[illegible] 4/1/85

Part 39. Appendix 1 to the Arizona State Rules and Regulations for Air Pollution Control is repealed and a new Appendix 1 is added as follows:

APPENDIX 1

FILING INSTRUCTIONS FOR INSTALLATION PERMIT APPLICATION

A1.1. Applications for installation permits required by A.R.S. § 36-1707.01.A. and R9-3-301. shall be filed in accordance with these instructions.

A1.2. All installation permit applications shall be prepared in duplicate and filed with the Bureau of Air Quality Control, 1740 West Adams Street, Phoenix, Arizona, 85007.

A1.3. No permit application shall be considered properly filed until the Director has determined that all information required by this appendix and the applicable statutes and regulations has been submitted.

~~A1.4. There are two classes of installation permits.~~

~~A1.4.1. Class A permits are issued to persons proposing to commence construction of a new major source or a major alteration (including any air pollution control equipment incident thereto).~~

A1.4.2. Class B installation permits are issued for each major air pollution control device and all appurtenances and accessories thereto.

A1.4.3. Where more than a single article, machine, equipment item, etc., is to be covered by a single permit, each such article, equipment item, etc., must be listed in the permit request.

~~A1.5. General Application. Applicants for either a Class A or Class B installation permit shall complete an application on a form to be supplied by the Bureau of Air Quality Control. The application form shall require, at a minimum, that the applicant supply the following information:~~

A1.5.1. The name to which the license is to be issued (usually the name on the business license of the organization or individual applying for the license).

A1.5.2. The name or names of the owner, principals or, if a corporation, the statutory agent, of the applicant.

A1.5.3. The mailing address of the applicant.

A1.5.4. The proposed location of the source or equipment for which a permit is sought. The location should be described in either a legal description or map coordinates.

A1.5.5. The type of organization of the application (corporation, governmental entity, etc.).

~~A1.5.6. The basis for the application (new major source, major alteration of existing, air pollution control equipment, etc.).~~

A1.5.7. Attainment status by pollutant of the area in which the source or equipment is proposed to be located. If the area is classified as attainment for sulfur dioxide and/or particulates, the class designation of the area shall also be specified.

A1.5.8. A general description of the nature of the applicant's business.

A1.5.9. A general description of the source or equipment to be permitted. If a permit is sought for a major alteration to an existing source, this description should note the operating permit number of the source being altered.

A1.5.10. If the applicant is installing air pollution control devices for which it will apply for certification pursuant to Section 43-123.02.C. of the Arizona Revised Statutes, the applicant should so indicate on the application form.

A1.6. Class A Installation Permit--Regulatory compliance plan, data and information.

An applicant for a Class A installation permit shall supply such information as is necessary to demonstrate compliance with the applicable requirements of R9-3-301. through R9-3-305. Such information shall include the following:

~~A1.6.1. A demonstration that the increase in the amounts of emission of any pollutant for which the source is classified as a major source caused by the operation or major alteration for which the permit is sought will not result in exceedances of the significance levels for that pollutant in any area of another state in which either:~~

~~a. Any national primary or secondary ambient air quality standard is violated, or~~

~~b. Any prevention of significant deterioration pollutant increment in classified attainment areas is violated.~~

A1.6.2. A demonstration that the new major source or existing source after completion of the major alteration will not exceed the applicable standards for hazardous air pollutants contained in Article 9.

A1.6.3. A demonstration that the new major source or existing source, after completion of the major alteration, will not exceed the limitations, if applicable, on emissions from non-point sources contained in Article 4.

~~A1.6.4. A demonstration that the applicant has provided written notice of the permit application to the agency having cognizance over major source construction permits in all nearby states, the air pollution levels of which may be affected by the new major source or major alteration above the concentrations specified in R9-3-301.E.~~

~~A1.6.5. If under R9-3-301.F. (no net increase in emissions) the new source or major alteration will be exempt from the requirements of Sections R9-3-302. through R9-3-305., the applicant must demonstrate the manner in which the~~

~~requirements of R9-3-301.F. will be met by the new major source or major alteration.~~

A1.6.6. A demonstration of the manner in which a new major source or major alteration which will be located in a nonattainment area for a pollutant for which the source is classified as a major source or the alteration is classified as a major alteration will meet the requirements of R9-3-302.

~~A1.6.6.1. In the case of a new major source or major alteration subject to an emission limitation which is LAER for that source or facility, the application shall contain a determination of LAER that is consistent with the requirements of the definition of LAER contained in R9-3-301. The demonstration shall contain the data and information relied upon by the applicant in determining the emission limitation that is LAER for the source or facility for which an operating permit is sought.~~

A1.6.6.2. In the case of a new major source or major alteration subject to the certification requirement of R9-3-302.A.2., the applicant shall submit such certification in a form that lists and describes all existing major sources owned or operated by the applicant and a statement of compliance with all conditions contained in the operating or conditional permits of each of the sources.

A1.6.6.3. In the case of a new major source or major alteration subject to the offset requirements described in R9-3-302.A.3., the applicant shall demonstrate the manner in which the new major source or major alteration meets the requirements of R9-3-303. (offset section).

~~A1.6.6.4. Unless otherwise exempt under R9-3-302.C., the applicant shall demonstrate compliance with the requirements of R9-3-302.A.4. (exceedance of baseline concentration).~~

A1.6.6.5. An applicant for a new major source or major alteration for volatile organic compounds or carbon monoxide (or both) which will be located in a nonattainment area for photochemical oxidants or carbon monoxide (or both) shall submit the analysis described in R9-3-302.B.

~~A1.6.6.6. If an applicant seeks an exemption from any or all of the requirements of R9-3-302.A. under the provisions of subsections C. through J. of R9-3-302., the applicant shall provide sufficient information and data in the application to demonstrate compliance with the requirements of the subsection(s) under which an exemption is sought. If the applicant seeks an exemption under subsections D. or I., the applicant need not submit the data and information necessary to comply with the requirements of R9-3-304. and R9-3-305. until such time as the Director has determined that the new major source or major alteration has submitted sufficient information to qualify for an exemption under subsections D. or I.~~

A1.6.6.7. A demonstration of the manner in which a new major source or major alteration which will be located in an attainment area for a pollutant for which the source is classified as a major source or the alteration is classified as a major alteration will meet the requirements of R9-3-304.

~~A1.6.7.1. In the case of a new major source or major alteration subject to an emission limitation which is BACT for that source or facility, the application shall contain a determination of BACT that is consistent with the requirements of the definition of BACT contained in R9-3-304.A. The demonstration shall contain the data and information relied upon by the applicant in determining the emission limitation that is BACT for the source or facility for which an operating permit is sought.~~

A1.6.7.2. ~~In the case of a new major source or major alteration required to perform and submit an air impact analysis in the form prescribed in R9-3-305.,~~

~~such an analysis shall meet the requirements of R9-3-304.A.2. Unless otherwise exempted in writing by the Director, the air impact analysis shall include all of the information and data specified in R9-3-305.~~

~~A1.6.7.3. If an applicant seeks an exemption from any or all of the requirements of R9-3-304.A. under the provisions of subsections B. through F. of R9-3-304., the applicant shall provide sufficient information and data in the application to demonstrate compliance with the requirements of the subsection(s) under which an exemption is sought.~~

A1.7. Class A Installation Permit--Source or Facility Description

A1.7.1 In addition to the information required to be submitted by A1.5. and A1.6. above, an applicant for an installation permit for a new major mobile or portable source or a major alteration to an existing mobile or portable source, shall submit the following information (unless otherwise indicated, the required information for a major alteration to an existing mobile or portable source shall be limited only to the facility being added or altered and not the remainder of the source):

A1.7.1.1. An operating schedule stating the process feed weight in tons per hour and the days of the week equipment is normally in operation.

A1.7.1.2. A brief sketch of equipment layout showing property lines, adjacent streets or roads and directional arrow.

A1.7.1.3. A description of all basic and control equipment for which permits are required. Include the name, make, size and type. Equipment manufacturers' bulletins and shop drawings are acceptable. Information submitted must include the following:

A1.7.1.4. Exterior and interior dimensions of control equipment, ductwork, etc.

A1.7.1.5. Size and location of all emission points.

A1.7.1.6. Height and inside dimensions of all stacks.

A1.7.1.7. Dimensions and characteristics of all fans and pumps, including flow rate, temperature, total net discharge head or static pressure, rated horsepower and RPM.

A1.7.1.8. The rated and operating efficiency of air pollution control equipment. The total quantity of gases exhausted to the atmosphere and the emissions of air pollutants to the atmosphere. The temperature and the barometric pressure shall be given for all gas flows. Where spray nozzles are used as control devices, pressure drop, water requirements in gallons per minute per nozzle, location and direction of spray shall be shown.

A1.7.1.9 A description of the processes to be carried out in each unit of equipment. All process materials used must be stated and the maximum hourly quantities used must be given. A sieve analysis of all bulk solids or aggregate must be listed. Gravel pit location and identification must be clearly shown. Source, quantity and method of water supply to water-using pollution control equipment must be indicated.

A1.7.1.10. A description of fuel use, including the type used, the maximum and average quantity used per hour, and higher heating value of the fuel. For solid fuels and fuel oils, state the sulfur and ash content. Furnish description of fuel-burning equipment.

A1.7.2. In addition to the information required to be submitted by A1.5. and A1.6. above, an applicant for an installation permit for a new major stationary source or a major alteration to an existing stationary source shall submit the following information (unless otherwise indicated, the required information for a major alteration to an existing stationary source shall be limited to the facility being added or altered and not the remainder of the source):

A1.7.2.1. An operating schedule stating the percent of annual production by season, the days of the week normally in operation, the shifts or hours of the day normally in operation, and the number of days per year in operation.

A1.7.2.2. Equipment location drawings showing building outlines, property lines, adjoining streets, directional arrow, and identification of basic operating or control equipment installations with respect to buildings and property lines.

A1.7.2.3. A description of all basic operating and control equipment for which permits are required. Include the name, make, size and type of equipment. The following must also be included:

A1.7.2.3.1. Interior and exterior dimensions.

A1.7.2.3.2. Size and location of all emission points.

A1.7.2.3.3. Height and inside dimensions of all stacks.

A1.7.2.3.4. Location of all cleanouts, grates, doors, controls, fans, motors, ducts, hoods, and all parts or other equipment which may influence the production, collection or control of air contaminants.

A1.7.2.3.5. Dimensions and operating characteristics of all pumps, fans, compressors or other fluid moving devices giving flow rate, temperature, barometric pressure, total net discharge head or static pressure, revolutions per minute, and rated horsepower.

A1.7.2.3.6. Heat transfer capacities and operating characteristics of all heat exchange devices which may influence the production, collection, or control of air contaminants.

A1.7.3.2.7. The rated and operating efficiency of air pollution control equipment. The total quantity of gases exhausted to the atmosphere along with their temperature and barometric pressure should be given. The emissions of air pollutants to the atmosphere from each unit of basic operating and control equipment should be stated. The method used to calculate the emissions should be described. Where water sprays are utilized as a control or cooling device, pressure drop, water requirements in gallons per minute per nozzle, location, and direction of spray shall be shown.

A1.7.2.3.8. A description of the processes to be carried out in each unit of equipment. All materials used must be stated and the maximum hourly and average annual quantities used must be given. The particle size distribution of all bulk solids must be listed. Flow diagrams and material balances for all process and waste materials must be clearly shown.

A1.7.2.3.9. A description of fuel use, including the type used, the quantity used per year, the maximum and average quantity used per hours, the percent used for space heating and percent used for process heat, and higher heating value of the fuel. For solid fuels and fuel oils, state the sulfur and ash content. Furnish description of fuel-burning equipment.

A1.7.2.3.10. The manufacturers' catalog designating specific standard commercial equipment may be submitted in lieu of items A1.7.2.3. through A1.7.2.3.7. provided that the information in the catalog is equivalent to the requirements of these items. Structural details are not required.

A1.8. Class B Installation Permit--Equipment Description

In addition to the information required to be submitted in A1.1., the applicant for a Class B installation permit shall submit the following information:

A1.8.1. A brief sketch of equipment layout showing relationship to buildings, property lines, adjacent streets or roads and directional arrow.

A1.8.2. A description of all air pollution control equipment for which permits are required. Include the name, make, size and type. Equipment manufacturers' bulletins and shop drawings are acceptable. Information submitted must include the following:

A1.8.2.1. Exterior and interior dimensions of control equipment, ductwork, etc.

A1.8.2.2. Size and location of all emission points.

A1.8.2.3. Height and inside dimensions of all stacks.

A1.8.2.4. Dimensions and characteristics of all fans and pumps, including flow rate, temperature, total net discharge head or static pressure, horsepower and RPM.

A1.8.2.5. Flow diagrams for air pollution control processes.

A1.8.3. The rated and operating efficiency of air pollution control equipment. The total quantity of gases exhausted to the atmosphere and the emissions of air pollutants to the atmosphere. The temperature, and the barometric pressure shall be given for all gas flow. Where spray nozzles are used as control devices, pressure drop, water requirements in gallons per minute per nozzle, location and direction of spray shall be shown. All process materials entering the equipment must be stated and the maximum hourly quantities given. A sieve analysis of all particulate solids must be given.

A1.8.4. A description of fuel use for pollution control purposes including the type used, the maximum average quantity used per hour, and higher heating value of the fuel. For solid fuels and fuel oils, state the sulfur and ash content. Furnish description of fuel-burning equipment (e.g., fume incinerators, etc.).

A1.8.5. Furnish evidence that operation of the new pollution control equipment will not violate any ambient air quality standards, PSD increments, or emission standards for hazardous air pollutants.

A1.8.6. Evidence that methods for liquid and solid waste disposal of wastes emanating from the pollution control device have been approved, where required, by the appropriate governmental agencies.

~~ARIZONA DEPARTMENT OF HEALTH SERVICES~~
DIVISION OF ENVIRONMENTAL HEALTH SERVICES
BUREAU OF AIR QUALITY CONTROL
1740 West Adams Street
Phoenix, Arizona 85007
Phone: (602) 255-1144

APPLICATION FOR INSTALLATION PERMIT

(As required by Title 36, Chapter 3, Article 1, Section 36-1707.01.C., Arizona Revised Statutes, and Section R9-3-301., Title 9, Chapter 3, Article 3, Arizona Administrative Rules and Regulation

1. Permit to be issued to (Business License Name of Organization that is to Receive Permit) ____________________

2. Name (or names) of Owner, Principals, or Statutory Agents doing business as the above organization. ____________________

3. Mailing Address ____________________

4. Equipment Location ____________________

5. Type of Organization - ☐ Corporation ☐ Individual Owner ☐ Partnership ☐ Government Agency

6. Permit Application Reason - ☐ Begin Installation of New Equipment ☐ Modify Existing Equipment ☐ Transfer Existing Equipment ☐ Change of Location of Ownership

7. Permit Type - ☐ Class A (Major Source) ☐ Class B (Pollution Control Equipment)

8. Classify Area in which Equipment is Located:

Particulate ☐ Unclassifiable ☐ Nonattainment ☐ Attainment, Class ________
Sulfur Dioxide ☐ Unclassifiable ☐ Nonattainment ☐ Attainment, Class ________
Carbon Monoxide ☐ Unclassifiable ☐ Nonattainment ☐ Attainment
Oxidants ☐ Unclassifiable ☐ Nonattainment ☐ Attainment

9. General Nature of Business ____________________

0. Equipment Description ____________________

1. If the organization is acquiring air pollution control device(s) and wishes to apply for certification of the device(s) in accordance with Section 43-123.02.C., Arizona Revised Statutes, check here ☐

2. Signature of Responsible Member of Organization ____________________

Official Title of Signer ____________________

Typed or Printed Name of Signer ____________________

Date __________ Telephone Number __________

~~ADHS/EHS/Air Quality 100A (REV. 4-79)~~

App 1 6/3/82

A.G. FILE NO. 82-035

Part 66. Appendix 1, Filing instructions for installation permit applications, is amended to read as follows:

A1.1 through A1.3. No change.

A1.4. There are ~~two~~ three classes of installation permits.

A1.4.1. Class A permits are issued to persons proposing to commence construction of a new major source or a major alteration (including any air pollution control equipment incident thereto), or the construction or alteration of a stationary source capable of emitting 5 or more tons of lead per year.

A1.4.2. No change.

A1.4.3. Class C installation permits are issued to persons proposing to commence construction of a minor source.

~~A1.4.3.~~ A1.4.4. No change.

A1.5. General application. Applicants for either a Class A ~~or~~, Class B or Class C installation permit shall complete an application on ~~a form to~~ Form ADHS/EHS Air Quality 100A which will be supplied by the Bureau of Air Quality Control. ~~The application form shall require at~~ At a minimum, ~~that~~ the applicant will supply the following information:

A1.5.1. through A1.5.10. No change.

A1.6. No change.

~~A1.6.1. A demonstration that the increase in the amounts of emission of any pollutant for which the source is classified as a major source caused by the operation or major alteration for which the permit is sought will not result in exceedances of the significance levels for that pollutant in any area of another state in which either:~~

~~a. Any national primary or secondary ambient air quality standard is violated, or~~

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~~b.--Any-prevention-of-significant-deterioration-pollution-increment-in classified-attainment-areas-is-violated.~~

A1.6.2. through A1.6.3. Renumber as A1.6.1. through A1.6.2.

A1.6.4. Delete

A1.6.5. Delete

A1.6.6. Renumber as A1.6.3.

~~A1.6.6.1.~~ A1.6.4.1. In the case of a new major source or major alteration subject to an emission limitation which is LAER for that source or facility, the application shall contain a determination of LAER that is consistent with the requirements of the definition of LAER contained in ~~R9-3-301~~ R9-3-101. The demonstration shall contain the data and information relied upon by the applicant in determining the emission limitation that is LAER for the source or facility for which an operating permit is sought.

A1.6.6.2. Renumber as A1.6.4.2.

A1.6.6.3. Renumber as A1.6.4.3.

A1.6.6.4. Delete.

A1.6.6.5. Renumber as A1.6.4.4.

~~A1.6.6.6.~~ A1.6.4.5. If an applicant seeks an exemption from any or all of the requirements of R9-3-302.A. under the provisions of Subsections C. through ~~J.~~ I. of R9-3-302, the applicant shall provide sufficient information and data in the application to demonstrate compliance with the requirements of the Subsection(s) under which an exemption is sought. If the applicant seeks an exemption under ~~Subsections D. or I.~~ Subsection C., the applicant need not submit the data and information necessary to comply with the requirements of R9-3-304 and R9-3-305 until such time as the Director has determined that the new major source or major alteration has submitted sufficient information to qualify for an exemption under ~~Subsections D. or I.~~ Subsection C.

A1.6.6.7. Renumber as A1.6.7.

A1.6.7.1. In the case of a new major source or major alteration subject to an emission limitation which is BACT for that source or facility, the application shall contain a determination of BACT that is consistent with the requirements of the definition of BACT contained in ~~R9-3-304.A.~~ R9-3-101. The demonstration shall contain the data and information relied upon by the applicant in determining the emission limitation that is BACT for the source or facility for which an operating permit is sought.

A1.6.7.2. In the case of a new major source or major alteration required to perform and submit an air impact analysis in the form prescribed in R9-3-305, such an analysis shall meet the requirements of ~~R9-3-304.A.2.~~ R9-3-304.A.4. Unless otherwise exempted in writing by the Director, the air impact analysis shall include all of the information and data specified in R9-3-305.

A1.6.7.3. If an applicant seeks an exemption from any or all of the requirements of R9-3-304.A. under the provisions of Subsections B. through ~~F.~~ H. of R9-3-304, the applicant shall provide sufficient information and data in the application to demonstrate compliance with the requirements of the Subsection(s) under which an exemption is sought.

A1.7. through A1.8. No change.

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ARIZONA DEPARTMENT OF HEALTH SERVICES
DIVISION OF ENVIRONMENTAL HEALTH SERVICES ▫ BUREAU OF AIR QUALITY CONTROL
1740 West Adams Street ▫ Phoenix, AZ 85007 ▫ Phone: (602)255-1144

APPLICATION FOR INSTALLATION PERMIT

(As required by Title 36, Chapter 3, Article 1, Section 36-1707.01.C., Arizona Revised Statutes and Section R9-3-301., Chapter 3, Article 3, Arizona Administrative Rules and Regulations)

1. PERMIT TO BE ISSUED TO (Business License Name of Organization that is to Receive Permit) ______________________

2. NAME (OR NAMES) OF OWNER, PRINCIPALS, OR STATUTORY AGENTS DOING BUSINESS AS THE ABOVE ORGANIZATION ______________________

3. MAILING ADDRESS ______________________

4. EQUIPMENT LOCATION ______________________

5. TYPE OF ORGANIZATION - ☐ Corporation ☐ Partnership ☐ Individual Owner ☐ Government Agency

6. PERMIT APPLICATION REASON -

☐ Begin Installation of New Equipment ☐ Transfer Existing Equipment
☐ Modify Existing Equipment ☐ Change of Location of Ownership

7. PERMIT TYPE - ☐ Class A (Major Source) ☐ Class B (Pollution Control Equipment) ☐ Class C (Minor Source)

8. CLASSIFY AREA IN WHICH EQUIPMENT IS LOCATED:

Particulate -	☐ Unclassifiable	☐ Non-attainment	☐ Attainment, Class ______
Sulfur Dioxide -	☐ Unclassifiable	☐ Non-attainment	☐ Attainment, Class ______
Carbon Monoxide -	☐ Unclassifiable	☐ Non-attainment	☐ Attainment
Oxidants -	☐ Unclassifiable	☐ Non-attainment	☐ Attainment

9. GENERAL NATURE OF BUSINESS ______________________

10. EQUIPMENT DESCRIPTION ______________________

11. IF THIS EQUIPMENT HAD A PREVIOUS WRITTEN PERMIT, STATE NAME OF CORPORATION, COMPANY OR INDIVIDUAL OWNER THAT OPERATED THIS EQUIPMENT AND STATE PREVIOUS BUREAU OF AIR QUALITY CONTROL PERMIT NUMBER.

NAME ______________________ PERMIT NUMBER ______________

12. IF THE ORGANIZATION IS ACQUIRING AIR POLLUTION CONTROL DEVICE(S) AND WISHES TO APPLY FOR CERTIFICATION OF THE DEVICE(S) IN ACCORDANCE WITH SECTION 43-123.02.C., ARIZONA REVISED STATUTES, CHECK HERE ☐

13. SIGNATURE OF RESPONSIBLE MEMBER OF ORGANIZATION ______________________

OFFICIAL TITLE OF SIGNER ______________________

14. TYPED OR PRINTED NAME OF SIGNER ______________________

DATE ______________ TELEPHONE NUMBER ______________

ADHS/EHS/Air Quality/100A (Rev 12-80)

Appd 2/3/84

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~~3. The refining of crude oil.~~

4. Air pollution generated by operations and activities of all agencies and departments of the State and its political subdivisions.

5. Air pollution generated by mobile or portable combustion engines, machinery and equipment which are capable, without major alteration, of being operated in more than one county, except those sources deemed by the Director to be stationary.

6. Air pollution by motor vehicles.

C. No change.

D. No change.

~~Part 41. A1. Appendix 1 is amended to read as follows:~~

A1. APPENDIX 1

FILING INSTRUCTIONS FOR INSTALLATION PERMIT APPLICATION

A1.1. No change.

A1.2. No change.

A1.3. No change.

A1.4.1. No change.

A1.4.2. No change.

~~A1.4.3. Renumber as A1.4.4~~

A1.4.3. Class C. installation permits are issued to persons proceeding to commence construction of a minor source.

A1.5 General application. Applicants for either a Class A, or Class B, or Class C installation permit shall complete an application on a form to ~~be supplied by the Bureau of Air Quality Control. The application form~~

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~~shall require, at a minimum, that the applicant supply the following information:~~

A1.5.1. No change

A1.5.2. No change

A1.5.3. No change

A1.5.4. No change

A1.5.5. No change

A1.5.6. The basis for the application (new major source, major alteration of existing source, air pollution control equipment, minor source etc.).

A1.5.7. No change

A1.5.8 No change

A1.5.9. No change

A1.5.10. No change

A1.6. Through A1.8.5. No change

A1.9. Class C Installation Permit-Source or facility description.

A1.9.1. In addition to the information required to be submitted by A1.5. above, an applicant for an installation permit for a new minor source shall submit the following information:

A1.9.1.1. An operating schedule stating the percent of annual production by season, the days of the week normally in operation, the shifts or hours of the day normally in operation, and the number of days per year in operation.

A1.9.1.2. A brief sketch of equipment layout showing relationship to buildings, property lines, adjacent streets or roads and directional arrow.

A1.9.1.3. A description of all basic operating and control equipment for which permits are required. Include the name, make, size and type of equipment.

A1.9.1.4. Flow diagrams for air pollution control processes and production processes.

A1.9.1.5. The rated and operating efficiency of air pollution control equipment. The total quantity of gases exhausted to the atmosphere and the emissions of air pollutants to the atmosphere. The temperature, and the barometric pressure shall be given for all gas flow. Where spray nozzles are used as control devices, pressure drop, water requirements in gallons per minute per nozzle, location and direction of spray shall be shown. All process materials entering the equipment must be stated and the maximum hourly quantities given. A sieve analysis of all particulate solids must be given.

A1.9.1.6. Fuel type and consumption must be given.

A1.9.1.7. The manufacturers catalog designating specific standard commercial equipment may be submitted in lieu of item A1.9.1.3. this item. Structural details are not required.

App 2 [illegible]

Part 40. Appendix 2 to the Arizona State Rules and Regulations for Air Pollution Control is repealed and a new Appendix 2 is added as follows:

APPENDIX 2

FILING INSTRUCTIONS FOR OPERATING PERMIT APPLICATION

A2.1. Applications for operating permits required by A.R.S. § 36-1707.01.B. and Section R9-3-306., Title 9, Chapter 3, Arizona Administrative Rules and Regulations shall be filed in accordance with these instructions.

A2.2. Operating Permit applications shall be prepared in duplicate and shall be filed after completion of construction and testing of the equipment for which an installation permit was issued.

A2.2.1. A single operating permit may cover a number of pieces of articles, machines, equipment or other contrivances which may cause, contribute to, eliminate, reduce or control the emission of air pollutants where the foregoing are used on a single piece of property or pieces of property contiguous or connected by a non-public right-of-way.

A2.2.2. Where more than a single article, machine, equipment item, etc., is to be covered by a single permit each such article, equipment item, etc., must be listed in the permit request.

A2.2.3. Where various installation permits have been granted and equipment is installed piecemeal, new pieces of equipment may be covered under an original operating permit if these are additionally submitted for approval.

A2.2.4. No permit application shall be considered properly filed until the Director has determined that all the required supplementary information has been submitted.

~~A2.2.5. Operating permits must be renewed annually, using Form AP-100-3 for~~

~~application. Any change in the information submitted in accordance with these instructions must be included with the application.~~

~~A2.3. All applications for operating permit shall be made by completing Application Form AP-100 B as follows:~~

A2.3.1. Item #1 requires the business license name of the applicant for the permit.

A2.3.2. Item #2 requires the name of the owner or principals doing business as identified in Item #1, if applicable.

A2.3.3. Item #3 requires the mailing address of the applicant identified in Item #1.

A2.3.4. Item #4 requires the address of the location where the equipment is to be operated.

A2.3.5. Item #5 provides information on the type of organization applying for the permit and Item #6 states the reason for the application. Both items require only a check mark in the appropriate box.

A2.3.6. Item #7 requires a brief description of the organization's activities, e.g., sand and gravel processing, manufacturing acids, asphaltic concrete production, etc.

A2.3.7. Item #8 requires a brief description of all equipment for which permits are required, e.g., serial numbers, model numbers, description, i.e., crusher, dryer, screening unit, baghouse, etc. Use additional paper if necessary.

~~A2.3.8. Item #9 is applicable if the equipment was operated or installed under a previous permit. It requires the name of the organization that operated or installed the equipment and the previous Arizona State Division of Air Pollution Control permit number.~~

A2.3.9. Item #10 is applicable if the organization, in accordance with Section

43-123.01(c), Arizona Revised Statues, wishes to amortize expenditures incurred in the acquisition of air pollution control devices for a period of sixty months as a deduction for corporate income taxes. A certificate from the Arizona Department of Health Services is required to be attached to the State tax return in order to claim this deduction. To obtain tax certification application, check the appropriate box in Item #10.

A2.3.10. Item #11 requires the signature and title of a legally responsible member of the organization and Item #12 requires the name of the signer typed or printed, the date the application was signed and the telephone number at which the signer can be contacted.

A2.4. The information for mobile or portable equipment or sources required by Appendix 1 if not previously submitted, must be submitted in duplicate with the application. Where such information has been previously submitted with the installation permit application, it shall be so noted.

A2.4.1. Unless otherwise specifically approved by the Director, only one collective operating permit will be issued to each owner of mobile or portable crushers and screens. One separate permit will be issued for each asphalt plant.

A2.4.2. Furnish a complete list of all mobile or portable equipment units which may be used separately or may attach to different other equipment. Include name, make, size, type, serial number and present location.

A2.4.3. Furnish evidence that each unit of equipment has successfully passed either a mass emissions test, if applicable, (i.e., emits from a stack) or, if not applicable, a visual determination of the opacity of emissions, both performed in accordance with the Arizona Testing Manual for Air Pollutant Emssions and observed by a representative of the Arizona Bureau of Air Quality

Control. A waiver of mass emission tests for certain equipment may be granted, upon request, by the Director and shall be evidenced in writing.

A2.4.4. Furnish records of any ambient air monitoring or mass emissions monitoring required by previous permit (either installation or operating).

A2.5. For all <u>stationary sources</u> under Arizona Department of Health Services jurisdiction, that information required by Appendix 1, if not previously submitted in duplicate with the application. Where such information has been previously submitted with the installation permit application, it shall be so noted.

A2.5.1. Unless otherwise specially approved by the Director, only one operating permit will be issued for all equipment with contiguous property. Copper Smelters shall be an exception to this rule, in that a separate permit shall be issued for the smelter which does not include permitted mine and mill facilities on the same property. Furnish a site description of property to be covered by permit.

A2.5.2. Furnish a complete inventory of all stationary machines, equipment, devices, boilers, incinerators, or other articles, the use of which may cause, contribute to, eliminate, reduce or control the emission of air pollutants and which are located on the property to be covered by the permit. Include name, make, size, type, serial number and location.

A2.5.3. Furnish a complete inventory of any mobile equipment (e.g., haul trucks, locomotives, etc.) the use of which causes or contributes to the emission of air pollutants. Include name, make, type, size, serial number and estimate of emissions.

A2.5.4. Furnish evidence that each unit of equipment has successfully passed all applicable mass emission or opacity tests performed in accordance with the

Arizona Testing Manual for Air Pollutant Emissions and observed by a representative of the Arizona Bureau of Air Quality Control, or furnish a waiver of tests, in writing, as approved by the Director.

A2.5.5. Furnish records of any ambient air monitoring, mass emissions monitoring or report of research program as required by previous permit (either installation or operating).

BEST AVAILABLE ORIGINAL

ARIZONA DEPARTMENT OF HEALTH SERVICES
Bureau of Air Quality Control • Division of Environmental Health Services
1740 West Adams Street • Phoenix, AZ 85007 • Phone: (602) 255-1144

APPLICATION FOR OPERATING PERMIT

(As required by Title 36, Chapter 14, Article 1, Section 36-1707.01, C., Arizona Revised Statutes)

1. Permit to be Issued to (Business License Name of Organization that is to Receive Permit) ____________________
2. Name (or names) of Owner, Principals, or statutory agents doing business as the above organization ____________________
3. Mailing Address ____________________
4. Equipment Location ____________________
5. Type of Organization - ☐ Corporation ☐ Partnership ☐ Individual Owner ☐ Government Agency
6. Permit Application Reason - ☐ Begin Operation of New Equipment ☐ Continue Operation of Existing Equipment
   ☐ Transfer (change of location or ownership)
7. General Nature of Business

8. Equipment Description

9. If this equipment had a previous written permit, state name of corporation, company or individual owner that operated this equipment and state previous Bureau of Air Quality Control Permit Number.

   Name ____________________ Permit Number ____________________
10. If the organization is acquiring air pollution control device(s) and wishes to apply for certification of the device(s) in accordance with Section 43-123.02, C., Arizona Revised Statutes, check here ☐
11. Signature of Responsible Member of Organization ____________________

    Official Title of Signer ____________________
12. Typed or Printed Name of Signer ____________________

    Date __________ Telephone number __________

ADHS/EHS/Air Quality 100B (REV. 4-79)

630

Appr 6/3/82

A.A. RULE No. 82-035

Part 67. Appendix 2, Filing instructions for operating permit application, is amended to read as follows:

A2.1. through A2.2.4. No change.

A2.2.5. Operating permits must be renewed annually, using Form ~~AP-100-B~~ ADHS/EHS/Air Quality 100B for application. Any change in the information submitted in accordance with these instructions must be included with the application.

A.2.3. All applications for operating permits shall be made by completing Application Form ~~AP-100B~~ ADHS/EHS/Air Quality 100B as follows:

A2.3.1. through A2.3.7. No change.

A2.3.8. Item #9 is applicable if the equipment was operated or installed under a previous permit. It requires the name of the organization that operated or installed the equipment and the previous Arizona State ~~Division~~ Bureau of Air ~~Pollution~~ Quality Control permit number.

A2.3.9. through A2.5.5. No change.

~~Part 68. Appendix 8, Procedures for utilizing the sulfur balance method for determining sulfur emissions, is amended to read as follows:~~

~~A8.1. through A8.3. No change.~~

~~A8.3.1. The sulfur dioxide emissions monitoring and recording system required under R9-3-401.B.6.or R9-3-515.C.4. shall meet the following specifications:~~

~~A8.3.1.1. through A8.3.1.2. No change.~~

~~A8.3.2. The sulfur removal equipment bypass monitoring required under R9-3-401.B.9.f. R9-3-515.C.7.v. shall consist of a detector and recorder system~~

Appendix 6. Repealed
Appendix 7. Repealed
Appendix 8. A8. Procedures for Utilizing the Sulfur Balance Method for Determining Sulfur Emissions
Appendix 9. A9. Monitoring Requirements
Appendix 10. Repealed
Appendix 11. Repealed
Appendix 12. A12. Procedures for Determining Ambient Air Concentrations for Hazardous Air Pollutants
Appendix 13. Repealed

APPENDIX 2. TEST METHODS AND PROTOCOLS

The following test methods and protocols are approved for use as directed by the Department under this Chapter. These standards are incorporated by reference as applicable requirements revised as of July 1, 2006, and no future editions or amendments. These standards are on file with the Department, and are also available from the U.S. Government Printing Office, Superintendent of Documents, bookstore.gpo.gov, Mail Stop: SSOP IDCC-SSOM, Washington, D.C. 20402-9328.

A. 40 CFR 50;
B. 40 CFR 50, Appendices A through N;
C. 40 CFR 51, Appendix M, Section IV of Appendix S, and Appendix W;
D. 40 CFR 52, Appendices D and E;
E. 40 CFR 53;
F. 40 CFR 58;
G. 40 CFR 58, all appendices;
H. 40 CFR 60, all appendices;
I. 40 CFR 61, all appendices;
J. 40 CFR 63, all appendices;
K. 40 CFR 75, all appendices.
L. 40 CFR 51.128, Appendix A(1)(B).
M. Silt Content Test Method. The purpose of this test method is to estimate the silt content of the trafficked parts of commercial farm roads, as defined in R18-2-610. The higher the silt content, the more fine dust particles that are released when cars and trucks drive on commercial farm roads.

1. Equipment:
    a. A set of sieves with the following openings: 4 millimeters (mm), 2mm, 1 mm, 0.5 mm and 0.25 mm and a lid and collector pan
    b. A small whisk broom or paintbrush with stiff bristles and dustpan 1 ft. in width. (The broom/brush should preferably have one, thin row of bristles no longer than 1.5 inches in length.)
    c. A spatula without holes A small scale with half ounce increments (e.g. postal/package scale)
    d. A shallow, lightweight container (e.g. plastic storage container)
    e. A sturdy cardboard box or other rigid object with a level surface
    f. Basic calculator
    g. Cloth gloves (optional for handling metal sieves on hot, sunny days)
    h. Sealable plastic bags (if sending samples to a laboratory)
    i. Pencil/pen and paper
2. Step 1: Look for a routinely-traveled surface, as evidenced by tire tracks. [Only collect samples from surfaces that are not wet or damp due to precipitation, dew or watering.] Use caution when taking samples to ensure personal safety with respect to passing vehicles. Gently press the edge of a dustpan (1 foot in width) into the surface four times to mark an area that is 1 square foot. Collect a sample of loose surface material using a whisk broom or brush and slowly sweep the material into the dustpan, minimizing escape of dust particles. Use a spatula to lift heavier elements such as gravel. Only collect dirt/gravel to an approximate depth of 3/8 inch or 1 cm in the 1 square foot area. If you reach a hard, underlying subsurface that is < 3/8 inch in depth, do not continue collecting the sample by digging into the hard surface. In other words, you are only collecting a surface sample of loose material down to 1 cm. In order to confirm that samples are collected to 1 cm. in depth, a wooden dowel or other similar narrow object at least one foot in length can be laid horizontally across the survey area while a metric ruler is held perpendicular to the dowel. At this point, you can choose to place the sample collected into a plastic bag or container and take it to an independent laboratory for silt content analysis. A reference to the procedure the laboratory is required to follow is in subsection (10) below.
3. Step 2: Place a scale on a level surface. Place a lightweight container on the scale. Zero the scale with the weight of the empty container on it. Transfer the entire sample collected in the dustpan to the container, minimizing escape of dust particles. Weigh the sample and record its weight.
4. Step 3: Stack a set of sieves in order according to the size openings specified above, beginning with the largest size opening (4 mm) at the top. Place a collector pan underneath the bottom (0.25 mm) sieve.
   Step 4: Carefully pour the sample into the sieve stack, minimizing escape of dust particles by slowly brushing material into the stack with a whisk broom or brush. (On windy days, use the trunk or door of a car as a wind barricade.) Cover the stack with a lid. Lift up the sieve stack and shake it vigorously up, down and sideways for at least 1 minute.
5. Step 5: Remove the lid from the stack and disassemble each sieve separately, beginning with the top sieve. As you remove each sieve, examine it to make sure that all of the material has been sifted to the finest sieve through which it can pass; e.g. material in each sieve (besides the top sieve that captures a range of larger elements) should look the same size. If this is not the case, re-stack the sieves and collector pan, cover the stack with the lid, and shake it again for at least 1 minute. (You only need to reassemble the sieve(s) that contain material which requires further sifting.)
6. Step 6: After disassembling the sieves and collector pan, slowly sweep the material from the collector pan into the empty container originally used to collect and weigh the entire sample. Take care to minimize escape of dust particles. You do not need to do anything with material captured in the sieves -- only the collector pan. Weigh the container with the material from the collector pan and record its weight.
7. Step 7: If the source is an unpaved road, multiply the resulting weight by 0.38. If the source is an unpaved parking lot, multiply the resulting weight by 0.55. The resulting number is the estimated silt loading. Then, divide by the total weight of the sample you recorded earlier in Step 2 and multiply by 100 to estimate the percent silt content.
8. Step 8: Select another two routinely-traveled portions of the unpaved road or unpaved parking lot and repeat this test method. Once you have calculated the silt loading

and percent silt content of the three samples collected, average your results together.

9. Step 9: Examine Results. If the average silt loading is less than 0.33 oz/ft&sup2, the surface is STABLE. If the average silt loading is greater than or equal to 0.33 oz/ft&sup2, then proceed to examine the average percent silt content. If the source is an unpaved road and the average percent silt content is 6% or less, the surface is STABLE. If the source is an unpaved parking lot and the average percent silt content is 8% or less, the surface is STABLE. If your field test results are within 2% of the standard (for example, 4%-8% silt content on an unpaved road), it is recommended that you collect three additional samples from the source according to Step 1 and take them to an independent laboratory for silt content analysis.
10. Independent Laboratory Analysis: You may choose to collect three samples from the source, according to Step 1, and send them to an independent laboratory for silt content analysis rather than conduct the sieve field procedure. If so, the test method the laboratory is required to use comes from the from the following text: *Procedures For Laboratory Analysis Of Surface/Bulk Dust Loading Samples*, (Fifth Edition, Volume I, Appendix C.2.3 "Silt Analysis", 1995), AP-42, Office of Air Quality Planning & Standards, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina.

Historical Note

Former Appendix 2 repealed, new Appendix 2 adopted effective October 2, 1979 (Supp. 79-5). Amended effective May 28, 1982 (Supp. 82-3). Amended effective December 1, 1988 (Supp. 88-4). Repealed effective November 15, 1993 (Supp. 93-4). New Appendix 2 adopted effective December 7, 1995 (Supp. 95-4). Amended effective May 9, 1996 (Supp. 96-2). Amended effective April 4, 1997; filed with the Office of the Secretary of State March 14, 1997 (Supp. 97-1). Amended effective December 4, 1997 (Supp. 97-4). Amended by final rulemaking at 5 A.A.R. 3221, effective August 12, 1999 (Supp. 99-3). Amended by final rulemaking at 6 A.A.R. 4170, effective October 11, 2000 (Supp. 00-4). Amended by final rulemaking at 8 A.A.R. 2543, effective May 24, 2002 (Supp. 02-2). Amended by final rulemaking at 10 A.A.R. 3281, effective September 27, 2004 (Supp. 04-3). Amended by final rulemaking at 11 A.A.R. 3305, effective October 3, 2005 (Supp. 05-3). Amended by final rulemaking at 13 A.A.R. 4199, effective January 5, 2008 (Supp. 07-4). Amended by exempt rulemaking pursuant to Laws 2011, Ch. 214, § 4, at 21 A.A.R. 1156, effective July 2, 2015 (Supp. 15-3).

Appendix 6. Repealed
Appendix 7. Repealed
Appendix 8. A8. Procedures for Utilizing the Sulfur Balance Method for Determining Sulfur Emissions
Appendix 9. A9. Monitoring Requirements
Appendix 10. Repealed
Appendix 11. Repealed
Appendix 12. A12. Procedures for Determining Ambient Air Concentrations for Hazardous Air Pollutants
Appendix 13. Repealed

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A. 40 CFR 50;
B. 40 CFR 50, Appendices A through N;
C. 40 CFR 51, Appendix M, Section IV of Appendix S, and Appendix W;
D. 40 CFR 52, Appendices D and E;
E. 40 CFR 53;
F. 40 CFR 58;
G. 40 CFR 58, all appendices;
H. 40 CFR 60, all appendices;
I. 40 CFR 61, all appendices;
J. 40 CFR 63, all appendices;
K. 40 CFR 75, all appendices.
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    c. A spatula without holes A small scale with half ounce increments (e.g. postal/package scale)
    d. A shallow, lightweight container (e.g. plastic storage container)
    e. A sturdy cardboard box or other rigid object with a level surface
    f. Basic calculator
    g. Cloth gloves (optional for handling metal sieves on hot, sunny days)
    h. Sealable plastic bags (if sending samples to a laboratory)
    i. Pencil/pen and paper
2. Step 1: Look for a routinely-traveled surface, as evidenced by tire tracks. [Only collect samples from surfaces that are not wet or damp due to precipitation, dew or watering.] Use caution when taking samples to ensure personal safety with respect to passing vehicles. Gently press the edge of a dustpan (1 foot in width) into the surface four times to mark an area that is 1 square foot. Collect a sample of loose surface material using a whisk broom or brush and slowly sweep the material into the dustpan, minimizing escape of dust particles. Use a spatula to lift heavier elements such as gravel. Only collect dirt/gravel to an approximate depth of 3/8 inch or 1 cm in the 1 square foot area. If you reach a hard, underlying subsurface that is < 3/8 inch in depth, do not continue collecting the sample by digging into the hard surface. In other words, you are only collecting a surface sample of loose material down to 1 cm. In order to confirm that samples are collected to 1 cm. in depth, a wooden dowel or other similar narrow object at least one foot in length can be laid horizontally across the survey area while a metric ruler is held perpendicular to the dowel. At this point, you can choose to place the sample collected into a plastic bag or container and take it to an independent laboratory for silt content analysis. A reference to the procedure the laboratory is required to follow is in subsection (10) below.
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    Step 4: Carefully pour the sample into the sieve stack, minimizing escape of dust particles by slowly brushing material into the stack with a whisk broom or brush. (On windy days, use the trunk or door of a car as a wind barricade.) Cover the stack with a lid. Lift up the sieve stack and shake it vigorously up, down and sideways for at least 1 minute.
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6. Step 6: After disassembling the sieves and collector pan, slowly sweep the material from the collector pan into the empty container originally used to collect and weigh the entire sample. Take care to minimize escape of dust particles. You do not need to do anything with material captured in the sieves -- only the collector pan. Weigh the container with the material from the collector pan and record its weight.
7. Step 7: If the source is an unpaved road, multiply the resulting weight by 0.38. If the source is an unpaved parking lot, multiply the resulting weight by 0.55. The resulting number is the estimated silt loading. Then, divide by the total weight of the sample you recorded earlier in Step 2 and multiply by 100 to estimate the percent silt content.
8. Step 8: Select another two routinely-traveled portions of the unpaved road or unpaved parking lot and repeat this test method. Once you have calculated the silt loading

and percent silt content of the three samples collected, average your results together.

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Historical Note

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   11. Precision farming;
   12. Residue management;
   13. Sequential cropping;
   14. Surface roughening; or
   15. Tree, shrub, or windbreak planting.

H. A person may develop different practices not contained in subsections (E), (F), or (G) that reduce PM_{10}. A person may submit practices that are proven effective through on-farm demonstration trials to the Director. The Director shall review the submitted practices.

I. A commercial farmer shall maintain records demonstrating compliance with this Section. The commercial farmer shall provide the records to the Director within two business days of written notice to the commercial farmer. The records shall contain:
   1. The name of the commercial farmer,
   2. The mailing address or physical location of the commercial farm, and
   3. The best management practices selected for tillage and harvest, noncropland, and cropland by the commercial farmer, and the date each best management practice was implemented.

~~R18-2-612.~~R18-2-614.Evaluation of Nonpoint Source Emissions

Opacity of ~~an~~ emission from any nonpoint source shall not be greater than 40% measured ~~in accordance with~~ according to the Arizona Testing Manual, Reference Method 9. An open ~~fires~~ fire permitted under R18-2-602 ~~and~~ or regulated under ~~R18-2-603~~ Article 15 ~~are~~ is exempt from this requirement.

NOTICE OF FINAL RULEMAKING

TITLE 18. ENVIRONMENTAL QUALITY

CHAPTER 2. DEPARTMENT OF ENVIRONMENTAL QUALITY AIR POLLUTION CONTROL

[R05-186]

PREAMBLE

1. **Sections Affected** — **Rulemaking Action**

Sections Affected	Rulemaking Action
Appendix 8	Amend

2. **The statutory authority for the rulemaking, including both the authorizing statute (general) and the statutes the rules are implementing (specific):**

   Authorizing statutes: A.R.S. §§ 49-104(A)(10) and 49-425

   Implementing statutes: A.R.S. §§ 49-404 and 49-406

3. **The effective date of the rules:**

   July 18, 2005

4. **A list of all previous notices appearing in the *Register* addressing the final rule:**

   Notice of Rulemaking Docket Opening: 10 A.A.R. 2945, July 23, 2004

   Notice of Proposed Rulemaking: 10 A.A.R. 3944, October 1, 2004

5. **The name and address of agency personnel with whom persons may communicate regarding the rulemaking:**

Name: Kevin Force

Address: ADEQ, Air Quality Planning Section
1110 W. Washington St.
Phoenix, AZ 85007

Telephone: (602) 771-4480 (Any extension may be reached in-state by dialing 1-800-234-5677 and asking for a specific number.)

Fax: (602) 771-2366

E-mail: force.kevin@azdeq.gov

Or

Name:	Bruce Friedl
Address:	ADEQ Air Quality Planning Section 1110 W. Washington St. Phoenix, AZ 85007
Telephone:	(602) 771-2259 (Any extension may be reached in-state by dialing 1-800-234-5677 and asking for a specific number.)
Fax:	(602) 771-2366
E-mail:	friedl.bruce@azdeq.gov

6. **An explanation of the rule, including the agency's reason for initiating the rule:**

Summary.

The Arizona Department of Environmental Quality (ADEQ) has made several technical and administrative changes to AAC Title 18, Chapter 2, Appendix 8, to clarify procedures for calculating material balance for sulfur applicable to three copper smelters: one located in Hayden, Gila County; one located in Miami, Gila County; and one located in San Manuel, Pinal County.

Background.

The Hayden, Miami, and San Manuel areas were designated nonattainment for SO_2 in 1979 due to measured exceedances of the national ambient air quality standards for sulfur dioxide (SO_2). Because local copper smelters were determined to be the principal sources of SO_2 emissions in these areas, stack emission limits were adopted into Arizona rules in 1979 as a means of lowering SO_2 emissions from the smelters. As a result of installation of emission controls, violations of the SO_2 standards have not been measured in any of these areas since 1989. To meet Clean Air Act redesignation requirements and demonstrate continued attainment of the air quality standards, updated air quality impact analyses were performed for the three smelters during the period 2001-2002. These analyses, based on new limits for both stack and fugitive emissions, demonstrate future air quality protection and show that the smelters are not expected to cause or contribute to a violation of the air quality standards for SO_2. In 2002, in two separate rulemakings, the new SO_2 emission limits for all three smelters were finalized in R18-2-715(F), (G), and (H) along with corresponding changes to compliance and monitoring procedures in R18-2-715.01. The revised rules were submitted to the U.S. Environmental Protection Agency (EPA) in June 2002 for review and approval as federally enforceable control measures in State Implementation Plan (SIP) revisions and redesignation to attainment requests for each of the SO_2 nonattainment areas.

The sulfur balance procedures in Appendix 8 were submitted to EPA for approval as a component of the SIP in 1998. The Appendix 8 procedures are used to determine compliance with certain of the emission limits contained in R18-2-715 and to determine overall emissions as required under R18-2-715.01. On May 14, 2004, EPA proposed full approval of the revised smelter rules R18-2-715(F), (G), and (H), R18-2-715.01, and R18-2-715.02 (previously submitted). At the same time, EPA also proposed "limited approval/limited disapproval" of Appendix 8 (69 FR 26786; May 14, 2004). Final EPA action was published on November 1, 2004 (69 FR 63321; November 1, 2004). In the proposed and final actions, EPA requested several changes and clarifications to Appendix 8 to make it a fully approvable component of the SIP. State adoption and submittal to EPA of the current Appendix 8 revisions will complete the necessary steps for EPA to consider redesignating the Hayden, Miami, and San Manuel areas to attainment.

Explanation of rule changes.

In addition to several minor clarifications, ADEQ determined the following changes are appropriate. Sections A8.1.2.3.1 and A8.1.2.3.2 are being clarified to specify methods for determining the sulfur and copper content of sulfur-bearing material introduced into the smelting process by incorporating by reference the Barium Sulfate Gravimetric Method and Potassium Iodide Titration Method procedures contained in *Standard Methods of Chemical Analysis*, Sixth Edition, 1962. These methods are considered industry standard practice methods and are appropriate to the materials being analyzed.

Section A8.2.5.5 was clarified to specify the method for determining the sulfur content of material at the casting stage of copper production by incorporating by reference the Barium Sulfate Gravimetric Method procedures contained in *Standard Methods of Chemical Analysis*, Sixth Edition, 1962. The method is considered an industry standard practice method and is appropriate to the materials being analyzed.

Because the sulfur balance procedures in Appendix 8 are included in the federally enforceable Arizona SIP, language was added in sections A8.1.2, A8.2, and A8.4.1 to require EPA approval (in addition to ADEQ approval), of any alternative method, process, or procedure used to meet the sulfur balance requirements. The changes to the rule maintain the flexibility for sources to develop alternative sulfur balance protocols specific to their operations while requiring the necessary EPA approval.

Given that the smelter's operating permits are required to contain all monitoring and analysis procedures, including sulfur balance procedures, under AAC Title 18, Chapter 2, Article 3, and 40 CFR part 70, and these permits are subject to ADEQ and EPA review, the proposed rule provided for EPA approval of any alternative method through the permitting process. Subsequent to proposal of the current revisions, however, EPA stated that due to permit workload issues, they may not review every Title V permit thoroughly, and default approval of an alternative procedure by oversight, would not comply with the intent of Section 110 of the Clean Air Act regarding implementation plans (69 FR 63322; November 1, 2004). Therefore, since Appendix 8 will be submitted to EPA for approval as a component of the Arizona SIP, the final Appendix 8 rule requires both ADEQ and EPA approval of any alternative method separately.

In addition to the above changes, references to applicable sections of R18-2-715.01 are being corrected in sections A8.3.1 and A8.3.2.

ADEQ determined that several of the changes requested by EPA in the May 14, 2004, proposed limited disapproval of Appendix 8 were not needed, and, after further discussion, EPA concurred. EPA had requested clarification of sampling procedures for sulfur-bearing materials introduced into the smelting process in Sections A8.1.2.1.1, A8.1.2.1.2, and A8.1.2.1.3 so that the sampling process is not biased. Bias can occur when there is a large variation in the size of the material being sampled. A subsequent examination confirmed that materials introduced into the smelting processes are primarily composed of a fine homogenous mixture. As noted in EPA's November 1, 2004, action, EPA now agrees that the current methods in Appendix 8 are adequate to ensure an accurate accounting of the sulfur content of materials introduced into the smelting process.

EPA also commented in the May 14, 2004, proposal that the accuracy of a gravimetric method procedure is normally about ±1% not ±50%. Of concern was Section A8.2.5.5., which addresses the analysis of sulfur content during casting operations. At the casting stage in copper production sulfur content is very low. For example, the sulfur content of anode samples taken over a one-month period at one facility ranged from 4.0 ppm to 108.0 ppm with an average value of 24.5 ppm. Because of the low sulfur content of the material being tested, an analysis of sulfur content to an accuracy of ±1% is not reasonable. EPA concurs (69 FR 63322; November 1, 2004); therefore, no change is being made.

7. **A reference to any study relevant to the rule that the agency reviewed and either relied on in its evaluation of or justification for the rule or did not rely on in its evaluation of or justification for the rule, where the public may obtain or review each study, all data underlying each study, and any analysis of each study and other supporting material:**

   Not applicable

8. **A showing of good cause why the rule is necessary to promote a statewide interest if the rule will diminish a previous grant of authority of a political subdivision of this state:**

   Not applicable

9. **The summary of the economic, small business, and consumer impact:**

Rule identification.

Arizona Administrative Code, Title 18, Chapter 2, Appendix 8, "Procedures for Utilizing the Sulfur Balance Method for Determining Sulfur Emissions." This rule clarifies procedures for calculating material balance for sulfur for determining sulfur emissions applicable to three smelters in Gila and Pinal Counties.

Entities directly impacted.

This is a source-specific rulemaking that pertains to three smelters located in Hayden and Miami in Gila County and San Manuel in Pinal County. The Hayden smelter is currently owned and operated by ASARCO Incorporated, the Miami smelter is currently owned and operated by Phelps Dodge Corporation, and the San Manuel smelter is currently owned and operated by BHP Copper Incorporated. These three facilities are all classified as major sources for sulfur dioxide, and all three areas are designated as nonattainment for sulfur dioxide.

The general public is expected to be positively impacted due to the improved air quality associated with implementation and enforcement of the rule. No other entities are expected to be directly impacted.

Probable costs and benefits associated with the revisions to Appendix 8.

The Arizona Department of Environmental Quality (ADEQ) anticipates that the rule changes will generate minimal, if any, economic impact to the regulated smelters, the public, or ADEQ because the rule changes primarily codify industry standard practice methods.

The current rule revisions are not expected to result in significant additional costs to the owners and operators of the smelters. No additional labor needs will be generated by the rule. Sections A1.2.3.1, A1.2.3.2, and A8.2.5.5 are being clarified to specify methods for determining the sulfur and copper content of sulfur-bearing material introduced into the smelting process and at the casting stage of copper production. The infrastructure for material sampling and testing technology necessary to meet the requirements of Appendix 8 are already in place at the smelting facilities; therefore, expenditures have already been incurred and are not attributed to the current rulemaking.

In the final rule, subsections A8.1.2, A8.2, and A8.4.1 were changed to require U.S. Environmental Protection Agency (EPA) approval of any alternative method, process, or procedure used to meet the sulfur balance requirements of Appendix 8. The requirements of Appendix 8 only apply to the three existing primary copper smelters in Arizona. Because all three of these facilities are required to obtain and maintain a Title V (Class I) operating permit under Arizona rules that include any sulfur balance requirements contained in Appendix 8, and these permits are subject to ADEQ and EPA review, the proposed rule provided for EPA approval of any alternative method through the permitting process. Subsequent to proposal of the current revisions, however, EPA determined that due to workload issues, they may not review every Title V permit thoroughly, and default approval of an alternative procedure by oversight, would not comply with the intent of Section 110 of the Clean Air Act regarding implementation plans (69 FR 63322; November 1, 2004). Therefore; since Appendix 8 will be submitted to EPA for approval as a component of the Arizona State Implementation Plan (SIP), the final Appendix 8 rule requires both ADEQ and EPA approval of any alternative method through a separate process.

All three smelters currently maintain operating permits that contain ADEQ and EPA approved sulfur balance procedures specific to each facility. The procedures required as part of the sulfur balance methods in the respective Title V permits are consistent with this final rule. Consequently, ADEQ does not expect that any additional approval process or permit revision for the current procedures will be necessary as a result of these revisions to Appendix 8.

For future changes to a facility's sulfur balance procedures under the revised rule, smelters will have to first obtain SIP approval, and then have their permits revised to include applicable SIP requirements. ADEQ expects the separate application and approval process to generate only minimal incremental administrative costs to the smelters. Any other costs associated with a change to a facility's sulfur balance protocol would be due to any needed technology upgrades, additional personnel, or expenditures attributed to the permit revision process. Although ADEQ deems the additional SIP approval costs to be minimal, these costs could be offset because of the potential for reduced time for analysis and review for a subsequent permit revision. Since an alternative analysis method would already have ADEQ and EPA approval, it could streamline the permitting process.

In summary, ADEQ expects only minimal economic impact, and any costs associated with this rulemaking are expected to be less than the potential benefits expected to accrue to the general public. In all cases, the local citizens may continue to benefit because of improved air quality due to implementation of the rules. In addition, areas redesignated to attainment have less restrictions on economic development.

Impact on Small Business.

A.R.S. § 41-1055(B)(5) requires agencies to state the probable impact of a rulemaking on small businesses. A.R.S. § 41-1035 requires agencies to reduce the impact of a rule on small businesses by using certain methods when they are legal and feasible in meeting the statutory objectives for the rulemaking. "Small business" is defined in A.R.S. § 41-1001 as "a concern, including its affiliates, which is independently owned and operated, which is not dominant in its field and which employs fewer than one hundred full-time employees or which had gross annual receipts of less than four million dollars in its last fiscal year. For purposes of a specific rule, an agency may define small business to include more persons if it finds that such a definition is necessary to adapt the rule to the needs and problems of small businesses and organizations." Based on the number and size of Arizona copper smelters, ADEQ has determined that this rule does not impact any small businesses.

10. A description of the changes between the proposed rules, including supplemental notices, and final rules (if applicable):

1) In subsection A8.3.1 the reference to R18-2-715.01(O) was omitted to reflect the applicability of A8.3.1 only to continuous emissions monitoring systems:

A8.3.1. The sulfur dioxide emissions monitoring and recording system required under R18-2-715.01(K) through ~~R18-2-715.01(O)~~ R18-2-715.01(N) shall meet the following specifications:

2) In response to EPA comments, subsection A8.4.1 was changed to require explicit approval of alternative methods, through a process independent of permitting procedures, as follows:

A8.4.1. For purposes of this Appendix, an approved alternative method, process, or procedure, must be approved in writing by the Director and the U.S. Environmental Protection Agency~~, as a condition within the Class I permit issued according to Article 3 of this Chapter~~.

3) Minor grammatical and technical changes were made to improve the rule's clarity, conciseness, and understandability.

11. A summary of the comments made regarding the rule and the agency response to them:

Comment 1: Two commenters noted that two options are available for obtaining U.S. Environmental Agency (EPA) approval of any alternative test method and suggested the addition of a second procedure in subsection A8.4.1. Commenters believe that while the proposed changes to subsection A8.4.1 address EPA's objection to the previous rule by requiring both ADEQ and EPA approval of any alternative test method (69 FR 63321, November 1, 2004), the inclusion of the second option provides additional advantage. Because the second method incorporates specific criteria preapproved by EPA that will be used by the Director to determine the approvability of an alternative analytical method under Appendix 8, sources will not have to wait for EPA's approval on a case-by-case basis. Commenters recommend revising A8.4.1 as follows:

> "For purposes of this Appendix, an approved alternative method, process, or procedure must be either (a) approved by the Director and the U.S. Environmental Protection Agency, as a condition in the Class I permit issued according to Article 3 of this Chapter; or (b) approved by the Director as having an accuracy that is within or more accurate than the accuracy of the standard method, process or, or procedure based on a comparison of the results for thirty (30) samples, and after the Director's approval is received the alternative is added to the Class I permit by a minor permit revision."

Response: ADEQ disagrees. EPA comments in its "limited approval/limited disapproval" action regarding Appendix 8 (69 FR 63321, November 1, 2004), that to correct excessive Director's discretion and make the rule an approvable component of the Arizona State Implementation Plan (SIP), the rule must either: 1) explicitly require approval of both ADEQ and EPA of an alternate analytical procedure; or 2) provide the criteria that will be used to determine approvability of an alternative method. The current revision to Appendix 8 makes use of the second approach by explicitly requiring both ADEQ and EPA approval. Regarding the first approach, EPA notes in "Guidance Document for Correcting Common VOC & Other Rule Deficiencies (A.K.A., The Little Bluebook)," August 21, 2001, that "Director's Discretion may be appropriate if explicit and replicable procedures within the rule tightly define how the discretion will be exercised to assure equivalent emission reductions." The example provided in the guidance includes both a standard, and specified test methods to determine control efficiency, assure equivalent emission reductions, and make this approach approvable. Because of the complex and varied nature of sulfur balance sampling and analytical methods, the rule cannot necessarily include all required criteria and test methods needed to tightly define how discretion will be exercised and assure equivalent emission reductions. Additionally, while the criteria approach may, under certain circumstances, mitigate the need for EPA approval for SIP purposes, under this approach, an alternative method will still be subject to review and approval for permitting purposes.

The provisions of AAC Title 18, Chapter 2, Article 3, require that a facility's permit contain all applicable monitoring and analysis procedures, and depending on the circumstances, a facility may not necessarily be allowed to implement alternative methods prior to completion of the permit application and approval process. In addition, these facilities' permit revisions are subject to review and objection by EPA. Therefore, even though the criteria option may not require EPA approval of an alternative method on a case-by-case basis before that method is implemented for SIP purposes, permit requirements may prevent implementation before completion of the final permitting process.

Because the current revision to Appendix 8 explicitly requires both ADEQ and EPA approval, the rule meets EPA's requirements to become an approvable component of the SIP and the inclusion of additional procedures for implementing alternative monitoring and test methods are not necessary.

Comment 2: Commenter notes that the citation in subsection A8.3.1 should read R18-2-715.01(K) through R18-2-715.01(N) instead of R18-2-715.01(K) through R18-2-715.01(O). Subsection A8.3.1 and the referenced subsections R18-2-715.01(K) through R18-2-715.01(N) apply to continuous emissions monitoring systems. In contrast, R18-2-715.01(O) does not refer to continuous emissions monitors, rather, it requires the smelter operator to perform material balance for sulfur according to the procedures in Appendix 8.

Response:

ADEQ agrees and has revised the rule accordingly.

Comment 3: Commenter supports the deletion of the words "in writing" in the phrase "approved in writing" in subsection A8.4.1, and the use of the permitting process to expedite approval of alternative sulfur balance methods by EPA. The commenter notes that because EPA has not always responded to previous state implementation plan (SIP) submittals in a timely manner, relying on a traditional SIP submittal process for approval of alternative methods and procedures under Appendix 8 may unduly delay the introduction of modern technology into the smelting process, but permitting procedures are subject to more rigorous processing and approval time-frames.

Response:

ADEQ disagrees. EPA notes in its final rule regarding Appendix 8 (69 FR 63322, November 1, 2004), that due to workload issues, EPA may not review every Title V permit thoroughly, and default approval of an alternative procedure by oversight, would not comply with the intent of Section 110 of the Clean Air Act regarding state implementation plans. Therefore, since Appendix 8 will be submitted to EPA for approval as a component of the Arizona SIP, the final Appendix 8 rule revision requires explicit ADEQ and EPA approval in writing, through a separate process, of any alternative method, process, or procedure used to meet the sulfur balance requirements of Appendix 8.

ADEQ understands the concerns expressed by the commenter related to EPA timeliness. The alternative method approval process, however, is not a traditional SIP approval and is handled in a much different fashion by EPA. Requests for approval of alternative methods have, historically, not been as extensive in scope or required the same degree of analysis and review as complete implementation plan revisions. For example, a recent facility request for EPA approval of alternative test methods to demonstrate compliance with the sulfur monitoring requirements for gaseous fuels contained in 40 CFR Part 60, subpart GG, Standards of Performance for Stationary Gas Turbines, was approved by EPA Region IX within 3 months.

Finally, because the affected facility's permits are required to include all applicable monitoring and test methods, including Appendix 8 sulfur balance procedures, prior approval of any alternative method should also help streamline the final permitting process.

12. Any other matters prescribed by statute that are applicable to the specific agency or to any specific rule or class of rules:

Not applicable

13. Incorporations by reference and their location in the rules:

Standard Methods of Chemical Analysis, Volume One, *The Elements*, Sixth Edition, N. Howell Furman (ed.), D. Van Nostrand Company, Inc., Princeton, New Jersey, 1962; pages 410-411, 1006-1011, and 1342-1343 are incorporated by reference in Appendix 8, Section A8.4.3.

14. Was this rule previously made as an emergency rule?

No.

15. The full text of the rules follows:

TITLE 18. ENVIRONMENTAL QUALITY

CHAPTER 2. DEPARTMENT OF ENVIRONMENTAL QUALITY AIR POLLUTION CONTROL

A8. APPENDIX 8

PROCEDURES FOR UTILIZING THE SULFUR BALANCE METHOD FOR DETERMINING SULFUR EMISSIONS

A8.1. Calculating Input Sulfur

Total sulfur input is the sum of the product of the weight of each ~~sulfur bearing~~ sulfur-bearing material introduced into the smelting process as calculated in A8.1.1. ~~below~~ multiplied by the fraction of sulfur contained in that material as calculated in A8.1.2. ~~below~~ plus the amount of sulfur contained in fuel utilized in the smelting process as calculated in A8.1.3. ~~below~~.

A8.1.1. Material Weight

The owner or operator of a copper smelter shall weigh ~~All~~ all sulfur-bearing ~~sulfur bearing~~ materials, other than fuels, introduced into the smelting process ~~shall be weighed~~. ~~Such~~ The weighing shall be subject to the following conditions:

A8.1.1.1. Weight shall be determined on a belt scale, rail or truck scales, or other weighing device.

A8.1.1.2. Weight shall be determined within an accuracy of ±5%.

A8.1.1.3. All devices or scales used for weighing ~~are to~~ shall be calibrated to manufacturer's specifications ~~but no less than~~ at least once a month.

A8.1.1.4. ~~Sulfur bearing~~ Sulfur-bearing materials subject to being weighed ~~shall~~ include ~~but not be limited to~~ concentrate, cement copper, reverts ~~which~~ that are discarded and not part of the internal circulating load and precipitates. Materials such as limestone and silica flux ~~which~~ that are mixed with a charge of sulfur bearing sulfur-bearing materials shall be weighed and reported by the owner or operator.

A8.1.2. Sulfur Content

~~The~~ The owner or operator shall calculate the sulfur content of all ~~sulfur bearing~~ sulfur-bearing materials introduced into the smelting process ~~shall be calculated~~ using the following steps or an ~~equivalent method approved by the Director~~ alternative method approved according to A8.4.1.

A8.1.2.1. Sampling

The ~~procedure to be~~ procedures followed by the owner or operator in sampling ~~is~~ are dependent upon the input vehicles for the ~~sulfur bearing~~ sulfur-bearing material.

A8.1.2.1.1. Beltfeed

The smelter owner or operator shall collect a five-pound sample each hour. ~~Hourly~~ The owner or operator shall combine hourly samples ~~shall be combined~~ for a total daily sample.

A8.1.2.1.2. Railcar

The smelter owner or operator shall collect a 24-pound sample from each car by the auger method at a minimum of four ~~points~~ locations. The owner or operator shall combine ~~Each~~ each car sample ~~shall be combined~~ with all other car samples for a total lot sample.

A8.1.2.1.3. Truck

The ~~smelter~~ owner or operator shall collect a 12-pound sample from each truck load. ~~Samples are to be taken~~ The owner or operator shall take samples at two ~~points~~ locations during unloading. ~~Where~~ If more than one truck delivers a single lot, the samples from each truck shall be combined for a total lot sample.

A8.1.2.2. Sample Preparation

~~Each~~ The owner or operator shall prepare each total sample ~~shall be prepared~~ for analysis in the following manner:

A8.1.2.2.1. The sample shall be crushed to minus ¼ inch particles.

A8.1.2.2.2. 2000 gm of the sample shall be split out using a Jones Riffle Splitter or similar device.

A8.1.2.2.3. The 2000 gm sample shall be pulverized to minus 150 mesh.

A8.1.2.2.4. The pulverized mass shall be mixed using a rolling cloth.

A8.1.2.2.5. 500 gm shall be split out for sample analysis.

A8.1.2.3. Sample Analysis

A8.1.2.3.1. The owner or operator shall analyze the sample ~~shall be analyzed~~ to determine sulfur content using the Barium Sulfate ($BaSO_4$) Gravimetric Method according to A8.4.3. ~~Such~~ The analysis shall be accurate to within ±1%.

A8.1.2.3.2. For ~~purpose~~ purposes of comparison, the owner or operator shall analyze the sample ~~shall be analyzed~~ for copper content using the Potassium ~~Iodine~~ Iodide (KI) Titration Method according to A8.4.3. ~~Such~~ The analysis shall be accurate to within ±1%.

A8.1.3. Fuel Sulfur Content

The owner or operator shall calculate sulfur ~~Sulfur~~ in fuels ~~shall be calculated~~ by multiplying the amount of fuel ~~delivered~~ that enters ~~to~~ the process by the fraction of sulfur in the fuel, as reported to the smelter operator by the fuel's supplier. The sulfur content determination shall be accurate to within ±5%.

A8.2. Calculating Removed Sulfur

Total removed sulfur is the sum of the removed sulfur ~~removed~~ in each of the following products as determined by each process set forth below, or by other processes approved according to A8.4.1 ~~by the Director~~.

A8.2.1. ~~Reverberatory~~ Furnace and Convertor Slags

A8.2.1.1. The owner or operator shall determine the weight of ~~the~~ each slag ~~shall be determined~~ using a scale with an accuracy within ±5%.

A8.2.1.2. The owner or operator shall collect ~~A~~ a five-pound sample ~~shall be collected~~ from each slag pot during tapping operations.

A8.2.1.3. The owner or operator shall prepare the sample ~~shall be prepared~~ and determine the amount of sulfur and copper ~~analyzed~~ using the procedures specified in A8.1.2.2. and A8.1.2.3. ~~above~~.

A8.2.2. ~~Cottrell, Scrubber, and Cyclone Dusts~~ Dust Collection Equipment Dusts

A8.2.2.1. After the owner or operator collects the dust ~~is collected~~ and places it ~~placed~~ in a rail car or truck ~~it~~ they shall ~~be weighed~~ weigh it using a scale with an accuracy within ± 5%.

A8.2.2.2. The owner or operator shall sample the dust ~~shall be sampled~~, and prepare and analyze a sample ~~prepared and analyzed~~ for sulfur and copper using the procedures specified in A8.1.2.1., A8.1.2.2., and A8.1.2.3. ~~above.~~

A8.2.3. Strong Acids

A8.2.3.1. The owner or operator shall take ~~An~~ an inventory of strong acids ~~shall be taken~~ daily by means of a manometer or sight glass~~.~~, and increase ~~The~~ the inventory ~~shall be increased~~ by the amounts of acid shipped or otherwise transferred during that day.

A8.2.3.2. The owner or operator shall ensure the daily inventory will be accurate to within ± 5%.

A8.2.3.3. The owner or operator shall take ~~A~~ a sample of each batch of the inventoried acid ~~inventoried shall be taken~~ and analyze the sample ~~analyzed~~ for sulfur, according to ~~in accordance with~~ the procedures in A8.1.2.3. ~~above.~~

A8.2.4. Weak Acids

A8.2.4.1. The owner or operator shall determine the amount of weak acid discharged from an acid plant and scrubber systems ~~is to be determined~~ by a time volumetric method of measurement in ~~gallons/minute~~ gallons per minute and to an accuracy of within ±20%.

A8.2.4.2. The owner or operator shall analyze ~~A~~ a 500 ml sample of the weak acid ~~shall be analyzed~~ daily for sulfur content according to ~~in accordance with~~ the procedures in A8.1.2.3.

A8.2.5. Sulfur in Copper Production

A8.2.5.1. The owner or operator shall determine the weight of copper produced ~~is to be determined~~ by weight of copper cast to an accuracy of within ±5%.

A8.2.5.2. The owner or operator shall record the weight and number of castings ~~shall be recorded~~.

A8.2.5.3. The owner or operator shall obtain ~~A~~ a sample of the copper, ~~is to be obtained~~ either by the grab sample method while casting, or by the use of at least three drill holes on a representative casting from each charge.

A8.2.5.4. The owner or operator shall obtain ~~At~~ at least one sample ~~must be obtained~~ from each charge.

A8.2.5.5. The owner or operator shall analyze ~~Each~~ each sample ~~is to be analyzed~~ for sulfur content using the ~~chemical~~ Barium Sulfate ($BaSO_4$) Gravimetric Method ~~gravimetric means of~~ according to A8.4.3. The analysis shall be accurate to ~~an accuracy of~~ within ~~+50%~~ ±50%.

A8.2.6. Materials in Process

A8.2.6.1. The owner or operator shall determine the ~~Total~~ total tonnage of materials in process ~~shall be determined~~ by physical inventory on the first or last day of each month.

A8.2.6.2. The owner or operator shall calculate ~~A~~ a monthly change in in-process inventory ~~shall be calculated~~ for each material in process by taking the difference between the inventory from each material in process on the first or last day of the preceding month and multiplying that difference by the monthly composite sulfur assay for that material.

A8.2.6.3. The change in monthly in-process inventory ~~must~~ shall be accurate to within ±50%.

A8.3. Sulfur Dioxide Emissions Monitoring

A8.3.1. The sulfur dioxide emissions monitoring and recording system required under R18-2-715.01(K) through R18-2-715.01(N) ~~R18-2-715(C)(4)~~ shall meet the following specifications:

A8.3.1.1. The monitoring system ~~It~~ shall be capable of continuously monitoring sulfur dioxide emissions with an accuracy of within ±20% and a confidence level of 95%.

A8.3.1.2. The owner or operator shall operate and calibrate the ~~Sulfur~~ sulfur dioxide emission monitoring and recording equipment ~~shall be operated and calibrated~~ according to ~~in accordance with~~ manufacturer's specifications for the equipment except that calibration ~~must~~ shall be done at least once every 24 hours.

A8.3.2. The sulfur removal equipment bypass monitoring required under R18-2-715.01(O) ~~R18-2-715(C)(7)(v)~~ shall consist of a detector and recorder system capable of producing a permanent record of all periods ~~in which a~~ that the bypass ~~has been operated~~ is in operation.

A8.4. General Provisions

A8.4.1. For purposes of this Appendix, an approved ~~equivalent~~ alternative method, process, or procedure, must be approved in writing by the Director and the U.S. Environmental Protection Agency ~~prior to its use by a smelter operator~~.

A8.4.2. The processes and procedures specified in this Appendix shall be available for inspection, review and verification by the Department at all reasonable times.

A8.4.3. The barium sulfate gravimetric test method and potassium iodide titration test method provided in *Standard Methods of Chemical Analysis*, Volume One, *The Elements*, Sixth Edition, N. Howell Furman (ed.), D. Van Nostrand Company, Inc., Princeton, New Jersey, 1962, pages 410-411, 1006-1011, and 1342-1343 (and no future editions or amendments) is incorporated by reference and available at the Department.

STANDARD METHODS OF CHEMICAL ANALYSIS

SIXTH EDITION

Volume One—The Elements

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IN COLLABORATION WITH MANY CONTRIBUTORS
(SEE LIST ON PAGES FOLLOWING)

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PREFACE

Throughout its various editions this work has been a source of analytical information of proven value for general use in the chemical laboratory. For more than fifty years it has been consulted by chemists as a reference for standard methods of analysis—those most widely accepted and readily applied. All of its characteristics—the plan of organization, the detail of presentation and even its selection of methods—have been determined by this function as a general, practical reference book.

Thus, it contains chapters of two kinds: (1) those dealing with a single element or a single class of substances, as exemplified by the chapters on aluminum or lead or uranium, and those on petroleum or plastics or water analysis; and (2) those chapters dealing with a single type of analytical method, as exemplified by the chapters on microanalysis or ion exchange or spectrographic analysis.

These characteristics of earlier editions have been maintained in the Sixth Edition. This has required, in view of the great advances of the intervening years, the addition of the third volume, devoted entirely to chapters on physical and instrumental methods and their applications. It has also necessitated the publication of the three volumes separately, at approximately annual intervals. However, the established policy has been followed by seeking as contributors men of wide specialized experience, either with individual elements and types of substances, or with particular methods of analysis. Furthermore, the basic organization of the chapters and within the chapters has been maintained, with certain minor changes made necessary by the extensive additions of new methods and new information.

In Volume I, the elements are taken up, chapter by chapter, in alphabetical order except for certain logical groupings of elements. Thus, tellurium is treated in the chapter with selenium, tantalum with niobium, technetium with rhenium, the rare earths with cerium, and the alkali metals in the first chapter of the book. An alphabetical listing of the elements, giving the page number of the chapter in which each element is treated, follows the comprehensive table of contents.

In Volume I on the elements the reader will note the omission of the analytical chemistry of the transuranium elements which is available in full detail only to those having access to classified information. The methods of determining the inert gases (helium family), are to be found under gas analysis, and under the mass spectrographic and spectral analysis in Volumes II and III, respectively.

Each chapter is arranged, for convenient reference, in accordance with a uniform sequence, that has been followed throughout the book. It is as follows:

Physical Properties. Atomic weight; specific gravity; melting-point; boiling-point; oxides.

Detection. Characteristic reactions leading to the recognition of the element.

Estimation. The subject is introduced with such information as is useful to the analyst.

Preparation and Solution of the Samples. Here directions are given for the preparation and decomposition of characteristic materials in which the element be used to complex Fe. This is an extremely sensitive method and is apparently specific for Cu+.

Procedure for Ferrous Alloys.—Dissolve sample by any appropriate means and add sufficient HNO_3 to oxidize Fe. Evaporate to small volume to remove excess acid. Transfer the solution (or a suitable aliquot) to a separatory funnel, add 5 ml. of hydroxylamine hydrochloride (100 g./l.), and 10 ml. of sodium citrate (300 g./l.). Add NH_4OH until the pH is 4–6 (pH paper). Add 10 ml. of the reagent (0.1% solution in absolute ethanol) and 10 ml. of chloroform. Shake about 30 seconds, allow the layers to separate, and draw off the chloroform layer into a dry, 25-ml. volumetric flask. Add 2–3 ml. of absolute ethanol to the chloroform extract. Repeat the extraction of the aqueous phase with 5 ml. of chloroform.

Transfer the extract to the volumetric flask, dilute to volume with absolute ethanol, and mix. Transfer a suitable portion of the extract to an absorption cell and measure photometrically at 457 mμ. This method has been applied to water, Mn and W ores, steels, ferro-alloys, titanium alloys, and toxicological samples. A slightly different procedure using ethylene dichloride as extractant has been developed for the determination of Cu in water.[56]

POLAROGRAPHIC METHODS

Polarographic measurement offers a rapid and simple method of determining Cu in a variety of materials. Often no preliminary separations are required and other metals in the sample may be likewise determined with a slight variation of conditions. Either noncomplex-forming supporting electrolytes (i.e. HNO_3) which give only a single wave, $Cu^{++} \rightarrow Cu(Hg)$ or complex-forming supporting electrolytes (i.e. NH_4OH, KCNS, pyridine, etc.) which give two waves, $Cu^{++} \rightarrow Cu^{+}$ and $Cu^{+} \rightarrow Cu(Hg)$ may be used.[57] Detailed methods have been worked out for the analysis of Al alloys using an HNO_3 electrolyte; [58] brass plate using an NH_4OH electrolyte; [59] brass, Al- and Zn-base alloys, Be, and Mg-base alloys using a pyrophosphate electrolyte; [60] and soils and plants using an NH_4OH electrolyte.[61]

SPECTROGRAPHIC METHODS

Spectrographic techniques are of great value for rapid, routine, large-volume estimations of Cu in Al and Mg-base alloys, Zn-base alloys, Pb- and Sn-base alloys, Ni-base alloys, ferrous alloys and similar materials. The spectral lines of greatest sensitivity are at 3247 A and 3274 A.

DETERMINATIONS IN SPECIFIC SUBSTANCES

DETERMINATION OF COPPER IN COPPER ORES

The usual Cu ores are sulfides, basic carbonates, or oxides and are likely to contain considerable Fe and silicious material as well as varying amounts of As, Sb,

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[56] Brown, J. K., and Connell, J., Paper presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Mar. 3, 1953.

[57] Kolthoff, I. M., and Lingane, J. J., Polarography, p. 279 and p. 328, New York, Interscience Publishers, Inc., 1941.

[58] Kolthoff, I. M., and Matsuyama, G., Ind. Eng. Chem., Anal. Ed., 17, 615, 1945.

[59] Tyler, W. P., and Brown, W. E., *ibid.*, 15, 520, 1943.

[60] Reynolds, C. A., and Rogers, L. B., Anal. Chem., 21, 176, 1949.

[61] Menzel, R. G., and Jackson, M. L., Anal. Chem., 23, 1861, 1951; 24, 732, 1952.

Ag, Ni, Pb, Bi, Se, and Te. The sulfide ores require strong oxidizing conditions to oxidize the S. Heating with $HCl + HNO_3$ or concentrated $HClO_4$ is usually effective. The addition of a little NaBr and subsequent heating to fumes with H_2SO_4 or $HClO_4$ volatilizes As, Sb, and Se.

Separation methods most commonly used for ores are the precipitation of Cu_2S with $Na_2S_2O_3$ and the displacement of Cu with metallic Al. None of the methods listed below ordinarily require a preliminary separation.

IODIDE METHOD[62]

Procedure.—Place the sample in a dry, small-mouthed 500-ml. Erlenmeyer flask and add 1 or 2 boiling chips. Wash down the side of the flask with 15 ml. of 70% $HClO_4$, cover with a small watch glass (or better with a refluxing still head obtainable from the G. Frederick Smith Co.) and heat rapidly to boiling. Adjust the heat so that the $HClO_4$ refluxes on the walls of the flask but does not escape into the room. Boil gently for about 5 minutes. Then allow to cool for about 2 minutes and add 50 ml. of water. Boil gently for about 5 minutes to remove chlorine. Cool and neutralize with NH_4OH (1:1) until the $Fe(OH)_3$ precipitates and the first faint blue of the Cu ammonia complex is noted (giving an over-all greenish color to the solution). Avoid any excess of NH_4OH. Cool the solution and add 2 g. of NH_4HF_2, dilute to 150 ml. and mix thoroughly. Add 2 g. of KI and titrate immediately with 0.1 *N* $Na_2S_2O_3$ until the solution has only a faint color of I_2; then add 2 ml. of 2% starch solution and continue the titration until the return of the starch-iodide color is slow. Add 2 g. of KCNS and titrate carefully to the disappearance of all blue color.

ELECTROLYTIC METHOD[63]

Procedure.—Transfer a 1-g. portion of sample to a lipless 250-ml. electrolysis beaker. Add 0.5 ml. H_2SO_4, 8–10 ml. HNO_3, and place on the steam plate. When nitrous fumes are expelled add 2–3 ml. HCl and evaporate to dryness on the steam plate. Add a little hot water, 6 ml. of HNO_3, and about 100 ml. of hot water. Stir until all soluble material is dissolved, then dilute to about 200 ml., and allow to settle for 2–3 hours. Finally electrolyze at about 0.4 ampere until deposition of Cu is complete as indicated by failure of Cu to plate on fresh cathode surface when the sample is diluted with a little water.

PHOTOMETRIC (TRIETHANOLAMINE) METHOD[64]

Procedure.—Transfer a 1-g. portion of sample to a casserole. Add 10 ml. HCl and 5 ml. HNO_3 and warm until dissolution is effected and only a white siliceous residue remains. Add 5 ml. H_2SO_4 and evaporate to dryness on a steam plate or by use of an infrared heat lamp. Add 15 ml. of water to the residue and heat until salts are in solution. If the amount of Fe present is slight, add triethanolamine (25% aqueous solution) to the boiling solution until a deep blue color appears, then 50 ml. in excess. Cool, filter, wash with 1% triethanolamine, dilute to 250 ml. in a volumetric flask, mix, and measure photometrically at approximately 650 mμ. If Fe is present, add the reagent slowly to the boiling solution until $Fe(OH)_3$ appears, then add 0.25 g. ZnO and continue adding the reagent until

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[62] Goetz, C. A., *et al.*, Anal. Chem., **21**, 1520, 1949.

[63] Keffer, R., Methods in Non-Ferrous Metallurgical Analysis, p. 104, New York, McGraw-Hill Book Co., Inc., 1928.

[64] Mehlig, J. P., and Durst, D., Chemist-Analyst, **37**, 52, 1948.

SULFUR IN COAL, ESCHKA'S METHOD

Procedure.—One gram of coal is intimately mixed with 3 g. of Eschka's mixture, consisting of 2 parts of porous, calcined magnesia and 1 part of anhydrous sodium carbonate. The mixture, placed in a platinum crucible, is covered with about 2 g. more of Eschka's mixture. The charge is placed in an open platinum crucible, which is protected from the flame by a shield, as shown in Fig. 44-8, page 1034. If possible, a sulfur-free flame should be used to avoid contaminating the material. With proper precautions, the shield will prevent this. Heating in a crucible electric furnace completely avoids sulfur contamination. The mixture is heated very gradually, to drive off the volatile matter, the charge being stirred frequently with a platinum wire to allow free access of air. The heat is increased, after half an hour, to a dull redness. When the carbon has burned out, the gray color having changed to a yellow or light brown, the heat is removed and the crucible cooled.

The powdered fusion is digested with 100 ml. of hot water for half an hour, and the clear liquor decanted through a filter into a beaker. The residue is washed twice more with hot water, by decantation, and finally on the filter, until the volume of the total filtrate amounts to about 200 ml. About 5 ml. of bromine and a little hydrochloric acid are added, and the solution boiled. Sulfuric acid is now precipitated as $BaSO_4$ by addition of barium chloride to the hot solution, and sulfur determined by the first of the gravimetric procedures.

SULFUR IN ROCKS, SILICATES, AND INSOLUBLE SULFATES

Procedure.—The material in finely powdered form is fused in a large platinum crucible with about six times its weight of sodium carbonate (sulfur free) mixed with about 0.5 g. of potassium nitrate. The charge is protected from the flame by an asbestos board or silica plate with an opening to accommodate the crucible snugly, as shown in Fig. 44-8, page 1034. The fusion is extracted with water, the filtrate evaporated to dryness and silica dehydrated. The residue is moistened with strong hydrochloric acid, then taken up with a little water, boiled free of CO_2, and silica filtered off. The filtrate contains the sulfate, which is now precipitated as barium sulfate according to one of the standard procedures.

Barium Sulfate.—This is transposed by fusion with sodium carbonate, as stated above. Barium carbonate remains in the water-insoluble residue. It is advisable to wash the residue in this case with hot sodium carbonate solution, to insure complete removal of the sodium sulfate. The filtrate is acidified with HCl, boiled free of CO_2, then precipitated.

Lead Sulfate.—This may be transposed by digesting the compound with a strong solution of sodium carbonate saturated with CO_2, keeping the solution at boiling temperature for half an hour or more. The sulfate will be in solution and the lead is precipitated as the water-insoluble carbonate.

Strontium or calcium sulfates may be transposed by the procedure described for lead.

SEPARATIONS

Substances Containing Iron.—When precipitating barium sulfate, in presence of ferric salts, from hot solutions by the gravimetric procedure commonly followed, considerable iron is carried down by the precipitate. Since $Fe_2(SO_4)_3$ loses SO_3

upon ignition, and since Fe_2O_3 weighs much less than $BaSO_4$, low results will be obtained. Hence the removal of iron is necessary, or a method should be followed in which iron does not interfere. It is found that barium sulfate precipitated from a large volume of cold solution, in which the iron has been reduced to ferrous condition, is free from iron. Details of this procedure are given in the second of the gravimetric methods.

If sulfur is to be precipitated from hot solution of comparatively small volume (200 to 400 ml.), it is necessary to remove iron. This is accomplished by precipitating it as $Fe(OH)_3$ by addition of ammonium hydroxide in decided excess (5 to 10 ml. excess of strong NH_4OH, sp. gr. 0.90). If the solution is barely neutralized with ammonia, the iron hydroxide carries down considerable of the sulfate. Even with the precaution recommended some of the combined sulfuric acid is occluded by the precipitate, so that it is necessary to recover this by dissolving the precipitate with hydrochloric acid and reprecipitating the ferric hydroxide with an excess of ammonia. The combined filtrates are now treated with barium chloride, upon acidification with hydrochloric acid, according to the procedure first given.

Separation of Sulfur from Metals Forming an Insoluble Sulfate.—This is accomplished by fusion of the compound with sodium carbonate and extraction of the mass with water. The metal remains with the residue and the sulfate of the alkali passes into solution. For details see subject under "Preparation and Solution of the Sample."

Nitrates and Chlorates.—These are carried down with the precipitate as barium salts if they are present in appreciable amount. They may be removed from the solution by evaporation to dryness with hydrochloric acid.

Silica.—Silica will be carried down with the barium sulfate precipitate if present in appreciable amounts. It is removed by evaporation of the solution with hydrochloric acid, dehydrating the silicic acid, taking up with HCl and water and filtering.

Ammonium and Alkali Salts.—These have a negligible effect on the precipitate of $BaSO_4$ if this is precipitated from a large volume, according to the second gravimetric procedure. Their effect is evident when sulfur is determined in small volume.

GRAVIMETRIC METHODS

PRECIPITATION AS BARIUM SULFATE

The general laboratory procedure for precipitation of sulfate sulfur is to add to the solution diluted to 300–400 ml. and containing 4–8 ml. of 3 *N* HCl an excess of barium chloride reagent, the sulfur solution being previously heated to boiling. Popoff and Neumann have shown that the reverse order is preferable.[4] The procedure worked out in the laboratories of the General Chemical Company is to add the barium chloride reagent to the sulfate solution diluted to a large volume, the solution being at room temperature. The crystals of $BaSO_4$ thus obtained are comparatively large and are less apt to be contaminated. The three optional methods are given.

[4] Popoff, S., and Neumann, E. W., Ind. Eng. Chem., Anal. Ed., 2, 45–54, 1930.

PRECIPITATION OF BARIUM SULFATE FROM HOT SOLUTIONS

Procedure.—The sulfur should be present in solution either as free sulfuric acid or as a sulfate salt. The solution is made acid by addition of hydrochloric acid (phenolphthalein indicator), and then 4 ml. added in excess (HCl, sp. gr. 1.2). After diluting to a volume of 400 ml. with hot water, the mixture is heated to boiling, and a 10% solution of barium chloride added in a fine stream, through a funnel with a capillary stem, or from a burette, at the rate of 10 ml. in 2 to 10 minutes. The reagent is added in slight excess of that required to react with the sulfuric acid or sulfate. (Ten ml. of 10% $BaCl_2 \cdot 2H_2O$ solution will precipitate about 0.13 g. of sulfur.) The beaker is placed on a steam bath and the precipitate allowed to settle for about an hour. The solution is filtered through a fine grade of filter paper (B. and A. grade A, or S. and S. grade No. 90), or through a tared Gooch crucible. Since the precipitate frequently passes through the filter it is advisable always to pass the solution through the same filter a second time. The precipitate is washed ten times with hot water, then dried, and ignited gently over a Bunsen burner, or in a muffle, for half an hour. (Blasting is not necessary, nor desirable.) The white $BaSO_4$ is cooled in a desiccator, and then weighed. If a filter paper has been used in place of a Gooch crucible, the ignition is best made in a porcelain crucible, with free access of air, the ignited sulfate, upon cooling, is brushed out of the crucible and so weighed.

Factors. $BaSO \times 0.1374 = S$
$\times 0.4202 = H_2SO_4$
$\times 0.3767 = FeS$
$\times 0.2745 = SO_2$
$\times 0.3430 = SO_3$
$\times 0.4116 = SO_4$

NOTE.—If much iron or alumina is present it is advisable to precipitate the sulfate from a large volume, by the second method, rather than attempt to remove these substances. If $BaSO_4$ is present in the original material its weight should be included with that of the precipitate.

OPTIONAL METHOD

Procedure.—Barium chloride solution (0.1 *N*), in sufficient quantity to precipitate the sulfur of the test solution completely with about 5 ml. in excess, is acidified with 4–8 ml. of 3 *N* HCl and heated to boiling. The sulfate solution is now added, dropwise with constant stirring, and the resulting precipitate digested for 1 hour near the boiling point with occasional stirring. The precipitate is washed by decantation and on the filter with hot water until free of chlorides. (A Gooch crucible may be used.) The precipitate is ignited (800°C.) for an hour and weighed.

NOTE.—A final volume of 350 ml. with 0.8 g. of precipitate under the above conditions has proven to be highly satisfactory. The presence of KNO_3 and probably any nitrate is objectionable.[3]

PRECIPITATION OF BARIUM SULFATE FROM COLD SOLUTIONS—LARGE VOLUME

The method worked out by Allen and Bishop, General Chemical Company,[5] is especially adapted to the determination of sulfur in iron pyrites and materials

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[5] Paper before Eighth International Congress of Applied Chemistry: An Exact Method for the Determination of Sulfur in Pyrite Ores, W. S. Allen and H. B. Bishop.

high in sulfur, 30 to 50% sulfur, but by varying the amount of material used the range may be extended from smaller to greater amounts. The finely ground sample is oxidized by means of a mixture of bromine and potassium bromide followed by nitric acid. The nitric acid is expelled by evaporation to dryness, followed by a second evaporation with hydrochloric acid, which dehydrates the silica. Iron is now reduced to the ferrous condition and the silica and residue, undissolved by addition of hot water and HCl, is filtered off. The sulfur is precipitated in a large volume of cold solution, by barium chloride solution, as $BaSO_4$ and so weighed.

Reagents. **Bromine-Potassium Bromide Solution.**—320 g. of potassium bromide are dissolved in just sufficient water to cause solution and mixed with 200 ml. of bromine, the bromine being poured into the saturated bromide solution. After mixing well the solution is diluted to 2000 ml.

Bromine-Carbon Tetrachloride Solution.—Carbon tetrachloride saturated with bromine.

Barium Chloride, anhydrous, 5% solution; or crystals, 6% solution.

Procedure. **Preparation of Sample.**—The sample ground to pass an 80-mesh sieve is carefully mixed and quartered down to 10 g. This is dried for one hour at 100°C. and then placed in a weighing tube.

A factor weight, 1.373 g. of the sample, is placed in a deep beaker, 300-ml. capacity, 2½ by 4½ inches.

Oxidation of Sulfur.—Ten ml. of the bromine-potassium bromide mixture for pyrrhotite ore, or bromine-carbon tetrachloride reagent for pyrite ores, are added and the beaker covered with a dry watch glass cover. After standing fifteen minutes in the cold bath (a casserole of water will do), with occasional shaking of the beaker, 15 ml. of concentrated nitric acid are added and the mixture allowed to stand fifteen minutes longer, at room temperature, and then warmed on an asbestos board on the steam bath until the reaction has apparently ceased and the bromine has been volatilized. The beaker is now placed within the ring of the steam bath so that the lower portion is exposed to steam heat. The solution is evaporated to dryness, the cover of the beaker being raised above the rim by means of riders (U-shaped glass rods), Fig. 44-1, 10 ml. of concentrated hydrochloric acid are now added and the solution again evaporated to dryness to expel the nitric acid. The silica is dehydrated by heating in the air oven at 100°C. for one hour, or overnight if preferred.

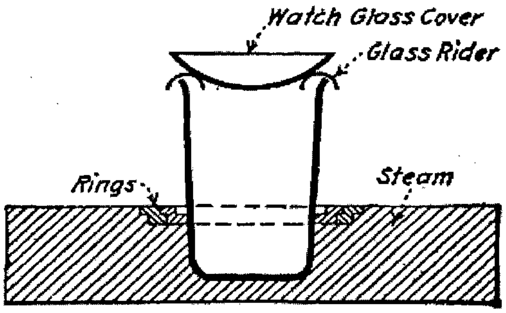

FIG. 44-1. Apparatus for Evaporator.

Reduction of Iron.—Four ml. of hydrochloric acid (sp. gr. 1.20), followed five minutes later by 100 ml. of hot water, are added, the sides of the beaker and the cover being rinsed into the solution. The riders being removed, the sample is gently boiled for five minutes to insure the solution of the sulfate. After cooling for about five minutes, approximately 0.2 gram powdered aluminum is stirred into the solution, keeping covered during the intervals between stirring. When the iron has been reduced, the solution becoming colorless, the sample is filtered into a 2500-ml. beaker, through a 12.5-cm. filter paper. The beaker should be copped out and the residue on the filter washed nine times with hot water, filling the filter funnel and draining each time.

Precipitation of the Sulfur.—The solution in the large beaker is diluted to 1600 ml. with cold water and 6 ml. HCl (sp. gr. 1.20) added, and mixed by stirring. The barium chloride solution is now added by means of a special delivering cup (Fig. 44-2), which should drain at the rate of 5 ml. per minute. 125 ml. of barium chloride solution are added for ores containing 30 to 50% sulfur, the factor weight being taken. The solution is not stirred while the barium chloride is being added, but when the cup has drained, the solution is mixed by stirring. The $BaSO_4$ is allowed to settle, two or three hours being advisable, overnight being preferred.

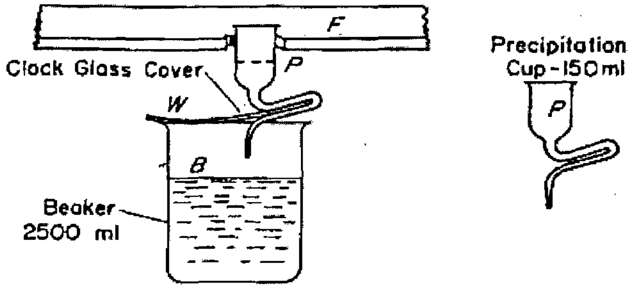

Fig. 44-2. Apparatus for Precipitating Sulfur.

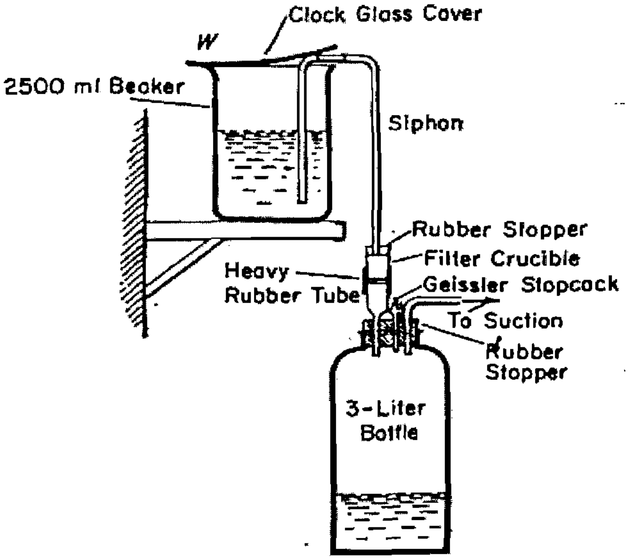

Fig. 44-3. Apparatus for Filtering Barium Sulfate.

Filtration.—The clear solution is filtered through a filter crucible (35 ml.), using suction. This is best done by the automatic arrangement shown in Fig. 44-3. The beaker containing the solution is placed on a shelf; a siphon dipping to within half an inch of the precipitate at the bottom of the beaker is connected to the filter crucible by means of a tightly fitting stopper. The crucible and thistle tube are best connected by heavy rubber tubing. The suction flask, or bottle, should have a capacity of about 3 liters. A Geissler stopcock passes through the rubber stopper in the suction flask to relieve the pressure when the filter crucible is to be removed. The precipitate is washed onto the asbestos mat in the crucible and washed with cold water six times, the beaker being copped out as usual.

Ignition.—The precipitate is dried by placing the crucible on an asbestos board over a flame for twenty-five minutes and then heated over a direct flame for thirty minutes.

Calculation.—$BaSO_4 \times 10 = \%\ S$. (If factor weight is taken.)

Factor. $BaSO_4 \times 0.1374 =$ gram S.

TITRIMETRIC METHODS

TITRIMETRIC METHODS FOR SULFATE

Two general procedures deserve mention: addition of barium chloride in known amount in slight excess of that required by the sulfate, and titrating the excess either with a soluble carbonate or a chromate; or addition of barium chromate and titrating the alkali chromate formed by the reaction. The sulfate is also determined by precipitation with a weak organic base benzidine, added in form of the hydrochloride salt; the benzidine sulfate, filtered off, is titrated with caustic. The typical procedures given below will meet general requirements for the titrimetric determination of sulfates.

TITRATION WITH BARIUM CHLORIDE AND POTASSIUM CHROMATE—WIDENSTEIN'S METHOD MODIFIED

Reaction.—

$$Na_2SO_4 + BaCl_2 \rightarrow BaSO_4 + 2NaCl \text{ and excess } BaCl_2 + K_2CrO_4 \rightarrow BaCrO_4 + 2KCl$$

Procedure.—The sample containing the sulfate in solution is diluted to 50 ml. in a small flask, acidified with hydrochloric acid, if necessary, heated to boiling, and precipitated with a slight excess of 0.25 *N* barium chloride added from a burette (1 ml. $BaCl_2 = 0.01$ g. SO_3). The precipitate settles rapidly, so that a large excess of the reagent may readily be avoided. The mixture is cautiously neutralized with ammonia, free from carbonate (CO_2 may be precipitated with $CaCl_2$ solution), the solution heated to boiling, and 0.25 *N* potassium chromate added from a burette in 0.5-ml. portions, each time removing the flask from the heat, allowing the precipitate to settle and examining the clear solution. A faint yellow color will appear as soon as the excess of barium has been precipitated and a few drops of the chromate in excess are present in the solution. The value of the chromate being equivalent to that of the barium chloride, the difference between the two titrations is due to the barium chloride required by the sulfate.

$$\text{One ml. } 0.25\ N\ BaCl_2 = 0.01001 \text{ g. } SO_3$$

NOTES.—Salts of the alkalies, alkaline earths (Sr and Ca), and zinc and cadmium do not interfere. Nickel, cobalt, and copper, however, give colored solutions which prevent the yellow chromate being seen. Should the latter be present, the end point may be recognized by using ammoniacal lead acetate as an outside indicator (1 vol. NH_4OH + 4 vols. $PbC_2H_3O_2 \cdot 3H_2O$, 5% sol.), the indicator and titrated solution being mixed drop per drop on a white tile. A yellowish red color indicates the presence of chromate.

Sodium Nitrite Solution.—Prepare by dissolving 150 mg. of sodium nitrite in 1 liter of water and diluting 10 ml. of this solution to 100 ml. (1 ml. = about 10 micrograms NO_2).

Sodium Silicate Standard Solution (equivalent to about 0.04 mg. Silicon per ml.).—To prepare a stock solution, dissolve 0.6 g. of silicic acid in water and a few pellets of sodium hydroxide, warm, dilute to 500 ml., and filter into a plastic bottle. To standardize, dehydrate a suitable aliquot with sulfuric acid, ignite, and weigh the residue. Volatilize with hydrofluoric and sulfuric acids, ignite, and reweigh.

Sodium Sulfide Solution, 10%.—Sodium sulfide may be made by saturating a concentrated solution of sodium hydroxide with hydrogen sulfide, then adding an equal volume of the sodium hydroxide. The solution is diluted to the required volume, allowed to stand several days, and filtered.

Sodium Tetraphenylboron, 1% Solution.—Dissolve 2.5 g. of sodium tetraphenylboron in 250 ml. of distilled water, add 0.5–1.0 g. of reagent grade aluminum hydroxide, stir for 5 minutes, and filter. Reject or refilter the first 20–30 ml. of filtrate.

Sodium Thiosulfate Standard Solutions for Copper Determination (equivalent to about 1 mg. and 4 mg. Copper per ml.).—Dissolve, respectively, 4 g. and 16 g. sodium thiosulfate pentahydrate in water containing 1 g. of sodium bicarbonate. Dilute each solution to 1 liter. Store in dark bottles. To standardize, transfer a measured quantity of standard copper sulfate solution into a 250-ml. Erlenmeyer flask, add 3 ml. of acetic acid and 5 ml. of potassium iodide solution. After mixing and allowing the solution to stand a few minutes, titrate with the sodium thiosulfate, adding a few drops of starch solution near the end of the titration. Calculate the equivalency in grams of copper per ml. of thiosulfate solution.

Sodium Thiosulfate, Standard 0.1 *N* Solution for General Analysis.—For 1 liter of 0.1 *N* sodium thiosulfate 0.1 mole, or 24.818 g. of $Na_2S_2O_3 \cdot 5H_2O$ is required; generally an excess—25 g. of the reagent salt—is used. The material is dissolved in hot distilled water that has just been boiled to remove CO_2. For each liter, 0.1 g. of Na_2CO_3 should be added to the water. When prepared in this way the solution requires little or no aging (to allow CO_2 to be used up and sulfur to settle); otherwise the solution has to stand a week or 10 days.

Standardization.—Iodine sublimed from a mixture of lime and KI and then resublimed may be used for standardization. Pure potassium iodate or pure potassium dichromate may be weighed and allowed to liberate an equivalent amount of iodine from KI. If the resublimed iodine is used, the procedure is as follows: Dissolve 2–3 g. of pure KI in ½ ml. of water in a weighing bottle, stopper, let come to room temperature and weigh. Add 0.5 g. of the iodine, allow temperature to come to that of the room and reweigh, the increase due to iodine dissolved being noted. Open the bottle under 200 ml. of water containing 1 g. of KI and titrate. Divide wt. of iodine by ml. of thiosulfate to get wt. of iodine per ml. and divide the latter by the milliequivalent of iodine, 0.12692 to find the normality of the thiosulfate solution.

Sodium Tungstate Solution.—Dissolve 10 g. of reagent grade sodium tungstate ($Na_2WO_4 \cdot H_2O$) in water and dilute to 100 ml. with water. Prepare fresh as needed.

Sodium Tungstate Solution, 0.5 *N*.—Dissolve in water 16.5 g. of $Na_2WO_4 \cdot 2H_2O$ and dilute to 100 ml.

Spekker Acid.—Mix 150 ml. H_3PO_4 and 150 ml. H_2SO_4, and make up to 1 liter.

Stannous Chloride Standard Solution.—(1) Dissolve 2 g. of stannous chloride crystals in hot concentrated HCl and make up to 1 liter. The solution should be kept in a dark bottle provided with burette and attachments for excluding air. The solution is protected from the oxygen of the air by passing the latter through alkaline pyrogallol when solution is transferred to the burette. It is advisable to restandardize every ten or fifteen days. One ml. of the solution is equivalent to about 0.001 g. of iron.

(2) Dissolve 50 mg. of National Bureau of Standards Sample No. 42 (melting point standard for tin) by warming gently with a small amount of hydrochloric acid. Add 100 ml. of water and 50 ml. of hydrochloric acid. Reduce the tin and titrate according to the procedure for tin in aluminum in Chapter on Aluminum.

Starch Solution.—One gram of potato or arrowroot starch or soluble starch are rubbed up to a paste with cold water, and the paste is poured into 1 liter of boiling distilled water.

Preservatives.—Various substances may be used: (*a*) 2 mg. of mercuric iodide added to the hot solution; (*b*) A few ml. of 5% NaOH added to the hot solution; (*c*) 10 ml. of 1% solution of salicylic acid per liter of starch solution; (*d*) A few drops of chloroform per liter of the starch solution; (*e*) A few ml. of 10% $ZnCl_2$ solution per liter of starch. (*f*) Sodium chloride and acetic acid.—The starch solution is prepared by adding 500 ml. of a saturated solution of sodium chloride (filtered), 100 ml. of 80% acetic acid and 3 g. of starch, mixing the substances in the cold, then boiling about 2 minutes. A solution thus prepared keeps indefinitely.

Strontium Carrier Solution.—Dissolve 0.280 g. of strontium nitrate in water and make up volume to 10.0 ml.

Sulfanilamide Solution.—Prepare a saturated solution of *p*-aminobenzenesulfonamide in water. This solution contains about 0.4 g. per 100 ml.

Sulfuric Acid Standard Solution.—Normal sulfuric acid contains 49.039 g. of H_2SO_4 per liter of solution. To make a liter of the normal acid the amount of the standard acid required is calculated by the formula:

$$\frac{100 \times 49.039}{\text{per cent } H_2SO_4 \text{ in standard}} = \text{grams standard acid necessary}$$

The acid is weighed out in a small beaker, a slight excess being taken (0.1 g.). The acid is washed into a liter flask and made to volume. An aliquot portion is standardized against the standard sodium carbonate. The solution may now be adjusted to the exact strength required.

Sulfurous Acid, Dilute.—Saturate water with sulfur dioxide and dilute to 1:50.

Superchrome Garnet Y Standard Solution.—Mix 50 ml. each of 2 *M* acetic acid and 2 *M* sodium acetate, 40 ml. of aluminum chloride solution (50 micrograms of aluminum per ml.), 48 ml. of 0.1% aqueous solution of the National Aniline dye or 33.2 ml. of the 0.1% aqueous solution of the Du Pont dye, and water to make 1 liter.

Tartrate Solution, Alkaline.—25 g. of sodium potassium tartrate, $NaKC_4H_4O_6 \cdot 4H_2O$, is dissolved in 50 ml. of water. A little ammonia is added and then sodium sulfide solution. After settling for some time the reagent is filtered. The filtrate is acidified with hydrochloric acid, boiled free of H_2S, again made ammoniacal and diluted to 100 ml.

Tellurium Standard Solution.—Dissolve 1 g. of pure tellurium in nitric acid. Add 50 ml. of sulfuric acid and evaporate to fumes. Dilute in a 1-liter volumetric flask with water, 1 ml. = 1 mg. of Te.

ARIZONA TESTING MANUAL FOR AIR POLLUTANT EMISSIONS

REVISION F
March 1992

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
3033 NORTH CENTRAL AVENU, PHOENIX, ARIZONA 85012

All sections and exhibits of the Arizona Testing Manual for Air Pollutant Emissions have been updated or otherwise amended in this revision (Revision F).

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1.0 INTRODUCTION

The Office Air Quality (OAQ), acting for the Director of the Department of Environmental Quality, is responsible for determining each regulated air pollution source's capability and continuing ability to comply with air pollution source's emission rules, adopted by the Director pursuant to Arizona Revised statutes §49 - 401 et seq.; and any terms of conditional permits issued by the Arizona Air Pollution Control Hearing Board. This applies to all sources under the jurisdiction of the Department in matters of air pollution control.

Performance tests, and/or visible emissions observations by agency personnel, are required to assure that sources are compliant with all applicable emission limitations at all major emission points before air pollution source operating permit are issued or renewed. If OAQ engineering analysis and field inspection provide defensible assurance of compliance, these requirements may be waived. OAQ may also require additional performance testing at anytime during the permit period when lack of compliance with the applicable rules is demonstrated or suspected.

1.1 PERFORMANCE TEST PLANNING AND APPROVAL

Performance testing for regulated pollutants is required of all sources subject to air pollution control for verification of compliance with applicable Arizona rules, unless compliance can be assured and documented by a department engineering analysis confirmed by on-site inspections.

Regulated air pollution sources shall conduct any required compliance verification performance testing in accordance with OAQ approved methods.

All performance testing and field evaluations to determine the compliance status of regulated air pollution sources is subject to on-site verification by qualified OAQ representatives. Advance notice of performance testing shall be given to OAQ in accordance with A.A.C. R18-2-312.D.

Sources subject to performance testing must also provide test facilities and test plans in accordance with A.A.C. R18-2-312. OAQ approval of test plans and any variations from approved test methods is required. Failure to obtain prior approval for plans and any variations from approved methods may result in rejection of the performance testing results. Requirements for performance test plans are outlined in Exhibit 1.2-1.

In order to work out the logistics of each test, and to arrange for an OAQ observer to be present at the test, a pre-test meeting should be arranged with OAQ at least 14 days before testing is to occur.

Major sources having multiple emission points must submit facility test schedules assuring annual testing of major emission points and rotational testing of minor emissions points as required by permit conditions. Rotational testing of identical or essentially similar air pollution control devices may also be authorized through permit conditions.

1.2.1 AGENCY OBSERVER REQUIREMENTS

OAQ representatives assigned to performance test verifications are required to have a degree in engineering or a related air pollution control discipline from an accredited college, or its equivalent. Each OAQ observer undergoes ongoing technical training to assure initial and continuing proficiency. Each observer is also required to maintain current certification as a visible emissions evaluator.

1.2.2 VISIBLE EMISSIONS EVALUATOR TRAINING AND CERTIFICATION

Approved training in visually measuring emissions is necessary for proper use of EPA Reference Method 9 (40 CFR 60, Appendix A). Opacity measurement training may be provided by OAQ, or through another OAQ-recognized training program.

Certification testing will be conducted by OAQ personnel or OAQ-recognized training personnel. Training course and certification costs for persons other than OAQ personnel are not the responsibility of ADEQ.

Equipment utilized for visible emissions evaluator training must be calibrated, operated, and maintained in accordance with the procedures contained in EPA Reference Method 9 (40 CFR 60, Appendix A).

To receive initial certification as a visible emissions evaluator, a candidate must successfully attend an OAQ or OAQ-recognized training school on the theory and practice of visible emissions evaluation, and pass the field certification test for measuring visible emissions within six months thereafter.

To maintain certification, a person must retake a recognized training course once every two years and repass he field certification test once every six months.

Exhibit 1.2-1

PERFORMANCE TEST PLAN REQUIREMENTS

The information specified below must be submitted to the Compliance Unit of the Office of Air Quality at least 14 working days prior to the scheduled test date. This information is required in order to insure that proper test methods and procedures are utilized. The Compliance Unit will review the test plan, and in the event of any deficiencies or comments concerning the plan, will contact the company to discuss the test plan. Submittal of this information will minimize the possibility of a test being rejected as a result of improper sampling or data collection procedures.

All testing shall be performed in strict accordance with the procedures, specified in an OAQ approved test plan.

Any proposed variation in the sampling or analytical procedures must receive approval from OAQ Compliance prior to testing. Appropriate chain of custody procedures must be followed during the sampling and analysis.

The following information should be included in the performance test plan:

1. Source Information:
    - A. Name (including serial number of equipment), address, and location of the facility being tested.
    - B. Responsible persons at the facility and telephone number.

2. Testing Firm Information:
    - A. Name and address of the firm conducting the testing.
    - B. Responsible person at the testing firm and telephone number.

3. Sampling Equipment:
    - A. A description of the emission sampling equipment including a schematic diagram of the sampling train.

4. Procedures:
    - A. Types of pollutants to be sampled.
    - B. A description of the sampling and analysis procedures.
    - C. Documentation for any proposed variations from OAQ approved procedures.

5. Emission Point Information:
    - A. A diagram of the stack showing the dimensions, and the configuration of the sampling location, location of continuous emission monitor (CEM) probes, and the distances to the nearest upstream and downstream flow interferences.

B. A cross-sectional sketch of the stack at the sampling location, showing the locations of the sampling traverse points.

C. Estimated flue gas conditions at the sampling location, including temperature, moisture content, and velocity.

6. Process Information:
   - A. Schematic diagram identifying gas flow from origination point to exit point, including identification of all control devices, fans and bypasses.
   - B. Other specific process information may be required on a case-by-case basis.

7. Process Equipment:
   - A. A description of the process equipment, including a process flow sheet.
   - B. Type and quantity of raw materials, catalysts, and products being used or produced in the process.
   - C. Maximum rated capacity of the process.
   - D. Actual maximum operating of the process.
   - E. Operating capacity during the previous six-month period.
   - F. Process data being monitored and recorded to insure representative operation throughout the test, including during the sampling interval.
   - G. Normal process operating schedule during a 24-hour period.
   - H. Normal maintenance schedule for this process.
   - I. Types of fuel used in production.

8. Control Equipment:
   - A. Description of emission control system, including the types of control equipment, manufacturer of control equipment, the rated capacity and efficiency of the control equipment.
   - B. Data to be monitored and recorded to insure representative operation of the control equipment during testing and the sampling period for recording.
   - C. Minimum acceptable values of all control devices parameters such as flow rates, pressure drops, temperature, and voltage of electrical input.
   - D. Description of any preconditioning of gases used with control equipment.
   - E. Normal maintenance schedule on control equipment for the previous year.

9. Data Sheets:
   - A. Copies of all field data sheets to be used during the test, including data sheets to record process and control equipment parameters.

10. Chain of Custody:
    - A. A description of the procedures that will be followed to maintain the integrity of the samples collected.
    - B. Copies of chain of custody seals and data sheets.

11. Quality Control:
    (The following items should be available to the OAQ observer of the performance test prior to the start of the test.)
    - A. Calibration sheets for the dry gas meter, pitot tube, nozzle, and other equipment requiring calibration.
    - B. Quality assurance control charts for the analytical procedures to be used in the analysis of the test samples.
    - C. A list of preweighted filters to be used during particulate emissions testing.

Exhibit 1.2-2

PROCESS AND CONTROL OPERATING PARAMETERS TO BE RECORDED AT LEAST EVERY 30 MINUTES

ASPHALT PLANTS

Process Rate
Recycle Rate
Drum Temperature

POWER PLANTS

Generation Rate
Coal Feed Rate
Opacity, SO_2, NOx and %CO_2 or %O_2 from CEM's (record at least every 15 minutes)
Coal Analysis

OTHER SOURCES

Process Rate
Other parameters as applicable

ESP

Operating voltage (per field)
Operating current (per field)
Spark rate
Cleaning cycle
Fan current or speed

SCRUBBER

Pressure drop
Water flow rate
Water supply pressure
Fan speed or current
Other parameters such as pH values, as applicable

BAGHOUSE

Pressure drop (total)
Pressure drop (each compartment)
Number, type, and temperature range of bags
Damper position
Fan current or speed
Cleaning cycle

1.3 QUALITY ASSURANCE PROVISIONS

1.3.1 QUALITY ASSURANCE PROCEDURES

The applicable procedures contained in the Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III - Stationary Source Specific Methods, incorporated herein by reference, shall be used.

1.3.2. EQUIPMENT MAINTENANCE AND CALIBRATION

Performance test equipment, including instrumentation, must be maintained in accordance with manufacturers' instructions and good engineering practice. Instrumentation for measurement of pertinent physical parameters shall be currently calibrated with traceability to documented reference standards or procedures.. Verification of such maintenance and calibration must be documented in each test record.

Performance of all calibration and control checks required by the approved test methods must be documented.

1.3.3. QUALITY ASSURANCE AUDITS

Audits of the sampling equipment and of the analytical techniques used may be required at any time during performance testing. The OAQ may use the results of such audits to determine the acceptability of test results.

1.4.1. OAQ OBSERVER ACTIVITIES

OAQ personnel are assigned to observe all performance testing activities. Observation of laboratory analysis may also be performed.

Visible emissions observations are recorded by the observer at appropriate times during performance testing. A summary of the field observations is documented.

1.4.2. TEST PROCEDURES

The procedures used during performance tests and subsequent sample analysis shall conform to that agreed upon in an approved test plan and/or at a pre-test meeting. When necessary, the OAQ observer may authorize minor modifications to agreed procedures at the time of the test.

The number of test runs required shall be in accordance with A.A.C. R18-2-312.F.

1.4.3. TEST DOCUMENTATION AND REPORTING

The OAQ observer may initial field data sheets, and may require that copies be provided on-site. Preliminary results may be required to be furnished on-site if feasible, or by telephone within three days of completion of the testing. The final test report shall be submitted to the OAQ within four weeks after the completion of testing. The test report will contain, at a minimum, the information listed in Exhibit 1.4.3-1. All pages of the report must be numbered to maximize it usefulness. All test samples must be maintained and be available to OAQ upon request for a period of one year after testing. A complete copy of all test records shall be retained by the source for a minimum period of three (3) years. This record shall include all applicable documents noted in this manual.

Exhibit 1.4.3-1

PERFORMANCE TEST REPORT OUTLINE

GENERAL
1. Plant name and location.
2. Source sampled.
3. Testing company or agency, name and address.

CERTIFICATION
1. Certification by team leader.
2. Certification by reviewer (e.g., P.E.).

TABLES OF CONTENTS (Include page numbers)

INTRODUCTION
1. Test purpose.
2. Test location, type of process.
3. Test dates.
4. Pollutants tested.
5. Observers' names (source and ~~OAQ~~ *AQD*).
6. Any other important background information.

SUMMARY OF RESULTS
1. Emission results.
2. Process data.
3. Allowable emissions.
4. Discussion of errors, both real and apparent.

SOURCE OPERATION
1. Description of source and control devises.
2. Process and control equipment diagram.
3. Process and control equipment data.
4. Representativeness of materials and operation.
5. Demonstration of any specially-required operation.

SAMPLING AND ANALYSIS PROCEDURES
1. Sampling port location and cross-section with dimensions.
2. Sampling port description, including labeling system.
3. Sampling train description.
4. Description of sampling procedures, and any deviations from standard procedures .
5. Description of analytical procedures, and any deviations from standard procedures.

Exhibit 1.4.3-1 (Cont.)

APPENDICES
1. Complete results with example calculations.
2. Copies of original field and laboratory data sheets.
3. Copies of original production data signed by plant official.
4. Test log.
5. Calibration procedures and results.
6. Project participants and titles.
7. Related correspondence.

1.4.4. TEST REPORT REVIEW

Upon the submittal of the final test report, the report is checked for completion, and the results are checked for accuracy and compliance with the applicable emission limits. The results of this review is documented on <u>Exhibit 1.4.4-1.</u>

The source will be notified of the results of the review and any additional information or testing that may be required.

Exhibit 1.4.4-1

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

OFFICE OF AIR QUALITY

COMPLIANCE TEST REPORT

Name of Company________________________ County_______________

Source Tested____

Person Submitting Test Report________________________________

Date(s) of Test(s)____

Circle One: PASS FAIL Process Rate_______________

Plant Emission Rates____

Maximum Allowable Emission Rate______________________________

Review of Test Method____

Review of Test Calculations__________________________________

____

____

Report Demonstrates Compliance with Applicable Emission Standards

____

____

Reviewer ____________________________ Date_______________

Comments (Precision and accuracy of replicate tests, percent isokinetic sampling, operating anonmalies):

____

____

____

cc: ___ Source Permit File
___ Permit Engineer
___ Source

ADA:JLG:101-88

PROCEDURES FOR PREVENTION OF EMERGENCY EPISODES

1988 Edition

Arizona Department of Environmental Quality

Office of Air Quality Control (OAQ)

10/18/88

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1. Introduction 1
2. Air Quality Advisory 1
3. Alert Stage 2
4. Warning Stage 3
5. Emergency Stage 4
6. Episode Termination 5

1.0 Introduction

Air quality surveillance will be maintained by the State, local agencies and private industries to check compliance with air quality and emission standards and detect potential episodes.

Complaints from the general public reporting poor air quality will be another indication of possible episodes.

Meteorology will be monitored continuously by the National Weather Service and the State to detect potential episodes caused by atmospheric stagnation conditions.

When theres activities indicate that pollutant concentrations will increase, or have increased, to harmful levels, certain actions will be taken by the Department or local pollution control agencies to alleviate conditions and inform the public. Narrative descriptions of these actions follow.

2.0 Air Quality Advisory

Air quality advisories will be issued for public information purposes when pollutant concentrations are significantly elevated. Advisories shall include information regarding the affected areas, pollutant concentrations, sources of the pollutant, meteorology and a warning that sensitive persons should avoid undue exposure. There will be two types of air quality advisories:

2.1 Urban

An urban advisory will be issued when concentrations are expected to be near but below alert level in an urban area. An urban advisory will be prepared by the local pollution control agencies in consultation with the Department.

2.2 Rural/Industrial

A rural/industrial advisory will be declared when exceedances of an alert level in rural areas occur as a result of industrial emissions, and such exceedances are not expected to recur due to expected emissions reductions. A rural/industrial advisory will be issued by the Department in consultation with local air pollution control agencies, health departments, and industries.

3.0 Alert Stage

When exceedances of an alert level occur and are expected to continue or recur within 24 hours, the Assistant Director, OAQ, will be advised that an alert stage exists.

The Assistant Director will prepare a news release in which the affected area, pollutant concentrations, emissions, and meteorological conditions are described. Persons sensitive to air pollution will be warned to remain indoors as much as possible and all persons will be warned to avoid prolonged or strenuous exertion while outside. The news release will be issued by the Public Information Officer.

In the case of automotive-related pollutants, the Assistant Director will request the general public to restrict motor vehicle usage as much as possible. For industrial pollutants, he will request emission reduction by applicable sources under State jurisdiction. He will contact local control agencies and health departments in the affected area to inform them of the situation and request emission reduction by applicable sources under their jurisdiction.

The meteorologist will evaluate air quality and meteorological data to determine the effectiveness of initial control actions and to forecast air quality.

4.0 Warning Stage

When exceedances of a warning level occur and are expected to continue or recur within 24 hours, the Assistant Director will be advised that a warning stage exists.

The Assistant Director will prepare a news release in which the affected area, the pollutant concentrations, emissions, and the meteorology are described. The general public will be urged to remain indoors whenever possible and avoid prolonged or strenuous exertion. A statement that the applicable sources have been asked to further curtail their emissions will be included in the press release.

In the case of automotive-related pollutants, the Assistant Director will request schools and industrial, business and government facilities to curtail activities as much as possible to restrict motor vehicle traffic. He will request that athletic events such as football and basketball games be postponed. For other pollutants, he will request increased emission reduction by applicable sources under State jurisdiction. He will contact local control agencies and health departments in the affected area and request increased emission reduction by applicable sources under their jurisdiction.

Warning stage control actions shall also be implemented when an alert stage has persisted for 48 hours with no improvement in air quality or meteorology.

A news release will be prepared by the Assistant Director, reviewed by the Director, Department of Environmental Quality and released by the Public Information Officer.

The meteorologist will evaluate air quality and meteorological data to evaluate the effectiveness of additional control actions and to forecast air quality.

5.0 Emergency Stage

When exceedances of an emergency level occur and are expected to continue or recur within 24 hours, or, 48 hours after a warning has been declared, air pollution concentrations and meteorological conditions do not improve, the Director will be advised that an emergency stage exists.

The Assistant Director will notify the Director that an emergency stage has been reached and that the Office of the Governor must be notified. As directed by the Governor, all industrial, construction, commercial, governmental and institutional facilities and activities, except those necessary for public safety, health and welfare, may be closed. The use of motor vehicles may be prohibited except in emergency situations which have been approved by local law enforcement officials.

All control directives and press releases shall come from the Office of the Governor. Office of Air Quality will provide the necessary information regarding air quality, emissions, meteorology and health effects.

6.0 Episode Termination

The meteorologist will notify the Assistant Director when monitoring data indicate that no episode stage exists and that improved conditions are expected to continue.

The Assistant Director will advise the Director that an episode termination notice will be isssued. Appropriate communications to local control agencies, health departments, industries, and other emission sources, and the general public will be issued. Industries and other emission sources will be advised that normal operations can be resumed.

A report describing the episode will be prepared by OAQ and forwarded to the U.S. Environmental Protection Agency.

JLG:lb

10/14/88