UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2466

DEC -2 1996

Ref: 8ENF-T

Mr. Richard Duarte
El Paso Natural Gas
3801 Atrisco Blvd., NW
Albuquerque, NM 87120

DEC 11 1996 ENVIRONMENTAL AFFAIRS

Dear Mr. Duarte:

This is in response to your November 8, 1996 request for a custom fuel monitoring schedule (CFMS) for El Paso Natural Gas Company's Florida River Compressor Station, Units 1 & 2, located in La Plata County, Colorado. El Paso Natural Gas Company also requested to be allowed to use gas chromatograph monitoring for Phase I and the "Length of Stain Tube" test for Phases II and III for measuring the sulfur content of the natural gas to be burned in the turbines.

Florida River's Units 1 & 2 are subject to 40 CFR Part 60 Subpart GG - Standards of Performance for Stationary Gas Turbines. The custom fuel monitoring schedule for sulfur content, proposed by El Paso, meets the custom sampling schedule set forth for approval in an August 14, 1987 memorandum signed by John B. Rasnic with EPA's Compliance Monitoring Branch. Therefore, EPA Region VIII approves your proposed CFMS for your Florida River's Units 1 & 2.

Your request for the use of a gas chromatograph monitoring system for measuring the natural gas sulfur content falls under the authority of Section 60.13(i) of 40 CFR as a request for alternative monitoring to replace the specified ASTM test methods. According to the tariff specifications in El Paso's gas transmission contracts, the natural gas received from suppliers is limited to approximately 0.0025 weight percent sulfur. This is far below the allowable sulfur content of 0.8 percent. Based on that, the use of El Paso's gas chromatograph monitoring system is sufficient to be used to determine the natural gas sulfur content, and therefore, is approved for use during Phase I sampling at your Florida River's Units 1 & 2. Should the sulfur content of the fuel approach the regulatory limit, EPA reserves the right to revisit this decision.

El Paso also requested the use of the "Length of Stain Tube" test for Phase II and III under the CFMS. In an April 26, 1991 memo from William G. Laxton, Director of the U.S. Environmental Protection Agency's Technical Support Division, the "Length of Stain Tube" test used to test for sulfur in natural gas was determined to be an acceptable alternative test provided that the sulfur content of the fuel gas is well below the 0.8 percent

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Subpart GG standard. Since El Paso's fuel gas is low in sulfur, EPA Region VIII agrees to your use of the "Length of Stain Tube" test for Phases II & III for monitoring the sulfur content of the natural gas.

If you have any questions concerning our approval of your custom fuel monitoring schedule, the use of your gas chromatograph as an alternative monitoring procedure or the use of the "Length of Stain Tube" test, you may call Cindy Reynolds of my staff (303) 312-6206.

Sincerely,

Martin Hestmark, Director
Technical Enforcement Program

cc: Jim Geier, CDPHE

EL PASO NATURAL GAS
3801 Atrisco Blvd., NW
Albuquerque, NM 87120

November 8, 1996

Martin Hestmark, Director
Technical Enforcement Program
US EPA Region 8
999 18th Street, Suite 500
Denver, Colorado 80202-2466

CERTIFIED MAIL
RETURN RECEIPT REQUESTED
P 591 541 749

Re: Custom Fuel Monitoring Schedule request for El Paso Natural Gas Company's ("El Paso") Florida River Compressor Station, La Plata County, Colorado.

Dear Mr. Hestmark:

El Paso submits this request for a custom fuel monitoring schedule ("CFMS") for the referenced compressor station. The proposed CFMS demonstrates continuous compliance by incorporating the following:

- El Paso's constant gas quality monitoring system required by the Federal Energy Regulatory Commission ("FERC"); and,
- Segments of a previously approved EPA schedule using the length-of-stain technique.

El Paso presently operates under a tariff, approved by the FERC, which contains more stringent sulfur specifications than the EPA standard in § 60.333.

By combining the FERC-required monitoring with portions of the EPA-approved schedule, the proposed CFMS helps to fulfill one of the main directives in the President's Regulatory Reinvention Initiative for the EPA. In short, the proposed protocol reduces unnecessary reporting and monitoring while at the same time maintaining a high level of environmental protection for the nation.

El Paso believes the proposed CFMS is amenable and appropriate. We would be glad to meet with you to discuss this protocol further and to assist in your review. If you should have any questions, please contact me at 505/831-7763.

Very truly yours,

Richard Duarte
Sr. Environmental Engineer
Compliance Services

Enclosure (Florida River CFMS)

RECEIVED
NOV 2
HAZARDOUS WASTE BRANCH

Copy (with enclosure):

CERTIFIED MAIL
RETURN RECEIPT REQUESTED
P 591 541 750

James S. Geier, P.E., Chief
Permit Section
Stationary Sources Program -- Air Pollution Control Division
Colorado Department of Public Health & Environment
4300 Cherry Creek Drive South
Denver, Colorado 80222-1530

EL PASO NATURAL GAS

Custom Fuel Monitoring Schedule
for

Florida River Compressor Station

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EL PASO NATURAL GAS

Custom Fuel Monitoring Schedule
for
Florida River Compressor Station

1.0 Introduction.

El Paso Natural Gas Company ("El Paso") provides pipeline-quality natural gas transportation services for natural gas suppliers and end users throughout the Southwestern United States. EPNG owns and operates a large pipeline network for which Florida River Compressor Station ("Florida River") is one of many stations that provide natural gas compression. The amount of pipeline quality natural gas transported in the system varies depending on customer demand for natural gas. Compression is needed to maintain enough pressure in the pipeline to make required deliveries to customers. Compression at Florida River is accomplished by two simple-cycle natural gas-fired turbines that drive compressor units. This compressor station is automated and therefore is an unattended location.

The two turbines currently operate under Colorado Department of Health and Environment Air Pollution Control Division's (CDH&E) Permit No. 95LP423 and 90LP014-2 (see Appendix A). The monitoring requirements listed under Florida River's air permits require fuel monitoring, and thus the purpose of this Custom Fuel Monitoring Schedule.

El Paso had initially submitted its request for a Custom Fuel Monitoring Schedule (CFMS) for this facility on December 13, 1994. However, the request had erroneously been submitted to EPA's Region 6 office. The plan was returned to El Paso on August 15, 1996, (which noted the submittal mix-up). In the interim, El Paso developed a different CFMS from that one proposed in 1994, which was recently submitted to Region 6 for turbine facility in Northwestern New Mexico. The enclosed plan and that one submitted to Region 6 are identical (in monitoring protocol) and were adapted from EPA-approved custom schedules for natural gas fueled turbines in the gas transportation industry. Thus the enclosed schedule is more detailed than the one submitted in 1994 and demonstrates continuous compliance with NSPS Subpart GG, specifically Title 40 CFR §60.332 and §60.333.

2.0 Title 40 CFR §60.332 (nitrogen oxides) and §60.333 (sulfur oxides) Applicability.

The station comprises two Solar Centaur Type H turbines. The Centaur's peak load is 5,500 hp (14.56 Gigajoules/hr). Therefore, both turbines are included by the standards (greater than 10.7 Gigajoules/hr) in Subpart GG, specifically at §60.330(a). Accordingly,

the monitoring requirements of the Florida River CFMS are applicable to both turbines (El Paso reference: Florida River Unit Numbers 1 & 2).

This proposed CFMS demonstrates continuous compliance by incorporating El Paso's constant gas quality monitoring system required by the Federal Energy Regulatory Commission ("FERC") and segments of an EPA-approved schedule using the length-of-stain ("LOS") technique. El Paso operates under a tariff approved by the FERC that establishes strict specifications for the sulfur content of the natural gas delivered by El Paso. Therefore, the gas received from suppliers is continuously monitored by El Paso at strategic locations at or very near receipt points to ensure compliance with the tariff specifications. A small portion of this gas is then used to fuel the various natural gas-fired engines used throughout the pipeline system, which includes Florida River. The pertinent sections of the tariff sheet are enclosed for your reference in Appendix B.

3.0 Nitrogen Monitoring Protocol.

3.1 Overview. In general, nitrogen monitoring is not necessarily required, unless fuel sources other than pipeline-quality natural gases are used. Therefore, this nitrogen monitoring protocol is specific to those conditions when non-pipeline-quality natural gas is used as fuel.

3.2 Nitrogen monitoring has been excluded as a requirement from the air permit. In brief, the motives for deleting this requirement are:

a. the nitrogen content of pipeline quality natural gas (and correspondingly the fuel that is used) does not vary significantly like other fuels often used by turbines;
b. El Paso is not taking fuel-bound nitrogen credits; and,
c. free nitrogen does not contribute appreciably to NO_x emissions.

Therefore, the primary focus of the monitoring protocol is chiefly on sulfur content. A copy of Florida River's permits are in Appendix C.

3.3 Regardless of the above, the following CFMS is an alternative to the monitoring requirements contained in §60.334(b)(2).

a. Monitoring of fuel nitrogen content shall **not be required** while pipeline-quality natural gas is the only fuel fired in the gas turbine. This includes use of a bulk storage tank(s) whose source is pipeline-quality natural gas.
b. Monitoring of fuel nitrogen content shall be determined and recorded daily while firing a fuel **other than** pipeline-quality natural gas or while firing an emergency fuel as defined in 40 CFR §60.331(r).
c. Should a nitrogen analysis, required for any reason other than firing an emergency fuel, demonstrate noncompliance with 40 CFR §60.332, El Paso shall immediately notify the CDH&E Air Pollution Control Division ("CDH&E") and the US EPA of the excess emissions, and the CFMS shall be re-examined by the CDH&E and EPA. Nitrogen monitoring shall be conducted daily during the interim period when this CFMS is being re-examined.

d. If there is a change in fuel supply, El Paso will immediately notify the CDH&E and EPA of such change for re-examination of the CFMS. For purposes of this CFMS, it is understood subtle changes or variations in fuel quality occur. These variations or changes are specific heating values, gas composition (methane, ethane, propane, isobutane, isopentane, n-pentane and hexanes) and inert gases, as allowed by El Paso's tariff. A change in fuel supply shall therefore be considered a change in the supply **apart from** pipeline-quality natural gas. Nitrogen monitoring shall be conducted daily during the interim period when this CFMS is being re-examined.

4.0 Sulfur Monitoring Protocol.

4.1 Overview. As its monitoring protocol, El Paso is proposing to use a combination of its natural gas quality monitors, which it is obligated to maintain under its FERC tariff, and EPA's Length-of-stain ("LOS") technique. Sulfur monitoring is proposed in three separate monitoring periods or phases (I, II and III).

Briefly, in the first phase, El Paso is proposing to utilize its 35-year operational knowledge of gas quality produced in the San Juan Basin and current gas quality measurements to replace the EPA's traditional phase I LOS alternative. Phase I of this protocol will serve to minimize duplication of effort, unnecessary paperwork and more importantly reduce personnel burdens for El Paso, CDH&E and EPA. Phases II and III are derived from previously approved EPA protocols.

4.2. Gas Quality Measurement System.

Overview. El Paso maintains, at a minimum three types of continuously operating gas quality monitors at strategic locations at or very near receipt points. The purpose of these monitors is to ensure that on a continuous basis "sweet" pipeline-quality natural gas is always in the pipeline as required by the FERC tariff. The tariff specifications are in turn written into El Paso's gas transmission contracts, which ensure a minimum quality (not solely for H_2S) of all natural gas received from and delivered to any customer. Accordingly as specified in the tariff sheets (on Original Sheet No. 220, Section 5.1(c)), natural gas received from suppliers is limited to total sulfur content of 5 grains/100 standard cubic feet. Reference Appendix B. This amount is equivalent to approximately 0.0025 weight percent sulfur, well below the 0.8 percent limit within Subpart GG.

These monitors may perform a gas analysis for the following components (individually or in select combinations): hydrogen sulfide (H_2S), total sulfur, nitrogen (N_2), carbon dioxide (CO_2), heat value, hydrocarbon content and specific gravity. These continuous composite samplers are either two types of automated gas chromatographs ("GC"), or H_2S-lead acetate tape analyzers ("H_2S analyzers") with data processing resulting in a versatile instrument system that can be adapted to a wide array of analysis methods. The two type of GCs used within the system either monitor solely for sulfur content (H_2S & organic

sulfur) or hydrocarbons and other inert gases. The basic components of these three continuous composite samplers are the automatic injection system, chromatography column or lead acetate tape, sensor, controls and communications connector. Sample gas is intermittently injected auotmatically through a chromatographic column or exposed to lead acetate tape in an H_2S analyzer.

Gas Chromatography of H_2S & Hydrocarbons

The chromatography column is a Teflon tube packed with an adsorbent material that separates the sample gas into its constituents by adsorption and then elution. Each constituent adsorbs for a finite period of time that is determined by the molecular weight and structure of the constituent compound. Thus, the adsorption and elution period are a predictable characteristic of each individual compound and can be programmed into the memory of the integrator or timed by the operator for identification purposes.

In normal operation of a sulfur-monitoring GC, nitrogen is used as the inert carrier gas which travels constantly through the column and into the sensor. This sample cycle normally takes 30 minutes. The carrier gas for the hydrocarbon-monitoring GC is helium. The sampling cycle for a hydrocarbon GC takes approximately 4 minutes. During the injection sequence, sample flow is diverted briefly to the sample loop and then is flushed from the sample loop into the column, where sulfur compounds and other gases are adsorbed. Flow of the carrier gas causes elution of sample components that are separated according to their affinity for the adsorbent material in the column. With some constituents this separation is almost immediate. This process exposes the natural gas constituents to an electrochemical sensor. Sulfur compounds in the sample react with the electrolyte in the sensor that causes a detectable current proportional to sulfur concentration. GCs that are designated for hydrocarbon-quality monitoring sample once every 4 minutes. Whereas, GCs designated for sulfur compounds sample the natural gas stream once every 30 minutes. These values are then averaged once every 24-hours to attain a daily average.

H_2S Analyzers

The H_2S analyzer operation is chiefly a quantitative analysis based on the classic lead acetate test for hydrogen sulfide. The procedure consists of exposing a piece of lead acetate to the gas stream. Any H_2S in the gas stream reacts with the lead acetate on the tape turning it varying shades of brown, depending on the H_2S concentration. The measuring portion of the H_2S analyzer consists of two photocells coupled to a millivolt recorder. Each photocell unit contains a lamp and optical filter. One photocell is the reference while the other serves for measuring the exposed stream. This produces a differential in millivolt output between the photocells. The difference is translated into an H_2S concentration value.

These H_2S analyzers are typically placed at receipt points where "sour gas" fields supply the natural gas treatment plants, which in turn deliver treated pipeline quality natural gas onto El Paso's pipeline network. In the New Mexico San Juan producing basin, El Paso operates only one H_2S analyzer. This is due to El Paso's 35-year operation in this producing area. In contrast, within the "sour" gas producing fields of the West Texas Permian Basin, El Paso maintains well over 70 H_2S Analyzers.

GC and Rubicon Quality Control

GCs and H_2S analyzers are checked by trained and skilled technicians. H_2S analyzers and GCs are inspected for general operation once every week. H_2S analyzers are manually calibrated once every month and GCs once every quarter. However, all GCs auto-verify at a preset time every day. The verification process consists of flowing a gas through the GC with known concentrations and checking the response factor and retention time. If these calculated values are within acceptable tolerances, the GC continues operation. Whenever, a verification fails an alarm is sent to El Paso's Gas Control Center (manned 24-hrs per day) and the equipment is checked and re-calibrated. Manual inspection includes reviewing the general operation of the systems and, at minimum, includes the inspection of temperature sensors, gas flow paths (sample line and purge line), recording devices, communication system and housekeeping.

Calibration on a GC consists of challenging the system with known concentrations of NIST traceable gases per manufacturer procedures. At a minimum, hydrocarbon monitoring GCs are calibrated monthly (verified daily, however); and, sulfur monitoring GCs are calibrated at least once every six months (also verified daily). The sensitivity is rated at 0.1 mg sulfur per cubic meter of gas (approximately 0.1 ppm H_2S). The GC's repeatability is $\pm$ 5%.

An H_2S analyzer is challenged monthly with tile standards that have been verified with concentrations of NIST traceable gas at a concentrations of less than or equal to 0.25 grains of H_2S. Accuracy for these systems is $\pm$ 0.5% of calibrated range.

GC and Rubicon Operation

The real-time information from any GC is monitored continuously, and if it exceeds 75% of H_2S tariff grain standard, an alarm is sent to El Paso's Gas Control Center. Once again, sulfur-monitoring GCs are typically installed where multiple and combined gas streams can be monitored. These sulfur-monitoring GCs are not used at or near the reciept point where H_2S is not produced with the natural gas and historically has never been a problem for El Paso. Such is the case at Florida River. An H_2S analyzer is not required at the inlet natural gas stream at Florida River because in El Paso's 35-year history of transporting this gas, it has been known as "sweet" from the point of production. The GC monitoring Florida River's sulfur content of the natural gas stream is down-stream of the station (based on El Paso's experience in this production area). The data from this GC is

included in Appendix C. This GC monitors the combined natural gas streams from three other sources (including gas from Florida River). The sole GC monitor upstream of Florida River only monitors hydrocarbon content and inert gases. It does not monitor sulfur compounds since it has never been a source problem. As a matter of fact, El Paso had operated an sulfur monitoring GC immediately downstream of Florida River for an estimated 10 years. The readings never exceeded zero for H_2S, so El Paso discontinued its use in 1992.

An H_2S analyzer functions more independently than a GC. All data is recorded on a chart recorder and any alarms or valve shut-ins are immediately sent to El Paso's Gas Control Center. Typically, the analyzers are set to "alarm" at 0.20 grains and shut-in the valve at 0.25 grains. Whenever a valve is shut-in, gas flow is immediately stopped from the treatment plant, and El Paso then notifies the natural gas treating plant. If a gas limit is exceeded, the gas treating plant operator must correct the H_2S problem before El Paso resets the slam valve and begins receiving pipeline-quality natural gas again. El Paso has only one H_2S analyzer in the San Juan Basin pipeline transportation system and connected to a gathering system downstream, and apart from, the gas flowing from Florida River. This is entirely based on El Paso's 35-year experience in the basin.

4.3 Sulfur Monitoring.

a. Analysis of fuel Sulfur content of the gas turbine (natural gas or any other type of fuel) shall be conducted using the appropriate methods specified in 40 CFR §60.33~~6~~35(d).; or,
b. For Phase I sampling only, use El Paso's GC monitoring system for daily sulfur; See Appendix C, for the proposed Phase I data.
c. Under Phases II and III, the "length of stain tube" method is approved as an alternative fuel sulfur test method for this CFMS, providing that the Gas Processors Association (GPA) procedures are followed and 100% pipeline quality natural gas is the only fuel fired in the gas turbines. (GPA Standard 2377-86).
d. Monitoring of fuel sulfur content shall be determined and recorded daily while firing an emergency fuel as defined in 40 CFR. §60.331(r).

Effective the date of this CFMS, the sampling and analysis frequency of fuel sulfur allowed under this CFMS fuel schedule is as follows:

PHASE	FREQUENCY	TECHNIQUE	PERIOD
I	Daily	El Paso's GC Data	Six months *(data included)*
II	Quarterly	LOS	Eighteen months
III	Semi-annually	LOS	Two years

If, during the period of each phase, this monitoring shows little variability in the fuel sulfur content and demonstrates continuous compliance with the emission limits for sulfur dioxide contained in 40 CFR §60.333, the company may then proceed to the next sampling phase with written notice to the CDH&E and EPA.

e. Should a sulfur analysis, required for any reason other than for firing emergency fuel, demonstrate non-compliance with the emission limits for Sulfur Dioxide contained in 40 CFR §60.333, the owner or operator shall immediately notify the CDH&E and EPA of such excess emissions and sulfur monitoring shall be conducted daily during the interim period while this CFMS is being re-examined.

f. If there is a change in fuel supply, the owner or operator must notify the CDH&E and EPA of such change for re-examination of this CFMS. A change in fuel quality, fuel makeup or fuel supplier shall be considered as a change in fuel supply. Sulfur monitoring shall be conducted daily during the interim period when this CFMS is being re-examined.

4.4 General Provisions

a. Approval of this CFMS is based on the application submitted El Paso, dated November 8, 1996, for the firing of 100% pipeline-quality natural gas. Any change in any representation made by the company in this application shall cause this CFMS to be suspended and re-examined by the CDH&E and EPA. CDH&E and EPA shall be notified immediately if any such change occurs.

b. All analyses required by this custom schedule shall be performed by a laboratory using the approved test methods, except for Phase I testing using El Paso's GC and Phases II and III using the LOS.

c. The company may request that EPA allow for the substitution of any analytical method for another method specified in this CFMS. Any substitution will require the written approval of the EPA.

d. CDH&E and the EPA may request that an audit of the fuel sampling program be conducted at any time during the life of this custom schedule. This audit shall consist of daily sampling of fuel gas for either nitrogen content, sulfur content, or both. The length of this audit shall be no less than two weeks. If noncompliance values are found, paragraphs 3.3 (c) and/or 4.3 (d) shall govern.

e. Records of sample analysis, fuel supplier, fuel supply, fuel quality, and fuel make-up pertinent to this custom schedule shall be retained for a period of two years, and made available for inspection by personnel of federal, state and local air pollution control agencies.

f. After the initial four year term of the CFMS, the custom schedule will continue using the same monitoring, record-keeping and notification requirements as stipulated in Phase III of the schedule. However, the

CDH&E and the EPA may choose to terminate the CFMS and require the company to reapply for a CFMS. Termination of the CFMS will require that the company begin as required by 40 CFR SS 60.334.

g. Date of issuance _____. The contents of this shall be implemented no later than 30-days from date of issuance. The effective start date shall be noted on all documents required by Phases II and III.

h. Records required by the sulfur monitoring protocol will be maintained at El Paso Natural Gas Company's Albuquerque Division Office, 3801 Atrisco Blvd., NW, Albuquerque, New Mexico 87120.

Last page of plan

PRELIMINARY STATEMENT

El Paso Natural Gas Company, hereinafter referred to as "El Paso" is a "natural gas company" as defined by the Natural Gas Act (52 Stat. 821, 15 U.S.C. 717–717w) and, as such, is subject to the jurisdiction of the Federal Energy Regulatory Commission, hereinafter referred to as "FERC" or "Commission." As used herein, "El Paso" shall not include any of El Paso's affiliates.

El Paso's jurisdictional sales for resale operations are described in the Preliminary Statement contained in Volume No. 1 of El Paso's FERC Gas Tariff.

El Paso is in the business of providing jurisdictional transportation services to or for others as an open–access transporter under authority of Part 284 of the Commission's Regulations pursuant to written contracts containing or incorporating by reference terms and conditions which are acceptable to El Paso. El Paso also provides jurisdictional transportation services on behalf of various **shippers** pursuant to pre–existing individual contracts which were entered into prior to the effective date of this Volume No. 1–A FERC Gas Tariff. Said pre–existing individual contracts, insofar as they provide for transportation services other than those open–access services which El Paso has agreed to provide under authority of Part 284 of the Commission's Regulations, have and will continue, after the effective date of the Volume No. 1–A FERC Gas Tariff, to be included as special rate schedules in El Paso's Volume No. 2 FERC Gas Tariff. El Paso specifically disclaims any undertaking on its part to provide service as a common or public carrier of **natural gas** or other goods for hire. Services which El Paso may provide under compulsion of emergency circumstances involving public or private need or of governmental directive shall not serve to constitute El Paso a common or public carrier of natural gas or other goods for hire.

This FERC Gas Tariff is filed in compliance with Part 154, Subchapter E, Chapter I, Title 18, of the Code of Federal Regulations.

Issued by: Patricia A. Shelton, Vice President
Issued on: November 28, 1995
Effective: January 01, 1996
Issued to comply with order of the Federal Energy Regulatory Commission, Docket No. CP94–183–000 and 001, dated SEPTEMBER 13, 1995

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Original Sheet No. 200

Transportation General Terms and Conditions

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Section 31	Washington Ranch Facility Stranded Investment Cost Recovery	**Sheet No. 361**

Issued by: A. W. Clark, Vice President
Issued on: May 23, 1994
Effective: July 01, 1994

5. QUALITY

5.1 All natural gas received by El Paso at any mainline Receipt Point(s) shall conform to the following specifications and must be, in El Paso's reasonable judgment, otherwise merchantable:

(a) Liquids – The gas shall be free of water and hydrocarbons in liquid form at the temperature and pressure at which the gas is received. The gas shall in no event contain water vapor in excess of seven (7) pounds per million standard cubic feet.

(b) Hydrocarbon Dew Point – The hydrocarbon dew point of the gas received shall not exceed twenty degrees Fahrenheit (20°F) at normal pipeline operating pressures.

(c) Total Sulfur – The gas shall not contain more than five (5) grains of total sulfur per one hundred (100) standard cubic feet, which includes hydrogen sulfide, carbonyl sulfide, carbon disulfide, mercaptans, and mono–, di– and poly–sulfides. The gas shall also meet the following individual specifications for hydrogen sulfide, mercaptan sulfur or organic sulfur:

(i) Hydrogen Sulfide – The gas shall not contain more than one–quarter (0.25) grain of hydrogen sulfide per one hundred (100) standard cubic feet.

(ii) Mercaptan Sulfur – The mercaptan sulfur content shall not exceed more than three–quarters (0.75) grain per one hundred (100) standard cubic feet.

(iii) Organic Sulfur – The organic sulfur content shall not exceed one and one–quarter (1.25) grains per one hundred (100) standard cubic feet, which includes mercaptans, mono–, di– and poly–sulfides, but it does not include hydrogen sulfide, carbonyl sulfide or carbon disulfide.

(d) Oxygen – The oxygen content shall not exceed two–tenths of one percent (0.2%) by volume and every reasonable effort shall be made to keep the gas delivered free of oxygen.

Issued by: A. W. Clark, Vice President
Issued on: May 23, 1994
Effective: July 01, 1994

Example Calculations & Fuel Analyses

The table below is representative of a typical fuel-gas analysis for the Rio Vista station. Gas chromatograph analysis results for nitrogen, carbon dioxide, and hydrocarbons (methane,"C1", through hexane+, "C6+") are reported on a percent molar basis. Hydrogen sulfide ("H_2S") and total organic sulfur ("TOS") results are generally reported in units of "grains per 100 standard cubic feet" (or "gr/100 scf"). The majority of the TOS measurement consists of mercaptans mono-sulfide, di-sulfide, and poly-sulfide.

Component	Mole Percent	gr / 100 scf	Molecular Weight	Mole % * MW	Weight Percent
Nitrogen	0.244	-	28.013	0.068	0.383
Carbon Dioxide	0.806	-	44.010	0.355	1.997
Methane	92.723	-	16.043	14.876	83.695
Ethane	3.640	-	30.070	1.095	6.161
Propane	1.524	-	44.097	0.672	3.781
ISO-Butane	0.253	-	58.123	0.147	0.827
N-Butane	0.380	-	58.123	0.221	1.243
ISO-Pentane	0.134	-	72.150	0.097	0.546
N-Pentane	0.103	-	72.150	0.074	0.416
Hexane +	0.193	-	86.177	0.166	0.934
Hydrogen Sulfide	0.0004	0.250	34.082	0.0001	0.0006
Total Organic Sulfur	0.0035	5.000	77.000	0.0027	0.0152
TOTAL	**100.00**			**17.774**	**100.00**

To convert a sulfur compound grain measurement "grains of H2S or TOS per 100 standard cubic feet " to a weight basis, the following methodology is used:

1. Calculate the weight of total sulfur in 100 SCF of gas.

$$\left(\frac{\text{grains } H_2S \text{ or TOS}}{}\right) \times \left(\frac{1.0 \text{ lb}}{7000 \text{ grains}}\right) \times \left(\frac{\text{(MW of Sulfur) lbs}}{\text{(MW of } H_2S \text{ or TOS) lbs}}\right) = \text{lbs of Sulfur in 100 scf of gas.}$$

Note: the sum of elemental sulfur in H_2S and TOS should equal the total sulfur in 100 SCF of fuel gas.

2. Calculate the total weight of 100 SCF of fuel gas:

$$\left(\frac{\text{100 SCF of fuel gas}}{}\right) \times \left(\frac{\text{1 lb-mol fuel gas}}{\text{379 SCF}}\right) \times \left(\frac{\text{(average MW of fuel gas) lbs}}{\text{lb-mol of fuel gas}}\right) = \text{lbs of 100 SCF of gas}$$

3. Weight percent of sulfur is calculated by:

$$\left(\frac{\text{lbs of Sulfur in 100 SCF of gas}}{\text{lbs of 100 SCF of fuel gas}}\right) \times 100 = \text{Wt \% of Sulfur in fuel}$$

For example, to convert 0.25 grains / 100 scf of hydrogen sulfide (assume TOS = 0.0 grains):

$$\left(\frac{0.25 \text{ grains } H_2S}{}\right) \times \left(\frac{\text{lb}}{7000 \text{ grains}}\right) \times \left(\frac{32 \text{ lbs of Sulfur}}{34 \text{ lbs of } H_2S}\right) = 0.000034 \text{ lbs of Sulfur in 100 SCF}$$

Next, calculate the weight of 100 SCF of fuel gas:

$$\left(\frac{100 \text{ SCF of fuel gas}}{}\right) \times \left(\frac{1 \text{ lb-mol fuel gas}}{379 \text{ SCF}}\right) \times \left(\frac{17.774 \text{ lbs}}{\text{lb-mol of fuel gas}}\right) = 4.69 \text{ lbs of 100 SCF of gas}$$

Next, calculate the weight percent of sulfur:

$$\left(\frac{0.000034 \text{ lbs of sulfur}}{4.69 \text{ lbs fuel gas}}\right) \times 100 = 0.0007\ \%$$

<u>NOTE</u>: At standard conditions (generally, "60°F" and "14.73 psia" for the natural gas transportation industry), the molar specific volume of any ideal gas, v, is approximately 379 scf/lb-mol. This value is calculated using the ideal gas law,

$$v = \left(\frac{R_u \times T}{P}\right)$$

where:

- v = molar specific volume, ft^3/ lb-mol [scf / lb-mol]
- R_u = universal gas constant, 10.73164 psia•ft^3 / (lb-mol•°R)
- T = standard temperature, °R
- P = standard pressure, psia

Total Organic Sulfur, or TOS, is derived from the odorant (mercaptan) contained in the gas transported by El Paso. Where necessary, El Paso may inject varing amounts of mercaptan to ensure minimum levels are delivered to customers.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET - SUITE 300
DENVER, CO 80202-2466
Phone 800-227-8917
http://www.epa.gov/region08

MAY 6 2002

Ref: 8ENF-T

David R. Brown
BP Amoco Production Company
San Juan Business Unit, HSE
1670 Broadway, Suite 1170
Denver, CO 80202

RE: Approval of Portable Monitoring Protocol for Amoco's Florida River Facility

Dear Mr. Brown:

This is in response to your November 23, 2001 request to EPA, for approval of a portable monitoring protocol that was prepared by Air Pollution Testing, Inc. The protocol will be followed for the monitoring requirements under the Part 71 permit (specifically Section II.B.2) for Amoco's Florida River Facility. EPA has reviewed the Air Pollution Testing's monitoring protocol and has determined the protocol to be acceptable for immediate implementation at Amoco's Florida River Facility.

If you have any questions, please contact Cindy Reynolds of my staff at 303-312-6206.

Sincerely,

Martin Hestmark, Director
Technical Enforcement Program

cc: Monica Morales, 8P-AR

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bp

David R. Brown
Environmental Specialist

Amoco Production Company
Part of the BP Group
San Juan Business Unit, HSE
1670 Broadway, Suite 1170
Denver, Colorado 80202

Telephone: 303-830-3241
Facsimile: 303-830-3292

November 23, 2001

Ms. Monica Morales
USEPA Region 8
Air and Radiation Program
999 18th Street
Suite 500
Denver, CO 80202-2466

Dear Ms Morales:

RE: Portable Monitoring Protocol; Florida River Facility; Permit V-SU-0022-00.01

Enclosed please find the portable monitoring protocol that has been prepared by Air Pollution Testing, Inc. This protocol will be followed for portable monitoring as required in the Part 71 permit applicable to our Florida River Facility. The protocol is being submitted for your approval pursuant to Section II.B.2., "Monitoring Requirements" of the subject Title V permit.

If you have questions, please feel contact me at (303) 830-3241 or (303) 887-3695.

Sincerely,

David R. Brown
Environmental Specialist

cc: Ms. Fran King Brown
Environmental Programs Director
Southern Ute Indian Tribe
P.O. Box 737
Ignacio, CO 81137

Ms. Kourtney Williams-DOC

AIR
POLLUTION
TESTING, INC.
DENVER, SALT LAKE CITY

Air Pollution Testing, Inc.
Portable Monitoring Protocol

[1] This protocol was modeled from the State of Wyoming, Department of Environmental Quality Portable Monitoring Protocol and the EPA Conditional Test Method 030, and adapted for the equipment, methods and Personnel of Air Pollution Testing, Inc.

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1. APPLICABILITY AND PRINCIPLE

1.1 Applicability. This method is applicable to the determination of nitrogen oxides (NO_x), carbon monoxide (CO), and oxygen (O_2) concentrations in controlled and uncontrolled emissions from natural gas-fired reciprocating engines, combustion turbines, boilers, and process heaters using portable analyzers with electrochemical cells.

1.2 Principle. A gas sample is continuously extracted from a stack and conveyed to a portable analyzer for determination of NO_x (NO and NO_2), CO, and O_2 gas concentrations using electrochemical cells. Analyzer design specifications, performance specifications, and test procedures are provided to ensure reliable data.

2. RANGE AND SENSITIVITY

2.1 Analytical Range. The analytical range for each gas component is determined by the electrochemical cell design. A portion of the analytical range is selected to be the nominal range by choosing a span gas concentration near the flue gas concentrations or permitted emission level in accordance with Sections 2.1.1 and 2.1.2.

2.1.1 CO and NO Span Gases. Choose a span gas concentration such that the average stack gas reading for each test is greater than 25 percent of the span gas concentration. Alternatively, choose the span gas such that it is not greater than 3.33 times the concentration equivalent to the emission standard. If concentration results exceed 125 percent of the span gas at any time during the test, then the test for that pollutant is invalid.

2.1.2 O_2 Span Gas. The O_2 span gas shall be dry ambient air at 20.9% O_2.

3. DEFINITIONS

3.1 Measurement System. The total equipment required for the determination of gas concentration. The measurement system consists of the following major subsystems:

3.1.1 Sample Interface. That portion of a system used for one or more of the following: sample acquisition, sample transport, sample conditioning, or protection of the electrochemical cells from particulate matter and condensed moisture.

3.1.2 Electrochemical (EC) Cell. That portion of the system that senses the gas to be measured

and generates an output proportional to its concentration. Any cell that uses diffusion-limited oxidation and reduction reactions to produce an electrical potential between a sensing electrode and a counter electrode.

3.1.3 Data Recorder. It is recommended that the analyzers be equipped with a strip chart recorder, computer, or digital recorder for recording measurement data. However, the operator may record the test results manually in accordance with the requirements of Section 7.5.

3.2 Nominal Range. The range of concentrations over which each cell is operated (25 to 125 percent of span gas value). Several nominal ranges may be used for any given cell as long as the linearity and stability check results remain within specification.

3.3 Span Gas. The high level concentration gas chosen for each nominal range.

3.4 Zero Calibration Error. The absolute value of the difference, expressed as a percent of the span gas, between the gas concentration exhibited by the gas analyzer when a zero level calibration gas is introduced to the analyzer and the known concentration of the zero level calibration gas.

3.5 Span Calibration Error. The absolute value of the difference, expressed as a percent of the span gas, between the gas concentration exhibited by the gas analyzer when a span gas is introduced to the analyzer and the known concentration of the span gas.

3.6 Response Time. The amount of time required for the measurement system to display 95 percent of a step change in the NO or CO gas concentration on the data recorder.

3.7 Interference Check. A method of quantifying analytical interferences from components in the stack gas other than the analyte.

3.8 Linearity Check. A method of demonstrating the ability of a gas analyzer to respond consistently over a range of gas concentrations.

3.9 Stability Check. A method of demonstrating an electrochemical cell operated over a given nominal range provides a stable response and is not significantly affected by prolonged exposure

to the analyte.

3.10 Stability Time. As determined during the stability check; the elapsed time from the start of the gas injection until a stable reading has been achieved.

3.11 Initial NO Cell Temperature. The temperature of the NO cell during the pretest calibration error check. Since the NO cell can experience significant zero drift with cell temperature changes in some situations, the cell temperature must be monitored.

3.12 Test. The collection of emissions data from a source for an equal amount of time at each sample point and for a minimum of 21 minutes total.

4. MEASUREMENT SYSTEM PERFORMANCE SPECIFICATIONS

4.1 Zero Calibration Error. Less than or equal to 3 percent of the span gas value for NO and CO channels and less than or equal to 0.3 percent O_2 for the O_2 channel.

4.2 Span Calibration Error. Less than or equal to 5 percent of the span gas value for NO and CO channels and less than or equal to 0.5 percent O_2 for the O_2 channel.

4.3 Interference Response. The CO and NO interference responses must be less than or equal to 5 percent as calculated in accordance with Section 7.7.

4.4 Linearity. For the zero, mid-level, and span gases, the absolute value of the difference, expressed as a percent of the span gas, between the gas value and the analyzer response shall not be greater than 2.5 percent for NO, CO and O_2 cells.

4.5 Stability Check Response. The analyzer responses to CO and NO span gases shall not vary more than 3.0 percent of span gas value over a 30-minute period or more than 2.0 percent of the span gas value over a 15-minute period.

4.6 CO Measurement, Hydrogen (H_2) Compensation. It is recommended that CO measurements be performed using a hydrogen-compensated EC cell since CO-measuring EC cells can experience significant reaction to the presence of H_2 in the gas stream.

5. APPARATUS AND REAGENTS

5.1 Measurement System. . The sampling system shall maintain the gas sample at a temperature

above the dew point up to the moisture removal system. The sample conditioning system shall be designed so there are no entrained water droplets in the gas sample when it contacts the electrochemical cells. The essential components of the measurement system are described below:

5.1.1 Sample Probe. Glass, stainless steel, or other nonreactive material, of sufficient length to sample per the requirements of Section 7.

5.1.2 Heated Sample Line. Heated (sufficient to prevent condensation) nonreactive tubing such as teflon, stainless steel, glass, etc. to transport the sample gas to the moisture removal system.

5.1.3 Sample Transport Lines. Nonreactive tubing such as teflon, stainless steel, glass, etc. to transport the sample from the moisture removal system to the sample pump, sample flow rate control, and electrochemical cells.

5.1.4 Calibration Assembly. A tee fitting where the probe attaches to the sample line to introduce calibration gases at ambient pressure during the calibration error checks.

5.1.5 Moisture Removal System. A chilled condenser to remove condensate continuously from the sample gas while maintaining minimal contact between the condensate and the sample gas.

5.1.6 Particulate Filter. Filters at the probe or the inlet or outlet of the moisture removal system and inlet of the analyzer may be used to prevent accumulation of particulate material in the measurement system and extend the useful life of the components. All filters shall be fabricated of materials that are nonreactive to the gas being sampled.

5.1.7 Sample Pump. A leak-free pump to pull the sample gas through the system at a flow rate sufficient to minimize the response time of the measurement system. The pump may be constructed of any material that is nonreactive to the gas being sampled.

5.1.8 Sample Flow Rate Control. A sample flow rate control valve to maintain a constant sampling rate during sampling and calibration error checks. The components shall be fabricated of materials that are nonreactive to the gas being sampled.

5.1.9 Gas Analyzer. A Testo model 350 containing electrochemical cells to determine the NO, CO, and O_2 concentrations in the sample gas stream. (Note: The analyzer will be housed in a clean, thermally-stable, vibration-free environment will minimize drift in the analyzer calibration.)

5.1.10 Data Recorder. A strip chart recorder, computer, or digital recorder, for recording measurement data. The data recorder resolution (i.e., readability) shall be at least 1 ppm for CO and NO, 0.1 percent O_2 for O_2; and one degree (C or F) for temperature.

5.1.11 NO Cell Temperature Indicator. A thermocouple will be used to monitor the temperature of the NO electrochemical cell. The temperature may be monitored at the surface of the cell, within the cell or in the cell compartment.

5.1.12 Dilution Systems. The use of dilution systems will be used when necessary, to protect the life and integrity of the EC cell.

5.1.13 NO_x convertor oven. A oven used to convert NO_2 to NO will be used during sampling to provide a total nitrogen oxides (NO_x) result.

5.2 Calibration Gases. The CO and NO calibration gases for the gas analyzer shall be CO in nitrogen and NO in nitrogen. The mid-level O_2 gas shall be O_2 in nitrogen.

5.2.1 Span Gases. Used for calibration error, linearity, and interference checks of each nominal range of each cell. Select concentrations according to procedures in Section 2.1. Clean dry air may be used as the span gas for the O_2 cell as specified in Section 2.1.2.

5.2.2 Mid-Level Gases. Select concentrations that are 40-60 percent of the span gas concentrations.

5.2.3 Zero Gas. Concentration of less than 0.25 percent of the span gas for each component. Ambient air may be used in a well ventilated area for the CO and NO zero gases.

6. MEASUREMENT SYSTEM PERFORMANCE CHECK PROCEDURES.

6.1 Calibration Gas Concentration Certification. For the mid-level and span cylinder gases, calibration gases certified according to EPA Protocol 1 procedures will be used. Calibration gases must meet the criteria under 40 CFR 60, Appendix F, Section 5.1.2 (3). Expired Protocol 1 gases

may be recertified using the applicable reference methods.

6.2 Linearity Check. The following procedure will be conducted once for each nominal range to be used on each electrochemical cell (NO, CO, and O_2). After a linearity check is completed, it remains valid for five consecutive calendar days. After the five calendar day period has elapsed, the linearity check must be reaccomplished. Additionally, the linearity check will be repeated if the cell is replaced.

6.2.1 Linearity Check Gases. For each cell obtain the following gases: zero (0-0.25 percent of nominal range), mid-level (40-60 percent of span gas concentration), and span gas (selected according to Section 2.1).

6.2.2 Linearity Check Procedure. After calibrating the analyzer with zero and span gases, inject the zero, mid-level, and span gases appropriate for each nominal range to be used on each cell. For each gas injection, verify the flow rate is constant and the analyzer responses have stabilized before recording the responses.

6.3 Interference Check. A CO cell response to the NO span gas during the linearity check may indicate interferences. If this cell response is observed during the linearity check, it may be desirable to quantify the CO cell response to the NO span gas during the linearity check and use estimated stack gas CO and NO concentrations to evaluate whether or not the portable analyzer will meet the post test interference check requirements of Section 7.7. The evaluation using the linearity check data is optional. However, the interference checks under Section 7.7 are mandatory for each test.

6.4 Stability Check. The following procedure will be conducted once for the maximum nominal range to be used on each electrochemical cell (NO and CO). After a stability check is completed, it remains valid for five consecutive calendar days. After the five calendar day period has elapsed, the stability check must be reaccomplished. Additionally, the stability check will be repeated if the cell is replaced or if a cell is exposed to gas concentrations greater than 125 percent of the highest span gas concentration.

6.4.1 Stability Check Procedure. Inject the span gas for the maximum nonimal range to be used during the emission testing into the analyzer and record the analyzer response at least once per minute until the conclusion of the stability check. One-minute average values may be used instead of instantaneous readings. After the analyzer response has stabilized, continue to flow the span gas for at least a 30-minute stability check period. Make no adjustments to the analyzer during the stability check except to maintain constant flow. Record the stability time as the number of

minutes elapsed between the start of the gas injection and the start of the 30-minute stability check period. As an alternative, if the concentration reaches a peak value within five minutes, you may choose to record the data for at least a 15-minute stability check period following the peak.

6.4.2 Stability Check Calculations. Determine the highest and lowest concentrations recorded during the 30-minute period and record the results on Form B. The absolute value of the difference between the maximum and minimum values recorded during the 30-minute period must be less than 3.0 percent of the span gas concentration. Alternatively, record stability check data in the same manner for the 15-minute period following the peak concentration. The difference between the maximum and minimum values for the 15-minute period must be less than 2.0 percent of the span gas concentration.

7. EMISSION TEST PROCEDURES.

7.1 Selection of Sampling Site and Sampling Points.

7.1.1 Reciprocating Engines. Select a sampling site located down stream of any control device, and upstream of any dilution air inlet. Use a sampling location at a single point near the center of the duct.

7.1.2 Combustion Turbines. Select a sampling site and sample points according to the procedures in 40 CFR 60, Appendix A, Method 20. Alternatively, the tester may choose an alternative sampling location and/or sample from a single point in the center of the duct if previous test data demonstrate the stack gas concentrations of CO, NO_X, and O_2 do not vary significantly across the duct diameter.

7.1.3 Boilers/Process Heaters. Select a sampling site located down stream of any control device, and upstream of any dilution air inlet. Use a sampling location at a single point near the center of the duct.

7.2 Warm Up Period. Assemble the sampling system and allow the analyzer and sample interface to warm up and adjust to ambient temperature at the location where the stack measurements will take place.

7.3 Pretest Calibration Error Check. Conduct a zero and span calibration error check before testing each new source. Conduct the calibration error check near the sampling location just prior to the start of an emissions test. Keep the analyzer in the same location until the post test calibration error check is conducted.

7.3.1 Zero and Span Procedures. Inject the zero and span gases using the calibration assembly. Ensure the calibration gases flow through all parts of the sample interface. During this check, make no adjustments to the system except those necessary to achieve the correct calibration gas flow rate at the analyzer. Allow each reading to stabilize before recording the result. The time allowed for the span gas to stabilize shall be no less than the stability time noted during the stability check. After achieving a stable response, disconnect the gas and briefly purge with ambient air.

7.3.2 Response Time Determination. Determine the NO and CO response times by observing the time required to respond to 95 percent of a step change in the analyzer response for both the zero and span gases. Note the longer of the two times as the response time.

7.3.3 Failed Pretest Calibration Error Check. If the zero and span calibration error check results are not within the specifications in Section 4, take corrective action and repeat the calibration error check until acceptable performance is achieved.

7.4 NO Cell Temperature Monitoring. Record the initial NO cell temperature during the pretest calibration error check and monitor and record the temperature regularly (at least once each 7 minutes) during the sample collection period. If at any time during sampling, the NO cell temperature is 85 degrees F or greater and has increased or decreased by more than 5 degrees F since the pretest calibration, stop sampling immediately and conduct a post test calibration error check per Section 7.6, re-zero the analyzer, and then conduct another pretest calibration error check per Section 7.3 before continuing. (It is recommended that testing be discontinued if the NO cell exceeds 85 degrees F since the design characteristics of the NO cell indicate a significant measurement error can occur as the temperature of the NO cell increases above this temperature. From a review of available data, these errors appear to result in a positive bias of the test results.)

7.5 Sample Collection. Position the sampling probe at the sample point and begin sampling at the same rate used during the calibration error check. Maintain constant rate sampling (10 percent of the analyzer flow rate value used in Section 7.3.2) during the entire test. Sample for an equal period of time at each sample point. Sample the stack gas for at least twice the response time or the period of the stability time, whichever is greater, before collecting test data at each sample point. A 21 minute period shall be considered a test for each source. When sampling combustion turbines per Section 7.1.2, collect test data as required to meet the requirements of 40 CFR 60, Appendix A, Method 20. Data collection should be performed for an equal amount of time at each sample point and for a minimum of 21 minutes total. The concentration data must be recorded

either (1) at least once each minute, or (2) as a block average for the test using values sampled at least once each minute. Do not break any seals in the sample handling system until after the post test calibration error check (this includes opening the moisture removal system to drain condensate).

7.6 Post Test Calibration Error Check. Immediately after the test, conduct a zero and span calibration error check using the procedure in Section 7.3. Conduct the calibration error check at the sampling location. Make no changes to the sampling system or analyzer calibration until all of the calibration error check results have been recorded. If the zero or span calibration error exceeds the specifications in Section 4, then all test data collected since the previous calibration error check are invalid. If the sampling system is disassembled or the analyzer calibration is adjusted, repeat the pretest calibration error check before conducting the next test.

7.7 Interference Check. Use the posttest calibration error check results and average emission concentrations for the test to calculate interference responses for the CO and NO cells. If an interference response exceeds 5 percent, all emission test results since the last successful interference test for that compound are invalid.

7.8 Re-Zero. At least once every three hours, recalibrate the analyzer at the zero level.

8. CALIBRATION CORRECTIONS

8.1 Emission Data Corrections. Emissions data shall be corrected for a test using the following equation. (Note: If the pretest and post test calibration error check results are not within the limits

$$C_{Corrected} = (C_R - C_O)\frac{C_{MA}}{C_M - C_O}$$

specified in Sections 4.1 and 4.2, the test results are invalid and the test must be repeated.)

where: $C_{Corrected}$ = corrected flue gas concentration (ppm)

C_R = flue gas concentration indicated by gas analyzer (ppm)
C_o = average of pretest and post test analyzer readings during the zero checks (ppm)
C_M = average of pretest and post test analyzer readings during the span checks (ppm)
C_{MA} = actual concentration of span gas (ppm)

9. EMISSION CALCULATIONS

9.1 Emission Calculations for Reciprocating Engines and Combustion Turbines. Emissions will be calculated and reported in units of the allowable emission limit as specified in the permit. The allowable may be stated in pounds per hour (lb/hr), grams per horsepower hour (gm/hp-hr), or both. EPA Reference Method 19 shall be used as the basis for calculating the emissions. As an alternative, EPA Reference Methods 1-4 may be used to obtain a stack volumetric flow rate.

9.2 Reciprocating Engines and Combustion Turbines Equipped with Fuel Meters. EPA Reference Method 19 and heat input per hour (MMBtu/hr) shall be used to calculate a pound per hour emission rate. Heat input per hour shall be based on the average hourly fuel usage rate during the test and the higher heating value of the fuel consumed. If the reciprocating engine or combustion turbine horsepower can be derived from operating conditions during the portable analyzer test, this derived horsepower will be used to calculate a gram per horsepower hour emission rate. If the reciprocating engine horsepower during the time of testing cannot be determined from the operating data, the operating horsepower for the time of the test will be calculated based on the heat input per hour during the test and the default values shown below for specific fuel consumption based on the higher heating value of the fuel. Heat input per hour (MMBtu/hr) shall be calculated based on the average hourly fuel usage during the test and the higher heating value of the fuel consumed. For 4-cycle engines (controlled and uncontrolled) and 2-cycle lean burn engines, a default specific fuel consumption of 9,400 Btu/hp-hr will be used. For 2-cycle uncontrolled (non-lean burn) engines, a default specific fuel consumption of 11,000 Btu/hp-hr is the preferred assumption.
(Note) If the combustion turbine horsepower cannot be calculated during the testing, the emissions will be reported in terms of concentration (ppm by volume, dry basis) corrected to 15 percent O_2.

9.3 Reciprocating Engines Not Equipped with Fuel Meters. If reciprocating engines are not equipped with fuel flow meters during the test, emissions shall be calculated using a calculated horsepower or site-rated horsepower and default specific fuel consumption factors, based on the higher heating value of the fuel, of 9,400 Btu/hp-hr for 4-cycle engines (controlled and uncontrolled) and 2-cycle lean burn engines and 11,000 Btu/hp-hr for 2-cycle uncontrolled (non-