TEST CYCLE HEAT BALANCE

VALVE POINT VWO-OP 05/15/87 TEST POINT 08
INTERMOUNTAIN PWR PROJECT UNIT #2
820000. KW TC6F-30 IN LSB TURBINE NO 270T151
2400. PSIG 1000./ 1000. F 2.300 IN HG ABS

CALCULATED USING ASME STEAM TABLES

COMBINED TURBINE-CYCLE PERFORMANCE

	TEST CONDITIONS	* RATED CONDITIONS
TOTAL LOAD	898356.	898356.
HEAT RATE	7772.3	7772.3
THROTTLE FLOW	6496919.	6281950.

TURBINE THERMAL PERFORMANCE

5% OP

	HIGH PRESS TB		REHEAT TB		
			IP TB		LP TB
	THROTTLE	COLD RHT	INLET	EXH	EXH
PRESS	2477.14	590.03	544.47	122.65	3.195
TEMP	988.20	612.10	995.81	612.80	117.29
ENTH	1450.32	1299.07	1516.74	1334.47	1020.74
ENTR	1.5228		1.7255	1.7411	
EFF	87.790		91.714		93.902

ABSCISSA PHPX/PT=0.2382 P1STSTG/PT=0.8045 VAN= 616.5

THRU FLOW PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE		LP TB ENERGY BALANCE	
	RHT TB	LP TB	RHT TB	LP TB
AE	528.21	336.94		
H ELEP	1020.74		1020.74	
H UEEP	1028.10		1028.10	
EFF ELEP	93.90	93.11	93.90	93.11
EFF UEEP	92.51	90.93	92.51	90.93
VAN	616.52		616.52	

* LOAD AND HEAT RATE AT RATED POWER FACTOR AND H2 PRESS. FLOW AT RATED THROTTLE PRESS. OF 2412.2 PSIA AND TEMP. OF 1000 F.

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T G L PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE		LP TB ENERGY BALANCE	
	RHT TB	LP TB	RHT TB	LP TB
H ELEP	1023.00		1023.00	
H UEEP	1030.39		1030.39	
EFF ELEP	93.48	92.44	93.48	92.44
EFF UEEP	92.07	90.25	92.07	90.25
VAN	618.01		618.01	

STAGE FLOW FUNCTION

STG NO	SHELL PRESS	ONE VEL HD	PCT DELTA P	FLANGE PRESS	NOZ AREA	Q/AP H FLG	QFS	Q/AP H SHL
1	1992.87	0.	0.	0.	86.6	0.	6438694.	1007.5
4	1124.35	4.554	1.28	1110.00	157.4	850.9	5801024.	845.5
RH 1	544.47	0.	0.	0.	350.2	0.	5249181.	800.5
8	533.58	0.	0.	0.	350.2	0.	5262602.	818.8
11	242.73	0.849	1.12	240.01	711.2	792.4	5019764.	782.2
15	122.65	0.	0.	0.	807.6	0.	4463988.	1128.8
15	67.63	0.311	1.33	66.73	1414.8	1089.7	4315958.	1063.6
16	41.18	0.202	1.42	40.59	2021.4	1104.1	4019545.	1080.1
18	12.09	0.064	1.53	11.91	6018.0	1071.1	3865914.	1044.7
19	5.14	0.028	1.57	5.06	12096.0	1132.1	3724659.	1123.2

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TL		PRESS	TEMP	ENTH	FLOW		

F E E D W A T E R C Y C L E

						HEATER	8
4	FW IN	2830.00	481.70	466.84	6502076.0	CLOSED	
2	EXTR	1098.85	779.40	1371.87	614860.0	TD =	1.8
3	DRAIN	1098.85	489.30	475.24	614860.0	DC =	7.6
						HEATER	7
7	FW IN	2830.00	397.50	375.61	6502076.0	CLOSED	
5	EXTR	577.10	610.90	1299.40	585006.7	TD =	0.3
6	DRAIN	577.10	406.70	382.70	1199866.7	DC =	9.2
3	ENTRY	1098.85	489.30	475.24	614860.0		
						HEATER	6
10	FW IN	3013.10	348.50	324.83	6502076.0	CLOSED	
8	EXTR	238.20	796.30	1421.99	242838.4	TD =	-0.8
9	DRAIN	238.20	356.50	328.75	1442705.1	DC =	8.0
6	ENTRY	577.10	406.70	382.70	1199866.7		
						PUMP	
11	FW IN	0.	0.	0.	6460944.9		
86	SEAL INJ	0.	0.	0.	106069.8		
30	SEAL RET	0.	0.	0.	64938.7		
32	LEAKAGE	0.	0.	0.	0.		
24	EXTR	1500.00	294.46	266.73	0.		
35	FW OUT	3013.10	348.50	324.83	6502076.0		
						HEATER	5
13	FW IN	131.80	298.00	267.78	4725859.4	OPEN	
12	EXTR	122.35	613.70	1334.95	291668.6	STO =	-1024.8
111	DRAIN	122.35	342.70	314.09	7355973.9	SC =	0.0
109	ENTRY	0.	0.	280.50	2337734.2		
						HEATER	4
17	FW IN	167.90	265.90	235.03	4725859.8	CLOSED	
15	EXTR	65.46	510.30	1287.74	148029.7	TD =	0.4
16	DRAIN	65.46	271.00	240.02	148029.7	DC =	5.1
						HEATER	3
20	FW IN	167.90	197.70	166.13	4725859.8	CLOSED	
18	EXTR	39.21	409.70	1241.24	296412.4	TD =	0.1
19	DRAIN	39.21	207.00	175.19	444442.1	DC =	9.3
16	ENTRY	65.46	271.00	240.02	148029.7		
						HEATER	2
23	FW IN	167.90	160.90	129.25	4725859.8	CLOSED	
21	EXTR	11.40	228.90	1159.77	153631.6	TD =	1.8
22	DRAIN	11.40	168.70	136.68	598073.7	DC =	7.8
19	ENTRY	39.21	207.00	175.19	444442.1		

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TL		PRESS	TEMP	ENTH	FLOW	
						STM SEAL REG
88	FLOW TO	0.	0.	0.	8020.4	CALCULATED
70	TDV	5.14	644.60	1357.36	8020.4	TO HEATER
68	TDV	1.88	480.00	1279.08	0.	TO CONDENSER
	NOT CODED FOR MU		MEAS TOTAL FLOW =		0.	
						HEATER 1
26	FW IN	228.40	124.20	92.74	4725859.8	CLOSED
25	EXTR	4.91	0.	1086.23	141255.1	TD = 0.6
123	DRAIN	4.91	130.40	98.36	747349.1	DC = 6.2
22	ENTRY	11.40	168.70	136.68	598073.7	
70	ENTRY	5.14	644.60	1357.36	8020.4	
						PUMP
33	FW IN	0.	0.	0.	4831929.6	
87	LEAKAGE	0.	0.	0.	0.	
27	FW OUT	0.	0.	0.	4831929.6	
						FW TO BOILER
1	FW IN	2830.00	554.30	551.63	6502076.0	S+L = -5157.

T U R B I N E E X P A N S I O N

						MAIN STEAM LINE
71	EXIT	0.	0.	1450.32	0.	
36	THROTTLE	2477.14	988.20	1450.32	6496919.1	
						VALVE STEM LKG
						SQRT P/V = 89.971
37	LO NO 1	544.67	872.85	1450.31	2863.5	C = 55.065
						SQRT P/V = 19.687
38	LO NO 2	0.	0.	0.	2090.7	C = 106.199
						EXP TO STG 1
40	SHELL	1992.87	926.23	1426.61	6438693.9	
112	EXTR	0.	0.	1426.61	53270.9	
						PACKING NO 2
						SQRT P/V =.115E 19
42	LO NO 1	127.70	677.50	1366.82	14646.0	C = 0.000
						SQRT P/V = 4.943
43	LO NO 2	17.18	668.60	1368.34	7530.7	C = 1651.600
						SQRT P/V = 0.663
100	LO NO 3	0.	0.	0.	633.6	C = 1907.083

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TL	PRESS	TEMP	ENTH	FLOW
				EXP TO STG 4
41 SHELL	1124.35	0.	1372.55	5801023.6
79 EXTR	1110.00	781.40	1372.55	614860.0
				PACKING NO 1
				SQRT P/V = 24.537
46 LO NO 1	126.30	592.10	1323.82	5338.4 C = 389.192
				SQRT P/V = 5.097
47 LO NO 2	17.02	571.70	1321.46	3577.5 C = 826.231
				SQRT P/V = 0.688
100 LO NO 3	0.	0.	0.	633.6 C = 1907.083
				EXPAND TO EXHAUST
49 EXH	590.03	612.10	1299.07	5831324.1
80 EXTR	590.03	612.10	1299.07	585006.7
50 TO RHT	590.03	612.10	1299.07	5246317.4
				REHEATER 1
BEFORE LO 37 ENTRY	0.08	0.	1517.05	0.
84 AFTER LO	544.47	996.30	1517.01	5249180.9 PCTDP = 7.722
				EXPAND TO BOWL
51 ENTRY	533.58	995.21	1516.74	5262601.9
125 ENTRY	545.13	802.90	1412.61	13420.9
				EXP TO STG 11
52 SHELL	242.73	0.	1412.55	5019763.5
53 EXTR	240.01	797.50	1422.54	242838.4
				PACKING NO 3
				SQRT P/V = 4.897
57 LO NO 1	17.00	632.10	1350.61	2280.0 C = 1165.281
				SQRT P/V = 0.667
58 LO NO 2	17.00	641.50	1355.17	2158.7 C = 5133.372
				SQRT P/V = 0.665
100 LO NO 3	0.	0.	0.	633.6 C = 1907.083
				SQRT P/V = 0.
100 LO NO 4	0.	0.	0.	633.6 C = 1907.083

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TL	PRESS	TEMP	ENTH	FLOW	
					EXPAND TO EXHAUST
56 EXH	122.65	612.80	1334.47	4463987.5	
55 EXTR	125.75	616.40	1336.09	550070.1	
					EXPAND TO BOWL
59 ENTRY	122.65	612.80	1334.47	4463987.5	
					EXP TO STG 15
61 SHELL	67.63	0.	1275.97	4315957.8	
60 EXTR	66.73	520.50	1292.66	148029.7	
					EXP TO STG 16
63 SHELL	41.18	0.	1231.68	4019545.4	
62 EXTR	40.59	416.80	1244.52	296412.4	
					EXP TO STG 18
65 SHELL	12.09	0.	1140.38	3865913.8	
64 EXTR	11.91	220.70	1155.69	153631.6	
					EXP TO STG 19
107 SHELL	5.14	0.	1086.76	3724658.8	
106 EXTR	5.06	0.	1086.23	141255.1	

TL	PRESS	TEMP	ENTH	FLOW	
					CONDENSER
					SHAFT 1
108 TB EXH	1.57	117.29	1028.1024	3724658.8	LEVL = -4445.2
76 ENTRY	0.	0.	0.	1102826.2	
122 DRAIN	0.	0.	0.	4831930.2	
					GENERATOR 1
					SHAFT 1

MEASURED LOAD = 898356.0 PF = 1.000 H2 = 63.00
SHAFT 1 KW = 910504.5 FL =4353.0 GL = 7795.5

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TEST CYCLE HEAT BALANCE

P E R F O R M A N C E

TRUNKLINE OUTPUT

TL	P	T	H	Q	SV	SP	PV	TR
1	2830.0	554.3	551.6	6502076.	0.0213	0.	0.	-5156.9
2	1098.9	779.4	1371.9	614860.	0.6049	556.147	1.847	223.3
3	1098.9	489.3	475.2	614860.	0.0201	0.	7.600	0.
4	2830.0	481.7	466.8	6502076.	0.	0.	0.	0.
5	577.1	610.9	1299.4	585007.	1.0029	482.036	0.336	128.9
6	577.1	406.7	382.7	1199867.	0.0187	0.	9.200	0.
7	2830.0	397.5	375.6	6502076.	0.	0.	0.	0.
8	238.2	796.3	1422.0	242838.	3.0800	396.736	-0.764	399.6
9	238.2	356.5	328.7	1442705.	0.0181	0.	8.000	0.
10	3013.1	348.5	324.8	6502076.	0.0177	0.	0.	0.
11	0.	0.	0.	6460945.	0.	0.	0.	0.
12	122.4	613.7	1334.9	291669.	5.1327	342.726	-1024.800	271.0
13	131.8	298.0	267.8	4725859.	0.0174	0.	0.	0.
14	167.9	298.0	267.8	4725860.	0.0174	1.014	0.	167.9
15	65.5	510.3	1287.7	148030.	8.7032	298.447	0.447	211.9
16	65.5	271.0	240.0	148030.	0.0172	0.	5.100	0.
17	167.9	265.9	235.0	4725860.	0.	0.	0.	0.
18	39.2	409.7	1241.2	296412.	13.0355	266.047	0.147	143.7
19	39.2	207.0	175.2	444442.	0.0167	0.	9.300	0.
20	167.9	197.7	166.1	4725860.	0.	0.	0.	0.
21	11.4	228.9	1159.8	153632.	35.5947	199.469	1.769	29.4
22	11.4	168.7	136.7	598074.	0.0164	0.	7.800	0.
23	167.9	160.9	129.3	4725860.	0.	0.	0.	0.
24	1500.0	294.5	266.7	0.	0.0173	0.	0.	0.
25	4.9	0.	1086.2	141255.	0.	161.469	0.569	-161.5
26	228.4	124.2	92.7	4725860.	0.0162	0.	0.	0.
27	0.	0.	0.	4831930.	0.	0.	0.	0.
28	0.	0.	0.	19289.	0.	0.	0.	0.
29	0.	0.	0.	45650.	0.	0.	0.	0.
30	0.	0.	0.	64939.	0.	0.	0.	0.
31	3027.8	299.1	274.4	0.	0.0172	0.	0.	0.
33	0.	0.	0.	4831930.	0.	0.	0.	0.
34	0.	0.	0.	-5157.	0.	0.	0.	0.
35	3013.1	348.5	324.8	6502076.	0.0177	0.	0.	0.
36	2477.1	988.2	1450.3	6496919.	0.3060	1450.316	89.971	0.
37	544.7	872.9	1450.3	2864.	1.4053	0.780	19.687	55.1
38	0.	0.	0.	2091.	0.	0.	0.	106.2
39	2477.1	0.	1450.3	6491965.	0.3060	0.	89.971	0.
40	1992.9	926.2	1426.6	6438694.	0.3659	143.990	73.796	0.
41	1124.3	0.	1372.5	5801024.	0.5917	559.348	43.590	845.5
42	127.7	677.5	1366.8	14646.	5.2260	0.779	4.943	0.0
43	17.2	668.6	1368.3	7531.	39.0396	0.	0.663	1651.6
45	0.	0.	0.	39850.	0.	0.	0.	0.
46	126.3	592.1	1323.8	5338.	4.8621	0.703	5.097	389.2
47	17.0	571.7	1321.5	3578.	35.9940	0.	0.688	826.2
48	0.	0.	0.	5840874.	0.	0.	0.	0.
49	590.0	612.1	1299.1	5831324.	0.9800	484.404	24.537	0.
50	590.0	612.1	1299.1	5246317.	0.	0.	0.	0.
51	533.6	995.2	1516.7	5262602.	1.5846	0.	18.354	0.

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TL	P	T	H	Q	SV	SP	PV	TR
52	242.7	0.	1412.5	5019764.	2.9807	398.783	9.024	782.2
53	240.0	797.5	1422.5	242838.	3.0594	397.396	8.857	0.
54	122.6	612.8	1334.5	5014058.	5.1153	0.	4.897	0.
55	125.8	616.4	1336.1	550070.	5.0048	344.800	0.	0.
56	122.6	612.8	1334.5	4463988.	5.1153	342.911	0.	0.
57	17.0	632.1	1350.6	2280.	38.1675	0.	0.667	1165.3
58	17.0	641.5	1355.2	2159.	38.4989	0.	0.665	5133.4
59	122.6	612.8	1334.5	4463988.	5.1154	0.	4.897	0.
60	66.7	520.5	1292.7	148030.	8.6300	299.726	2.781	0.
61	67.6	0.	1276.0	4315958.	8.2211	300.687	2.868	1063.6
62	40.6	416.8	1244.5	296412.	12.6951	268.135	1.788	0.
63	41.2	0.	1231.7	4019545.	12.1492	269.138	1.841	1080.1
64	11.9	220.7	1155.7	153632.	33.6258	201.590	0.595	0.
65	12.1	0.	1140.4	3865914.	31.9879	202.714	0.615	1044.7
66	16.6	625.7	1347.5	9617.	38.8583	0.	0.	0.
67	109.9	345.6	1195.2	0.	4.1244	0.	0.	0.
68	1.9	480.0	1279.1	0.	297.6007	0.	0.	0.
69	5.1	644.6	1357.4	1863.	127.8890	0.	0.	0.
70	5.1	644.6	1357.4	8020.	127.8890	0.	0.	0.
71	0.	0.	1450.3	0.	0.	0.	0.	0.
72	0.	0.	0.	-1025.	0.	0.	0.	0.
73	0.	0.	0.	-4445.	0.	0.	0.	0.
75	0.	0.	0.	5815.	0.	0.	0.	0.
76	0.	0.	0.	1102826.	0.	0.	0.	0.
79	1110.0	781.4	1372.5	614860.	0.5995	557.401	43.031	0.
80	590.0	612.1	1299.1	585007.	0.	0.	0.	0.
81	12.4	625.7	1347.8	0.	52.0502	0.	0.	0.
82	.0.	0.	0.	5246317.	0.	0.	0.	0.
83	122.4	342.7	1190.7	313.	0.	0.	0.	0.
84	544.5	996.3	1517.0	5249181.	1.5528	7.722	18.725	800.5
86	0.	0.	0.	106070.	0.	0.	0.	0.
88	0.	0.	0.	8020.	0.	0.	0.	0.
90	152.3	342.7	314.1	0.	0.0179	0.	0.	0.
91	141.7	234.1	202.7	895029.	0.0169	0.647	0.	141.7
95	1.6	117.3	1020.7	3724659.	198.7881	1028.102	3.195	616.5
99	0.	0.	0.	6971.	0.	0.	0.	0.
100	0.	0.	0.	634.	0.	0.	0.	1907.1
104	2830.0	554.3	551.6	6514032.	0.0213	1.028	0.	2830.0
106	5.1	0.	1086.2	141255.	69.4398	162.741	0.270	0.
107	5.1	0.	1086.8	3724659.	68.3995	0.	0.274	1123.2
108	1.6	117.3	1028.1	3724659.	218.2728	1028.102	3.195	-4445.2
109	0.	0.	280.5	2337734.	0.	0.	0.	0.
111	122.4	342.7	314.1	7355974.	0.0179	0.	0.026	0.
112	0.	0.	1426.6	53271.	0.	0.	0.	0.
113	0.	0.	0.	6415884.	0.	0.	0.115E 19	0.
114	400.4	123.1	92.1	14671.	0.0162	0.624	0.	400.4
115	400.4	123.1	92.1	13570.	0.0162	0.624	0.	400.4
116	400.4	123.1	92.1	27977.	0.0162	0.623	0.	400.4
117	400.4	123.1	92.1	11145.	0.0162	0.660	0.	400.4
118	400.4	123.1	92.1	20090.	0.0162	0.660	0.	400.4
119	400.4	123.1	92.1	18617.	0.0162	0.660	0.	400.4
120	0.	0.	0.	4954.	0.	0.	0.	0.
122	0.	0.	0.	4831930.	0.	0.	0.	0.
123	4.9	130.4	98.4	747349.	0.0162	0.	6.200	0.
125	545.1	802.9	1412.6	13421.	1.3196	0.628	0.	537.8
130	0.	0.	0.	278386.	0.	0.	0.	0.
131	123.2	613.3	1334.7	134133.	5.0959	1.019	0.	123.2
132	123.1	613.1	1334.6	144253.	5.0987	1.020	0.	123.1
133	0.	0.	0.	277752.	0.	0.	0.	0.
201	0.1	0.	1517.0	0.	0.	217.978	0.	0.

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