MONTHLY STEAM BOILER PLANT OPERATING LOG

1. COMMAND	2. BASE AND LOCATION	3. BLDG. #	4. DATE

	(A)	(B)					(C)	(D)									
	AVG	STEAM PRODUCED						FUEL USED									
	STEAM	(1000 POUNDS)					HEAT	FUEL 1 TYPE:		BTU VALUE:			FUEL 2 TYPE:			BTU VALUE:	
	PRESS	BOILER NUMBER					DEGREE	BOILER NUMBER					BOILER NUMBER				
DATE	(psig)	1	2	3	4	TOTAL	DAYS	1	2	3	4	TOTAL	1	2	3	4	TOTAL
1																	
2																	
3																	
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TOTAL																	
MAX																	
MIN																	
AVG																	

5. PLANT INPUT (Million BTU)				
FUEL USED		VOL CORRECT	BTU VALUE	MBTU INPUT
GAS (kcf):			BTU/kcf	
OIL (Gals.):			BTU/Gal	
COAL (Lb.):			BTU/Lb	
			TOTAL	

6. PLANT OUTPUT (Million BTU)		
MONTHLY STEAM	BTU/LB	TOTAL OUTPUT

7. PLANT COMBUSTION EFFICIENCY (Percent)				
BOILER NUMBER				
1	2	3	4	AVERAGE

8. PLANT OVERALL EFFICIENCY (Percent)

DATE:	SIGNATURE (Chief Operating Engineer):	DATE:	SIGNATURE (Base Civil Engineer):

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	(E)																				(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)
	FLUE GAS ANALYSIS-EFFICIENCY																				FEED	MAKE-UP	MAKE-UP	COND	PLANT	PLANT	ELECTRIC	
	02 OR CO2 (AVG) \ TEMP DIFF (F) \ FEEDWATER TEMP (F) \ OTHER ( ) COMBUSTION EFFICIENCY																				WATER	WATER	WATER	RTN	COMB	OVERALL	POWER	
	BOILER NUMBER																				FLOW	FLOW	PERCENT	TEMP	EFFICY	EFFICY	USED	TOTAL
DATE	1					2					3					4					(GALS)	(GALS)	(%)	(F)	(%)	(%)	(KWH)	MANHRS
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REMARKS

AF Form 1464 will be used by Air Force steam boiler plants having capacities greater than 4,800,000 Btu/hour for low operating pressures (less than 15 psi) and 1,400,000 Btu/hour for operating pressures over 15 psi. Post information on daily totals and averages from AF Form 1458, Daily Steam Boiler Plant Operating Log, on AF Form 1464. Where there is more than one plant, a separate log is required for each plant.

ITEMS 1-4. Self-explanatory.

Column A. Steam pressure from steam gage readings.

Column B. Steam produced in units of 1000 pounds from steam flow or feedwater memters for each boiler. If the plant has more than four boilers use additional forms.

Column C. Enter the degree days for each day of the month. The heating degree days can be obtained either from the base weather office or calculated independently. The degree days are calculated by adding the maximum and minimum outside temperature for each day of the month, dividing by 2, and subtracting from 65. Negative results will be entered as zero.

$$\text{Heating Degree Days} = 65 - \frac{(F\ Max\ (Column\ K) + F\ Min\ (Column\ K)}{2}$$

Column D. Enter the quantity of fuel used in each boiler. Coal = the pounds of coal burned from actual weighing or estimated use. Oil = gallons of oil from meters or tank gaging. Gas = thousands of cubic feet as read from the gas meter.

Column E. Record the 0_2 or CO_2 in the flue gas from each boiler. Record the average daily temperature of feedwater (at the exit of the economizer if the boiler is so equipped). Record the difference between average stack temperature and the average combustion air temperature for the day. From applicable efficiency charts, or manufacturer's conversion charts furnished with the equipment for the fuel used, based on daily average O_2 or CO_2 readings and temperatures differences between the average stack temperature and the average combustion air temperature, obtain combustion efficiency for each boiler.

Column F. Enter the total amount of feedwater to all boilers in gallons from feedwater meter for each day.

Column G. Enter the total metered gallons of make-up water for each day.

Column H. Calculate by dividing the pounds of make-up water by the pounds of steam produced and multiply by 100. Multiply gallons of make-up water by 8.3 to determine pounds.

Column I. Enter the temperature of condensate return for each day.

Column J. Enter the average of individual boiler combustion efficiencies for each day.

Column K. Enter the plant overall efficiency for each day.

Column L & M. Self explanatory.

ITEM 5. Plant Input: Enter the total fuel used for each fuel from Column D. If oil is used calculate the volumetric correction factor as:

Volume Correction Factor = 1.0000 - [T - 60Â°F) X .0004], where T is the temperature of the fuel oil at the meter.

If the natural gas meter does not record in standard cubic feet, calculate the volumetric correction factor:

Volume Correction Factor = [14.696psi + Pgas @meter(psig) / 14.696 psi

Enter the unit heating value for each fuel. Multiply the quantifies to determine the MILLION BTU 9MBTU) INPUT and enter for each fuel. Sum the MBTU INPUT for each fuel and enter the TOTAL MBTU INPUT for the plant.

ITEM 6. Plant Output: Enter the total monthly steam produced in 1000 pounds from Column B. Enter the heat content of the steam Btu/lb *(from steam tables, enthalpy of the steam at operating steam pressure and temperature minus the enthalpy of the feedwater at the average feedwater temperature, Column E).* Multiply the total monthly steam produced by the steam heat content and divide by 1000 and enter the TOTAL OUTPUT in Million Btu.

ITEM 7. Plant Combustion Efficiency. Enter monthly individual boiler efficiencies from Column E. Calculate the plant average combustion efficiency by adding all boiler efficiencies and dividing by the number of operating boilers.

ITEM 8. Overall Efficiency. Divide PLANT OUTPUT (Item 6), by PLANT INPUT (Item 5), and multiply by 100.

$$\text{OVERALL EFFICIENCY} = \frac{\text{PLANT OUTPUT (Item 6)}}{\text{PLANT INPUT (Item 5)}} \times 100$$

METRIC CONVERSION

MULTIPLY	BY	TO OBTAIN
psig	6.895	kPa (kilopascal)
lb	0.4536	kg (kilogram)
kcf	0.02832	1000m (thousand cubic meters)
gal	3.7854	l (liter)
Btu/kcf	0.02988	kJ/1000m (kilojoule/1000 cubic meters)
Btu/gal	3.9936	kJ/l (kilojoule/liter)
Btu/lb	0.47855	kJ/kg (kilojoule/kilogram)
MBtu	1.055	GJ (gigajoule)

TEMPERATURE CONVERSION

TO OBTAIN DEGREES CENTIGRADE, ^{o}C = (T -32) / 1.8