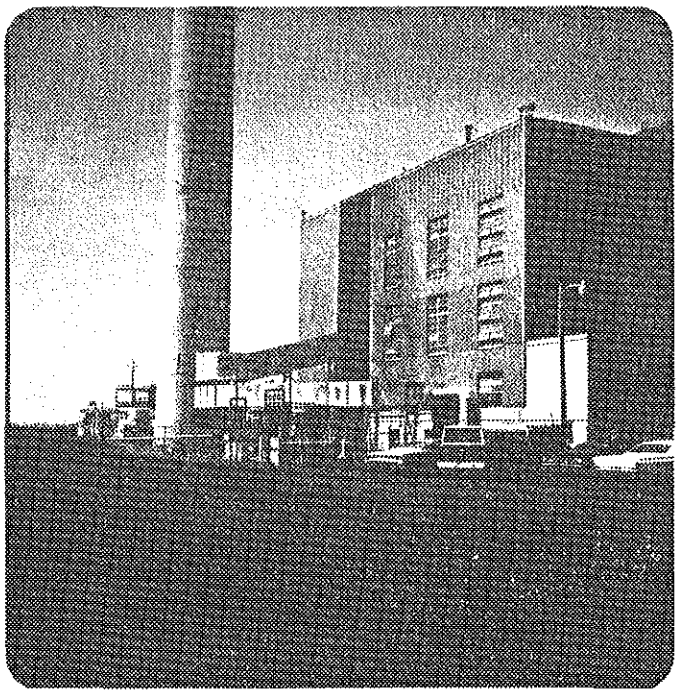
NORTHWEST ELEVATION



NORTHEAST ELEVATION

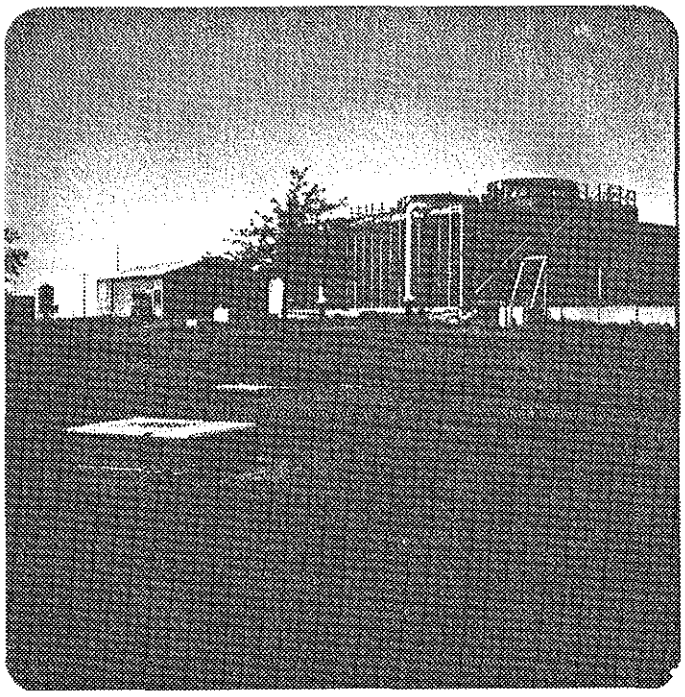


COAL HANDLING

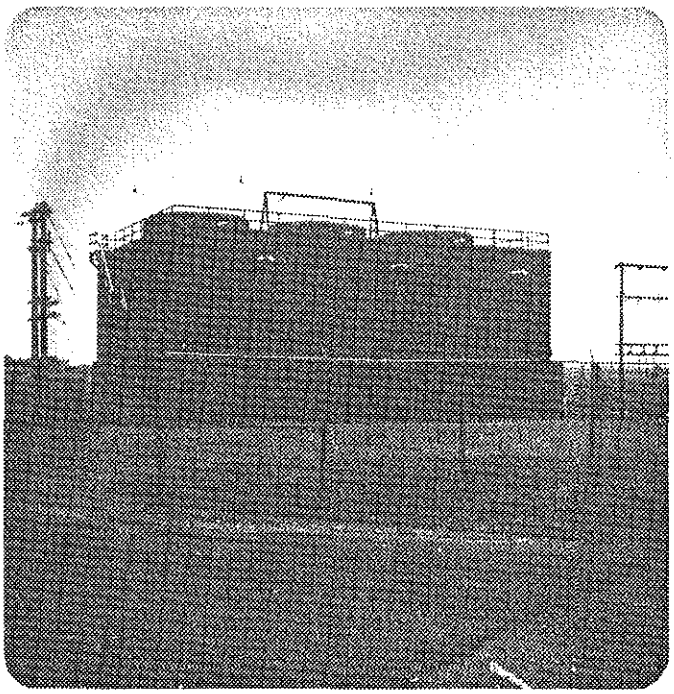


SOUTH ELEVATION

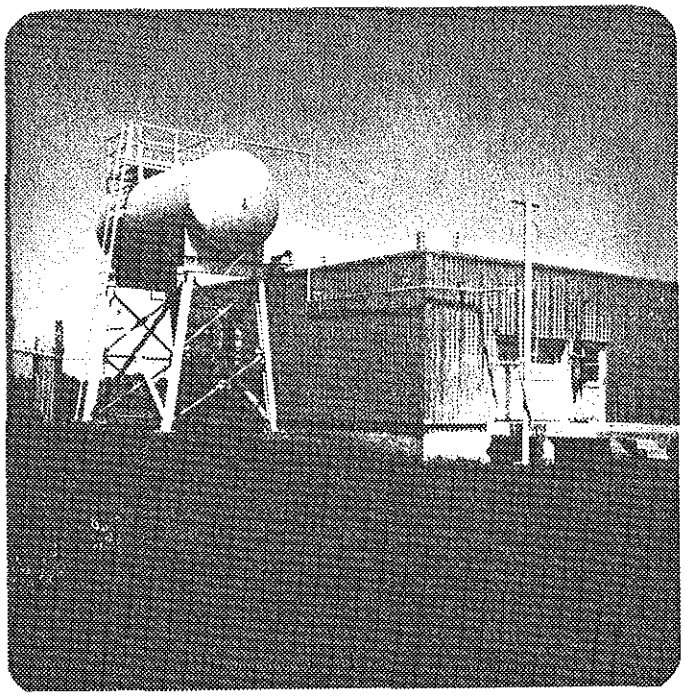
IPS- STORM LAKE



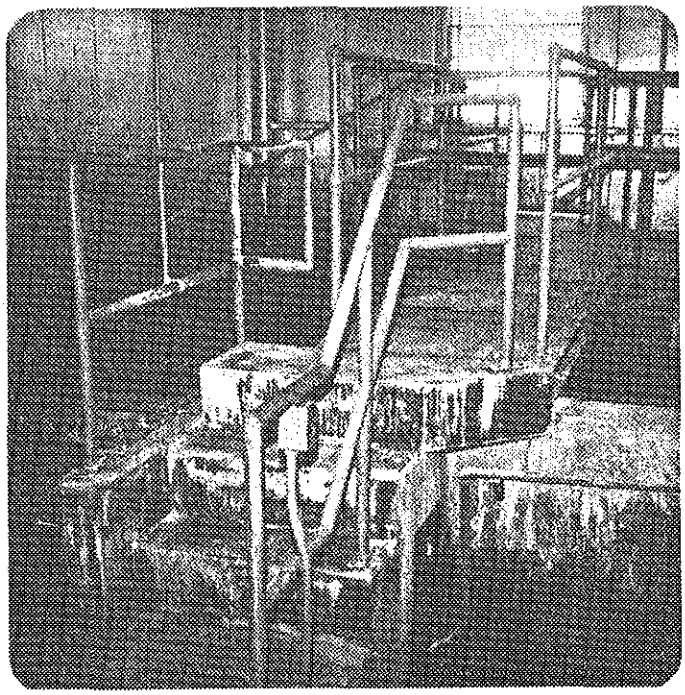
North Cooling Tower



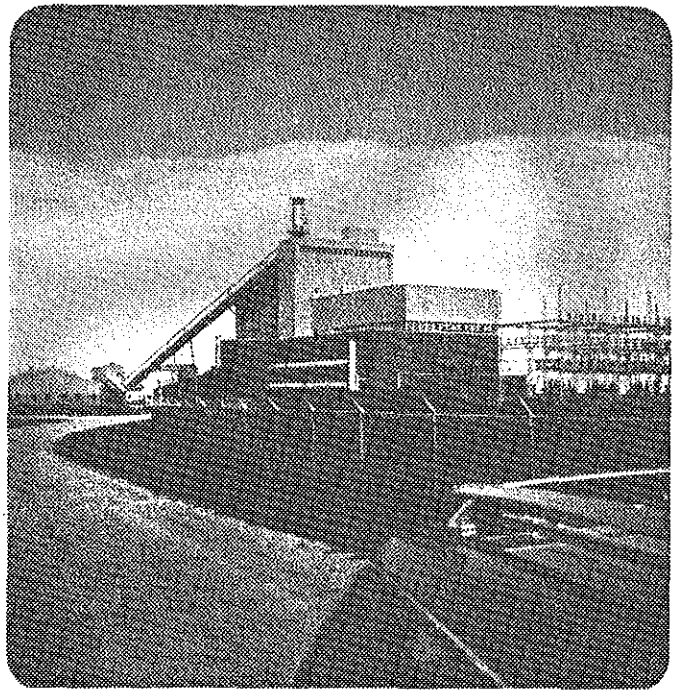
South Cooling Tower



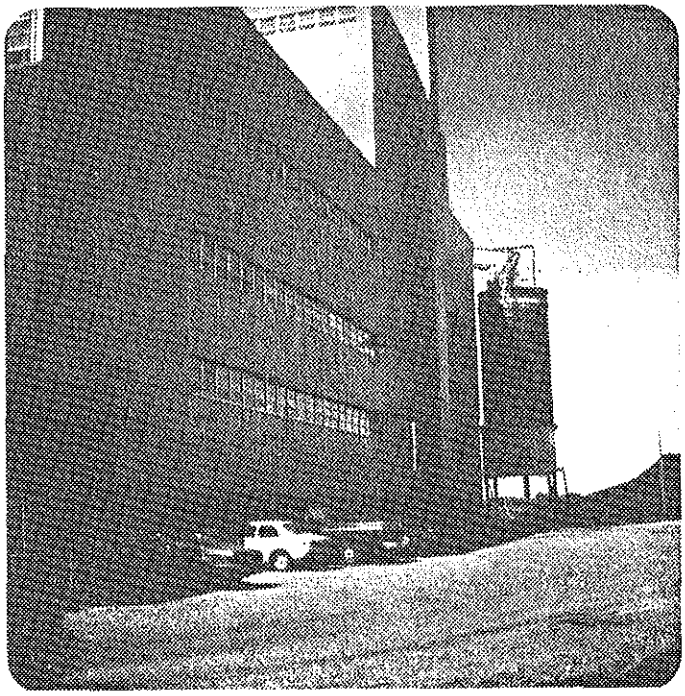
Water Treatment Building



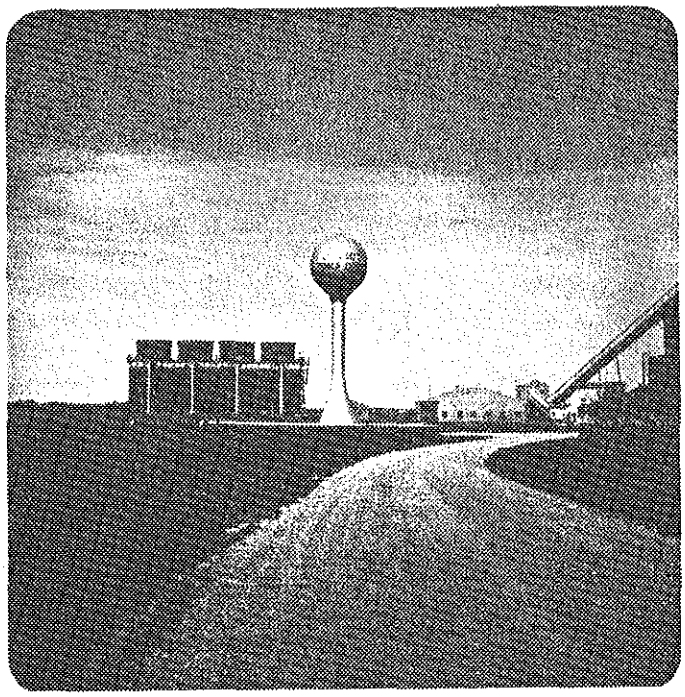
Water Treatment Basin



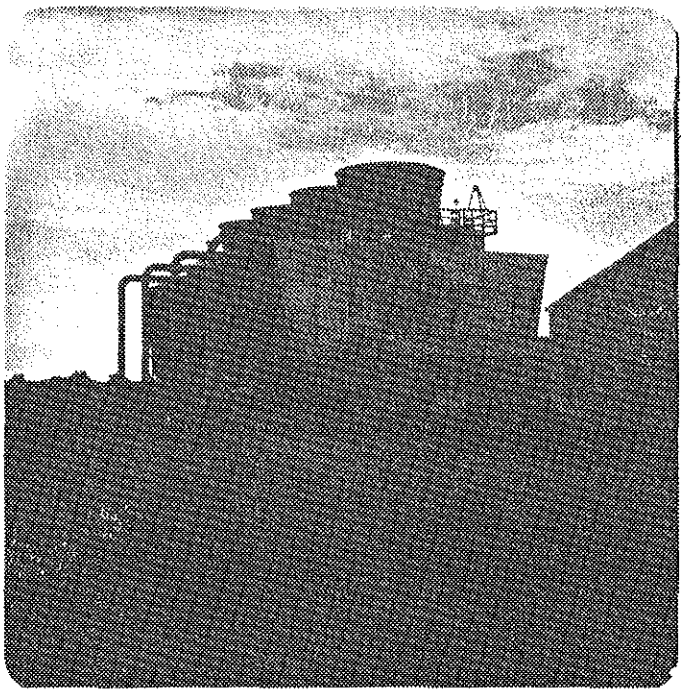
SOUTHEAST ELEVATION



NORTH ELEVATION

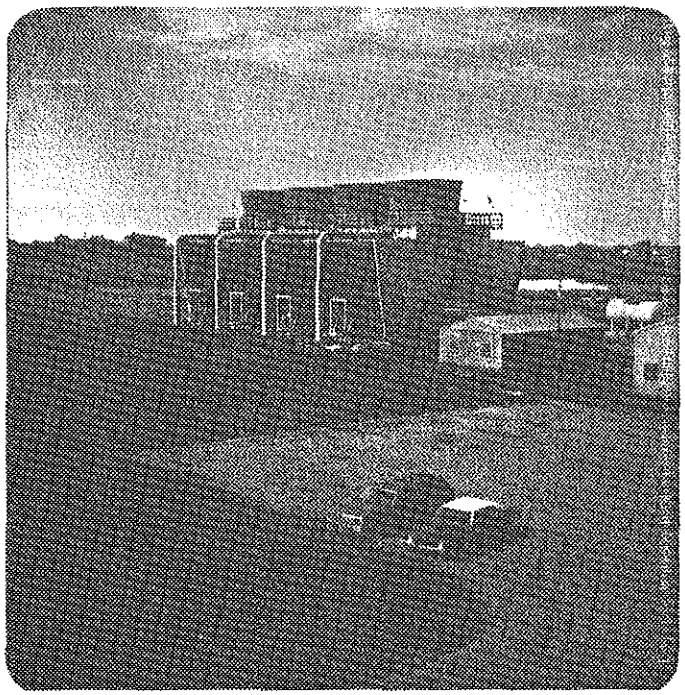


EAST ELEVATION
COOLING TOWER &
WATER TOWER



COOLING TOWER

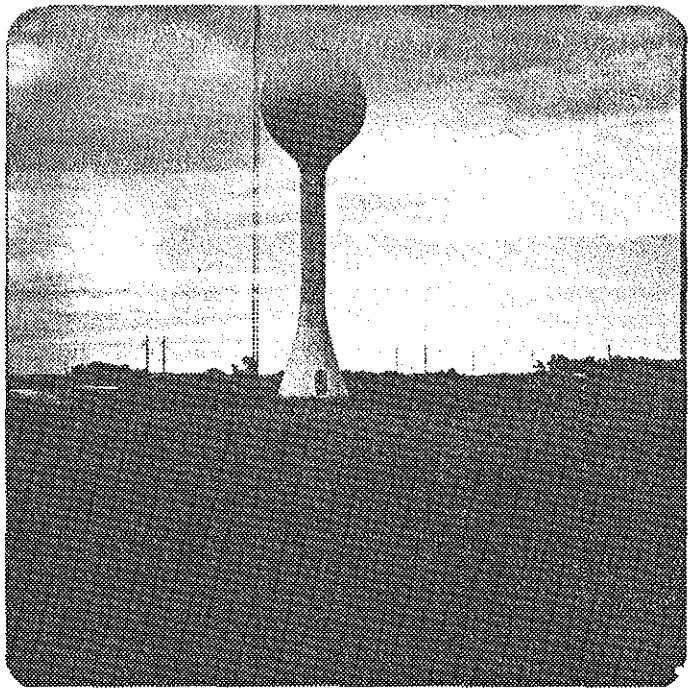
CARL BELT - 3D SCULPTOR



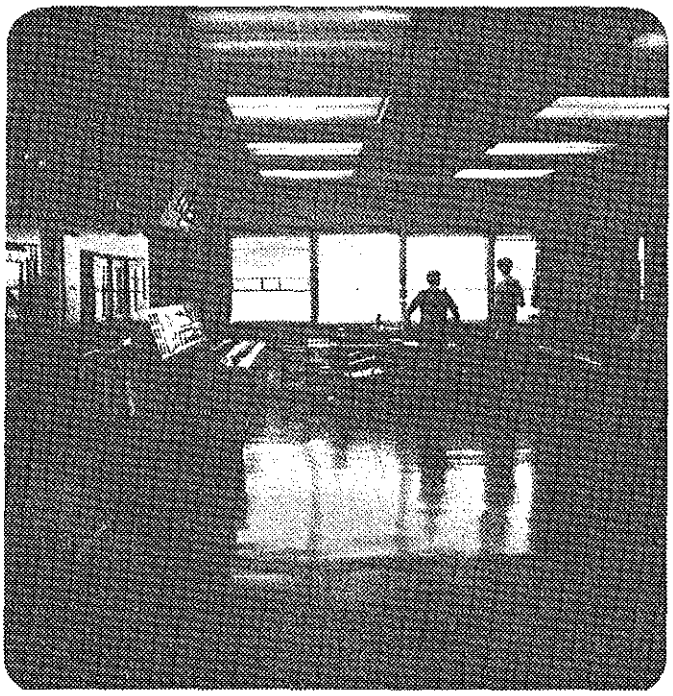
COOLING TOWER

RAIL CAR WINCH

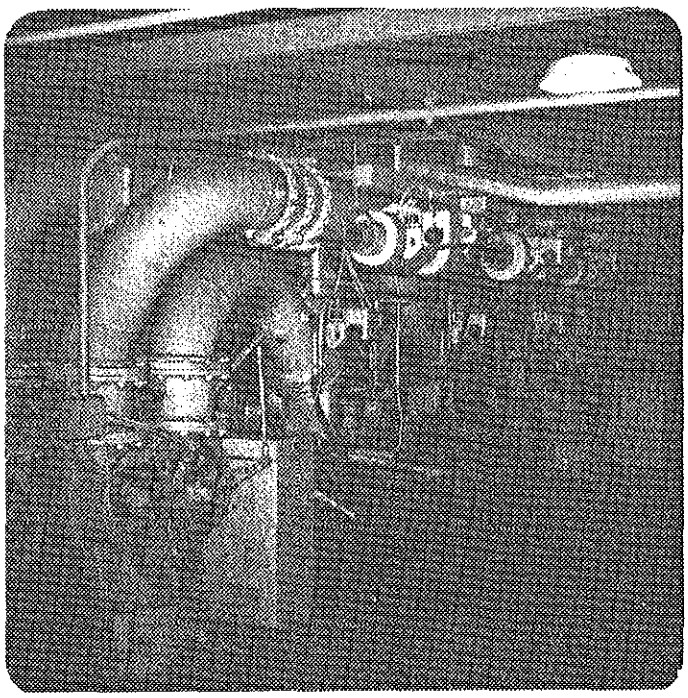
EAST ELEVATION



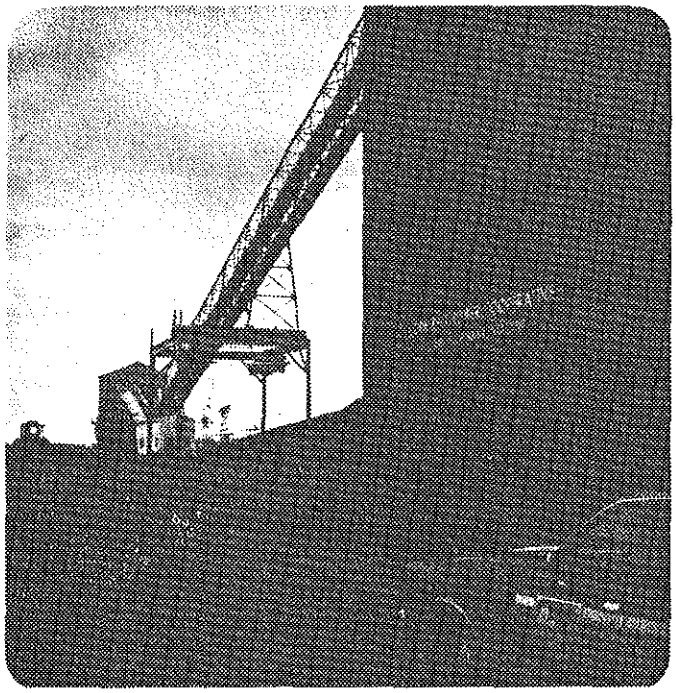
100,000 GALLON WATER STORAGE TANK



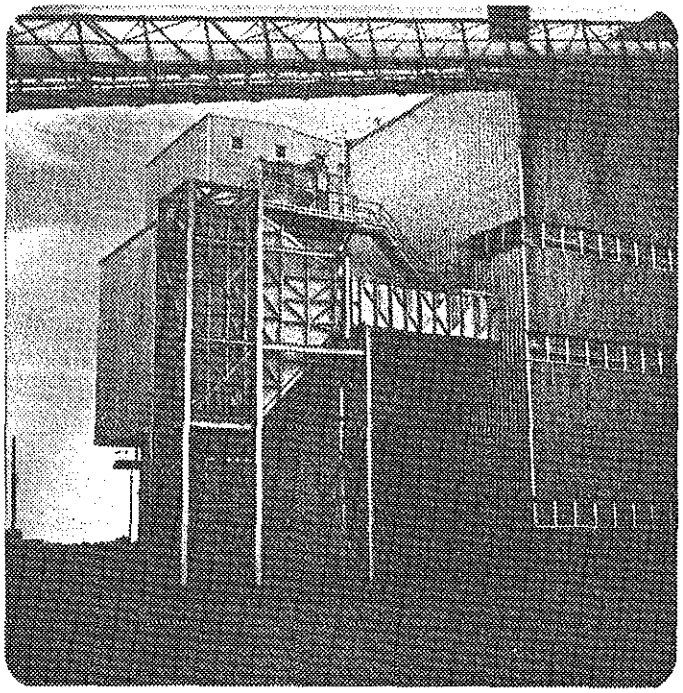
Power Plant
Control Center



Circular Burners

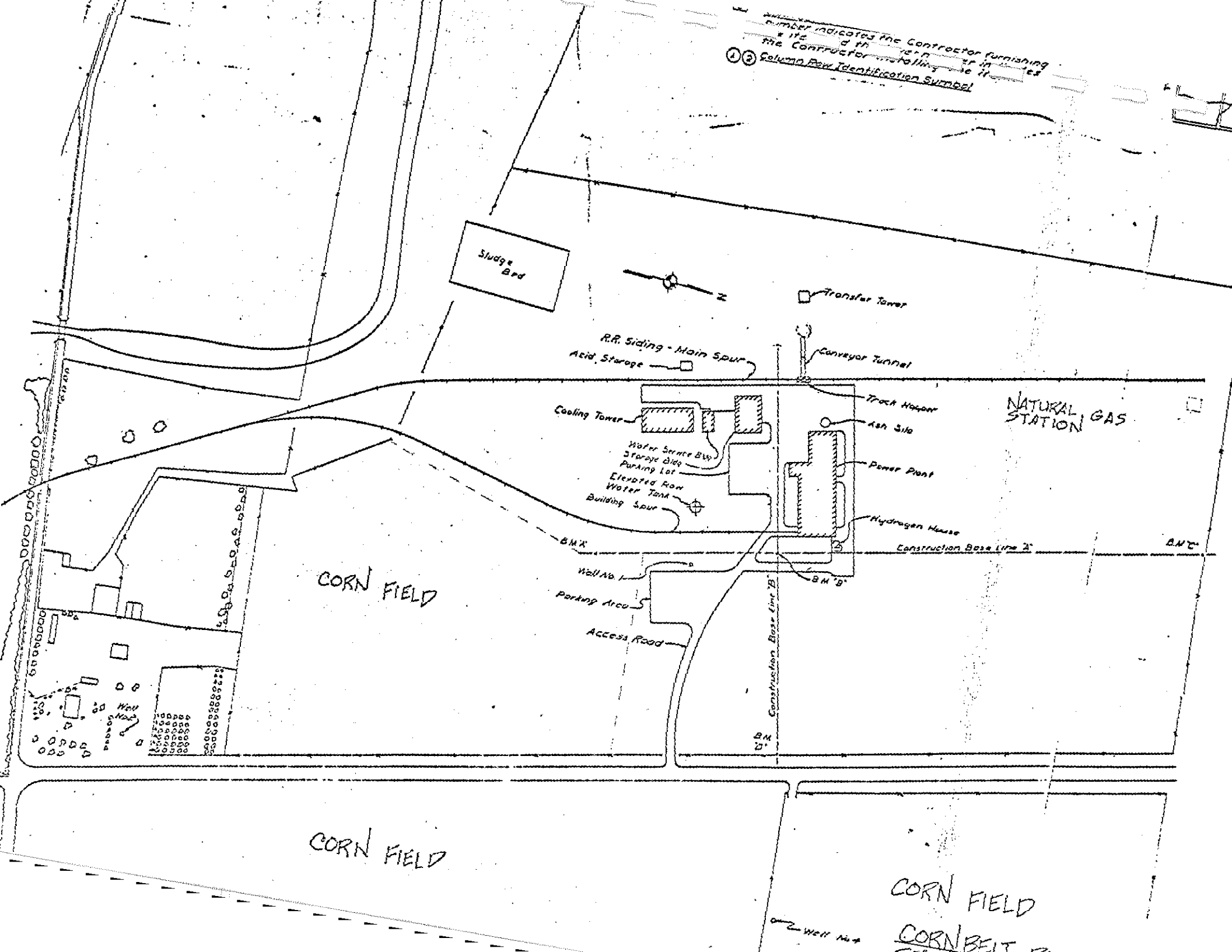


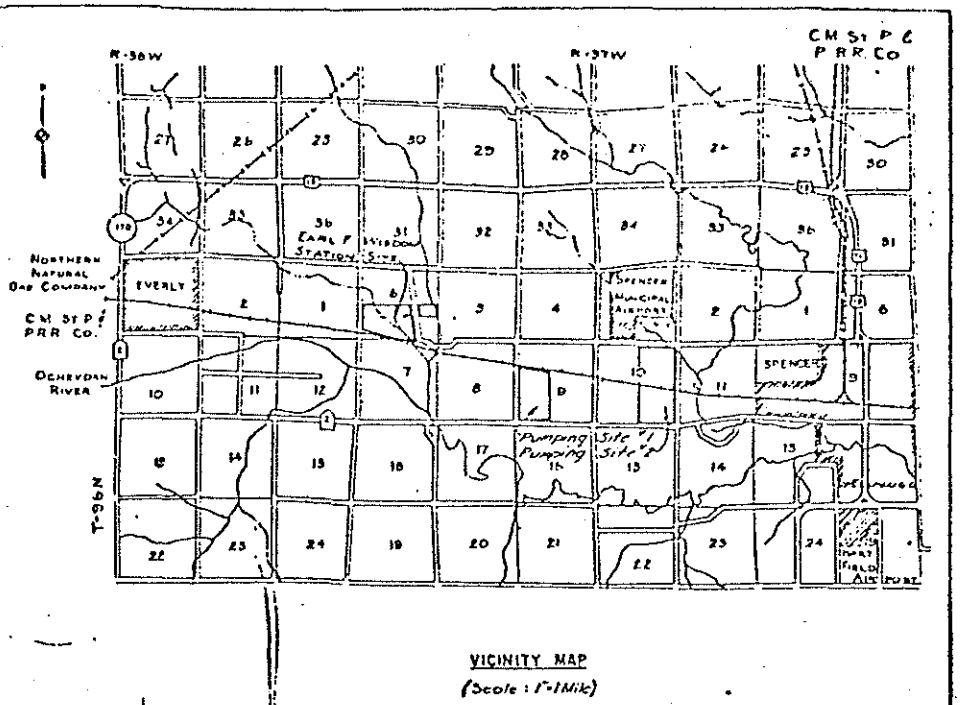
Coal Handling
Equipment



Electrostatic
Precipitator

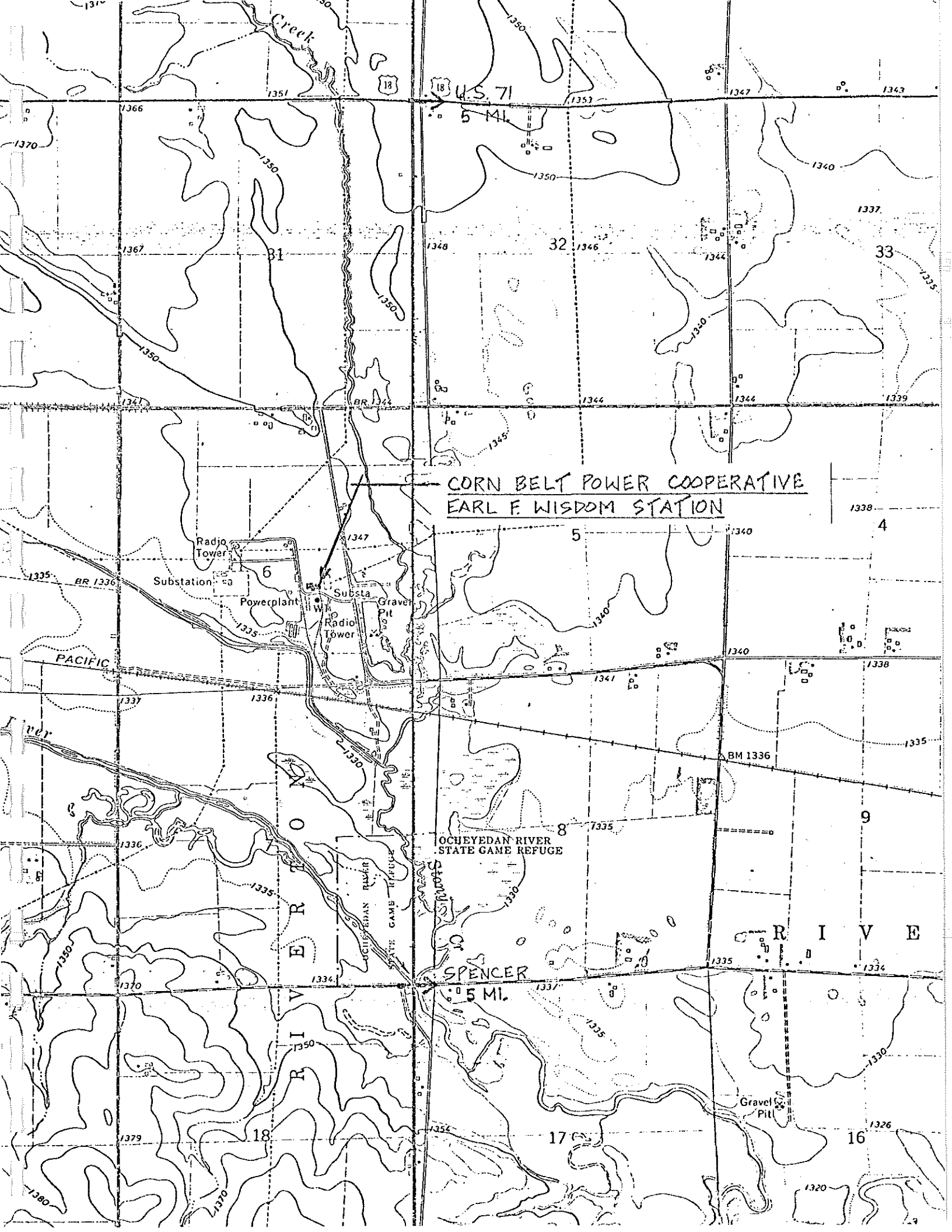
COAL BELT - SPENCER


Number indicates the Contractor furnishing
the Contractor installing
Column Row Identification Symbol
Sludge Bed
Transfer Tower
R.R. Siding - Main Spur
Acid Storage
Conveyor Tunnel
Truck Hopper
Cooling Tower
Ash Silo
NATURAL GAS STATION
Water Service Bldg.
Storage Bldg.
Parking Lot
Elevated Row Water Tank
Power Plant
Building Spur
Hydrogen House
B.M. 'A'
Construction Base Line 'A'
B.M. 'C'
Wall No. 1
B.M. 'B'
Parking Area
CORN FIELD
Access Road
Construction Base Line 'B'
Well No. 2
B.M. 'D'
CORN FIELD
CORN FIELD
Well No. 4
CORN BELT



VICINITY MAP
(Scale: 1"=1Mile)

CORN BELT POWER COOP
SPENCER, IOWA PLANT


U.S. 71
5 MI.
CORN BELT POWER COOPERATIVE
EARL F. WISDOM STATION
Radio Tower
Substation
Powerplant
Substa
Gravel Pit
Radio Tower
PACIFIC
BM 1336
OCHEYEDAN RIVER
STATE GAME REFUGE
SPENCER
5 MI.
Gravel Pit
31
32
33
6
5
4
8
9
18
17
16

Boiler Checklist - Plant Name Sutherland Station, Iowa Electric Light & Power, Marshalltown IA

Steam Pressure #1 & 2-980 / #3-1500 psig Temp. 910 / 1000 °F Capacity 300,000 ea. / 575,000 PPH

Boiler Age - Installed # 1 & 2 - 1955, #3 - 1961

Boiler Maintenance

	When	Extent	General Condition
Superheater Tubes	Yearly	Tube leaks	Good
Economizer Tubes	Yearly	Tube leaks	Good
Air Heaters	Yearly	Cleaning & seals	Very good
Stokers/Burners 1 & 2-PC 3-cyclone	Yearly	Routine	Good
Fans	1976	Wheels replaced	Good
B.F.P.		#3-3yr. overhaul program	Good
Cooling Tower	Present	Fill & girt replacement	Very Good
Ash Handling			Ave/Excell. (FA)
Coal Handling	1981	Crushers overhauled	Good

Combustion Controls - Pneumatic

Condition - Average
Maintenance - Routine, New O_2 analizers being installed

Water Treatment - Demineralizers and polishers

Capacity - Unknown-not running at full capacity
Condition - Good

Exist. Air Pollution Control Equipment

Condition - Good - normal wire and insulator breakage
Type - ESP

Package Boiler Site Availability - None existing - Yes

Oil Storage (Existing) 2,500,000 gallons Yes X No
Natural Gas-Available Yes X No

Any local Environmental Regulations other than IDEQ Yes No X

ACCREDITATION STATUS Full X Part-time

No. of KW on Grid #1 & 2 - 33 MW EA / #3 - 89 MW
Operation Hr/yr 6300+ each

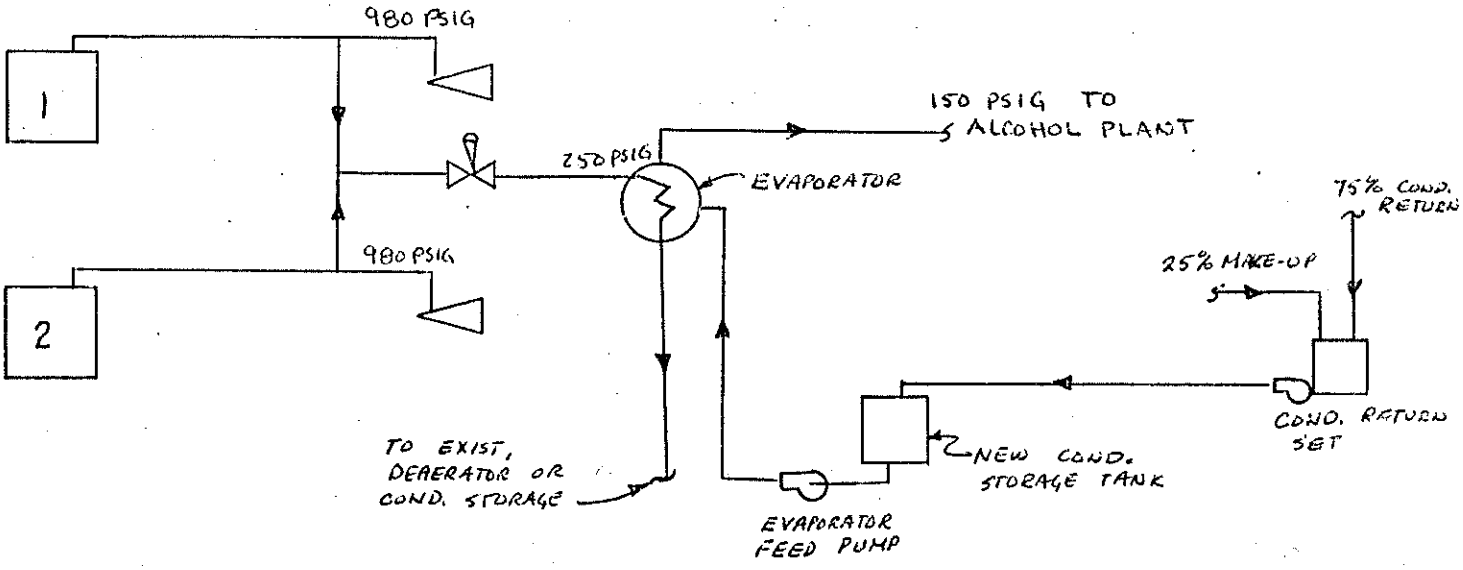
Boiler Checklist cont.

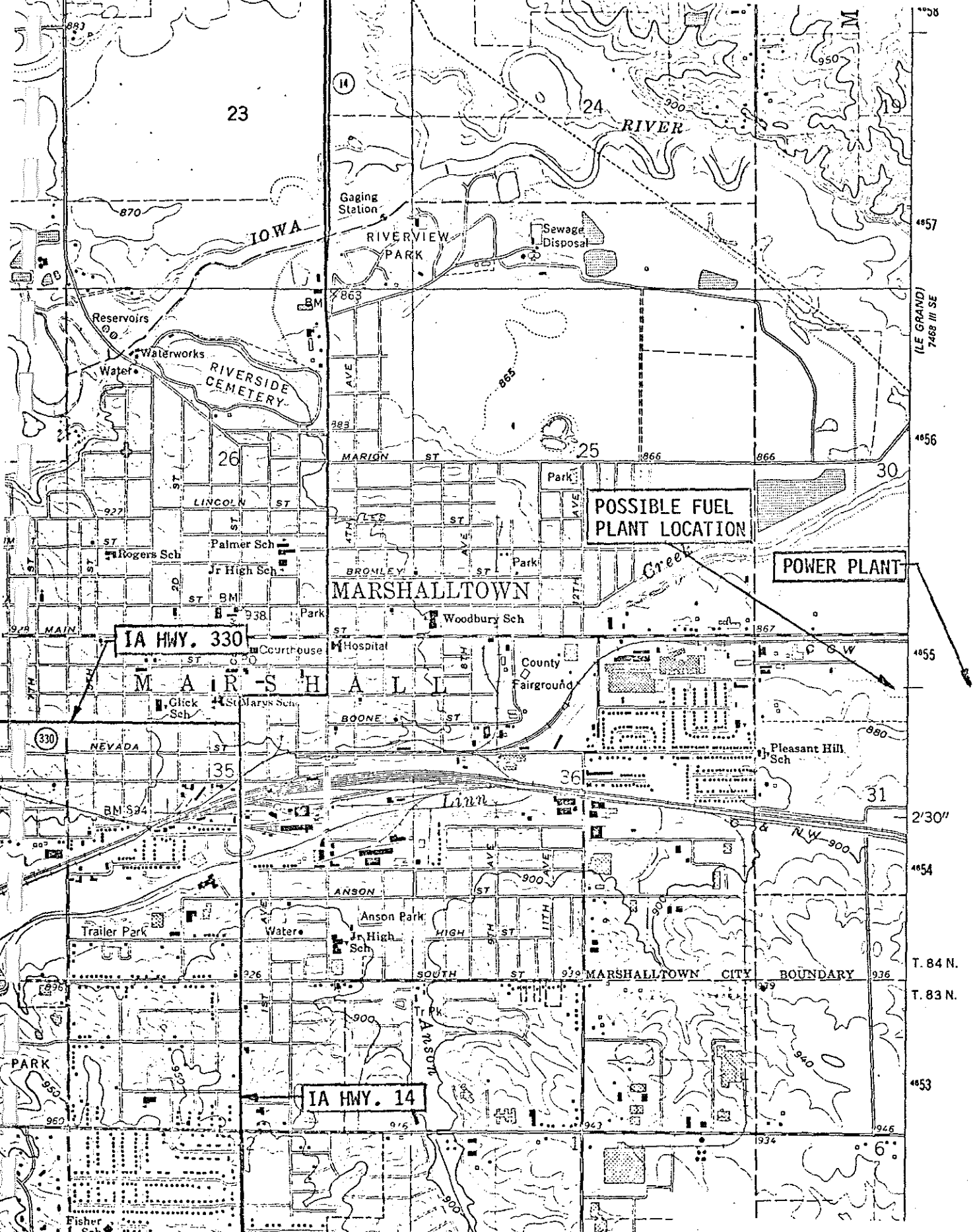
Fuel Cost			
	Coal	38	$/Ton
	Oil	0.70	$/Gal (2 yrs. ago)
	Nat. Gas	5.07	~~$/1000 cu. ft.~~ MBTU

Drawing or Sketch - easily reproducable

Conceptualize steam out of building (rough sketch)

Units one and two are on intermediate status, will to to stand-by when Chilicothe & Muscatine plants go on-line. Can provide steam at pressure required either from turbine extraction or PRV/Desuperheater from boiler.

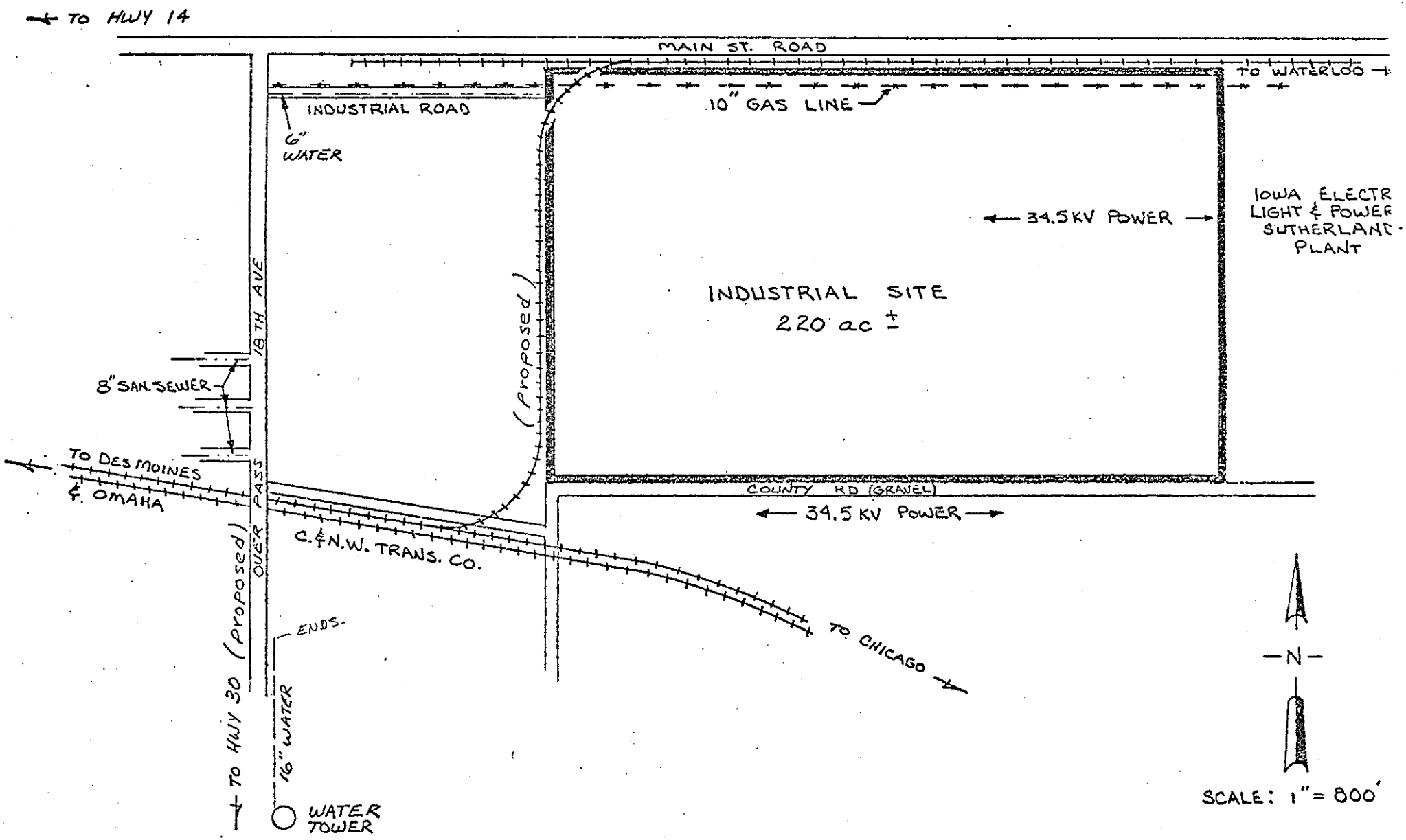




IOWA ELECTRIC LIGHT AND POWER

SUTHERLAND STATION

MARSHALLTOWN, IOWA


TO HWY 14
MAIN ST. ROAD
TO WATERLOO
INDUSTRIAL ROAD
6" WATER
10" GAS LINE
34.5 KV POWER
IOWA ELECTR LIGHT & POWER SUTHERLAND PLANT
INDUSTRIAL SITE
220 ac ±
(Proposed)
18TH AVE
8" SAN. SEWER
TO DES MOINES & OMAHA
PASS OVER
C. & N.W. TRANS. CO.
COUNTY RD (GRAVEL)
34.5 KV POWER
TO CHICAGO
ENDS
TO HWY 30 (Proposed)
16" WATER
WATER TOWER
N
SCALE: 1" = 800'

IOWA ENERGY POLICY COUNCIL

BOILER CO-UTILIZATION STUDY

BROWN ENGINEERING COMPANY

FIELD INFORMATION SURVEY

Facility Name/Location Iowa Electric Light & Power - Marshalltown

Land Availability

Parcel No.	
Acres	220 Ac.
Ownership	
Private	yes
City	
Industrial Park	
Location	Immediately W. of plant
Cost	$13,300 to $18,100/Ac.
Zoning	M-2 heavy Ind. - needs special use permit from Board of Adjust

Feedstock Availability

Storage/Terminal Capacity	
Owner	See attached list
Location	
Potential Grain Production (Bu.)	
Potential Grain Production Location	
Transportation (Type)(Truck,Ral,Barge)	
To Storage/Terminal	Truck/Rail
Owner	Independents/Chicago N. Western R.R.
From Storage/Terminal	
To Ethanol Site	Truck or Direct Rail
Owner	Independents/C.N.W.R.R.

Product/By-Product

Local Ethanol Market	(Name)		
Alcohol Transporters	(Name)	Gulf Central Storage & Pipeline	
	(Location)	Green Mountain	
	(Type)	Pipeline	
	(Exist/Potential Capacity)		
Local D.D.G. Market	(Name)	Green Products in Conrad	Arbie Mineral Feed Co., Inc.
D.D.G. Transporters	(Name)		
	(Location)		Indepen/C.N.W.R.R
	(Type)		Truck/Rail
	(Exist/Potential Capacity)		

Water Availability

Source X City 9 Wells _____ River

City Mains

Location	at N.W. corner of site
Capacity	650 gpm @ 20psi, 5MGD
Future Construction	12" main along Church St.

Wells

Location	
Capacity	
Aquifer	
Limitations	

River

Intake Location	
Capacity	
Limitations	

Gas/Electric Utilities

Gas (Owner)	Iowa Electric Light & Power
Location	N. side of property
Capacity	
Size	10"
Limitations	985 btu/cu ft.
Electric (Owner)	Iowa Electric Light & Power
Location	Adjacent to site
Capacity	
Size	34.5 KV
Limitations	

Wastewater Facilities

Mains

Location	1600' West of site	12th & Marion
Size	8"	33"
Limitations	will require lift sta. at Linn Creek	
Capacity (c.f.s.)		
Future Extensions		

Wastewater Treatment Plant	Activated Sludge Plant
Location	N.E. of town
Size	5.5MGD
Limitations	Hydraulically loaded at 6.2 MGD
Capacity (B.O.D./Gal. per day)	18,000 B.O.D. now is 25,000 B.O.D.
Future Expansions	in 3-5 yrs will add 1-1½ MG capacity and pretreatment in 1982

Environmental Constraints

Air
- Local Constraints
- Ambient Air Quality Analysis — D.E.Q.
- Emission Modeling Data (DEQ)
- Available Air Pollution Increments (from DEQ)

Water
- Stream Discharge Limitations — D.E.Q.

County Constraints

Reducing Energy Requirements

Existing Plants/Processes — None
- Name
- High Temp. Effluent (Preheating)(Gal./Day)
- Make-Up Water Effluent (Gal./Day)
- Cooling Water Effluent (Gal./Day)
- Cooperative Agreements
- Available Additional Energy

Other Applications — None

Company Name
Size
Lcoation
Existing/Needed Capacity
Product Used
Product Produced

Miscellaneous Information

Available Area Employment
- % Unemployment — 4.2%
- Potential for Labor Force

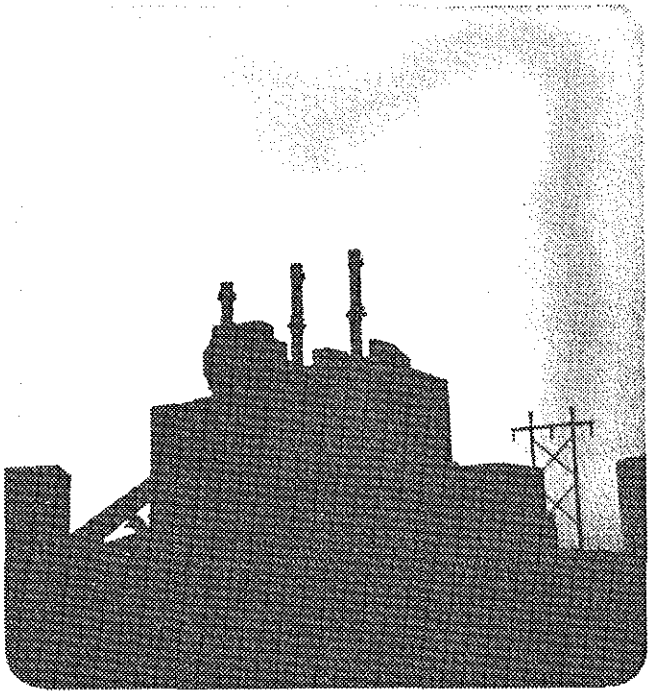
Other Potential Site Data
Local Development Contracts
Building Codes/Restrictions
Available Area for Backup Systems
- Boilers — Sufficient
- Water Treatment — Sufficient
- Wastewater Treatment Plant — Sufficient
- Fuel, Etc. — Sufficient

Steam Line Routing to Site
Local Financing Incentives — Industrial Revenue Bonds

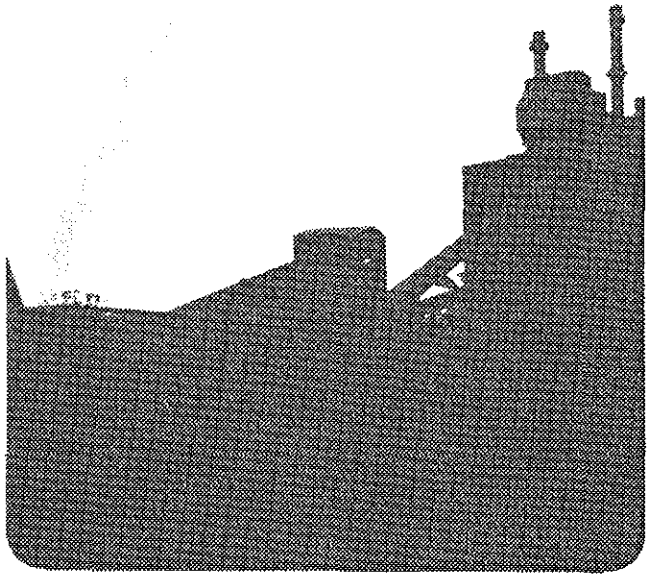
MARSHALLTOWN AREA

GRAIN TERMINALS

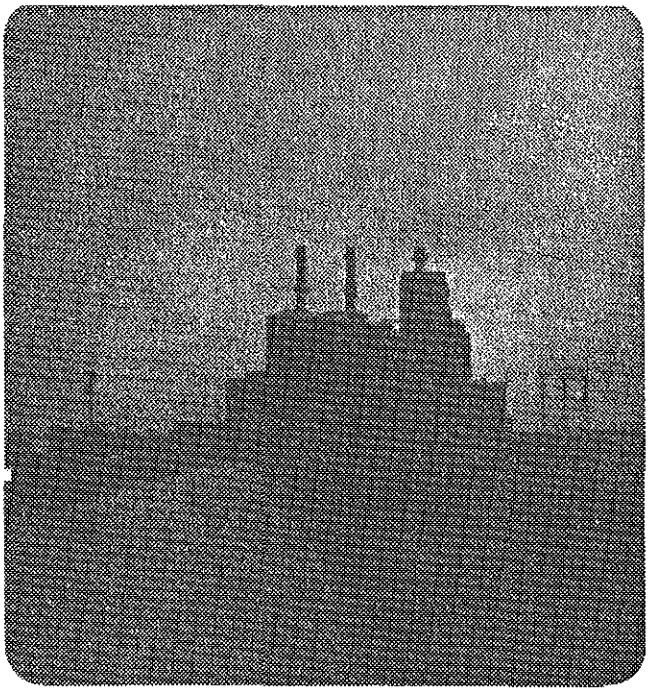
Liscomb - Pillsbury
St. Anthony - Mackin Grain Co.
Clemons - Clemons Grain & Supply Co.
Albion - The Pillsbury Co.
Green Mountain - The Pillsbury Co.
State Center - Goodman MLG. & State Center Grain and Feed
LeGrand - Carlson Agri Service
Melbourne - Bob's Feed and Service & Melbourne Grain Co.
Haverhill - Haverhill Elevator, Inc.
Ferguson - Fronings Western Grain
Dunbar - Marshall Farm Service
Laurel - Farmers Coop.
Gilman - Farmers Coop.
Marshalltown - Bob's Feed & Supply
Rhodes - Ag Service, Inc.



NORTH ELEVATION



NORTH ELEVATION
COAL HANDLING



SOUTH ELEVATION

SUTHERLAND ST.

Boiler Checklist - Plant Name Maynard Plant, Iowa Public Service, Waterloo, IA

Steam Pressure 1470/900 psig Temp. 1000 °F Capacity 300,000/100,000 PPH

Boiler Age - Installed 1958, 1951

Boiler Maintenance

	When	Extent	General Condition
Superheater Tubes	1971	Replaced in 1958 unit	Good
Economizer Tubes			Good
Air Heaters Lungstrom/Tubular		Some tubes plugged	Good
Stokers/Burners 58-PC		Stokers removed - '51 unit	
Fans			Excellent
B.F.P.			Good
Cooling Tower None			----------
Ash Handling			Good
Coal Handling			Good

Combustion Controls - Pneumatic

Condition - Good
Maintenance - Some parts problems - '51 system replaced in 1971

Water Treatment-Demineralizer

Capacity - 25 GPM ea - 2 trains
Condition - Good - New Resin

Exist. Air Pollution Control Equipment

Condition - Good
Type - ESP - 1958, nothing - 1951

Package Boiler Site Availability

Oil Storage (Existing) Yes X No
Natural Gas-Available Yes X No

Any local Environmental Regulations other than IDEQ Yes No

ACCREDITATION STATUS Full Part-time X

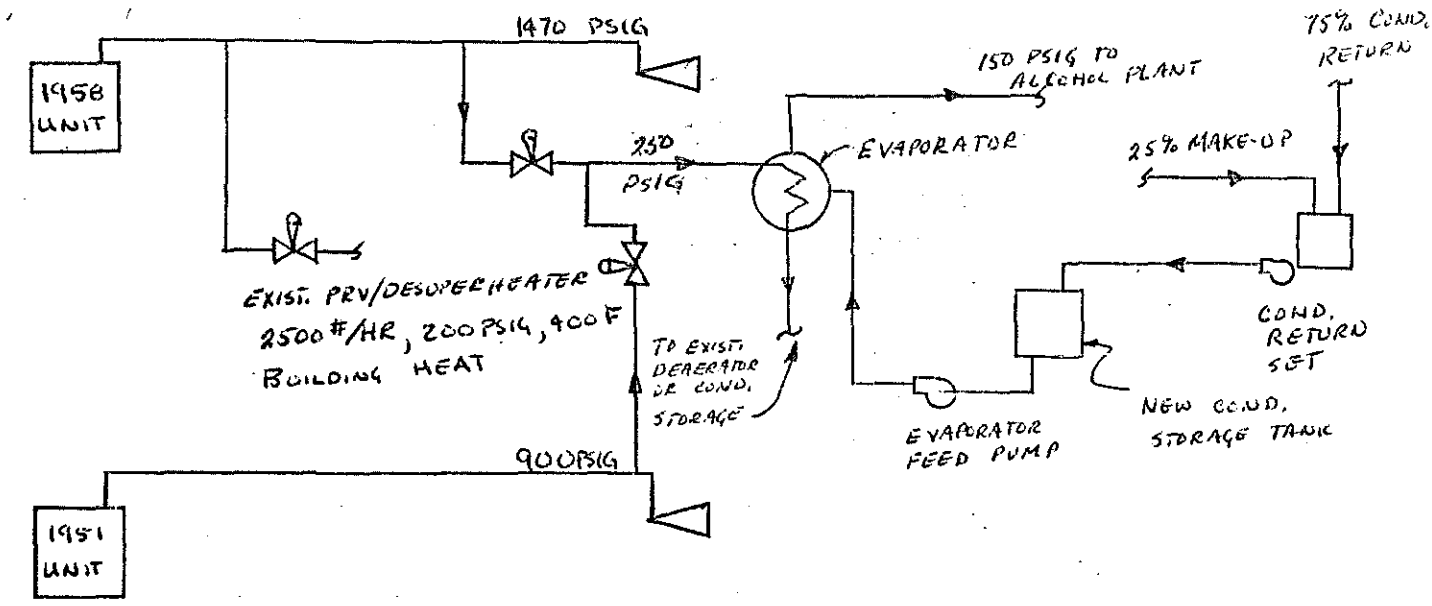
No. of KW on Grid 53/22
Operation Hr/yr Peaking

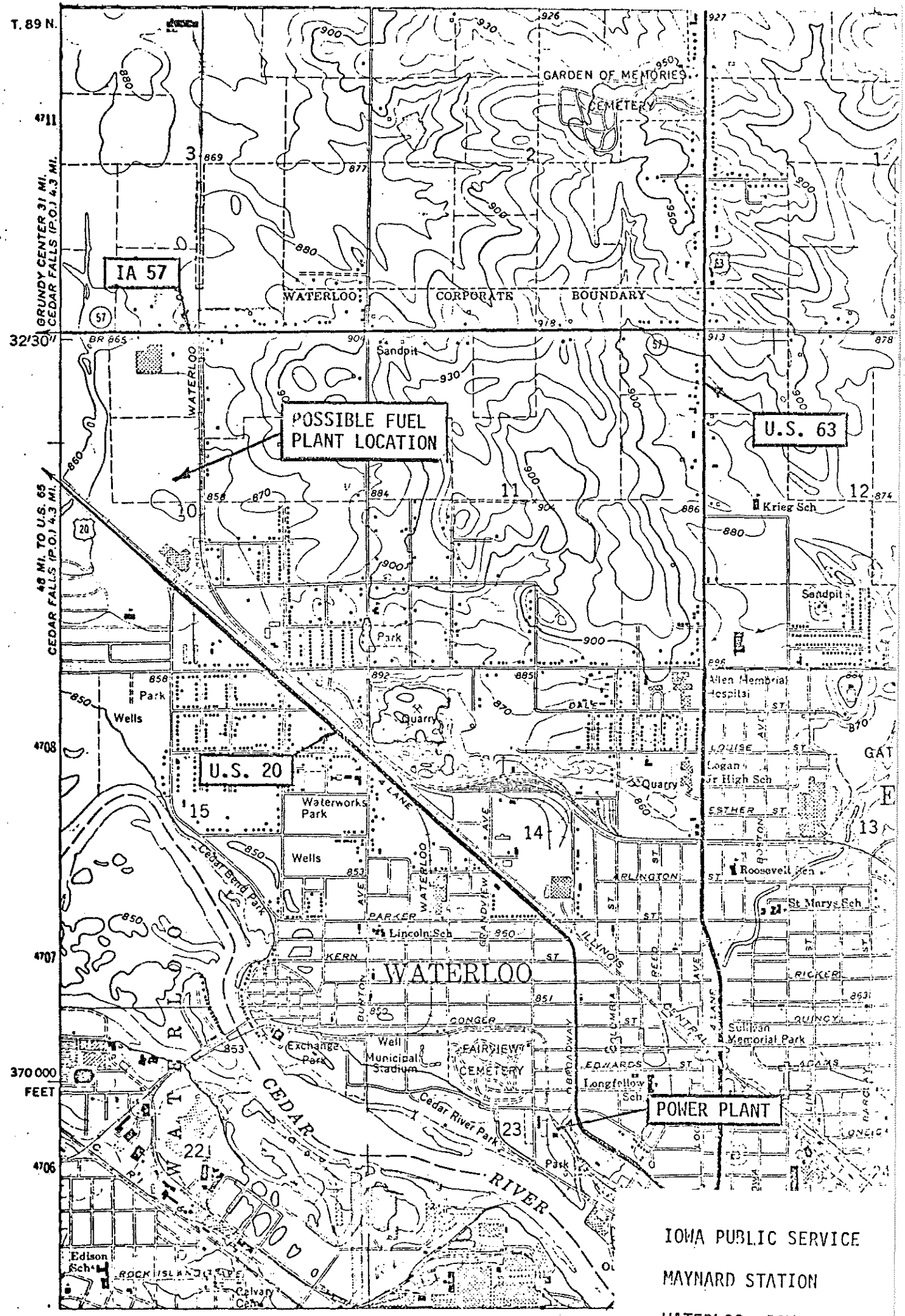
Boiler Checklist cont.

Fuel Cost			
	Coal	38-39	$/Ton (10,500 Btu/lb)
	Oil		$/Gal
	Nat. Gas		$/1000 cu. ft.

Drawing or Sketch - easily reproducable

Conceptualize steam out of building (rough sketch)





IOWA PUBLIC SERVICE

MAYNARD STATION

WATERLOO, IOWA

IOWA ENERGY POLICY COUNCIL

BOILER CO-UTILIZATION STUDY

BROWN ENGINEERING COMPANY

FIELD INFORMATION SURVEY

Facility Name/Location Iowa Public Service - Waterloo

Land Availability

Parcel No.	
Acres	several from 1.7Ac to 15.7Ac.
Ownership	
Private	Yes
City	
Industrial Park	
Location	North of Airline Hwy; E. of Airport
Cost	$17,000 +
Zoning	M-2 Heavy Industrial

Feedstock Availability

Storage/Terminal Capacity	1,000,000Bu
Owner	Pillsbury
Location	S. of River at Bismark & Cleveland
Potential Grain Production (Bu.)	
Potential Grain Production Location	
Transportation (Type)(Truck,Ral,Barge)	
To Storage/Terminal	Truck/Rail
Owner	Chicago, Rock Island
From Storage/Terminal	
To Ethanol Site	Truck/Rail
Owner	Waterloo-Cedar Falls & Northern

Product/By-Product

Local Ethanol Market	(Name)	Northland Products
Alcohol Transporters	(Name)	Possibly Williams Bros.
	(Location)	S. on Hwy 63
	(Type)	
	(Exist/Potential Capacity)	
Local D.D.G. Market	(Name)	
D.D.G. Transporters	(Name)	
	(Location)	
	(Type)	
	(Exist/Potential Capacity)	

IOWA ENERGY POLICY COUNCIL

BOILER CO-UTILIZATION STUDY

BROWN ENGINEERING COMPANY

FIELD INFORMATION SURVEY

Facility Name/Location Iowa Public Service - Waterloo

Land Availability

- Parcel No.
- Acres
- Ownership
  - Private
  - City
  - Industrial Park
- Location
- Cost
- Zoning

Feedstock Availability

Storage/Terminal Capacity	400,000Bu
Owner	Geerling Feed
Location	E. of 18th at Court
Potential Grain Production (Bu.)	
Potential Grain Production Location	
Transportation (Type)(Truck,Ral,Barge)	
To Storage/Terminal	Truck/Rail
Owner	Ill.-Central Gulf
From Storage/Terminal	
To Ethanol Site	Truck/Rail
Owner	Waterloo-Cedar Falls & Northern

Product/By-Product

Local Ethanol Market	(Name)
Alcohol Transporters	(Name)
	(Location)
	(Type)
	(Exist/Potential Capacity)
Local D.D.G. Market	(Name)
D.D.G. Transporters	(Name)
	(Location)
	(Type)
	(Exist/Potential Capacity)

Water Availability

Source ____XX____ City ____XX____ Wells _____ River

City Mains

Location	Wagner Road
Capacity	980 gpm-12" main
Future Construction	

Wells

Location	
Capacity	
Aquifer	
Limitations	

River

Intake Location	
Capacity	
Limitations	

Gas/Electric Utilities

Gas (Owner)	I.P.S.
Location	W. of W.C.F.R.R.-runs 1 mile N. of Airline Highway
Capacity	25 psi
Size	4"
Limitations	None
Electric (Owner)	I.P.S.
Location	West of W.C.F.R.R.
Capacity	
Size	13.8 KV
Limitations	None

Wastewater Facilities

Mains

Location	Along Hwy 20 to Wagner St.
Size	12"
Limitations	None
Capacity (c.f.s.)	
Future Extensions	

Wastewater Treatment Plant

Location	Mitchell and Easton
Size	
Limitations	300 B.O.D. -- 350 S.Solids
Capacity (B.O.D./Gal. per day)	28 MGD -- 15 MGD Ave. daily flow
Future Expansions	

Environmental Constraints

Air	was non-attainment area but is now unclassified
Local Constraints	
Ambient Air Quality Analysis	
Emission Modeling Data (DEQ)	
Available Air Pollution Increments (from DEQ)	
Water	
Stream Discharge Limitations	DEQ
County Constraints	None

Reducing Energy Requirements

Existing Plants/Processes	
Name	Hydrite Chem. Plant,/Chamberlain Mfg.
High Temp. Effluent (Preheating)(Gal./Day)	
Make-Up Water Effluent (Gal./Day)	
Cooling Water Effluent (Gal./Day)	
Cooperative Agreements	
Available Additional Energy	Possibly John Deere

Other Applications

Company Name	Possibly Chamberlain Mfg.
Size	
Lcoation	
Existing/Needed Capacity	
Product Used	Steam
Product Produced	Ammunition

Miscellaneous Information

Available Area Employment	
% Unemployment	5-1/2%
Potential for Labor Force	3700
Other Potential Site Data	Antic. Expansions
Local Development Contracts	
Building Codes/Restrictions	State Bldg. Code, Ht. Restriction
Available Area for Backup Systems	
Boilers	Yes
Water Treatment	Yes
Wastewater Treatment Plant	Yes
Fuel, Etc.	Yes
Steam Line Routing to Site	Up Hwy 20 then W.C.F.R.R. to site
Local Financing Incentives	Ind. Rev. Bonds, Tax Abatement

Boiler Checklist - Plant Name Rath Packing Co., Waterloo, Iowa

Steam Pressure 410 psig Temp. 675 °F Capacity #6-75,000 #7 & 8-125,000 ea. PPH

Boiler Age - Installed #6-1940, #7-1945, #8-1956

Boiler Maintenance	When	Extent	General Condition
Superheater Tubes	8-1981 7-1974 6-1980	41 tubes All tubes All tubes	Good
Economizer Tubes		Replace #7 next 24 months	Good except 7
Air Heaters	None		----------
Stokers/Burners #8-PC		Routine	Good
Fans		Routine	Good
B.F.P.			Good
Cooling Tower None			----------
Ash Handling		Replaced Piping ($16,000-$18,000)	Good
Coal Handling			Good

Combustion Controls - Pneumatic

Condition - Average
Maintenance - Partial Replacement w/electronic - Bailey services 3 times/year

Water Treatment - Chemical treatment in boilers only

Capacity
Condition

Exist. Air Pollution Control Equipment

Condition - Good
Type - #8 mech. coll., none on other units

Package Boiler Site Availability

Oil Storage (Existing) Yes____ No X
Natural Gas-Available Yes X No____

Any local Environmental Regulations other than IDEQ Yes____ No X

ACCREDITATION STATUS None Full____ Part-time____

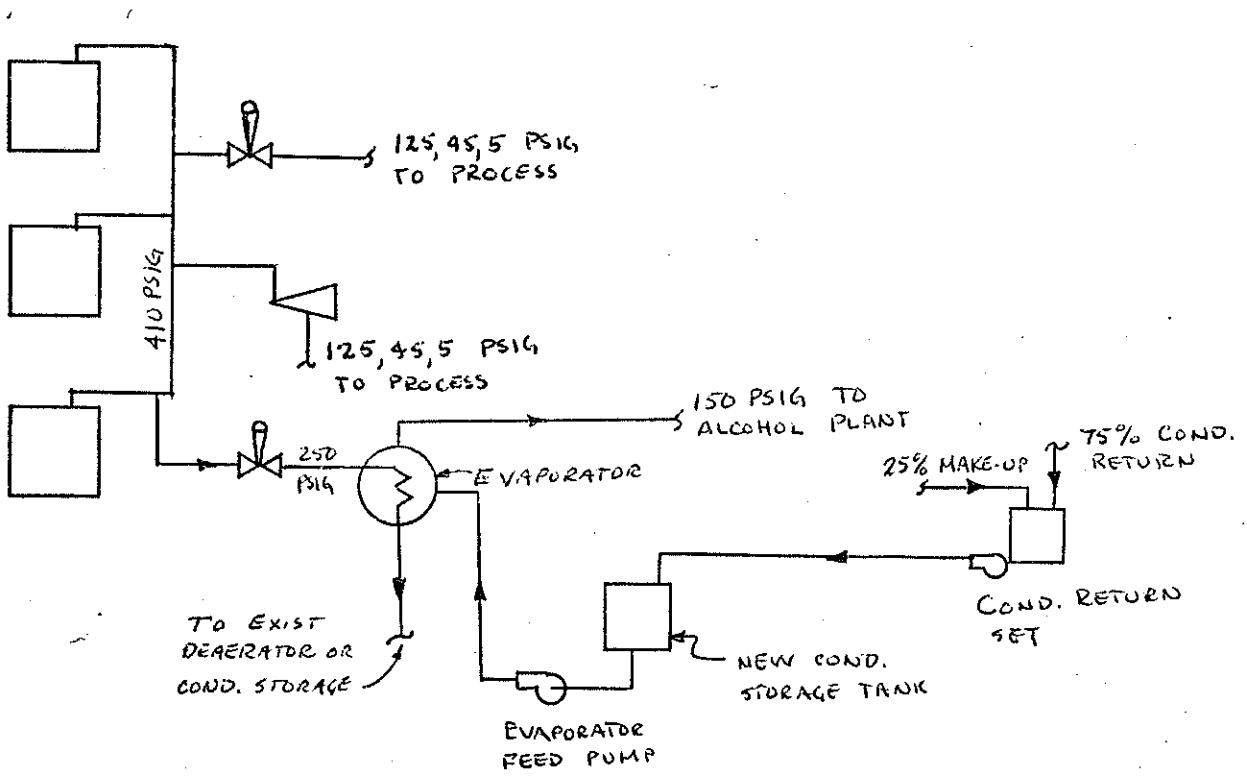
No. of KW on Grid
Operation Hr/yr

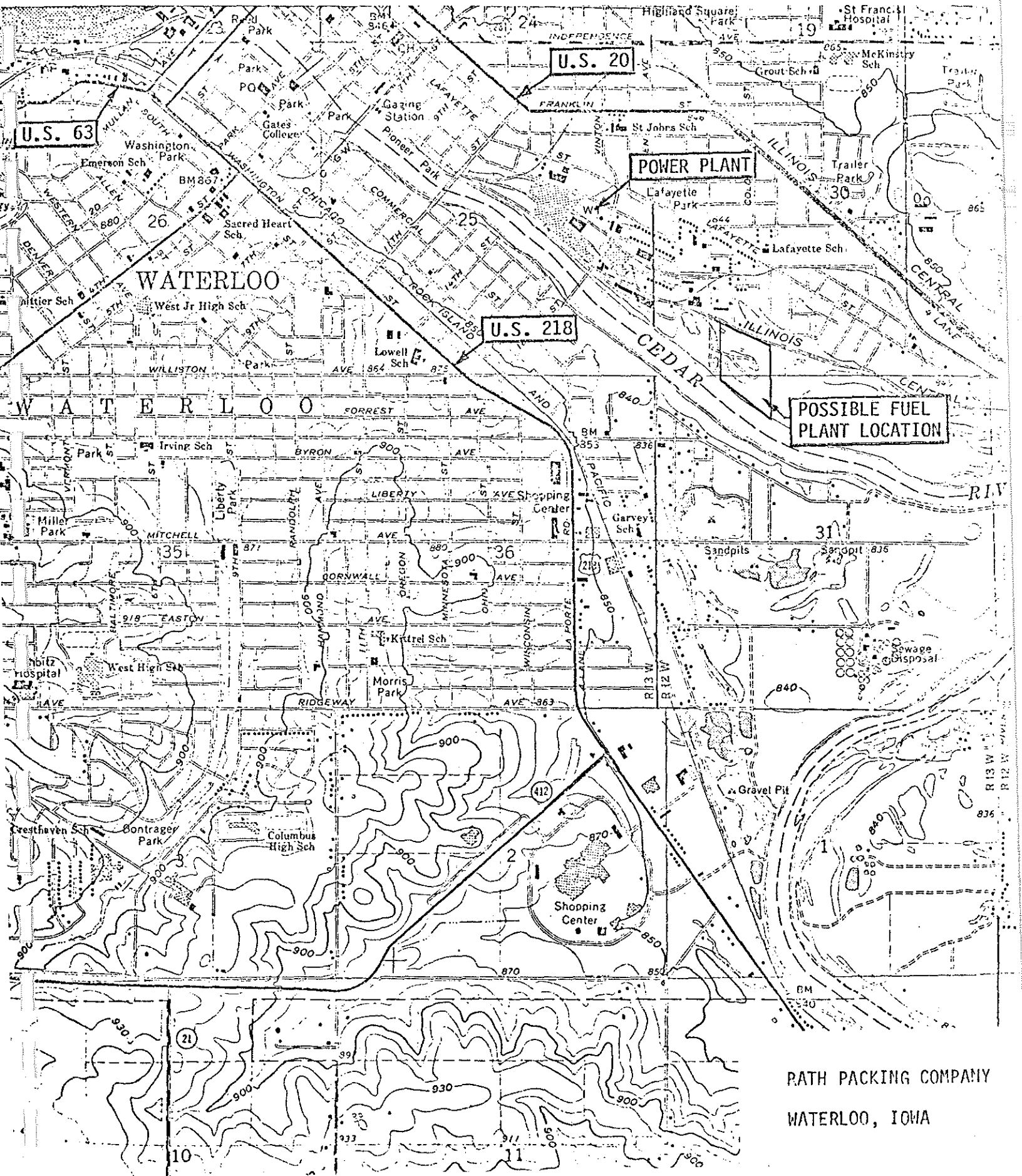
Boiler Checklist cont.

Fuel Cost			
	Coal	52.00	$/Ton Approx.
	Oil		$/Gal
	Nat. Gas		$/1000 cu. ft.

Drawing or Sketch - easily reproducable

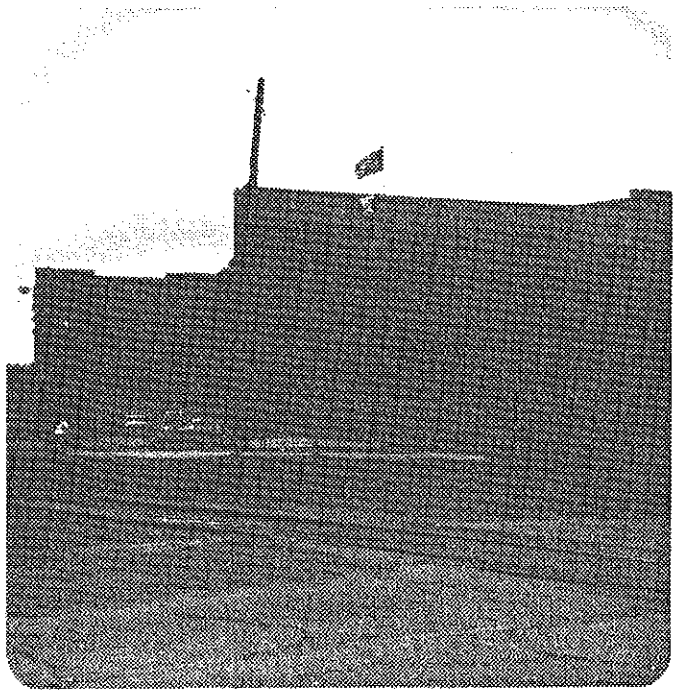
Conceptualize steam out of building (rough sketch)

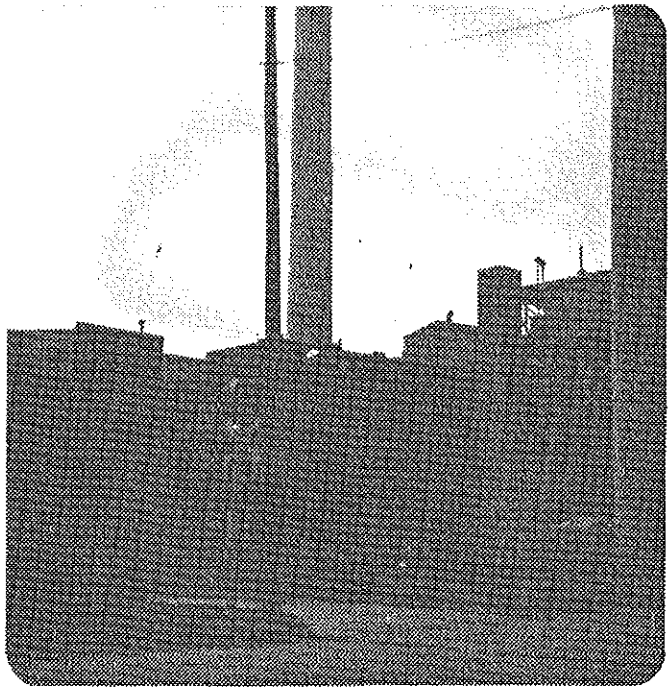




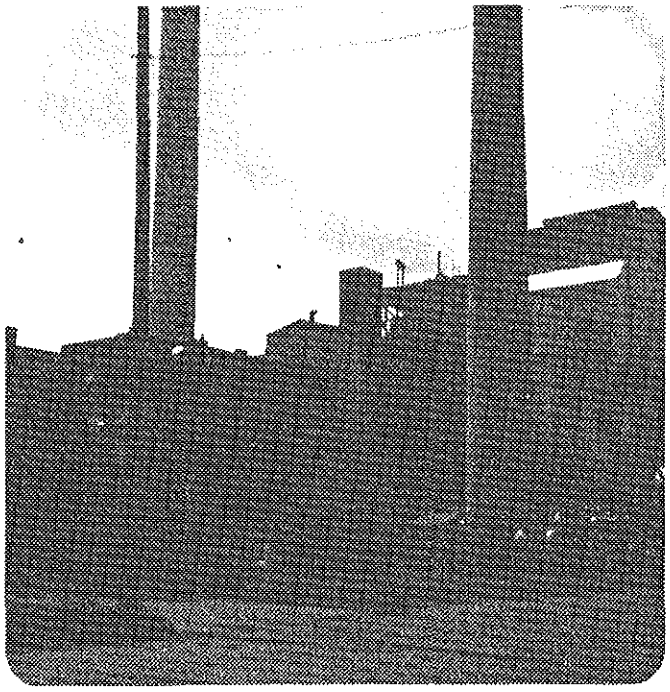
RATH PACKING COMPANY

WATERLOO, IOWA

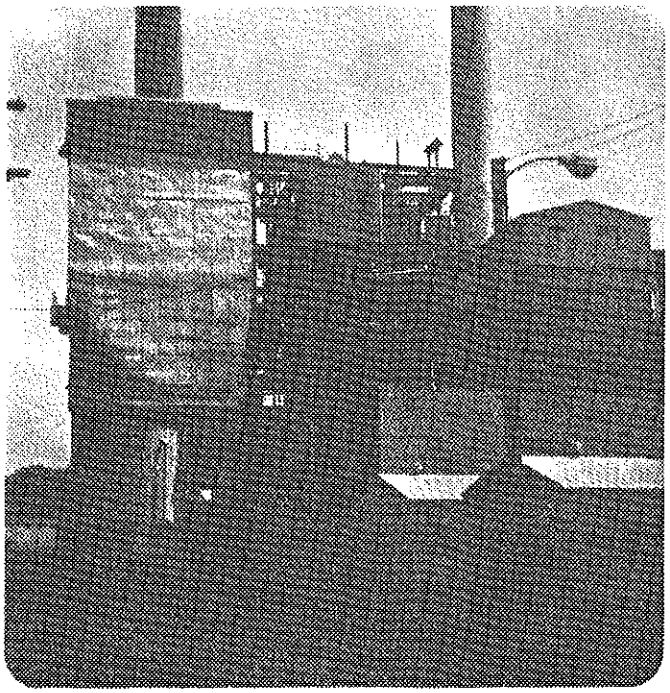


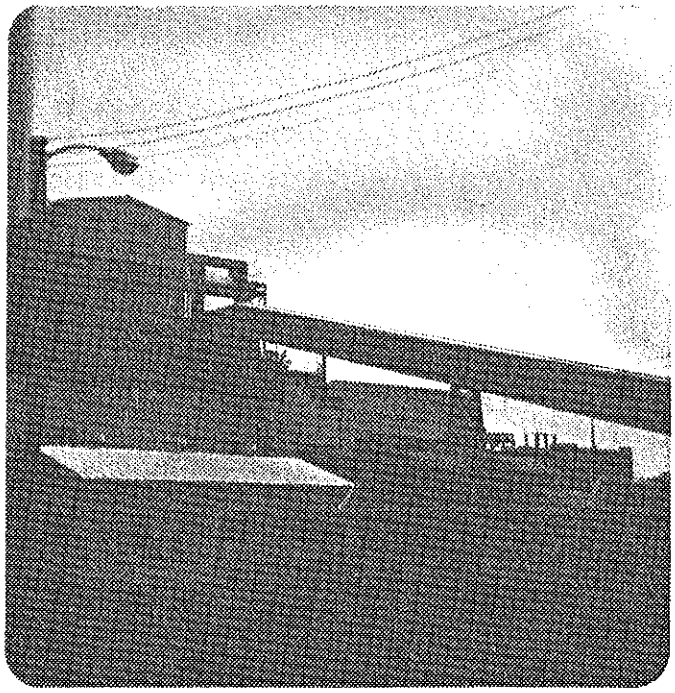


NORTH ELEVATION - TURBINE BUILDING

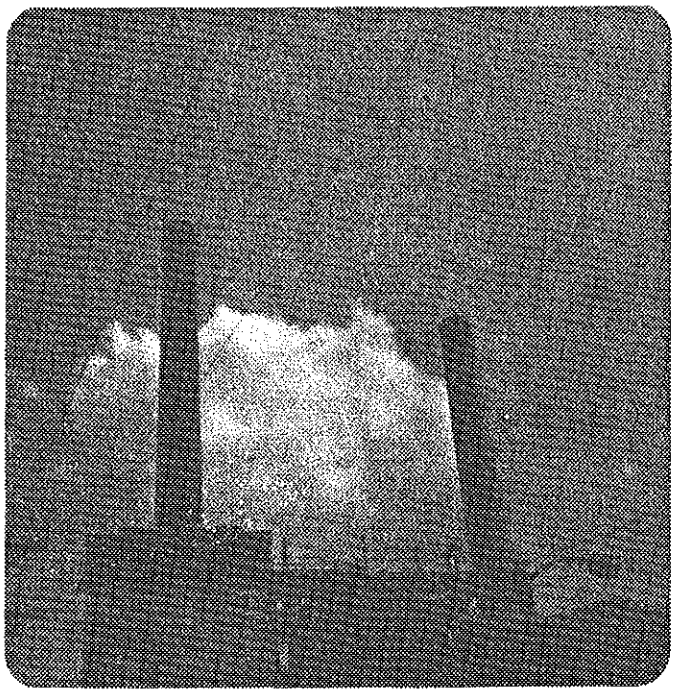


EAST ELEVATION





WEST ELEVATION



MAYNARD ST

IOWA ENERGY POLICY COUNCIL

BOILER CO-UTILIZATION STUDY

BROWN ENGINEERING COMPANY

FIELD INFORMATION SURVEY

Facility Name/Location Rath Packing Co. - Waterloo

Land Availability

Parcel No.	
Acres	25 Ac
Ownership	
Private	Rath Prop.
City	
Industrial Park	
Location	3400' from plant
Cost	
Zoning	U-1 unclassified

Feedstock Availability

Storage/Terminal Capacity	1,000,000 Bu
Owner	Pillsbury
Location	S. of River at Bismark and Cleveland
Potential Grain Production (Bu.)	
Potential Grain Production Location	
Transportation (Type)(Truck,Rail,Barge)	
To Storage/Terminal	Truck/Rail
Owner	Chicago-Rock Island
From Storage/Terminal	
To Ethanol Site	Rail/Truck
Owner	C.N.W.R.R./Independents

Product/By-Product

Local Ethanol Market	(Name)	Northland Products
Alcohol Transporters	(Name)	Possibly Williams Bros.
	(Location)	South on Hwy 63
	(Type)	
	(Exist/Potential Capacity)	
Local D.D.G. Market	(Name)	
D.D.G. Transporters	(Name)	
	(Location)	
	(Type)	
	(Exist/Potential Capacity)	

IOWA ENERGY POLICY COUNCIL

BOILER CO-UTILIZATION STUDY

BROWN ENGINEERING COMPANY

FIELD INFORMATION SURVEY

Facility Name/Location Rath Packing Co. - Waterloo

Land Availability

Parcel No.	
Acres	
Ownership	
Private	
City	
Industrial Park	
Location	
Cost	
Zoning	

Feedstock Availability

Storage/Terminal Capacity	400,000 Bu.
Owner	Geerling Feed
Location	E. of 18th at Court
Potential Grain Production (Bu.)	
Potential Grain Production Location	
Transportation (Type)(Truck,Ral,Barge)	
To Storage/Terminal	Truck/Rail
Owner	Ill.-Central Gulf
From Storage/Terminal	
To Ethanol Site	Rail/Truck
Owner	C.N.W.R.R./Independents

Product/By-Product

Local Ethanol Market	(Name)	Northland Products
Alcohol Transporters	(Name)	Possibly Williams Bros.
	(Location)	S. on Hwy 63
	(Type)	
	(Exist/Potential Capacity)	
Local D.D.G. Market	(Name)	
D.D.G. Transporters	(Name)	
	(Location)	
	(Type)	
	(Exist/Potential Capacity)	

Water Availability

Source XX City XX Wells _____ River None

City Mains
- Location: North side of property
- Capacity: 3950 gpm-6"-45 MGD capacity, 28 MGD max. pumped
- Future Construction

Wells
- Location
- Capacity
- Aquifer
- Limitations

River
- Intake Location
- Capacity
- Limitations

Gas/Electric Utilities

Gas (Owner): I.P.S.
- Location: on Nevada St. to south of R.R. tracks
- Capacity: 70 psi
- Size: 3"
- Limitations: None

Electric (Owner): I.P.S.
- Location: on Nevada St. to south of R.R. tracks
- Capacity
- Size: 13.8 KV
- Limitations: None

Wastewater Facilities

Mains
- Location: South of property
- Size: 54"main
- Limitations
- Capacity (c.f.s.)
- Future Extensions

Wastewater Treatment Plant
- Location: Mitchell and Easton
- Size
- Limitations: 300B.O.D.-350 S. solids
- Capacity (B.O.D./Gal. per day): 28 MGD --15 MGD ave. daily flow
- Future Expansions

Environmental Constraints

Air	was non-attainment area but is now unclassified.
Local Constraints	
Ambient Air Quality Analysis	
Emission Modeling Data (DEQ)	
Available Air Pollution Increments (from DEQ)	
Water	
Stream Discharge Limitations	D.E.Q.
County Constraints	None

Reducing Energy Requirements

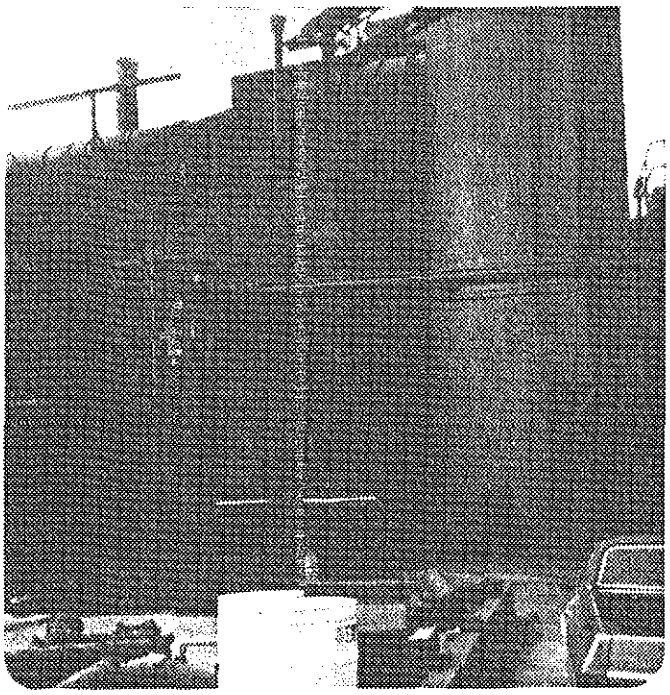
Existing Plants/Processes	
Name	
High Temp. Effluent (Preheating)(Gal./Day)	
Make-Up Water Effluent (Gal./Day)	
Cooling Water Effluent (Gal./Day)	
Cooperative Agreements	
Available Additional Energy	

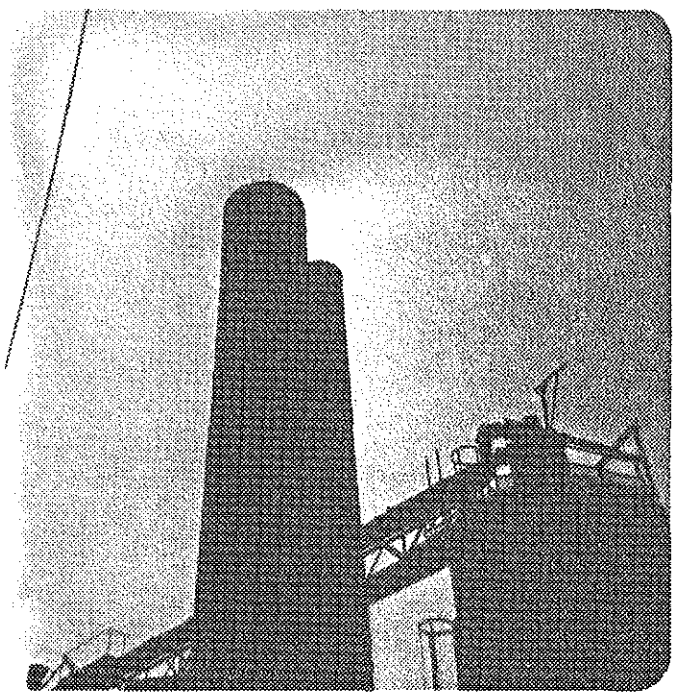
Other Applications

Company Name	Possibly Chamberlain Manufacturing
Size	
Lcoation	
Existing/Needed Capacity	
Product Used	Steam ?
Product Produced	Ammunition

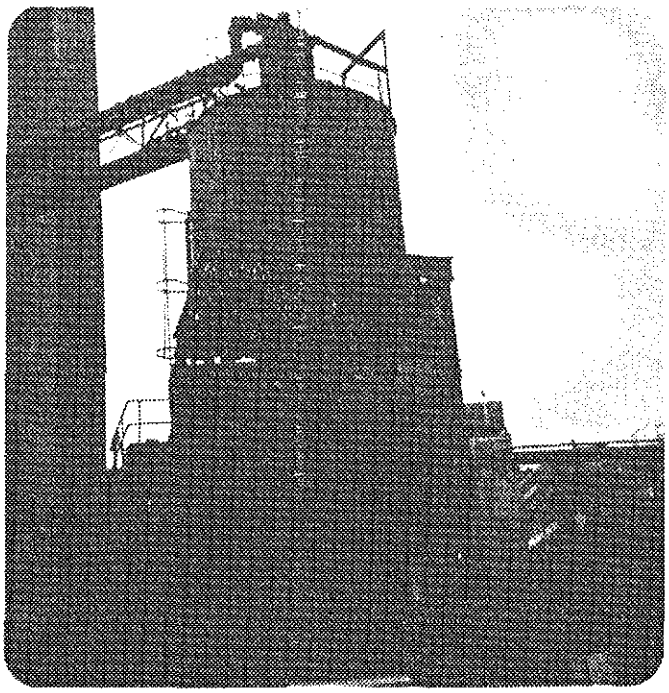
Miscellaneous Information

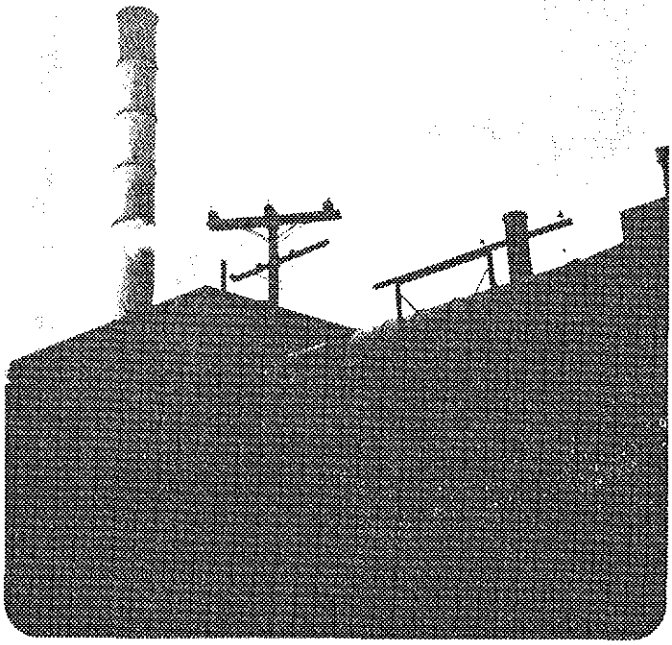
Available Area Employment	
% Unemployment	5-1/2%
Potential for Labor Force	3700
Other Potential Site Data	
Local Development Contracts	
Building Codes/Restrictions	State Bldg. Code
Available Area for Backup Systems	
Boilers	
Water Treatment	
Wastewater Treatment Plant	
Fuel, Etc.	
Steam Line Routing to Site	
Local Financing Incentives	Industrial Revenue Bonds, Tax Abatement





NORTH ELEVATION

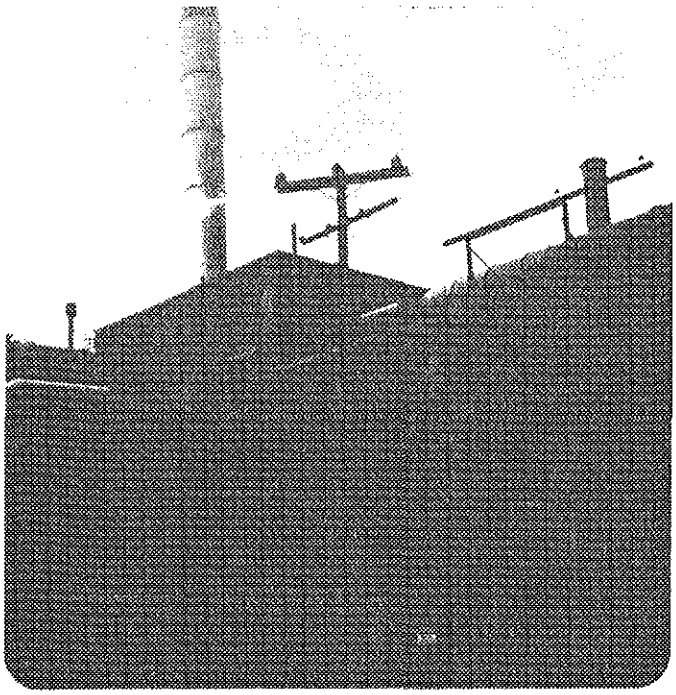




NORTH ELEVATION

EAST ELEVATION

RATH



EAST ELEVATION

Boiler Checklist - Plant Name Plant #2, Vandalia Rd., Iowa Power, Des Moines, IA

2@ 1250, 1@ 1450, 1@ 1800 — 630,000 / 400,000

Steam Pressure _____ psig Temp. 950 °F Capacity 425,000 / 790,000 PPH

Boiler Age - Installed #6-1963, #9-1950, #10-1954, #11-1964

Boiler Maintenance	When	Extent	General Condition
Superheater Tubes		#6-6 removed, #10-2 removed	Good
Economizer Tubes			Good
Air Heaters	1978	#6&10 - new baskets	Good
Stokers/Burners *			Good
Fans		#10-broken shaft replaced	Good
B.F.P.			Good
Cooling Tower	1978/81	Misc., Replac. fan cycl. deck	Good
Ash Handling			Good
Coal Handling			Good

Combustion Controls - Pneumatic

Condition - Showing Age
Maintenance - Replacement Parts - hard to obtain - replacing with new as required.

Water Treatment - City Water
Softeners & demineralizers (evaporator on large unit)
Capacity 60 GPM
Condition Good

Exist. Air Pollution Control Equipment - None on 6 & 9

Condition Good
Type ESP - 10 & 11

Package Boiler Site Availability - Possibly-would require retired equipment removal

Oil Storage (Existing) 300,000 + 5,000,000 Yes X No _____
Natural Gas-Available Yes X No _____

Any local Environmental Regulations other than IDEQ Yes _____ No X

ACCREDITATION STATUS Full _____ Part-time X

No. of MW on Grid 282 summer/248 winter
Operation Hr/yr _____

* #6 oil/gas fired
#9 gas fired/had pulverizers-retired because of no pollution controls
#10 & 11 - PC fired

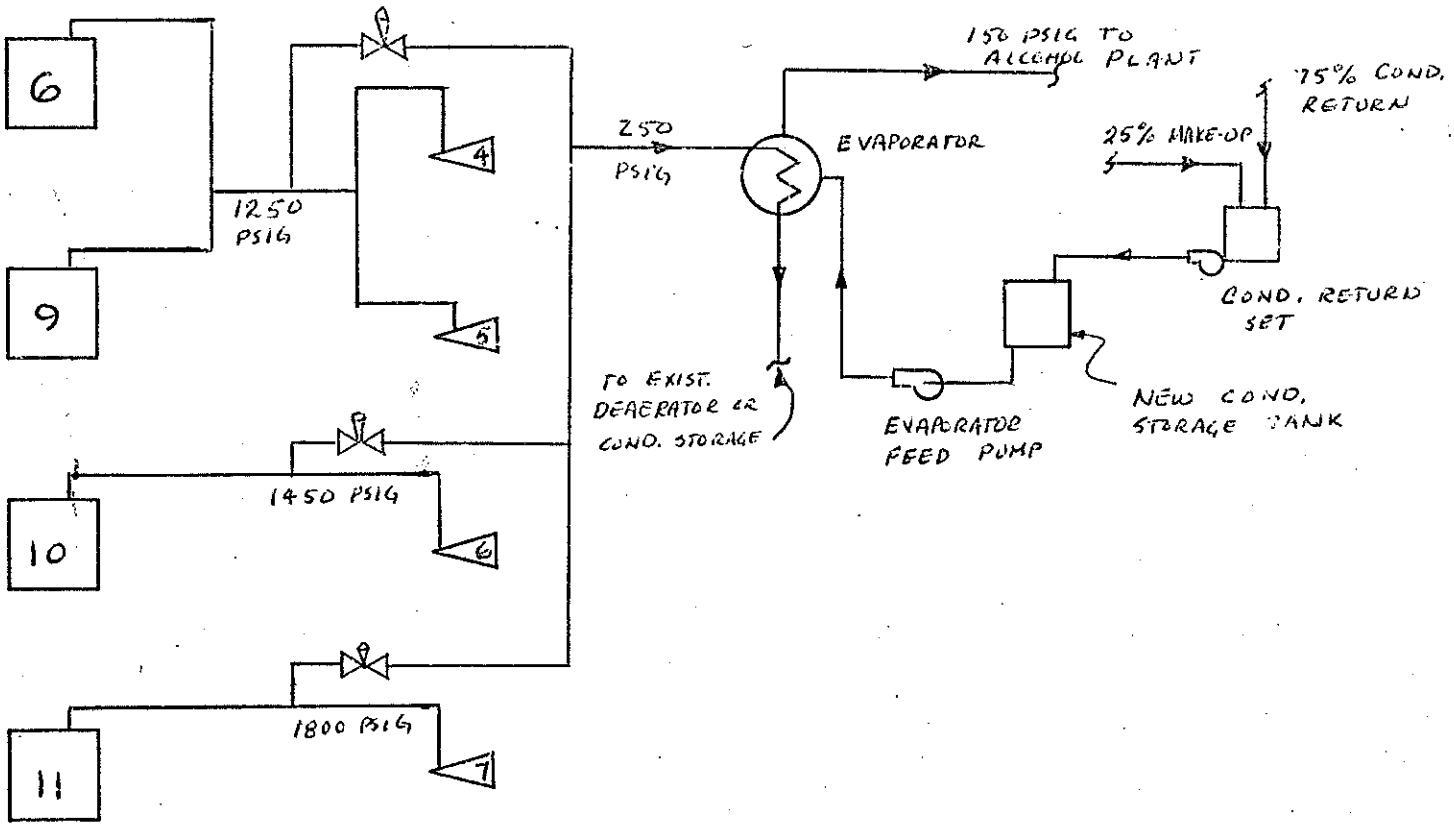
Boiler Checklist cont.

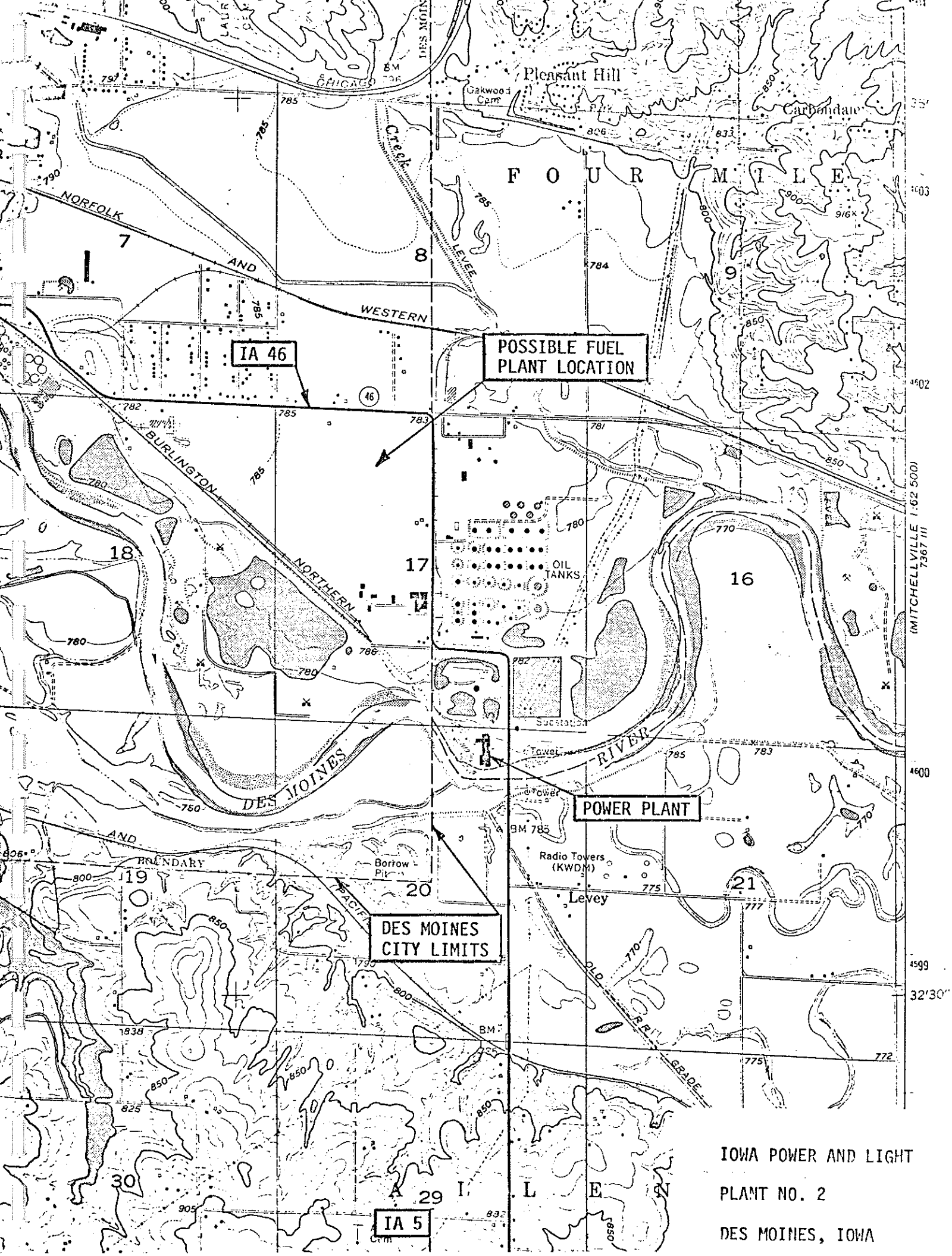
Fuel Cost

Coal	_____	$/Ton
Oil	_____	$/Gal
Nat. Gas	_____	$/1000 cu. ft.

Drawing or Sketch - easily reproducable

Conceptualize steam out of building (rough sketch)





IOWA POWER AND LIGHT

PLANT NO. 2

DES MOINES, IOWA

IOWA ENERGY POLICY COUNCIL

BOILER CO-UTILIZATION STUDY

BROWN ENGINEERING COMPANY

FIELD INFORMATION SURVEY

Facility Name/Location Iowa Power and Light Company - Des Moines

Land Availability

Parcel No.	ADM Site
Acres	168 Ac
Ownership	
Private	yes - private
City	
Industrial Park	
Location	
Cost	
Zoning	M-2

Feedstock Availability

Storage/Terminal Capacity	
Owner	
Location	
Potential Grain Production (Bu.)	
Potential Grain Production Location	
Transportation (Type)(Truck,Ral,Barge)	
To Storage/Terminal	Rail/Truck
Owner	
From Storage/Terminal	Williams Bros.-Ethanol-Pipe Line
To Ethanol Site	Truck/Rail for Solids
Owner	

Product/By-Product

Local Ethanol Market (Name)	Oil Companies (possibly Pesters)
Alcohol Transporters (Name)	
(Location)	
(Type)	
(Exist/Potential Capacity)	
Local D.D.G. Market (Name)	
D.D.G. Transporters (Name)	
(Location)	
(Type)	
(Exist/Potential Capacity)	

Water Availability

Source XX City _____ Wells _____ River None

City Mains — D.M. Water Works
- Location — Vandalia Road/S.E. 43rd St.
- Capacity — 1200 gpm - 96 MGD capac/58MGD consumption
- Future Construction — 24" main

Wells
- Location
- Capacity
- Aquifer
- Limitations

River
- Intake Location
- Capacity
- Limitations

Gas/Electric Utilities

Gas (Owner) — Northern Natural
- Location — Along R.R. Tracks
- Capacity — 65-125 psi
- Size — 8" H.P.
- Limitations

Electric (Owner)
- Location — Along R.R. Tracks
- Capacity — 69,000KV. could go to 13KV.
- Size
- Limitations

Wastewater Facilities

Mains
- Location — Along R.R. Tracks
- Size — 15" Main
- Limitations — Pretreament needed Lift STA. Limited to 1100 gpm
- Capacity (c.f.s.) — Gravity main capacity is 1120 gpm
- Future Extensions

Wastewater Treatment Plant
- Location — 1-1/2 mi. N.W. of Site
- Size
- Limitations — 400 ppm B.O.D.
- Capacity (B.O.D./Gal. per day) — 45 MGD; Ave = 30 MGD
- Future Expansions — New treatment plant in future

Environmental Constraints Iowa Power would need electr. STAT Precip. on boilers to supply Ethanol plant.

Air
- Local Constraints
- Ambient Air Quality Analysis — DEQ monitoring at Pleasant Hill
- Emission Modeling Data (DEQ)
- Available Air Pollution Increments (from DEQ)

Water
- Stream Discharge Limitations

County Constraints

Reducing Energy Requirements

Existing Plants/Processes
- Name
- High Temp. Effluent (Preheating)(Gal./Day)
- Make-Up Water Effluent (Gal./Day)
- Cooling Water Effluent (Gal./Day)
- Cooperative Agreements
- Available Additional Energy

Other Applications

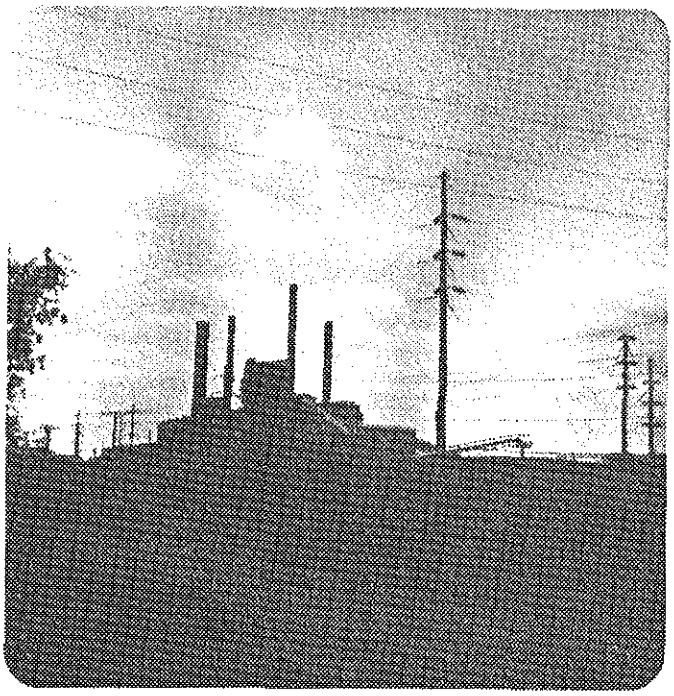
Company Name — Nothing presently
Size
Lcoation
Existing/Needed Capacity
Product Used
Product Produced

Miscellaneous Information

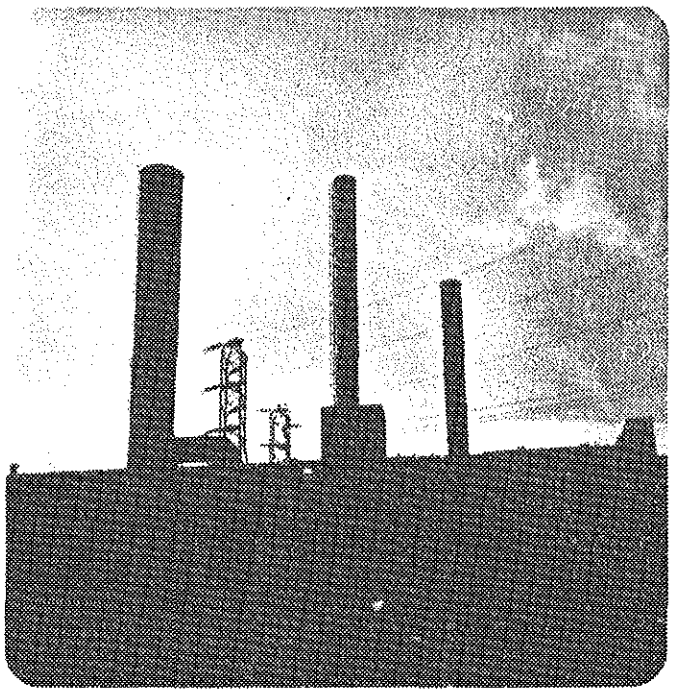
Available Area Employment
- % Unemployment
- Potential for Labor Force

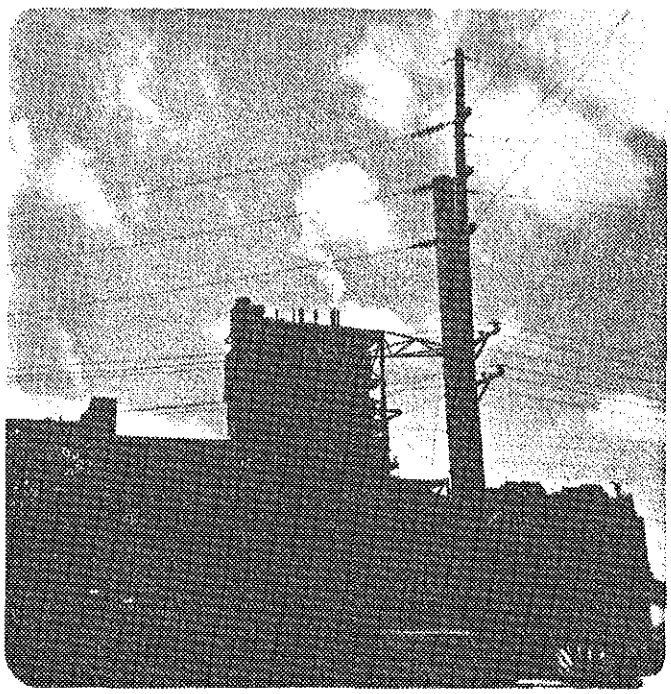
Other Potential Site Data
Local Development Contracts - None
Building Codes/Restrictions - Heavy Industry
Available Area for Backup Systems
- Boilers
- Water Treatment
- Wastewater Treatment Plant
- Fuel, Etc.

Steam Line Routing to Site — Along R.R. R.O.W. to N.W. then No.
Local Financing Incentives — Asked to place moratorium on taxes



North Elevation





East Elevation

Boiler Checklist - Plant Name Iowa Southern Utilities, Burlington, IA

Steam Pressure 2000 psig Temp. 1005 °F Capacity 1,425,000 PPH

Boiler Age - Installed 1967

Boiler Maintenance	When	Extent	General Condition
Superheater Tubes		Patches	Good
Economizer Tubes			Good
Air Heaters	1979	Replaced baskets	Good
Stokers/Burners P.C.			Good
Fans 2-FD (Pressurized)			Good
B.F.P.		Rewound one motor	Good
Cooling Tower None			----------
Ash Handling Wet sluice		Some replaced	Good
Coal Handling			Good

Combustion Controls - Pneumatic

Condition Good
Maintenance May have some parts problem in future, manufacturer to discontinue production.

Water Treatment - Flash evaporator
- Demineralizer for start-up
Capacity - Unknown
Condition - Good

Exist. Air Pollution Control Equipment

Condition Good
Type ESP

Package Boiler Site Availability

Oil Storage (Existing) Yes X No
Natural Gas-Available Yes No X

Any local Environmental Regulations other than IDEQ Yes X No

ACCREDITATION STATUS Full X Part-time

No. of KW on Grid 208 MW
Operation Hr/yr Continuous except 2-4 wk. maintenance shut-down

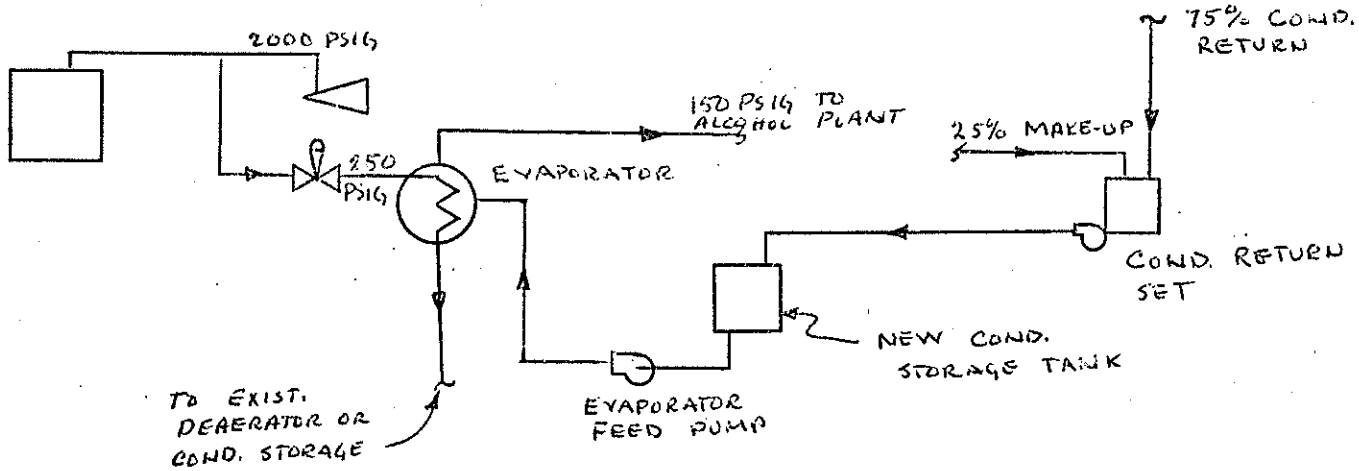
Boiler Checklist cont.

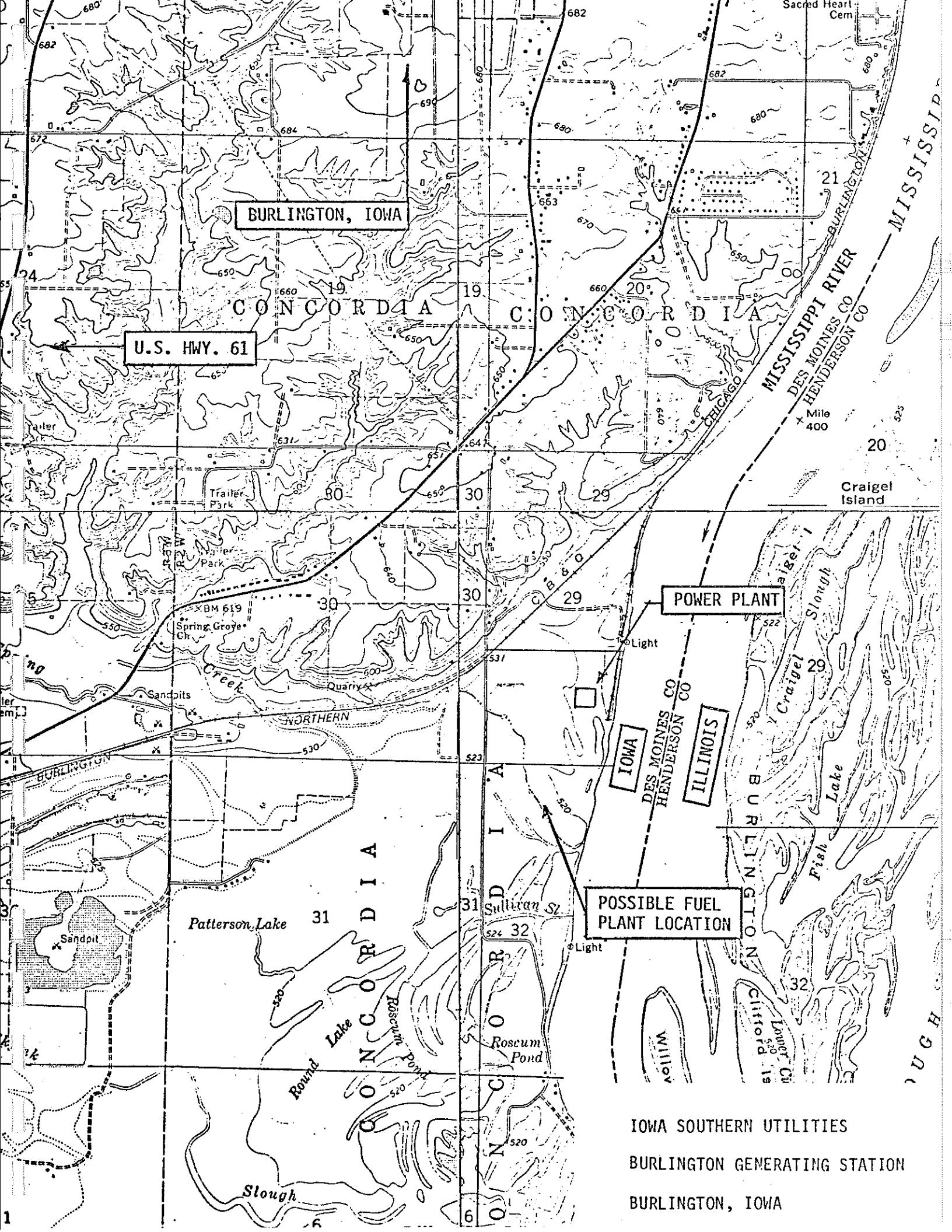
Fuel Cost			
	Coal	32.00	$/Ton
	Oil		$/Gal
	Nat. Gas		$/1000 cu. ft.

Drawing or Sketch - easily reproducable

Conceptualize steam cut of building (rough sketch)

Plant has one boiler serving one turbine-any shut-down would mean loss of steam source.





IOWA SOUTHERN UTILITIES

BURLINGTON GENERATING STATION

BURLINGTON, IOWA

IOWA ENERGY POLICY COUNCIL

BOILER CO-UTILIZATION STUDY

BROWN ENGINEERING COMPANY

FIELD INFORMATION SURVEY

Facility Name/Location Iowa Southern Utilities, Burlington

Land Availability

Parcel No.		
Acres	500	75
Ownership		
Private	ISU	Yes
City		
Industrial Park		
Location	on property	S.W. of ISU property
Cost	?	$2700-$3500/Ac; $15,000/Ac with barge acces
Zoning	None	None

Feedstock Availability

Storage/Terminal Capacity	
Owner	Wayne Bros. Div. of GARNAC
Location	North, Industrial Bottoms
Potential Grain Production (Bu.)	
Potential Grain Production Location	
Transportation (Type)(Truck,Ral,Barge)	
To Storage/Terminal	Truck/Rail/Barge
Owner	
From Storage/Terminal	
To Ethanol Site	All to ISU, TR/RR to 75 Ac. Site
Owner	Independent/Burlington Northern

Product/By-Product

Local Ethanol Market	(Name)	
Alcohol Transporters	(Name)	Carpenter Station Inc,
	(Location)	North Bottoms Area, 1/2 mi. N. of CBD
	(Type)	Barge/Truck; Petro./Fuel Oil
	(Exist/Potential Capacity)	3-1/2 million Gal/?
Local D.D.G. Market	(Name)	
D.D.G. Transporters	(Name)	
	(Location)	
	(Type)	
	(Exist/Potential Capacity)	

IOWA ENERGY POLICY COUNCIL

BOILER CO-UTILIZATION STUDY

BROWN ENGINEERING COMPANY

FIELD INFORMATION SURVEY

Facility Name/Location Iowa Southern Utilities, Burlington

Land Availability

Parcel No.
Acres
Ownership
- Private
- City
- Industrial Park

Location
Cost
Zoning

Feedstock Availability

Storage/Terminal Capacity	
Owner	Taber and Co.(A.D.M)
Location	6 blocks S. of C.B.D.
Potential Grain Production (Bu.)	
Potential Grain Production Location	
Transportation (Type)(Truck,Ral,Barge)	
To Storage/Terminal	Truck/Rail/Barge
Owner	
From Storage/Terminal	All to ISU TR/RR to 75 Ac. Site
To Ethanol Site	Independent/Burlington Northern
Owner	

Product/By-Product

Local Ethanol Market	(Name)	
Alcohol Transporters	(Name)	
	(Location)	
	(Type)	
	(Exist/Potential Capacity)	
Local D.D.G. Market	(Name)	Danville Mill and Supply
D.D.G. Transporters	(Name)	Independent/Burlington Northern
	(Location)	
	(Type)	Truck/Rail
	(Exist/Potential Capacity)	?

IOWA ENERGY POLICY COUNCIL

BOILER CO-UTILIZATION STUDY

BROWN ENGINEERING COMPANY

FIELD INFORMATION SURVEY

Facility Name/Location Iowa Southern Utilities, Burlington

Land Availability

- Parcel No.
- Acres
- Ownership
  - Private
  - City
  - Industrial Park
- Location
- Cost
- Zoning

Feedstock Availability

Storage/Terminal Capacity		
Owner	Miss. Grain Dealers	Danville Mill & Supp
Location	Gulf Port, Ill.	Danville, 12 mi west
Potential Grain Production (Bu.)		
Potential Grain Production Location		
Transportation (Type)(Truck,Ral,Barge)		
To Storage/Terminal	Truck/Rail/Barge	Truck/ Rail
Owner		Ind./Burlington North
From Storage/Terminal		
To Ethanol Site	All to ISU TR/RR to 75 Ac. Site	
Owner	Ind./Burlington Northern	

Product/By-Product

- Local Ethanol Market (Name)
- Alcohol Transporters (Name)
  - (Location)
  - (Type)
  - (Exist/Potential Capacity)
- Local D.D.G. Market (Name)
- D.D.G. Transporters (Name)
  - (Location)
  - (Type)
  - (Exist/Potential Capacity)

IOWA ENERGY POLICY COUNCIL

BOILER CO-UTILIZATION STUDY

BROWN ENGINEERING COMPANY

FIELD INFORMATION SURVEY

Facility Name/Location Iowa Southern Utilities, Burlington

Land Availability

- Parcel No.
- Acres
- Ownership
  - Private
  - City
  - Industrial Park
- Location
- Cost
- Zoning

Feedstock Availability

Storage/Terminal Capacity	
Owner	Des Moines Co. Farm Service
Location	Danville
Potential Grain Production (Bu.)	
Potential Grain Production Location	
Transportation (Type)(Truck,Ral,Barge)	
To Storage/Terminal	Truck/Rail
Owner	Independent/Burlington Northern
From Storage/Terminal	
To Ethanol Site	Truck/Rail
Owner	Independent/Burlington Northern

Product/By-Product

Local Ethanol Market	(Name)
Alcohol Transporters	(Name)
	(Location)
	(Type)
	(Exist/Potential Capacity)
Local D.D.G. Market	(Name)
D.D.G. Transporters	(Name)
	(Location)
	(Type)
	(Exist/Potential Capacity)

IOWA ENERGY POLICY COUNCIL

BOILER CO-UTILIZATION STUDY

BROWN ENGINEERING COMPANY

FIELD INFORMATION SURVEY

Facility Name/Location Iowa Southern Utilities, Burlington

Land Availability

Parcel No.
Acres
Ownership
- Private
- City
- Industrial Park

Location
Cost
Zoning

Feedstock Availability

Storage/Terminal Capacity	
Owner	Meekers Landing
Location	8-10 miles N. of Burlington
Potential Grain Production (Bu.)	
Potential Grain Production Location	
Transportation (Type)(Truck,Ral,Barge)	
To Storage/Terminal	Barge/Truck/Rail
Owner	Independent/Burlington Northern
From Storage/Terminal	
To Ethanol Site	All to ISU TR/RR to 75 Ac. Site
Owner	Independent/Burlington Northern

Product/By-Product

Local Ethanol Market	(Name)
Alcohol Transporters	(Name)
	(Location)
	(Type)
	(Exist/Potential Capacity)
Local D.D.G. Market	(Name)
D.D.G. Transporters	(Name)
	(Location)
	(Type)
	(Exist/Potential Capacity)

Water Availability

Source	City XX	Wells XX	River None
City Mains	I.S.U. Site		Private Site
Location	None		None
Capacity			
Future Construction			20 yrs from now
Wells			
Location	New wells may be possible		
Capacity	1000 gpm - very little drawdown		
Aquifer	surficial		
Limitations	land area may be small for amount needed		
River			
Intake Location			
Capacity			
Limitations			

Gas/Electric Utilities

Gas (Owner)	Mich/Wisc. Pipeline Co.	Distributed by I.S.U.
Location	2-1/2 miles from site	Same
Capacity		
Size		
Limitations	Interruptable	Same
Electric (Owner)	I.S.U.	I.S.U.
Location	in area	in area
Capacity	161 KV	161 KV
Size		
Limitations		

Wastewater Facilities 20 years from now

Mains	
Location	
Size	
Limitations	
Capacity (c.f.s.)	
Future Extensions	
Wastewater Treatment Plant	
Location	
Size	
Limitations	
Capacity (B.O.D./Gal. per day)	
Future Expansions	

Environmental Constraints

Air

Local Constraints	Concordia, Township is better than Burlingt
Ambient Air Quality Analysis	for available air pollution increments
Emission Modeling Data (DEQ)	
Available Air Pollution Increments (from DEQ)	

Water

Stream Discharge Limitations	Corps of Engrs. Primary Permitting Authorit

County Constraints	Eagle Roosts Also Conservation Commission Involvement

Reducing Energy Requirements

Existing Plants/Processes	None
Name	Alter Barge Terminal may use hi-temp
High Temp. Effluent (Preheating)(Gal./Day)	effluent to keep slips open in winte
Make-Up Water Effluent (Gal./Day)	
Cooling Water Effluent (Gal./Day)	
Cooperative Agreements	
Available Additional Energy	

Other Applications

None

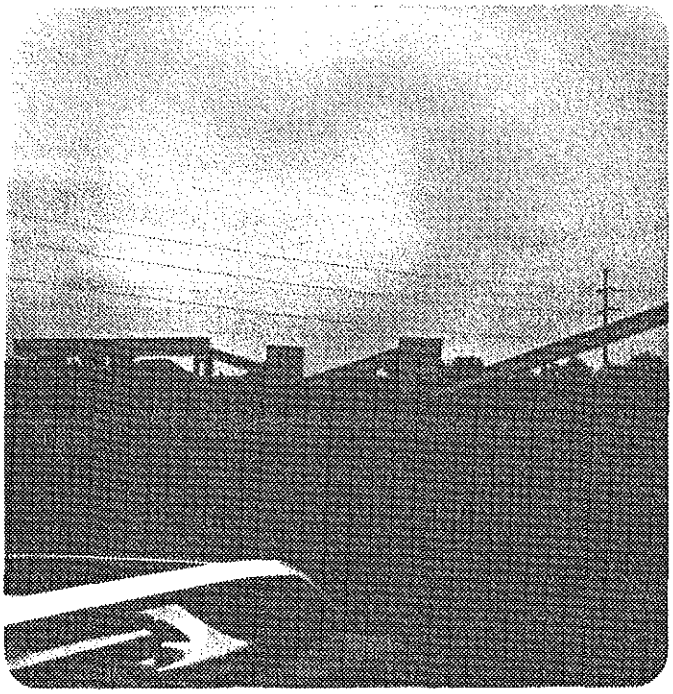
Company Name
Size
Lcoation
Existing/Needed Capacity
Product Used
Product Produced

Miscellaneous Information

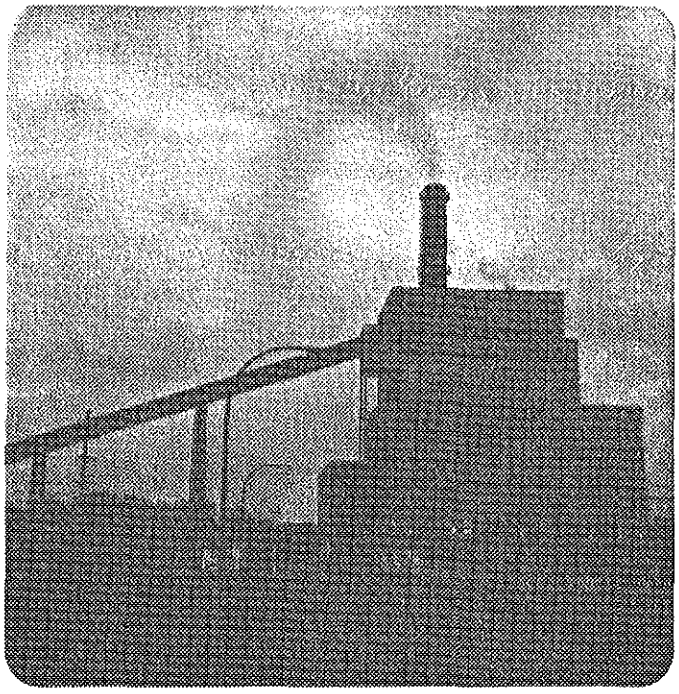
Available Area Employment	
% Unemployment	6.9%
Potential for Labor Force	5000±

Other Potential Site Data	
Local Development Contracts	
Building Codes/Restrictions	Co. may not have restrictions
Available Area for Backup Systems	
Boilers	sufficient
Water Treatment	sufficient
Wastewater Treatment Plant	sufficient
Fuel, Etc.	sufficient

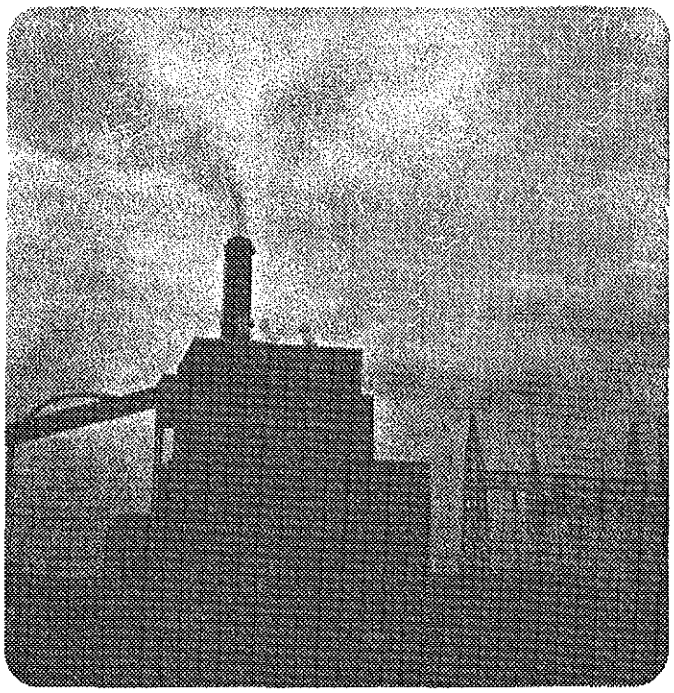
Steam Line Routing to Site	
Local Financing Incentives	Industrial Rev. Bonds

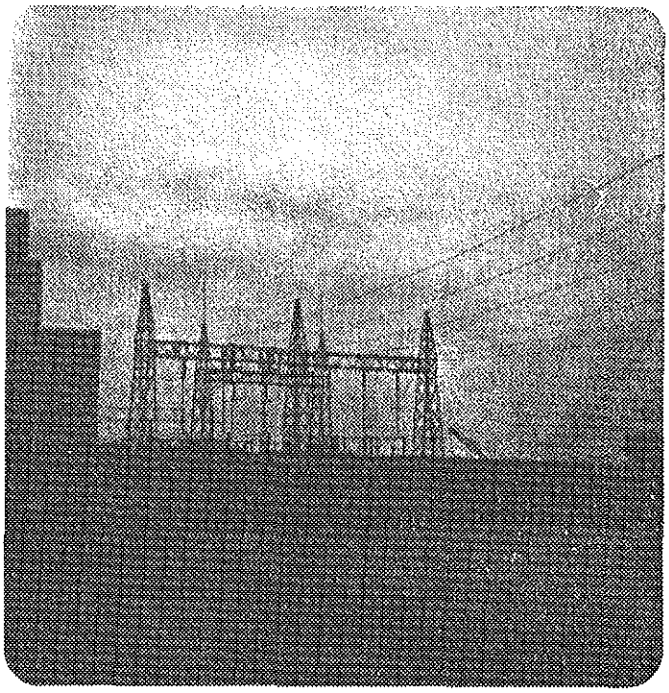


COAL AREA



WEST ELEVATION





WEST ELEVATION

Boiler Checklist - Plant Name Fair Station, Eastern Iowa REC, Mountpelier, Iowa

Steam Pressure 850 psig Temp. 900 °F Capacity 610,000 PPH

Boiler Age - Installed #1-1958, #2-1967

Boiler Maintenance

	When	Extent	General Condition
Superheater Tubes	Last 2 Years	6 patched	Good
Economizer Tubes None			----------
Air Heaters		#1 replaced baskets	Good
Stokers/Burners P.C.			Good
Fans			Good
B.F.P.			Good
Cooling Tower None			----------
Ash Handling			Good
Coal Handling			Good

Combustion Controls Pneumatic

Condition - Good
Maintenance - Routine, no parts problems

Water Treatment - 2 wells, demineralizer
70,000 gallons storage
Capacity Unknown, fill tanks approx. every 5-7 days
Condition Good

Exist. Air Pollution Control Equipment

Condition Good
Type Mech. coll., ESP

Package Boiler Site Availability - Yes

Oil Storage (Existing) 18,000 gal. approx. Yes X No
Natural Gas-Available Yes X No

Any local Environmental Regulations other than IDEQ Yes No X

ACCREDITATION STATUS Full X Part-time

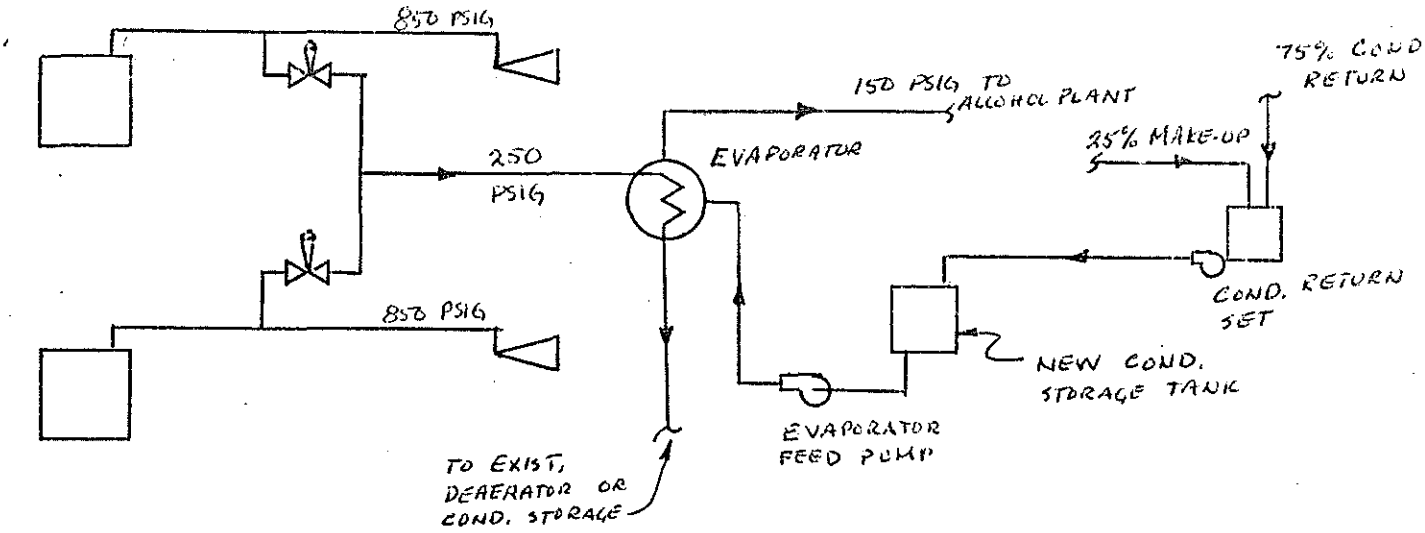
No. of KW on Grid 62.5
Operation Hr/yr Full time except routine shut-down

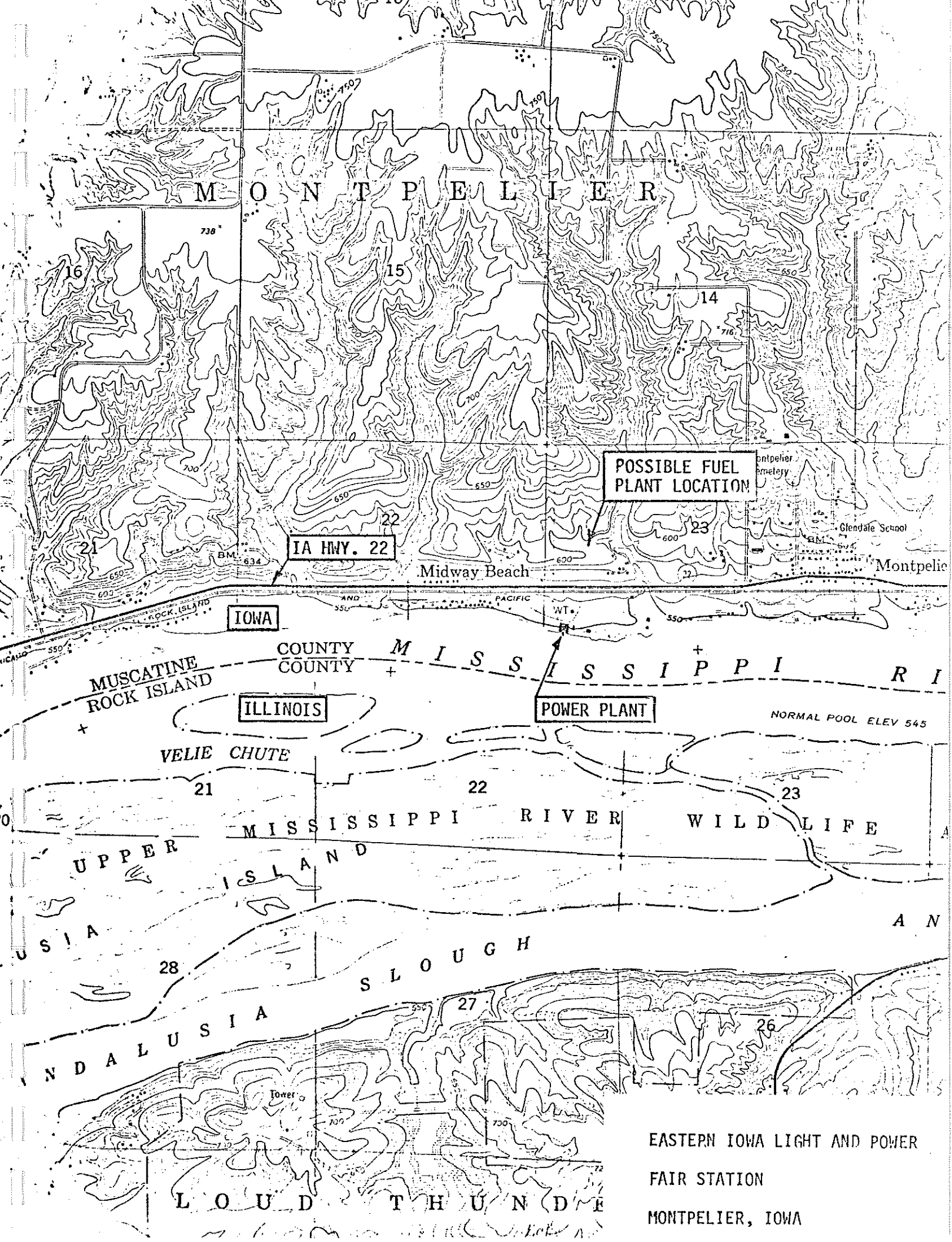
Boiler Checklist cont.

Fuel Cost			
	Coal	1.40	~~$/Ton~~ MBTU
	Oil		$/Gal
	Nat. Gas	3.00	~~$/1000 cu. ft.~~ MBTU

Drawing or Sketch - easily reproducable

Conceptualize steam out of building (rough sketch)





EASTERN IOWA LIGHT AND POWER

FAIR STATION

MONTPELIER, IOWA

IOWA ENERGY POLICY COUNCIL

BOILER CO-UTILIZATION STUDY

BROWN ENGINEERING COMPANY

FIELD INFORMATION SURVEY

Facility Name/Location Eastern Iowa Light & Power - Montpelier, Iowa

Land Availability

Parcel No.	
Acres	150 Acres
Ownership	
Private	yes - private
City	
Industrial Park	
Location	Across Road
Cost	
Zoning	Agricultural

Feedstock Availability

Storage/Terminal Capacity	Scott County Storage Terminals
Owner	Pillsbury - Miss. River Grain Elev.
Location	Davenport Area
Potential Grain Production (Bu.)	
Potential Grain Production Location	
Transportation (Type)(Truck,Ral,Barge)	
To Storage/Terminal	
Owner	
From Storage/Terminal	
To Ethanol Site	Truck (Rail Close)
Owner	Chicago-Rock Island & Pacific

Product/By-Product

Local Ethanol Market	(Name)	
Alcohol Transporters	(Name)	McMillian Oil Storage Facil.
	(Location)	Near Pillsbury
	(Type)	
	(Exist/Potential Capacity)	
Local D.D.G. Market	(Name)	Kent Feeds/Grain Processing, Muscatine
D.D.G. Transporters	(Name)	
	(Location)	
	(Type)	
	(Exist/Potential Capacity)	

Water Availability

Source _____ City XX Wells _____ River None

City Mains
- Location
- Capacity
- Future Construction

Wells
- Location
- Capacity: 200-250 gpm---4± gpm /ft drawdown
- Aquifer: Selerian
- Limitations: exist wells

River
- Intake Location: Section 10-Construction Permit & 404 Placement Permit
- Capacity
- Limitations

Gas/Electric Utilities

Gas (Owner): Iowa-Ill. Gas & Electric (Davenport)
- Location: North side of Hwy 20
- Capacity: 400 psi
- Size: 8"
- Limitations

Electric (Owner): Eastern Iowa Light and Power
- Location
- Capacity: 69 KV
- Size
- Limitations: interconnected on system

Wastewater Facilities

Mains
- Location
- Size
- Limitations
- Capacity (c.f.s.)
- Future Extensions

Wastewater Treatment Plant
- Location
- Size
- Limitations: only for power plant (none for city)
- Capacity (B.O.D./Gal. per day)
- Future Expansions

Environmental Constraints

Air
- Local Constraints
- Ambient Air Quality Analysis
- Emission Modeling Data (DEQ)
- Available Air Pollution Increments (from DEQ)

Water
- Stream Discharge Limitations

County Constraints

Reducing Energy Requirements — NONE

Existing Plants/Processes
- Name
- High Temp. Effluent (Preheating)(Gal./Day)
- Make-Up Water Effluent (Gal./Day)
- Cooling Water Effluent (Gal./Day)
- Cooperative Agreements
- Available Additional Energy

Other Applications — NONE

Company Name
Size
Lcoation
Existing/Needed Capacity
Product Used
Product Produced

Miscellaneous Information

Available Area Employment
- % Unemployment
- Potential for Labor Force — Draw from Quad Cities and Muscatin

Other Potential Site Data
Local Development Contracts
Building Codes/Restrictions — Plant is in Moline Airport approach pattern
Available Area for Backup Systems — yes
- Boilers
- Water Treatment
- Wastewater Treatment Plant
- Fuel, Etc.

Steam Line Routing to Site — Across Road to site
Local Financing Incentives

Boiler Checklist - Plant Name Riverside Plant, Iowa-Illinois Gas & Electric, Bettendorf, IA

Steam Pressure 800 psig Temp. 900 °F Capacity 100,000 PPH available

Boiler Age - Installed 1937, 1942, 1949, 1949

Boiler Maintenance

	When	Extent	General Condition
Superheater Tubes			Reasonably good-in operating condition but showing their age.
Economizer Tubes			
Air Heaters			
Stokers/Burners			
Fans			
B.F.P.			
Cooling Tower None			
Ash Handling			
Coal Handling			

Combustion Controls-Pneumatic

Condition - good but showing age
Maintenance

Water Treatment - City water

Capacity - 2 trains - 100 GPM each, operate one at a time
Condition- good

Exist. Air Pollution Control Equipment

Condition-Good
Type-ESP - 72

Package Boiler Site Availability Yes

Oil Storage (Existing) 5,000,000 gal Yes X No
Natural Gas-Available Yes X No

Any local Environmental Regulations other than IDEQ Yes No X

ACCREDITATION STATUS Full Part-time X

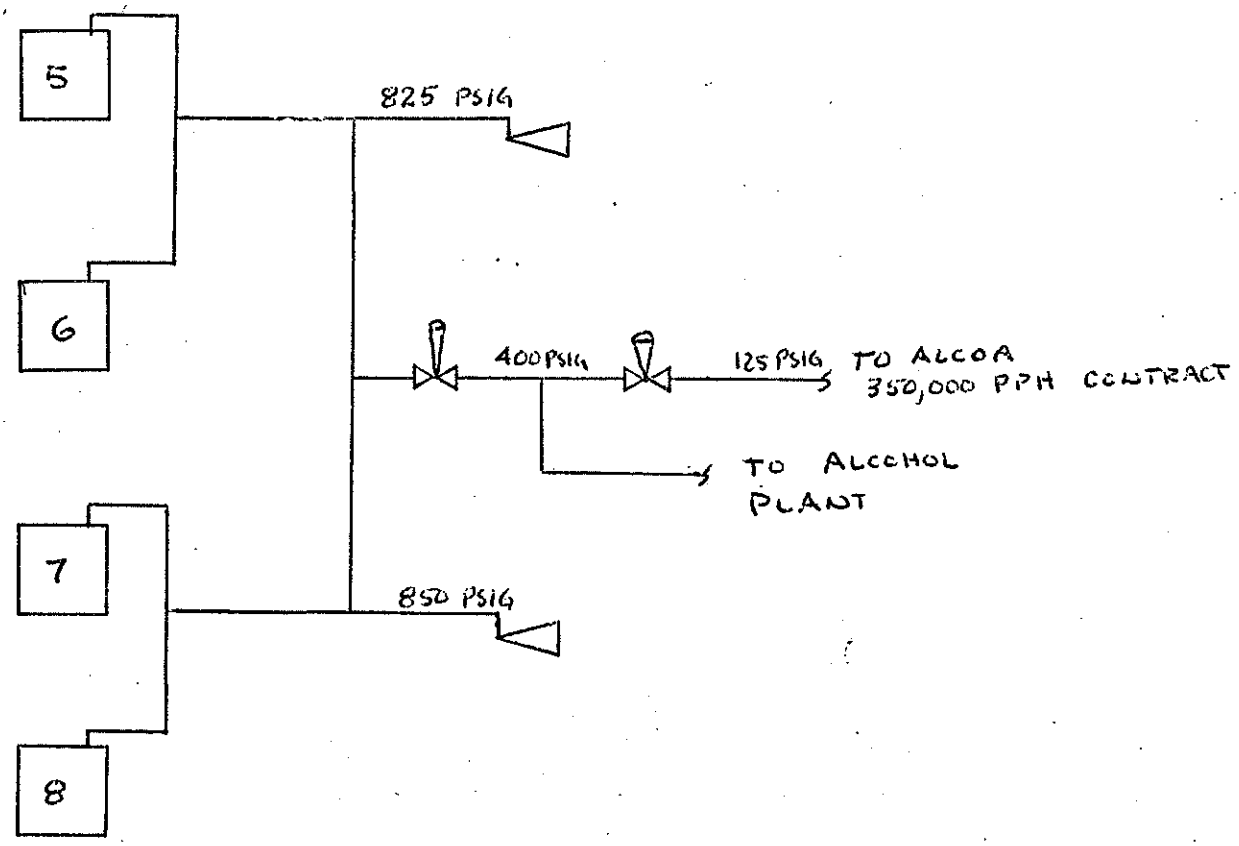
No. of KW on Grid 225 KW
Operation Hr/yr

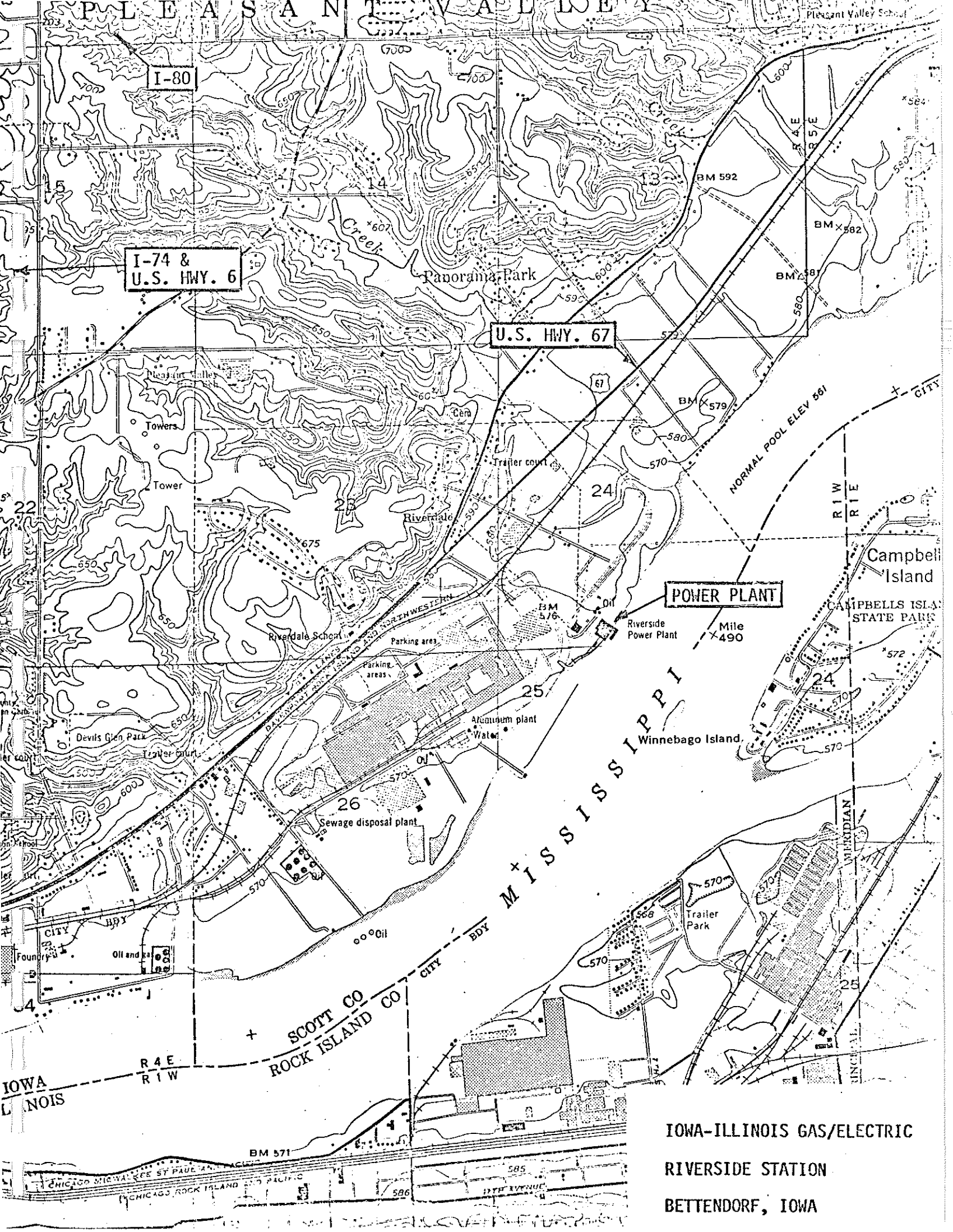
Boiler Checklist cont.

Fuel Cost			
	Coal	1.50	$/~~Ton~~ MBTU
	Oil		$/Gal
	Nat. Gas		$/1000 cu. ft.

Drawing or Sketch - easily reproducable

Conceptualize steam out of building (rough sketch)





IOWA-ILLINOIS GAS/ELECTRIC

RIVERSIDE STATION

BETTENDORF, IOWA

IOWA ENERGY POLICY COUNCIL

BOILER CO-UTILIZATION STUDY

BROWN ENGINEERING COMPANY

FIELD INFORMATION SURVEY

Facility Name/Location Iowa - Illinois Gas & Electric - Bettendorf

Land Availability

Parcel No.		
Acres	11 acres	13.5 ac
Ownership		
Private	yes	
City		
Industrial Park		
Location	3600' N. of Iowa - Ill. (out of '65 flood)	
Cost	$20,000 - $25,000/ac with RAIL	
Zoning	I-3 Zone	

Feedstock Availability

Storage/Terminal Capacity	2,555,000Bu
Owner	Pillsbury
Location	Davenport
Potential Grain Production (Bu.)	
Potential Grain Production Location	
Transportation (Type)(Truck,Ral,Barge)	
To Storage/Terminal	Truck/Rail/Barge
Owner	Milw./Independents
From Storage/Terminal	
To Ethanol Site	Truck/Rail
Owner	Davenport, Rock Island & North Western/Truck

Product/By-Product

Local Ethanol Market	(Name)	
Alcohol Transporters	(Name)	Independents, also McMillan Oil
	(Location)	
	(Type)	
	(Exist/Potential Capacity)	
Local D.D.G. Market	(Name)	?Linwood Stone Products
D.D.G. Transporters	(Name)	
	(Location)	Pillsbury, Cargill, Miss. River Grai
	(Type)	Truck/Rail/Barge
	(Exist/Potential Capacity)	

IOWA ENERGY POLICY COUNCIL

BOILER CO-UTILIZATION STUDY

BROWN ENGINEERING COMPANY

FIELD INFORMATION SURVEY

Facility Name/Location Iowa - Illinois Gas & Electric Co. - Bettendorf

Land Availability

- Parcel No.
- Acres
- Ownership
  - Private
  - City
  - Industrial Park
- Location
- Cost
- Zoning

Feedstock Availability

Storage/Terminal Capacity	904,000Bu	950,000Bu
Owner	Cargill	Miss. River Grain Co.
Location	Buffalo, Ia.	Davenport
Potential Grain Production (Bu.)		
Potential Grain Production Location		
Transportation (Type)(Truck,Ral,Barge)		
To Storage/Terminal	Truck/Rail/Barge	Truck/Rail/Barge
Owner	Milw./Independents	Milw./Independents
From Storage/Terminal		
To Ethanol Site	Truck/Rail	Truck/Rail
Owner	Davenport, Rock Island & North Western/Truck	

Product/By-Product

Local Ethanol Market	(Name)	
Alcohol Transporters	(Name)	
	(Location)	
	(Type)	
	(Exist/Potential Capacity)	
Local D.D.G. Market	(Name)	Ralston Purina Co. - Maehr Feed - Eldridge Coop-S/M
D.D.G. Transporters	(Name)	Service C
	(Location)	Pillsbury, Cargill, Miss River Grain Co.
	(Type)	Truck/Rail/Barge
	(Exist/Potential Capacity)	

IOWA ENERGY POLICY COUNCIL

BOILER CO-UTILIZATION STUDY

BROWN ENGINEERING COMPANY

FIELD INFORMATION SURVEY

Facility Name/Location Iowa - Illinois Gas and Electric - Bettendorf

Land Availability

- Parcel No.
- Acres
- Ownership
  - Private
  - City
  - Industrial Park
- Location
- Cost
- Zoning

Feedstock Availability

Storage/Terminal Capacity		850,000Bu.
Owner	ConAgra	Ralston Purina Co
Location	Davenport	Davenport
Potential Grain Production (Bu.)		433 S. Pine St.
Potential Grain Production Location		
Transportation (Type)(Truck,Ral,Barge)		
To Storage/Terminal		
Owner		
From Storage/Terminal		
To Ethanol Site		
Owner		

Product/By-Product

- Local Ethanol Market (Name)
- Alcohol Transporters (Name)
  - (Location)
  - (Type)
  - (Exist/Potential Capacity)
- Local D.D.G. Market (Name)
- D.D.G. Transporters (Name)
  - (Location)
  - (Type)
  - (Exist/Potential Capacity)

IOWA ENERGY POLICY COUNCIL

BOILER CO-UTILIZATION STUDY

BROWN ENGINEERING COMPANY

FIELD INFORMATION SURVEY

Facility Name/Location Iowa - Illinois Gas & Electric - Bettendorf

Land Availability

- Parcel No.
- Acres
- Ownership
  - Private
  - City
  - Industrial Park
- Location
- Cost
- Zoning

Feedstock Availability

Storage/Terminal Capacity	45,000
Owner	Maehr Feed & Supply
Location	6230 Brady St., Davenport
Potential Grain Production (Bu.)	
Potential Grain Production Location	
Transportation (Type)(Truck,Ral,Barge)	
To Storage/Terminal	Truck
Owner	Independent
From Storage/Terminal	
To Ethanol Site	Truck
Owner	Independent

Product/By-Product

Local Ethanol Market	(Name)
Alcohol Transporters	(Name)
	(Location)
	(Type)
	(Exist/Potential Capacity)
Local D.D.G. Market	(Name)
D.D.G. Transporters	(Name)
	(Location)
	(Type)
	(Exist/Potential Capacity)

Water Availability

Source _____ City _____ Wells XX River Mississippi

City Mains — Davenport Water Co. (private)
- Location — 12" main in Hwy R.O.W. on N. Side
- Capacity — Pump-30MGD treat 30MGD Ave. Demand 18MGD, Peak Demand 25MGD Excess Capacity 5MGD
- Future Construction

Wells
- Location
- Capacity
- Aquifer
- Limitations

River
- Intake Location
- Capacity
- Limitations

Gas/Electric Utilities

Gas (Owner) — Iowa-Illinois Gas And Electric Co.
- Location
- Capacity
- Size
- Limitations — less than or equal to 50,000 cuft/hr

Electric (Owner) — Iowa-Illinois Gas and Electric Co.
- Location
- Capacity
- Size
- Limitations

Wastewater Facilities

Mains
- Location
- Size — 48" sewer interceptor-needs lateral
- Limitations
- Capacity (c.f.s.)
- Future Extensions

Wastewater Treatment Plant
- Location
- Size — 26MGD
- Limitations
- Capacity (B.O.D./Gal. per day) — 26MGD - Ave Flow= 18MGD
- Future Expansions — Oscar Meyer will stop hog slaughtering

Environmental Constraints

Air — Ill. is a non-attainment area
- Local Constraints
- Ambient Air Quality Analysis
- Emission Modeling Data (DEQ)
- Available Air Pollution Increments (from DEQ)

Water
- Stream Discharge Limitations

County Constraints

Reducing Energy Requirements

Existing Plants/Processes
- Name
- High Temp. Effluent (Preheating)(Gal./Day)
- Make-Up Water Effluent (Gal./Day)
- Cooling Water Effluent (Gal./Day)
- Cooperative Agreements
- Available Additional Energy

Other Applications

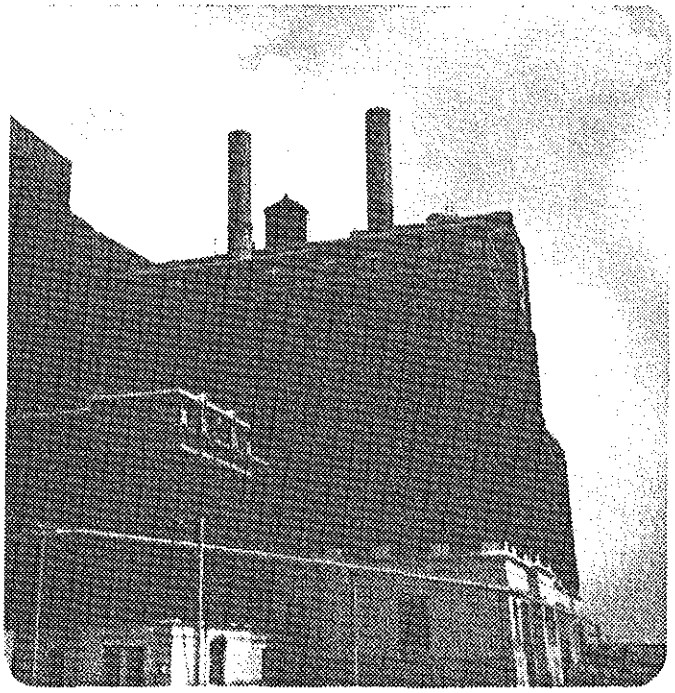
Company Name
Size
Lcoation
Existing/Needed Capacity
Product Used
Product Produced

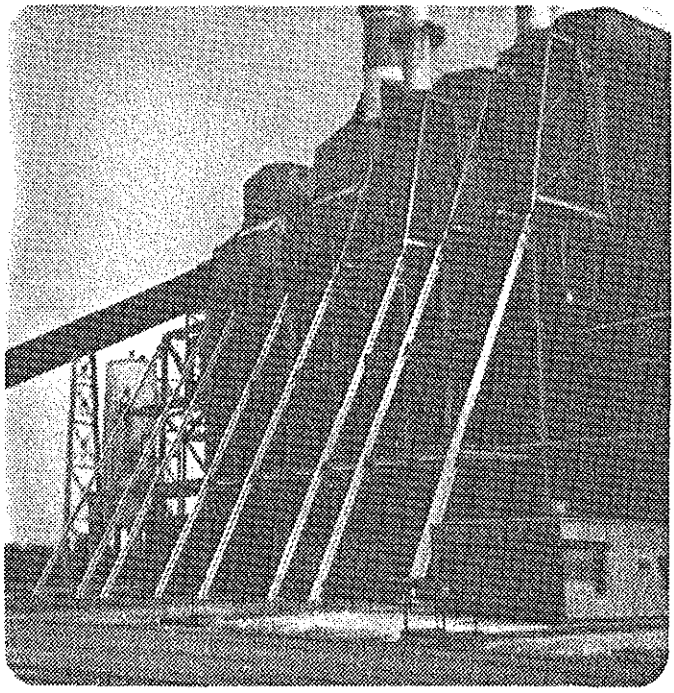
Miscellaneous Information

Available Area Employment
- % Unemployment — 7.4%
- Potential for Labor Force — 13,663 (officially)

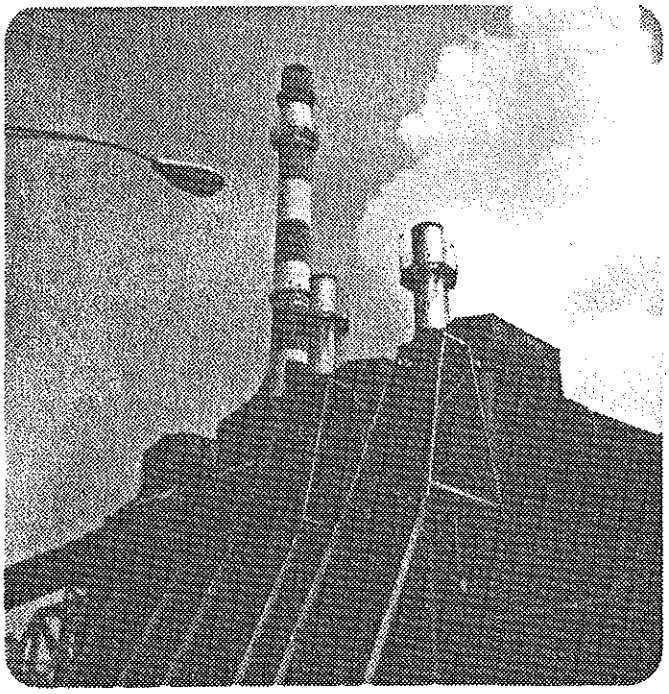
Other Potential Site Data
Local Development Contracts
Building Codes/Restrictions — Follow subdivision code
Available Area for Backup Systems
- Boilers
- Water Treatment
- Wastewater Treatment Plant
- Fuel, Etc.

Steam Line Routing to Site
Local Financing Incentives — Ind. Rev. Bonds





WEST ELEVATION



Boiler Checklist - Plant Name Chemplex Company, Clinton, Iowa

383,360 waste heat boilers
909,000 not counting WHB

Steam Pressure 600 psig Temp. _____ °F Capacity _____ PPH

Boiler Age - Installed 2-1969, 1-1975, 2-1980, 12 waste heat boilers - 1969

Boiler Maintenance

	When	Extent	General Condition
Superheater Tubes	Becoming a problem on older boilers		
Economizer Tubes			
Air Heaters	None		
Stokers/Burners		May replace w/more efficient	
Fans			Good
B.F.P. 6 - 2 new			Good
Cooling Tower	None		
Ash Handling	None		
Coal Handling	None		

Combustion Controls

Condition - Installing a master control for all boilers
Maintenance

Water Treatment - Water from wells

Capacity - Lime, demineralizer, Calgon boiler injection
Condition Not available
Good

Exist. Air Pollution Control Equipment - None

Condition
Type

Package Boiler Site Availability

Oil Storage (Existing) Yes X No _____
Natural Gas-Available Yes X No _____

Any local Environmental Regulations other than IDEQ Yes _____ No X

ACCREDITATION STATUS - No generation Full _____ Part-time _____

No. of KW on Grid _____
Operation Hr/yr _____

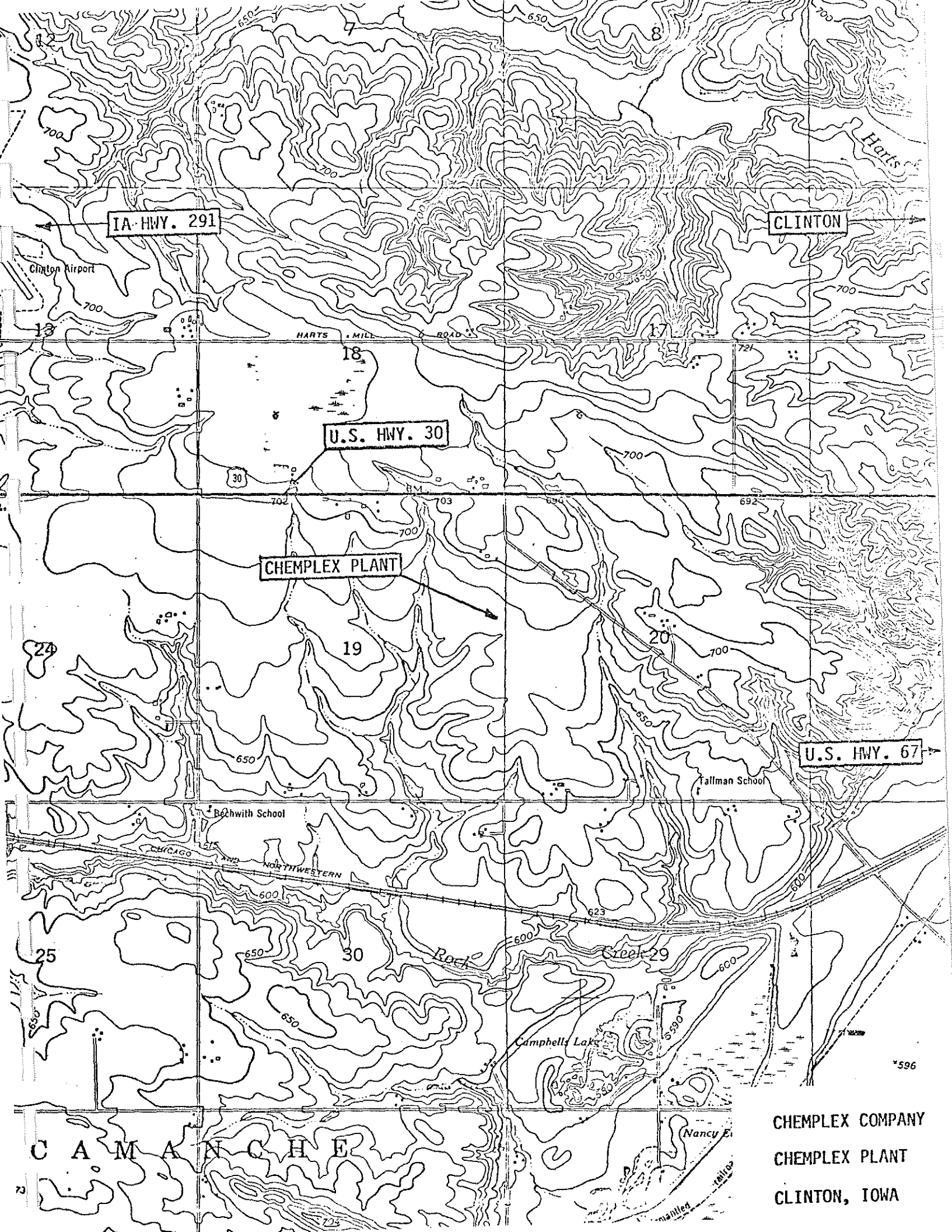
Boiler Checklist cont.

Fuel Cost	Coal	_____	$/Ton
	Oil	_____	$/Gal
	Nat. Gas	_____	$/1000 cu. ft.

Drawing or Sketch - easily reproducable

Conceptualize steam out of building (rough sketch)

Presently steam limited - if a boiler is down, production is down - trying to develop an energy conservation program.


IA-HWY. 291
CLINTON
Clinton Airport
HARTS MILL ROAD
U.S. HWY. 30
CHEMPLEX PLANT
U.S. HWY. 67
Tallman School
Bechwith School
CHICAGO AND NORTHWESTERN
Rock Creek
Campbells Lake
C A M A N C H E
CHEMPLEX COMPANY
CHEMPLEX PLANT
CLINTON, IOWA

IOWA ENERGY POLICY COUNCIL

BOILER CO-UTILIZATION STUDY

BROWN ENGINEERING COMPANY

FIELD INFORMATION SURVEY

Facility Name/Location Chemplex; Clinton

Land Availability

Parcel No.	
Acres	700
Ownership	
Private	Getty Oil and American Can
City	
Industrial Park	
Location	Part of Sec. 19 & 20 T8IN R6E 5th Prin. Merid.
Cost	Ag. Land $4000-5000/ac. Ind. land $10,000-11,000/ac.
Zoning	M-4 Zoning

Feedstock Availability

Storage/Terminal Capacity	
Owner	Agri-Indust.
Location	Fulton, Ill.
Potential Grain Production (Bu.)	
Potential Grain Production Location	
Transportation (Type)(Truck,Ral,Barge)	
To Storage/Terminal	Rail/Barge
Owner	Chic.,Milwaukee, C.N.W. across river
From Storage/Terminal	and Independents
To Ethanol Site	Truck
Owner	Determan Trucking & Fert.

Product/By-Product

Local Ethanol Market	(Name)	
Alcohol Transporters	(Name)	Ruan Alcohol Transport
	(Location)	Clinton
	(Type)	Trucking
	(Exist/Potential Capacity)	
Local D.D.G. Market	(Name)	Clinton Corn Processing
D.D.G. Transporters	(Name)	Clinton Corn Processing
	(Location)	Clinton
	(Type)	
	(Exist/Potential Capacity)	100,000-125,000Bu./day

IOWA ENERGY POLICY COUNCIL

BOILER CO-UTILIZATION STUDY

BROWN ENGINEERING COMPANY

FIELD INFORMATION SURVEY

Facility Name/Location Chemplex; Clinton

Land Availability

- Parcel No.
- Acres
- Ownership
  - Private
  - City
  - Industrial Park
- Location
- Cost
- Zoning

Feedstock Availability

Storage/Terminal Capacity		
Owner	Peavy Barge Terminal	C.F. Sales
Location	2nd St. on Beaver	Munie Dock & Albany Illinois
Potential Grain Production (Bu.)		
Potential Grain Production Location		
Transportation (Type)(Truck,Ral,Barge)		
To Storage/Terminal	All	All
Owner	C.N.W.R.R.;IND.	C.Milw.;C,N.W.;Ind.
From Storage/Terminal		
To Ethanol Site	Truck	Truck
Owner	Determan Trucking and Eastern Iowa Grain and Fert. and Independents	

Product/By-Product

Local Ethanol Market	(Name)	
Alcohol Transporters	(Name)	Determan Trucking
	(Location)	Camanche
	(Type)	Barge?
	(Exist/Potential Capacity)	
Local D.D.G. Market	(Name)	Overseas (no Tarriff)
D.D.G. Transporters	(Name)	
	(Location)	
	(Type)	
	(Exist/Potential Capacity)	

IOWA ENERGY POLICY COUNCIL

BOILER CO-UTILIZATION STUDY

BROWN ENGINEERING COMPANY

FIELD INFORMATION SURVEY

Facility Name/Location Chemplex; Clinton

Land Availability

- Parcel No.
- Acres
- Ownership
  - Private
  - City
  - Industrial Park
- Location
- Cost
- Zoning

Feedstock Availability

Storage/Terminal Capacity	500,000Bu.
Owner	Gulfcoast Grain
Location	Camanche
Potential Grain Production (Bu.)	
Potential Grain Production Location	
Transportation (Type)(Truck,Ral,Barge)	
To Storage/Terminal	All
Owner	
From Storage/Terminal	
To Ethanol Site	Truck
Owner	Determan Trucking and Eastern Iowa Grain and Fert. and Independents

Product/By-Product

Local Ethanol Market	(Name)	
Alcohol Transporters	(Name)	Municipal Facil.
	(Location)	Clinton
	(Type)	Barge
	(Exist/Potential Capacity)	
Local D.D.G. Market	(Name)	
D.D.G. Transporters	(Name)	
	(Location)	
	(Type)	
	(Exist/Potential Capacity)	

Water Availability

Source _____ City _____ Wells XX River _____ None

City Mains
- Location: To 7th Ave and Hwy 30 intersection
- Capacity: 8"-10"
- Future Construction: none anticipated

Wells
- Location: on Chemplex Property
- Capacity
- Aquifer
- Limitations

River
- Intake Location
- Capacity
- Limitations

Gas/Electric Utilities

Gas (Owner): Interstate Power
- Location
- Capacity
- Size
- Limitations: Interruptable Service

Electric (Owner): Interstate Power
- Location
- Capacity
- Size
- Limitations

Wastewater Facilities

Mains
- Location
- Size
- Limitations
- Capacity (c.f.s.)
- Future Extensions: City Mains stop short of Chemplex Property

Wastewater Treatment Plant
- Location
- Size
- Limitations
- Capacity (B.O.D./Gal. per day)
- Future Expansions

Environmental Constraints

Air

- Local Constraints
- Ambient Air Quality Analysis
- Emission Modeling Data (DEQ)
- Available Air Pollution Increments (from DEQ)

Water

- Stream Discharge Limitations — D.E.Q.

County Constraints

Reducing Energy Requirements

Existing Plants/Processes

- Name — Possibly Hawkeye Chem. Co.
- High Temp. Effluent (Preheating)(Gal./Day)
- Make-Up Water Effluent (Gal./Day)
- Cooling Water Effluent (Gal./Day)
- Cooperative Agreements
- Available Additional Energy

Other Applications

- Company Name
- Size — Chemplex is 6 miles from Clinton
- Lcoation — exist. indust. area
- Existing/Needed Capacity
- Product Used
- Product Produced

Miscellaneous Information

Available Area Employment

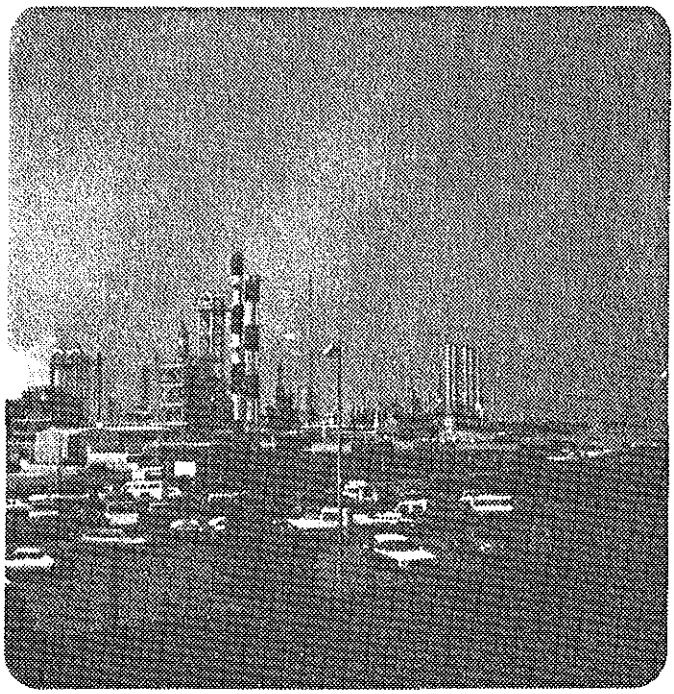
- % Unemployment — 5%
- Potential for Labor Force — Stable Labor Force (2200 avail)

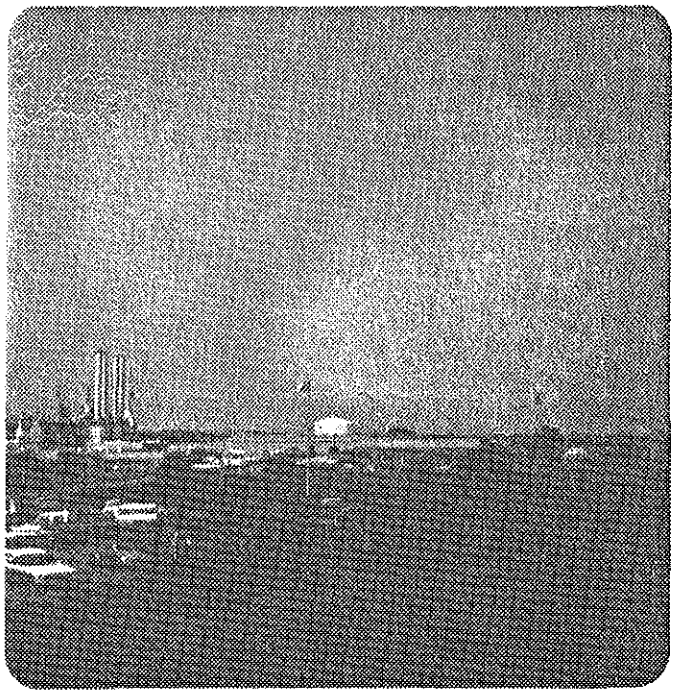
Other Potential Site Data

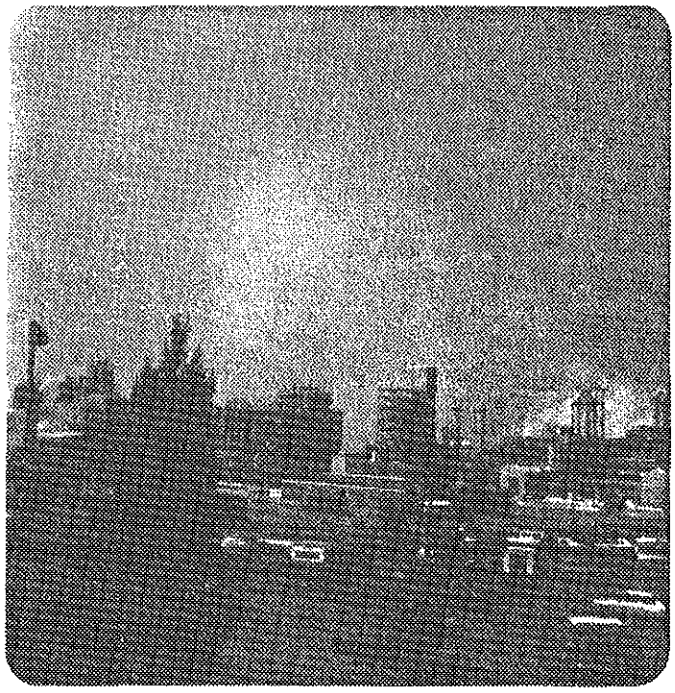
- Local Development Contracts — City contract for utility extensions (2-3mi extension)
- Building Codes/Restrictions — Near Airport/clearances
- Available Area for Backup Systems
  - Boilers
  - Water Treatment
  - Wastewater Treatment Plant
  - Fuel, Etc.

Steam Line Routing to Site

- Local Financing Incentives — Tax Abatement, Ind. Rev. Bonds, Urban Devel. Action Grants







NORTH EAST ELEVATION

CHEMPLEX

Boiler Checklist - Plant Name Muscatine Power and Water, Muscatine, IA

Steam Pressure 650 psig Temp. 700 °F Capacity 210,000 PPH

Boiler Age - Installed #5-1943, #6-1948

Boiler Maintenance	When	Extent	General Condition
Superheater Tubes		Replaced water wall headers	Good
Economizer Tubes			Good
Air Heaters None			----------
Stokers/Burners			Good
Fans	1975	New Fans	Good
B.F.P. -3		May replace 1	Good to Fair
Cooling Tower None			----------
Ash Handling	1973	Rebuilt	Good
Coal Handling		May replace scales	Good to Fair

Combustion Controls New controls to be installed

Condition
Maintenance

Water Treatment - Demineralizers - 1969

Capacity
Condition

Exist. Air Pollution Control Equipment

Condition - Good
Type - Mechanical Collectors installed 1975

Package Boiler Site Availability

Oil Storage (Existing) 200,000 gal (New Plant) Yes X No
Natural Gas-Available Yes X No

Any local Environmental Regulations other than IDEQ Yes No X

ACCREDITATION STATUS Full Part-time X

No. of KW on Grid 22,000 KW
Operation Hr/yr #5-1500, #6-3000

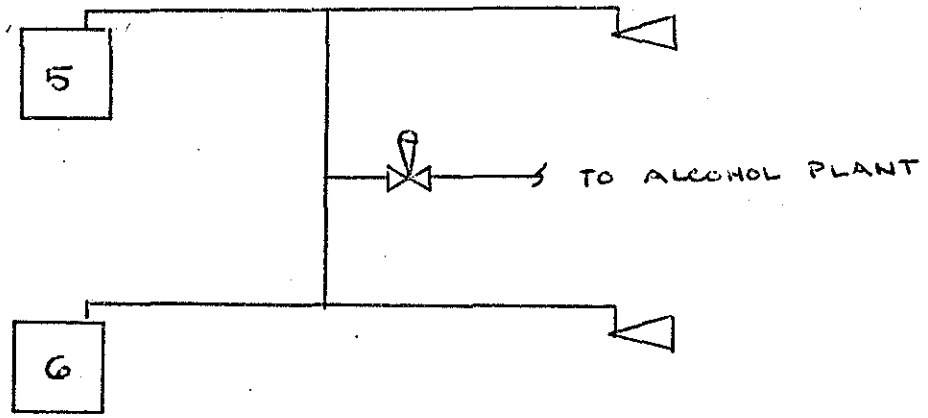
Boiler Checklist cont.

Fuel Cost

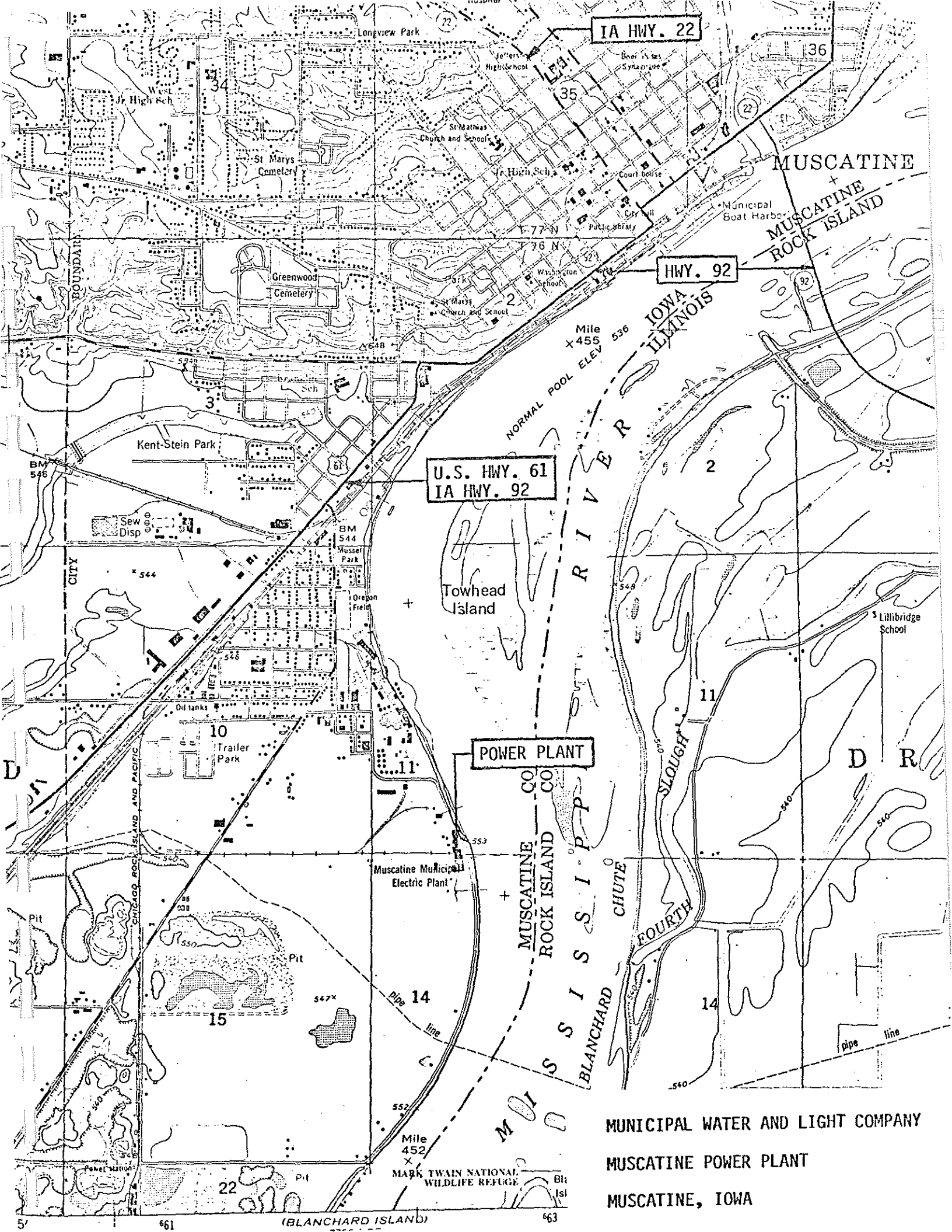
Coal	1.75	$/Ton MBTU
Oil		$/Gal
Nat. Gas	3.15	$/1000 cu. ft. MBTU

Drawing or Sketch - easily reproducable

Conceptualize steam out of building (rough sketch)



Currently negotiating to sell steam from these boilers to nearby grain processor. If contract signed, will have no excess steam. Currently building new plant (650 MW), most electricity sold to other utilities. Boilers 7 and 8 at old plant will then go on stand-by. Steam may be available from these units.



MUNICIPAL WATER AND LIGHT COMPANY

MUSCATINE POWER PLANT

MUSCATINE, IOWA

IOWA ENERGY POLICY COUNCIL

BOILER CO-UTILIZATION STUDY

BROWN ENGINEERING COMPANY

FIELD INFORMATION SURVEY

Facility Name/Location Municipal Water and Light Co. - Muscatine

Land Availability

Parcel No.			
Acres	70	40	100
Ownership			
Private		yes	yes
City			
Industrial Park	Progress Park		
Location	4-5 mi. S.of plant	1 mi. W/plant	Farm
Cost	$6500/ac or less		
Zoning	M-2 Zone		
Restrictions	restrictive covenents		

Feedstock Availability

Storage/Terminal Capacity	
Owner	Agri-Indust.
Location	North of Plant
Potential Grain Production (Bu.)	
Potential Grain Production Location	
Transportation (Type)(Truck,Ral,Barge)	
To Storage/Terminal	All
Owner	Independents/Chic.-Milwaukee
From Storage/Terminal	
To Ethanol Site	Truck/Rail
Owner	Independents/Chicago-Milwaukee R.R.

Product/By-Product

Local Ethanol Market	(Name)	None (possibly Grain Processing)
Alcohol Transporters	(Name)	Garrent Trucking
	(Location)	Muscatine
	(Type)	Truck
	(Exist/Potential Capacity)	
Local D.D.G. Market	(Name)	None
D.D.G. Transporters	(Name)	TeStrake
	(Location)	Green St.
	(Type)	Truck
	(Exist/Potential Capacity)	

IOWA ENERGY POLICY COUNCIL

BOILER CO-UTILIZATION STUDY

BROWN ENGINEERING COMPANY

FIELD INFORMATION SURVEY

Facility Name/Location Municipal Water & Light Co.- Muscatine

Land Availability

- Parcel No.
- Acres
- Ownership
  - Private
  - City
  - Industrial Park
- Location
- Cost
- Zoning

Feedstock Availability

Storage/Terminal Capacity		
Owner	Continental Grain	River Terminal Grp.
Location	116 Spring St.	S.E. of Plant
Potential Grain Production (Bu.)		
Potential Grain Production Location		
Transportation (Type)(Truck,Ral,Barge)		
To Storage/Terminal	All	Barge/Truck
Owner	Indep/Chic.-Milwaukee	Independents
From Storage/Terminal		
To Ethanol Site	Indep/Chic.-Milwaukee	Truck
Owner	Indep/Chic.-Milwaukee	Independents

Product/By-Product

Local Ethanol Market	(Name)	None (possibly Grain processing)	
Alcohol Transporters	(Name)	Daufelt Trucking	Amer. Bulk Tra
	(Location)	Muscatine	Kansas City
	(Type)	Truck	Truck
	(Exist/Potential Capacity)		
Local D.D.G. Market	(Name)		
D.D.G. Transporters	(Name)	Custom Feeds	Grain Proc. Ker Feeds
	(Location)	R.R. 6	1600 Oregon
	(Type)	?	Truck/Rail
	(Exist/Potential Capacity)		

Water Availability

Source ____X____ City ____X____ Wells _____ River

City Mains
- Location: Progress Park
- Capacity: 6"-8" Feeds 30" to City
- Future Construction:

Wells
- Location: in Progress Park
- Capacity:
- Aquifer:
- Limitations: use city water

River
- Intake Location:
- Capacity:
- Limitations:

Gas/Electric Utilities

Gas (Owner)
- Location: Progress Park
- Capacity:
- Size: 8", 4", 2" & Gas Regulator Station in Park
- Limitations: None

Electric (Owner)
- Location: Progress Park
- Capacity:
- Size: 13,800 volt
- Limitations: none

Wastewater Facilities

Mains: None
- Location:
- Size:
- Limitations:
- Capacity (c.f.s.):
- Future Extensions:

Wastewater Treatment Plant
- Location:
- Size:
- Limitations:
- Capacity (B.O.D./Gal. per day):
- Future Expansions:

Environmental Constraints

Air	Previously non-attainment area now unclassified
Local Constraints	
Ambient Air Quality Analysis	
Emission Modeling Data (DEQ)	
Available Air Pollution Increments (from DEQ)	
Water	
Stream Discharge Limitations	D.E.Q.
County Constraints	

Reducing Energy Requirements

Existing Plants/Processes	None
Name	Future Roy Carver Elec. Foundry
High Temp. Effluent (Preheating)(Gal./Day)	
Make-Up Water Effluent (Gal./Day)	
Cooling Water Effluent (Gal./Day)	may sink well for cooling H_2O
Cooperative Agreements	None
Available Additional Energy	

Other Applications

None

Company Name	
Size	
Lcoation	
Existing/Needed Capacity	
Product Used	
Product Produced	

Miscellaneous Information

Available Area Employment	
% Unemployment	4.2%
Potential for Labor Force	Labor force of 800 at Louisa will drop to 75 people.
Other Potential Site Data	
Local Development Contracts	
Building Codes/Restrictions	Possible ht. restriction - airport
Available Area for Backup Systems	yes at Progress Park
Boilers	
Water Treatment	
Wastewater Treatment Plant	
Fuel, Etc.	
Steam Line Routing to Site	
Local Financing Incentives	Industrial Rev. Bonds