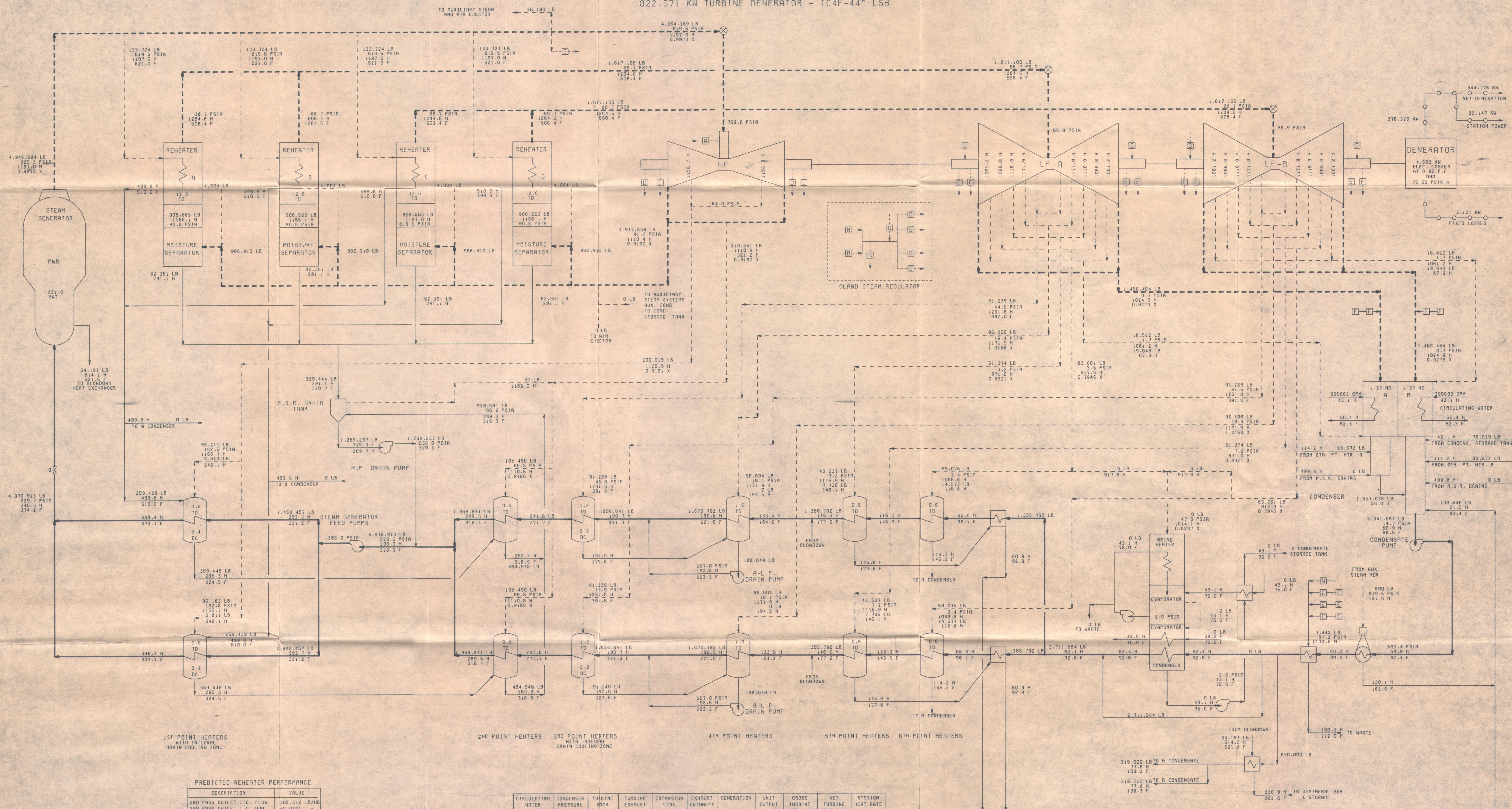


# 822,571 KW TURBINE GENERATOR - TC4F-44" LSB



PREDICTED REHEATER PERFORMANCE

| DESCRIPTION                | VALUE         |
|----------------------------|---------------|
| 2ND PASS OUTLET LTO. FLOW  | 102,512 LB/HR |
| 2ND PASS OUTLET LTO. GURL  | -0.0221       |
| 2ND PASS OUTLET LTO. PRESS | 614.8 PSIA    |
| 4TH PASS OUTLET LTO. FLOW  | 27,207 LB/HR  |
| 4TH PASS OUTLET LTO. GURL  | -0.0046       |
| EXCESS STEAM FLOW          | 4,004 LB/HR   |

| CIRCULATING WATER TEMPERATURE | CONDENSER PRESSURE | TURBINE BACK PRESSURE | TURBINE EXHAUST FLOW | EXPANSION LINE END POINT | EXHAUST ENTHALPHY | GENERATION | UNIT OUTPUT | GROSS TURBINE HEAT RATE | NET TURBINE HEAT RATE | STATION HEAT RATE |
|-------------------------------|--------------------|-----------------------|----------------------|--------------------------|-------------------|------------|-------------|-------------------------|-----------------------|-------------------|
| °F                            | IN HG              | IN HG                 | LB/HR                | BTU/LB                   | BTU/LB            | KW         | KW          | BTU/KWH                 | BTU/KWH               | BTU/KWH           |
| 75.0                          | 1.37               | 1.37                  | 2,912,945            | 1017.2                   | 1024.9            | 376,326    | 344,176     | 11162                   | 12205                 | 12100             |

## BASIS OF HEAT BALANCE CALCULATIONS

ELEVATION: APPROXIMATELY 27 FEET ABOVE SEA LEVEL

STEAM GENERATOR BLOWDOWN: 0.8 %

PRESSURE DROPS: PRESSURE DROPS FOR THE STEAM GENERATORS, REHEATERS, MOISTURE SEPARATORS, MAIN STEAM H.P. EXHAUST, AND EXTRACTION PIPING WERE CALCULATED AT ALL LOADS.

PRESSURES: TURBINE PLANO PRESSURES ARE SHOWN ON EXTRACTION LINES ADJACENT TO THE TURBINES. HEATER INLET PRESSURES ARE SHOWN ADJACENT TO THE HEATERS.

BASE BALANCE CONDITIONS: THE HEAT BALANCE CONDITIONS SHOWN ON THE DIAGRAM CORRESPOND TO A CIRCULATING WATER TEMPERATURE OF 65 °F.

ALL HEAT BALANCE RESULTS ARE PRODUCED BY A COMPUTER PROGRAM PROCESSED ON A IBM 360 COMPUTER.

AUXILIARY POWER REQUIREMENTS ARE CALCULATED FOR ALL EQUIPMENT. THE REQUIREMENTS OF THE FOLLOWING MAJOR EQUIPMENT VARY WITH LOAD.

3 CONDENSATE HEAT PUMPS 2 OPERATING  
2 H.P. HEATER DRAIN PUMPS 1 OPERATING  
2 L.P. HEATER DRAIN PUMPS 2 OPERATING  
2 STEAM GENERATOR FEED PUMPS 2 OPERATING

THE FOLLOWING ARE IMPORTANT AUXILIARY POWER ITEMS WHICH ARE CONSIDERED NOT TO VARY WITH LOAD:

AUXILIARY POWER FOR THESE AND LESSER EQUIPMENT HAS BEEN CALCULATED FOR AVERAGE DAILY REQUIREMENTS.

CIRCULATING WATER PUMPS  
PRIMARY COOLANT PUMPS  
SEALING COOLING WATER PUMPS  
INSTRUMENT AIR COMPRESSOR

BALANCE DIAGRAMS ARE GENERATED BY A CALIFORNIA COMPUTER PRODUCTS INC. PEN PLOTTING SYSTEM.

REFERENCES:

1) BONE STEAM TABLES 1957  
2) STONE & WARRISER PLANT SPECIFICATIONS  
3) SOUTHWEST ENGINEERING

$$\text{GROSS TURBINE HEAT RATE} = \frac{\text{HEAT TO TURBINE CYCLE}}{\text{GENERATION}} = \frac{4,200,550 \times 10^9}{376,326} = 11162 \text{ BTU/KWH}$$

$$\text{NET TURBINE HEAT RATE} = \frac{\text{HEAT TO TURBINE CYCLE}}{\text{GENERATION} - \text{AUXILIARY POWER}} = \frac{4,200,550 \times 10^9}{344,176} = 12205 \text{ BTU/KWH}$$

$$\text{STATION HEAT RATE} = \frac{\text{REACTOR DUTY}}{\text{STATION OUTPUT}} = \frac{4,164,52 \times 10^9}{344,176} = 12100 \text{ BTU/KWH}$$

EXTERNAL DRAIN COOLERS

FLASH EVAPORATOR

BLOWDOWN HEAT EXCHANGER

GLAND STEAM CONDENSER

STEAM JET AIR EJECTOR

LEAKAGES

| FLOW  | ENTHALPHY |
|-------|-----------|
| 1,865 | 1197.0    |
| 1,488 | 1110.4    |
| 360   | 1110.4    |
| 2,058 | 1174.3    |
| 1,204 | 1174.3    |
| 1,654 | 1174.3    |
| 8,437 | 1197.0    |
| 0     | 1110.4    |

## LEGEND

— STEAM  
— POWER  
LB FLOW, POUNDS PER HOUR  
H ENTHALPHY, BTU PER HOUR  
F TEMPERATURE, DEGREES FAH  
X QUALITY, FRACTION  
TD TERMINAL DIFFERENCE  
DC TERM. DIFFERENCE DRAIN COOLER  
KW KILOWATTS  
HG PRESSURE, IN. OF MERCURY, ABS  
PRV PRESSURE REDUCING VALVE  
PSIA PRESSURE, LB PER SQ. INCH, ABS  
PSIG PRESSURE, LB PER SQ. INCH, GAGE  
GPM GALLONS PER MINUTE  
⊗ THROTTLE OR INTERCEPT VALVE

TI  
APERTURE  
CARD

FOR INFORMATION  
ONLY

VIRGINIA POWER COMPANY  
MAINTENANCE AND PERFORMANCE SERVICES  
PERFORMANCE TESTING AND RESULTS ANALYSIS

SURRY 1 & 2  
HEAT BALANCE DIAGRAM  
1231.0 MW, LOAD

50 % LICENSED LOAD NO. EVAPORATION

| MODELED | NAME      | DATE   | FILE NO. | SHEET NO. |
|---------|-----------|--------|----------|-----------|
| 1       | DRANNBY   | 3-6-85 |          | 4 of 6    |
| 2       | INSPECTED | 3-7-85 |          |           |
| 3       | CORRECT   | 3-7-85 |          |           |
| 4       | APPROVED  | 3-7-85 |          |           |

DRAWING NO. P1448-FM-59D

REVISIONS

4 REDRAWN FOR  
DC 34.47 AND  
OTHERS

CHKD CORR APP DATE

8709220455