AIR QUALITY DIVISION

CHAPTER 6, SECTION 3

OPERATING PERMIT

WYOMING DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
122 West 25th Street
Cheyenne, Wyoming 82002

PERMIT NO. 3-2-198

Issue Date: **May 30, 2014**
Expiration Date: **May 30, 2019**
Effective Date: **May 30, 2014**
Replaces Permit No.: **3-1-198-1**

In accordance with the provisions of W.S. §35-11-203 through W.S. §35-11-212 and Chapter 6, Section 3 of the Wyoming Air Quality Standards and Regulations,

Basin Electric Power Cooperative
Hartzog Generating Station
Section 20, Township 44 North, Range 74 West
Campbell County, Wyoming

is authorized to operate a stationary source of air contaminants consisting of emission units described in this permit. The units described are subject to the terms and conditions specified in this permit. All terms and conditions of the permit are enforceable by the State of Wyoming. All terms and conditions of the permit, except those designated as not federally enforceable, are enforceable by EPA and citizens under the Act. A copy of this permit shall be kept on-site at the above named facility.

Steven A. Dietrich

Steven A. Dietrich, Administrator
Air Quality Division

MAY 30, 2014
Date

Todd Parfitt, Director
Department of Environmental Quality

June 4, 2014
Date

WAQSR CHAPTER 6, SECTION 3 OPERATING PERMIT

WYOMING DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

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GENERAL INFORMATION

Company Name: Basin Electric Power Cooperative

Mailing Address: 1717 East Interstate Avenue

City: Bismarck State: ND Zip: 58503

Plant Name: Hartzog Generating Station

Plant Location: Section 20, Township 44 North, Range 74 West, Campbell County, Wyoming (15 miles west of Wright, Wyoming)

Latitude/Longitude (WGS84): 43.7736/-105.7814

Plant Mailing Address: 1717 East Interstate Avenue

City: Bismarck State: ND Zip: 58503

Name of Owner: Basin Electric Power Cooperative Phone: (701)223-0441

Responsible Official: John Jacobs Phone: (701)223-0441

Plant Manager/Contact: Kevin Tschosik Phone: (701)223-0441

DEQ Air Quality Contact: District 3 Engineer
2100 West 5th Street
Sheridan, WY 82801
Phone: (307)673-9337

SIC Code: 4911 NAICS Code: 22112

Description of Process: Three natural gas driven turbines at the generating station provide local power generation and line voltage stability to the region when required. A fourth unit at the facility is a diesel generator used to start the turbines during cold weather.

SOURCE EMISSION POINTS

This table may not include any or all insignificant activities at this facility.

SOURCE ID#	SOURCE DESCRIPTION	SIZE	CH. 6, SEC. 2 PERMITS
TURB 1	Solar Taurus 70 Turbine	6,106 kW (8,187 hp)	CT-2621
TURB 2	Solar Taurus 70 Turbine	6,106 kW (8,187 hp)	CT-2621
TURB 3	Solar Taurus 70 Turbine	6,106 kW (8,187 hp)	CT-2621
STARTUP 1	Caterpillar 3412 Diesel Generator	823 hp	wv-11332-3

TOTAL FACILITY ESTIMATED EMISSIONS

For informational purposes only. These emissions are not to be assumed as permit limits.

POLLUTANT	EMISSIONS (TPY)
CRITERIA POLLUTANT EMISSIONS	
Particulate Matter	7
PM_{10} Particulate Matter	7
$PM_{2.5}$ Particulate Matter	7
Sulfur Dioxide (SO_2)	3
Nitrogen Oxides (NO_X)	103
Carbon Monoxide (CO)	122
Volatile Organic Compounds (VOCs)	30
HAZARDOUS AIR POLLUTANT (HAP) EMISSIONS	0.9
GREENHOUSE GAS EMISSIONS (CO_2e)	361,893

Emission estimates are from the operating permit application.

FACILITY-SPECIFIC PERMIT CONDITIONS

Facility-Wide Permit Conditions

(F1) PERMIT SHIELD [WAQSR Ch 6, Sec 3(k)]
Compliance with the conditions of this permit shall be deemed compliance with any requirements applicable on the date of permit issuance.

(F2) ENGINE CONFIGURATION REQUIREMENTS
[WAQSR Ch 6, Sec 2 Permit CT-2621 & Ch 6, Sec 2 Waiver wv-11332-3]
(a) The facility shall be limited to no more than three 6,106 kW (8,178 hp) Solar Taurus 70 turbines (TURB 1, 2, & 3) and one 823 hp Caterpillar 3412 diesel generator (STARTUP 1).
(b) The permittee may expand the engine configuration beyond that described in paragraph (a) upon receipt of a construction or modification permit issued under Chapter 6, Section 2 of WAQSR that authorizes such change. The permittee must, however, submit an application to modify this operating permit within 12 months of commencement of operation for any engine not already included in this permit.

Source-Specific Permit Conditions

(F3) VISIBLE EMISSIONS [WAQSR Ch 3, Sec 2 & Ch 6, Sec 2 Waiver wv-11332-3]
(a) Visible emissions from the diesel generator (STARTUP 1) are limited to 20 percent opacity. This limitation shall not apply during a reasonable period of warmup following a cold start or where undergoing repairs and adjustment following a malfunction.
(b) Visible emissions of any contaminant discharged into the atmosphere from any other single emission source shall not exhibit greater than 20 percent opacity except for one period or periods aggregating not more than six minutes in any one hour of not more than 40 percent opacity.

(F4) TURBINE NO_X AND CO EMISSION LIMITATIONS [WAQSR Ch 6, Sec 2 Permit CT-2621]
(a) NO_X emissions from the Solar Taurus 70 turbines (TURB 1, 2 & 3) shall not exceed 25 ppmv at 15 percent O_2 and 7.3 lb/hr, at ambient temperatures greater than zero degrees Fahrenheit.
(b) CO emissions from the Solar Taurus 70 turbines (TURB 1, 2 & 3) shall not exceed 50 ppmv at 15 percent O_2 and 8.9 lb/hr, at ambient temperatures greater than zero degrees Fahrenheit.

(F5) DIESEL GENERATOR LIMITS [WAQSR Ch 6, Sec 2 Waiver wv-11332-3]
The diesel generator (STARTUP 1) shall be limited to 500 hours of operation per calendar year.

(F6) PREVENTATIVE MAINTENANCE [WAQSR Ch 6, Sec 2 Permit CT-2621]
The permittee shall follow the preventative maintenance program for the Solar Taurus 70 turbines (TURB 1, 2, & 3) to ensure the turbines operate within the allowable emission limits on a continuous basis. The preventative maintenance program is attached as Appendix A of this permit.

(F7) ENGINE OR TURBINE REPLACEMENT [WAQSR Ch 6, Sec 2; Ch 6, Sec 3(h)(i)(I)]
(a) Permanent replacement of an engine or turbine must be evaluated by the Division under WAQSR Ch 6, Sec 2 prior to such replacement to determine the appropriate permitting action and evaluate the need for additional requirements resulting from the permanent replacement.
(b) Should an engine or turbine break down or require an overhaul, the permittee may bring on site and operate a temporary replacement engine or turbine until repairs are made. The temporary replacement unit shall be identical or similar to the unit replaced, with emission levels at or below those of the unit replaced. The permittee shall notify the Division in writing of such temporary replacement within five working days and include the following:
(i) The startup date of the temporary replacement unit; and
(ii) A statement regarding the applicability of any New Source Performance Standards (NSPS) in 40 CFR Part 60; any National Emission Standards for Hazardous Air Pollutants (NESHAPs) in 40 CFR Part 63; and Compliance Assurance Monitoring (CAM) in WAQSR Ch 7, Sec 3 for the temporary replacement unit.

Testing and Monitoring Requirements

(F8) EMISSIONS TESTING [W.S. 35-11-110 & 40 CFR 60 Subpart GG]

(a) The Division reserves the right to require testing as provided under condition G1 of this permit. Should testing be required:

(i) For visible emissions, Method 9 shall be used.

(ii) For turbines subject to the requirements of 40 CFR 60 Subpart GG, testing for NO_X and SO_2 on a ppm basis shall follow the requirements of Subpart GG, and testing on a lb/hr basis shall follow Methods 1-4, 6C, and 7E.

(iii) For other NO_X emissions sources, Methods 1-4 and 7 or 7E shall be used.

(iv) For CO emissions, Methods 1-4 and 10 shall be used.

(v) For alternative test methods, or methods used for other pollutants, the approval of the Administrator must be obtained prior to using the test method to measure emissions.

(b) Unless otherwise specified, testing shall be conducted in accordance with WAQSR Ch 5, Sec 2(h).

(F9) EMISSIONS AND OPERATIONS MONITORING
[WAQSR Ch 6, Sec 3(h)(i)(C)(I) & Ch 6, Sec 2 Permit CT-2621]

(a) The permittee shall measure NO_X and CO emissions from each Solar Taurus 70 turbine (TURB 1, 2, & 3) at least once every 2,160 hours of operation for comparison with the emission limits specified in condition F4, using the Division's portable analyzer monitoring protocol, or the EPA reference methods described in condition F8. The monitoring protocol can be downloaded at *http://deq.state.wy.us/aqd/operating.asp* or is available from the Division upon request.

(i) Notification of the test date shall be provided to the Division at least 15 days prior to testing. Results of the tests shall be submitted to the Division within 45 days of completing the tests.

(b) The permittee shall monitor the operating hours of each turbine (TURB 1, 2, & 3).

(c) The permittee shall monitor the ambient temperature on day that any Solar Taurus 70 turbine (TURB 1, 2, & 3) is in operation at the facility to determine the dates and number of turbine operating hours during the calendar year that the ambient temperature is below zero degrees Fahrenheit.

(d) The permittee shall monitor the operating hours of the diesel generator (STARTUP 1) to assess compliance with the annual limit specified in condition F5.

(F10) VISIBLE EMISSIONS MONITORING [WAQSR Ch 6, Sec 3(h)(i)(C)(I)]

(a) For visible emissions from the Solar Taurus 70 turbines (TURB 1, 2, & 3), the permittee shall monitor the type of fuel used to ensure natural gas is the sole fuel source for these units.

(b) The permittee shall conduct observations of visible emissions from the diesel-fired engine (STARTUP 1) during periodic availability assurance tests of this source, at least semi-annually, to assess compliance with the opacity limit under condition F3(a) and to identify maintenance needs. The visual observations shall be conducted by a person who is educated on the general procedures for determining the presence of visible emissions but not necessarily certified to perform Method 9 observations. Observation of excess emissions shall prompt immediate inspection and, if necessary, corrective actions.

Recordkeeping Requirements

(F11) TESTING AND MONITORING RECORDS
[WAQSR Ch 6, Sec 3(h)(i)(C)(II); WAQSR Ch 6, Sec 2 Waiver wv-11332-3]

(a) For any testing or monitoring performed under conditions F8, F9(a) and F10(b), other than Method 9 observations, the permittee shall record, as applicable, the following:

(i) The date, place, and time of sampling, measurements, or observations;

(ii) The date(s) analyses were performed;

(iii) The company or entity that performed the analyses or observations;

(iv) The analytical techniques or methods used;

(v) The results of such analyses or observations;

(vi) The operating conditions and parameters as they existed at the time of testing, monitoring, or observation; and

(vii) Any corrective actions taken.

(b) For any Method 9 observations required by the Division under condition F8, the permittee shall keep field records in accordance with Section 2.2 of Method 9.

(c) For the monitoring required by condition F9(d), the permittee shall record the operating hours of the diesel generator.

(d) For the monitoring required under condition F9(b) and (c), the permittee shall keep records of the following:

(i) The operating hours for each turbine based on hours operated since the last test conducted under condition F9(a).

(ii) The dates and hours that any Solar Taurus 70 turbine (TURB 1, 2, & 3) operated when the ambient temperature was below zero degrees Fahrenheit, and which turbine engine(s) was in operation at that time.

(e) The permittee shall retain these records on-site at the facility for a period of at least five years from the date the records are generated.

(F12) MAINTENANCE RECORDS [WAQSR Ch 6, Sec 3(h)(i)(C)(II)]

(a) The permittee shall maintain records of preventative maintenance activities for turbines (TURB 1, 2, & 3) as described in Appendix A. These records shall include an explanation for any deviation from the preventative maintenance program.

(b) The permittee shall retain these records on-site at the facility for a period of at least five years from the date the records are generated.

Reporting Requirements

(F13) TEST NOTIFICATION AND REPORTS [WAQSR Ch 6, Sec 3(h)(i)(C)(III) & WAQSR Ch 6, Sec 2 Permit CT-2621]

(a) Notification of the test date for the monitoring required by condition F9(a) shall be provided to the Division at least 15 days prior to testing.

(b) The permittee shall report the results of any emissions tests performed under conditions F8 and F9(a), within 30 days of completing the tests. The reports shall include the information indicated in condition F11(a) and (b) as appropriate. For emissions testing of any of the turbines, the report shall include the hours the turbine operated between tests to verify testing frequency compared to that specified in condition F9(a).

(c) The reports shall reference this permit condition (F13), and be submitted to the Division in accordance with condition G4.

(F14) MONITORING REPORTS [WAQSR Ch 6, Sec 3(h)(i)(C)(III)]

(a) The following shall be reported to the Division by January 31 and July 31 each year:

(i) A statement verifying that the emissions units listed in condition F10(a) fired only natural gas during the reporting period.

(ii) A summary of all visible emission monitoring conducted as specified in condition F10(b).

(iii) The calendar year-to-date operating hours for the emergency generator.

(b) All instances of deviations from the conditions of this permit must be clearly identified in each report.

(c) The reports shall reference this permit condition (F14), and be submitted to the Division in accordance with condition G4.

(F15) MAINTENANCE REPORTS [WAQSR Ch 6, Sec 3(h)(i)(C)(III)]

The permittee shall report to the Division by January 31 and July 31 each year whether the permittee has adhered to the preventative maintenance plan described in Appendix A of this permit.

(a) Any deviations from the preventative maintenance plan must be clearly identified in each report.

(b) If the permittee has adhered to the preventative maintenance plan during the reporting period, this shall be stated in the report.

(c) The semiannual reports shall reference this permit condition (F15) and be submitted in accordance with condition G4 of this permit.

(F16) GREENHOUSE GAS REPORTS [W.S. 35-11-110]

The permittee shall submit to the Division a summary of any report(s) required to be submitted to the EPA under 40 CFR Part 98.

(a) The reports shall be submitted to the Division within 60 days of submission to EPA, in a format as specified by the Division.

(b) The reports shall be submitted in accordance with condition G4(a)(i) of this permit, to the attention of the Division's Emission Inventory Program. A copy need not be sent to the DEQ Air Quality contact.

(F17) REPORTING EXCESS EMISSIONS & DEVIATIONS FROM PERMIT REQUIREMENTS
[WAQSR Ch 6, Sec 3(h)(i)(C)(III)]

(a) General reporting requirements are described under the General Conditions of this permit. The Division reserves the right to require reports as provided under condition G1 of this permit.

(b) Emissions which exceed the limits specified in this permit and which are not reported under a different condition of this permit shall be reported annually with the emission inventory unless specifically superseded by condition G17, condition G19, or other condition(s) of this permit. The probable cause of such exceedance, the duration of the exceedance, the magnitude of the exceedance, and any corrective actions or preventative measures taken shall be included in this annual report. For sources and pollutants which are not continuously monitored, if at any time emissions exceed the limits specified in this permit by 100 percent, or if a single episode of emission limit exceedance spans a period of 24 hours or more, such exceedance shall be reported to the Division within one working day of the exceedance. (Excess emissions due to an emergency shall be reported as specified in condition G17. Excess emissions due to unavoidable equipment malfunction shall be reported as specified in condition G19.)

(c) Any other deviation from the conditions of this permit shall be reported to the Division in writing within 30 days of the deviation or discovery of the deviation.

WAQSR CHAPTER 5, SECTION 2 NEW SOURCE PERFORMANCE STANDARDS (NSPS) AND 40 CFR 60 SUBPART GG REQUIREMENTS FOR STATIONARY GAS TURBINES

(P60-GG1) SUBPART GG REQUIREMENTS

[40 CFR 60 Subparts A and GG; WAQSR Ch 5, Sec 2; Ch 6, Sec 2 Permit CT-2621]

The permittee shall meet all requirements of 40 CFR 60 Subparts A and GG and WAQSR Ch 5 Sec 2, as they apply to the turbines (TURB 1, 2, & 3).

(P60-GG2) MONITORING FUEL SULFUR & NITROGEN CONTENT

[WAQSR Ch 6, Sec 2 Permit CT-2621; 40 CFR 60 Subpart GG]

For fuel sulfur and nitrogen content monitoring, the permittee shall comply with paragraphs (a) and (c) of this condition until such time as the custom monitoring schedule requirement in permit CT-2621 is modified or superseded. Upon modification of the custom monitoring schedule requirement in permit CT-2621, the permittee may demonstrate that the fuel combusted in the turbines meets the definition of natural gas in §60.331(u), and the permittee shall then comply with either paragraph (a) OR (b), and (c). The EPA approval for custom fuel monitoring is provided in Appendix B of this permit.

(a) The permittee shall determine and record the sulfur content of the fuel fired in each turbine (TURB 1, 2, & 3) according to the following custom schedule:
  (i) Sulfur monitoring shall be conducted during the first and third quarters of each calendar year.
  (ii) Should any sulfur analysis required under paragraph (a)(i) of this condition indicate non-compliance with the requirements of Subpart GG, the permittee shall notify the Division of such exceedance, and shall conduct fuel sulfur monitoring weekly until notified otherwise by the Division.
  (iii) The permittee shall notify the Division of any change in fuel supply, including a substantial change in fuel quality. In such cases, the permittee shall conduct fuel sulfur monitoring weekly until notified otherwise by the Division.
  (iv) For determining the sulfur content of the fuel, the permittee shall use the Gas Processors Association's "Test for Hydrogen Sulfide and Carbon Dioxide in Natural Gas Using Length of Stain Tubes." The length of stain tubes method is provided in Appendix C of this permit.

(b) Upon appropriate modification of permit CT-2621, the permittee may demonstrate that the fuel combusted in the turbines engines meets the definition of natural gas in §60.331(u). The permittee shall use the sources of information described in 60.339(h)(3) to make the required demonstration.

(c) No monitoring of fuel nitrogen content is required as long as the permittee does not claim an allowance for fuel bound nitrogen as described in §60.332(a), and as long as natural gas is the fuel fired in the turbines.

(P60-GG3) RECORDKEEPING [WAQSR Ch 5, Sec 2(g)(ii) and (g)(v), and Ch 6, Sec 3(h)(i)(C)(II)]

(a) Upon appropriate modification of permit CT-2621, the permittee shall keep records demonstrating that the fuel used in the turbines meets the definition of natural gas, as described in condition P60-GG2 of this permit.

(b) The permittee shall maintain records of the occurrence and duration of any startup, shutdown, or malfunction in the operation of the turbine(s).

(c) The permittee shall maintain records of all measurements, reports, and other information required by the P60 conditions of this permit in a permanent form suitable for inspection.

(d) These records shall be retained on-site at the facility for a period of at least five (5) years from the date such records are generated. Records of the most recent demonstration that fuel meets the definition of natural gas shall be retained regardless of the date of record.

(P60-GG4) SUBPART GG REPORTS

[WAQSR Ch 6, Sec 3(h)(i)(C)(III); Ch 6 Sec 2 Permit CT-2621; and 40 CFR 60 Subpart GG]

(a) Until appropriate modification of permit CT-2621, the permittee shall submit a written report of excess emissions (as defined in paragraph (b) of this condition) to the Administrator semiannually. All semiannual reports shall be postmarked by the 30th day following the end of each calendar half and shall include the following information:

(i) The magnitude of excess emissions, any conversion factor(s) used, the date and time of commencement and completion of each time period of excess emissions, and the process operating time during the reporting period.

(ii) Specific identification of each period of excess emissions that occurs during start-ups, shutdowns, and malfunctions of the turbine(s), the nature and cause of any malfunction (if known), and the corrective action taken or preventative measures adopted.

(iii) When no excess emissions have occurred, such information shall be stated in the report.

(b) Excess emissions are defined as any period during which the sulfur content of the fuel being fired in any of the turbines exceeds 0.8 percent by weight, or when the SO_2 exhaust gas concentration from any turbine exceeds 0.015 percent by volume at 15 percent oxygen on a dry basis.

(c) If applicable, the permittee shall submit written documentation of any change in the information used in the demonstration required by condition P60-GG2 related to the fuel fired by the turbines, within 45 days of such change.

(d) The reports shall be submitted in accordance with condition G4 of this permit.

The subparts are available at *http://www.gpoaccess.gov/cfr/retrieve.html*, or from the Division upon request.

WAQSR CHAPTER 5, SECTION 3 NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAPS) AND 40 CFR 63 SUBPART ZZZZ REQUIREMENTS FOR STATIONARY RECIPROCATING INTERNAL COMBUSTION ENGINES

SUBPART ZZZZ REQUIREMENTS

[40 CFR 63 Subparts A and ZZZZ; WAQSR Ch 5, Sec 3; Ch 6, Sec 2 Waiver wv-11332-3]

The permittee shall meet all requirements of 40 CFR 63 Subparts A and ZZZZ and WAQSR Ch 5, Sec 3 as they apply to each affected source as indicated in §63.6590(a). An affected source is any existing, new, or reconstructed stationary RICE located at a major or area source of HAP emissions, excluding stationary RICE being tested at a stationary RICE test cell/stand. (As required by condition F7(c), if an engine is replaced or reconstructed, subpart applicability will need to be re-evaluated and a statement regarding applicability submitted to the Division.) This facility is currently identified as an area/major source of HAP emissions. Affected sources at this facility include the diesel generator (STARTUP 1).

The subparts are available at *http://www.gpoaccess.gov/cfr/retrieve.html*, or from the Division upon request.

COMPLIANCE CERTIFICATION AND SCHEDULE

Compliance Certification [WAQSR Ch 6, Sec 3(h)(iii)(E)]

(C1) (a) The permittee shall submit by January 31 each year a certification addressing compliance with the requirements of this permit. The certification shall be submitted as a stand-alone document separate from any monitoring reports required under this permit.

(b) (i) For visible emissions, the permittee shall assess compliance with condition F3 of this permit by verifying natural gas was the sole fuel source used for the turbines (TURB 1, 2, & 3) specified in condition F10(a), and by conducting the monitoring required by condition F10(b) for the diesel generator (STARTUP 1).

(ii) For NO_X and CO emissions, the permittee shall assess compliance with condition F4 by conducting the testing and monitoring required by condition F9(a).

(iii) For the diesel generator (STARTUP 1), the permittee shall assess compliance with the operating hour limit in condition F5 by conducting monitoring required by condition F9(d) and by reviewing the records kept in accordance with condition F11(c).

(iv) For the preventative maintenance requirements, the permittee shall assess compliance with condition F6 by reviewing the records kept in accordance with condition F12.

(v) For greenhouse gas reporting, the permittee shall assess compliance with condition F16 by verifying that reports were submitted in accordance with condition F16(b).

(vi) The permittee shall assess compliance with condition P60-GG1 of this permit and 40 CFR 60 Subpart GG by conducting the monitoring required by condition P60-GG2.

(vii) The permittee shall assess compliance with Part 63 Subpart ZZZZ by conducting any testing and monitoring required by §§63.6610 through 63.6640 and by reviewing the records required by §§63.6655 and 63.6665.

(c) The compliance certification shall include:

(i) The permit condition or applicable requirement that is the basis of the certification;

(ii) The current compliance status;

(iii) Whether compliance was continuous or intermittent; and

(iv) The methods used for determining compliance.

(d) For any permit conditions or applicable requirements for which the source is not in compliance, the permittee shall submit with the compliance certification a proposed compliance plan and schedule for Division approval.

(e) The compliance certification shall be submitted to the Division in accordance with condition G4 of this permit and to the Assistant Regional Administrator, Office of Enforcement, Compliance, and Environmental Justice (8ENF-T), U.S. EPA - Region VIII, 1595 Wynkoop Street, Denver, CO 80202-1129.

(f) Determinations of compliance or violations of this permit are not restricted to the monitoring requirements listed in paragraph (b) of this condition; other credible evidence may be used.

Compliance Schedule [WAQSR Ch 6, Sec 3(h)(iii)(C) and (D)]

(C2) The permittee shall continue to comply with the applicable requirements with which the permittee has certified that it is already in compliance.

(C3) The permittee shall comply in a timely manner with applicable requirements that become effective during the term of this permit.

GENERAL PERMIT CONDITIONS

Powers of the Administrator: [W.S. 35-11-110]

(G1) (a) The Administrator may require the owner or operator of any point source to complete plans and specifications for any application for a permit required by the Wyoming Environmental Quality Act or regulations made pursuant thereto and require the submission of such reports regarding actual or potential violations of the Wyoming Environmental Quality Act or regulations thereunder.

(b) The Administrator may require the owner or operator of any point source to establish and maintain records; make reports; install, use and maintain monitoring equipment or methods; sample emissions, or provide such other information as may be reasonably required and specified.

Permit Renewal and Expiration: [WAQSR Ch 6, Sec 3(c)(i)(C), (d)(ii), (d)(iv)(B), and (h)(i)(B)] [W.S. 35-11-206(f)]

(G2) This permit is issued for a fixed term of five years. Permit expiration terminates the permittee's right to operate unless a timely and complete renewal application is submitted at least six months prior to the date of permit expiration. If the permittee submits a timely and complete application for renewal, the permittee's failure to have an operating permit is not a violation of WAQSR Chapter 6, Section 3 until the Division takes final action on the renewal application. This protection shall cease to apply after a completeness determination if the applicant fails to submit by the deadline specified in writing by the Division any additional information identified as being needed to process the application.

Duty to Supplement: [WAQSR Ch 6, Sec 3(c)(iii)]

(G3) The permittee, upon becoming aware that any relevant facts were omitted or incorrect information was submitted in the permit application, shall promptly submit such supplementary facts or corrected information. The permittee shall also provide additional information as necessary to address any requirements that become applicable to the facility after this permit is issued.

Submissions: [WAQSR Ch 6, Sec 3(c)(iv)] [W.S. 35-11-206(c)]

(G4) Any document submitted shall be certified as being true, accurate, and complete by a responsible official.

(a) Submissions to the Division.

(i) Any submissions to the Division including reports, certifications, and emission inventories required under this permit shall be submitted as separate, stand-alone documents and shall be sent to:

Administrator, Air Quality Division
122 West 25th Street
Cheyenne, Wyoming 82002

(ii) Unless otherwise noted elsewhere in this permit, a copy of each submission to the Administrator under paragraph (a)(i) of this condition shall be sent to the DEQ Air Quality Contact listed on page 3 of this permit.

(b) Submissions to EPA.

(i) Each certification required under condition C1 of this permit shall also be sent to:

Assistant Regional Administrator
Office of Enforcement, Compliance, and Environmental Justice (8ENF-T)
U.S. EPA - Region VIII
1595 Wynkoop Street
Denver, CO 80202-1129.

(ii) All other required submissions to EPA shall be sent to:

Office of Partnerships and Regulatory Assistance
Air and Radiation Program (8P-AR)
U.S. EPA - Region VIII
1595 Wynkoop Street
Denver, CO 80202-1129

Changes for Which No Permit Revision Is Required: [WAQSR Ch 6, Sec 3(d)(iii)]

(G5) The permittee may change operations without a permit revision provided that:

(a) The change is not a modification under any provision of title I of the Clean Air Act;

(b) The change has met the requirements of Chapter 6, Section 2 of the WAQSR and is not a modification under Chapter 5, Section 2 or Chapter 6, Section 4 of the WAQSR and the changes do not exceed the emissions allowed under the permit (whether expressed therein as a rate of emissions or in terms of total emissions); and

(c) The permittee provides EPA and the Division with written notification at least 14 days in advance of the proposed change. The permittee, EPA, and the Division shall attach such notice to their copy of the relevant permit. For each such change, the written notification required shall include a brief description of the change within the permitted facility, the date on which the change will occur, any change in emissions, and any permit term or condition that is no longer applicable as a result of the change. The permit shield, if one exists for this permit, shall not apply to any such change made.

Transfer of Ownership or Operation: [WAQSR Ch 6, Sec 3(d)(v)(A)(IV)]

(G6) A change in ownership or operational control of this facility is treated as an administrative permit amendment if no other change in this permit is necessary and provided that a written agreement containing a specific date for transfer of permit responsibility, coverage, and liability between the current and new permittee has been submitted to the Division.

Reopening for Cause: [WAQSR Ch 6, Sec 3(d)(vii)] [W.S. 35-11-206(f)(ii) and (iv)]

(G7) The Division will reopen and revise this permit as necessary to remedy deficiencies in the following circumstances:

(a) Additional applicable requirements under the Clean Air Act or the WAQSR that become applicable to this source if the remaining permit term is three or more years. Such reopening shall be completed not later than 18 months after promulgation of the applicable requirement. No reopening is required if the effective date of the requirement is later than the date on which the permit is due to expire, unless the original permit or any of its terms and conditions have been extended.

(b) Additional requirements (including excess emissions requirements) become applicable to an affected source under the acid rain program. Upon approval by EPA, excess emissions offset plans shall be deemed to be incorporated into the permit.

(c) The Division or EPA determines that the permit contains a material mistake or that inaccurate statements were made in establishing the emissions standards or other terms or conditions of the permit.

(d) The Division or EPA determines that the permit must be revised or revoked to assure compliance with applicable requirements.

Annual Fee Payment: [WAQSR Ch 6, Sec 3(f)(i), (ii), and (vi)] [W.S. 35-11-211]

(G8) The permittee shall, as a condition of continued operations, submit an annual fee to the Division as established in Chapter 6, Section 3 (f) of the WAQSR. The Division shall give written notice of the amount of fee to be assessed and the basis for such fee assessment annually. The assessed fee is due on receipt of the notice unless the fee assessment is appealed pursuant to W.S. 35-11-211(d). If any part of the fee assessment is not appealed it shall be paid to the Division on receipt of the written notice. Any remaining fee which may be due after completion of the appeal is immediately due and payable upon issuance of the Council's decision. Failure to pay fees owed the Division is a violation of Chapter 6, Section 3 (f) and W.S. 35-11-203 and may be cause for the revocation of this permit.

Annual Emissions Inventories: [WAQSR Ch 6, Sec 3(f)(v)(G)]

(G9) The permittee shall submit an annual emission inventory for this facility to the Division for fee assessment and compliance determinations within 60 days following the end of the calendar year. The emissions inventory shall be in a format specified by the Division.

Severability Clause: [WAQSR Ch 6, Sec 3(h)(i)(E)]

(G10) The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

Compliance: [WAQSR Ch 6, Sec 3(h)(i)(F)(I) and (II)] [W.S. 35-11-203(b)]

(G11) The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Air Act, Article 2 of the Wyoming Environmental Quality Act, and the WAQSR and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

Permit Actions: [WAQSR Ch 6, Sec 3(h)(i)(F)(III)] [W.S. 35-11-206(f)]

(G12) This permit may be modified, revoked, reopened, and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or of a notification of planned changes or anticipated noncompliance does not stay any permit condition.

Property Rights: [WAQSR Ch 6, Sec 3(h)(i)(F)(IV)]

(G13) This permit does not convey any property rights of any sort, or any exclusive privilege.

Duty to Provide Information: [WAQSR Ch 6, Sec 3(h)(i)(F)(V)]

(G14) The permittee shall furnish to the Division, within a reasonable time, any information that the Division may request in writing to determine whether cause exists for modifying, revoking and reissuing, or terminating the permit or to determine compliance with the permit. Upon request, the permittee shall also furnish to the Division copies of records required to be kept by the permit, including information claimed and shown to be confidential under W.S. 35-11-1101 (a) of the Wyoming Environmental Quality Act. Upon request by the Division, the permittee shall also furnish confidential information directly to EPA along with a claim of confidentiality.

Emissions Trading: [WAQSR Ch 6, Sec 3(h)(i)(H)]

(G15) No permit revision is required, under any approved economic incentives, marketable permits, emissions trading and other similar programs or processes for changes that are provided for in this permit.

Inspection and Entry: [WAQSR Ch 6, Sec 3(h)(iii)(B)] [W.S. 35-11-206(c)]

(G16) Authorized representatives of the Division, upon presentation of credentials and other documents as may be required by law, shall be given permission to:

(a) enter upon the permittee's premises where a source is located or emissions related activity is conducted, or where records must be kept under the conditions of this permit;
(b) have access to and copy at reasonable times any records that must be kept under the conditions of this permit;
(c) inspect at reasonable times any facilities, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under this permit;
(d) sample or monitor any substances or parameters at any location, during operating hours, for the purpose of assuring compliance with this permit or applicable requirements.

Excess Emissions Due to an Emergency: [WAQSR Ch 6, Sec 3(l)]

(G17) The permittee may seek to establish that noncompliance with a technology-based emission limitation under this permit was due to an emergency, as defined in Ch 6, Sec 3(l)(i) of the WAQSR. To do so, the permittee shall demonstrate the affirmative defense of emergency through properly signed, contemporaneous operating logs, or other relevant evidence that:

(a) an emergency occurred and that the permittee can identify the cause(s) of the emergency;
(b) the permitted facility was, at the time, being properly operated;
(c) during the period of the emergency the permittee took all reasonable steps to minimize levels of emissions that exceeded the emissions standards, or other requirements in this permit;

(d) The permittee submitted notice of the emergency to the Division within one working day of the time when emission limitations were exceeded due to the emergency. This notice must contain a description of the emergency, any steps taken to mitigate emissions, and corrective actions taken.

Diluting and Concealing Emissions: [WAQSR Ch 1, Sec 4]

(G18) No person shall cause or permit the installation or use of any device, contrivance, or operational schedule which, without resulting in reduction of the total amount of air contaminant released to the atmosphere, shall dilute or conceal an emission from a source. This condition shall not apply to the control of odors.

Unavoidable Equipment Malfunction: [WAQSR Ch 1, Sec 5]

(G19) (a) Any source believing that any emissions in excess of established regulation limits or standards resulted from an unavoidable equipment malfunction, shall notify the Division within 24 hours of the incident via telephone, electronic mail, fax, or other similar method. A detailed description of the circumstances of the incident as described in paragraph 5(a)(i)(A) Chapter 1, including a corrective program directed at preventing future such incidents, must be submitted within 14 days of the onset of the incident. The Administrator may extend this 14-day time period for cause.

(b) The burden of proof is on the owner or operator of the source to provide sufficient information to demonstrate that an unavoidable equipment malfunction occurred.

Fugitive Dust: [WAQSR Ch 3, Sec 2(f)]

(G20) The permittee shall minimize fugitive dust in compliance with standards in Ch 3, Sec 2(f) of WAQSR for construction/demolition activities, handling and transportation of materials, and agricultural practices.

Carbon Monoxide: [WAQSR Ch 3, Sec 5]

(G21) The emission of carbon monoxide in stack gases from any stationary source shall be limited as may be necessary to prevent ambient standards from being exceeded.

Asbestos: [WAQSR Ch 3, Sec 8]

(G22) The permittee shall comply with emission standards for asbestos during abatement, demolition, renovation, manufacturing, spraying and fabricating activities.

(a) No owner or operator shall build, erect, install, or use any article, machine, equipment, process, or method, the use of which conceals an emission which would otherwise constitute a violation of an applicable standard. Such concealment includes, but is not limited to, the use of gaseous dilutants to achieve compliance with a visible emissions standard, and the piecemeal carrying out of an operation to avoid coverage by a standard that applies only to operations larger than a specified size.

(b) All owners and operators conducting an asbestos abatement project, including an abatement project on a residential building, shall be responsible for complying with Federal requirements and State standards for packaging, transportation, and delivery to an approved waste disposal facility as provided in paragraph (m) of Ch 3, Sec 8.

(c) The permittee shall follow State and Federal standards for any demolition and renovation activities conducted at this facility, including:

(i) A thorough inspection of the affected facility or part of the facility where the demolition or renovation activity will occur shall be conducted to determine the presence of asbestos, including Category I and Category II non-friable asbestos containing material. The results of the inspection will determine which notification and asbestos abatement procedures are applicable to the activity.

(ii) The owner or operator shall follow the appropriate notification requirements of Ch 3, Sec 8(i)(ii).

(iii) The owner or operator shall follow the appropriate procedures for asbestos emissions control, as specified in Chapter 3, Section 8(i)(iii).

(d) No owner or operator of a facility may install or reinstall on a facility component any insulating materials that contain commercial asbestos if the materials are either molded and friable or wet-applied and friable after drying. The provisions of this paragraph do not apply to spray-applied insulating materials regulated under paragraph (j) of Ch 3, Sec 8.

(e) The permittee shall comply with all other requirements of WAQSR Ch 3, Sec 8.

Open Burning Restrictions: [WAQSR Ch 10, Sec 2]

(G23) The permittee conducting an open burn shall comply with all rules and regulations of the Wyoming Department of Environmental Quality, Division of Air Quality, and with the Wyoming Environmental Quality Act.

(a) No person shall burn prohibited materials using an open burning method, except as may be authorized by permit. ***"Prohibited materials"*** means substances including, but not limited to; natural or synthetic rubber products, including tires; waste petroleum products, such as oil or used oil filters; insulated wire; plastic products, including polyvinyl chloride ("PVC") pipe, tubing and connectors; tar, asphalt, asphalt shingles, or tar paper; railroad ties; wood, wood waste, or lumber that is painted or chemically treated; explosives or ammunition; batteries; hazardous waste products; asbestos or asbestos containing materials; or materials which cause dense smoke discharges, excluding refuse and flaring associated with oil and gas well testing, completions and well workovers.

(b) No person or organization shall conduct or cause or permit open burning for the disposal of trade wastes, for a salvage operation, for the destruction of fire hazards if so designated by a jurisdictional fire authority, or for firefighting training, except when it can be shown by a person or organization that such open burning is absolutely necessary and in the public interest. Any person or organization intending to engage in such open burning shall file a request to do so with the Division.

Sulfur Dioxide Emission Trading and Inventory Program [WAQSR Ch 14]

(G24) Any BART (Best Available Retrofit Technology) eligible facility, or facility which has actual emissions of SO_2 greater than 100 tpy in calendar year 2000 or any subsequent year, shall comply with the applicable requirements of WAQSR Ch 14, Sections 1 through 3, with the exceptions described in sections 2(c) and 3(a).

Stratospheric Ozone Protection Requirements: [40 CFR Part 82]

(G25) The permittee shall comply with all applicable Stratospheric Ozone Protection Requirements, including but not limited to:

(a) *Standards for Appliances* [40 CFR Part 82, Subpart F]
The permittee shall comply with the standards for recycling and emission reduction pursuant to 40 CFR Part 82, Subpart F - Recycling and Emissions Reduction, except as provided for motor vehicle air conditioners (MVACs) in Subpart B:

(i) Persons opening appliances for maintenance, service, repair, or disposal must comply with the required practices pursuant to §82.156.

(ii) Equipment used during the maintenance, service, repair, or disposal of appliances must comply with the standards for recycling and recovery equipment pursuant to §82.158.

(iii) Persons performing maintenance, service, repair, or disposal of appliances must be certified by an approved technician certification program pursuant to §82.161.

(iv) Persons disposing of small appliances, MVACs, and MVAC-like appliances must comply with record keeping requirements pursuant to §82.166. ("MVAC-like appliance" is defined at §82.152).

(v) Persons owning commercial or industrial process refrigeration equipment must comply with the leak repair requirements pursuant to §82.166.

(vi) Owners/operators of appliances normally containing 50 or more pounds of refrigerant must keep records of refrigerant purchased and added to such appliances pursuant to §82.166.

(vii) The permittee shall comply with all other requirements of Subpart F.

(b) *Standards for Motor Vehicle Air Conditioners* [40 CFR Part 82, Subpart B]
If the permittee performs a service on motor (fleet) vehicles when this service involves ozone-depleting substance refrigerant in the MVAC, the permittee is subject to all the applicable requirements as specified in 40 CFR Part 82, Subpart B, Servicing of Motor Vehicle Air Conditioners. The term "motor vehicle" as used in Subpart B does not include a vehicle in which final assembly of the vehicle has not been completed. The term "MVAC" as used in Subpart B does not include the air-tight sealed refrigeration system used as refrigerated cargo, or the system used on passenger buses using HCFC-22 refrigerant.

STATE ONLY PERMIT CONDITIONS

The conditions listed in this section are State only requirements and are not federally enforceable.

Ambient Standards

(S1) The permittee shall operate the emission units described in this permit such that the following ambient standards are not exceeded:

POLLUTANT	STANDARD*	CONDITION	WAQSR CH 2, SEC
PM_{10} particulate matter	50 micrograms per cubic meter	annual arithmetic mean	2 (a)
	150 micrograms per cubic meter	24-hr average concentration with not more than one exceedance per year	
$PM_{2.5}$ particulate matter	15 micrograms per cubic meter	annual arithmetic mean	2 (b)
	35 micrograms per cubic meter	98th percentile 24-hr average concentration	
Nitrogen dioxide	53 parts per billion	annual average concentration	3
	100 parts per billion	three-year average of the annual 98th percentile of the daily maximum 1-hr average concentration	
	0.053 parts per million	annual arithmetic mean	
Sulfur dioxide	75 parts per billion	three-year average of the annual (99th percentile) of the daily max 1-hr average	4
	0.5 parts per million	3-hr blocks not to be exceeded more than once per calendar year	
Carbon monoxide	10 milligrams per cubic meter	max 8-hr concentration with not more than one exceedance per year	5
	40 milligrams per cubic meter	max 1-hr concentration with not more than one exceedance per year	
Ozone	0.075 parts per million	three-year average of the annual fourth-highest daily maximum 8-hr average concentration	6
Hydrogen sulfide	70 micrograms per cubic meter	½ hour average not to be exceeded more than two times per year	7
	40 micrograms per cubic meter	½ hour average not to be exceeded more than two times in any five consecutive days	
Suspended sulfate	0.25 milligrams SO_3 per 100 square centimeters per day	maximum annual average	8
	0.50 milligrams SO_3 per 100 square centimeters per day	maximum 30-day value	
Lead and its compounds	0.15 micrograms per cubic meter	maximum arithmetic 3-month mean concentration for a 3-year period	10

*Exceedances of these standards shall be determined using the procedures in 40 CFR 50.

Hydrogen Sulfide: [WAQSR Ch 3, Sec 7]

(S2) Any exit process gas stream containing hydrogen sulfide which is discharged to the atmosphere from any source shall be vented, incinerated, flared or otherwise disposed of in such a manner that ambient sulfur dioxide and hydrogen sulfide standards are not exceeded.

Odors: [WAQSR Ch 2, Sec 11]

(S3) (a) The ambient air standard for odors from any source shall be limited to an odor emission at the property line which is undetectable at seven dilutions with odor free air as determined by a scentometer as manufactured by the Barnebey-Cheney Company or any other instrument, device, or technique designated by the Division as producing equivalent results. The occurrence of odors shall be measured so that at least two measurements can be made within a period of one hour, these determinations being separated by at least 15 minutes.

(b) Odor producing materials shall be stored, transported, and handled in a manner that odors produced from such materials are confined and that accumulation of such materials resulting from spillage or other escape is prevented.

SUMMARY OF SOURCE EMISSION LIMITS AND REQUIREMENTS

Source ID#: TURB 1, TURB 2, & TURB 3 Source Description: Solar Taurus 70 Turbines (3)

Pollutant	Emission Limit/ Work Practice Standard	Corresponding Regulation(s)	Testing Requirements	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements
Particulate	20 percent opacity [F3]	WAQSR Ch 3, Sec 2	Testing if required [F8]	Verification of natural gas firing [F10]	Record the results of any additional testing [F11]	Semiannual: report type of fuel fired [F14] Report excess emissions and permit deviations [F17]
SO_2	As limited by 40 CFR 60 Subpart GG [P60-GG1]	WAQSR Ch 6, Sec 2 Permit CT-2621 40 CFR 60 Subparts A and GG	Testing if required [F8]	Measure fuel sulfur content [P60-GG2]	Record the results of any additional testing [F11] Record fuel sulfur content [P60-GG2 & P60-GG3]	Semiannual Reports [P60-GG4] Report excess emissions and permit deviations [17]
NO_X	25 ppmv at 15% O_2 and 7.3 lb/hr [F4] As limited by 40 CFR 60 Subpart GG [P60-GG1] Preventative maintenance [F6]	WAQSR Ch 6, Sec 2 Permit CT-2621 40 CFR 60 Subparts A and GG	Testing if required [F8]	Monitor operating hours and ambient temperature [F9] NO_X monitoring every 2,160 hours of operation [F9]	Record monitoring results [F11] Record maintenance [F12] Subpart GG records [P60-GG3]	30 days: report test results [F13] Semiannual: report monitoring results [F14] Maintenance reports [F15] Report excess emissions and permit deviations [F17]
CO	50 ppmv at 15% O_2 and 8.9 lb/hr [F4] Preventative maintenance [F6]	WAQSR Ch 6, Sec 2 Permit CT-2621	Testing if required [F8]	Monitor operating hours and ambient temperature [F9] CO monitoring every 2,160 hours of operation [F9]	Record monitoring results [F11] Record maintenance [F12]	30 days: report test results [F13] Semiannual: report monitoring results [F14] Maintenance reports [F15] Report excess emissions and permit deviations [F17]

These tables are intended only to highlight and summarize applicable requirements for each source. The corresponding permit conditions, listed in brackets, contain detailed descriptions of the compliance requirements. Compliance with the summary conditions in these tables may not be sufficient to meet permit requirements. These tables may not reflect all emission sources at this facility.

Source ID#: STARTUP 1 Source Description: Caterpillar 3412 Diesel Emergency Generator

Pollutant	Emissions Limit/Work Practice Standard	Corresponding Regulation(s)	Testing Requirements	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements
Particulate	20 percent opacity [F3] 500 operating hours limit [F5]	WAQSR Ch 6, Sec 2 Waiver wv-11332-3	Testing if required [F8]	Monitor operating hours [F9] Visual observations [F10]	Record the results of any visible observations [F11]	Semiannual: operating hours and visible observation monitoring [F14] Report excess emissions and permit deviations [F17]
HAPs	WAQSR Ch 5, Sec 3 and 40 CFR 63 Subparts A and ZZZZ					

These tables are intended only to highlight and summarize applicable requirements for each source. The corresponding permit conditions, listed in brackets, contain detailed descriptions of the compliance requirements. Compliance with the summary conditions in these tables may not be sufficient to meet permit requirements. These tables may not reflect all emission sources at this facility.

ABBREVIATIONS

ACFM	Actual cubic feet per minute
AFRC	Air-fuel ratio controls
AQD	Air Quality Division
BACT	Best available control technology (see Definitions)
Btu	British thermal unit
CAA	Clean Air Act
CAM	Compliance Assurance Monitoring
C.F.R.	Code of Federal Regulations
CO	Carbon monoxide
CO_2e	Carbon dioxide equivalent
DEQ	Wyoming Department of Environmental Quality
EPA	United States Environmental Protection Agency (see Definitions)
ESP	Electrostatic Precipitator
g/hp-hr	Gram(s) per horsepower hour
gal	Gallon(s)
gr	Grain(s)
H_2S	Hydrogen sulfide
HAP(s)	Hazardous air pollutant(s)
hp	Horsepower
hr	Hour(s)
lb	Pound(s)
M	Thousand
MACT	Maximum available control technology (see Definitions)
mfr	Manufacturer
mg	Milligram(s)
MM	Million
MVACs	Motor vehicle air conditioners
NMHC(s)	Non-methane hydrocarbon(s)
NO_X	Oxides of nitrogen
NSCR	Non-selective catalytic reduction
O_2	Oxygen
PM	Particulate matter
PM_{10}	Particulate matter less than or equal to a nominal diameter of 10 micrometers
ppmv	Parts per million (by volume)
ppmw	Parts per million (by weight)
QIP	Quality Improvement Plan
RICE	Reciprocating internal combustion engine
SCF	Standard cubic foot (feet)
SCFD	Standard cubic foot (feet) per day
SCM	Standard cubic meter(s)
SIC	Standard Industrial Classification
SO_2	Sulfur dioxide
SO_X	Oxides of sulfur
TBD	To be determined
TPD	Ton(s) per day
TPH	Ton(s) per hour
TPY	Tons per year
U.S.C.	United States Code
µg	Microgram(s)
VOC(s)	Volatile organic compound(s)
W.S.	Wyoming Statute
WAQSR	Wyoming Air Quality Standards & Regulations (see Definitions)

DEFINITIONS

"Act" means the Clean Air Act, as amended, 42 U.S.C. 7401, *et seq.*

"Administrator" means Administrator of the Air Quality Division, Wyoming Department of Environmental Quality.

"Applicable requirement" means all of the following as they apply to emissions units at a source subject to Chapter 6, Section 3 of the WAQSR (including requirements with future effective compliance dates that have been promulgated or approved by the EPA or the State through rulemaking at the time of issuance of the operating permit):

(a) Any standard or other requirement provided for in the Wyoming implementation plan approved or promulgated by EPA under title I of the Act that implements the relevant requirements of the Act, including any revisions to the plan promulgated in 40 C.F.R. Part 52;

(b) Any standards or requirements in the WAQSR which are not a part of the approved Wyoming implementation plan and are not federally enforceable;

(c) Any term or condition of any preconstruction permits issued pursuant to regulations approved or promulgated through rulemaking under title I, including parts C or D of the Act and including Chapter 5, Section 2 and Chapter 6, Sections 2 and 4 of the WAQSR;

(d) Any standard or other requirement promulgated under Section 111 of the Act, including Section 111(d) and Chapter 5, Section 2 of the WAQSR;

(e) Any standard or other requirement under Section 112 of the Act, including any requirement concerning accident prevention under Section 112(r)(7) of the Act and including any regulations promulgated by EPA and the State pursuant to Section 112 of the Act;

(f) Any standard or other requirement of the acid rain program under title IV of the Act or the regulations promulgated thereunder;

(g) Any requirements established pursuant to Section 504(b) or Section 114(a)(3) of the Act concerning enhanced monitoring and compliance certifications;

(h) Any standard or other requirement governing solid waste incineration, under Section 129 of the Act;

(i) Any standard or other requirement for consumer and commercial products, under Section 183(e) of the Act (having to do with the release of volatile organic compounds under ozone control requirements);

(j) Any standard or other requirement of the regulations promulgated to protect stratospheric ozone under title VI of the Act, unless the EPA has determined that such requirements need not be contained in a title V permit;

(k) Any national ambient air quality standard or increment or visibility requirement under part C of title I of the Act, but only as it would apply to temporary sources permitted pursuant to Section 504(e) of the Act; and

(l) Any state ambient air quality standard or increment or visibility requirement of the WAQSR.

(m) Nothing under paragraphs (A) through (L) above shall be construed as affecting the allowance program and Phase II compliance schedule under the acid rain provision of Title IV of the Act.

"BACT" or "Best available control technology" means an emission limitation (including a visible emission standard) based on the maximum degree of reduction of each pollutant subject to regulation under the WAQSR or regulation under the Federal Clean Air Act, which would be emitted from or which results for any proposed major emitting facility or major modification which the Administrator, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application or production processes and available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant. If the Administrator determines that technological or economic limitations on the application of measurement methodology to a particular class of sources would make the imposition of an emission standard infeasible, he may instead prescribe a design, equipment, work practice or operational standard or combination thereof to satisfy the requirement of Best Available Control Technology. Such standard shall, to the degree possible, set forth the emission reduction achievable by implementation of such design, equipment, work practice, or operation and shall provide for compliance by means which achieve equivalent results. Application of BACT shall not result in emissions in excess of those allowed under Chapter 5, Section 2 of the WAQSR and any other new source performance standard or national emission standards for hazardous air pollutants promulgated by EPA but not yet adopted by the state.

"Department" means the Wyoming Department of Environmental Quality or its Director.

"Director" means the Director of the Wyoming Department of Environmental Quality.

"Division" means the Air Quality Division of the Wyoming Department of Environmental Quality or its Administrator.

"Emergency" means any situation arising from sudden and reasonably unforeseeable events beyond the control of the source, including acts of God, which situation requires immediate corrective action to restore normal operation, and that causes the source to exceed a technology-based emission limitation under the permit, due to unavoidable increases in emissions attributable to the emergency. An emergency shall not include noncompliance to the extent caused by improperly designed equipment, lack of preventative maintenance, careless or improper operation, or operator error.

"EPA" means the Administrator of the U.S. Environmental Protection Agency or the Administrator's designee.

"Fuel-burning equipment" means any furnace, boiler apparatus, stack, or appurtenances thereto used in the process of burning fuel or other combustible material for the purpose of producing heat or power by indirect heat transfer.

"Fugitive emissions" means those emissions which could not reasonably pass through a stack chimney, vent, or other functionally equivalent opening.

"Insignificant activities" means those activities which are incidental to the facility's primary business activity and which result in emissions of less than one ton per year of a regulated pollutant not included in the Section 112 (b) list of hazardous air pollutants or emissions less than 1000 pounds per year of a pollutant regulated pursuant to listing under Section 112 (b) of the Act provided, however, such emission levels of hazardous air pollutants do not exceed exemptions based on insignificant emission levels established by EPA through rulemaking for modification under Section 112 (g) of the Act.

"MACT" or "Maximum achievable control technology" means the maximum degree of reduction in emissions that is deemed achievable for new sources in a category or subcategory that shall not be less stringent than the emission control that is achieved in practice by the best controlled similar source, as determined by the Administrator. Emission standards promulgated for existing sources in a category or subcategory may be less stringent than standards for new sources in the same category or subcategory but shall not be less stringent, and may be more stringent than:

(a) the average emission limitation achieved by the best performing 12 percent of the existing sources (for which the Administrator has emission information), excluding those sources that have, within 18 months before the emission standard is proposed or within 30 months before such standard is promulgated, whichever is later, first achieved a level of emission rate or emission reduction which complies, or would comply if the source is not subject to such standard, with the lowest achievable emission rate applicable to the source category and prevailing at the time, in the category or subcategory for categories and subcategories with 30 or more sources, or

(b) the average emission limitation achieved by the best performing five sources (for which the Administrator has or could reasonably obtain emissions information) in the category or subcategory for categories or subcategories with fewer than 30 sources.

"Modification" means any physical change in, or change in the method of operation of, an affected facility which increases the amount of any air pollutant (to which any state standards applies) emitted by such facility or which results in the emission of any such air pollutant not previously emitted.

"Permittee" means the person or entity to whom a Chapter 6, Section 3 permit is issued.

"Potential to emit" means the maximum capacity of a stationary source to emit any air pollutant under its physical and operational design. Any physical or operational limitation on the capacity of a source to emit an air pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored or processed, shall be treated as part of its design if the limitation is enforceable by EPA and the Division. This term does not alter or affect the use of this term for any other purposes under the Act, or the term "capacity factor" as used in title IV of the Act or the regulations promulgated thereunder.

"Regulated air pollutant" means the following:

(a) Nitrogen oxides (NO_X) or any volatile organic compound;

(b) Any pollutant for which a national ambient air quality standard has been promulgated;

(c) Any pollutant that is subject to any standard established in Chapter 5, Section 2 of the WAQSR or Section 111 of the Act;

(d) Any Class I or II substance subject to a standard promulgated under or established by title VI of the Act; or

(e) Any pollutant subject to a standard promulgated under Section 112 or other requirements established under Section 112 of the Act, including Sections 112(g), (j), and (r) of the Act, including the following:

(i) Any pollutant subject to requirements under Section 112(j) of the Act. If EPA fails to promulgate a standard by the date established pursuant to Section 112(e) of the Act, any pollutant for which a subject source would be major shall be considered to be regulated on the date 18 months after the applicable date established pursuant to Section 112(e) of the Act; and

(ii) Any pollutant for which the requirements of Section 112(g)(2) of the Act have been met, but only with respect to the individual source subject to Section 112(g)(2) requirement.

(f) Pollutants regulated solely under Section 112(r) of the Act are to be regulated only with respect to the requirements of Section 112(r) for permits issued under this Chapter 6, Section 3 of the WAQSR.

"Renewal" means the process by which a permit is reissued at the end of its term.

"Responsible official" means one of the following:

(a) For a corporation:

(i) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or

(ii) A duly authorized representative of such person if the representative is responsible for the overall operation of one or more manufacturing, production, or operating facilities applying for or subject to a permit and either:

(A) the facilities employ more than 250 persons or have gross annual sales or expenditures exceeding $25 million (in second quarter 1980 dollars); or

(B) the delegation of authority to such representative is approved in advance by the Division;

(b) For a partnership or sole proprietorship: a general partner or the proprietor, respectively;

(c) For a municipality, State, Federal, or other public agency: Either a principal executive officer or ranking elected official. For the purposes of this part, a principal executive officer of a federal agency includes the chief executive officer having responsibility for the overall operations of a principal geographic unit of the agency; or

(d) For affected sources:

(i) The designated representative or alternate designated representative in so far as actions, standards, requirements, or prohibitions under title IV of the Act or the regulations promulgated thereunder are concerned; and

(ii) The designated representative, alternate designated representative, or responsible official under Chapter 6, Section 3 (b)(xxvi) of the WAQSR for all other purposes under this section.

"WAQSR" means the Wyoming Air Quality Standards and Regulations promulgated under the Wyoming Environmental Quality Act, W.S. §35-11-101, *et seq.*

APPENDIX A

PREVENTATIVE MAINTENANCE PLAN

BASIN ELECTRIC POWER COOPERATIVE
HARTZOG GENERATION STATION

PREVENTATIVE MAINTENANCE PROGRAM

This document identifies and describes the preventative maintenance program that Basin Electric Power Cooperative (Basin Electric) will implement at the proposed Hartzog Generation Station to verify ongoing compliance with the emission limits specified in the Wyoming Department of Environmental Quality (WDEQ) air construction permit for the Hartzog Generation Station. The proposed Hartzog Generation Station would consist of three natural gas-fired turbines, driving 3 associated electricity generators. The turbines proposed are 6,105 kilowatt Solar Taurus 70 natural gas combustion turbines. The Hartzog Generation Station also includes a 500-horsepower startup generator with a heat input of 35.15 million British thermal units per hour. This document is divided into two sections based on the different emission units. Section 1.0 outlines the preventative maintenance program for the turbines and Section 2.0 covers the startup generator.

1.0 PREVENTATIVE MAINTENANCE PROGRAM FOR TURBINES

This section outlines the elements of the preventative maintenance program for the Solar Taurus 70 turbines.

1.1 Routine Inspection and Maintenance

The combustion turbines will be monitored using a microprocessor based monitoring system located on each of the three turbines. These microprocessors will monitor all the parametric data needed to determine compliance and operating characteristics of the combustion turbines. The data will include gas and turbine temperatures, fuel flow, generator output, oil temperatures and other necessary information. The turbines will be monitored 24 hours per day, 7 days per week.

Basin Electric is in the process of developing a Quality Assurance and Quality Control (QA/QC) manual for routine and non-routine maintenance procedures. The QA/QC document will provide operation and maintenance personnel with the requirements and frequency for the proper maintenance of the combustion turbines.

1.2 Control Equipment

The combustion turbines will be monitored using a microprocessor-based monitoring system located on each of the three turbines. These processors will monitor the gas and turbine temperatures, fuel flow, generator output, oil temperatures and other necessary information to verify the turbine and associated control equipment are operating within normal operating parameters. As described in Section 1.1, the turbines will be monitored remotely 24 hours per day, 7 days per week.

1.3 Recordkeeping

Basin Electric will maintain inspection and maintenance records to document the actions taken as part of the routine inspection and maintenance program. This information will be used to monitor changes in day-to-day readings and operating conditions that could be an indication of potential operating problems. Leased data lines from the telephone company will be the primary communications link and a microwave system will provide backup. The monitoring data will be forwarded to the plant operators at the Antelope Valley Station in Beulah, North Dakota and to the PRECorp office in Sundance, Wyoming. The stations at Antelope Valley Station and the PRECorp office will have redundant computers, which will be used to control, monitor, and log the combustion turbines.

1.4 Initial Performance Test

Emissions of NO_x and CO will be measured and recorded during the initial compliance stack testing required under the permit.

1.6 Annual Emissions Testing

Basin Electric will conduct annual emissions testing to verify compliance with the NO_x and CO limits set forth in the permit. Testing for NO_x and CO shall be conducted in accordance with EPA reference methods or the State of Wyoming's Portable Analyzer Protocol. Basin Electric shall provide notice of the test date to WDEQ 15 days prior to testing. Results of the testing shall be submitted to WDEQ within 30 days of completing the tests.

2.0 PREVENTATIVE MAINTENANCE PROGRAM FOR STARTUP GENERATOR

This section outlines the elements of the preventative maintenance program for the startup generator.

2.1 Routine Inspection and Maintenance

Basin Electric will perform routine inspection and maintenance on the startup generator as recommended by Caterpillar for the 3406C generator. Inspections and required maintenance on the startup generator will be conducted quarterly. Items that will be inspected on a quarterly basis will include:

- Air cleaner system
- Cooling system
- Exhaust system
- Ignition system
- Crankcase oil
- Oil pressure
- Exhaust back pressure
- Governor
- Filters (fuel and oil)
- Crankcase breather

2.2 Recordkeeping

Basin Electric will maintain inspection and maintenance records to document the actions taken as part of the routine inspection and maintenance program.

1.3 Initial Performance Test

Emissions of NO_x and CO will be measured and recorded during the initial compliance stack testing required under the permit.

2.4 Annual Emissions Testing

Basin Electric will conduct annual emissions testing to verify compliance with the NO_x and CO limits set forth in the permit. Testing for NO_x and CO shall be conducted in accordance with EPA reference methods or the State of Wyoming's Portable Analyzer Protocol. Basin Electric shall provide notice of the test date to WDEQ 15 days prior to testing. Results of the testing shall be submitted to WDEQ within 30 days of completing the tests.

APPENDIX B

EPA APPROVAL FOR CUSTOM FUEL MONITORING

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

JAN 27 2004

Ref: 8ENF-AT

Mr. Jerry Menge
Air Quality Program Coordinator
Basin Electric Power Cooperative
1717 East Interstate Ave.
Bismark, ND 58501-0564

Re: NSPS Subpart GG Affected Facilities in Wyoming
Standards of Performance for Stationary Gas Turbines

Dear Mr. Menge:

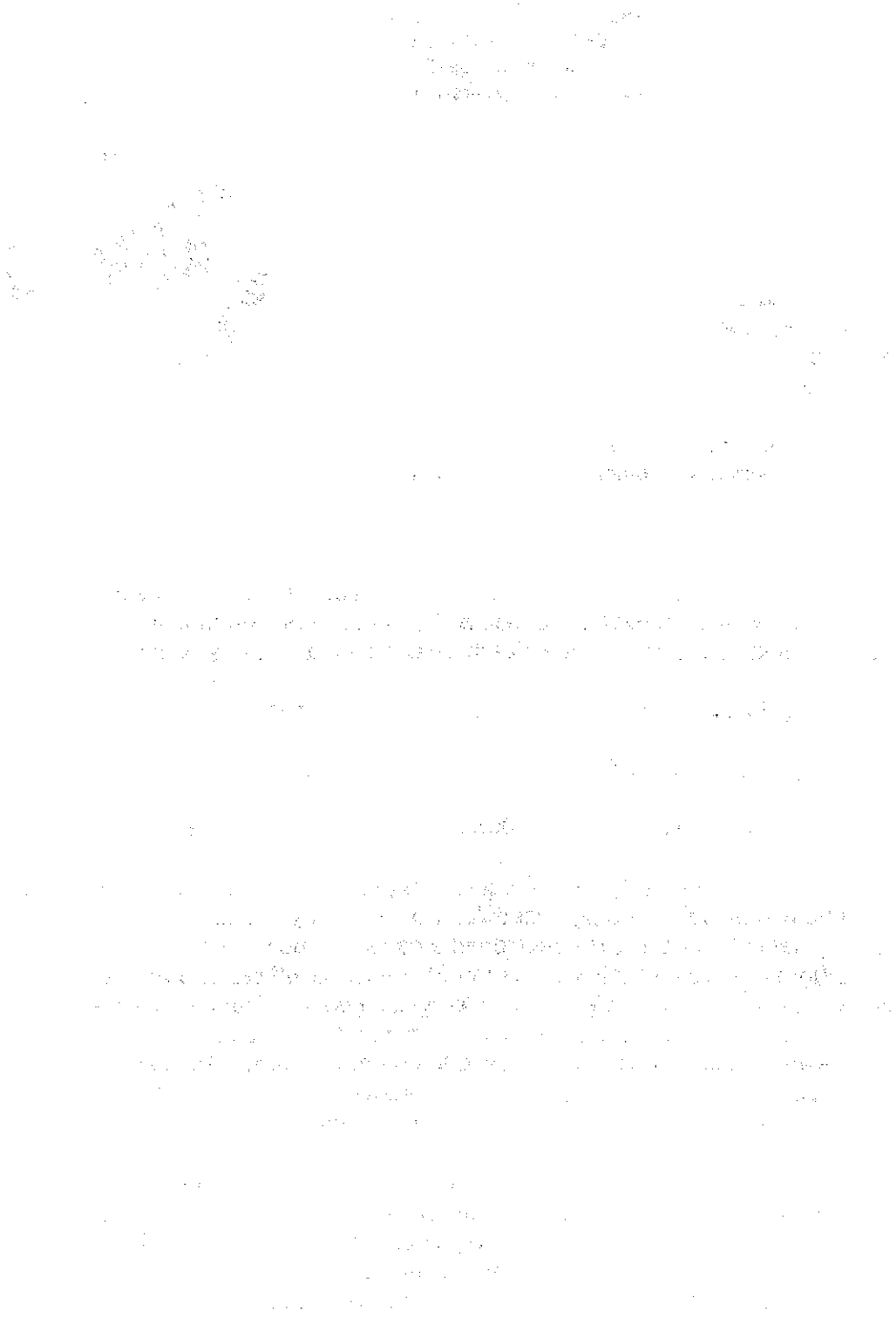
This is in response to your December 11, 2003 letter submitted to the EPA Region 8 requesting approval for custom fuel monitoring schedules for natural gas fired turbines which are used to provide line voltage support as needed at three affected facilities listed below:

1.	Hartzog Generating Station (AFS# 56-005-00116)	3-Solar Taurus 70
2.	Arvada Generating Station (AFS# 56-005-00127)	3-Solar Taurus 70
3.	Barber Creek Generating Station (AFS# 56-005-00117)	3-Solar Taurus 70

Pursuant to 40 CFR §60.334(b)(2), Basin Electric is required to monitor the nitrogen and sulfur content of the natural gas fuel on a daily schedule. For stationary gas turbines which combust pipeline quality natural gas fuel, EPA developed a national policy (Rasnic memorandum, dated August 14, 1987), which allows the EPA regional offices to approve NSPS Subpart GG custom fuel monitoring schedules on a case-by-case basis. The memorandum states that the minimum sulfur monitoring requirements are bimonthly for at least six months. If the sulfur content in the fuel shows little variability during the six month period, then sulfur monitoring can be conducted quarterly. If, after at least six quarters, there is still little variability in the fuel sulfur content, then sulfur monitoring can be done semi-annually.

The records you sent via facsimile dated 01/26/04 for twelve fuel readings from 6/19/03 to 1/08/04 at each of the three sites (average of 2 fuel analysis per month for about 6 months) demonstrate Basin Electric's statement that the fuel gas sulfur concentration is significantly below the applicable 8,000 ppmw (0.8 percent by weight) standard in 40 CFR Sec. 60.333(b). We therefore approve the use of the Rasnic custom fuel monitoring schedule, and you may now move to quarterly fuel monitoring.

40 CFR § 60.335(d) requires analysis of sulfur in gaseous fuels in accordance with ASTM D 1072-80, D 3031-81, D 4084-82 or D 3246-81. However, an August 7, 1991,



memorandum (available in ADI, Control Number: NS08) from EPA's Mamie Miller (Chief, Compliance Monitoring Branch, Stationary Source Compliance Division) concurs with the Technical Support Division's recommendation to approve the use of the length of stain tube method (GPA Standard 2377-86, Test for Hydrogen Sulfide and Carbon Dioxide in Natural Gas Using Length of Stain Tubes) of monitoring sulfur content of the fuel, as Basin Electric has been doing. Also EPA agrees (per Rasnic memo, August 14, 1987) that no monitoring for nitrogen is necessary as long as pipeline quality natural gas is the fuel being fired since there is no fuel-bound nitrogen and since the free nitrogen does not contribute appreciably to NOx emissions (per the EPA document EMTIC GD-009, dated March 12, 1990).

If the quality of fuel changes such that nitrogen and/or sulfur content increase substantially or the source of the fuel changes, Basin Electric shall sample for nitrogen and/or sulfur within two weeks of the change and shall notify EPA Region 8 within 30 days.

This alternate monitoring plan does not alter any of the other requirements of NSPS Subpart GG which may apply to these facilities. If you have any questions regarding this letter, please contact Cindy Beeler of my staff at 303-312-6204 or Beeler.Cindy@epa.gov.

Sincerely,

Martin Hestmark, Director
Technical Enforcement Program

cc: Robert Gill, WDEQ
Chad Schlichtemeier, WDEQ

APPENDIX C
LENGTH OF STAIN TUBES

Test for Hydrogen Sulfide and Carbon Dioxide in Natural Gas Using Length of Stain Tubes

Adopted as a Tentative Standard 1977
Revised and Adopted as a Standard 1984
Revised 1986
Reprinted 1988, 1997, 1998, 1999

Gas Processors Association
6526 East 60th St.
Tulsa, Oklahoma 74145

Test for Hydrogen Sulfide and Carbon Dioxide in Natural Gas Using Length of Stain Tubes

1. SCOPE

1.1 This method covers the determination of hydrogen sulfide in natural gas in the range of 3 ppmv to 5 vol %.

1.2 This method covers the determination of carbon dioxide in natural gas in the range of 0.25 to 10 vol %.

1.3 This method as written is applicable to the determination of hydrogen sulfide and carbon dioxide in hydrocarbons and in air.

2. SUMMARY OF METHOD

2.1 The sample is passed through the detector tube made specifically for the detection of hydrogen sulfide or carbon dioxide by specially prepared chemicals. The hydrogen sulfide or carbon dioxide present in the sample reacts with the chemical to produce a color change. The length of stain (or color change) produced in the detector tube when exposed to a measured volume of sample is directly proportional to the amount of hydrogen sulfide or carbon dioxide present in the sample being tested. A bellows or piston type pump is used to draw a measured volume of sample through the tube at a controlled rate of flow. The length of stain produced is converted to volume by comparison with a calibration scale supplied by the manufacturer with each box of detector tubes. Some tubes have a predetermined calibration constant which is multiplied by the observed length of stain to arrive at a volume percent concentration in the sample being tested. The apparatus is easily portable and is completely suitable for making spot checks for hydrogen sulfide or carbon dioxide under the field conditions.

3. APPARATUS

3.1 *Piston or Bellows Pump* – The pump is hand-operated and must be capable of drawing a minimum of 100 ml per stroke of sample through the detector tube with an accuracy of ±2.0 ml.

3.2 *Detector Tube* – Tubes must be made of glass with break-off tips sized to fit the orifice of the pump. The chemical sealed in the tube must be specific for hydrogen sulfide or carbon dioxide and produce a distinct color change when exposed to a sample of gas containing hydrogen sulfide or carbon dioxide. Any substances known to interfere must be listed in instructions accompanying the tubes. A calibration scale or other markings referenced to a scale should be etched directly on the tube to provide for easy interpretation of hydrogen sulfide or carbon dioxide content. Shelf life of the detector tubes must be a minimum of two years when stored according to the manufacturer's recommendations.

3.3 *Gas Sampling Container* – Any container which provides for access of the detector tube into a uniform flow of sample gas at atmospheric pressure and isolated from the surrounding atmosphere.

3.3.1 A suitable container may be devised from a one pint polyethylene bottle. A ¼ in OD polyethylene tubing sealed into the bottle and discharging near the bottom provides for flow of sample gas into the bottle. A ½ in hole cut into the cap of the bottle provides both access for the detector tube and a vent for gas flow. (Figure 1.)

Note 1–A one pint polyethylene wash bottle is easily adapted to a suitable sample container.

3.3.2 Mylar gas collection bags are useful as gas sample containers when the supply of sample gas is limited. Mylar bags with a minimum capacity of two liters are an acceptable substitute for the bottle described in 3.3.1.

3.4 *Barometer* – Any barometer equipped with a scale graduated in 1 mm of mercury subdivisions and a range including the expected atmospheric pressure condition at the sampling site.

3.5 *Thermometer* – Standard laboratory thermometer graduated in 1°C subdivisions and including the range of sample temperatures expected during the test.

3.6 *Needle Valve and Tubing* – Any stainless steel needle valve which can be adjusted to control the flow of gas from source pressure into the gas sampling container. Polyethylene or gum rubber tubing may be used to connect the gas sampling container to the needle valve outlet.

Note 2–A pressure regulator may be used to control flow of the sample gas, in lieu of a needle valve.

4. SAMPLING

4.1 Select a sampling point which affords access to a representative sample of the gas to be tested (i.e., a point on the main flow line). Flow line connections should have a centerline tap.

4.1.1 Open source valve (Valve A), Figure 1, and blow down vigorously to clear foreign materials from source valve and connecting nipple. Close source valve.

4.1.2 Install control valve (Valve B) or pressure regulator on outlet of source valve. Connect outlet of control valve (Valve B) to gas sampling container using shortest length practicable of polyethylene or other suitable tubing.

4.1.3 Open source valve (Valve A) and crack control valve (Valve B) to obtain positive flow of gas through gas sample container venting to atmosphere through tube access and vent (Vent C).

4.1.4 Purge gas sample container until all air is displaced. A minimum purge time of three minutes is recommended.

Note 3–When using collection bags the same procedure is followed except that the deflated bag is attached directly to control valve (Valve B). The bag is filled once, disconnected and deflated. The bag is filled a second time and is then ready for the analysis.

5. PROCEDURE

5.1 Immediately, before each series of measurements, test the pump for tightness by inserting an unopened tube and operating the pump. A loss in vacuum on the pump after 30 seconds indicates a leak.

5.1.1 Select the tube range that includes the expected amount of hydrogen sulfide or carbon dioxide present in the sample. Reading accuracy is improved when the stain extends at

least 50% of the tube length. Consider multiple strokes and/or a lower range tube to achieve this length of stain.

5.1.2 Break off tips and insert outlet end of tube snugly into the pump head. Temperature of tube must remain in the 0 - 40°C range throughout the test period.

5.1.3 Place detector tube well into gas sampling container through the tube access and vent (Vent C).

Note 4—Gas sample container must be completely purged of air and with control valve (Valve B) adjusted to maintain a positive flow of gas leaving the tube access and vent (Vent C) for the duration of the test.

5.1.4 Operate the pump to draw a measured volume of gas through the detector tube. Within limits set by manufacturer's instructions, use multiple strokes to maximize length of stain.

5.1.5 Remove the tube from the pump and immediately read the concentration of hydrogen sulfide or carbon dioxide from graduations on the tube or charts supplied with the tubes. The scale reading even with the end of the stain is the approximate hydrogen sulfide or carbon dioxide concentration. Interpolation can be made between scale readings. If the number of strokes used is different from the number specified by the manufacturer for a particular concentration, a correction must be made as follows:

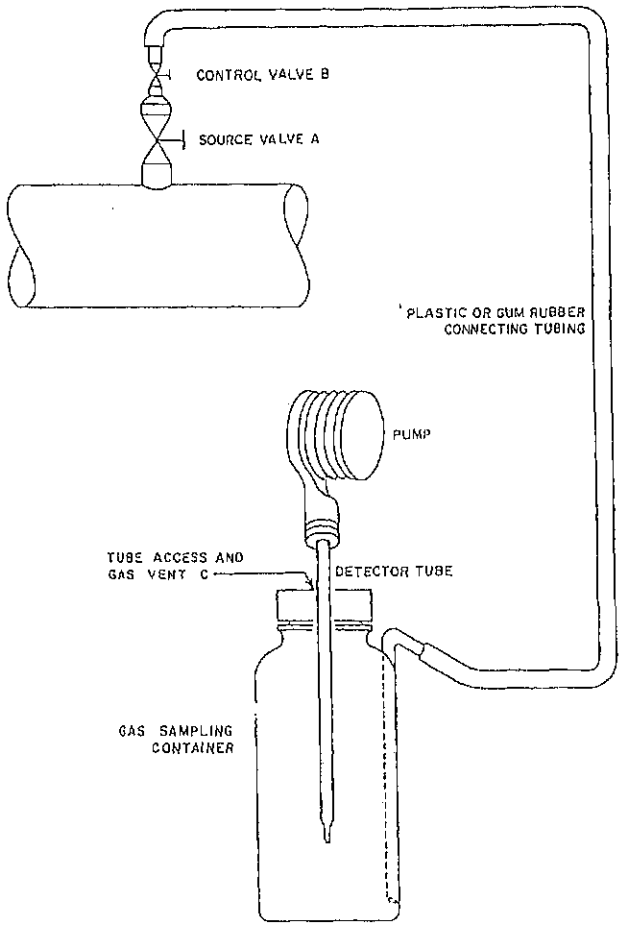


FIG. 1—Sampling manifold to be used with H_2S and CO_2 detector tubes.

$$\text{Corr. } H_2S/CO_2 \text{ Conc.} = \text{Scale reading} \times \frac{\text{Specified Strokes}}{\text{Actual Strokes}}$$

5.1.6 Record temperature of gas flowing through gas sample container and barometric pressure to provide data for gas volume corrections if required.

6. CALCULATIONS

6.1 Gas volume corrections may be desirable to improve precision of results. The effect of temperature is usually negligible; however, the barometric pressure becomes significant at altitudes above 2,000'. Correction for barometric pressure is done as follows:

$$\text{Corr. Volume \%} = \text{Vol \% (read from tube)} \times \frac{760 \text{ mm Hg}}{\text{Baro. Press. mm Hg}}$$

6.2 Check with manufacturer if it becomes necessary to test at gas temperatures outside the 0 - 40°C range.

7. PRECISION

7.1 The following criteria should be used for judging the acceptability of hydrogen sulfide or carbon dioxide concentration when determined using a "length of stain" detector tube. (95% confidence limit)

7.1.1 *Repeatability*—Duplicate results by the same operator should be considered suspect if they differ by more than the following amounts:

Component	Range of Sample Conc.	Repeatability
H_2S	3 - 120 ppmv	10% of amount found
H_2S	0.05 - 5 vol %	5% of amount found
CO_2	0.25 - 10 vol %	2% of amount found

7.1.2 *Reproducibility*—The results submitted by each of two laboratories should be considered suspect if the two results differ by more than the following amounts:

Component	Range of Sample Conc.	Reproducibility
H_2S	3 - 120 ppmv	12% of amount found
H_2S	0.05 - 5 vol %	7% of amount found
CO_2	0.25 - 10 vol %	5% of amount found

7.1.3 *Accuracy*—The expected error in measurement of the two commercial tubes (Drager & Gastec) based on all of Work Group studies is as follows:

Tube Model	Comp.	Sample Conc.	Mean Value	Actual Mean Value	No. of Meas.	% Error
Drager	H_2S	35 ppmv	30 ± 1	35	39	15
Drager	H_2S	481 ppmv	455 ± 33	481	12	7
Drager	H_2S	0.49 Vol%	0.57 ± 0.1	0.49	12	16
Drager	H_2S	5.23 Vol%	4.62 ± 0.4	5.23	12	12
Drager	CO_2	0.25 Vol%	0.27 ± 0.02	0.25	12	8
Drager	CO_2	4.99 Vol%	5.07 ± 0.2	4.99	12	2
Drager	CO_2	10.00 Vol%	9.31 ± 0.8	10.00	12	7
Gastec	H_2S	35 ppmv	32 ± 1	35	65	9
Gastec	H_2S	481 ppmv	460 ± 10	481	24	4
Gastec	H_2S	0.49 Vol%	0.56 ± 0.04	0.49	24	14
Gastec	H_2S	5.23 Vol%	5.26 ± 0.3	5.23	24	1
Gastec	CO_2	0.25 Vol%	0.24 ± 0.04	0.25	24	4
Gastec	CO_2	4.99 Vol%	4.76 ± 0.2	4.99	24	5
Gastec	CO_2	10.00 Vol%	9.61 ± 0.4	10.00	24	4

Note 6–Precision limits shown above were obtained from raw data generated by 10 to 13 laboratories involved in cooperative testing of eight separate samples. Computations on the raw data were made using ASTM Bulletin RR D-2-1007, "Manual on Determining Precision Data for ASTM Methods on Petroleum Products and Lubricants." The cooperative tests were completed prior to finalizing the method write-up.

Note 6–Cooperative test results indicate a major source of error to be in the variance in response from lot number to lot number of tubes as supplied by the manufacturer. The fidelity of a given lot number of tubes can be verified by calibrating one or more tubes using a gas with a known concentration of hydrogen sulfide or carbon dioxide. The cooperative test results are shown in Tables I, II and III.

Note 7–Precision data on high levels of hydrogen sulfide and carbon dioxide were obtained from raw data generated by six laboratories in the cooperative testing of six blends of known concentration. All six laboratories used identical tube lot numbers for testing. The cooperative test results are shown in Table IV.

TABLE I

Length of Stain Method for Determination of H_2S in Natural Gas

Reproducibility of Laboratories

Samples Mean/Laboratory

	Lab Fld Gas 9 ppm	Lab Fld Gas 98 ppm	Lab Permeation Tube–44 ppm	Ecospan 88 ppm	Ecospan 18 ppm	Fld Gas 35 ppm	Fld Gas 93 ppm
Lab A	–	100	54	91	15	29	95
Lab B	–	101	42	89	13	28	–
Lab C	11	118	53	–	–	31	93
Lab E	9	–	47	94	14	–	–
Lab F	9	98	48	–	14	–	–
Lab G	–	–	43	79	21	29	93
Lab I	10	110	45	–	–	28	–
Lab J	9	91	43	86	10	29	100
Lab K	9	95	39	80	12	–	–
Lab P	7	98	–	86	9	38	101
Lab S	–	–	–	–	–	30	93
No. of Labs Participating	7	8	9	7	8	8	6
ppm H_2S Mean	9	101	46	86	13.5	30	96
% Error	0	3.1	4.5	3.4	25	14	3.2
Std. Deviation	1.2	8.7	5	4.4	3.6	3	3.7
Probable Error of Mean	.31	2.06	1.13	1.12	.87	.78	1.02
Probable Error	.81	5.83	3.38	2.96	2.5	2.2	2.50
Std. Deviation from Mean	.46	3.05	1.7	1.66	1.2	1.2	1.51
Std. Deviation for 95% Confidence Level	1.1	7.2	3.8	4.07	3.0	2.5	3.9

TABLE II

GPA Sulfur Analysis Work Group H_2S Data, May 11-June 7, 1976

			Experimental Data–Detector Tubes		
Gas Source	PPM H_2S	% Error	No. Determinations	PPM H_2S (Ave.)	
Ecospan	18	22%	38	14±5	σ = 1.4
Ecospan	88	6%	36	83±8	σ = 2.2
Permeation Tubes	44	5%	73	46±8	σ = 1.6
Field Gas	9±1*	11%	83	10±3	σ = 0.55
Field Gas	98±8*	5%	73	103±13	σ = 2.53
Shamburger Lake Plant Inlet	35±3*	11%	124	31±4	σ = 0.79
Sun-Lateral = 2	221±15	2%	36	226±13	σ = 4.75
Sun M. T. Cole = 21	93±7	9%	39	101±6	σ = 2.2

σ (Standard Deviation for 95% Confidence Unit)

* Precision reflects repeatability of $CdSO_4$ method according to GPA Standard 2265.

\+ H_2S concentration was apparently continuously increasing during 4-5 hour period of $CdSO_4$ gas sampling. Determinations by detector tubes, occurred near end of $CdSO_4$ method sampling and instrumental determinations even later.

TABLE III

Detector Tube H_2S Measurements by Tube Lot Numbers – June 7-8, 1976

	Drager 5/b Ch29801 5-60 ppm Range							Average
Lot No.	157091	1050184	1050185	1050186	1056371	1052101	255761	
No. Measurements	5	8	4	12	3	4	3	39
PPM H_2S	32±1	30±1	29±1	29±2	28±0	29±1	31±1	30±1
% Error	9%	14%	17%	17%	20%	17%	11%	17%

	Gastec 4LL 0-60 ppm Range								Average
Lot No.	51215	30710	30912	40113	40809	60116	50217	50913	
No. Measurements	19	13	6	9	6	4	4	4	65
PPM H_2S	30±2	28±2	38±1	36±1	36±1	28±1	27±1	30±1	32±1
% Error	14%	20%	9%	3%	3%	20%	23%	14%	9%

Field Gas Source

Shamburger Lake Plant Inlet–35 PPM

TABLE IV

GPA Analysis Work Group Data, July 29, 1985

		H_2S	H_2S	H_2S	CO_2	CO_2	CO_2
Blend No.		1	2	3	1	2	3
Nominal Blended Value (Vol %)		0.05	0.50	5.0	0.25	5.0	10.0
Laboratory		**ppm**	**Vol %**	**Vol %**	**Vol %**	**Vol %**	**Vol %**
A		460	0.585	5.27	0.237	4.73	9.78
B		472	0.583	5.35	0.248	4.82	9.75
D		448	0.542	5.63	0.250	4.63	8.98
E		458	0.552	4.78	0.230	4.87	9.93
F		473	0.620	4.87	0.250	5.22	9.45
G		437	0.540	4.38	0.286	4.93	9.17
Mean Value		458	0.570	5.05	0.250	4.87	9.51
Blended Value		481*	0.490*	5.23*	0.250**	4.99**	10.00**
Repeatability#	DT	18	0.03	0.16	0.01	0.05	0.32
Reproducibility##	DT	30	0.05	0.38	0.03	0.21	0.34
Repeatability#	GT	11	0.07	0.16	0.01	0.08	0.14
Reproducibility##	GT	14	0.07	0.38	0.01	0.13	0.44

* Measured by Iodometric Titration
** Measured by Gas Chromatography
\# Precision within Laboratories
Precision between Laboratories