Report on EQUIPMENT AVAILABILITY for the TEN-YEAR PERIOD ■ 1967-1976

A Report of the
EQUIPMENT AVAILABILITY TASK FORCE
of the PRIME MOVERS COMMITTEE

EDISON ELECTRIC INSTITUTE
90 Park Avenue • New York, N.Y. 10016

Issued December 1977

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FOR THE
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A REPORT OF THE
EQUIPMENT AVAILABILITY TASK FORCE
OF THE
PRIME MOVERS COMMITTEE
EDISON ELECTRIC INSTITUTE

MASTER

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EEI PUBLICATION No. 77-64
PRINTED IN USA

AVAILABILITY STATEMENT:
Available from the Institute,
90 Park Avenue, New York, NY
10016

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REPORT ON EQUIPMENT AVAILABILITY
FOR THE
TEN-YEAR PERIOD, 1967-1976

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ACKNOWLEDGEMENT

THE EQUIPMENT AVAILABILITY TASK FORCE EXPRESSES ITS APPRECIATION TO THE LARGE GROUP OF UTILITIES AND THEIR PERSONNEL WHO PREPARE THE INPUT DATA FOR THIS PROGRAM. IT IS HOPED THIS REPORT WILL REACH THEM AND RETURN REAL BENEFIT FOR THEIR EFFORTS.

THE EQUIPMENT AVAILABILITY TASK FORCE ALSO EXPRESSES APPRECIATION TO MR J P WHOOLEY OF PUBLIC SERVICE ELECTRIC AND GAS COMPANY AND MR J L WEISER AND MRS CAROL SPATZ OF THE EEI FOR THEIR TECHNICAL ASSISTANCE AND SUPERVISION IN THE COMPUTER PROCESSING OF ANNUAL AND SPECIAL REPORTS.

INTRODUCTION

This annual report of availability and outage statistics covers most of the electric power generating units operating in the United States of America. A list of the utility organizations that voluntarily participated in the EEI Equipment Availability Program in 1976 is located in Appendix F of this report.

The statistics were derived from outage and summary reports of individual units, as submitted by the reporting organizations. This input data was subjected to extensive validation checks prior to being entered into the data base; however, the primary responsibility for data accuracy lies with the reporting organizations.

Each reporting utility organization has received reports on individual units for which data was submitted. Also, selected major equipment manufacturers receive computer summary data for their equipment.

HISTORY AND SCOPE

The Equipment Availability Task Force of the Prime Movers Committee developed an organized data-collection program for reporting and summarizing major electric power generating unit equipment failures in the late 1950's. The fundamental concept used by the Task Force was to develop a system which would document the availability of generating units as a function of their size, fuel type, thermal cycle and major equipment manufacturer. This system was not designed to develop reliability statistics on plant components, but rather to document the effect of unreliability of key power plant auxiliaries upon the availability of the generating unit. With this in mind, a pilot program was initiated in 1960 with the intent of evaluating reporting procedures. This effort facilitated the implementation of the program industrywide.

In 1965 the Task Force, under an EEI research project, managed the development of a computer program system which provided a more comprehensive input data format, a more detailed data preparation guide, and foremost, improved methods of analysis. In 1968 this program was placed into full operation.

The objectives of the Task Force in the development of an annual report was to publish availability and outage statistics on a uniform basis with minimal effort. The report provides information to assist in the design, operation and maintenance of equipment. In addition, special analyses are made available for unique data requirements. In 1976 the Task Force initiated the distribution of quarterly Equipment Availability reports on fossil units 600 MW and above on a unit-by-unit basis. To increase the utilization of these unit data, manufacturers, architect/engineers and consultants, as well as program participants, receive copies of these reports. An industry summary of the latest quarterly report is included as Figure 9.

CHANGES TO THE ANNUAL REPORT

In the 1966-1975 edition of this report, fossil unit data were summarized for two different sets of size categories:

- 60-89MW, 90-129MW, 130-389MW, 390-599MW, and 600MW and above (old megawatt size categories)
- 100-199MW, 200-299MW, 300-399MW, 400-599MW, 600-799MW, and 800MW and above (new megawatt size categories).

Since the Task Force did not receive requests to the contrary, beginning with this report, we will only publish the latter series. However, data for the old megawatt size categories for 1967-1976 are still available through EEI.

A graphical comparison of large coal-fired units versus nuclear units has been included in this report replacing the large fossil unit (all fuels) and nuclear unit comparisons.

For the first time the summaries in this report include outages of the flue gas scrubber system and outages for safety or environmental requirements as separate major component cause code categories. PLEASE NOTE that, although the summaries contained in this report are for the ten-year period 1967-1976, data for the two new categories were collected only for the year 1976, which represent a 10% effect on the ten-year-based summaries.

SUPPLEMENTAL REPORTS AND ANALYSES

Recognizing that an annual report contains only a limited amount of general analyses in selected categories, the Task Force distributed the following supplemental reports and analyses in 1976:

- *EEI Equipment Availability Report on Trends of Large Mature Fossil Units Categorized by Fuel and in Commercial Operation Prior to January, 1971*
- *Boiler Comparison (Drum Vs Supercritical) of Coal Units 390-599MW and 600MW and Above*

- *Fossil (200MW and Above) Unit-by-Unit Composite Summary Report 1966-1975 (microfiche)*
- *EEL Equipment Availability Coal Unit/Boiler Summary Report, 1966-1975*
- *Equipment Availability Component Cause Code Summary Report, 1975*
- *Equipment Availability Fossil Coal-Fired Unit Summary Report, 1966-1975*

The Task Force received an overwhelming response to these reports, and will continue to publish special studies as required.

REQUESTS FOR SPECIAL ANALYSES

The Task Force will perform special analyses of the Equipment Availability data bank if the cost of the computer services is met by the requester and if the required analysis conforms to the following policy guidelines:

1. Data of specific generating units or specific utility companies will not be disseminated without the written consent (obtained by requester) of a designated representative of the company involved.
2. A contributing company may request an analysis of the data bank on any basis which does not reveal the data of specific generating units, specific companies other than their own or groups of companies. A contributor may also request data on equipment of specific manufacturers.

3. A member of a power pool or interconnection organization may request data on the same basis as described in paragraph 2 or may request data from specific units or companies within the pool organization provided that the request is accompanied by written consent from the pool members whose data are being included in the request.

4. Manufacturers may request analyses of the data bank on any basis which does not reveal the data of specific units, utility companies, groups of companies or manufacturers, and may request data on their own equipment, on any basis which does not reveal the data of specific units, specific companies or groups of companies.

Manufacturers may make requests for data on specific units of their own manufacture provided that the request is accompanied by written consent from the utility companies involved.

5. Architect/engineers and consultants may request composite or component summarized data on units which they have designed. A list of these units must be submitted to EEI containing company and unit names and unit identification numbers. If unit-by-unit reports are requested, written consent (obtained by requester) of designated representatives of companies involved must accompany the request.

6. Requests which do not fit the policy guidelines as approved by the EEI Prime Movers Committee should be referred to the Chairman of the Equipment Availability Task Force. Requests for special analyses should be sent to EEI Headquarters in New York.

7. To assist the Task Force in processing special requests, the following information should be included in the request:

- a. sample desired (eg, total industry units with manufacturer "X's" condensers only, power pool units only, etc)
- b. unit sizes (eg, 60-90MW, 220-360MW, etc)
- c. unit designation (eg, fossil units only, fossil and nuclear, etc)
- d. time period (eg, calendar years 1967-1976 only, 1972 only, the first through the fifth year of commercial operation, etc)
- e. fuel type (eg, coal only, coal primary, etc)
- f. for additional sample selection categories, refer to the Equipment Availability Reporting Instructions which are available through EEI Headquarters, New York.

All inquiries concerning this publication or questions regarding the Equipment Availability Program should be directed to:

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EDISON ELECTRIC INSTITUTE EQUIPMENT AVAILABILITY
1976 SUMMARY REPORT FOR ALL SYSTEMS
TOTAL NUMBER OF UNIT YEARS IS 15723

PAGE 1 OF 1
Figure 1

ALL UNITS 1967-1976

UNIT YEAR AVERAGES

DESIGNATION OF UNITS	NO OF UNITS	UNIT YEARS	SERVICE HOURS	AVAILABLE HOURS	SERVICE FACTOR %	FORCED OUT RATE % *	EQUIV FOR OUT RATE %	CAPACITY FACTOR %	OUTPUT FACTOR %	EQUIV AVAIL %
FOSSIL	1046	7651	6862.31	7323.90	79.24	5.97	8.31	61.81	79.21	82.17
NUCLEAR	54	218	5857.36	5931.98	71.33	13.18	17.82	58.78	86.26	67.26
GAS TURBINE	640	3443	1041.35	7154.15	12.56	36.41	37.17	10.71	78.07	86.13
JET ENGINE	340	1749	858.80	7258.76	10.22	44.13	51.64	8.03	68.47	84.68
DIESEL	226	1365	798.90	8115.77	9.34	29.50	33.96	6.27	80.08	94.31
HYDRU	170	1078	6045.97	8361.31	69.04	1.57	1.64	38.77	57.60	95.42
PUMPED STORAGE	32	193	2282.24	7291.49	27.08	14.38	14.43	15.16	61.20	86.52
MISCELLANEOUS	11	26	4724.45	5659.49	67.16	7.87	9.03	53.18	81.31	79.19
TOTAL	2519	15723								

UNIT YEAR AVERAGES

DESIGNATION OF UNITS	REL MECH AVAIL UNIT YRS	REL MECH AVAIL %	OPERATING AVAILABILITY %	SCHEDULED OUTAGE RATE % ***	FORCED OUTAGE RATIO %	FORCED OUTAGE INCIDENT RATE %	MEAN TIME BETWEEN FULL FORCED OUTAGES	STARTS NO. NO. NO.	TRIED SUCC	YRS
FOSSIL	3307	Data No	84.57	10.38	32.67	64.19	1057.86	69.8 29.2 739		
NUCLEAR	37	Longer	72.24	16.91	39.04	65.77	841.59	22.9 15.0 74		
GAS TURBINE	730	Collected	86.31	6.48	52.59	55.27	818.56	179.9 148.6 2708		
JET ENGINE	372		86.45	5.46	59.67	47.82	799.52	183.4 156.5 1371		
DIESEL	178		94.96	1.12	77.71	62.47	1071.68	244.7 222.3 641		
HYDRU	530		95.48	3.41	24.43	25.97	3370.06	423.2 183.3 42		
PUMPED STORAGE	36		86.54	8.90	33.80	34.72	1037.71	612.8 604.1 93		
MISCELLANEOUS	5		80.46	13.79	29.40	66.66	1278.88	33.2 19.2 9		
TOTAL	5195									

UNIT YEAR AVERAGES

DESIGNATION OF UNITS	FORCED OUTAGES				MAINTENANCE OUTAGE				PLANNED OUTAGES			
	NO OF OCC	OUTAGE HOURS	** MANHOURS	HOURS WAIT	NO OF OCC	OUTAGE HOURS	** MANHOURS	HOURS WAIT	NO OF OCC	OUTAGE HOURS	** MANHOURS	HOURS WAIT
FOSSIL	8.18	436.31	2965.44	11.09	3.27	252.56	2255.05	3.57	1.28	646.62	7418.14	5.08
NUCLEAR	9.75	889.96	5010.91	4.46	2.65	330.72	8794.81	0.26	2.41	1058.62	16986.81	6.92
GAS TURBINE	10.12	596.43	690.97	7.95	6.43	274.91	444.33	3.73	1.76	262.62	299.36	3.20
JET ENGINE	10.50	678.52	946.12	15.69	9.75	259.60	671.17	1.35	1.69	198.81	411.77	3.33
DIESEL	7.97	334.31	36.63	2.43	3.38	60.37	46.66	0.62	1.40	35.51	15.89	0.02
HYDRU	2.59	96.56	74.07	0.23	3.67	67.42	118.07	0.06	3.72	231.24	541.98	0.78
PUMPED STORAGE	8.11	383.30	146.58	0.00	13.64	286.06	475.50	0.00	1.60	464.50	1088.77	0.00
MISCELLANEOUS	5.46	404.07	3648.20	80.92	1.07	136.58	4452.00	3.65	1.65	833.69	6682.80	3.07
TOTAL	8.48	471.75	2101.59	9.30	4.84	230.16	1629.87	2.77	1.63	434.97	4984.54	3.70

* NOT RECOMMENDED AS A MEASURE OF OUTAGE RISK FOR UNITS WITH LOW ANNUAL SERVICE HOURS

** THESE NUMBERS ARE AVERAGED USING THE REL MECH AVAIL UNIT YEARS SHOWN ABOVE

*** COMBINATION OF PLANNED AND MAINTENANCE OUTAGES

Figure 2
Comparison of Fossil Coal-Fired* Units 400 MW and Above to
All Nuclear Units

UNIT YEAR AVERAGES
1967-1976

SAMPLE TABLE

Year of Operation	Fossil-Coal* 400 MW and Above No. of Units	Nuclear No. of Units
1967	16	6
1968	26	7
1969	39	7
1970	51	9
1971	64	11
1972	80	11
1973	93	22
1974	108	42
1975	117	49
1976	123	53

— FOSSIL
- - - NUCLEAR
*Coal Primary Fuel

Figure 2 Continued
**Comparison of Fossil Coal-Fired* Units 400 MW and Above to
 All Nuclear Units**

UNIT YEAR AVERAGES
 1967-1976

— FOSSIL
 - - - NUCLEAR
 *Coal Primary Fuel

-6-

EDISON ELECTRIC INSTITUTE EQUIPMENT AVAILABILITY
COMPOSITE UNIT SUMMARY REPORT 1976
FOSSIL UNITS 1967-1976

PAGE 1 OF 2
Figure 3

SELECTED FOSSIL UNITS NO OF SYSTEMS 119 NO OF UNITS 1046 NO OF UNIT YEARS 7651 NO OF RMA UNIT YEARS 2799

UNIT STATISTICS	CUMULATIVE	CAUSE CODE	FORCED OUTAGE RATE	OPERATING AVAILABILITY	RELATIVE MECH AVAILABILITY	MEAN TIME BETWEEN FULL FORCED OUTAGES
			CUMULATIVE-%	CUMULATIVE-%	CUMULATIVE-%	CUMULATIVE
SERVICE HOURS	52503578.40	BOILER	3.8	88.7	Data No Longer Collected	1508.66
SERVICE FACTOR-%	79.24	TURBINE	1.3	92.8		9091.96
AVAILABLE HOURS	56035163.34	COND.	0.1	97.0		33259.60
CAPACITY FACTOR-%	61.81	GEN.	0.4	95.9		26823.12
OUTPUT FACTOR-%	79.21	OTHER	0.4	97.3		9408.28
EQUIV F.O.R.-%	8.31	UNIT	5.9	84.5		1057.86
SCHEDULED OUT RATE-%	10.38					
FORCED OUT RATIO-%	32.67					
F.O. INCIDENT RATE-%	64.19					
EQUIV AVAILABILITY-%	82.10					

FORCED OUTAGES

MAINTENANCE OUTAGE

CAUSE CODE	UNIT YR AVG				CUMULATIVE				NO OCC	UNIT YR AVG				NO OCC	CUMULATIVE			
	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT		NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT		NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT
BOILER	6	273.58	2587	10	43914	2093131.4	7240672	72892	2	197.46	1686	2	15240	1510732.4	4719428	18681		
SCRBBRS	0	0.18	0	0	32	1369.5	0	0	0	0.11	0	0	21	874.0	0	0		
TURBINE	1	93.69	432	1	7286	716821.1	1208013	7785	1	108.90	494	1	7336	833166.3	1383056	4624		
COND.	0	7.83	39	0	1991	59919.7	108156	436	0	51.09	121	0	3789	390884.5	339844	1001		
REGUL.	0	0.09	0	0	22	666.9	0	0	0	1.19	0	0	44	9067.9	0	0		
GEN.	0	31.13	294	0	2469	238178.7	821604	1039	0	62.49	204	0	3527	478125.2	569770	1634		
OTHER	1	33.19	153	0	7041	253943.4	428267	2752	1	57.48	159	0	4776	439748.2	445368	1398		
UNIT	8	436.32	3504	11	62628	3338270.9	9806712	84904	3	252.57	2664	4	25095	1932376.3	7457466	27338		

PLANNED OUTAGES

NONCURTAILING OUTAGES

CAUSE CODE	UNIT YR AVG				CUMULATIVE				NO OCC	UNIT YR AVG				NO OCC	CUMULATIVE			
	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT		NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT		NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT
BOILER	1	502.21	4984	2	6862	3842390.0	13951227	18255	2	121.72	161	1	13743	931294.9	450859	5935		
SCRBBRS	0	0.59	0	0	13	4540.4	0	0	0	0.00	0	0	1	5.0	0	0		
TURBINE	1	414.17	2322	1	4781	3168800.4	6497892	8394	0	11.34	1	0	409	86757.5	3990	3640		
COND.	0	197.26	386	0	2172	1509260.7	1079908	2127	0	37.36	11	0	2021	285846.0	30209	1679		
REGUL.	0	10.39	0	0	104	79517.3	0	0	0	0.12	0	0	29	952.2	0	0		
GEN.	0	259.17	613	1	2612	1982900.8	1715849	6589	0	7.77	2	0	1040	59416.5	5183	53		
OTHER	0	136.96	460	0	1799	1047899.7	1286927	3573	1	108.60	99	1	4875	830892.6	277750	7134		
UNIT	1	646.62	8764	5	9837	4947317.3	24531803	38938										

** UNIT YEAR AVERAGES OF MAN HOURS AND RELATIVE MECHANICAL AVAILABILITY ARE BASED ON RMA UNIT YEARS

EDISON ELECTRIC INSTITUTE EQUIPMENT AVAILABILITY
COMPOSITE UNIT SUMMARY REPORT 1976
FOSSIL UNITS 1967-1976

PAGE 2 OF 2
Figure 3

SELECTED FOSSIL UNITS NO OF SYSTEMS 119 NO OF UNITS 1046 NO OF UNIT YEARS 7651 NO OF RMA UNIT YEARS 2799

PROBABILITY STATE - COMBINED UNIT

PERCENTAGE AVAILABLE CATEGORIES	UNIT YR AVG						CUMULATIVE							
	FORCED			SCHEDULED			FORCED				SCHEDULED			
	NO	OUTAGE	PERCENT	NO	OUTAGE	PERCENT	NO	DUR	PER	PERCENT	NO	DUR	PER	PERCENT
	OCC	HOURS	OF YEAR	OCC	HOURS	OF YEAR	OCC	OUTAGE	PERIOD	PERIOD	OCC	OUTAGE	PERIOD	PERIOD
FULL OUTAGE	8	436.32	5.03	5	899.19	10.38	62628	53.30	5.03		34932	196.94	10.38	
00.1 - 19.9	0	11.60	0.13	0	3.39	0.03	3408	26.04	0.13		1357	19.13	0.03	
20.0 - 29.9	0	7.19	0.08	0	1.99	0.02	3579	15.36	0.08		1913	7.96	0.02	
30.0 - 39.9	1	12.52	0.14	1	4.04	0.04	6937	13.81	0.14		4639	6.66	0.04	
40.0 - 49.9	2	32.39	0.37	1	11.02	0.12	13804	17.95	0.37		9426	8.94	0.12	
50.0 - 59.9	3	60.10	0.69	2	17.11	0.19	21765	21.12	0.69		13896	9.42	0.19	
60.0 - 69.9	3	59.95	0.69	1	11.86	0.13	25909	17.70	0.69		8224	11.03	0.13	
70.0 - 79.9	5	111.53	1.28	1	15.90	0.18	36989	23.07	1.28		9407	12.92	0.18	
80.0 - 89.9	8	224.66	2.59	1	33.34	0.38	60430	28.44	2.59		11127	22.92	0.38	
90.0 - 99.9	6	231.99	2.67	1	23.90	0.27	47355	37.48	2.67		5243	34.87	0.27	
ECONOMY OUTAGE **		461.58 HOURS			5.33 % OF YEAR			3531584.94 HOURS				5.33 % OF PERIOD		
FULL OPERATION		5987.82 HOURS			69.14 % OF YEAR			45812856.23 HOURS				69.14 % OF PERIOD		

UNIT STARTS NO. OF YEARS 739

	UNIT YR AVG		CUMULATIVE	
	ATTEMPTED	SUCCESSFUL	ATTEMPTED	SUCCESSFUL
	69.88	29.21	51648	21592

** ECONOMY OUTAGE HOURS DERIVED FROM AVAILABLE HOURS - SERVICE HOURS
TOTAL ECONOMY OUTAGE OCCURANCES REPORTED 41019
TOTAL ECONOMY OUTAGE HOURS REPORTED 2527227.79

EDISON ELECTRIC INSTITUTE EQUIPMENT AVAILABILITY
COMPOSITE UNIT SUMMARY REPORT 1976
FOSSIL UNITS 1967-1976 100-199 MW

PAGE 1 OF 2
Figure 4a

SELECTED FOSSIL UNITS NO OF SYSTEMS 101 NO OF UNITS 435 NO OF UNIT YEARS 3475 NO OF RMA UNIT YEARS 1357

UNIT STATISTICS	CUMULATIVE	CAUSE CODE	FORCED OUTAGE RATE	OPERATING AVAILABILITY	RELATIVE MECH AVAILABILITY	MEAN TIME BETWEEN FULL FORCED OUTAGES
			CUMULATIVE-%	CUMULATIVE-%	CUMULATIVE-%	CUMULATIVE
SERVICE HOURS	24668000.83	BOILER	2.9	90.2	Data No Longer Collected	1675.36
SERVICE FACTOR-%	81.11	TURBINE	0.9	93.7		12577.05
AVAILABLE HOURS	26412859.18	COND.	0.0	97.2		38740.52
CAPACITY FACTOR-%	64.81	GEN.	0.2	96.2		36728.63
OUTPUT FACTOR-%	79.60	OTHER	0.2	97.8		15508.06
EQUIV F.O.R.-%	5.91	UNIT	4.4	86.8		1261.51
SCHEDULED OUT RATE-%	9.37					
FORCED OUT RATIO-%	28.71					
F.O. INCIDENT RATE-%	60.84					
EQUIV AVAILABILITY-%	85.20					

FORCED OUTAGES

CAUSE CODE	UNIT YR AVG				CUMULATIVE			
	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT
BOILER	5	219.38	1585	11	18151	762346.1	2150309	39150
SCRBBRS	0	0.06	0	0	6	204.3	0	0
TURBINE	1	68.52	263	2	2417	238116.8	356561	5248
COND.	0	6.56	21	0	784	22786.2	28125	202
REGUL.	0	0.11	0	0	11	372.1	0	0
GEN.	0	20.03	48	0	827	69619.1	64744	609
UTHER	1	20.23	90	0	1960	70298.8	122652	1700
UNIT	7	330.44	2006	13	24106	1148287.1	2722391	46909

MAINTENANCE OUTAGE

CAUSE CODE	UNIT YR AVG				CUMULATIVE			
	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT
BOILER	2	158.62	1160	3	6784	551206.3	1573914	10663
SCRBBRS	0	0.08	0	0	8	283.6	0	0
TURBINE	1	84.20	345	1	2914	292607.9	467801	2539
COND.	0	43.07	105	0	1602	149671.9	143061	453
REGUL.	0	1.65	0	0	27	5720.2	0	0
GEN.	0	51.93	171	0	1364	180444.7	232489	750
UTHER	1	42.05	70	0	1920	146136.2	94986	637
UNIT	3	209.12	1851	4	10957	726694.6	2512251	15042

PLANNED OUTAGES

CAUSE CODE	UNIT YR AVG				CUMULATIVE			
	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT
BOILER	1	475.59	4244	3	3181	1652681.8	5758956	9739
SCRBBRS	0	0.15	0	0	3	533.3	0	0
TURBINE	1	390.74	1871	2	2189	1357815.0	2538585	5703
COND.	0	190.67	310	0	1064	662562.3	420889	947
REGUL.	0	8.14	0	0	43	28271.3	0	0
GEN.	0	254.14	447	1	1251	883139.2	605930	3703
OTHER	0	122.99	233	1	806	427379.4	316675	1779
UNIT	1	611.07	7105	6	4557	2123471.0	9641035	21871

NONCURTAILING OUTAGES

CAUSE CODE	UNIT YR AVG				CUMULATIVE			
	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT
BOILER	1	75.21	70	0	3756	261349.8	95043	981
SCRBBRS	0	0.00	0	0	0	0.0	0	0
TURBINE	0	17.13	1	1	241	59519.5	1743	3640
COND.	0	37.03	12	0	848	128687.8	16694	641
REGUL.	0	0.00	0	0	0	0.0	0	0
GEN.	0	6.16	3	0	743	21412.0	3871	48
OTHER	1	148.38	36	1	2523	515621.4	48941	4235

** UNIT YEAR AVERAGES OF MAN HOURS AND RELATIVE MECHANICAL AVAILABILITY ARE BASED ON RMA UNIT YEARS

EDISON ELECTRIC INSTITUTE EQUIPMENT AVAILABILITY
COMPOSITE UNIT SUMMARY REPORT 1976
FOSSIL UNITS 1967-1976 100-199 MW

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Figure 4a

SELECTED FOSSIL UNITS NO OF SYSTEMS 101 NO OF UNITS 435 NO OF UNIT YEARS 3475 NO OF RMA UNIT YEARS 1357

PROBABILITY STATE - COMBINED UNIT

PERCENTAGE AVAILABLE CATEGORIES	UNIT YR AVG						CUMULATIVE							
	FORCED			SCHEDULED			FORCED			SCHEDULED				
	NO OCC	OUTAGE HOURS	PERCENT OF YEAR	NO OCC	OUTAGE HOURS	PERCENT OF YEAR	NO OCC	DUR OUTAGE	PER PERIOD	PERCENT PERIOD	NO OCC	DUR OUTAGE	PER PERIOD	PERCENT PERIOD
FULL OUTAGE	7	330.44	3.77	4	820.19	9.37	24106	47.63	3.77		15514	183.71	9.37	
00.1 - 19.9	0	8.08	0.09	0	1.79	0.02	876	32.05	0.09		362	17.17	0.02	
20.0 - 29.9	0	4.39	0.05	0	2.36	0.02	1124	13.58	0.05		1044	7.83	0.02	
30.0 - 39.9	1	9.41	0.10	0	2.89	0.03	2483	13.16	0.10		1697	5.92	0.03	
40.0 - 49.9	1	25.41	0.29	1	10.38	0.11	4964	17.78	0.29		4401	8.19	0.11	
50.0 - 59.9	2	39.42	0.45	2	13.66	0.15	7447	18.39	0.45		6875	6.90	0.15	
60.0 - 69.9	2	36.88	0.42	1	9.78	0.11	6494	19.73	0.42		3358	10.11	0.11	
70.0 - 79.9	3	66.73	0.76	1	16.20	0.18	10803	21.46	0.76		3676	15.31	0.18	
80.0 - 89.9	3	118.81	1.35	1	20.13	0.23	12087	34.15	1.35		2793	25.04	0.23	
90.0 - 99.9	3	151.51	1.73	0	10.88	0.12	9374	56.16	1.73		896	42.19	0.12	
ECONOMY OUTAGE **	502.12 HOURS			5.73 % OF YEAR			1744858.35 HOURS			5.73 % OF PERIOD				
FULL OPERATION	6549.99 HOURS			74.84 % OF YEAR			22761245.78 HOURS			74.84 % OF PERIOD				

UNIT STARTS NO. OF YEARS 265

	UNIT YR AVG		CUMULATIVE	
	ATTEMPTED	SUCCESSFUL	ATTEMPTED	SUCCESSFUL
	81.30	28.52	21547	7559

** ECONOMY OUTAGE HOURS DERIVED FROM AVAILABLE HOURS - SERVICE HOURS
TOTAL ECONOMY OUTAGE OCCURANCES REPORTED 25813
TOTAL ECONOMY OUTAGE HOURS REPORTED 1566107.30

EDISON ELECTRIC INSTITUTE EQUIPMENT AVAILABILITY
COMPOSITE UNIT SUMMARY REPORT 1976
FOSSIL UNITS 1967-1976 200-299 MW

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Figure 4b

SELECTED	FOSSIL UNITS	NO OF SYSTEMS	70	NO OF UNITS	169	NO OF UNIT YEARS	1242	NO OF RMA UNIT YEARS	515
UNIT STATISTICS				CAUSE CODE	FORCED OUTAGE RATE	OPERATING AVAILABILITY	RELATIVE MECH AVAILABILITY	MEAN TIME BETWEEN FULL FORCED OUTAGES	
-----		-----		-----	-----	-----	-----	-----	
	CUMULATIVE			CUMULATIVE-%	CUMULATIVE-%	CUMULATIVE-%	CUMULATIVE-%	CUMULATIVE	
	-----			-----	-----	-----	-----	-----	
SERVICE HOURS	9076930.71	BOILER		3.9	88.4	Data No Longer Collected		1444.17	
SERVICE FACTOR-%	83.82	TURBINE		1.2	93.2		11719.03		
AVAILABLE HOURS	9235116.76	COND.		0.0	96.9		47492.94		
CAPACITY FACTOR-%	68.95	GEN.		0.2	96.1		32420.33		
QUTPUT FACTOR-%	82.42	OTHER		0.3	97.8		13014.89		
EQUIV F.O.R.-%	7.99	UNIT		5.7	85.2		1105.50		
SCHEDULED OUT RATE-%	9.60								
FORCED OUT RATIO-%	34.69								
F.O. INCIDENT RATE-%	65.63								
EQUIV AVAILABILITY-%	82.70								

FORCED OUTAGES									MAINTENANCE OUTAGE							
UNIT YR AVG				CUMULATIVE					UNIT YR AVG				CUMULATIVE			
CAUSE CODE	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT
BOILER	6	303.73	1781	12	7497	377228.0	917353	14398	2	213.82	2049	3	2369	265567.6	1055150	3213
SCRBBRS	0	0.01	0	0	2	6.7	0	0	0	0.00	0	0	0	0.0	0	0
TURBINE	1	94.65	202	1	923	117553.2	104047	892	1	117.42	506	0	1223	145837.9	260448	614
COND.	0	4.70	13	0	227	5837.0	6642	68	0	58.08	144	0	512	72133.1	74127	166
REGUL.	0	0.00	0	0	0	0.0	0	0	0	0.07	0	0	4	91.0	0	0
GEN.	0	16.71	128	0	333	20752.0	66090	70	0	65.32	170	0	530	81130.4	87314	316
OTHER	1	26.49	38	0	831	32900.9	19514	218	1	53.43	147	0	630	66360.8	75813	298
UNIT	8	445.10	2162	13	9794	552814.7	1113646	15646	3	260.79	3015	4	3680	323898.2	1552852	4607

PLANNED OUTAGES									NONCURTAILING OUTAGES							
UNIT YR AVG				CUMULATIVE					UNIT YR AVG				CUMULATIVE			
CAUSE CODE	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT
BOILER	1	488.57	4767	2	1082	606807.4	2455045	3059	2	147.42	100	0	2816	183095.4	51513	168
SCRBBRS	0	0.00	0	0	1	5.9	0	0	0	0.00	0	0	0	0.0	0	0
TURBINE	1	373.90	2054	1	741	464389.3	1057824	943	0	0.98	0	0	43	1219.3	52	0
COND.	0	206.93	380	0	377	257009.2	195446	538	0	29.41	3	0	200	36522.6	1788	8
REGUL.	0	9.25	0	0	19	11484.2	0	0	0	0.00	0	0	0	0.0	0	0
GEN.	0	257.93	725	2	437	320348.7	373392	2022	0	17.62	1	0	193	21888.7	680	0
OTHER	0	103.21	223	0	268	128185.4	115072	166	0	69.56	51	0	608	86399.4	26136	267
UNIT	1	576.94	8149	5	1448	716562.2	4196779	6728								

** UNIT YEAR AVERAGES OF MAN HOURS AND RELATIVE MECHANICAL AVAILABILITY ARE BASED ON RMA UNIT YEARS

EDISON ELECTRIC INSTITUTE EQUIPMENT AVAILABILITY
COMPOSITE UNIT SUMMARY REPORT 1976
FOSSIL UNITS 1967-1976 200-299 MW

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Figure 4b

SELECTED FOSSIL UNITS NO OF SYSTEMS 70 NO OF UNITS 169 NO OF UNIT YEARS 1242 NO OF RMA UNIT YEARS 515

PROBABILITY STATE - COMBINED UNIT

PERCENTAGE AVAILABLE CATEGORIES	UNIT YR AVG						CUMULATIVE					
	FORCED			SCHEDULED			FORCED			SCHEDULED		
	NO OCC	OUTAGE HOURS	PERCENT OF YEAR	NO OCC	OUTAGE HOURS	PERCENT OF YEAR	NO OCC	DUR PER OUTAGE	PERCENT PERIOD	NO OCC	DUR PER OUTAGE	PERCENT PERIOD
FULL OUTAGE	8	445.10	5.10	4	837.73	9.60	9794	56.44	5.10	5128	202.89	9.60
00.1 - 19.9	1	8.08	0.09	0	3.71	0.04	785	12.78	0.09	178	25.85	0.04
20.0 - 29.9	1	6.86	0.07	0	1.62	0.01	922	9.23	0.07	321	6.27	0.01
30.0 - 39.9	1	14.31	0.16	1	6.50	0.07	1510	11.76	0.16	991	8.14	0.07
40.0 - 49.9	2	36.37	0.41	2	15.69	0.17	2662	16.97	0.41	1922	10.13	0.17
50.0 - 59.9	3	63.33	0.72	2	19.92	0.22	3336	23.57	0.72	1927	12.84	0.22
60.0 - 69.9	5	67.86	0.77	1	12.78	0.14	6467	13.03	0.77	1728	9.18	0.14
70.0 - 79.9	5	112.30	1.28	2	17.34	0.19	5656	24.65	1.28	2100	10.25	0.19
80.0 - 89.9	9	240.90	2.76	2	42.52	0.48	11024	27.14	2.76	1899	27.80	0.48
90.0 - 99.9	5	160.92	1.84	1	35.10	0.40	6079	32.87	1.84	688	63.36	0.40
ECONOMY OUTAGE **	127.36 HOURS			1.46 % OF YEAR			158186.05 HOURS			1.46 % OF PERIOD		
FULL OPERATION	6442.21 HOURS			73.89 % OF YEAR			8001230.19 HOURS			73.89 % OF PERIOD		

UNIT STARTS NO. OF YEARS 88

	UNIT YR AVG		CUMULATIVE	
	ATTEMPTED	SUCCESSFUL	ATTEMPTED	SUCCESSFUL
	110.47	24.72	9722	2176

** ECONOMY OUTAGE HOURS DERIVED FROM AVAILABLE HOURS - SERVICE HOURS
TOTAL ECONOMY OUTAGE OCCURANCES REPORTED 2837
TOTAL ECONOMY OUTAGE HOURS REPORTED 144037.64

EDISON ELECTRIC INSTITUTE EQUIPMENT AVAILABILITY
COMPOSITE UNIT SUMMARY REPORT 1976
FOSSIL UNITS 1967-1976 300-399 MW

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Figure 4c

SELECTED FOSSIL UNITS NO OF SYSTEMS 60 NO OF UNITS 126 NO OF UNIT YEARS 766 NO OF RMA UNIT YEARS 303

UNIT STATISTICS	CUMULATIVE	CAUSE CODE	FORCED OUTAGE RATE	OPERATING AVAILABILITY	RELATIVE MECH AVAILABILITY	MEAN TIME BETWEEN FULL FORCED OUTAGES
			CUMULATIVE-%	CUMULATIVE-%	CUMULATIVE-%	CUMULATIVE
SERVICE HOURS	5076186.47	BOILER	4.9	85.4	Data No	1249.33
SERVICE FACTOR-%	77.77	TURBINE	2.0	90.5	Longer	6367.35
AVAILABLE HOURS	5232175.59	COND.	0.1	95.9	Collected	23392.60
CAPACITY FACTOR-%	60.94	GEN.	0.4	94.7		22199.10
OUTPUT FACTOR-%	78.46	OTHER	0.7	95.2		6361.14
EQUIV F.O.R.-%	12.22	UNIT	7.9	80.1		833.21
SCHEDULED OUT RATE-%	13.12					
FORCED OUT RATIO-%	33.82					
F.O. INCIDENT RATE-%	63.56					
EQUIV AVAILABILITY-%	75.80					

FORCED OUTAGES

MAINTENANCE OUTAGE

CAUSE CODE	UNIT YR AVG				CUMULATIVE				CAUSE CODE	UNIT YR AVG				CUMULATIVE			
	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT		NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT
BOILER	7	344.52	5439	9	5223	263902.0	1647894	7071	3	279.50	2328	2	2091	214098.9	705481	1743	
SCRBBRS	0	1.19	0	0	14	912.5	0	0	0	0.14	0	0	2	109.9	0	0	
TURBINE	1	137.97	856	0	1024	105686.4	259386	245	1	165.31	854	1	1129	126623.7	258879	690	
COND.	0	12.34	125	0	278	9456.1	37940	90	1	74.72	179	0	512	57237.9	54315	197	
REGUL.	0	0.13	0	0	1	97.5	0	0	0	0.86	0	0	6	658.3	0	0	
GEN.	0	29.44	100	0	293	22553.0	30270	71	1	80.98	165	0	533	62033.7	50021	234	
OTHER	1	48.87	671	0	1025	37436.8	203237	93	1	110.69	457	0	924	84786.2	138378	239	
UNIT	10	571.58	7191	10	7832	437827.8	2178727	7570	4	338.13	3984	4	3335	259004.1	1207074	3103	

PLANNED OUTAGES

NONCURTAILING OUTAGES

CAUSE CODE	UNIT YR AVG				CUMULATIVE				UNIT YR AVG				CUMULATIVE			
	NO	OUTAGE	MAN	HRS	NO	OUTAGE	MAN	HOURS	NO	OUTAGE	MAN	HRS	NO	OUTAGE	MAN	HOURS
	OCC	HOURS	HOURS	WAIT	OCC	HOURS	HOURS	WAIT	OCC	HOURS	HOURS	WAIT	OCC	HOURS	HOURS	WAIT
BOILER	1	619.44	7856	2	770	474491.2	2380445	1317	4	306.03	276	3	3389	234418.2	83565	2174
SCRBBRS	0	1.50	0	0	6	1148.1	0	0	0	0.00	0	0	0	0.0	0	0
TURBINE	1	503.85	3508	1	549	385948.0	1062940	444	0	19.64	0	0	92	15040.6	105	0
COND.	0	261.54	828	0	230	200342.7	250851	158	0	87.18	21	0	370	66776.8	6408	10
REGUL.	0	7.60	0	0	8	5824.9	0	0	0	0.00	0	0	0	0.0	0	0
GEN.	0	333.77	960	0	301	255665.8	290746	309	0	3.12	1	0	38	2389.5	451	5
OTHER	0	241.72	1061	1	264	185155.9	321601	1115	1	104.97	49	0	548	80406.4	14859	44
UNIT	2	780.06	14213	4	1155	597528.4	4306583	3343								

** UNIT YEAR AVERAGES OF MAN HOURS AND RELATIVE MECHANICAL AVAILABILITY ARE BASED ON RMA UNIT YEARS

EDISON ELECTRIC INSTITUTE EQUIPMENT AVAILABILITY
COMPOSITE UNIT SUMMARY REPORT 1976
FOSSIL UNITS 1967-1976 300-399 MW

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Figure 4c

SELECTED FOSSIL UNITS NO OF SYSTEMS 60 NO OF UNITS 126 NO OF UNIT YEARS 766 NO OF RMA UNIT YEARS 303

PROBABILITY STATE - COMBINED UNIT

PERCENTAGE AVAILABLE CATEGORIES	UNIT YR AVG						CUMULATIVE					
	FORCED			SCHEDULED			FORCED			SCHEDULED		
	NO OCC	OUTAGE HOURS	PERCENT OF YEAR	NO OCC	OUTAGE HOURS	PERCENT OF YEAR	NO OCC	DUR PER OUTAGE	PERCENT PERIOD	NO OCC	DUR PER OUTAGE	PERCENT PERIOD
FULL OUTAGE	10	571.58	6.70	6	1118.19	13.12	7832	55.90	6.70	4490	190.76	13.12
00.1 - 19.9	1	32.33	0.37	1	6.23	0.07	584	42.39	0.37	510	9.35	0.07
20.0 - 29.9	1	21.22	0.24	0	3.98	0.04	570	28.52	0.24	372	8.19	0.04
30.0 - 39.9	1	17.98	0.21	1	7.26	0.08	716	19.23	0.21	742	7.49	0.08
40.0 - 49.9	2	42.09	0.49	2	13.10	0.15	1682	19.16	0.49	1403	7.15	0.15
50.0 - 59.9	3	87.16	1.02	3	21.91	0.25	2611	25.56	1.02	2039	8.22	0.25
60.0 - 69.9	4	113.47	1.33	2	18.94	0.22	2804	30.99	1.33	1190	12.19	0.22
70.0 - 79.9	6	184.92	2.17	2	27.34	0.32	4725	29.97	2.17	1738	12.04	0.32
80.0 - 89.9	11	423.96	4.97	3	68.17	0.80	8429	38.52	4.97	2188	23.86	0.80
90.0 - 99.9	9	447.55	5.25	1	54.56	0.64	7188	47.69	5.25	897	46.59	0.64
ECONOMY OUTAGE **	203.64 HOURS			2.39 % OF YEAR			155989.12 HOURS			2.39 % OF PERIOD		
FULL OPERATION	5034.71 HOURS			59.09 % OF YEAR			3856592.29 HOURS			59.09 % OF PERIOD		

UNIT STARTS NO. OF YEARS 121

	UNIT YR AVG		CUMULATIVE	
	ATTEMPTED	SUCCESSFUL	ATTEMPTED	SUCCESSFUL
	82.76	24.10	10014	2917

** ECONOMY OUTAGE HOURS DERIVED FROM AVAILABLE HOURS - SERVICE HOURS
TOTAL ECONOMY OUTAGE OCCURANCES REPORTED 2853
TOTAL ECONOMY OUTAGE HOURS REPORTED 124040.88

EDISON ELECTRIC INSTITUTE EQUIPMENT AVAILABILITY
COMPOSITE UNIT SUMMARY REPORT 1976
FOSSIL UNITS 1967-1976 400-599 MW

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Figure 4d

SELECTED	FOSSIL UNITS	NO OF SYSTEMS	61	NO OF UNITS	145	NO OF UNIT YEARS	731	NO OF RMA UNIT YEARS	282
UNIT STATISTICS					FORCED OUTAGE RATE	OPERATING AVAILABILITY	RELATIVE MECH AVAILABILITY	MEAN TIME BETWEEN FULL FORCED OUTAGES	
-----				CAUSE CODE	-----	-----	-----	-----	
		CUMULATIVE			CUMULATIVE-%	CUMULATIVE-%	CUMULATIVE-%	CUMULATIVE	
		-----		-----	-----	-----	-----	-----	
SERVICE HOURS		4694509.58		BOILER	5.8	84.7			1131.60
SERVICE FACTOR-%		75.96		TURBINE	2.3	89.3	Data No		4916.21
AVAILABLE HOURS		4817787.29		COND.	0.2	95.8	Longer		25965.07
CAPACITY FACTOR-%		59.51		GEN.	0.7	94.4	Collected		14574.73
OUTPUT FACTOR-%		78.42		OTHER	1.0	95.5			4212.46
EQUIV F.O.R.-%		13.18		UNIT	9.6	77.9			699.61
SCHEDULED OUT RATE-%		13.93							
FORCED OUT RATIO-%		36.78							
F.O. INCIDENT RATE-%		71.36							
EQUIV AVAILABILITY-%		74.50							

FORCED OUTAGES									MAINTENANCE OUTAGE							
UNIT YR AVG					CUMULATIVE				UNIT YR AVG				CUMULATIVE			
CAUSE CODE	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT
BOILER	7	402.02	7086	7	5460	293878.2	1998392	5189	2	293.39	2762	2	1435	214469.2	778907	1206
SCRBRS	0	0.08	0	0	1	57.0	0	0	0	0.00	0	0	0	0.0	0	0
TURBINE	2	154.24	848	1	1256	112747.8	239270	427	1	182.64	761	1	813	133506.7	214622	369
COND.	0	15.79	97	0	237	11540.1	27475	60	0	61.08	107	0	280	44647.0	30197	49
REGUL.	0	0.07	0	0	5	54.3	0	0	0	2.47	0	0	4	1806.8	0	0
GEN.	1	48.55	143	0	423	35488.5	40426	168	0	89.16	234	0	299	65173.9	65920	47
OTHER	2	68.29	201	1	1466	49921.4	56618	437	1	83.02	216	0	461	60684.1	60914	112
UNIT	12	685.30	8377	9	8832	500951.8	2362181	6281	3	366.83	4080	2	2448	268152.3	1150560	1783

PLANNED OUTAGES									NONCURTAILING OUTAGES							
UNIT YR AVG					CUMULATIVE				UNIT YR AVG				CUMULATIVE			
CAUSE CODE	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT
BOILER	1	593.51	5896	3	685	433856.5	1662633	2403	1	55.79	61	0	568	40781.9	17249	8
SCRBRS	0	0.00	0	0	0	0.0	0	0	0	0.00	0	0	0	0.0	0	0
TURBINE	1	560.36	3876	1	604	409620.4	1093076	414	0	0.05	0	0	7	34.6	40	0
COND.	0	269.79	436	0	231	197220.0	122986	116	0	10.66	1	0	140	7796.0	144	0
REGUL.	0	7.36	0	0	6	5383.0	0	0	0	0.00	0	0	0	0.0	0	0
GEN.	0	333.98	997	0	277	244142.0	281126	188	0	0.01	0	0	1	7.8	0	0
OTHER	0	225.14	1508	0	233	164577.9	425174	211	0	42.00	12	1	189	30703.0	3519	613
UNIT	1	810.94	12713	5	1095	592796.5	3584995	3332								

** UNIT YEAR AVERAGES OF MAN HOURS AND RELATIVE MECHANICAL AVAILABILITY ARE BASED ON RMA UNIT YEARS

EDISON ELECTRIC INSTITUTE EQUIPMENT AVAILABILITY
COMPOSITE UNIT SUMMARY REPORT 1976
FOSSIL UNITS 1967-1976 400-599 MW

PAGE 2 OF 2
Figure 4d

SELECTED FOSSIL UNITS NO OF SYSTEMS 61 NO OF UNITS 145 NO OF UNIT YEARS 731 NO OF RMA UNIT YEARS 282

PROBABILITY STATE - COMBINED UNIT

PERCENTAGE AVAILABLE CATEGORIES	UNIT YR AVG						CUMULATIVE					
	FORCED			SCHEDULED			FORCED			SCHEDULED		
	NO OCC	OUTAGE HOURS	PERCENT OF YEAR	NO OCC	OUTAGE HOURS	PERCENT OF YEAR	NO OCC	DUR PER OUTAGE	PERCENT PERIOD	NO OCC	DUR PER OUTAGE	PERCENT PERIOD
FULL OUTAGE	12	685.30	8.10	5	1177.77	13.93	8832	56.72	8.10	3543	242.99	13.93
00.1 - 19.9	1	17.03	0.20	0	8.26	0.09	471	26.42	0.20	180	33.54	0.09
20.0 - 29.9	1	12.23	0.14	0	1.15	0.01	470	19.02	0.14	68	12.39	0.01
30.0 - 39.9	1	20.18	0.23	0	3.00	0.03	1009	14.61	0.23	169	12.98	0.03
40.0 - 49.9	2	33.84	0.40	1	8.88	0.10	1546	16.00	0.40	677	9.58	0.10
50.0 - 59.9	4	102.11	1.20	2	22.18	0.26	3128	23.86	1.20	1104	14.68	0.26
60.0 - 69.9	4	67.42	0.79	1	10.28	0.12	2682	18.37	0.79	516	14.56	0.12
70.0 - 79.9	7	171.18	2.02	1	16.08	0.19	5119	24.44	2.02	863	13.61	0.19
80.0 - 89.9	13	355.66	4.20	3	47.84	0.56	9715	26.76	4.20	1979	17.67	0.56
90.0 - 99.9	11	385.40	4.55	2	40.50	0.47	7839	35.93	4.55	1303	22.71	0.47
ECONOMY OUTAGE **	168.64 HOURS			1.99 % OF YEAR			123277.71 HOURS			1.99 % OF PERIOD		
FULL OPERATION	5098.80 HOURS			60.31 % OF YEAR			3727225.69 HOURS			60.31 % OF PERIOD		

UNIT STARTS NO. OF YEARS 109

	UNIT YR AVG		CUMULATIVE	
	ATTEMPTED	SUCCESSFUL	ATTEMPTED	SUCCESSFUL
	34.44	29.68	3755	3236

** ECONOMY OUTAGE HOURS DERIVED FROM AVAILABLE HOURS - SERVICE HOURS
TOTAL ECONOMY OUTAGE OCCURANCES REPORTED 951
TOTAL ECONOMY OUTAGE HOURS REPORTED 48719.62

EDISON ELECTRIC INSTITUTE EQUIPMENT AVAILABILITY
COMPOSITE UNIT SUMMARY REPORT 1976
FUSSIL UNITS 1967-1976 600-799 MW

PAGE 1 OF 2
Figure 4e

SELECTED	FUSSIL UNITS	NO OF SYSTEMS	32	NO OF UNITS	75	NO OF UNIT YEARS	329	NO OF RMA UNIT YEARS	94
UNIT STATISTICS					CAUSE CODE	FORCED OUTAGE RATE	OPERATING AVAILABILITY	RELATIVE MECH AVAILABILITY	MEAN TIME BETWEEN FULL FORCED OUTAGES
	CUMULATIVE					CUMULATIVE-%	CUMULATIVE-%	CUMULATIVE-%	CUMULATIVE
SERVICE HOURS	1934000.85				BOILER	7.9	82.4	Data No Longer Collected	829.89
SERVICE FACTOR-%	71.55				TURBINE	3.1	89.2		3594.35
AVAILABLE HOURS	1989060.13				COND.	0.2	96.7		19874.64
CAPACITY FACTOR-%	56.88				GEN.	2.5	92.7		11404.86
OUTPUT FACTOR-%	79.48				OTHER	1.5	95.3		3003.28
EQUIV F.O.R.-%	19.88				UNIT	13.8	73.5		511.92
SCHEDULED OUT RATE-%	14.88								
FORCED OUT RATIO-%	43.65								
F.O. INCIDENT RATE-%	76.48								
EQUIV AVAILABILITY-%	67.90								

FORCED OUTAGES

MAINTENANCE OUTAGE

CAUSE CODE	UNIT YR AVG				CUMULATIVE				CAUSE CODE	UNIT YR AVG				CUMULATIVE			
	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT		NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT
BOILER	10	505.46	3882	7	3256	166295.0	364893	2448	2	257.14	4098	1	639	84599.3	385233	466	
SCRBBRS	0	0.57	0	0	8	187.2	0	0	0	1.31	0	0	7	432.4	0	0	
TURBINE	2	189.46	2195	1	751	62333.6	206336	396	1	146.66	1195	0	481	48251.5	112334	83	
COND.	0	13.13	18	0	135	4319.1	1700	0	0	81.61	102	0	118	26848.1	9557	4	
REGUL.	0	0.39	0	0	2	129.1	0	0	0	2.41	0	0	3	791.4	0	0	
GEN.	1	156.02	250	0	236	51330.8	23529	105	0	110.56	554	0	149	36373.5	52038	63	
OTHER	3	91.57	159	1	899	30126.3	14940	220	1	121.24	478	0	272	39887.5	44906	63	
UNIT	16	947.21	6504	10	5279	311630.5	611398	3169	3	328.51	6426	2	1090	108081.0	604068	679	

PLANNED OUTAGES

NONCURTAILING OUTAGES

CAUSE CODE	UNIT YR AVG				CUMULATIVE				CAUSE CODE	UNIT YR AVG				CUMULATIVE			
	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT		NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT
BOILER	1	681.07	8029	0	364	224072.1	754711	130	4	170.63	79	7	1285	56137.2	7410	2214	
SCRBBRS	0	4.38	0	0	1	1440.8	0	0	0	0.00	0	0	0	0.0	0	0	
TURBINE	1	543.96	3851	1	230	178963.2	361950	190	0	0.39	0	0	2	129.3	0	0	
COND.	0	175.49	221	0	58	57734.8	20781	8	1	90.69	40	3	212	29836.2	3758	1018	
REGUL.	0	58.20	0	0	17	19146.2	0	0	0	2.82	0	0	27	929.2	0	0	
GEN.	0	326.23	876	0	107	107331.2	82312	8	0	0.00	0	0	0	0.0	0	0	
OTHER	0	171.42	676	0	82	56397.9	63509	0	1	54.03	98	6	241	17774.8	9245	1968	
UNIT	2	894.16	13652	1	533	294180.2	1283263	336									

** UNIT YEAR AVERAGES OF MAN HOURS AND RELATIVE MECHANICAL AVAILABILITY ARE BASED ON RMA UNIT YEARS

EDISON ELECTRIC INSTITUTE EQUIPMENT AVAILABILITY
COMPOSITE UNIT SUMMARY REPORT 1976
FOSSIL UNITS 1967-1976 600-799 MW

PAGE 2 OF 2
Figure 4e

SELECTED FOSSIL UNITS NO OF SYSTEMS 32 NO OF UNITS 75 NO OF UNIT YEARS 329 NO OF RMA UNIT YEARS 94

PROBABILITY STATE - COMBINED UNIT

PERCENTAGE AVAILABLE CATEGORIES	UNIT YR AVG						CUMULATIVE						
	FORCED			SCHEDULED			FORCED				SCHEDULED		
	NO OCC	OUTAGE HOURS	PERCENT OF YEAR	NO OCC	OUTAGE HOURS	PERCENT OF YEAR	NO OCC	DUR OUTAGE	PER PERIOD	PERCENT PERIOD	NO OCC	DUR OUTAGE	PERCENT PERIOD
FULL OUTAGE	16	947.21	11.52	5	1222.68	14.88	5279	59.03	11.52		1623	247.85	14.88
00.1 - 19.9	1	9.84	0.11	0	1.33	0.01	342	9.46	0.11		61	7.19	0.01
20.0 - 29.9	1	9.47	0.11	0	1.29	0.01	232	13.43	0.11		49	8.64	0.01
30.0 - 39.9	2	26.95	0.32	3	10.16	0.12	681	13.02	0.32		871	3.83	0.12
40.0 - 49.9	5	81.26	0.98	2	16.52	0.20	1568	17.04	0.98		518	10.49	0.20
50.0 - 59.9	8	163.32	1.98	2	30.01	0.36	2596	20.69	1.98		750	13.16	0.36
60.0 - 69.9	13	164.66	2.00	2	15.50	0.18	4396	12.32	2.00		535	9.53	0.18
70.0 - 79.9	15	246.57	3.00	1	14.34	0.17	4993	16.24	3.00		432	10.91	0.17
80.0 - 89.9	33	654.33	7.96	4	66.28	0.80	10775	19.97	7.96		1247	17.48	0.80
90.0 - 99.9	26	548.46	6.67	2	43.07	0.52	8643	20.87	6.67		798	17.75	0.52

ECONOMY OUTAGE ** 167.35 HOURS 2.03 % OF YEAR 55059.28 HOURS 2.03 % OF PERIOD
FULL OPERATION 3775.05 HOURS 45.94 % OF YEAR 1241994.69 HOURS 45.94 % OF PERIOD

UNIT STARTS NO. OF YEARS 69

	UNIT YR AVG		CUMULATIVE	
	ATTEMPTED	SUCCESSFUL	ATTEMPTED	SUCCESSFUL
	31.79	25.36	2194	1750

** ECONOMY OUTAGE HOURS DERIVED FROM AVAILABLE HOURS - SERVICE HOURS
TOTAL ECONOMY OUTAGE OCCURANCES REPORTED 270
TOTAL ECONOMY OUTAGE HOURS REPORTED 24225.03

EDISON ELECTRIC INSTITUTE EQUIPMENT AVAILABILITY
COMPOSITE UNIT SUMMARY REPORT 1976
FOSSIL UNITS 1967-1976 800 MW + ABOVE

PAGE 1 OF 2
Figure 4f

SELECTED	FOSSIL UNITS	NO OF SYSTEMS	18	NO OF UNITS	38	NO OF UNIT YEARS	145	NO OF RMA UNIT YEARS	21
UNIT STATISTICS					CAUSE CODE	FORCED OUTAGE RATE	OPERATING AVAILABILITY	RELATIVE MECH AVAILABILITY	MEAN TIME BETWEEN FULL FORCED OUTAGES
	CUMULATIVE				CUMULATIVE	CUMULATIVE-%	CUMULATIVE-%	CUMULATIVE-%	CUMULATIVE
SERVICE HOURS	836834.52				BOILER	10.8	82.0	Data No	699.24
SERVICE FACTOR-%	70.35				TURBINE	3.5	90.4	Longer	2355.27
AVAILABLE HOURS	881342.78				COND.	0.1	96.8	Collected	24779.50
CAPACITY FACTOR-%	57.47				GEN.	1.9	93.7		7342.07
OUTPUT FACTOR-%	81.74				OTHER	1.1	96.3		2437.32
EQUIV F.O.R.-%	22.83				UNIT	16.1	74.0		410.42
SCHEDULED OUT RATE-%	12.38								
FORCED OUT RATIO-%	52.17								
F.O. INCIDENT RATE-%	83.82								
EQUIV AVAILABILITY-%	67.50								

FORCED OUTAGES

MAINTENANCE OUTAGE

CAUSE CODE	UNIT YR AVG				CUMULATIVE				CAUSE CODE	UNIT YR AVG				CUMULATIVE			
	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT		NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT
BOILER	12	703.48	3433	2	1700	102005.1	72087	228	1	278.48	3163	0	0	217	40379.0	66413	72
SCRBBRS	0	0.01	0	0	1	1.6	0	0	0	0.00	0	0	0	0	0.0	0	0
TURBINE	3	214.76	1122	2	504	31140.5	23561	331	1	233.56	1653	0	0	158	33865.5	34713	38
COND.	0	10.19	154	0	47	1476.9	3231	0	0	76.11	463	0	0	60	11035.5	9732	0
REGUL.	0	0.01	0	0	1	1.1	0	0	0	0.00	0	0	0	0	0.0	0	0
GEN.	1	115.03	24057	0	161	16679.2	505196	4	1	140.96	2244	0	0	83	20439.5	47126	4
OTHER	3	69.88	70	0	487	10132.7	1474	48	1	112.99	757	0	0	108	16383.2	15891	0
UNIT	20	1108.54	28836	4	2897	160738.0	605549	611	3	334.39	8280	1	1	413	48486.6	173875	114

PLANNED OUTAGES

NONCURTAILING OUTAGES

CAUSE CODE	UNIT YR AVG				CUMULATIVE				CAUSE CODE	UNIT YR AVG				CUMULATIVE			
	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT		NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT
BOILER	1	493.94	13859	0	103	71621.4	291047	4	9	842.47	0	0	0	1365	122157.9	0	0
SCRBBRS	0	7.11	0	0	1	1030.3	0	0	0	0.00	0	0	0	0	0.0	0	0
TURBINE	0	337.47	2069	0	57	48932.6	43439	36	0	11.10	0	0	0	10	1609.8	0	0
COND.	0	175.68	92	0	22	25473.7	1942	0	1	50.30	0	0	0	126	7293.4	0	0
REGUL.	0	0.00	0	0	0	0.0	0	0	0	0.00	0	0	0	0	0.0	0	0
GEN.	0	259.15	210	0	31	37576.2	4412	1	0	83.49	0	0	0	16	12106.5	0	0
OTHER	0	118.31	1	0	21	17155.3	29	0	1	134.82	0	0	0	142	19548.3	0	0
UNIT	1	681.71	16232	0	146	98848.5	340869	41									

** UNIT YEAR AVERAGES OF MAN HOURS AND RELATIVE MECHANICAL AVAILABILITY ARE BASED ON RMA UNIT YEARS

EDISON ELECTRIC INSTITUTE EQUIPMENT AVAILABILITY
COMPOSITE UNIT SUMMARY REPORT 1976
FOSSIL UNITS 1967-1976 800 MW + ABOVE

PAGE 2 OF 2
Figure 4f

SELECTED FOSSIL UNITS NO OF SYSTEMS 18 NO OF UNITS 38 NO OF UNIT YEARS 145 NO OF RMA UNIT YEARS 21

PROBABILITY STATE - COMBINED UNIT

PERCENTAGE AVAILABLE CATEGORIES	UNIT YR AVG						CUMULATIVE					
	FORCED			SCHEDULED			FORCED			SCHEDULED		
	NO OCC	OUTAGE HOURS	PERCENT OF YEAR	NO OCC	OUTAGE HOURS	PERCENT OF YEAR	NO OCC	DUR PER OUTAGE	PERCENT PERIOD	NO OCC	DUR PER OUTAGE	PERCENT PERIOD
FULL OUTAGE	20	1108.54	13.51	4	1016.10	12.38	2897	55.48	13.51	559	263.56	12.38
00.1 - 19.9	2	10.88	0.13	0	20.33	0.24	238	6.63	0.13	27	109.17	0.24
20.0 - 29.9	1	6.65	0.08	0	1.42	0.01	114	8.46	0.08	12	17.13	0.01
30.0 - 39.9	2	21.75	0.26	0	2.85	0.03	241	13.08	0.26	61	6.76	0.03
40.0 - 49.9	4	74.52	0.90	1	7.98	0.09	620	17.42	0.90	118	9.80	0.09
50.0 - 59.9	10	158.89	1.93	3	40.27	0.49	1387	16.61	1.93	500	11.67	0.49
60.0 - 69.9	17	217.17	2.64	2	18.52	0.22	2400	13.12	2.64	316	8.49	0.22
70.0 - 79.9	34	423.18	5.15	2	20.99	0.25	4896	12.53	5.15	345	8.82	0.25
80.0 - 89.9	52	633.34	7.72	5	55.25	0.67	7498	12.24	7.72	688	11.64	0.67
90.0 - 99.9	47	734.36	8.95	4	72.58	0.88	6850	15.54	8.95	528	19.93	0.88

ECONOMY OUTAGE ** 306.95 HOURS
FULL OPERATION 3250.35 HOURS

3.74 % OF YEAR
39.62 % OF YEAR

44508.26 HOURS
471301.63 HOURS

3.74 % OF PERIOD
39.62 % OF PERIOD

UNIT STARTS NO. OF YEARS 23

	UNIT YR AVG		CUMULATIVE	
	ATTEMPTED	SUCCESSFUL	ATTEMPTED	SUCCESSFUL
	44.47	34.39	1023	791

** ECONOMY OUTAGE HOURS DERIVED FROM AVAILABLE HOURS - SERVICE HOURS
TOTAL ECONOMY OUTAGE OCCURANCES REPORTED 188
TOTAL ECONOMY OUTAGE HOURS REPORTED 7580.05

EDISON ELECTRIC INSTITUTE EQUIPMENT AVAILABILITY
COMPOSITE UNIT SUMMARY REPORT 1976
NUCLEAR UNITS FOR 1967-1976

PAGE 1 OF 2
Figure 5

SELECTED	NUCLEAR UNITS	NO OF SYSTEMS	32	NO OF UNITS	54	NO OF UNIT YEARS	218	NO OF RMA UNIT YEARS	30
UNIT STATISTICS				CAUSE CODE	FORCED OUTAGE RATE	OPERATING AVAILABILITY	RELATIVE MECH AVAILABILITY	MEAN TIME BETWEEN FULL FORCED OUTAGES	
CUMULATIVE					CUMULATIVE-%	CUMULATIVE-%	CUMULATIVE-%	CUMULATIVE	
SERVICE HOURS			1276905.34	REACTOR	7.0	80.3	Data No Longer Collected	1685.55	
SERVICE FACTOR-%			71.33	TURBINE	2.7	92.4		4282.44	
AVAILABLE HOURS			1293172.97	COND.	0.5	97.0		12517.93	
CAPACITY FACTOR-%			58.78	GEN.	0.9	96.4		24521.42	
OUTPUT FACTOR-%			86.26	OTHER	3.0	95.5		4153.28	
EQUIV F.O.R.-%			17.82	UNIT	13.1	72.2		841.59	
SCHEDULED OUT RATE-%			16.91						
FORCED OUT RATIO-%			39.04						
F.O. INCIDENT RATE-%			65.77						
EQUIV AVAILABILITY-%			67.20						

FORCED OUTAGES									MAINTENANCE OUTAGE							
UNIT YR AVG					CUMULATIVE				UNIT YR AVG				CUMULATIVE			
CAUSE CODE	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT
REACTOR	5	447.17	1659	2	1061	97483.5	49760	335	1	292.40	4287	0	311	63744.0	128596	40
TURBINE	2	164.64	3305	2	417	35891.9	99156	534	1	173.71	3405	0	193	37869.6	102150	1
COND.	1	35.09	98	0	142	7649.0	2935	103	0	62.98	642	0	95	13730.6	19256	15
REGUL.	0	0.28	0	0	4	61.1	0	0	0	5.40	0	0	8	1176.3	0	0
GEN.	0	57.34	6	0	72	12499.3	179	0	0	102.83	750	0	40	22416.7	22497	0
OTHER	2	185.45	1112	0	430	40427.7	33374	2	0	78.06	1764	0	99	17017.0	52909	1
UNIT	10	889.97	6180	4	2126	194012.8	185404	974	3	330.73	10847	0	579	72098.7	325408	57

PLANNED OUTAGES									NONCURTAILING OUTAGES							
UNIT YR AVG					CUMULATIVE				UNIT YR AVG				CUMULATIVE			
CAUSE CODE	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT
REACTOR	2	875.81	12390	7	407	190926.4	371712	1456	4	300.02	15	0	831	65405.1	445	0
TURBINE	0	281.00	3742	0	98	61258.2	112260	28	0	127.70	3	0	108	27838.8	85	0
COND.	0	141.50	471	0	37	30846.5	14135	7	1	156.49	1	0	153	34115.0	43	0
REGUL.	0	42.34	0	0	11	9229.8	0	0	0	0.61	0	0	2	132.9	0	0
GEN.	0	131.96	122	0	31	28767.5	3667	0	0	29.40	1	0	30	6409.6	43	0
OTHER	0	100.29	4225	0	45	21863.5	126738	19	1	71.20	31	6	195	15522.2	928	1292
UNIT	2	1058.62	20950	7	527	230779.5	628512	1510								

** UNIT YEAR AVERAGES OF MAN HOURS AND RELATIVE MECHANICAL AVAILABILITY ARE BASED ON RMA UNIT YEARS

EDISON ELECTRIC INSTITUTE EQUIPMENT AVAILABILITY
COMPOSITE UNIT SUMMARY REPORT 1976
NUCLEAR UNITS FOR 1967-1976

PAGE 2 OF 2
Figure 5

SELECTED NUCLEAR UNITS NO OF SYSTEMS 32 NO OF UNITS 54 NO OF UNIT YEARS 218 NO OF RMA UNIT YEARS 30

PROBABILITY STATE - COMBINED UNIT

PERCENTAGE AVAILABLE CATEGORIES	UNIT YR AVG						CUMULATIVE					
	FORCED			SCHEDULED			FORCED			SCHEDULED		
	NO OCC	OUTAGE HOURS	PERCENT OF YEAR	NO OCC	OUTAGE HOURS	PERCENT OF YEAR	NO OCC	DUR PER OUTAGE	PERCENT PERIOD	NO OCC	DUR PER OUTAGE	PERCENT PERIOD
FULL OUTAGE	10	889.97	10.83	5	1389.35	16.91	2126	91.25	10.83	1106	273.85	16.91
00.1 - 19.9	1	9.58	0.11	0	17.60	0.21	148	14.10	0.11	80	47.95	0.21
20.0 - 29.9	1	14.64	0.17	1	6.48	0.07	180	17.73	0.17	135	10.46	0.07
30.0 - 39.9	1	29.03	0.35	1	16.51	0.20	180	35.15	0.35	138	26.07	0.20
40.0 - 49.9	1	77.93	0.94	1	36.10	0.43	301	56.43	0.94	217	36.26	0.43
50.0 - 59.9	2	116.35	1.41	1	14.71	0.17	349	72.67	1.41	135	23.75	0.17
60.0 - 69.9	2	135.09	1.64	1	24.02	0.29	434	67.85	1.64	161	32.51	0.29
70.0 - 79.9	3	252.01	3.06	1	53.79	0.65	735	74.74	3.06	241	48.65	0.65
80.0 - 89.9	4	279.23	3.40	1	50.47	0.61	877	69.40	3.40	318	34.59	0.61
90.0 - 99.9	8	495.38	6.03	2	45.53	0.55	1657	65.17	6.03	488	20.33	0.55
ECONOMY OUTAGE **	74.62 HOURS			0.90 % OF YEAR			16267.63 HOURS			0.90 % OF PERIOD		
FULL OPERATION	4182.94 HOURS			50.94 % OF YEAR			911882.19 HOURS			50.94 % OF PERIOD		

UNIT STARTS NO. OF YEARS 74

	UNIT YR AVG		CUMULATIVE	
	ATTEMPTED	SUCCESSFUL	ATTEMPTED	SUCCESSFUL
	22.90	15.05	1695	1114

NUCLEAR SAFETY SYSTEMS TESTS

UNIT YR AVG						CUMULATIVE					
TEST OCC	PARTIAL SUCCESS		UNSUCCESSFUL			TEST OCC	PARTIAL SUCCESS		UNSUCCESSFUL		
	NO	MANHOURS	NO	MANHOURS	DURATION		NO	MANHOURS	NO	MANHOURS	DURATION
8	0	0	0	1	0.07	1715	0	0	6	269	15.5

** ECONOMY OUTAGE HOURS DERIVED FROM AVAILABLE HOURS - SERVICE HOURS
TOTAL ECONOMY OUTAGE OCCURANCES REPORTED 13
TOTAL ECONOMY OUTAGE HOURS REPORTED 4105.94

EDISON ELECTRIC INSTITUTE EQUIPMENT AVAILABILITY
COMPOSITE UNIT SUMMARY REPORT 1976
JET ENGINES FOR 1967-1976

PAGE 1 OF 2
Figure 6

SELECTED JET ENGINE UNITS NO OF SYSTEMS 40 NO OF UNITS 340 NO OF UNIT YEARS 1749 NO OF RMA UNIT YEARS 335

UNIT STATISTICS	CUMULATIVE	CAUSE CODE	FORCED OUTAGE RATE	OPERATING AVAILABILITY	RELATIVE MECH AVAILABILITY	MEAN TIME BETWEEN FULL FORCED OUTAGES
			CUMULATIVE-%	CUMULATIVE-%	CUMULATIVE-%	CUMULATIVE
SERVICE HOURS	1502043.75	JET ENG	32.7	91.2	Data No	974.13
SERVICE FACTOR-%	10.22	TURBINE	5.6	99.0	Longer	18218.47
AVAILABLE HOURS	12695572.11	GEN.	15.3	96.8	Collected	12085.66
CAPACITY FACTOR-%	8.03	OTHER	5.7	98.8		11516.93
OUTPUT FACTOR-%	68.47	UNIT	44.1	86.4		799.52
EQUIV F.O.R.-%	51.64					
SCHEDULED OUT RATE-%	5.46					
FORCED OUT RATIO-%	59.67					
F.O. INCIDENT RATE-%	47.82					
EQUIV AVAILABILITY-%	84.60					

CAUSE CODE	FORCED OUTAGES								MAINTENANCE OUTAGE							
	UNIT YR AVG				CUMULATIVE				UNIT YR AVG				CUMULATIVE			
	NO	OUTAGE	MAN	HRS	NO	OUTAGE	MAN	HOURS	NO	OUTAGE	MAN	HRS	NO	OUTAGE	MAN	HOURS
	OCC	HOURS	HOURS	WAIT	OCC	HOURS	HOURS	WAIT	OCC	HOURS	HOURS	WAIT	OCC	HOURS	HOURS	WAIT
JET ENG	9	418.81	863	8	15073	732503.6	289191	14350	8	190.86	454	1	13538	333821.6	152171	1634
TURBINE	0	51.53	60	4	805	90119.1	20002	6214	0	21.00	200	0	714	36736.7	67010	303
REGUL.	0	0.00	0	0	0	0.0	0	0	0	0.05	0	0	14	84.6	0	0
GEN.	1	156.03	104	3	1214	272891.8	34903	5144	1	49.66	35	0	1280	86863.2	11642	344
OTHER	1	52.22	23	1	1274	91325.2	7863	1734	1	26.98	56	0	1693	47183.4	18853	90
UNIT	11	678.52	1051	16	18365	1186738.2	351959	27442	10	259.61	745	1	17063	454056.9	249676	2371

CAUSE CODE	PLANNED OUTAGES								NONCURTAILING OUTAGES							
	UNIT YR AVG				CUMULATIVE				UNIT YR AVG				CUMULATIVE			
	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT
JET ENG	1	124.24	397	2	2359	217290.2	133139	4039	0	6.64	10	0	136	11610.9	3209	144
TURBINE	0	10.49	30	0	104	18346.4	10123	8	0	0.96	0	0	8	1682.6	0	0
REGUL.	0	0.02	0	0	9	35.7	0	0	0	0.00	0	0	0	0.0	0	0
GEN.	0	54.72	18	1	291	95708.7	6157	1771	0	1.56	0	0	5	2728.6	36	10
OTHER	0	15.53	11	0	243	27167.5	3762	12	0	0.00	0	0	1	6.5	0	0
UNIT	2	198.81	457	3	2971	347720.6	153181	5830								

** UNIT YEAR AVERAGES OF MAN HOURS AND RELATIVE MECHANICAL AVAILABILITY ARE BASED ON RMA UNIT YEARS

EDISON ELECTRIC INSTITUTE EQUIPMENT AVAILABILITY
COMPOSITE UNIT SUMMARY REPORT 1976
JET ENGINES FOR 1967-1976

PAGE 2 OF 2
Figure 6

SELECTED JET ENGINE UNITS NO OF SYSTEMS 40 NO OF UNITS 340 NO OF UNIT YEARS 1749 NO OF RMA UNIT YEARS 335

PROBABILITY STATE - COMBINED UNIT

PERCENTAGE AVAILABLE CATEGORIES	UNIT YR AVG						CUMULATIVE							
	FORCED			SCHEDULED			FORCED				SCHEDULED			
	NO OCC	OUTAGE HOURS	PERCENT OF YEAR	NO OCC	OUTAGE HOURS	PERCENT OF YEAR	NO OCC	DUR OUTAGE	PER PERIOD	PERCENT PERIOD	NO OCC	DUR OUTAGE	PER PERIOD	PERCENT PERIOD
FULL OUTAGE	11	678.52	8.08	11	458.42	5.46	18365	64.61	8.08		20034	40.02	5.46	
00.1 - 19.9	0	8.37	0.09	0	3.27	0.03	496	29.49	0.09		410	13.94	0.03	
20.0 - 29.9	0	4.81	0.05	0	3.39	0.04	277	30.35	0.05		201	29.47	0.04	
30.0 - 39.9	0	10.32	0.12	0	4.00	0.04	365	49.42	0.12		141	49.65	0.04	
40.0 - 49.9	0	12.88	0.15	0	7.66	0.09	608	37.06	0.15		157	85.32	0.09	
50.0 - 59.9	1	68.35	0.81	0	29.39	0.35	2290	52.20	0.81		807	63.70	0.35	
60.0 - 69.9	1	36.96	0.44	0	12.79	0.15	1172	55.16	0.44		359	62.30	0.15	
70.0 - 79.9	2	61.87	0.73	0	11.64	0.13	3574	30.27	0.73		808	25.20	0.13	
80.0 - 89.9	1	54.39	0.64	0	6.51	0.07	1477	64.41	0.64		289	39.42	0.07	
90.0 - 99.9	0	32.45	0.38	0	2.06	0.02	617	91.97	0.38		66	54.65	0.02	
ECONOMY OUTAGE **	6399.96 HOURS			76.22 % OF YEAR			11193528.36 HOURS				76.22 % OF PERIOD			
FULL OPERATION	487.68 HOURS			5.80 % OF YEAR			852954.26 HOURS				5.80 % OF PERIOD			

UNIT STARTS NO. OF YEARS 1371

	UNIT YR AVG		CUMULATIVE	
	ATTEMPTED	SUCCESSFUL	ATTEMPTED	SUCCESSFUL
	183.48	156.59	251552	214687

** ECONOMY OUTAGE HOURS DERIVED FROM AVAILABLE HOURS - SERVICE HOURS
TOTAL ECONOMY OUTAGE OCCURRENCES REPORTED 4450
TOTAL ECONOMY OUTAGE HOURS REPORTED 271888.21

EDISON ELECTRIC INSTITUTE EQUIPMENT AVAILABILITY
COMPOSITE UNIT SUMMARY REPORT 1976
GAS TURBINES FOR 1967-1976

PAGE 1 OF 2
Figure 7

SELECTED GAS TURBINE UNITS		NO OF SYSTEMS	73	NO OF UNITS	633	NO OF UNIT YEARS	3413	NO OF RMA UNIT YEARS	609
UNIT STATISTICS		CUMULATIVE		CAUSE CODE	FORCED OUTAGE RATE	OPERATING AVAILABILITY	RELATIVE MECH AVAILABILITY	MEAN TIME BETWEEN FULL FORCED OUTAGES	
					CUMULATIVE-%	CUMULATIVE-%	CUMULATIVE-%	CUMULATIVE	
SERVICE HOURS		3541447.12		GAS TUR	32.2	88.3	Data No	959.25	
SERVICE FACTOR-%		12.52		GEN.	5.3	98.9	Longer	18264.17	
AVAILABLE HOURS		24411962.92		OTHER	3.3	99.1	Collected	9297.24	
CAPACITY FACTOR-%		10.68		UNIT	36.4	86.3		827.73	
OUTPUT FACTOR-%		78.35							
EQUIV F.O.R.-%		37.15							
SCHEDULED OUT RATE-%		6.48							
FORCED OUT RATIO-%		52.54							
F.O. INCIDENT RATE-%		55.15							
EQUIV AVAILABILITY-%		86.10							

FORCED OUTAGES									MAINTENANCE OUTAGE							
UNIT YR AVG					CUMULATIVE				UNIT YR AVG				CUMULATIVE			
CAUSE CODE	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT
GAS TUR	9	495.04	732	7	29473	1689559.0	445959	23633	5	242.55	402	3	17572	827832.6	244535	9677
REGUL.	0	0.02	0	0	3	77.2	0	45	0	1.50	0	0	8	5116.4	0	0
GEN.	0	58.48	27	1	1547	199609.2	16657	1755	0	12.84	117	1	1458	43812.9	71235	2128
OTHER	1	35.72	57	1	3040	121906.7	34699	1839	1	16.60	11	0	2742	56668.5	6730	548
UNIT	10	594.38	818	8	34156	2028602.7	497964	27320	6	275.56	530	4	21759	940492.7	322991	12777

PLANNED OUTAGES									NONCURTAILING OUTAGES							
UNIT YR AVG					CUMULATIVE				UNIT YR AVG				CUMULATIVE			
CAUSE CODE	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT
GAS TUR	1	229.24	336	3	4880	782386.6	204695	10642	0	134.68	1	0	260	459648.4	631	409
REGUL.	0	0.27	0	0	7	909.1	0	0	0	0.00	0	0	0	0.0	0	0
GEN.	0	11.57	3	0	293	39502.0	2109	100	0	0.33	0	0	28	1130.0	84	0
OTHER	0	18.96	10	0	823	64699.0	5789	269	0	0.07	0	0	19	240.0	4	0
UNIT	2	261.32	355	3	6007	891877.6	216044	11027								

** UNIT YEAR AVERAGES OF MAN HOURS AND RELATIVE MECHANICAL AVAILABILITY ARE BASED ON RMA UNIT YEARS

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EDISON ELECTRIC INSTITUTE EQUIPMENT AVAILABILITY
COMPOSITE UNIT SUMMARY REPORT 1976
GAS TURBINES FOR 1967-1976

PAGE 2 OF 2
Figure 7

SELECTED GAS TURBINE UNITS NO OF SYSTEMS 73 NO OF UNITS 633 NO OF UNIT YEARS 3413 NO OF RMA UNIT YEARS 609

PROBABILITY STATE - COMBINED UNIT

PERCENTAGE AVAILABLE CATEGORIES	UNIT YR AVG						CUMULATIVE								
	FORCED			SCHEDULED			FORCED				SCHEDULED				
	NO	OUTAGE	PERCENT	NO	OUTAGE	PERCENT	NO	DUR	PER	PERCENT	NO	DUR	PER	PERCENT	
	OCC	HOURS	OF YEAR	OCC	HOURS	OF YEAR	OCC	OUTAGE	PERIOD	PERIOD	OCC	OUTAGE	PERIOD	PERIOD	
FULL OUTAGE	10	594.38	7.17	8	536.88	6.48	34156	59.39	7.17	27766	65.99	6.48			
00.1 - 19.9	0	0.45	0.00	0	0.09	0.00	47	32.49	0.00	17	18.08	0.00			
20.0 - 29.9	0	0.18	0.00	0	0.00	0.00	16	39.17	0.00	11	0.56	0.00			
30.0 - 39.9	0	0.17	0.00	0	0.09	0.00	23	24.69	0.00	17	18.85	0.00			
40.0 - 49.9	0	0.40	0.00	0	1.08	0.01	24	56.84	0.00	7	524.57	0.01			
50.0 - 59.9	0	3.88	0.04	0	0.08	0.00	109	121.64	0.04	4	67.44	0.00			
60.0 - 69.9	0	3.94	0.04	0	4.15	0.05	75	179.36	0.04	55	257.51	0.05			
70.0 - 79.9	0	2.88	0.03	0	0.00	0.00	169	58.07	0.03	2	1.64	0.00			
80.0 - 89.9	0	27.94	0.33	0	0.57	0.00	748	127.48	0.33	13	149.28	0.00			
90.0 - 99.9	0	51.92	0.62	0	0.17	0.00	1191	148.79	0.62	19	30.90	0.00			
ECONOMY OUTAGE **	6115.01 HOURS			73.81 % OF YEAR			20870515.80 HOURS				73.81 % OF PERIOD				
FULL OPERATION	939.64 HOURS			11.34 % OF YEAR			3206998.23 HOURS				11.34 % OF PERIOD				

UNIT STARTS NO. OF YEARS 2688

	UNIT YR AVG		CUMULATIVE	
	ATTEMPTED	SUCCESSFUL	ATTEMPTED	SUCCESSFUL
	179.31	148.40	481990	398918

** ECONOMY OUTAGE HOURS DERIVED FROM AVAILABLE HOURS - SERVICE HOURS
TOTAL ECONOMY OUTAGE OCCURANCES REPORTED 21655
TOTAL ECONOMY OUTAGE HOURS REPORTED 1256712.46

EDISON ELECTRIC INSTITUTE EQUIPMENT AVAILABILITY
COMPOSITE UNIT SUMMARY REPORT 1976
DIESEL UNITS FOR 1967-1976

PAGE 1 OF 2
Figure 8

SELECTED	DIESEL UNITS	NO OF SYSTEMS	29	NO OF UNITS	226	NO OF UNIT YEARS	1365	NO OF RMA UNIT YEARS	117
UNIT STATISTICS				CAUSE CODE	FORCED OUTAGE RATE	OPERATING AVAILABILITY	RELATIVE MECH AVAILABILITY	MEAN TIME BETWEEN FULL FORCED OUTAGES	
CUMULATIVE				CUMULATIVE-%	CUMULATIVE-%	CUMULATIVE-%	CUMULATIVE		
SERVICE HOURS	1090506.51	DIESEL	26.8	95.5	Data No	1131.01			
SERVICE FACTOR-%	9.34				Longer				
AVAILABLE HOURS	11078038.15	GEN.	3.7	99.5	Collected	37997.62			
CAPACITY FACTOR-%	6.27	OTHER	1.3	99.8		43854.40			
OUTPUT FACTOR-%	80.08	UNIT	29.5	94.9		1071.68			
EQUIV F.O.R.-%	33.96								
SCHEDULED OUT RATE-%	1.12								
FORCED OUT RATIO-%	77.71								
F.O. INCIDENT RATE-%	62.47								
EQUIV AVAILABILITY-%	94.30								

FORCED OUTAGES									MAINTENANCE OUTAGE							
UNIT YR AVG				CUMULATIVE					UNIT YR AVG				CUMULATIVE			
CAUSE CODE	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT
DIESEL	8	292.97	46	1	10313	399902.8	5402	1863	3	55.78	63	0	4182	76136.9	7411	475
REGUL.	0	0.01	0	0	1	9.0	0	0	0	0.00	0	0	5	5.2	0	0
GEN.	0	30.77	8	1	306	42006.7	904	959	0	2.38	7	0	180	3254.4	780	64
OTHER	0	10.57	2	0	265	14433.8	215	500	0	2.69	1	0	262	3676.9	116	312
UNIT	8	334.32	56	2	10884	456344.1	6521	3322	3	60.38	71	1	4625	82418.4	8307	851

PLANNED OUTAGES									NONCURTAILING OUTAGES							
UNIT YR AVG				CUMULATIVE					UNIT YR AVG				CUMULATIVE			
CAUSE CODE	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HRS WAIT	NO OCC	OUTAGE HOURS	MAN HOURS	HOURS WAIT
DIESEL	1	34.72	22	0	1795	47387.4	2623	28	1	59.06	18	0	991	80619.1	2103	353
REGUL.	0	0.00	0	0	0	0.0	0	0	0	0.00	0	0	0	0.0	0	0
GEN.	0	1.03	2	0	81	1412.4	189	0	0	0.38	1	0	7	523.5	137	0
OTHER	0	0.25	0	0	36	346.3	18	0	0	0.01	0	0	8	18.7	8	0
UNIT	1	35.51	24	0	1911	48471.2	2830	28								

** UNIT YEAR AVERAGES OF MAN HOURS AND RELATIVE MECHANICAL AVAILABILITY ARE BASED ON RMA UNIT YEARS

EDISON ELECTRIC INSTITUTE EQUIPMENT AVAILABILITY
COMPOSITE UNIT SUMMARY REPORT 1976
DIESEL UNITS FOR 1967-1976

PAGE 2 OF 2
Figure 8

SELECTED DIESEL UNITS NO OF SYSTEMS 29 NO OF UNITS 226 NO OF UNIT YEARS 1365 NO OF RMA UNIT YEARS 117

PROBABILITY STATE - COMBINED UNIT

PERCENTAGE AVAILABLE CATEGORIES	UNIT YR AVG						CUMULATIVE						
	FORCED			SCHEDULED			FORCED			SCHEDULED			
	NO OCC	OUTAGE HOURS	PERCENT OF YEAR	NO OCC	OUTAGE HOURS	PERCENT OF YEAR	NO OCC	DUR OUTAGE	PER PERIOD	PERCENT PERIOD	NO OCC	DUR OUTAGE	PER PERIOD
FULL OUTAGE	8	334.32	3.91	5	95.89	1.12	10884	41.92	3.91		6536	20.02	1.12
00.1 - 19.9	0	4.92	0.05	0	0.30	0.00	52	129.21	0.05		15	27.35	0.00
20.0 - 29.9	0	0.01	0.00	0	0.00	0.00	3	3.21	0.00		0	0.00	0.00
30.0 - 39.9	0	24.17	0.28	0	1.12	0.01	123	268.23	0.28		38	40.38	0.01
40.0 - 49.9	0	1.69	0.01	0	0.16	0.00	21	109.63	0.01		7	30.50	0.00
50.0 - 59.9	0	23.95	0.28	0	3.81	0.04	227	144.01	0.28		45	115.56	0.04
60.0 - 69.9	0	12.92	0.15	0	2.87	0.03	68	259.44	0.15		65	60.27	0.03
70.0 - 79.9	0	57.17	0.66	0	6.58	0.07	505	154.52	0.66		121	74.18	0.07
80.0 - 89.9	0	1.12	0.01	0	0.00	0.00	6	255.54	0.01		0	0.00	0.00
90.0 - 99.9	0	0.02	0.00	0	0.00	0.00	3	9.78	0.00		0	0.00	0.00
ECONOMY OUTAGE **	7316.87 HOURS			85.61 % OF YEAR			9987531.64 HOURS				85.61 % OF PERIOD		
FULL OPERATION	658.09 HOURS			7.70 % OF YEAR			898299.76 HOURS				7.70 % OF PERIOD		

UNIT STARTS NO. OF YEARS 641

	UNIT YR AVG		CUMULATIVE	
	ATTEMPTED	SUCCESSFUL	ATTEMPTED	SUCCESSFUL
	244.75	222.30	156888	142496

** ECONOMY OUTAGE HOURS DERIVED FROM AVAILABLE HOURS - SERVICE HOURS
TOTAL ECONOMY OUTAGE OCCURANCES REPORTED 669
TOTAL ECONOMY OUTAGE HOURS REPORTED 66254.01

EEI EQUIPMENT AVAILABILITY
QUARTERLY OPERATING DATA **
FOSSIL UNITS 600 MW AND ABOVE

	<u>3rd Quarter 1976</u>	<u>4th Quarter 1976</u>	<u>1st Quarter 1977^r</u>	<u>2nd Quarter, 1977^p</u>
Number of Units	96	97	103	105
Number of Quarterly Blocks	96	97	103	105
Quarter	3	4	1	2
Period Hours	2,208.00	2,208.00	2,160.00	2,184.00
Service Hours - AVG	1,727.50	1,618.46	1,579.77	1,468.43
Available Hours - AVG	1,774.26	1,647.03	1,588.56	1,484.54
Forced Outage Hours Total	22,433.66	21,126.21	28,317.15	27,999.29
Occurrences	440	433	465	447
Planned Outage Hours Total	12,157.14	25,490.43	22,902.98	35,455.91
Occurrences	44	41	61	69
Maintenance Outage Hours Total	5,870.50	6,082.33	10,096.51	7,890.43
Occurrences	71	65	53	80
Reserve Shutdown Hours Total	4,489.05	2,771.38	905.08	1,691.28
Occurrences	89	62	69	94
Forced Partial Outage Hours Total	93,315.32	70,461.25	88,157.06	80,123.61
Occurrences	3,542	3,174	3,437	3,314
Scheduled Partial Outage Hours Total	8,074.17	7,821.71	5,501.38	8,036.08
Occurrences	394	409	389	463
Operating Availability	80.30	74.50	74.70	67.90
Equivalent Availability	73.30	68.70	68.50	61.90
Capacity Factor	58.97	58.91	58.80	52.18

** CAUTION: Quarterly comparisons may vary radically
because of maintenance and other cyclical events.

r: revised

p: preliminary

APPENDIX

A. EQUIPMENT DEFINITIONS

1. Component	Part within a "major equipment" group, such as: superheater tube, governor, buckets, boiler feed pump.
2. Header Unit	Unit in which the turbine-generator is not solely and independently connected to single boiler.
3. Major Equipment	Major group of equipment within a unit, such as: boiler, reactor, generator, steam turbine, condenser.
4. Maximum Dependable Capacity (MDC)	The dependable main-unit capacity winter or summer, whichever is smaller.
5. Non-header Unit	Unit in which a single boiler is connected solely and independently to a given turbine-generator.

B. OPERATION AND OUTAGE DEFINITIONS

1. Available	The status of a unit or major piece of equipment which is capable of service, whether or not it is actually in service.
2. Base Loading	When a unit is generally run at or near rated output.
3. Cranking Loading	When a unit is generally shut down on standby for auxiliary power during emergency.
4. Cycling Loading	When a unit is generally run but at a load which varies widely with system demand.
5. Economy Outage	(See Reserve Shutdown)
6. Forced Outage	The occurrence of a component failure or other condition which requires that the unit be removed from service immediately or up to and including the very next weekend.

APPENDIX (continued)

7. Forced Partial Outage	The occurrence of a component failure or other condition which requires that the load on the unit be reduced 2% or more immediately or up to and including the very next weekend.
8. Maintenance Outage	The removal of a unit from service to perform work on specific components which could have been postponed past the very next weekend. This is work done to prevent a potential forced outage and which could not be postponed from season to season.
9. Non-curtailing Equipment Outage	The removal of a specific component from service for repair, which causes no reduction in unit load or a reduction of less than 2%.
10. Non-operating Equipment Test	A scheduled test or required operation of a back-up system which is not normally operating.
11. Outage Cause	A component failure, preventive maintenance or other condition which requires that the unit or a component be taken out of service or run at reduced capacity.
12. Peak Loading	When a unit is generally shut down and is run only during high demand periods.
13. Planned Outage	The removal of a unit from service for inspection and/or general overhaul of one or more major equipment groups. This is work which is usually scheduled well in advance (e.g., annual boiler overhaul, five-year turbine overhaul).
14. Reserve Shutdown	The removal of a unit from service for economy or similar reasons. This status continues as long as the unit is out but available for operation.

APPENDIX (continued)

15. Scheduled Partial Outage	The occurrence of a component failure or other condition which requires that the load on the unit be reduced 2% or more but where this reduction could be postponed past the very next weekend.
16. Unavailable	The status of any major piece of equipment which renders it inoperable because of the failure of a component, work being performed or other adverse condition.

C. TIME DEFINITIONS

1. Available Hours (AH)	The time in hours during which a unit or major equipment is available; SH + RSH.
2. Demand Period	The time interval each day which is the period of maximum demand on a particular system.
3. Economy Outage Hours (See Reserve Shutdown Hours) (TEOH)	The theoretical value of Economy Outage Hours (TEOH) is the difference between Available Hours and Service Hours. If the TEOH differs by less than 1% with the Economy Outage Hours reported at the end of the year, they are considered equal and flagged with Code 1. If the difference is more than 1%, but less than 10%, they are flagged with Code 3; but the reported Economy Outage Hours are still used. However, if the difference is greater than 10%, the calculated value TEOH is used, and Code 2 is a flag that Economy Outage Hours have been derived.
4. Equivalent Forced Outage Hours (EFOH)	$\sum \left[\frac{\text{Forced Partial Outage Hours} \times \text{Size of Reduction}}{\text{MDC}} \right]$
5. Equivalent Scheduled Outage Hours (ESOH)	$\sum \left[\frac{\text{Scheduled Partial Outage Hours} \times \text{Size of Reduction}}{\text{MDC}} \right]$
6. Forced Outage Hours (FOH)	The time in hours during which a unit or major equipment was unavailable due to a Forced Outage.
7. Forced Partial Outage Hours (FPOH)	The time in hours during which a unit or major equipment is unavailable for full load due to a Forced Partial Outage.

APPENDIX (continued)

8. Hours Waiting (HW)	That portion of time for any outage during which no work could be performed. This includes time for cooling down equipment and shipment of parts. This is time that could not be affected by a change in work schedule or the number of men worked.																		
9. Maintenance Outage Hours (MOH)	The time in hours during which a unit or major equipment is unavailable due to a maintenance outage.																		
10. Period Hours (PH)	The clock hours in the period under consideration. (Generally one year).																		
11. Planned Outage Hours (POH)	The time in hours during which a unit or major equipment is unavailable due to a planned outage.																		
12. Reserve Shutdown Hours (RSH)	Reserve shutdown duration in hours.																		
13. Scheduled Partial Outage Hours (SPOH)	The time in hours during which a unit or major equipment is unavailable for full load due to a scheduled partial outage.																		
14. Service Hours (SH)	The total number of hours the unit was actually operated with breakers closed to the station bus.																		
15. Unit Years (UY)	This term is the common denominator used or normalize data from units of the same type with different lengths of service. The following example contains 20 UY of experience from 4 units. <table border="0" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td style="text-align: center;"><u>TOTAL</u></td> </tr> <tr> <td>Unit</td> <td style="text-align: center;">A</td> <td style="text-align: center;">B</td> <td style="text-align: center;">C</td> <td style="text-align: center;">D</td> <td style="text-align: center;">4</td> </tr> <tr> <td>Years in Service</td> <td style="text-align: center;">8</td> <td style="text-align: center;">3</td> <td style="text-align: center;">7</td> <td style="text-align: center;">2</td> <td style="text-align: center;">20</td> </tr> </table>						<u>TOTAL</u>	Unit	A	B	C	D	4	Years in Service	8	3	7	2	20
					<u>TOTAL</u>														
Unit	A	B	C	D	4														
Years in Service	8	3	7	2	20														
16. Work (manhours Worked) (MH)	The total number of manhours worked on or off site to accomplish repairs.																		

D. EQUATIONS

1. Average Forced Outage Duration	$(\text{Summation of FOH}) / (\text{Number of Forced Outages})$
2. Capacity Factor	$\frac{[(\text{Total Gross Generation in MW-Hr}) / (\text{PH} \times \text{MDC})]}{100}$

APPENDIX (continued)

3. Component Outage Severity Index	The average number of forced outage hours of a specific component per incident.
4. Equivalent Availability	$[AH - (EFOH + ESOH)] / PH \times 100$
5. Equivalent Forced Outage Rate (EFOR) (for each forced partial outage, an equivalent full load outage duration is calculated to include the effect of partial as well as full forced outages on the forced outage rate).	$[(FOH + EFOH) / (FOH + SH)]$
6. Forced Outage Incident	$\left[\frac{\text{Forced Incidents}}{\text{Forced} + \text{Maintenance} + \text{Planned Incidents}} \right] 100$
7. Forced Outage Rate	$[FOH / (SH + FOH)] 100$
8. Forced Outage Ratio	$[FOH / (\text{Total Unavailable Hours})] 100$
9. Mean Duration of Starting Failure Outage	$(\text{Starting Failure Outage Hours}) / (\text{Number of Starting Failures})$
10. Mean Time Between Full Forced Outages	$(\text{Summation of PH}) / [(\text{Number of Full Forced Outages}) + 1]$
11. Operating Availability	$[AH / PH] 100$
12. Output Factor	$(\text{Total gross generation in MW-Hr}) \times 100 / (SH \times MDC)$
13. Relative Mechanical Availability (RMA)	Relative Mechanical Availability is a form of Operating Availability adjusted to show relative effort. The prime assumption is that most outage time is affected by work schedules and crew sizes. The reporting of hours worked is optional. RMA is only available on a limited basis.
14. Service Factor	$[SH / PH] 100$
15. Scheduled Outage Rate	$[SOH / (SH + SOH)] 100$
16. Starting Failure Ratio	$(\text{Number of Starting Failures}) / (\text{Total Number of Starting Attempts})$

APPENDIX E

CAUSE CODE TABLES

BOILER**

<u>Code</u>	<u>Cause</u>	<u>Code</u>	<u>Cause</u>
100	Boiler, General Code; see codes 500-545 for additional classifications	127	Soot Blowers
101	Water Walls	128	Boiler Circulating Pumps
102	Generating Tubes	129	Air Compressors (sootblowing, control and station air)
103	Superheater	130	Precipitator - Electrical
104	Reheater - First	131	Precipitator - Mechanical
105	Reheater - Second	132	Burners
106	Economizer	133	Explosion
107	Air Preheater - Tubular	134	Boiler Controls
108	Air Preheater - Regenerative	135	Stack Emission (also see code 507)
109	Induced Draft Fans	136	Furnace Slagging
110	Forced Draft Fans	137	Superheater Fouling
111	Recirculating Fans	138	Reheater Fouling
112	Desuperheaters and Attenuators	139	Air Heater Fouling
113	By-Pass Dampers	140	Induced Draft Fan Fouling
114	Furnace Refractory	141	Precipitator Fouling
115	Safety Valves	142	Wet Coal
116	Steam Valves and Piping	143	Poor Quality Fuel (low Btu) (also see code 502, 503)
117	Valves and Piping - Feedwater and Blowdown	144	Drum, Steam Scrubbers and Separators, etc
118	Gage Glasses	145	Pulverizer Capacity Limited (due to wear, but still in service)
119	Slag and Fly Ash Disposal System	146	Ashpit Trouble
120	Stack	147	Fly Ash Disposal Trouble (also see code 502, 503)
121	Pulverizers	148	Startup System (superheater or turbine by-pass system)
122	Cyclones	149	Light-Off System (ignitors, purging system, etc)
123	Fuel Handling Equipment (gas, oil, coal, etc)	150	Headers
124	Fireside Cleaning	151	Inspection, License, Insurance (also see codes 500-545)
125	Acid Cleaning	152	Flue-Gas-Scrubber-(particulate only) USE CODES 400-450 FOR FLUE GAS SCRUBBERS
126	Boiler Casing, Breeching and Ducts	153	Flue-Gas-Scrubber-(particulate and-gas-absorption) USE CODES 400-450 FOR FLUE GAS SCRUBBERS
		*160	Auxiliary Boiler
		199	Miscellaneous; see codes 500-545 for additional classifications

* New Code Addition (effective 1/1/76)

** Code 100-199 are to be used specifically for equipment failures, use codes 500-545 for outages attributed to other causes.

OUTAGE CAUSE CODE TABLES (continued)

DIESEL ENGINE*

<u>Code</u>	<u>Cause</u>	<u>Code</u>	<u>Cause</u>
100	Diesel Engine, General Code; see codes 500-545 for additional classifications	180	Governor
170	Drive Shaft and Bearings	181	Lube Oil System
171	Fuel System	182	Engine Cooling System
172	Pistons	183	Heater Elements
173	Cylinders	184	Control Power Transformer
174	Cylinder Heads	185	Vibration
175	Battery and Battery Charger System	186	Intake Valves
176	Engine Starting System	187	Exhaust Valves
177	Synchronizing System	188	Hydraulic Lock (water in cylinders)
178	Air Filter System	189	Engine Control System
179	Turbo Charger	190	Overhaul
		199	Miscellaneous; see codes 500-545 for additional classifications

* Codes 100-199 are to be used specifically for equipment failures,
use codes 500-545 for outages attributed to other causes.

OUTAGE CAUSE CODE TABLES (continued)

NUCLEAR REACTOR*

<u>Code</u>	<u>Cause</u>	<u>Code</u>	<u>Cause</u>
200	Reactor, General Code; see codes 500-545 for additional classification	228	Auxiliary System Valves and Piping
201	Reactor Vessel	229	Safety System Valves and Piping
202	Reactor Internals Including Core Support and Control Rod Guide Structures	240	Reactor Containment
203	Reactor Coolant System Valves and Piping	241	Reactor Containment Test
204	Reactor Coolant Recirculating Pumps and Drives	242	Reactor Containment Cooling and Ventilation - Normal
205	Steam Generator (Reactor Coolant System)	243	Reactor Containment Cooling and Gas Cleanup - Post Accident
206	Pressurizer	244	Auxiliary Building Ventilation System
207	Control Rods and Drives	250	Plant Radiation Levels
208	Reactivity Limitation	251	Radioactivity Discharge
209	Fuel Assembly Including Cladding, Burnable Poison Rods and Burnable Poison Shims	} Also see codes 520-527	
210	Refueling	252	Radioactive Waste Treatment System
211	Fuel Handling and Storage	253	Radioactive Waste Storage
220	Auxiliary or Standby Feedwater Supply System	260	Reactor Control (excluding protection) - Inst. and Control
221	Emergency Core Cooling System High Pressure (also see code 524)	261	Reactor Protection - Inst. and Control
222	Emergency Core Cooling System Low Pressure	262	Nuclear Instrumentation
223	Core and Containment Cooling Long-term Post-Accident	263	Engineered Safeguards - Inst. and Control
224	Residual Heat Removal System	264	Auxiliary Systems - Inst. and Control
225	Component Cooling System	265	Control and Instrument Power
226	Chemical Addition System - Reactor Coolant Quality Control	270	Emergency Power System
227	Chemical Addition System - Reactor Coolant Reactivity Control	280	Core Physics Test
		290	Operator Training and License Testing (also see code 523)
		299	Miscellaneous; see codes 500-545 for additional classificatic

* Codes 200-299 are to be used specifically for equipment failures, use codes 500-545 for outages attributed to other causes.

OUTAGE CAUSE CODE TABLES (continued)

GAS TURBINE**

<u>Code</u>	<u>Cause</u>	<u>Code</u>	<u>Cause</u>
300	Gas Turbine, General Code; see codes 500-545 for additional classifications	319	Supercharging Fan
301	Inlet Air Ducts and Vanes	320	Interstage Gas Passages
302	Compressor	321	Expansion Joints
303	Air Filters	322	Starting Motor
304	Fuel Supply System	323	Battery and Charger System
305	Ignition System	324	Turning Gear and Motor
306	Combustion Chamber	325	Control and Instrumentation
307	Turbine (high pressure if more than one)	326	Vibration
308	Low Pressure Turbine	327	Overhaul
309	Exhaust Chamber, Hood and Vanes	*330	Engine Cleaning (carboblust, etc)
310	Intercoolers	*331	Hot End Inspection
311	Regenerators	*332	Boroscope
312	Reduction Gear	*333	Fire Protection System
313	Load Shaft and Bearings	*334	Fire in Unit
314	Compressor Shaft and Bearings for Two-shaft Machine	*335	Engine Exchange
315	Cooling and Seal Air Systems and Seals	*336	High Engine Exhaust Temperature
316	Cooling Water System	*337	Engine Vibration
317	Lube Oil System	346	Exhaust Emission (also see code 502)
318	Heat Shields	347	Noise (also see codes 540-545)
		348	Inspection (also see code 542)
		349	Miscellaneous; see codes 500- 545 for additional classification

* New Code Addition (effective 1/1/76)

** Codes 300-399 are to be used specifically for equipment failures,
use codes 500-545 for outages attributed to other causes.

OUTAGE CAUSE CODE TABLES (continued)

JET ENGINE**

<u>Code</u>	<u>Cause</u>	<u>Code</u>	<u>Cause</u>
350	Jet Engine, General Code; see codes 500-545 for additional classifications	365	Lube Oil System
351	Air Inlet Vanes	366	Engine Shaft and Bearings
352	Low Pressure Compressor	367	Engine Starting System
353	High Pressure Compressor	368	Control and Instrumentation
354	Fuel System	369	Auxiliary Drive System
355	Ignition System	*370	Engine (carboblant, etc)
356	Combustors	*371	Hot-end Inspection
357	Low Temperature Turbine	*372	Boroscope
358	High Temperature Turbine	*373	Fire Protection System
359	Inlet and Exhaust Cones	*374	Fire in Unit
360	Anti-icing System	*375	Engine Exchange
361	Fuel Nozzle Cooling Air System	*376	High Engine Exhaust Temperature
362	Regenerator	*377	Engine Vibration
363	Expansion Joints	378	Overhaul
364	Shaft Seals	396	Exhaust Emission (also see code 502)
		397	Noise (also see codes 540-545)
		398	Inspection (also see code 542)
		399	Miscellaneous; see codes 500- 545 for additional classification

* New Code Addition (effective 1/1/76)

** Codes 300-399 are to be used specifically for equipment failures,
use codes 500-545 for outages attributed to other causes.

OUTAGE CAUSE CODE TABLES (continued)

FLUE GAS SCRUBBER SYSTEM*

<u>Code</u>	<u>Cause</u>	<u>Code</u>	<u>Cause</u>
400	Flue Gas Scrubber, General Code; see codes 500-545 for additional classifications	426	SO ₂ Monitor
401	Operator Failure	427	Disc Scrubber Throats
402	Stacks	428	Absorber Tower
403	ID Fans	429	Screw Conveyors
404	FD Fans	430	Bucket Elevators
405	Fan Vibration	431	Grinders & Crushers
406	Fan Blades	432	Centrifuge/Vacuum Filter
407	Reheaters, General	433	Weigh Feeders
408	Reheater, Vibration	434	Dampers
409	Reheater, Tube Leaks	435	Demister
410	Reheater Ducts	436	Demister Wash Piping Assembly
411	Thickeners	437	Agitators
412	Piping	438	Heat Tracer
413	Tubes, Corrosion, Leaking...	439	Motors
414	Spray Pumps	440	Calciners
415	Duct System, Baffles...	441	Recycle Tanks
416	Reactor Tank	442	Liquid Level Controls
417	Coupling Failure	443	Sludge Pond
418	Drain Pots	444	Test Program (also see codes 500-510)
419	Strainer Plugging	445	Instrumentation
420	Recycle Pumps	446	Inspection (also see code 502)
421	Valves, Erosion...	447	External Causes (also see codes 500-545)
422	Precipitators	448	Chemical Unavailability
423	Spray Nozzles	449	Other, Mechanical
424	Dryer	450	Other, Electrical
425	Reagent Feed Lines		

* Codes 400-450 are to be used specifically for equipment failures, use codes 500-545 for outages attributed to other causes.

OUTAGE CAUSE CODE TABLES (continued)

SAFETY AND ENVIRONMENTAL REQUIREMENTS**

<u>Code</u>	<u>Cause</u>	<u>Code</u>	<u>Cause</u>
*500	Safety and Environmental Requirements, General Code		

NON-RADIOLOGICAL PROTECTION OF ENVIRONMENT**

*501	NRC Order to Investigate Possible Deficiency	*507	EPA Required Modification or Addition to Plant, e.g., Installation of Cooling Towers, Precipitators, Scrubbers, etc
*502	EPA Order to Investigate Possible Deficiency	*508	Other Required Modification or Addition to Plant, e.g., Installation of Cooling Tower Blowdown Treatment Equipment Required by State or Local Agencies
*503	Other Order to Investigate Possible Deficiency	*509	License or Operating Permit Restrictions, e.g., SO ₂ Concentration or Discharge Steam Temperature Limitation
*504	Operating Utility Decision to Investigate Possible Deficiency	*510	Intervenor Action
*505	Required Inspection or Test, e.g., Periodic Precipitator, Scrubber...etc, Tests to Demonstrate Proper Acceptable Performance		
*506	NRC Required Modification or Addition to Plant, e.g., Installation of Fish Protection Equipment or Cooling Towers, etc		

* New Codes (effective 1/1/76)

** Codes 500-510 are to be used specifically for outages not directly attributed to equipment failures.

OUTAGE CAUSE CODE TABLES (continued)

NUCLEAR SAFETY PROTECTION**

<u>Code</u>	<u>Cause</u>	<u>Code</u>	<u>Cause</u>
*520	NRC Order to Investigate Possible Safety Problem, e.g., BWR Pipe Crack	*524	NRC Required Modification or Addition to Plant, e.g., Design Upgrade to Meet Current Seismic Criteria or Final ECCS Acceptance Criteria
*521	Other Order to Investigate Possible Safety Problem, e.g., State or Local Legislative Action	*525	Other Required Modification or Addition to Plant, e.g., State or Local Legislation
*522	Operating Utility Decision to Investigate Possible Safety Problem, e.g., BWR Torus Design Verification	*526	ALARA (as low as reasonably achievable) Requirements, e.g., Manpower Radiation Limitations, Installation of Shielding to Reduce Background Radiation Levels
*523	Compliance with NRC Technical Specification and/or Regulatory Guides, e.g., Periodic Leak Testing of Containment Vessel - ASME Boiler and Pressure Vessel Code; Section 11	*527	Intervenor Actions

INDUSTRY SAFETY PROTECTION**

*540	Operating Utility Decision to Investigate Possible Safety Problem, e.g., Alleviation of Adverse Employee Working Conditions	*543	Required Plant Modification or Addition, e.g., Noise Abatement Equipment Installation
*541	Order to Investigate Possible Safety Problem	*544	License Operating Permit Restrictions or Regulations
*542	Required Inspection or Test, e.g., Annual Boiler Inspection	*545	Intervenor Action

* New Codes (effective 1/1/76)

** Codes 520-545 are to be used specifically for outages not directly attributed to equipment failures.

OUTAGE CAUSE CODE TABLES (continued)

EXPANDER TURBINE**

<u>Code</u>	<u>Cause</u>	<u>Code</u>	<u>Cause</u>
600	Expander Turbine, General Code; see codes 500-545 for additional classifications	607	Exhaust Diffusers
601	Couplings	608	Seal Oil System and Seals
602	Shaft and Bearings	609	Inner Casing
603	Blades	610	Outer Exhaust Casing
604	Discs and Spacers	611	Lube Oil System
605	Nozzles	612	Control and Instrumentation
606	Heat Shields	613	Evactor
		699	Miscellaneous; see codes 500-545 for additional classifications

STEAM TURBINE**

600	Turbine, General Code; see codes 500-545 for additional classification	636	Seal Leaks
620	Turning Gear	637	Cylinder Outer
621	Governors	638	Cylinder Inner
622	Control, Turbine and Reheat Stop Valves	639	Dummy Ring
623	Shaft Packing	640	Gland Rings
624	Nozzles and Nozzle Blocks	641	Diaphragm, Unit and Shroud Type
625	Nozzle Bolting (first stage)	642	Piping, Steam Drain and Gland
626	Diaphragms	643	Piping, Steam Inlet and Reheat
627	Shaft	644	Cross Over or Under Piping
628	Wheels or Spindles	645	Moisture Removal Equipment (nuclear plant)
629	Buckets or Blades	646	Turbine Building Closed Cooling Water System (nuclear plant)
630	Vibration of Turbine Generator Unit	647	Steam Reheater (nuclear plant)
631	Lube Oil System & Bearings (except bearing vibration)	648	Inspection
632	Turbine Control	649	Water Induction
633	Gland Steam Controller	*650	Differential Expansion
634	Blade Fouling	699	Miscellaneous; see codes 500-545 for additional classifications
635	Shell Leaks		

* New Codes (effective 1/1/76)

** Codes 600-699 are to be used specifically for equipment failures, use codes 500-545 for outages attributed to other causes.

OUTAGE CAUSE CODE TABLES (continued)

HYDRO TURBINE**

<u>Code</u>	<u>Cause</u>	<u>Code</u>	<u>Cause</u>
600	Hydro Turbine, General Code; see codes 500-545 for additional classification	675	Turbine Controls
660	Shaft Packing	676	Upper Reservoir Dam and Dikes
661	Shaft	677	Intake Channel or Flume (including trash racks)
662	Runner	678	Intake Tunnel
663	Nozzle Assembly	679	Lower Reservoir Dam and Dikes
664	Lube Oil System and Oil Lubricated Bearings	680	Auxiliary Reservoir Dam and Dikes
665	Water Lubricated Bearings	681	Penstock (including valves or headgates)
666	Vibration	682	Canal (including siphon, radial gates and spills)
667	Wicket Gate Assembly	683	Tailrace
668	Draft Tube	684	Dewatering and Rewatering Piping System
669	Spiral Case	685	Tailwater Depressing Equipment
670	Pressure Regulating Valve	686	Runner Cavitation Damage
671	Relief Valve	687	Inspections
672	Spherical Valve or Shut-off Valve	699	Miscellaneous; see codes 500- 545 for additional classifications
673	Spherical Valve or Shut-off Valve Bypass Line and Valve		
674	Governor		

GENERATOR**

700	Generator, General Code; see codes 500-545 for additional classification	708	Rotor Windings
701	Lube Oil System and Bearings	709	Rotor Collector Rings
702	Air Cooling System	710	Brush Rigging
703	Hydrogen Cooling System	711	Generator Main Leads
704	Liquid Cooling System	712	Exciter
705	Seal Oil System and Seals	713	Voltage Regulator
706	Stator Windings, Bushings Terminals	714	Generator Control
707	Stator Core Iron	715	Inspection
		716	Core Monitor Alarm
		799	Miscellaneous; see codes 500- 545 for additional classifications

* Codes 600-699 and 700-799 are to be used specifically for equipment failures,
use codes 500-545 for outages attributed to other causes.

OUTAGE CAUSE CODE TABLES (continued)

CONDENSER**

<u>Code</u>	<u>Cause</u>	<u>Code</u>	<u>Cause</u>
800	Condenser, General Code; see codes 500-545 for additional classification	809	Expansion Joint
801	Cleaning	810	Inspection
802	Tube Failure	811	Off-gas System (nuclear plant)
803	Circulating Water Pumps	812	Cooling Towers
804	Condensate Pumps	813	Traveling Screens
805	Air Removal Pumps	*814	Loss of Vacuum
806	Shell	*815	High Condenser Temperature
807	Condenser Control	*816	Circulating Water System (screens, piping, etc)
808	Air Leakage	*817	Condensate Cooler
		899	Miscellaneous; see codes 500- 545 for additional classificatio

OTHER**

900	Other, General Code; see codes 500-545 for additional classification	916	Maintenance Error
901	Feedwater Heaters - Leaking	918	Boiler Feed Pump Drive - Electric Motor
902	Feedwater Heaters - Dirty	919	Boiler Feed Pump Drive - Steam Turbine
903	Main Transformer	920	Boiler Feed Pump Drive - Main Shaft
904	Switchgear	921	Boiler Feed Pump Drive - Other
905	Boiler Feed Pumps, General (see 918 to 922)	922	Boiler Feed <u>PUMP</u>
906	Coal Conveying System	*923	Fuel Supply Limitation
907	Water Treatment System	*924	Coal Pulverizer Feeders
908	Boiler Water Condition	*925	Starting System Failure
909	Service Water Pumps	*926	Parts Unavailability
910	Computer	*927	Coal Pipes
911--Radioactivity--(nuclear plant) ***		*928	Station Service Air
912	Cooling Water Limitation	*929	Feedwater Valves
913	Auxiliary Generator	*930	Precipitators
914	Auxiliary Transformer	999	External Cause (e.g., flood, earthquake, transmission line)
915	Operating Error		

* New Codes (effective 1/1/76)

** Codes 800-899 and 900-999 (except 923, 926 and 999) are to be used specifically for equipment failures, use codes 500-545 for outages attributed to other causes.

*** See codes 250 and 251.

APPENDIX F

COMPANIES WHICH PARTICIPATED IN THE
1976 EEI EQUIPMENT AVAILABILITY PROGRAM

Alabama Power Co	Indiana & Michigan Electric Co
Appalachian Electric Power Co	Indianapolis Power & Light Co
Arizona Public Service Co	Interstate Power Co
Arkansas Power & Light Co	Iowa Electric Light & Power Co
Atlantic Electric Co	Iowa-Illinois Gas & Electric Co
Baltimore Gas & Electric Co	Iowa Power & Light Co
Boston Edison Co	Iowa Public Service Co
Canal Electric Co	Iowa Southern Utilities Co
Carolina Power & Light Co	Jersey Central Power & Light Co
Central Hudson Gas & Electric Corp	Kansas City Power & Light Co
Central Illinois Light Co	Kansas Gas & Electric Co
Central Illinois Public Service Co	Kentucky Power Co
Central Louisiana Electric Co	Kentucky Utilities Co
Central Operations Co	Long Island Lighting Co
Central Power & Light Co	Los Angeles Dept of Water & Power
Cincinnati Gas & Electric Co	Louisiana Power & Light Co
Cleveland Electric Illuminating Co	Louisville Gas & Electric Co
Columbus & Southern Ohio Electric Co	Metropolitan Edison Co
Commonwealth Edison Co	Minnesota Power & Light Co
Connecticut Light & Power Co	Minnkota Power Cooperative
Con Edison Co of NY, Inc	Mississippi Power & Light Co
Consumers Power Co	Mississippi Power Co
Cool Water Generating Station	Monongahela Power Co
Dairyland Power Cooperative	Montana-Dakota Utilities
Dallas Power & Light Co	Montana Power Co
Dayton Power & Light Co	Nebraska Public Power District
Delmarva Power & Light Co	New England Electric System
Detroit Edison Co	New Orleans Public Service Co
Duke Power Co	New York State Electric & Gas Corp
Duquesne Light Co	Niagara Mohawk Power Corp
Eastern Iowa Light & Power Cooperative	Northern Indiana Public Service Co
Electric Energy, Inc	Northern States Power Co
El Paso Electric Co	Northwestern Public Service Co
Florida Power & Light Co	Ohio Edison Co
Florida Power Corp	Ohio Power Co
Georgia Power Co	Ohio Valley Electric Corp
Gulf Power Co	Oklahoma Gas & Electric Co
Gulf States Utilities Co	Omaha Public Power District
Hartford Electric Light Co	Orange & Rockland Utilities, Inc
Hawaiian Electric Co	Pacific Gas & Electric Co
Holyoke Water Power Co	Pacific Power & Light Co
Houston Lighting & Power Co	Pennsylvania Electric Co
Idaho Power Co	Pennsylvania Power & Light Co
Illinois Power Co	Philadelphia Electric Co
Indiana-Kentucky Electric Corp	Portland General Electric Co

Potomac Electric Power Co
Public Service Co of Colorado
Public Service Co of Indiana
Public Service Co of New Hampshire
Public Service Co of New Mexico
Public Service Co of Oklahoma
Public Service Electric & Gas Co
Rochester Gas & Electric Corp
Sacramento Municipal Utility District
San Diego Gas & Electric Co
Sierra Pacific Power Co
South Carolina Electric & Gas Co
South Carolina Generating Co
Southern California Edison Co
Southern Electric Generating Co
Southwestern Electric Power Co
Tampa Electric Co
Tennessee Valley Authority

Texas Electric Service Co
Texas Power & Light Co
Toledo Edison Co
Tucson Gas & Electric Co
Union Electric Co
United Illuminating Co
United Power Association
United States Bureau of Reclamation
Utah Power & Light Co
Virginia Electric & Power Co
West Penn Power Co
Western Massachusetts Electric Co
Wisconsin Electric Power Co
Wisconsin Power & Light Co
Wisconsin Public Service Co
Yankee Atomic Electric Co
Yuma Axis Station