



Missouri Public Service Commission

Area Code 314
751-3234

P.O. BOX 360
JEFFERSON CITY
MISSOURI 65102

June 21, 1983

Mr. Harvey G. Hubbs
Secretary
Missouri Public Service Commission
P.O. Box 360
Jefferson City, Missouri 65102

Re: Case No. ER-83-40

Dear Mr. Hubbs:

Attached you will find the original and fourteen (14) conformed copies of the affidavit of Hossein A. Novin and the Staff's recommendations on commercial operation of Jeffrey Energy Center Unit No. 3. This document contains the Staff's recommendation that Jeffrey Energy Center Unit No. 3 be considered fully operational and used for service as of 12:01 a.m., May 27, 1983.

The Staff requests that the attached be included as a late-filed exhibit in Case No. ER-83-40. The remainder of the true-up information and reconciliation will be filed with the Commission later in the week.

A copy of this letter and the enclosure are being provided to all parties of record, as well as Hearing Examiner Paul DeFord. Thank you for your attention to this matter.

Sincerely yours,

Mary Ann Garr

Mary Ann Garr
Assistant General Counsel

MAG:nsh

enclosure

cc: W. R. England, III
Mr. Jack Baker
Richard French, Assistant Public Counsel



OFFICIAL CASE FILE
MISSOURI PUBLIC SERVICE COMMISSION

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the matter of Missouri Public)
Service Company of Kansas City,)
Missouri, for authority to file)
tariffs increasing electric rates)
for service provided to customers)
in the Missouri service area for the)
Company.)

Case No. ER-83-40

AFFIDAVIT OF HOSSEIN A. NOVIN

STATE OF MISSOURI)
COUNTY OF COLE) ss

Hossein A. Novin, of lawful age, on his oath states: that he has participated in the preparation of the attached report entitled "Jeffrey Energy Center Unit No. 3 Staff Recommendation on Commercial Operation", consisting of 21 pages of text and figures, to be presented in the above case; that the recommendations in the attached report were given by him; that the matters contained herein are true to the best of his knowledge and belief.

Hossein A. Novin

Subscribed and sworn to before me this 20th day of June, 1983.

Judy Fritsch

JUDY FRITSCH

NOTARY PUBLIC STATE OF MISSOURI

COLE CO

My Commission expires

MY COMMISSION EXPIRES JULY 31 1983

FILED
JUN 21 1983
PUBLIC SERVICE
COMMISSION

JEFFREY ENERGY CENTER

UNIT NO. 3

STAFF RECOMMENDATIONS ON COMMERCIAL OPERATION

OFFICIAL CASE FILE
MISSOURI PUBLIC SERVICE COMMISSION

MISSOURI PUBLIC SERVICE COMPANY

CASE No. ER-83-40

HOSSEIN A. NOVIN

GENERATING FACILITIES DEPARTMENT
MISSOURI PUBLIC SERVICE COMMISSION

JUNE, 1983

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UNIT IDENTIFICATION

Station: Jeffrey Energy Center

Unit: Unit No. 3

Location: Approximately 7 miles north of St. Mary's Kansas

Owners: Missouri Public Service Company (8%)
Kansas Power & Light Company (64%)
Kansas Gas & Electric Company (20%)
Central Telephone & Utility Corp. (8%)

Operator: Kansas Power & Light Company

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Central Telephone & Utility Corp. (8%)

Operator: Kansas Power & Light Company

DESIGN SPECIFICATIONS

STEAM TURBINE

Name plate rating - 680.936 MW
Speed - 3600 rpm
Initial Pressure - 2400 psig
Exhaust Pressure - 3.0 inches Hg. ABS.
Initial Temperature - 1000° F
Reheat Temperature - 1000° F
Serial No. - 11-7182

AC GENERATOR

Rating - 800,000 kVA
Power Factor - 0.90
Voltage - 26 kV
Serial No. - 12-7182

STEAM GENERATOR

At control load:

Primary steam - 2.74 million pounds per hour
Reheat steam - 2.59 million pounds per hour
Super heater steam temperature - 1,005° F
Reheater steam temperature - 1,005° F
Fuel fired - Pulverized bituminous coal 500,000 pounds per hour
HHV = 8,125 BTU per pound

GENERAL

First year projected capacity factor is 57%.

STARTUP HISTORY

Startup is the time period required to bring the steam-electric generating unit from an inactive condition, to the state ready for commercial operation. The startup period includes inspection and checkout of equipment and supporting subsystems; trial, test, initial operation and placing in service of supporting equipment and subsystems; initial operation of the complete steam-electric generating unit; operation of the complete unit to obtain data, perform calibration and corrective work; shutdown, inspection and adjustment prior to obtaining commercial operating status.

The unit was first synchronized to the electrical grid on March 3, 1983 at 3:56 p.m. The average daily power output history is shown on Figure 1.

Performance tests were conducted during the unit startup to ensure that components and systems operate as designed. The performance tests that are required prior to commercial operation were evaluated as a part of the Criterion 5 review.

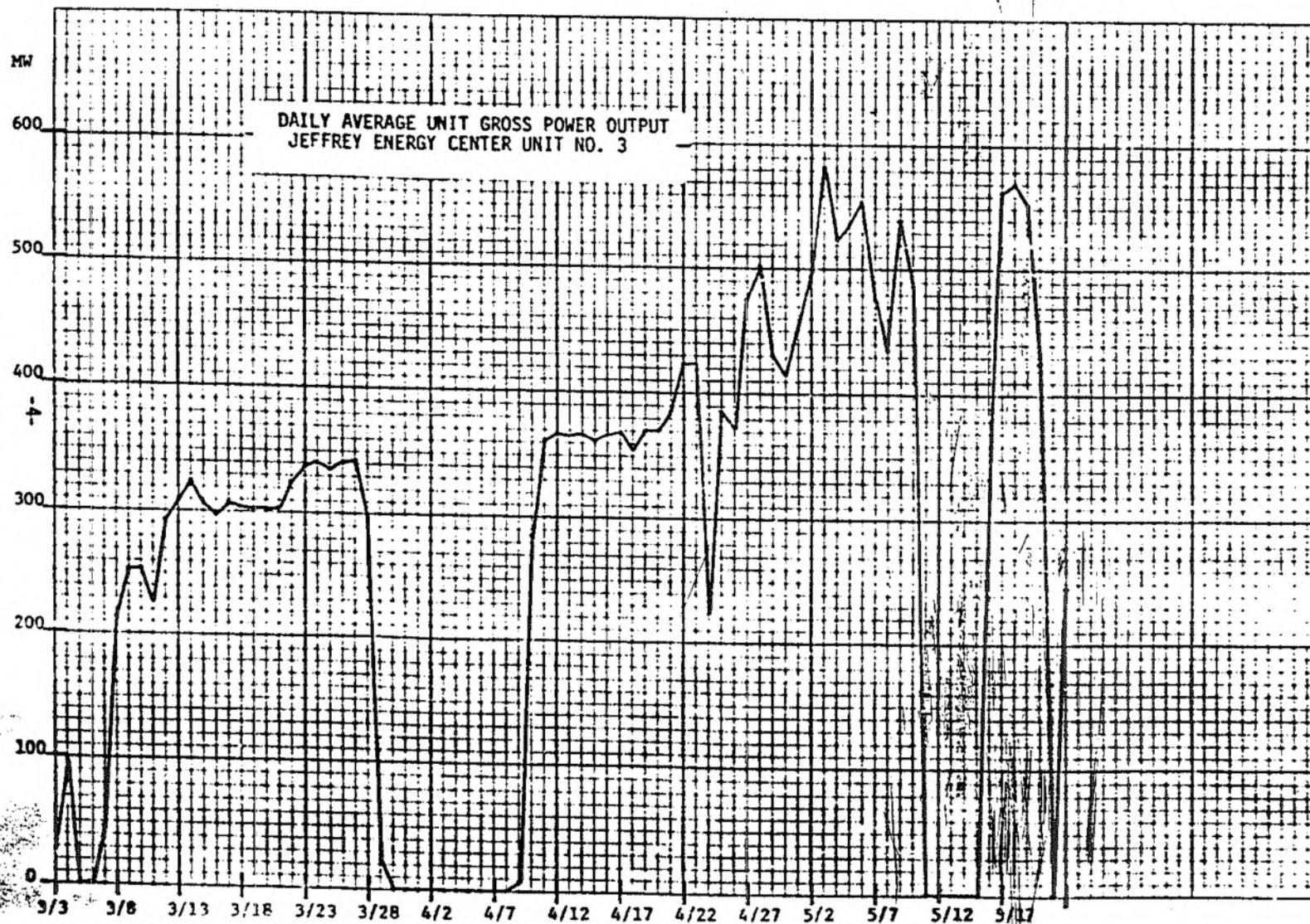


FIGURE 1

STAFF CRITERIA

The criteria used to evaluate the commercial operation date are shown on page 6.

The evaluation of the Jeffrey Energy Center Unit No. 3 startup based on a comparison with the requirements of each criterion begins on page 8.

JEFFREY ENERGY CENTER UNIT NO. 3

STAFF CRITERIA FOR DETERMINING THE OPERATIONAL
STATUS OF NEW COAL-FIRED ELECTRIC POWER PLANTS

1. A UNIT MUST DEMONSTRATE THAT IT CAN OPERATE AT ITS DESIGN MINIMUM POWER OR ABOVE.

This requirement is fulfilled if any 400 continuous hours of operation result in the satisfying of the following equation

$$\frac{\text{hours at design minimum power or above}}{400 \text{ hours}} \geq 0.8$$

2. A UNIT MUST BE ABLE TO OPERATE AT OR ABOVE ITS DESIGN CAPACITY FACTOR FOR A REASONABLE PERIOD OF TIME.

This criterion will be satisfied if:

$$\text{design capacity factor} \leq \frac{\text{energy generated in a continuous 168 hour period (MWhe)}}{\text{name plate rating (MWe) x 168 hours}}$$

If the design capacity factor is not specified it will be assumed to be 0.6 unless the utility can offer evidence justifying a lower value.

Name plate rating is the full-load continuous rating of a generator, prime mover or other electrical equipment under specified conditions as designated by the manufacturer. It is usually indicated on a name plate attached mechanically to the individual machine or device. The name plate rating of a steam electric turbine-generator set is the guaranteed continuous output in kilowatts or kVA* and power factor at generator terminals when the turbine is clean and operating under specified throttle steam pressure and temperature, specified reheat temperature, specified exhaust pressure, and with full extraction from all extraction openings.

3. A UNIT MUST OPERATE AT A CAPACITY EQUAL TO 95% OF ITS NAME PLATE RATING FOR 4 HOURS.
4. A UNIT MUST BE OPERATED SO AS TO SHOW A CLEAR AND OBVIOUS TREND TOWARD THE PREDOMINATE USE OF COAL AS ITS PRIMARY FUEL.

The test period will be 30 days.

*kVA = Kilovolt Ampere

5. A UNIT MUST HAVE FINISHED THE STARTUP TEST PROGRAM WITH ALL STARTUP TEST PROCEDURES NECESSARY FOR OPERATION SATISFACTORILY COMPLETED.
6. SUFFICIENT TRANSMISSION FACILITIES SHALL EXIST TO CARRY THE TOTAL DESIGN NET ELECTRICAL CAPACITY FROM THE COMPLETED GENERATING STATION INTO THE SYSTEM AT THE TIME THE NEWEST UNIT IS DECLARED FULLY OPERATIONAL AND USED FOR SERVICE.

CRITERION NO. 1

A UNIT MUST DEMONSTRATE THAT IT CAN OPERATE AT ITS DESIGN MINIMUM POWER OR ABOVE.

This requirement is fulfilled if any 400 continuous hours of operation result in the satisfying of the following equation.

$$\frac{\text{hours at design minimum power or above}}{400 \text{ hours}} \geq 0.8$$

Discussion

Calculations are based on a 400-hour period beginning at 0001 hours on April 13, 1983. Design minimum power = 300 MW

Date	Hours ≥ 300 MWe ¹	Hours < 300 MWe ¹	Station Demand Gross MWe ²	
			Maximum	Minimum
4/13	24	0	372	357
4/14	24	0	375	362
4/15	23	1	378	299
4/16	24	0	372	356
4/17	24	0	373	365
4/18	23	1	371	283
4/19	24	0	377	365
4/20	24	0	381	362
4/21	24	0	427	360
4/22	24	0	435	403
4/23	24	0	433	423
4/24*	9	14	432	-
4/25	21	3	451	292
4/26	24	0	382	367
4/27	24	0	526	368
4/28	24	0	525	467
4/29	24	0	499	400
TOTAL	388	19		

Data Sources:

1. Jeffrey Energy Center Unit No. 3 Periodic Log
2. Jeffrey Energy Center Unit No. 3 Production Report

$$\frac{\text{hours at design minimum power or above}}{400 \text{ hours}} = \frac{388 \text{ hours}}{400 \text{ hours}} = 0.9700$$

Therefore, Criterion No. 1 has been satisfied.

*Daylight Saving Time

CRITERION NO. 2

A UNIT MUST BE ABLE TO OPERATE AT OR ABOVE ITS DESIGN CAPACITY FACTOR FOR A REASONABLE PERIOD OF TIME.

This criterion will be satisfied if:

$$\text{design capacity factor} \leq \frac{\text{energy generated in a continuous 168 hour period (MWhe)}}{\text{name plate rating (MWe) x 168 hours}}$$

If the design capacity factor is not specified it will be assumed to be 0.6 unless the utility can offer evidence justifying a lower value.

Name plate rating is the full-load continuous rating of a generator, prime mover or other electrical equipment under specified conditions as designated by the manufacturer. It is usually indicated on a name plate attached mechanically to the individual machine or device. The name plate rating of a steam electric turbine-generator set is the guaranteed continuous output in kilowatts or kVA and power factor at generator terminals when the turbine is clean and operating under specified throttle steam pressure and temperature, specified reheat temperature, specified exhaust pressure, and with full extraction from all extraction openings.

Discussion

Calculations are based on a 168-hour period beginning May 2, 1983 at 0001 hours. Design capacity factor = 0.57¹

<u>Date</u>	<u>Energy Generated (MWhe)</u>
5/2	11,893
5/3	13,952
5/4	12,639
5/5	12,929
5/6	13,318
5/7	11,382
5/8	10,463
TOTAL	86,576

$$\frac{\text{energy generated in 168 hours}}{(\text{name plate rating}) \times (168 \text{ hours})} = \frac{86,576 \text{ MWhe}}{(680.9 \text{ MWe})(168 \text{ hours})} = 0.76$$

Since 0.76 is greater than the design capacity factor of 0.57, Criterion No. 2 has been satisfied.

Data Sources:

1. Company's first year projected capacity factor
2. Jeffrey Energy Center Unit No. 3 Production Report

CRITERION NO. 2

A UNIT MUST BE ABLE TO OPERATE AT OR ABOVE ITS DESIGN CAPACITY FACTOR FOR A REASONABLE PERIOD OF TIME.

This criterion will be satisfied if:

$$\text{design capacity factor} \leq \frac{\text{energy generated in a continuous 168 hour period (MWe)}}{\text{name plate rating (MWe)} \times 168 \text{ hours}}$$

If the design capacity factor is not specified it will be assumed to be 0.6 unless the utility can offer evidence justifying a lower value.

Name plate rating is the full-load continuous rating of a generator, prime mover or other electrical equipment under specified conditions as designated by the manufacturer. It is usually indicated on a name plate attached mechanically to the individual machine or device. The name plate rating of a steam electric turbine-generator set is the guaranteed continuous output in kilowatts or kVA and power factor at generator terminals when the turbine is clean and operating under specified throttle steam pressure and temperature, specified reheat temperature, specified exhaust pressure, and with full extraction from all extraction openings.

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TOTAL	86,576

$$\frac{\text{energy generated in 168 hours}}{(\text{name plate rating}) \times (168 \text{ hours})} = \frac{86,576 \text{ MWe}}{(680.9 \text{ MWe})(168 \text{ hours})} = 0.76$$

Since 0.76 is greater than the design capacity factor of 0.57, Criterion No. 2 has been satisfied.

Data Sources:

1. Company's first year projected capacity factor
2. Jaffrey Energy Center Unit No. 3 Production Report

CRITERION NO. 3

A UNIT MUST OPERATE AT A CAPACITY EQUAL TO 95% OF ITS NAME PLATE RATING FOR 4 HOURS.

Discussion

The name plate rating of the turbine-generator is 680.936 MWe.

Capacity required is $(0.95) \times (680.936 \text{ MWe}) = 646.9 \text{ MWe}$

DATE: May 9, 1983

<u>Time (Hours)</u>	<u>Unit 3 Gross $\geq 647 \text{ MWe}^1$ (MWe)</u>	<u>Time Period (Hours)</u>
1000	650	
1100	653	
1200	682	
1300	694	
1400	691	
1500	683	
1600	682	
1700	670	8

DATE: May 18, 1983

<u>Time (Hours)</u>	<u>Unit 3 Gross $\geq 647 \text{ MWe}^1$ (MWe)</u>	<u>Time Period (Hours)</u>
0800	648	
0900	674	
1000	680	
1100	680	
1200	678	
1300	678	
1400	679	
1500	676	
1600	678	
1700	673	10

DATE: May 19, 1983

<u>Time (Hours)</u>	<u>Unit 3 Gross $\geq 647 \text{ MWe}^1$ (MWe)</u>	<u>Time Period (Hours)</u>
1200	680	
1300	683	
1400	683	
1500	681	
1600	684	
1700	678	
1800	670	7

Data Sources:

1. Jeffrey Energy Center Unit No. 3 Periodic Log

Therefore, Criterion No. 3 has been satisfied.

CRITERION NO. 4

A UNIT MUST BE OPERATED SO AS TO SHOW A CLEAR AND OBVIOUS TREND TOWARD THE PREDOMINATE USE OF COAL AS ITS PRIMARY FUEL.

The test period will be 30 days.

Discussion

Shown in Table 1 is the daily heat input from oil and coal separately and the total heat input to the boiler during power operation. Also shown is the fraction of the total heat input to the boiler that results from the burning of the coal. A fraction 1.00 indicates that 100% of the heat input to the boiler is from coal only.

The information listed in the column entitled FRACTION OF INPUT STATION FROM COAL FIRED is shown graphically in Figure 2.

The unit has burned coal consistently since March 12, 1983 except for the oil usage during startup following the unit being off line.

Based upon my evaluation of the fuel usage, I have concluded that Criterion No. 4 has been satisfied.

Table 1

DATE	TOTAL MEGA BTU OIL FIRED	TOTAL MEGA BTU COAL FIRED	TOTAL MEGA BTU INPUT STATION	FRACTION OF INPUT STATION FROM COAL FIRED
3/3	11,761	4,141	15,902	0.26
3/4	9,746	24,744	34,490	0.72
3/5	0	0	0	0
3/6	0	0	0	0
3/7	8,453	15,222	23,675	0.64
3/8	8,085	54,793	62,878	0.87
3/9	8,750	62,940	71,690	0.88
3/10	7,835	62,732	70,567	0.89
3/11	4,792	64,148	68,940	0.93
3/12	0	76,622	76,622	1.00
3/13	0	79,600	79,600	1.00
3/14	0	82,609	82,609	1.00
3/15	0	80,673	80,673	1.00
3/16	0	77,803	77,803	1.00
3/17	0	78,321	78,321	1.00
3/18	0	76,328	76,328	1.00
3/19	0	75,230	75,230	1.00
3/20	0	74,250	74,250	1.00
3/21	0	75,548	75,548	1.00
3/22	0	80,414	80,414	1.00
3/23	0	89,772	89,772	1.00
3/24	0	85,273	85,273	1.00
3/25	0	87,307	87,307	1.00
3/26	0	89,636	89,636	1.00
3/27	0	91,127	91,127	1.00
3/28	8,676	75,195	83,871	0.90
3/29	0	5,202	5,202	1.00
3/30	0	0	0	0
3/31	0	0	0	0
4/1	0	0	0	0
4/2	0	0	0	0
4/3	0	0	0	0
4/4	0	0	0	0
4/5	0	0	0	0
4/6	0	0	0	0
4/7	0	0	0	0
4/8	0	0	0	0
4/9	10,453	2,710	13,163	0.21
4/10	2,583	70,714	73,297	0.96
4/11	0	89,143	89,143	1.00
4/12	0	93,950	93,950	1.00
4/13	0	92,503	92,503	1.00
4/14	0	93,205	93,205	1.00
4/15	0	90,728	90,760	0.99
4/16	0	90,805	90,805	1.00
4/17	0	92,068	92,068	1.00
4/18	2,032	87,093	89,125	0.98
4/19	0	90,676	90,676	1.00
4/20	0	90,580	90,580	1.00
4/21	0	98,246	98,246	1.00
4/22	0	107,295	107,295	1.00
4/23	0	107,498	107,498	1.00
4/24	3,309	54,846	58,155	0.94
4/25	0	98,588	98,588	1.00
4/26	0	97,219	97,219	1.00

Table 1

<u>DATE</u>	<u>TOTAL MEGA BTU OIL FIRED</u>	<u>TOTAL MEGA BTU COAL FIRED</u>	<u>TOTAL MEGA BTU INPUT STATION</u>	<u>FRACTION OF INPUT STATION FROM COAL FIRED</u>
4/27	0	123,740	123,740	1.00
4/28	0	118,678	118,678	1.00
4/29	0	106,134	106,134	1.00
4/30	0	99,537	99,537	1.00
5/1	0	110,388	110,388	1.00
5/2	0	125,209	125,209	1.00
5/3	0	137,766	137,766	1.00
5/4	0	129,139	129,139	1.00
5/5	0	132,544	132,544	1.00
5/6	0	138,888	138,888	1.00
5/7	0	117,587	117,587	1.00
5/8	0	103,843	103,843	1.00
5/9	0	129,027	129,207	1.00
5/10	946	116,632	117,578	.99
5/11	0	0	0	0
5/12	0	0	0	0
5/13	0	0	0	0
5/14	2159	0	2,159	0
5/15	2814	0	2,814	0
5/16	3654	70,426	74,080	.95
5/17	0	128,483	128,483	1.00
5/18	0	136,282	136,282	1.00
5/19	0	132,357	132,357	1.00

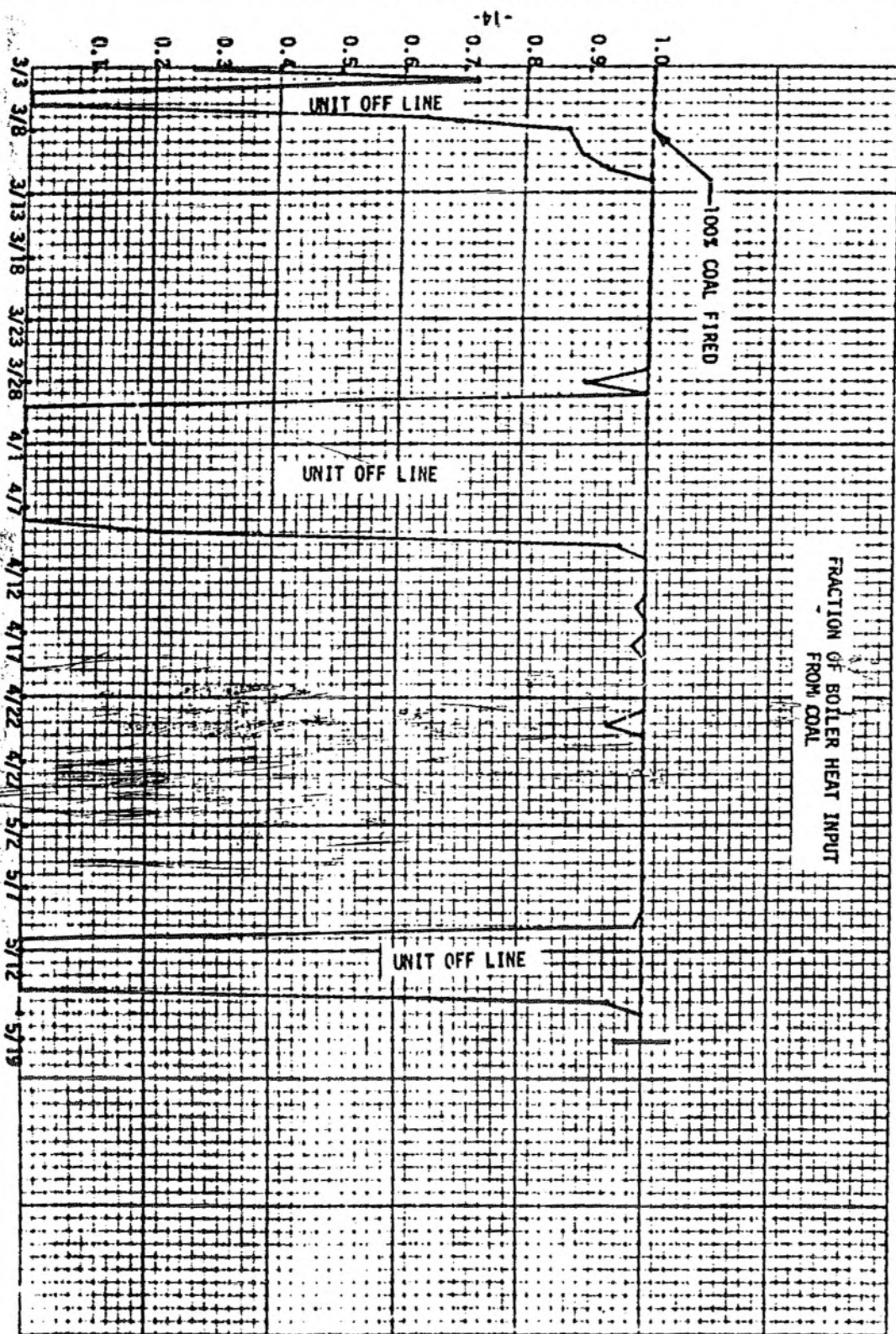


FIGURE 2

CRITERION NO. 5

A UNIT MUST HAVE FINISHED THE STARTUP TEST PROGRAM WITH ALL STARTUP TEST PROCEDURES NECESSARY FOR OPERATION SATISFACTORILY COMPLETED.

Discussion

The evaluation of the startup test program has included

- (1) a site audit on May 27, 1983 while the unit was operating at power levels above the name plate capacity (This operating level requires that system components be installed and operational (e.g., all coal mills).);
- (2) a detailed review of all weekly progress reports beginning December 1, 1981 which describe alignment and startup tests, etc.;
- (3) a review and evaluation of the performance tests required prior to commercial operation.

As a result of my evaluation, I have concluded that Criterion No. 5 has been satisfied.

CRITERION NO. 6

SUFFICIENT TRANSMISSION FACILITIES SHALL EXIST TO CARRY THE TOTAL DESIGN NET ELECTRICAL CAPACITY FROM THE COMPLETED GENERATING STATION INTO THE SYSTEM AT THE TIME THE NEWEST UNIT IS DECLARED FULLY OPERATIONAL AND USED FOR SERVICE.

Discussion

The Company is in the process of constructing a 161kv transmission line which will deliver the Company's share of power from all the Jeffrey Units to its transmission system. At the present time, the power is being transmitted over a 345kv line in the MO-KAI Power pool, of which the Company is a member. Company has provided to the Staff copies of agreements extending permission to use the 345kv line until December 31, 1983. At that time it is expected that either the Company's 161kv line will be completed or further extensions of the reservation agreement can be obtained.

Therefore, Criterion No. 6 has been satisfied.

STAFF RECOMMENDATIONS

On June 2, 1983 Missouri Public Service Company requested the Commission to issue its order declaring the Jeffrey Energy Center Unit No. 3 fully operational and used for service as of May 27, 1983. In said filing the Company stated that as of 12:01 a.m., May 27, 1983, Unit No. 3 was put into commercial operation.

I have reviewed the startup and initial operation of Jeffrey Energy Center Unit No. 3. Based upon my detailed evaluation using the Staff criteria, I have determined that Unit No. 3 has satisfied the said criteria.

I, therefore, recommend that Jeffrey Energy Center Unit No. 3 be considered fully operational and used for service as of 12:01 a.m., May 27, 1983.