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SEVENTH FLOOR
WASHINGTON, D. C. 20036
202-833-9730

October 17, 1977

Frederic J. Coufal, Esquire
Chairman
Atomic Safety and Licensing
Board Panel
U.S. Nuclear Regulatory Comm.
Washington, D.C. 20555

Dr. J. Venn Leeds, Jr., Esq.
10807 Atwell
Houston, Texas 77[illegible]

Dr. Emmeth A. Luebke
Atomic Safety and Licensing
Board Panel
U.S. Nuclear Regulatory Comm.
Washington, D.C. 20555

RE: In the Matter of CONSUMERS POWER COMPANY
(Midland Plant, Units 1 and 2)
Docket Nos. 50-329 and 50-330

Gentlemen:

Consumers Power Company is establishing a system to facilitate the coordination and use of common data within its various areas. Consequently, certain data and assumptions have been adopted for standard reference.

Initial review of the compiled standard reference data disclosed some data and assumptions which may differ to some degree from those related to or bearing upon testimony presented in the Midland suspension hearings. Copies of such data and assumptions are enclosed herewith for your information.

Continuing review is not expected to produce any additional differences.

Very truly yours,

Michael I. Miller

Michael I. Miller

MIM/dh
Enclosures
cc: Service List

G

RELATED CORRESPONDENCE

SERVICE LIST

Atomic Safety and Licensing
Appeal Board
U.S. Nuclear Regulatory Comm.
Washington, D.C. 20555

Mr. C.R. Stephens
Chief, Docketing & Service Section
Office of the Secretary of the Commission
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U.S. Nuclear Regulatory Comm.
Washington, D.C. 20555

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DATA SUMMARY

Page	Line	
1	1, 5, 10	Inflation rate -- future coal costs
2	19	Palisades output -- 1983 capacity (following outage) (Note: data being revised does not include this data)
3	4, 6	Availability (high sulphur)
4	7, 18	Palisades energy output
6	--	Fossil units availability -- system wide
7, 8	--	Fossil units fuel costs -- gas: future
9, 10, 11, 12, 13	--	Fossil units fuel costs -- oil: future
14, 15	9, 8, 12	Midland Plant output -- capacity
16	3	Capability -- Campbell Unit 3 output at 109%
17	25	Alternate plant total leadtime

STANDARD REFERENCE DATA

3. Major Assumptions
1. Economic Rates
b. Escalation Rates

September 1, 1977

B S Coryell 9/1/77
J A Parker

PRICE INDEXES - ESTIMATED ANNUAL RATES OF CHANGE
J T Andrews Memo 8/26/77

	1977 a	1978 b	1979 c	1980-1985 d	1986-1990 e	Avg Cmpd Rate 1977-1990 f
Gross National Product Price Deflator	5.7	5.9	5.8	5.4	4.6	5.2
Consumer Price Index (All Items)	6.6	5.7	5.6	5.4	4.6	5.2
Wholesale Price Index						
All Commodities	6.9	6.6	6.5	5.8	4.6	5.5
Industrial Commodities	7.6	7.9	7.2	6.3	4.8	6.0
Lumber and Wood Products	12.3	3.9	4.5	5.3	3.2	4.9
Pulp, Paper and Allied Products	4.6	6.4	7.3	6.0	3.5	5.1
Metals and Metal Products	7.7	7.6	6.9	6.3	5.0	6.[illegible]
Machinery and Equipment	6.0	5.7	6.4	5.9	5.1	5.[illegible]
Index of Hourly Earnings (Private Non-Farm)	7.1	6.9	7.3	7.2	6.2	6.[illegible]

Listed [above] are estimates in selected price indexes for the period 1977 to 1990. These estimates are meant to update E V Denton's letter of November 9, 1976 regarding projected changes in these indexes for use in escalation.

When using these estimates, if a great amount of detail is not appropriate, I suggest using the Wholesale Price Index for Industrial Commodities for general materials escalation, and the Index of Hourly Earnings for labor cost escalation. Since these indexes are based on national averages, the rate of escalation actually experienced at different localities may vary somewhat.

NOTE: ALL VALUES SHOWN ARE STUDY-RELATED AND MAY VARY FROM THOSE EMPLOYED IN CONSTRUCTION PROJECT CALCULATIONS. (SEE SECTION 4.4.a)

1

STANDARD REFERENCE DATA

4. Electric

2. Generation

a. System Planning Data

July 1, 1977

DALapinski 6/24/77

RCYoungdahl 8/10/77

NOT APPROVED
REVISION IN PROCESS

EXPANSION PLAN - NEW GENERATION

Generation Expansion Plan (EHK)

1977 July; Karn 4 initial start-up.
September; Karn 4 in service; no third party participation.
Purchase 250 MW at AEP Gavin unit over summer period.
Palisades long-term derate 11 MW 1977-80; other annual derates of 71 MW in 1978, 106 MW in 1979, and 141 MW in 1980.

1978 June; Karn 3 uprated; no third party participation.

1980 May; Campbell 3 in service; third party participation of 60 MW.

1981 Palisades out of service.
March; Midland 2 in service; third party participation of 174 MW.
Midland 2 buy back of 60 MW. Cooling towers are added to Karn 1-2 and Weadock 1-8.

1982 Palisades out of service.
March; Midland 1 in service; third party participation of 98 MW; Midland 1 and 2 buy back of 94 MW, 78 MW, 62 MW, 40 MW, 15 MW from 1982 through 1986, respectively.

1983 Palisades restored at 775 MW.
Winter; Ludington return of 159 MW of capacity.
Summer; Morrow 1-2 retired.

1986 Spring; Unassigned 800 MW, low-sulfur coal.

1987 Spring; Unassigned 800 MW, high-sulfur coal.
January 1; Morrow 3-4 retired.
Campbell 2 turbine modifications.

1988 Winter; Ludington return of 159 MW of capacity.

1989 Spring; Unassigned 800 MW, high-sulfur coal.
January 1; Weadock 1-2 retired.

STANDARD REFERENCE DATA

4. Electric
2. Generation
a. System Planning Data

August 1, 1977
Page 8 of 14
D A Lapinski 9/2/77
R C Youngdahl 9/6/77

PLANT SPECIFICATIONS - CONCEPTUAL

Fossil Low Sulfur - 800 MW net output; 9,150 Btu/kWh heat rate (design, net); 80% availability; no scrubber required.

Fossil High Sulfur - 800 MW net output; 9,500 Btu/kWh heat rate (design, net); 80% availability; scrubber required.

Nuclear - 1,150 MW net output; 10,400 Btu/kWh heat rate (design, net); 80% availability.

Note: Design net heat rate is defined as heat input to boiler, divided by kWh output minus station power at turbine-generator nameplate rating - see heat rate curve data for appropriate heat rate at other loadings. Note that the expected annual average heat rate is higher than design heat rate.

STANDARD REFERENCE DATA

4. Electric
2. Generation
1. Nuclear
1. Fuel
k. Nuclear Activities Data

PALISADES FUEL MANAGEMENT PLAN (Contd)

July 6, 1977

WJBeckius
CRBillby
8/12/77

	Fuel Cycles by Year	Reference	9c	10a	10b	11a	11b	11c	g	h	i	j
			a	b	c	d	e	f				
1	Beginning of Cycle or Year		1/1/90	6/15/90	1/1/91	12/14/91	1/1/92	1/1/93				
2	End of Cycle or Year		3/22/90	12/31/90	9/20/91	12/31/91	12/31/92	3/22/93				
3	Days of Operation		81	200	263	18	366	81				
4	Reactor Power Lev . (MW)		2530	2530	2530	2530	2530	2530				
5	Thermal Capacity Factor %		80.0	80.0	80.0	80.0	80.0	80.0				
6	Net Efficiency %		29.5	29.5	29.5	29.5	29.5	29.5				
7	Net Generation (GWh)		1161	2866	3769	258	5245	1161				
8	Core Weight (Metric Ton of Uranium)		78.7	78.7	78.7	78.7	78.7	78.7				
9	Burnup (MWd/MTU)		2083	5144	6764	463	9413	2083				
10												
11												
12												
13												
14												
15												
16												
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(4)

STANDARD REFERENCE DATA

PALISADES FUEL MANAGEMENT PLAN

4. Electric
2. Generation
1. Nuclear
1. Fuel
K. Nuclear Activities Data

July 6, 1977
Page 1 of 19
WJBecklus
CRBillby
8/12/77

	Fuel Cycles by Year	Reference	2a a	2b b	2c c	2d d	3a e	3b f	4a g	4b h	4c i	5a j
1	Beginning of Cycle or Year		5/6/76	1/1/77	9/17/77	1/1/78	4/1/78	1/1/79	9/3/79	1/1/80	1/1/81	3/1/83
2	End of Cycle or Year		12/31/76	9/6/77	12/31/77	1/6/78	12/31/78	6/10/79	12/31/79	12/31/80	2/28/81	12/31/83
3	Days of Operation		240	248	107	6	275	161	120	366	59	306
4	Rated Thermal Power (MW)		2200	2200	2450	2450	2479	2479	2429	2429	2429	2530
5	Thermal Capacity Factor Between Refuelings %		76.0	83.4	80.0	100	77.3	80.0	80.0	80.0	60.0	80.0
6	Net Efficiency %		29.4	29.2	30.1	30.0	29.4	29.5	29.5	29.5	29.5	29.5
7	Net Generation (GWh)		2836	3184	1515	106	3718	2261	1651	5035	609	4385
8	Core Weight (Metric Tons of Uranium)		81.9	81.9	81.9	81.9	80.7	80.7	80.2	80.2	80.2	78.7
9	Burnup (MWd/MTU)		4900	5556	2561	179	6530	3957	2908	8868	1072	7870
10												
11	Fuel Cycles by Year		5b	6a	6b	7a	7b	7c	8a	8b	9a	9b
12	Beginning of Cycle or Year		1/1/84	6/15/84	1/1/85	12/14/85	1/1/86	1/1/87	6/15/87	1/1/88	12/14/88	1/1/89
13	End of Cycle or Year		3/22/84	12/31/84	9/20/85	12/31/85	12/31/86	3/22/87	12/31/87	9/20/88	12/31/88	12/31/89
14	Days of Operation		82	200	263	18	365	81	200	264	18	365
15	Rated Thermal Power (MW)		2530	2530	2530	2530	2530	2530	2530	2530	2530	2530
16	Thermal Capacity Factor %		80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
17	Net Efficiency %		29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5
18	Net Generation (GWh)		1175	2866	3769	258	5230	1161	2866	3783	258	5230
19	Core Weight (Metric Tons of Uranium)		78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
20	Burnup (MWd/MTU)		2109	5144	6764	463	9387	2083	5144	6790	463	9387
21												
22												
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5

STANDARD REFERENCE DATA

4 Electric
2 Generation
2 Fossil
a Unit Availability Projections

July 1, 1977
77-11 Page 2 of 5
K E Spencer 4/1/77
C R Bilby 8/12/77

FOSSIL GENERATING UNIT AVAILABILITY PROJECTIONS (%)

	Generating Units	Reference	1977 a	1978 b	1979 c	1980 d	1981 e	1982 f	1983 g	1984 h	1985 i	1986 j
1	Campbell 1		80.3	80.3	73.6	80.3	80.3	80.3	80.3	73.6	80.3	80.3
2	Campbell 2		75.2	74.2	76.4	76.4	63.7	76.4	76.4	76.4	76.4	63.7
3	Campbell 3		-	-	-	70.0	65.0	80.0	80.0	80.0	80.0	70.0
4	Cobb 1 through 3		82.1	82.1	82.1	82.1	82.1	82.1	82.1	82.1	82.1	82.1
5	Cobb 4		83.5	63.0	84.3	84.3	84.3	77.3	84.3	84.3	84.3	84.3
6	Cobb 5		80.5	73.8	82.7	82.7	82.7	82.7	75.8	82.7	82.7	82.7
7	Karn 1		70.	73.2	73.2	67.1	73.2	73.2	73.2	73.2	67.1	73.2
8	Karn 2		79.6	86.1	89.7	89.7	78.9	89.7	89.7	89.7	89.7	78.9
9	Karn 3		77.2	61.9	78.8	72.3	78.8	69.0	78.8	78.8	78.8	78.8
10	Karn 4		65.0	80.0	70.0	80.0	85.0	85.0	74.4	85.0	85.0	85.0
11	Morrow 1 through 4		78.2	79.3	79.3	79.3	79.3	79.3	79.3	79.3	79.3	79.3
12	Weadock 1 through 6		71.3	71.9	71.9	71.9	71.9	71.9	71.9	71.9	71.9	71.9
13	Weadock 7		66.0	68.4	76.8	76.8	76.8	76.8	70.4	76.8	76.8	76.8
14	Weadock 8		62.6	71.3	79.5	72.9	79.5	79.5	79.5	79.5	72.9	79.5
15	Whiting 1		88.5	88.5	81.2	88.9	88.9	88.9	88.9	81.8	88.9	88.9
16	Whiting 2		87.3	73.3	88.7	81 6	88.7	88.7	81.6	88.7	88.7	81.6
17	Whiting 3		75.0	82.1	69.5	82.7	82.7	82.7	82.7	76.1	82.7	82.7
18	Average (Fossil Plant)		75.9	74.8	77.2	76.6	6.6	79.1	78.6	79.8	80.0	77.3
19												
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(6)

STANDARD REFERENCE DATA

4. Electric
2. Generation
2. Fossil
1. Fuel
m. Gas Fuel Costs

July 1, 1977

EJSnider 7/6/77
JEVanReenen 8/9/77

		Reference	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct
			a	b	c	d	e	f	g	h	i	j
1	1977 Rate C (F.C.) ¢/mcF		-	-	-	-	-	230.6	220.4	225.9	226.5	221.7
2												
3	1978 Rate C (F.C.) ¢/mcF		193.2	195.3	194.4	201.7	207.2	207.9	207.2	210.9	211.2	205.6
4												
5												
6												
7	Note: Costs shown are for month indicated. Billing month would be delayed one month.											
8												
9												
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(7)

STANDARD REFERENCE DATA

4. Electric
2. Generation
2. Fossil
1. Fuel
F. Gas Fuel Costs

July 1, 1977

EJSolder
JEVanReenen 8/9/77

		Reference	Nov a	Dec b	c	d	e	f	g	h	i	j
1	1977 Rate C (F.C.) ¢/mcF		212.8	208.2								
2												
3	1978 Rate C (F.C.) ¢/mcF		203.3	198.6								
4												
5												
6												
7	Note: Costs shown are for month indicated. Billing month would be delayed one month.											
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(8)

STANDARD REFERENCE DATA

4. Electric
2. Generation
2. Fossil
1. Fuel
n. Oil Fuel Costs - 1977

July 1, 1977

EJSnider
JEVanReenen 8/9/77

		Reference	Jan a	Feb b	Mar c	Apr d	May e	June f	July g	Aug h	Sept i	Oct j
1	Morrow Plant Boilers ¢/gal		-	-	-	-	-	-	33.00	32.00	33.00	33.00
2												
3	Weadock 1-6 ¢/gal		-	-	-	-	-	-	37.07	37.33	37.40	37.47
4												
5	Karn 3-4 ¢/gal		-	-	-	-	-	-	37.07	37.33	37.40	40.97
6												
7	Campbell Peaker ¢/gal		-	-	-	-	-	-	40.50	40.50	41.00	41.50
8												
9	Whiting Peaker ¢/gal		-	-	-	-	-	-	40.50	40.50	41.00	41.50
10												
11	Thetford 5-9 ¢/gal		-	-	-	-	-	-	37.50	37.50	37.00	37.00
12												
13	Gaylord ¢/gal		-	-	-	-	-	-	39.50	39.50	39.00	39.00
14												
15												
16												
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9

STANDARD REFERENCE DATA

4. Electric
2. Generation
2. Fossil
1. Fuel
n. Oil Fuel Cost - 1977 (Cont'd)

July 1, 1977
Page 2 of 4
EJSnider 7/6/77
JEVanReenen 8/9/77

			Reference	Nov	Dec	c	d	e	f	g	h	i	j
				a	b								
1	Morrow Plant Boilers	¢/gal		34.00	34.50								
2													
3	Woodock 1-6	¢/gal		37.50	37.50								
4													
5	Karn 3-4	¢/gal		40.91	40.42								
6													
7	Campbell Peaker	¢/gal		42.00	42.50								
8													
9	Whiting Peaker	¢/gal		42.00	42.50								
10													
11	Thetford 5-9	¢/gal		37.50	38.25								
12													
13	Gaylord	¢/gal		39.50	40.25								
14													
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(10)

STANDARD REFERENCE DATA

4. Electric
2. Generation
2. Fossil
1. Fuel
n. Oil Fuel Cost - 1978

July 1, 1977
Page 3 of 4
EJSnider 7/6/77
JEVanReenen 8/9/77

			Reference	Jan a	Feb b	Mar c	Apr d	May e	June f	July g	Aug h	Sept i	Oct j
1	Morrow Plant Boilers	¢/gal		36.30	39.05	39.60	39.60	39.60	37.95	36.30	36.30	36.30	36.30
2													
3	Weadock 1-6	¢/gal		38.47	38.99	39.47	39.69	39.70	39.70	40.72	41.00	41.10	41.15
4													
5	Karn 3-4	¢/gal		41.65	41.25	41.70	42.51	42.48	42.31	43.78	44.08	44.00	43.89
6													
7	Campbell Peaker	¢/gal		43.00	43.50	44.00	44.00	44.55	44.55	44.55	45.00	45.50	46.00
8													
9	Whiting Peaker	¢/gal		43.00	43.50	44.00	44.00	44.55	44.55	44.55	45.00	45.50	46.00
10													
11	Thetford 5-9	¢/gal		39.33	42.08	42.08	41.53	41.25	41.53	41.25	41.25	40.70	40.70
12													
13	Gaylord	¢/gal		41.33	44.08	44.08	43.53	43.25	43.53	43.25	43.25	42.70	42.70
14													
15													
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11

STANDARD REFERENCE DATA

4. Electric
2. Generation
2. Fossil
1. Fuel
a. Oil Fuel Cost - 1978 (Cont'd)

July 1, 1977
Page 4 of 4
EJSnider 7/6/77
JEVanReenen 8/9/77

		Reference	Nov	Dec	c	d	e	f	g	h	i	j
			a	b								
Morrow Plant Boilers	¢/gal		37.40	37.95								
Weadock 1-6	¢/gal		41.17	41.19								
Karn 3-4	¢/gal		44.13	44.06								
Campbell Peaker	¢/gal		47.00	48.00								
Whiting Peaker	¢/gal		47.00	48.00								
Thetford 5-9	¢/gal		41.25	42.08								
Gaylord	¢/gal		43.25	44.08								

(12)

STANDARD REFERENCE DATA

4. Electric
2. Generation
2. Fossil
1. Fuel
0. Oil Fuel Cost

September 1, 1977

EJSnider 9/2/77
RJOdlevak 9/7/77

PROJECTED OIL FUEL COST
($/MMBtu)

		1979 a	1980 b	1981 c	1982 d	1983 e	1984 f	1985 g	1986 h	1987 i	1988 j	1989 k	1990 l
1	Morrow Boilers	3.27	3.95	4.12	4.54	4.72	4.91	5.10	5.31	5.52	5.74	5.97	6.21
2													
3	Campbell & Whiting Peakers	3.86	4.59	4.77	5.21	5.40	5.61	5.82	6.04	6.27	6.51	6.76	7.02
4													
5	Morrow, Weadock, Essexville	3.56	4.29	4.47	4.91	5.10	5.31	5.52	5.74	5.97	6.21	6.46	6.72
6	Thetford & Gaylord Peakers												
7													
8													
9													

		1991 m	n
10			
11	Morrow Boilers	6.46	4% per Year Thereafter
12			
13	Campbel' & Whiting Peakers	7.30	4% per Year Thereafter
14			
15	Morrow, Weadock, Essexville	7.00	4% per Year Thereafter
16	Thetford & Gaylord Peakers		
17			
18			
19			
20	NOTE: Values In 1977 Dollars		
21			
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13

STANDARD REFERENCE DATA

(7)

4. Electric
4. Construction
1. Nuclear
2. New Plant
a. Authorized

September 1, 1977

J J Murphy 9/16/77
S H Howell 9/16/77

1. Capital Cost - Midland
   Total - $1,670,000,000
   Estimated Electric Portion - $1,283,000,000
   Cost Per Kilowatt - $946/kW (Gross Nameplate Basis)
2. Gross Nameplate Rating* - Midland
   A. At 4.05 x 10^6 lbs/hr of steam to Dow
      Unit 1 - 504MWe
      Unit 2 - 852MWe
   B. At Other Steam Rates
      See 4.4.1.2.a.P2
3. Schedule - Midland

	Initial Operation	Commercial Operation
Unit 1	November 1, 1981	March 1, 1982
Unit 2	November 1, 1980	March 1, 1981

4. Dow Steam From Midland
   A. Design - 3,650,000 lbs/hr of 175 psig (low pressure steam)
      400,000 lbs/hr of 600 psig (high pressure steam)
      Reserved - 2,400,000 lbs/hr of 175 psig
      400,000 lbs/hr of 600 psig
5. Net Electric - Midland
   Various Generating Modes - See 4.4.1.2.a.P2
6. Heat Rates - Midland
   See 4.4.1.2.a.P2
7. Plant Specifications
   By Request
8. Escalation Rates
   By Request

* A decision has been made to use the gross nameplate rating (manufacturer's guaranteed gross capability of the limiting piece of equipment) in reports, publications and statistical data related to new electric generating plants under construction.

STANDARD REFERENCE DATA

4. Electric
4. Construction
1. Nuclear
2. New Plant
a. Authorized

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Midland Units 1 & 2
Heat Rates & Outputs
At Indicated Steam Flows

		Reference	a	b	c	d	e	f	g
1	Core Thermal Power (MWt)		2,452	2,428	2,388	1,464	2,452	2,452	2,452
2	Pumping Power (MWt)		16	16	16	16	16	16	16
3	NSSS Thermal Power (MWt)		**2,468	2,444	2,404	**1,480	**2,468	2,468	2,468
4	Net Core Heat Rate (BTU/kW-hr)		8,313	9,665	9,972	11,406	10,386	10,976	10,454
5	Net Turbine Heat Rate (BTU/kW-hr)		8,432	9,768	10,072	11,531	10,454	11,131	10,563
6	Unit 1 Gross (MWe)		**504	578	592	**480	-	-	-
7	Unit 1 Aux Load (MWe)		48	47	47	42	-	-	-
8	Unit 1 Net (MWe)		456	531	545	438	-	-	-
9	Unit 1 Transf Losses (MWe)		2	2.2	2.2	2.2	-	-	-
10	Unit 2 Gross (MWe)		-	-	-	-	**852	399	549
11	Unit 2 Aux Loads (MWe)		-	--	-	-	46	48	47
12	Unit 2 Net (MWe)		-	-	-	-	806	351	502
13	Unit 2 Transf Losses (MWe)		-	-	-	-	2.5	2	2.2
*14	Power Only HR (BTU/kW-hr)		10,386	10,386	10,386	-	-	-	
15									

a = 3,650,000 lb/hr of 175 and 400,000 lb/hr of 600 psig from Unit 1
b = 2,400,000 lb/hr of 175 psig and 400,000 lb/hr of 600 psig from Unit 1
c = 2,000,000 lb/hr of 175 psig and 400,000 lb/hr of 600 psig from Unit 1
d = Zero process steam from Unit 1
e = Unit 2 at rated electrical output
f = 3,650,000 lb/hr of 175 psig and 400,000 lb/hr of 600 psig from Unit 2
g = 2,400,000 lb/hr of 175 psig and 400,000 lb/hr of 600 psig from Unit 2

16 *Note: In computing electrical costs in mills/kWh from Unit 1 to the electrical customer, there is a fuel savings
17 credit given to Dow when Unit 1 T/G is supplying steam to Dow. To calculate the mills/kW-hr, the Unit 1
18 Fuel Costs in ¢/MBtu have to be multiplied by the power only HR.
19
20 By letter of 11/7/74 Dow has reserved 2,400,000 lb/hr 175 psig and 400,000 lb/hr 600 psig.
21
22 ** Gross Electrical Generation and NSSS Thermal Power from GE supplied heat balances.
23
24
25
26
27
28

(15)

STANDARD REFERENCE DATA

4. Electric
4. Construction
2. Fossil
2. New Plant
a. Authorized

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J J Murphy 6/24/77
S H Howell 9/16/77

CAMPBELL 3

TURBINE GENERATOR CAPABILITY
BY % OF NAMEPLATE CAPABILITY

	CAMPBELL 3	Reference	25%	40%	60%	80%	100%	109%
1	Gros Generator Output: (MW)		192.5	308.0	462.0	616.0	770.0	836.0
2	Auxiliary Power: (MW)		22.5	25.5	30.5	36.0	41.6	44.7
3	Net Output: (MW)		170.0	282.5	431.5	580.0	728.4	791.3
4	Auxiliary Power Consumption:		11.69%	8.28%	6.60%	5.84%	5.40%	5.35%
5	Boiler Efficiency:		91.24%	91.24%	90.94%	90.40%	89.69%	89.12%
6	Heat Rates:							
7	Turbine Room Gross HR: (BTU/KW-HR.)		9,111	8,365	7,931	7,783	7,757	7,751
8	Turbine Room Net HR: (BTU/KW-HR.)		10,317	9,120	8,491	8,266	8,200	8,189
9	Unit Net Heat Rate (HR): (BTU/KW-HR.)		11,308	9,996	9,337	9,144	9,143	9,189
10								

Notes: 1. The boiler efficiencies listed above are based upon firing Coal No. 2, reference Steam Generator Contract, and are calculated to reflect excess combustion air and air heater leakage quantities which exceed those listed by FWEC in their contract documents which reflect optimistic operation of the unit.

2. Turbine Room Gross Heat Rates from General Electric Heat Balances 562-443-HB: 940,941 and 995 through 998.

3. Turbine Room Net Heat Rate = $\frac{\text{Turbine Room Gross Heat Rate}}{1.0 - \text{Auxiliary Power Consumption}}$

4. Unit Net Heat Rate = Turbine Room Net Heat Rate = $\frac{\text{Turbine Room Net Heat Rate}}{\text{Boiler Efficiency}}$

5. 109% of nameplate capability is equivalent to turbine generator output at valves wide open and 5% over pressure.

Note: These parameters are based on once-through cooling and deep jet discharge.

16

STANDARD REFERENCE DATA

4. Electric	July 1, 1977
4. Construction	Page 5 of 6
2. Fossil	JJMurphy 6/24/77
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b. Future	

The lead times to be used for planning purposes for new fossil (coal fired) plants are shown below. The lead times are based on a nominal 800 MWe coal fired unit similar to Campbell 3. The lead times indicated assume a "designated site" has been selected in accordance with the Site Selection Process (Reference Standard Reference Data 4.2.2.X). The calendar time required to complete this process must be considered when using these lead times for planning future generating capacity.

A. Preconstruction Period - 48 months (4 years)
   Includes -
   (1) Environmental site work and conceptual engineering studies.
   (2) Environmental analyses, ER preparation and detailed engineering studies.
   (3) EIS preparation and approval, permit application and processing, T/G and S/G award, detailed engineering design and public hearings.

B. Construction Period - 52 months (4 years-4 months)
   Includes -
   (1) Plant construction.
   (2) Start-up testing up to commercial operation.

C. Total Lead Time - 100 months (8 years-4 months)

The attached chart diagrams the major activities, their durations and relationships from the time a primary site is designated until commercial operation.