Section IV – Performance Reporting

Performance data provide information, in a summarized format, pertaining to overall unit operation during a particular month in a given year. These data are needed to calculate unit performance, reliability, and availability statistics. NERC requires performance data for all unit types and sizes reported to the GADS program.

Reporting to the GADS program is now mandatory for all conventional units 20 MW and larger, starting January 1, 2013. Reporting the level of detail *GADS Data Reporting Instructions* requests enables you and other industry analysts to perform detailed and useful analyses. Figure III-1 presents the classes of events generating companies must report for different types and sizes of conventional, non-renewable generating units.

Performance Report (05 Format)

Report performance data to GADS in the Performance Report (05) format, as described in this section. Submit the data to Open Assess Technology International, Inc. (OATI) using the webE-GADS data collection system **within 45 days after the end of each quarter**. You must submit performance data for a unit even if it was off-line during the entire quarter. It is preferred to report year-to-date information each quarter rather than four, single quarterly submittals.

There are six distinct sections of the performance report: a) event identification; b) unit generation performance; c) unit starting characteristics; d) unit time information; e) primary fuel; and, f) secondary fuel. together, these sections provide an overall summary of the operating status of a unit.

The performance report (05) is divided into several sections. The different sections of the performance report are on different records: Sections A, B, and C on Record 01, section d on record 02, and sections E and F on records 03 and 04. unless otherwise stated, do not zero fill or asterisk fill unused data fields in any section of the performance report.

NERC invites Generator Owners and Operators to report on units that have a nameplate capacity of 20MW or less on a voluntary basis.

A description of each section and the data elements within it follows. Included are detailed instructions for reporting each performance data element.

A. Unit Identification

There are six data elements, referred to as "fields," in this section. See Table IV-1. These elements form a "key" — an identifier that makes each performance record unique from all others in the database. This key is referenced at the beginning of every record used to report performance data.

Table IV-1: Record Layout of Section A – Unit Identification		
All Records		
Column ID	**Number of Columns**	**Starting Position**
A – Unit Identification		
Record Code (required)	2	1
Utility (Company) Code (required)	3	3
Unit Code (required)	3	6
Year (required)	4	9
Report Period (required)	2	13
Report Revision Code (voluntary)	1	15

Record Code (columns 1-2) - Required
This "05" code uniquely identifies these data as a Performance Report.

Utility (Company) Code (columns 3-5) - Required
Enter the three character (alphanumeric) code NERC assigned to your operating company. Appendix C contains a complete list of the operating companies participating in GADS and their assigned utility (operating company) codes.

Unit Code (columns 6-8) - Required
Enter the three-digit code your operating company assigned for the unit that you are reporting. This code distinguishes one unit from another in your utility. Appendix C, Page C-1, contains a guide for selecting unit codes.

Year (columns 9-12) - Required
Enter the year (YYYY) for which data are being summarized.

Report Period (columns 13-14) - Required
Enter the month of the year for which data are being summarized:

Table IV-2: Monthly Summaries					
01	- January	05	- May	09	- September
02	- February	06	- June	10	- October
03	- March	07	- July	11	- November
04	- April	08	- August	12	- December

Report Revision Code (column 15) - Voluntary
This one-character data field signals that you wish to make a change to a performance report already submitted to GADS. Changes can be corrections, additions, or deletions of existing reports.

The first time you submit a performance report to GADS it is called an "original." Give all original reports a revision code of zero (0).

Use the following codes when making changes to an original performance report:

1, 2, . . . 9   Use these codes when making corrections or additions to original performance reports. Each time you make a change, you must increase the revision code by one. You can make up to nine corrections and additions to an original report.

When making **corrections or additions** to an original report, you need to send GADS all records relating to the performance report you intend to change. On the record:

1.   Complete columns 1-14, repeating the information from the original report;

2.   Increase the revision code in column 15 by one;

3.   Make sure the same record number used in the original report is in columns 124-125. Do not leave the record number blank; and

4.   Enter the updated information in the appropriate field.

To delete data from one or more data fields, GADS recommends that you resubmit the entire data set–year-to-date–for that unit (or all units you report) to GADS. This procedure will insure that both you and the GADS database have the same records on file. You also have the option to find the record that has the highest revision code and then increase this number by one or set all revision codes back to zero.

B. Unit Generation Performance

GADS uses the data you provide in this section to calculate performance statistics. GADS requests both gross and net values but only requires certain net values. Reporting gross data, net data, or both depends on how the unit is electrically metered. Some units are metered on a single basis (gross or net). Enter your unit's data on the basis of how your unit is actually metered. If you meter both gross and net, enter both values. If you meter on a single basis but can estimate the other, do so and enter the estimated value in the appropriate field. Complete the elements in section B as detailed below. The value you report, whether it be gross or net, must be consistent with the available capacity as a result of deratings reported on the event reports (07).

Table IV-3: Record Layout of Section B – Unit Generation Performance		
Record 01		
Column ID	**Number of Columns**	**Starting Position**
B – Unit Generation Performance		
Gross Maximum Capacity (voluntary)	4 + 2 decimals	16
Gross Dependable Capacity (voluntary)	4 + 2 decimals	22
Gross Actual Generation (voluntary)	7 + 2 decimals	28
Net Maximum Capacity (required)	4 + 2 decimals	37
Net Dependable Capacity (required)	4 + 2 decimals	43
Net Actual Generation (required)	7 + 2 decimals	49

Gross Maximum Capacity (GMC) (Record 01, columns 16-21) - Voluntary
Enter the maximum capacity the unit can sustain over a specified period of time when not restricted by ambient conditions or deratings. To establish this capacity, a formal demonstration is required. No standard demonstration test method or test duration exists at this time, but many of the NERC Regions have their own criteria that all operating companies in those Regions follow. If your operating company has not set demonstration test requirements, contact your regional manager listed in appendix C.

The GMC of a unit should change only as a result of a new performance tests or permanent unit modifications. Never change the GMC due to equipment problems even if they persist for a lengthy period of time **unless** the unit is permanently modified as a result. If the unit is permanently modified, note changes in the unit's design on a new design data form and submit it to NERC-GADS for updating.

Gross Dependable Capacity (GDC) (Record 01, columns 22-27) - Voluntary
Enter the gross power level that the unit can sustain during a given period if there are no equipment, operating, or regulatory restrictions. Therefore by definition, the GDC is the GMC modified for ambient limitations.

The GDC is the same in intent and purpose as the historically reported Maximum Dependable Capacity (MDC).

Gross Actual Generation (GAG) (Record 01, columns 28-36) - Voluntary
Enter the actual number of gross electrical megawatthours (MWh) generated by the unit during the month.

If you report both service hours and gross actual generation (one to 9999999), you must also report GMC or GDC. Similarly, if you report both service hours and a gross capacity value, you must also report gross actual generation. This provides consistency when calculating performance statistics.

Net Maximum Capacity (NMC) (Record 01, columns 37-42) - Required
NMC is the unit's GMC minus any capacity (MW) utilized for that unit's station service or auxiliary load.

Net Dependable Capacity (NDC) (Record 01, columns 43-48) - Required
NDC is the unit's GDC minus any capacity (MW) utilized for that unit's station service or auxiliary loads.

Net Actual Generation (NAG) (Record 01, columns 49-57) - Required
NAG is the unit's GAG less minus generation (MWh) utilized for that unit's station service or auxiliary loads. If NAG is negative during the month being reported, enter a minus sign in the column immediately before the reported value.

For consistency in calculating statistics, if you report net actual generation (negative integer or positive integer), you must also report NMC or NDC. Similarly, if you report net capacity value, you must also report net actual generation.

Please note: If you only report either the gross or the net capacities, the GADS editing program will calculate any missing GMC, GDC, NMC, or NDC using the following criteria:

Fossil, Nuclear, and Fluidized Bed:	5.0% difference between gross and net values
Gas Turbine/Jet Engine:	2.0% difference between gross and net values
Diesel:	No difference between gross and net values
Hydro/Pumped Storage:	2.0% difference between gross and net values
Miscellaneous:	4.0% difference between gross and net values

For example, if you report a fossil unit's NMC and NDC, then the program will take your NMC and multiply it by 1.05 to determine the new GMC. The same operation would occur for determining the GDC from the NDC number.

If you report only one capacity (for example NMC), then the program will assume the NMC and NDC are equal and will record the unit as such. It will then calculate the GMC and GDC using the calculation stated above.

If you think the differences between gross and net are different than the numbers stated above, then complete all capacities (maximum and dependable) with the correct numbers. The computer will accept entered numbers and will only calculate new numbers if the fields are blank, zero-fielded, or have an asterisk (*).

Special Note on Gas Turbines and Jet Engines
Gas turbine and jet engine capacities are very sensitive to outside temperatures and their capacities are not as constant as fossil or nuclear plants. See *Figure IV-1* below as an example. Therefore, base the GMC and NMC capacities of these units on the International Organization of Standardization (ISO) charts (at standard temperatures and pressures) for each individual Gas Turbine and Jet Engine unit. Once the GMC and NMC are determined, any non-equipment restriction that lessens the capacity would be the GDC and NDC numbers. Report the monthly average GMC, GDC, NMC and NDC to GADS.
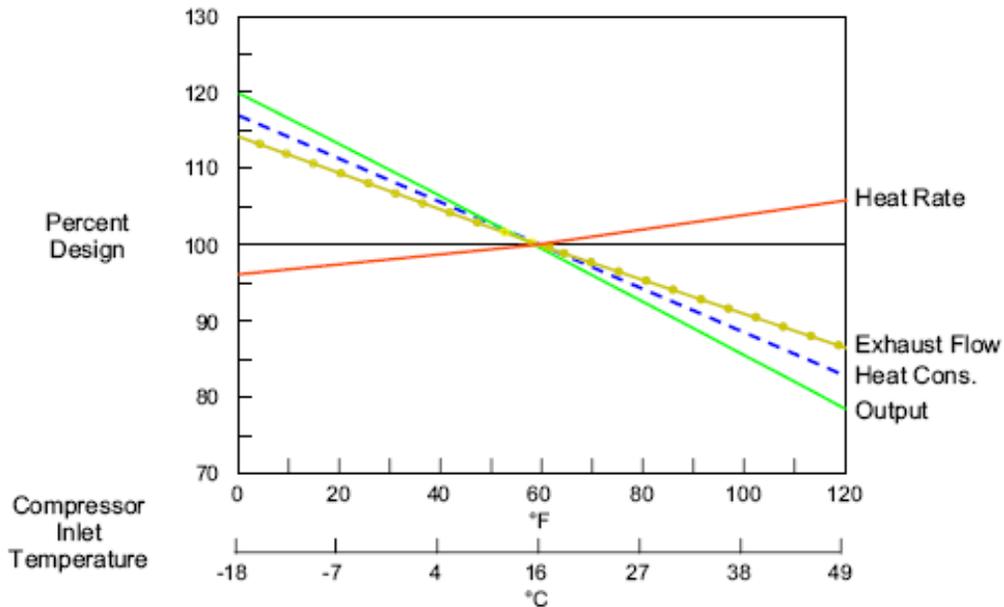
Figure IV-1: Effects of Ambient Temperature on Gas Turbines/Jet Engines

B. Unit Starting Characteristics

Use the data elements in this section to establish the manner in which the unit was operated during the month. This information is needed when sorting data for use in special availability and reliability applications. Section C is located on record 01; refer to *Table IV-4* below.

Table IV-4: Record Layout of Section C – Unit Starting Characteristics		
Record 01		
Column ID	Number of Columns	Starting Position
C – Unit Starting Characteristics		
Typical Unit Loading Characteristics (voluntary)	1	58
Attempted Unit Starts (required)	3	59
Actual Unit Starts (required)	3	62
(Blank Columns)	34	65
Verbal Description (voluntary)	25	99
Record Number (required)	2	124

Typical Unit Loading Characteristics (Record 01, column 58) - Voluntary
Enter the code from the list below that best describes how the unit was operated or loaded during the month being reported. Generally, these are numbered from least starts to most starts.

Table IV-5: Unit Loading Characteristics	
Code	**Description**
1	Base loaded with minor load following at night and on weekends
2	Periodic startups with daily load-following and reduced load nightly
3	Weekly startup with daily load-following and reduced load nightly
4	Daily startup with daily load-following and taken off-line nightly
5	Startup chiefly to meet daily peaks
6	Other (describe in verbal description)
7	Seasonal Operation

If the unit was off-line during the entire period, describe how the unit typically would have been loaded had it been on-line.

Attempted Unit Starts (Record 01, columns 59-61) – Required
Enter the number of attempts made to start the unit during the month to either generate, pump, or synchronous condense where the unit goes from a stopped position to generating, pumping, or synchronously condensing mode. Please note that:

- Repeated failures for the same cause without attempted corrective actions are considered a single start.
- Repeated initiations of the starting sequence without accomplishing corrective repairs are counted as a single attempt.

If you abandon startup attempts, the unit is shut down for repairs, and then started at a future time, report two startup attempts.

Actual Unit Starts (Record 01, columns 62-64) - Required
Enter the number of times the unit actually starts during the month to generate, pump, or condense where the unit goes from a stopped position to generate, pump, or synchronous condensing mode.

The number of actual unit starts must be less than or equal to the number of attempted unit starts.

Verbal Description (Record 01, columns 99-123) - Voluntary
If you enter Code 6 (Other) for the typical unit loading characteristics, as noted in column 58 in Figures IV-5, describe how the unit actually was operated during the month.

Unlike the verbal description field on the event report (07), you must abbreviate your description to fit in columns 99-123. **You may not use additional records.**

D.   Unit Time Information

The data reported in section D (see *Table IV-6*) summarize information reported on the event report (07). The technique for summarizing event data is described on page IV-9. If reserve shutdown event data are not reported for the special group of hydro and pumped storage units (see *Table III-1*, Page III-1), the data needed to complete section D must be computed from your own station records.

The first 15 characters of Record 02 (A – Unit Identification) are identical to that of record 01. These 15 characters link the records together.

Table IV-6: Record Layout of Section D – Unit Time Information		
Record 02		
Column ID	**Number of Columns**	**Starting Position**
A – Unit Identification		
Record Code (required)	2	1
Utility Code (required)	3	3
Unit Code (required)	3	6
Year (required)	4	9
Report Period (required)	2	13
Report Revision Code (voluntary)	1	15
D – Unit Time Information		
Unit Service Hours (required)	3 + 2 decimals	16
Reserve Shutdown Hours (required)	3 + 2 decimals	21
Pumping Hours (required)	3 + 2 decimals	26
Synchronous Condensing Hours (required)	3 + 2 decimals	31
Available Hours (required)	3 + 2 decimals	36
Planned Outage Hours (required)	3 + 2 decimals	41
Forced Outage Hours (required)	3 + 2 decimals	46
Maintenance Outage Hours (required)	3 + 2 decimals	51
Extensions of Scheduled Outages (required)	3 + 2 decimals	56
Unavailable Hours (required)	3 + 2 decimals	61
Period Hours (required)	3 + 2 decimals	66
Inactive Hours (required)	3 + 2 decimals	71
(Blank Columns)	48	76
Record Number (required)	2	124

Unit Service Hours (Record 02, columns 16-20) - Required
Enter the number of hours the unit was synchronized to the system. For units equipped with multiple generators, count only the hours when at least one of the generators was synchronized, whether or not one or more generators were actually in service.

Reserve Shutdown Hours (Record 02, columns 21-25) - Required
Enter the sum of all hours the unit was available to the system but not synchronized for economy reasons.

For information regarding work done during Reserve Shutdowns, see *Section III*, Page III-17.

Pumping Hours (Record 02, columns 26-30) - Required
Enter the number of hours the hydro turbine/generator operated as a pump/motor.

Synchronous Condensing Hours (Record 02, columns 31-35) - Required
Enter the number of hours the unit operated in the synchronous condensing mode (applies primarily to hydro/pumped storage and some combustion turbine units). Do not report these hours as unit service hours.

Available Hours (Record 02, columns 36-40) - Required
Enter the sum of the unit service hours, reserve shutdown hours, pumping hours (if applicable), and synchronous condensing hours (if applicable), as entered in columns 16-35 above.

Planned Outage Hours (Record 02, columns 41-45) - Required
Enter the sum of all hours the unit was off-line due to planned outages (PO) as detailed on the event reports completed for this unit. The technique used to compute hours from the event reports is described on page IV-12.

Unplanned (Forced) Outage Hours and Startup Failure Hours – Required
(Record 02, columns 46-50)
Enter the sum of all hours the unit was off-line due to immediate, delayed, and postponed outages (U1, U2, and U3) and startup failures (SF) outages as detailed on the event reports completed for this unit. The technique used to compute hours from the event reports is described below.

Maintenance Outage Hours (Record 02, columns 51-55) - Required
Enter the sum of all hours the unit was off-line due to maintenance outages (mo) as detailed on the event reports completed for this unit. The technique used to compute hours from the event reports is described below.

When calculating statistics involving maintenance outage hours, note that IEEE Standard 762 considers these hours **unplanned**. The use of maintenance outage Hours in the GADS statistics is described in detail in Appendix F.

Extensions of Scheduled Outages (Record 02, columns 56-60) - Required
Enter the sum of all hours the unit was off-line due to extensions of scheduled (maintenance and planned) outages (ME and PE) as detailed on the event reports completed for this unit. The technique used to compute hours from the event reports is described below.

Unavailable Hours (Record 02, columns 61-65) - Required
Enter the sum of planned outage hours (PO), unplanned (forced) outage hours (U1, U2, U3 + SF), maintenance outage hours (MO), and extensions of scheduled outages (ME and PE), as entered in columns 41-60 above.

Computing Hours from the Event Report (07)

1. Calculate the duration of each outage (PO, MO, ME, PE, U1, U2, U3, and SF) and reserve shutdown (RS) reported as an event to the GADS database by subtracting the START OF EVENT from the END OF EVENT. Convert this to hours.

2. Add the total number of hours during the month spent in each outage category (PO, MO, ME, PE, U1, U2, U3, and SF) and the reserve shutdown category (RS). Round the resultant values to two decimal places and enter in the appropriate fields in Section D of the Performance Report.

Period Hours (Record 02, columns 66-70) - Required
Enter the number of hours in the month being reported that the unit was in the **active** state (see Page III-5). The sum of available hours and unavailable hours must equal period hours. The period hours in each month or year are as follows in table 7:

Table IV-7: Period Hours	
Month*	**Hours**
January	744
February	672*
March	719 or 744** for 2007 and beyond
April	719 or 720** before 2007
May	744
June	720
July	744
August	744
September	720
October	744 or 745** before 2007
November	719 or 720** for 2007 and beyond
December	744
Year	8760*

 * Add 24 hours during a leap year.
   ** May be adjusted one hour as appropriate for daylight saving time.

Inactive Hours (Record 02, columns 71-75) - Required
Enter the number of hours in the month being reported that the unit was in the **inactive** state. (See Page III-5 for details of inactive states.)

E. Primary Fuel; and
F. Secondary Fuel

Sections E and F, shown in *Table IV-8*, detail the type, amount, and quality of fuels burned in the unit during the reporting period. These sections are used to report primary and secondary fuels burned and are located on Record 03 of the Performance Report. Tertiary and quaternary fuels may be reported; however, no unique sections of the Performance Report exist for this purpose. Instead, use another Section E and another Section F, changing the record number from 03 to 04. Enter the tertiary fuel data in Section E on the 04 record and the quaternary fuel data in Section F on the 04 record.

Reporting **E. Primary Fuel is required** for all units except hydro/pumped storage units (optional for these units only). If a unit was not operated during the reporting period, enter the type of fuel that would have been burned in the unit had it been on-line.

Secondary, tertiary, and quaternary fuel sections are not used for hydro/pumped storage units, wind- or solar-powered units, or nuclear units.

The first 15 characters of Records 03 and 04 (A – Unit Identification) are identical to that of Records 01 and 02. These 15 characters link the records together.

Table IV-8: Record Layout of Section E – Primary Fuel; and F – Secondary Fuel		
Records 03 and 04		
Column ID	**Number of Columns**	**Starting Position**
A – Unit Identification		
Record Code (required)	2	1
Utility Code (required)	3	3
Unit Code (required)	3	6
Year (required)	4	9
Report Period (required)	2	13
Report Revision Code (voluntary)	1	15
E – Primary Fuel		
Fuel Code (required)	2	16
Quantity Burned (voluntary)	5 + 2 decimals	18
Average Heat Content (voluntary)	6	25
% Ash (voluntary)	2 + 1 decimal	31
% Moisture (voluntary)	2 + 1 decimal	34
% Sulfur (voluntary)	1 + 1 decimal	37
% Alkalines (voluntary)	2 + 1 decimal	39
Grindability Index / % Vanadium (voluntary)	2 + 1 decimal	42
Ash Softening Temperature (voluntary)	4	45
(Blank columns)	21	49
F – Secondary Fuel		
Fuel Code (required)	2	70
Quantity Burned (voluntary)	5 + 2 decimals	72
Average Heat Content (voluntary)	6	79
% Ash (voluntary)	2 + 1 decimal	85
% Moisture (voluntary)	2 + 1 decimal	88
% Sulfur (voluntary)	1 + 1 decimal	91
% Alkalines (voluntary)	2 + 1 decimal	93
Grindability Index / % Vanadium (voluntary)	2 + 1 decimal	96
Ash Softening Temperature (voluntary)	4	99
(Blank columns)	21	103
Record Number (required)	2	124

Please Note: *Performance record 04 for the tertiary and quaternary fuels is identical to performance record 03*

Fuel Code (Records 03 & 04, columns 16-17 and 70-71) - Required
Enter the two-character code from the list below that identifies the fuels burned in the unit during the reporting period.

Table IV-9: Fuel Types and Codes			
Code	**Description**	**Code**	**Description**
BM	Biomass	**PC**	Petroleum Coke
CC	Coal	**PR**	Propane
LI	Lignite	**SL**	Sludge Gas
PE	Peat	**GE**	Geothermal
WD	Wood	**NU**	Nuclear
OO	Oil	**WM**	Wind
DI	Distillate Oil (No. 2)	**SO**	Solar
KE	Kerosene	**WH**	Waste Heat
JP	JP4 or JP5	**OS**	Other-Solid (Tons)
WA	Water	**OL**	Other-Liquid (BBL)
GG	Gas	**OG**	Other-Gas (Cu. Ft.)

Report in **E. Primary Fuel** the code for the fuel that made the greatest contribution to thermal generation during the period. In **F. Secondary Fuel,** enter the code for the fuel that made the second greatest contribution to generation. You can only report fuels used for ignition or warm-up in this section if there was no more important secondary fuel. Tertiary and quaternary fuels, reported in Sections E and F on Record 04 of the Performance Report, are those which made the third and fourth greatest contribution to generation, respectively.

Quantity Burned (Record 03 & 04, columns 18-24 and 72-78) - Voluntary
Enter the quantity of fuel consumed during the reporting period. Note, NERC-GADS computer programs recognize a decimal place indicator that appears in the performance report. Therefore, enter a factor of the actual quantity burned in this field. Use the following factors to determine the correct number to enter: 1,000 short tons (2,000 pounds) for coal; 1,000 barrels (42 gallons/barrel) for oil; and, 1,000,000 cubic feet for gas. Do not attempt to manually enter a decimal place.

Example:

If coal is your primary fuel and the unit burned 900 tons of coal during the reporting period, enter 0000090 in columns 18-24 of record 03.

If oil is your primary fuel and the unit burned 900,000 barrels of oil, enter 0090000 in columns 18-24 of Record 03.

When reporting data for geothermal units, enter in this field the quantity of steam brought into the plant from the geothermal wells. The factor used to determine the number to enter is 1,000,000. Thus, 1,234,500,000 pounds of steam is entered as 0123450 in columns 18-24 of Record 03.

Leave columns 18-24 blank when reporting data for nuclear units.

Average Heat Content (Records 03 & 04, columns 25-30 and 79-84) - Voluntary
Enter the average heat content for the fuel, to the nearest Btu/lb. of coal, Btu/gal. of oil or Btu/cu. ft. of gas. Enter a weighted average if the heat content of the fuel varied.

When reporting data for geothermal units, enter the heat content calculated using the following equation:

$$\frac{\text{Steam Consumption (lbs) } \textbf{x} \text{ 1195.5 (Btu/lb)}}{\text{Net Generation (kWh)}}$$

For nuclear units, enter the Net Plant Heat Rate (Btu/kWh) in this field.

% Ash (Records 03 & 04, columns 31-33 and 85-87)* - Voluntary
Enter the average ash content of the fuel to the nearest 0.1% (by weight). Obtain this factor from an ultimate analysis of the fuel.

% Moisture (Records 03 & 04, columns 34-36 and 88-90)* - Voluntary
Enter the average moisture content of the fuel to the nearest 0.1% (by weight). Obtain this factor from an ultimate analysis of the fuel.

% Sulfur (Records 03 & 04, columns 37-38 and 91-92)* - Voluntary
Enter the average sulfur content of the fuel to the nearest 0.1% (by weight). Obtain this factor from an ultimate analysis of the fuel.

% Alkalies (Records 03 & 04, columns 39-41 and 93-95)* - Voluntary
Enter the sum of the average sodium and potassium contents of the fuel to the nearest 0.1% (by weight), as obtained from an ash analysis.

Coal Units Only: Grindability Index (Records 03 & 04, columns 42-44 and 96-98)* - Voluntary
If the fuel type has been identified as coal (CC) or lignite (LI), enter the weighted average grindability index of the fuel burned during the period. When entering the grindability index, disregard the decimal point.

Oil Units Only: % Vanadium and Phosphorus (Records 03 & 04, columns 42-44 and 96-98)* - Voluntary
If the fuel type has been identified as oil (OO), kerosene (KE), JP4/5 (JP), or distillate oil (DI), enter the sum of the average vanadium and phosphorus contents of the fuel to the nearest 0.1% (by weight) as obtained from an ash analysis.

Ash Softening Temperature (Records 03 & 04, columns 45-48 and 99-102)* - Voluntary
Enter the average ash softening temperature (°F) of the fuel. This temperature should be determined under reducing atmosphere conditions.

* Because the average heat content (Btu), ash, moisture, sulfur, alkalies, grindability index, vanadium and phosphorus, and softening temperature values may change during a month due to new fuel supplies, etc., these values should be weighted averages.

   Example:

   (15,000 Btu x 10 tons of coal + 18,000 Btu x 20 tons of coal)/30 tons of coal = Weighted Average Heat Content. The shown on these sections indicates a computer-inserted decimal point. Do not manually insert a decimal point. For example, a value of 6.8% would be entered as 068 in columns 45-48.