

No. MB10

Data Information Request
From Union Electric Company d/b/a AmerenUE
MPSC Case No. EO-2000-580

Requested From: Maurice Brubaker

Requested By: Richard J. Kovach

Date of Request: 10/12/00

Information Requested:

Please provide a complete copy of the NERC and GADS documents relied upon in referencing CT forced outage rates on page 15 of your Surrebuttal testimony.

Response:

The attached information provided to Union Electric Company in response to the above Data Information Request is accurate and complete and contains no material misrepresentations or omissions, based upon present facts of which the undersigned has knowledge, information or belief. The undersigned agrees to immediately inform Union Electric Company if, during the pendency of Case No. EO-2000-580 before the Commission, any matters are discovered which would materially affect the accuracy or completeness of the attached information.

If these data are voluminous, please (1) identify the relevant documents and their location; (2) make arrangements with requestor to have documents available for inspection at a location mutually agreeable. Where identification of a document is requested, briefly describe the document (e.g., book, letter, memorandum, report) and state the following information as applicable for the particular document: name, title, number, author, date of publication and publisher, addresses, date written, and the name and address of the person(s) having possession of the document. As used in this Data Request, the term "document(s)" includes publication of any format, workpapers, letters, memoranda, notes, reports, analyses, computer analyses, test results, studies or data recordings, transcriptions and printed, typed or written materials of every kind in your possession, custody or control within your knowledge. The pronoun "you" or "your" refers to the person identified in the "Requested From" block above and all other employees, contractors, agents or others employed by or acting on behalf of the organization, group or governmental unit associated with that person.

Response Provided By: M. Brubaker
(Please print)

Date: 10/14/00

Signed By: M. Brubaker

Exhibit No. 8
Date 11-30-00 **Case No.** EO-2000-580
Reporter ma

AMERENUE
Missouri PSC Case No. 2000-580

**Interruptible Customers' Responses to
AmerenUE's Data Requests Directed to Maurice Brubaker**

Response MB10

The entire NERC GADS document can be downloaded from their website. Attached please find a copy of the summary data from the August 1999 edition.

**Generating
Unit
Statistical
Brochure**

1994-1998

August 1999

North American Electric Reliability Council
Princeton Forrestal Village
116-390 Village Boulevard
Princeton, New Jersey 08540-5731

**Generating
Availability
Data
System**



North American
Electric
Reliability
Council

Phone: 609-452-8060 ■ Fax: 609-452-9550
Internet: <http://www.nerc.com>
E-mail: gads@nerc.com

EQUATIONS

Unweighted

Average Run Time - ART

$[\text{SH}/\text{Actual Unit Starts}]$

Starting Reliability - SR

$[\text{Actual Unit Starts}/\text{Attempted Unit Starts}] \times 100 (\%)$

Net Capacity Factor - NCF

$[\text{NAG}/(\text{PH} \times \text{NMC})] \times 100 (\%)$

Net Output Factor - NOF

$[\text{NAG}/(\text{SH} \times \text{NMC})] \times 100 (\%)$

Service Factor - SF

$(\text{SH}/\text{PH}) \times 100 (\%)$

Availability Factor - AF

$(\text{AH}/\text{PH}) \times 100 (\%)$

Equivalent Availability Factor - EAF

$\{[\text{AH} - (\text{EUDH} + \text{EPDH} + \text{ESEDH})]/\text{PH}\} \times 100 (\%)$

Forced Outage Rate - FOR

$[\text{FOH}/(\text{FOH} + \text{SH})] \times 100 (\%)$

Equivalent Forced Outage Rate - EFOR

$\{[\text{FOH} + \text{EFDH}]/(\text{FOH} + \text{SH} + \text{EFDHRS})\} \times 100 (\%)$

Scheduled Outage Factor - SOF

$(\text{SOH}/\text{PH}) \times 100 (\%)$

Forced Outage Factor - FOF

$(\text{FOH}/\text{PH}) \times 100 (\%)$

Weighted

Weighted Service Factor - WSF

$[\Sigma(\text{SH} \times \text{NMC})/\Sigma(\text{PH} \times \text{NMC})] \times 100 (\%)$

Weighted Availability Factor - WAF

$[\Sigma(\text{AH} \times \text{NMC})/\Sigma(\text{PH} \times \text{NMC})] \times 100 (\%)$

Weighted Equivalent Availability Factor - WEAFA

$\{[\Sigma(\text{AH} \times \text{NMC}) - \Sigma[(\text{EUDH} + \text{EPDH} + \text{ESEDH}) \times \text{NMC}]]/\Sigma(\text{PH} \times \text{NMC})\} \times 100 (\%)$

Weighted Forced Outage Rate - WFOR

$\{[\Sigma(\text{FOH} \times \text{NMC})]/\Sigma[(\text{FOH} + \text{SH}) \times \text{NMC}]\} \times 100 (\%)$

Weighted Equivalent Forced Outage Rate - WEFOR

$\{[\Sigma[(\text{FOH} + \text{EFDH}) \times \text{NMC}]]/\Sigma[(\text{FOH} + \text{SH} + \text{EFDHRS}) \times \text{NMC}]\} \times 100 (\%)$

Weighted Scheduled Outage Factor - WSOF

$[\Sigma(\text{SOH} \times \text{NMC})/\Sigma(\text{PH} \times \text{NMC})] \times 100 (\%)$

Weighted Forced Outage Factor - WFOF

$[\Sigma(\text{FOH} \times \text{NMC})/\Sigma(\text{PH} \times \text{NMC})] \times 100 (\%)$

*Applies to groups of units only.

Notes:

Equivalent hours are computed for each derating and then summed.

Size of Reduction is determined by subtracting the Net Available Capacity (NAC) from the Net Dependable Capacity (NDC).

In cases of multiple deratings, the Size of Reduction of each derating is the difference in the NAC of the unit prior to the initiation of the derating and the reported NAC as a result of the derating.

DEFINITIONS

Actual Unit Starts

Number of times the unit was synchronized to the transmission system.

Attempted Unit Starts

Number of attempts to bring the unit from shutdown to synchronization.

Available Hours - AH

Sum of all SH, RSH, Pumping Hours, and Synchronous Condensing Hours.

Equivalent Forced Derated Hours - EFDH

Product of the Forced Derated Hours and the Size of Reduction, divided by the NMC.

Equivalent Forced Derated Hours During Reserve Shutdowns - EFDHRS

Product of the Forced Derated Hours (during Reserve Shutdowns (RS) only) and the Size of Reduction, divided by the NMC.

Equivalent Planned Derated Hours - EPDH

Product of the Planned Derated Hours and the Size of Reduction, divided by the NMC.

Equivalent Seasonal Derated Hours - ESEDH

NMC less the NDC, times the Available Hours (AH), divided by the NMC.

Equivalent Unplanned Derated Hours - EUDH

Product of the Unplanned Derated Hours and the Size of Reduction, divided by the NMC.

Forced Derated Hours - FDH

Sum of all hours experienced during Forced Deratings.

Forced Outage Hours - FOH

Sum of all hours experienced during Forced Outages.

Net Available Capacity - NAC

The NDC, modified for equipment limitations.

Net Actual Generation - NAG

Net electrical megawatthours (MWh) produced by the unit during the period being considered.

Net Dependable Capacity - NDC

NMC modified for ambient limitations.

Net Maximum Capacity - NMC

Capacity a unit can sustain over a specified period when not restricted by ambient conditions or equipment deratings, minus the losses associated with station service or auxiliary loads.

Period Hours - PH

Number of hours a unit was in the active state. A unit generally enters the active state on its commercial date.

Reserve Shutdown Hours - RSH

Total number of hours the unit was available for service but not electrically connected to the transmission system for economic reasons.

Service Hours - SH

Total number of hours a unit was electrically connected to the transmission system.

Scheduled Outage Hours - SOH

Sum of all hours experienced during Planned Outages and Maintenance Outages plus any Scheduled Outage Extensions associated with those outages.

Unplanned Derated Hours - UDH

Sum of all hours experienced during Forced Deratings and Maintenance Deratings plus any Scheduled Derating Extensions of any Maintenance Deratings.

Unplanned Outage Hours - UOH

Sum of all hours experienced during Forced Outages and Maintenance Outages plus any Scheduled Outage Extensions of any Maintenance Outages.

INTRODUCTION

This brochure highlights some of the information from NERC's *Generating Availability Report* (GAR). Statistics are shown for the cumulative five years, 1994–1998, and are calculated using both the capacity-weighted technique and the traditional, unweighted method.

Generating Availability Report

Continuing the effort to bring timely, useful information to the industry in an efficient manner, NERC again will "publish" the 1994–1998 *Generating Availability Report* in electronic format. The report is available for downloading from the Internet, and also is available on a 3½ inch diskette. Call us at 609-452-8060 to request a copy on diskette. A printed, bound version of the GAR is not available.

The electronic GAR consists of a series of formatted, ASCII files, ready for printing on any laser printer set to a condensed font. Included are all the tables and graphs found in previous printed editions of the report, and more. The traditional unit groupings — by generation technology, size and, in some cases, fuel type — have been retained.

The new GAR is available to everyone at no cost. To download the GAR from the NERC home page (<http://www.nerc.com>) go to "GADS Services," and then "Publications," and download the self-extracting zip file GAR1998.EXE. That's all there is to it!

GADS Data Applications

The statistics in this brochure and the GAR are calculated from data that electric utilities report voluntarily to NERC's Generating Availability Data System (GADS). Operating histories for more than 4,400 electric generating units reside in GADS. Data are reported by 178 utilities in the United States and Canada, representing investor-owned, municipal, state, cooperative, provincial,

and federal segments of the industry. NERC aggregates these data and presents the results annually in its GAR.

The GAR provides an overview of the availability performance of classes of generating units. More specific data are available from NERC's GADS database to use in detailed unit- or equipment-level reliability, availability, and maintainability (RAM) analyses. GADS data are used in a wide variety of deterministic and probabilistic applications to:

- benchmark unit performance against statistically validated peers,
- conduct loss-of-load and similar system-wide analyses,
- optimize maintenance schedules and prepare cost-benefit analyses,
- compare the reliability of original equipment manufacturers' (OEM) components, and
- prepare reports for state and federal regulators.

You can conduct your own GADS special analyses with a software product called pc-G.A.R., available from NERC on CD-ROM. GADS data for special applications are also available by calling NERC. Call or e-mail (gads@nerc.com) NERC for further information.

Historical Availability Statistics

Back again this year is the 1982–1998 *Historical Availability Statistics* (HAS) report. Based on previous GAR publications, this report provides statistics for individual, five, ten, and seventeen-year periods. The HAS report is included when you order the annual GAR diskette.

1994-1998 Generating Unit Statistical Brochure

Unit Type	MW Trp/Gen Nameplate	# of Units	Unit Years
FOSSIL	All Sizes	1,532	7,126
All Fuel Types	1-99	351	1,486
	100-199	426	2,016
	200-299	171	825
	300-399	147	717
	400-599	262	1,250
	600-799	127	602
	800-999	34	165
	1000 Plus	14	65
Coal Primary	All Sizes	929	4,319
	1-99	165	707
	100-199	258	1,203
	200-299	114	560
	300-399	88	433
	400-599	171	799
	600-799	95	433
	800-999	25	124
	1000 Plus	13	60
Oil Primary	All Sizes	200	685
	1-99	64	205
	100-199	50	174
	200-299	12	36
	300-399	21	96
	400-599	30	91
	600-799	13	48
	800-999	9	30
Gas Primary	All Sizes	466	1,965
	1-99	145	554
	100-199	147	624
	200-299	47	211
	300-399	41	188
	400-599	63	296
	600-799	20	81
	800-999	3	11
Lignite Primary	All Sizes	32	128

ART	SR	NGR	NOF	SF	AF	EAF	FOR	EFOR	SOF	FOR
263	97.98	53.00	73.23	64.47	86.28	88.88	5.59	7.91	9.91	3.82
157	99.11	29.01	61.67	42.13	88.65	88.83	7.02	9.28	8.17	3.18
234	97.69	44.04	68.52	63.55	87.17	84.52	5.15	7.56	9.39	3.45
362	98.88	52.19	71.53	73.34	85.90	83.72	4.78	6.55	10.42	3.68
274	97.07	47.12	67.84	70.02	82.88	80.48	6.75	9.43	12.05	5.07
292	97.35	54.99	74.06	74.10	84.49	81.57	5.48	8.10	11.21	4.29
478	97.45	62.01	78.67	78.97	85.92	83.42	5.07	7.40	9.86	4.22
443	98.61	59.17	78.13	75.52	87.29	85.18	4.40	6.17	9.22	3.48
760	95.91	57.58	70.53	81.27	81.75	78.72	6.64	8.45	12.47	5.78
384	97.19	63.82	78.02	77.53	86.37	88.75	4.81	7.06	9.71	3.92
219	99.17	41.25	65.71	60.15	87.59	85.58	4.80	6.98	9.38	3.03
417	95.80	57.91	73.29	78.25	87.77	84.92	3.95	6.31	9.01	3.21
517	99.15	63.38	77.40	82.19	86.26	84.09	4.63	6.33	9.74	3.99
376	95.90	59.33	74.53	79.22	83.93	81.21	6.29	8.73	10.75	5.32
335	96.61	64.82	79.75	81.15	84.32	81.09	5.50	8.18	10.95	4.72
668	96.75	70.11	81.29	66.28	87.06	84.50	4.57	6.74	8.80	3.13
694	97.40	71.25	82.81	85.96	87.07	85.29	4.29	5.79	9.08	3.85
761	95.69	59.54	71.80	82.88	83.25	80.87	6.18	7.25	11.29	5.46
94	99.05	24.30	55.65	38.89	85.84	89.49	9.05	12.37	10.29	3.87
54	99.20	19.71	57.26	26.42	89.65	88.03	9.95	12.87	7.43	2.92
105	99.39	22.84	54.55	41.26	86.01	88.37	9.87	12.68	9.47	4.52
110	97.87	21.94	63.48	35.58	84.14	81.77	16.10	19.41	9.04	6.82
148	99.77	29.57	57.53	51.90	80.53	78.62	9.38	12.22	14.10	5.37
134	98.07	25.89	53.07	49.66	84.34	81.89	5.26	8.19	12.89	2.76
78	98.21	23.91	63.21	37.63	85.13	81.38	6.23	13.05	12.37	2.50
93	100.00	17.96	49.20	38.38	87.89	85.02	6.72	10.32	9.48	2.83
150	98.81	28.22	52.88	43.25	86.08	84.21	7.65	9.85	10.34	3.58
129	99.04	14.27	50.36	24.39	89.43	87.75	12.64	14.84	7.04	3.53
103	99.05	22.73	54.57	40.98	86.30	84.38	8.11	10.53	10.11	3.61
204	99.17	28.22	49.37	56.96	85.33	83.38	3.90	5.58	12.36	2.31
186	97.29	29.34	51.15	57.66	81.60	79.71	6.99	8.95	14.07	4.33
214	98.77	31.37	53.11	59.29	84.10	81.99	6.21	8.56	11.97	3.82
320	97.96	34.69	56.49	60.96	80.46	79.09	6.55	8.37	15.26	4.27
535	100.00	29.32	48.07	61.05	88.29	84.04	2.40	5.84	10.21	1.50
448	96.99	76.05	88.43	84.48	87.13	84.00	4.56	7.04	8.83	4.04

WSF	WAF	WEAF	WFOR	WEFOR	WSOF	WFOF
72.38	85.30	82.74	5.43	7.74	10.54	4.18
47.04	88.70	86.98	6.06	8.12	8.25	3.04
64.27	87.00	84.45	5.11	7.50	9.54	3.48
72.96	85.82	83.62	4.77	6.61	10.51	3.66
69.67	82.89	80.50	6.76	9.14	12.05	5.06
74.25	84.41	81.46	5.50	8.16	11.26	4.33
78.82	85.85	83.36	5.12	7.44	9.88	4.26
75.74	87.38	85.29	4.32	6.02	9.19	3.42
81.65	82.10	79.20	6.49	8.13	12.22	5.67
81.79	85.75	83.06	5.01	7.20	9.93	4.32
62.79	87.71	85.73	4.53	6.48	9.28	2.99
79.01	87.76	84.94	3.91	6.20	9.01	3.22
81.88	86.18	83.97	4.66	6.43	9.81	4.00
79.60	84.05	81.33	6.20	8.63	10.67	5.27
81.28	84.32	81.08	5.49	8.16	10.95	4.72
86.25	87.03	84.44	4.60	6.78	8.80	4.17
86.05	87.16	85.45	4.21	5.61	9.05	3.78
82.92	83.30	80.90	6.12	7.18	11.28	5.41
43.67	84.07	81.21	7.97	11.96	12.14	3.78
34.44	89.79	88.43	8.04	10.37	7.20	3.01
41.88	85.31	82.34	9.38	12.40	10.35	4.34
34.57	84.54	82.26	14.98	18.52	9.36	6.09
51.40	80.45	78.59	9.65	12.45	14.05	5.49
48.80	84.00	81.44	5.50	8.72	13.15	2.84
37.84	85.26	81.61	6.19	12.70	12.24	2.50
36.50	87.99	85.08	6.56	10.15	9.44	2.57
53.37	84.16	82.23	6.54	8.75	12.10	3.74
28.34	89.69	88.20	10.01	12.25	7.16	3.15
41.65	85.98	84.05	8.17	10.70	10.33	3.71
57.15	85.18	83.23	3.93	5.63	12.47	2.34
57.36	81.60	79.67	7.04	9.05	14.05	4.35
59.06	83.86	81.73	6.37	8.79	12.12	4.02
61.41	80.62	79.30	6.48	8.21	15.12	4.26
60.99	88.31	83.99	2.44	5.92	10.15	1.53
86.00	86.84	83.77	5.20	7.73	8.43	4.72

1994-1998 Generating Unit Statistical Brochure

Unit Type	MW Trb/Gen Nameplate	# of Units	Unit-Years
NUCLEAR <i>All Types</i>	*All Sizes	126	598
	400-799	24	111
	800-999	49	237
	1000 Plus	51	247
PWR	All Sizes	71	342
	400-799	11	52
	800-999	24	118
	1000 Plus	36	172
BWR	*All Sizes	33	159
	400-799	4	18
	800-999	13	63
	1000 Plus	15	75
CANDU	All Sizes	21	97
JET ENGINE**	All Sizes	310	1,505
	1-19	59	294
	20 Plus	251	1,211
GAS TURBINE**	All Sizes	768	3,475
	1-19	199	928
	20-49	251	1,161
	50 Plus	318	1,386
COMB. CYCLE	All Sizes	58	242
HYDRO	All Sizes	829	3,855
	1-29	314	1,429
	30 Plus	515	2,426
PUMPED STORAGE	All Sizes	69	299
MULTI-BOILER/ MULTI-TURBINE	All Sizes	75	268
GEO THERMAL	All Sizes	18	86
DIESEL**	All Sizes	161	666

ART	SR	NCF	NOF	SF	AF	EAF	FOR	EFOR	SOF	FOF
1,822	99.47	74.11	94.71	77.93	78.00	74.55	10.77	13.05	12.60	9.41
1,669	99.50	71.43	93.59	75.90	76.01	72.71	10.63	12.01	15.03	9.03
1,740	100.00	74.80	94.30	79.46	79.46	75.51	9.68	13.10	12.01	8.52
2,005	99.12	74.15	95.25	77.37	77.49	74.51	11.82	13.39	12.13	10.37
2,024	99.43	78.24	97.02	80.62	80.62	78.19	8.58	9.72	11.81	7.57
2,209	99.40	81.58	97.76	82.90	82.90	80.58	3.41	3.92	14.17	2.92
1,930	100.00	80.54	97.97	82.14	82.14	80.66	8.21	8.82	10.51	7.35
2,032	99.13	76.55	96.40	78.90	78.90	75.77	10.36	12.06	11.98	9.12
1,940	99.40	67.63	92.05	73.77	74.03	70.34	13.51	15.20	14.44	11.53
1,969	98.31	63.04	79.80	79.75	80.31	72.87	4.70	5.37	15.76	3.93
1,992	99.06	67.09	94.26	71.80	71.80	68.09	13.79	16.26	16.71	11.49
1,927	100.00	68.53	92.36	73.87	74.28	71.61	15.19	16.49	12.49	13.23
1,229	100.00	68.45	88.66	75.14	75.16	68.49	14.29	21.62	12.40	12.53
4	96.59	61.39	67.79	2.05	91.40	85.81	60.40	69.01	5.47	3.12
4	96.88	60.57	60.97	0.94	92.00	85.40	81.89	82.58	3.73	4.27
4	96.56	61.47	68.10	2.32	91.26	85.91	55.10	65.94	5.90	2.84
7	94.81	62.62	65.12	3.09	90.21	85.50	55.43	56.40	6.01	3.84
8	91.54	61.12	70.00	1.87	91.81	86.65	69.10	69.36	4.25	4.18
6	94.44	61.44	56.39	2.45	88.70	83.20	69.57	71.17	5.70	5.60
7	95.81	63.21	66.22	4.47	90.40	85.68	32.18	32.91	7.47	2.12
53	98.35	60.15	69.03	53.86	91.49	84.33	2.71	5.71	7.01	1.50
84	99.41	67.81	79.72	60.95	90.30	89.73	4.97	5.02	6.51	3.19
139	99.38	49.46	80.45	64.18	90.88	90.03	5.47	5.47	5.41	3.71
67	99.42	47.70	79.67	59.04	89.96	89.56	4.56	4.73	7.16	2.88
6	98.90	63.41	70.92	21.11	85.52	84.64	9.82	10.12	12.18	2.30
299	97.39	49.04	67.19	58.51	88.92	88.18	5.59	9.26	7.61	3.48
807	98.64	46.72	56.54	80.75	89.67	66.37	3.11	25.57	8.34	2.59
5	99.17	61.95	70.66	61.99	95.34	95.29	63.58	64.10	1.19	3.46

WSF	WAF	WEAF	WFOR	WEFOR	WSOF	WFOF
78.26	78.33	74.95	10.62	12.86	12.18	9.31
76.33	76.43	73.17	10.16	11.49	15.00	8.64
79.42	79.42	75.47	9.71	13.13	11.55	8.55
77.85	77.98	74.97	11.37	12.95	12.01	9.99
80.64	80.64	78.09	8.79	10.04	11.58	7.77
83.45	83.45	81.12	3.45	3.95	13.55	2.99
82.21	82.21	80.73	8.11	8.72	10.52	7.26
79.41	79.41	76.27	9.93	11.63	11.83	8.76
73.47	73.75	70.40	13.92	15.57	13.68	11.89
79.01	79.50	72.50	4.76	5.48	16.54	3.95
71.18	71.18	67.54	14.31	16.70	15.11	11.89
74.20	74.63	71.93	14.79	16.09	12.43	12.88
77.20	77.21	69.80	12.51	20.66	11.80	11.05
2.06	91.91	86.06	56.50	69.81	5.41	2.67
0.95	92.03	85.23	81.11	81.80	3.90	2.07
2.17	91.90	86.15	53.77	68.60	5.57	2.53
4.04	90.22	85.54	43.59	44.45	6.68	3.12
1.61	92.00	86.35	71.58	71.89	4.17	4.05
2.56	89.26	83.31	67.49	69.06	5.42	5.52
4.85	90.22	86.07	32.40	33.07	7.45	2.33
58.16	92.26	83.68	2.04	5.12	6.52	7.28
59.98	89.12	88.81	4.52	4.61	7.97	2.84
61.49	92.19	91.45	3.94	3.96	5.22	2.53
59.87	88.91	88.62	4.56	4.66	8.17	2.86
18.92	88.68	87.40	9.78	10.47	9.26	2.05
72.99	85.70	78.28	4.86	10.30	10.56	3.73
82.64	90.62	64.55	2.58	27.72	7.63	2.20
2.77	95.26	95.05	54.82	56.48	1.37	3.36

*Statistics for groups of 1 to 2 units are included in the all sizes category but are not shown separately.

**Caution: EFOR and WEFOR values may be low since deratings during reserve shutdown periods may not have been reported for a large number of these units.