TITLE 20 ENVIRONMENTAL PROTECTION
CHAPTER 2 AIR QUALITY (STATEWIDE)
PART 14 PARTICULATE EMISSIONS FROM COAL BURNING EQUIPMENT

20.2.14.1 ISSUING AGENCY: Environmental Improvement Board.
[11/30/95; 20.2.14.1 NMAC - Rn, 20 NMAC 2.14.100 10/31/02]

20.2.14.2 SCOPE: All geographic areas within the jurisdiction of the Environmental Improvement Board.
[11/30/95; 20.2.14.2 NMAC - Rn, 20 NMAC 2.14.101 10/31/02]

20.2.14.3 STATUTORY AUTHORITY: Environmental Improvement Act, NMSA 1978, Section 74-1-8(A)(4) and (7), and Air Quality Control Act, NMSA 1978, Sections 74-2-1 et seq., including specifically, Section 74-2-5(A), (B) and (C).
[11/30/95; 20.2.14.3 NMAC - Rn, 20 NMAC 2.14.102 10/31/02]

20.2.14.4 DURATION: Permanent.
[11/30/95; 20.2.14.4 NMAC - Rn, 20 NMAC 2.14.103 10/31/02]

20.2.14.5 EFFECTIVE DATE: November 30, 1995.
[11/30/95; 20.2.14.5 NMAC - Rn, 20 NMAC 2.14.104 10/31/02]
[The latest effective date of any section in this Part is 10/31/02.]

20.2.14.6 OBJECTIVE: The objective of this Part is to establish particulate matter emission standards for coal burning equipment.
[11/30/95; 20.2.14.6 NMAC - Rn, 20 NMAC 2.14.105 10/31/02]

20.2.14.7 DEFINITIONS: In addition to the terms defined in 20.2.2 NMAC (Definitions), as used in this Part:

A. "Commenced" means that an owner or operator has undertaken a continuous program of construction or that an owner or operator has entered into a binding agreement or contractual obligation to undertake and complete, within a reasonable time, a continuous program of construction.

B. "Construction" means fabrication, erection, or installation of an affected facility.

C. "Existing coal burning equipment" means coal burning equipment that was fully constructed and operational or under construction prior to September 1, 1971.

D. "New coal burning equipment" means coal burning equipment the construction of which is commenced after September 1, 1971.

E. "Part" means an air quality control regulation under Title 20, Chapter 2 of the New Mexico Administrative Code, unless otherwise noted, as adopted or amended by the Board.
[11/30/95; 20.2.14.7 NMAC - Rn, 20 NMAC 2.14.107 10/31/02]

20.2.14.8 AMENDMENT AND SUPERSESSION OF PRIOR REGULATIONS: This Part amends and supersedes Air Quality Control Regulation ("AQCR") 504 -- Particulate Emissions from Coal Burning Equipment last filed June 13, 1978.

A. All references to AQCR 504 in any other rule shall be construed as a reference to this Part.

B. The amendment and supersession of AQCR 504 shall not affect any administrative or judicial enforcement action pending on the effective date of such amendment nor the validity of any permit issued pursuant to AQCR 504.
[11/30/95; 20.2.14.8 NMAC - Rn, 20 NMAC 2.14.106 10/31/02]

20.2.14.9 DOCUMENTS: Documents cited in this Part may be viewed at the New Mexico Environment Department, Air Quality Bureau, Harold Runnels Building, 1190 Saint Francis Drive, Santa Fe, NM, 87503 [2048 Galisteo St., Santa Fe, NM 87505].
[11/30/95; 20.2.14.9 NMAC - Rn, 20 NMAC 2.14.108 10/31/02]

20.2.14.10 to 20.2.14.199 [RESERVED]

20.2.14.200 Emission Limitations - Equipment Less Than or Equal to 250 MBTU/Hour Heat Capacity:

A. The owner or operator of coal burning equipment having a rated heat capacity less than or equal to 250 million British Thermal Units per hour (higher heating value) shall not permit, cause, suffer or allow particulate matter emissions to the atmosphere to exceed the limits set forth in the following table:

I Heat Input in Million British Thermal Units Per Hour (higher heating value)	E Maximum Allowable Emissions for Particulate Matter in Pounds per Million British Thermal Units Input Per Hour
10	0.56
20	0.48
30	0.43
40	0.40
50	0.38
70	0.35
100	0.33
200	0.28
250	0.26

B. For values of heat input not specified in the table, maximum allowable emissions shall be calculated by the following formula:

(1) E = Allowable Particulate Emissions (lbs./million BTU);

(2) I = Total Heat Input (in units of million BTU's /hr., higher heating value);

(3) When I equals 1 to 250, E equals 0.996135 times I raised to the power -0.23471.

[11/30/95; 20.2.14.200 NMAC - Rn, 20 NMAC 2.14.200 10/31/02]

20.2.14.201 Emission Limitations - New Equipment Greater Than 250M BTU/Hour Heat Capacity: The owner or operator of new coal burning equipment having a rated heat capacity greater than 250 million British Thermal Units per hour (higher heating value) shall not permit, cause, suffer, or allow:

A. Particulate matter emissions to the atmosphere in excess of 0.05 pounds per million British Thermal Units of heat input (higher heating value); or

B. Fine particulate matter emissions of less than two microns equivalent aerodynamic diameter to the atmosphere in excess of 0.02 pounds per million British Thermal Units of heat input (higher heating value) as determined pursuant to Procedure I for fine particulate sampling from stationary coal burning equipment set forth in 20.2.14.300 NMAC -20.2.14.399 NMAC or an equivalent method approved by the Department.

[11/30/95; 20.2.14.201 NMAC - Rn, 20 NMAC 2.14.201 10/31/02]

20.2.14.202 Emission Limitations - Existing Equipment Greater Than 250M BTU/Hour and Less Than 5000M BTU/Hour Heat Capacity: The owner or operator of existing coal burning equipment having a rated heat capacity greater than 250 million British Thermal Units and less than 5000 million British Thermal Units per hour (higher heating value) shall not permit, cause, suffer or allow:

A. Particulate matter emissions to the atmosphere in excess of 0.05 pounds per million British Thermal Units of heat input (higher heating value); or

B. Fine particulate matter emissions of less than two microns equivalent aerodynamic diameter to the atmosphere in excess of 0.04 pounds per million British Thermal Units of heat input (higher heating value) as determined pursuant to Procedure II for fine particulate sampling from stationary coal burning equipment set forth in 20.2.14.400 NMAC - 20.2.14.499 NMAC or an equivalent method approved by the Department.

[11/30/95; 20.2.14.202 NMAC - Rn, 20 NMAC 2.14.202 10/31/02]

20.2.14.203 Emission Limitations--Existing Equipment Equal to or Greater Than 5000M BTU/Hour: After December 31, 1982, The owner or operator of existing coal burning equipment having a rated heat capacity equal to or greater than 5000 million British Thermal Units per hour (higher heating value) shall not permit, cause, suffer, or allow:

A. Particulate matter emissions to the atmosphere in excess of 0.05 pounds per million British Thermal Units of heat input (higher heating value); or

B. Fine particulate matter emissions of less than two microns equivalent aerodynamic diameter to the atmosphere in excess of 0.04 pounds per million British Thermal Units of heat input (higher heating value) as determined pursuant to Procedure II for fine particulate sampling from stationary coal burning equipment set forth in 20.2.14.400 NMAC - 20.2.14.499 NMAC or an equivalent method approved by the Department.
[11/30/95; 20.2.14.203 NMAC - Rn, 20 NMAC 2.14.203 10/31/02]

20.2.14.204 Method for Determining Emissions Limitations: Particulate matter emissions governed by 20.2.14.200 NMAC, and subsection A of 20.2.14.201 NMAC, subsection A of 20.2.14.202 NMAC, and subsection A of 20.2.14.203 NMAC, shall be determined by a method consistent with the method set forth by the US EPA at 40 CFR, Part 60, Appendix A, Methods 1 through 5, or any other method receiving prior approval from the Department.
[11/30/95; 20.2.14.204 NMAC - Rn, 20 NMAC 2.14.204 10/31/02]

20.2.14.205 Petition for Test Method of Emission Limitation for Existing Equipment - Heat Capacity Equal to or Greater than 5000M BTU/Hour:

A. With regard to existing coal burning equipment having a rated heat capacity greater than 250 million British Thermal Units and less than 5000 million British Thermal Units per hour (higher heating value) or with regard to existing coal burning equipment having a rated heat capacity equal to or greater than 5000 million British Thermal Units per hour (higher heating value) the Department, any other interested person or any person owning or operating existing coal burning equipment of such capacities may petition the Board to amend subsection B of 20.2.14.202 NMAC or subsection B of 20.2.14.203 NMAC to require all existing coal burning equipment of the capacity specified in 20.2.14.202 NMAC or 20.2.14.203 NMAC, whichever is the subject of the petition, to comply with the emission limitation of subsection B of 20.2.14.201 NMAC pursuant to the test method contained therein.

B. The Board, after receipt of the petition, shall:

(1) Notify all persons owning or operating coal burning equipment which are the subject of the petition of the filing of said petition, and the date of the Board's regularly scheduled meeting at which the Board plans to consider the request for hearing;

(2) Make available for public inspection a copy of the petition at its office;

(3) Not less than 30 days nor more than forty-five days after the mailing of the notification provided in paragraph (1) of subsection B of 20.2.14.205 NMAC at its regularly scheduled meeting, consider setting the date, time and place of a public hearing on the petition; provided, however, that if any person owning or operating coal burning equipment of the capacities covered by the petition appears before the Board at such meeting and informs the Board that it does not possess sufficient testing information to determine whether its equipment does or does not comply with the emission limitation contained in paragraph (2) of subsection A of 20.2.14.201 NMAC pursuant to the test method specified therein, the Board, if it determines additional testing information is justified, shall specify a period of testing deemed adequate to permit such person to conduct such testing and shall set the date of the public hearing on the petition at its next regularly scheduled meeting following the expiration of such testing period;

(4) Within five days following the scheduling of the hearing, notify the petitioner and all persons who own or operate the coal burning equipment affected by the petition by certified mail of the date, time and place of the public hearing on the petition;

(5) Publish notice of the hearing and conduct the hearing according to the procedures set forth in the New Mexico Air Quality Control Act, section 74-2-6; and

(6) At the conclusion of the hearing on the petition or at the next Board meeting after transcripts of the hearing are available, if the Board determines that all the equipment regulated pursuant to 20.2.14.202 NMAC and 20.2.14.203 NMAC, whichever was the subject of the hearing, complies with the emission limitation of subsection B of 20.2.14.201 NMAC pursuant to the test method contained therein, the Board may amend subsection B of 20.2.14.202 NMAC or subsection B of 20.2.14.203 NMAC, whichever was the subject of the hearing.
[11/30/95; 20.2.14.205 NMAC - Rn, 20 NMAC 2.14.205 10/31/02]

20.2.14.206 to 20.2.14.299 [RESERVED]

20.2.14.300 PROCEDURE I, INTRODUCTION: A method is specified for use in sampling the emissions from stationary coal-burning equipment for particulate matter of less than two microns (2u) equivalent aerodynamic diameter. This procedure shall be used for testing emissions from coal-burning equipment operating in the State of New Mexico for compliance with 20.2.14 NMAC (Particulate Emissions from Coal Burning Equipment), as

specified within the regulation. It is generally intended that sampling for fine particulates, as described below, be carried out only on those stacks (or ducts) which are controlled for gross particulates and which have already been demonstrated to be in compliance with the sections of the regulation for total particulate emissions.
[11/30/95; 20.2.14.300 NMAC - Rn, 20 NMAC 2.14.300 10/31/02]

20.2.14.301 PROCEDURE I, METHOD:

A. Principle: Particulate matter is withdrawn at an approximately isokinetic rate from the source, the large (over 2u) [over 2 micrometer] particles separated from the gas stream, and the fine particles collected on a filter. The weight of the fine particles is determined gravimetrically after removal of uncombined water.

B. Apparatus:

(1) Sampling Train: The recommended sampling train is shown schematically in Figure 1 (20.2.14.302 NMAC). It is based on the US EPA sampling train described in the Code of Federal Regulations, Title 40, Part 60, Appendix A, Method 5, Section 2.1 (hereinafter referred to as US EPA Method 5). To the Method 5 train is added a particle separator. The purpose of the particle separator is to trap essentially all of the particles greater than 2u [two micrometers]; to do this, a certain gas flowrate is required through this device as specified in Section 2.2.1.3.

(2) Nozzle: Stainless steel (type 304 or 316).

(3) Probe: Pyrex glass, insulated and heated uniformly to a temperature sufficient to prevent condensation from occurring at any point in the tube. For lengths greater than about 8 feet, a metal tube may be used. Incoloy 825 is preferred, but types 304 or 316 stainless steel are acceptable. Long probes shall be reinforced or supported to prevent excessive droop or gas stream whip. For sampling stacks carrying electrically charged particles (as for installations using electrostatic precipitators), the probe shall be grounded to prevent electrical shock to personnel and the inner shell of the probe shall be electrically conductive and shall be grounded to prevent size discriminative trapping of particles within the probe.

(4) Particulate Separator and Filter: The particle separator and filter system shall be housed in a temperature-controlled container.

(a) Particle Separator: The particle separator shall be a cascade impactor, such as the Andersen Mark II or Mark III Stack Head, manufactured by 2000 Inc., Atlanta, Georgia, or other if approved by the Department. The stack head must be modified to use only five of the collection plates arranged in the following order 0, 1, 2, 3, 4, 1 (manufacturer's numbers) and a filter holder as specified in subparagraph (b) of paragraph (4) of subsection B of 20.2.14.301 NMAC. The complete arrangement is shown in Figure 2 (20.2.14.303 NMAC). The gas flowrate through the stack head must be controlled to maintain a particle impaction efficiency of 50% on plate 4 for particles of 2 microns aerodynamic diameter. The procedure for doing this is described in paragraphs (3) and (4) of subsection D of 20.2.14.301 NMAC.

(b) Filter Holder: The filter holder shall immediately follow the last collection plate, as indicated in Figure 2 (20.2.14.303 NMAC), and contain a filter similar to those specified in paragraph (2) of subsection C of 20.2.14.301 NMAC.

(5) Metering System: Vacuum gage, leak-free pumps, thermometers capable of measuring to within 3 degrees Fahrenheit., dry test meter with 2 percent accuracy, and related equipment, as required to maintain an approximately isokinetic sampling rate through the probe and specified flowrate through the Andersen Stack Head, and to determine sample volume.

(6) Other Sampling Train Equipment: Pitot tube (type S, or equivalent), impingers/condensers, and barometer shall be as specified in US EPA Method 5, Section 2.1. Note that an equivalent condenser may be used in place of the impinger train.

(7) Sample Recovery Accessories: As specified in Section 2.2 of US EPA Method 5.

(8) Analytical Accessories: As specified in US EPA Method 5, Section 2.3.

C. Reagents:

(1) Sampling:

(2) Filters: Glass fiber type, having high efficiency for collecting small particles (99% or higher efficiency for particles 0.3 microns or larger in diameter). Cambridge Media CM-114 or Gelman Type A filters are acceptable types.

(3) Other Sampling Reagents: As specified in US EPA Method 5, Section 3.1.

(4) Sample Recovery and Analytical Reagents: Acetone and water, as specified in Sections 3.2 and 3.3 of US EPA Method 5.

D. Sampling Procedure:

(1) Selection of Sampling Site and Sampling Points: The sampling site is preferably located in a vertical duct or stack, at least eight stack diameters downstream and two diameters upstream of a major disturbance (bend, expansion, contraction, or visible flame). In large ducts (of 20 feet or greater diameter), a distance five diameters downstream of a disturbance will be considered adequate, providing the velocity traverse does not show the flow to be highly irregular. Under these recommended conditions, a single sampling point is considered to be adequate (See Industrial Gas Cleaning Institute, Test Procedures for Gas Scrubbers, Publication No. 1, p. 6): This point shall be located between 0.2 and 0.5 of the diameter from the outside toward the center of the stack, preferably at a point whose velocity approximates the average velocity of the flue gases. For conditions which do not meet the criteria given above, additional sampling points must be considered and will be determined as agreed upon between the coal-burning equipment operator and the Department.

(2) Determination of Stack Pressure, Temperatures, Moisture and Distribution of Velocity Heads: Prior to actual sampling for particulates, a preliminary survey of stack pressure, temperature, moisture content, and velocity distribution shall be made to assess overall sampling conditions and establish isokinetic sampling velocities.

(a) Stack Pressure and Temperature: Stack pressure shall be obtained at one or more points at the sampling station using a water-filled U-tube manometer to sense pressure from a hole in the side of the stack or duct to within 0.1 in water. Temperatures shall be determined from a thermocouple (or equivalent device) attached to the pitot tube, capable of measuring to within 1.5% of the minimum absolute stack temperature.

(b) Distribution of Velocity Heads: The US EPA Method 1 (40 CFR, Part 60, Appendix A) shall be used as a general guide in determining the number and distribution of pitot tube traverse points. US EPA Method 2 (40 CFR, Part 60, Appendix A) shall be used as a guide in selection of pitot tube equipment, procedure for making and recording measurements, and calibration of the instrument. In calibration, the procedure shall be modified in that the pitot tube to be used in testing shall be mounted on the probe and the probe shall have attached to it a 1/4-inch sampling nozzle so that the arrangement is similar to that used in testing. A complete velocity traverse shall be done each day of testing.

(c) Moisture Determination: Moisture content of the gas stream is determined by extracting a measured quantity of gas from the stack, condensing the moisture in an external condenser (or in the impingers), and measuring the volume of condensate. A single, preliminary measurement shall be made using either the stack sampling train or a simplified apparatus consisting mainly of a filter, condenser, pump, and dry gas meter. If liquid drops are present in the gas stream, proceed as follows: Assume the stream to be saturated, determine the average stack gas temperature from the data obtained in subparagraph (a) of paragraph (2) of subsection D of 20.2.14.301 NMAC above, and use a psychometric chart with appropriate altitude correction along with steam tables to calculate the approximate percentage of moisture. A further determination of moisture content is made as a part of the particulate sampling as described below.

(3) Preparation of Collection Train: Check to see that the probe, nozzle, etc., are clean and that there is sufficient ice to fill the ice bath, place 100 ml. of water in the first two impingers, leave the third impinger empty, and place approximately 200 g. of preweighed indicating silica gel in the fourth impinger. Complete the preparation by desiccating the filter, checking the train for leaks and adjusting the probe heater, generally as specified in US EPA Method 5, Section 4.1.2. To establish near isokinetic sampling conditions at the start of testing, the desired flowrate through the particle separator is corrected to stack conditions and the desired sample nozzle size is calculated. To do this record the temperature of the container surrounding the particle separator. Find this temperature in the abscissa of the graph in Figure 3 (20.2.14.304 NMAC), go up to the curve and read the correction factor on the ordinate of the graph. Multiply the correction factor by 2 microns and obtain the temperature corrected aerodynamic diameter. Locate the corrected aerodynamic diameter on the abscissa of the graph on Figure 4 (20.2.14.305 NMAC), go up to the curve and read on the ordinate the flowrate needed to maintain an impaction efficiency of 50% on plate #4. Correct this flowrate to stack conditions by adjusting for the difference in particle separator temperature and stack temperature. Using the equation Q = VA where Q = volumetric flowrate through the separator adjusted to stack temperature (cfm), V = velocity of the stack gas at the point in the stack where the sampling is to take place (fpm) and A is area of the nozzle (sq. ft.) calculate the desired sampling nozzle diameter. Attach a nozzle to the probe that matches this calculated diameter within 1%. To establish at the start of testing the correct gas flow through the separator, using the dry gas meter, correct the desired flowrate through the separator to meter conditions by correcting for the difference in temperature between the separator and the dry gas meter and subtract out that portion of the gas volume which will be condensed in the impingers.

(4) Particulate Train Operation: To begin sampling, position the nozzle at the selected point in the stack with the nozzle tip pointing directly into the gas stream. Immediately after, start the pump and adjust the dry gas meter to the flowrate calculated in paragraph (3) of subsection D of 20.2.14.301 NMAC. Sample for at least 5 minutes and then record the temperature of the gas on the outlet end of the separator. If the temperature is different from that of the container surrounding the separator readjust the dry gas meter flowrate by repeating the steps described in paragraph (3) of subsection D of 20.2.14.301 NMAC using Figures 3 (20.2.14.304 NMAC) and 4 (20.2.14.305 NMAC) excluding the step used in calculating nozzle diameter. Continue the run until 30 standard cubic feet (70 degrees Fahrenheit, 29.92 inches Hg) have been drawn through the sampling train. For each run record the required data on a sheet such as the one shown in Figure 5-2 of US EPA Method 5 and include the temperature monitored at the outlet of the separator. Record the data after every 5 minutes of testing. At the end of the run, turn off the pump and record the final readings. Remove the probe and nozzle from the stack. Remove the filter from the separator and place in a container. Repeat the sampling procedure until three runs have been obtained. Desiccate the filters for at least 24 hours and weigh to the nearest 0.5 mg in a room where the relative humidity is less than 50%.

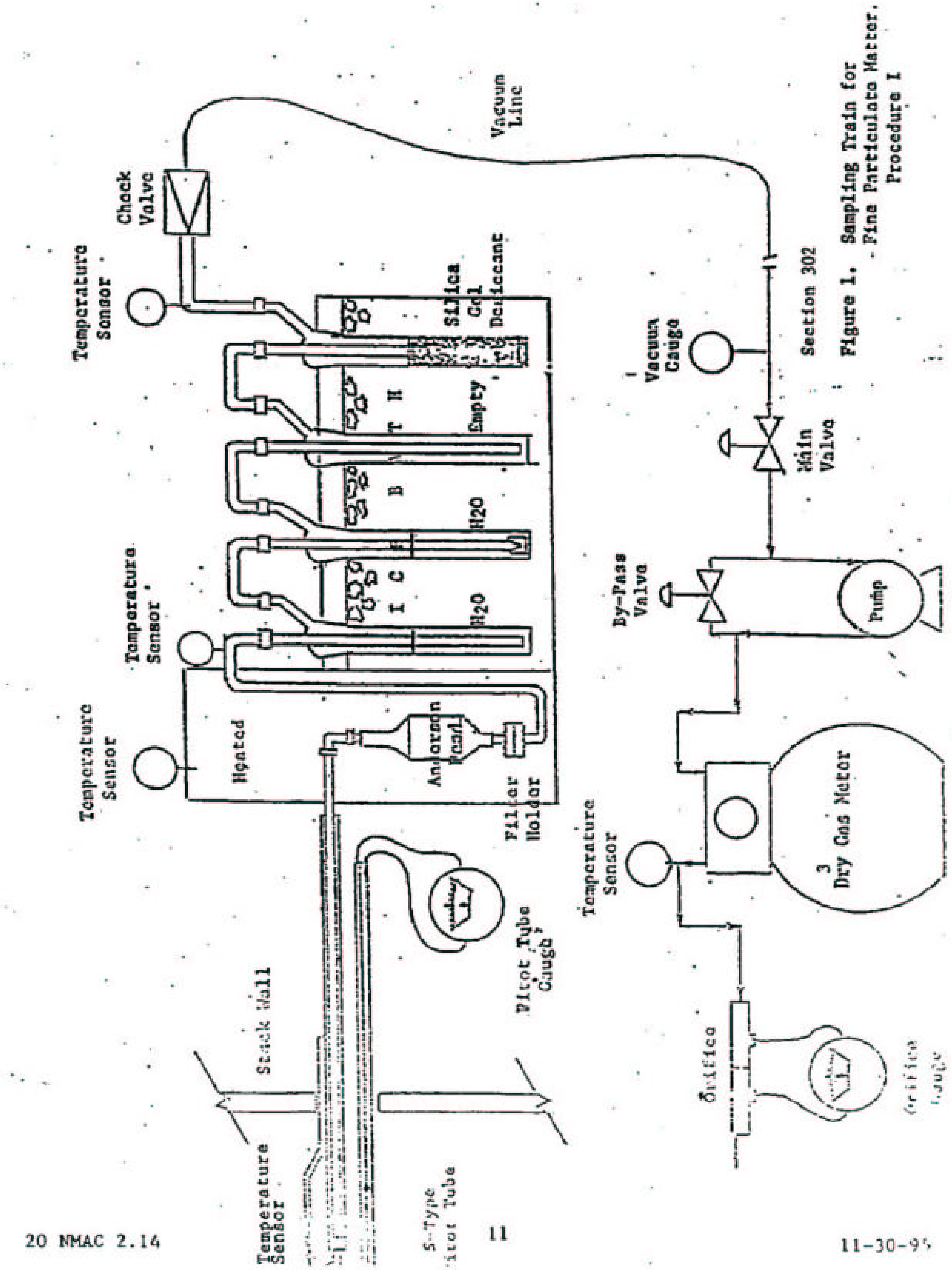
E. Calibration: Use approved methods and equipment for calibration of the particle separator, orifice meter, pitot tube, temperature sensors and dry test meter. Recalibrate after every third test or three months whichever comes first except for the particle separator which shall be recalibrated as agreed upon between the owner or operator of the coal burning equipment and the Department.

F. Calculations: After completing the test series, average the dry gas meter temperatures and average orifice pressure drops, correct the sample volume measure to standard conditions and calculate the water vapor and moisture content. Calculate the concentration of particulate matter in the stack gas in pounds per standard cubic foot on a dry basis by using equation 5-5 given in Section 6.6.2 of US EPA Method 5. Use only the weight of the particulate collected on the filter. Using the stack volumetric flowrate corrected to standard conditions on a dry basis calculate the emission rate in pounds per hour. Using the average heat input to the coal burning equipment during the time of testing, in million Btu per hour, calculate the emission rate in pounds per million Btu. Average the emission rate for the three runs.

G. Acceptable results: Validity of each run shall be determined by calculating the actual flow through the particle separator from the recorded data. If the flowrate is within 10% of the ideal flow calculated from Figure 4 (20.2.14.305 NMAC) the run will be considered valid. Deviations from isokinetic sampling rate shall not invalidate the test.

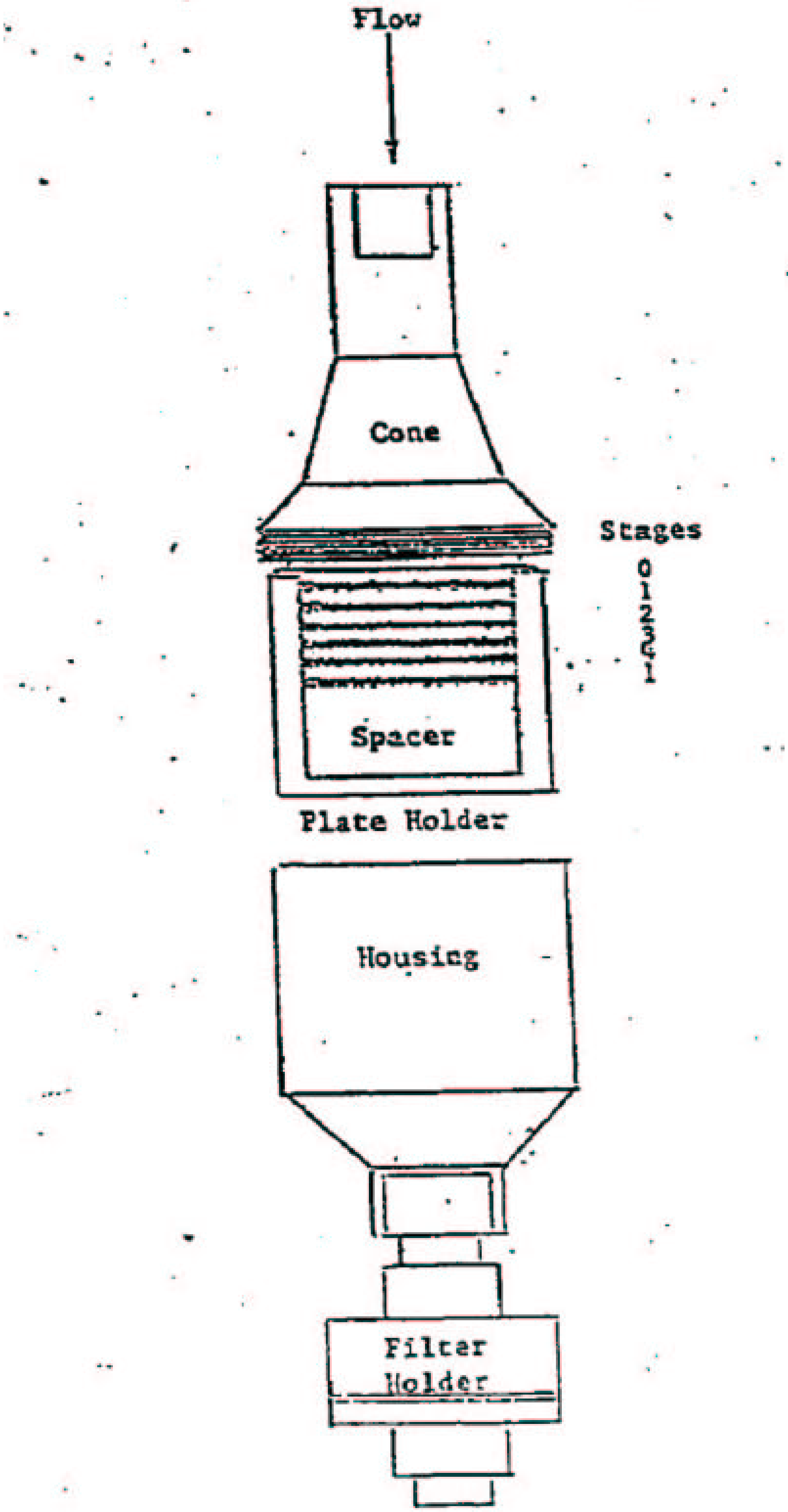
[11/30/95; 20.2.14.301 NMAC - Rn, 20 NMAC 2.14.301 10/31/02]

20.2.14.302 SAMPLING TRAIN FOR FINE PARTICULATE MATTER, PROCEDURE I: Figure 1.



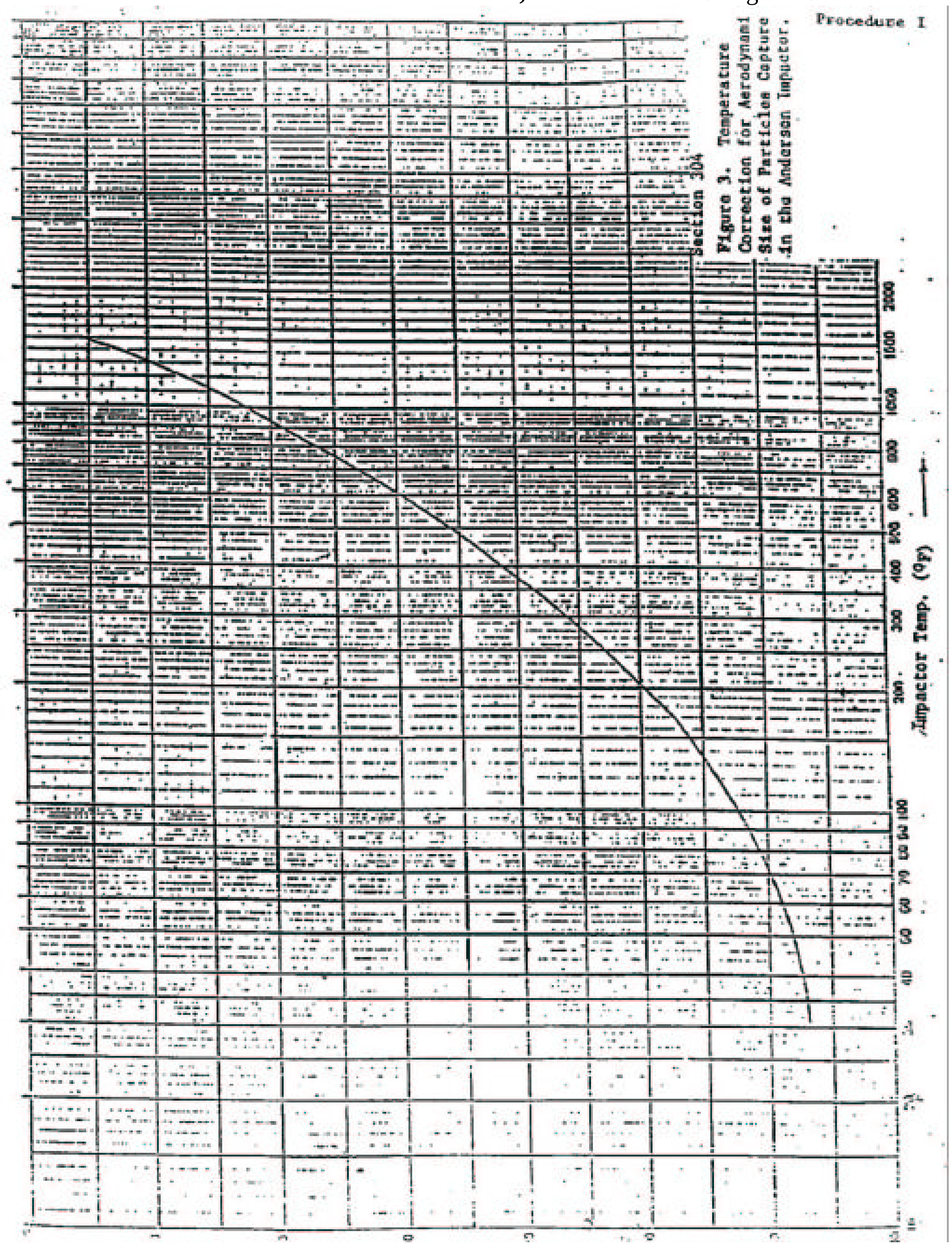
[11/30/95; 20.2.14.302 NMAC - Rn, 20 NMAC 2.14.302 10/31/02]

20.2.14.303 ARRANGEMENT OF IMPACTION PLATES AND FILTER HOLDER IN THE ANDERSON IMPACTOR, PROCEDURE I: Figure 2.



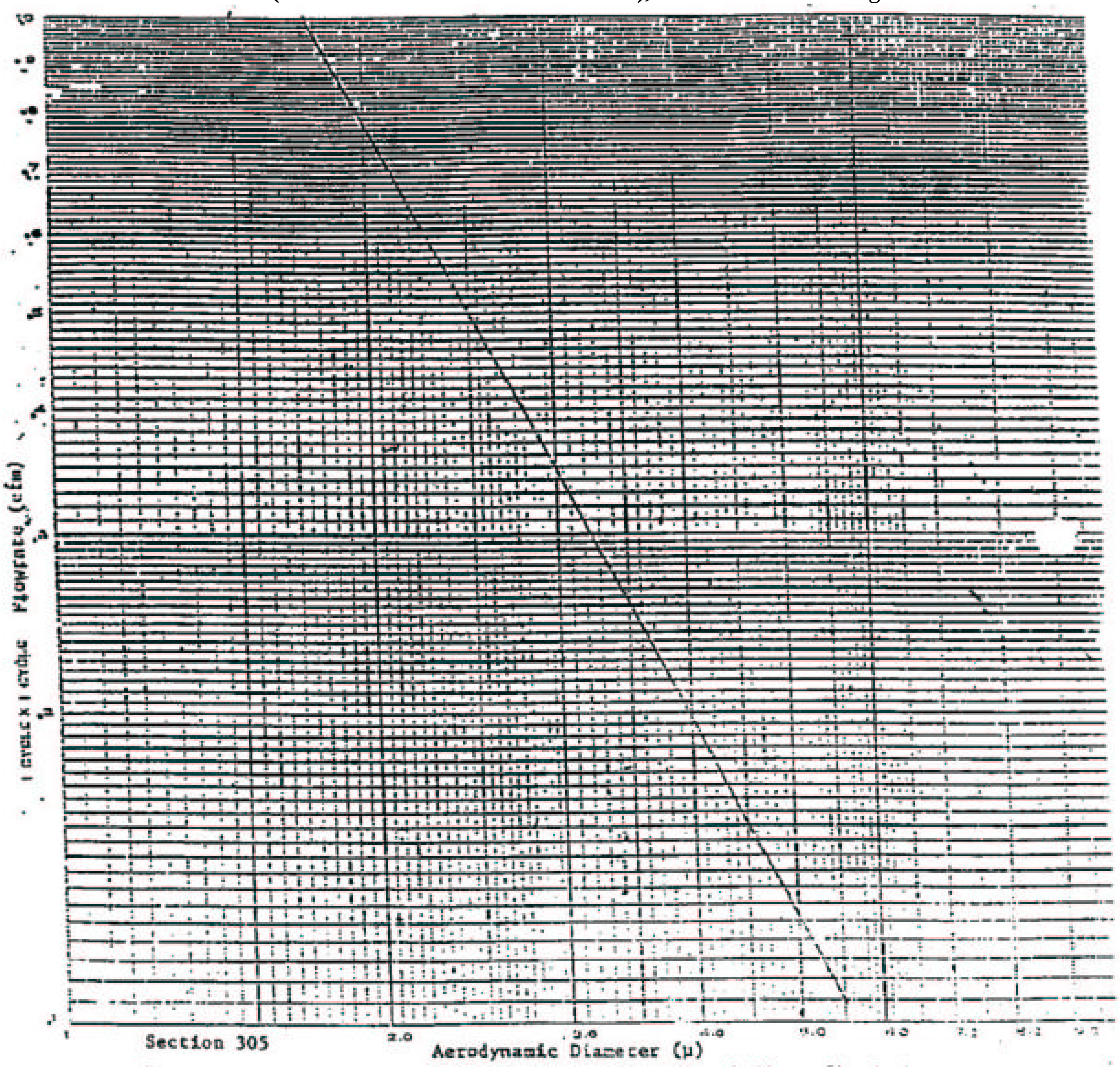
[11/30/95; 20.2.14.303 NMAC - Rn, 20 NMAC 2.14.303 10/31/02]

20.2.14.304 TEMPERATURE CORRECTION FOR AERODYNAMIC SIZE OF PARTICLES CAPTURED IN THE ANDERSON IMPACTOR, PROCEDURE I: Figure 3.



[11/30/95; 20.2.14.304 NMAC - Rn, 20 NMAC 2.14.304 10/31/02]

20.2.14.305 AERODYNAMIC DIAMETER VS. FLOWRATE THROUGH PLATE 44 OF THE ANDERSON IMPACTOR (50% IMPACTION EFFICIENCY), PROCEDURE I: Figure 4.



[11/30/95; 20.2.14.305 NMAC - Rn, 20 NMAC 2.14.305 10/31/02]

20.2.14.306 to 20.2.14.399 [RESERVED]

20.2.14.400 PROCEDURE II, INTRODUCTION: A method is specified for use in sampling the emissions from stationary coal burning equipment for particulate matter of less than two microns (2u) equivalent aerodynamic diameter. This procedure shall be used for testing emissions from coal burning equipment in the State of New Mexico for compliance with 20.2.14 NMAC (Particulate Emissions from Coal Burning Equipment), as specified within that regulation. It is generally intended that sampling for fine particulates, as described below, be carried out only on those stacks (or ducts) which have already been demonstrated to be in compliance with the sections of the regulation for total particulate emissions.
[11/30/95; 20.2.14.400 NMAC - Rn, 20 NMAC 2.14.400 10/31/02]

20.2.14.401 PROCEDURE II, METHOD:

A. Principle: Particulate matter is withdrawn at an approximately isokinetic rate from the source. The particles are then separated by equivalent aerodynamic diameter by an in-stack size separating device to determine the percentage by mass of particles less than 2 microns equivalent aerodynamic diameter. This percentage is then applied to the total mass loading in pounds per million British Thermal Units as determined by US EPA Method 5, contained in 40 CFR, Part 60, Appendix A, in order to determine emissions of particulates of less than two micron equivalent aerodynamic diameter in pounds per million British Thermal Units.

B. Apparatus:

(1) Sampling Train:

(a) The sampling train for total mass loading is described by the Environmental Protection Agency in 40 CFR, Part 60, Appendix A, Method 5 (hereinafter referred as US EPA Method 5). The percentage by mass of particles less than two microns equivalent aerodynamic diameter shall be as follows.

(b) The recommended sampling train is shown in Figure 1 (20.2.14.402 NMAC). It is based on the sampling train described in US EPA Method 5, Section 2.1, with the addition of an Andersen Mark III in-stack sampler. The purpose of the in-stack particle collector is to collect the particles and segregate them by aerodynamic size; to do this, a certain gas flowrate is required through this device as specified in paragraph (4) of subsection B of 20.2.14.401 NMAC.

(2) Nozzle: Stainless steel (type 304 or 316).

(3) Probe: Pyrex glass, insulated and heated uniformly to a temperature sufficient to prevent condensation from occurring at any point in the tube. For lengths greater than about 8 feet, a metal tube may be used. Incoloy 825 is preferred, but types 304 or 316 stainless steel are acceptable. Long probes shall be reinforced or supported to prevent excessive droop or gas stream whip. For sampling stacks carrying electrically charged particles (as for installations using electrostatic precipitators), the probe shall be grounded to prevent electrical shock to personnel and the inner shell of the probe shall be electrically conductive and shall be grounded to prevent size discriminative trapping of particles within the probe.

(4) Particulate Separator: The particle collector shall be heated so that the temperature of the collection plates and back up filter is above the dew point of the stack gases.

(5) Particle Collector: The particle collector shall be a cascade impactor, such as the Andersen Mark III Stack Sampler (Mark III sampler) manufactured by 2000 Inc., Atlanta, Georgia or other similar cascade impactor approved by the Department. The Mark III Sampler shall use a complete set of collector plates consisting of the following: Ten plates numbered 0, 1, 2, 3, 4, 5, 6, 7, 8, and F, eleven spacers, eight crossbars, eight glass fiber collection discs, one glass fiber filter, and one plate holder. Collector plates are installed as follows; 0, 1, 2, 3, 4, 5, 6, 7, 8, F. The complete arrangement is shown in Figure 2 (20.2.14.403 NMAC). The gas flowrate through the Mark III Sampler must be controlled to maintain a particle impaction efficiency of 50% on plate 4 for particles of 2 microns aerodynamic diameter. The procedure for doing this is described in paragraphs (4) and (5) of subsection D of 20.2.14.401 NMAC.

(6) Metering System: Vacuum gage, leak-free pumps, thermometers capable of measuring to within 3 degrees Fahrenheit., dry test meter with 2 percent accuracy, and related equipment, as required to maintain an approximately isokinetic sampling rate through the probe and specified flowrate through the Mark III Sampler, and to determine sample volume.

(7) Other Sampling Train Equipment: Pitot tube (type S, or equivalent), impingers/condensers, and barometer shall be as specified in US EPA method 5, Section 2.1. Note that an equivalent condenser may be used in place of the impinger train.

(8) Sample Recovery Accessories: As specified in US EPA Method 5, Section 2.2.

(9) Analytical Accessories: As specified in US EPA Method 5, Section 2.3.

C. Reagents:

(1) Sampling: Sampling for total particulate mass loading shall be in accordance with US EPA Method 5. Procedures for determining the percent by mass of particles less than two microns equivalent aerodynamic diameter shall be as follows.

(2) Filters: Glass fiber type, having high efficiency for collecting small particles (99% or higher efficiency for particles 0.3 microns or larger in diameter). Cambridge Media CM-114 or Gelman Type A filters are acceptable types.

(3) Other Sampling Reagents: As specified in US EPA Method 5, Section 3.1.

(4) Sample Recovery and Analytical Reagents: Acetone and water, as specified in US EPA Method 5, Sections 3.2 and 3.3.

D. Sampling Procedure:

(1) Procedures: Sampling procedures for total particulate mass loading shall be in accordance with US EPA Method 5. Procedures for determining the percent by mass of particles less than two microns equivalent aerodynamic diameter shall be as follows.

(2) Selection of Sampling Site and Sampling Points: The sampling site is preferably located in a vertical duct or stack, at least eight stack diameters downstream and two diameters upstream of a major disturbance (bend, expansion, contraction or visible flame). In large ducts (of 20 feet or grater diameter), a distance five diameters downstream of a disturbance will be considered adequate, providing the velocity traverse does not show the flow to be highly irregular. Under these recommended conditions, a single sampling point is considered to be adequate (See Industrial Gas Cleaning Institute, Test Procedures for Gas Scrubbers, Publication No. 1, p.6): This point shall be located between 0.2 and 0.5 of the diameter from the outside toward the center of the stack, preferably at a point whose velocity approximates the average velocity of the flue gases. For conditions which do not meet the criteria given above, additional sampling points must be considered and will be determined as agreed upon between the coal burning equipment operator and the Department.

(3) Determination of Stack, Pressure, Temperatures, Moisture and Distribution of Velocity Heads: Prior to actual sampling for particulates, a preliminary survey of stack pressure, temperatures, moisture content, and velocity distribution shall be made to assess overall sampling conditions and establish isokinetic sampling velocities.

(a) Stack Pressure and Temperature: Stack pressure shall be obtained at one or more points at the sampling station using a water-filled U-tube manometer to sense pressure from a hole in the side of the stack or duct to within 0.1 in water. Temperatures shall be determined from a thermocouple (or equivalent device) attached to the pitot tube, capable of measuring to within 1.5% of the minimum absolute stack temperature.

(b) Distribution of Velocity Heads: The US EPA Method 1 (found in 40 CFR, Part 60, Appendix A) shall be used as a general guide in determining the number and distribution of pitot tube traverse points. US EPA Method 2, (found in 40 CFR, Part 60, Appendix A) shall be used as a guide in selection of pitot tube equipment, procedure for making and recording measurements, and calibration of the instrument. In calibration, the procedure shall be modified in that the pitot tube to be used in testing shall be mounted on the probe and the probe shall have attached the Mark III Sampler and nozzle so that the arrangement is similar to that used in testing. A complete velocity traverse shall be done each day of testing.

(c) Moisture Determination: Moisture content of the gas stream is determined by extracting a measured quantity of gas from the stack, condensing the moisture in an external condenser (or in the impingers), and measuring the volume of condensate. A single, preliminary measurement shall be made using either the stack sampling train or a simplified apparatus consisting mainly of a filter, condenser, pump, and dry gas meter. If liquid drops are present in the gas stream proceed as follows: Assume the stream to be saturated, determine the average stack gas temperature from the data obtained in subparagraph (a) of paragraph (3) of subsection D of 20.2.14.401 NMAC above, and use a psychometric chart with appropriate altitude correction along with steam tables to calculate the approximate percentage of moisture. A further determination of moisture content is made as a part of the particulate sampling as described below.

(4) Preparation of Collection Train: Check to see that the probe, nozzle, etc., are clean and that there is sufficient ice to fill the ice bath, place 100 ml. of water in the first two impingers, leave the third impinger empty, and place approximately 200 g. of preweighed indicating silica gel in the fourth impinger. Complete the preparation by desiccating the filter, checking the train for leaks and adjusting the probe heater, generally as specified in the US EPA Method 5, Section 4.1.2. To establish near isokinetic sampling conditions at the start of testing, the desired flowrate through the particle separator is corrected to stack conditions and the desired sample nozzle size is calculated. To do this record the temperature of the in-stack Mark III Sampler. Find this temperature in the abscissa of the graph on Figure 3 (20.2.14.404 NMAC), go up to the curve and read the correction factor on the ordinate of the graph. Multiply the correction factor by two microns and obtain the temperature corrected aerodynamic diameter. Locate the corrected aerodynamic diameter on the abscissa of the graph on Figure 4 (20.2.14.405 NMAC) go up to the curve and read on the ordinate the flowrate needed to maintain an impaction efficiency of 50% on plate #4. Correct this flowrate to stack conditions by adjusting for the difference in particle separator temperature and stack temperature. Using the equation Q = VA where Q = volumetric flowrate through the separator adjusted to stack temperature (cfm), V = velocity of the stack gas at the point in the stack where the sampling is to take place (fpm) and A is area of the nozzle (sq. ft.) calculate the desired sampling nozzle diameter. Attach a nozzle to the probe that matches this calculated diameter within 1%. To establish at the start of testing the correct gas flow through the separator, using the dry gas meter, correct the desired flowrate through the separator to meter conditions by correcting for the difference in temperature between the separator and the dry gas meter and subtract out that portion of the gas volume which will be condensed in the impingers.

(5) Particulate Train Operation: To begin sampling, position the nozzle at the selected point in the stack with the nozzle tip pointing directly into the gas stream. Immediately after, start the pump and adjust the dry gas meter to the flowrate calculated in paragraph (4) of subsection D of 20.2.14.401 NMAC. Sample for at least 5 minutes and then record the temperature of the gas on the outlet end of the separator. If the temperature is different from that of the container surrounding the separator readjust the dry gas meter flowrate by repeating the steps described in paragraph (4) of subsection D of 20.2.14.401 NMAC using Figures 3 (20.2.14.404 NMAC) and 4 (20.2.14.405 NMAC) excluding the step used in calculating nozzle diameter. Continue the run until 30 standard cubic feet (70 degrees Fahrenheit, 29.92 inches Hg) have been drawn through the sampling train. For each run record the required data on a sheet such as the one shown in Figure 5-2 of the US EPA Method 5 and include the temperature monitored at the outlet of the separator. Record the data after every 5 minutes of testing. At the end of the run, turn off the pump and record the final readings. Remove the probe and nozzle from the stack. Remove the filter and glass fiber collection discs from the separator and place each in a separate container. Collect in a container all particles brushed and washed from the nozzle, the impactor inlet cone and the zero stage plate. Repeat the sampling procedure until three runs have been obtained. Filter wash-solution and dry filter. Desiccate the filters and collection discs for at least 24 hours and weigh to the nearest 0.5 mg in a room where the relative humidity is less than 50%.

E. Calibration: Use methods and equipment for calibration of the particle separator, orifice meter, pitot tube, temperature sensors and dry test meter approved by the Department. Recalibrate after every third test or three months whichever comes first except for the particle separator which shall be recalibrated as agreed upon between the owner or operator of the coal burning equipment and the Department. Figures 3 (20.2.14.404 NMAC) and 4 (20.2.14.405 NMAC) shall reflect results of such calibration.

F. Calculations:

(1) Total Particulate Emissions: After completing the test series, average the dry gas meter temperatures and average orifice pressure drops, then correct the sample volumes measured to standard conditions and calculate the water vapor and moisture content. Using data gathered, using US EPA Method 5, calculate the concentration of total particulate matter in the stack gas in pounds per standard cubic foot on a dry basis by using equation 5-5 given in Section 6.6.2 of US EPA Method 5. Using the stack volumetric flowrate corrected to standard conditions on a dry basis calculate the emission rate in pounds per hour. Using the average heat input to the coal burning equipment during the time of testing, in millions of British Thermal Units per hour, calculate the emission rate in pounds per million British Thermal Units. Average the emission rate for the three runs to determine total particulate emissions.

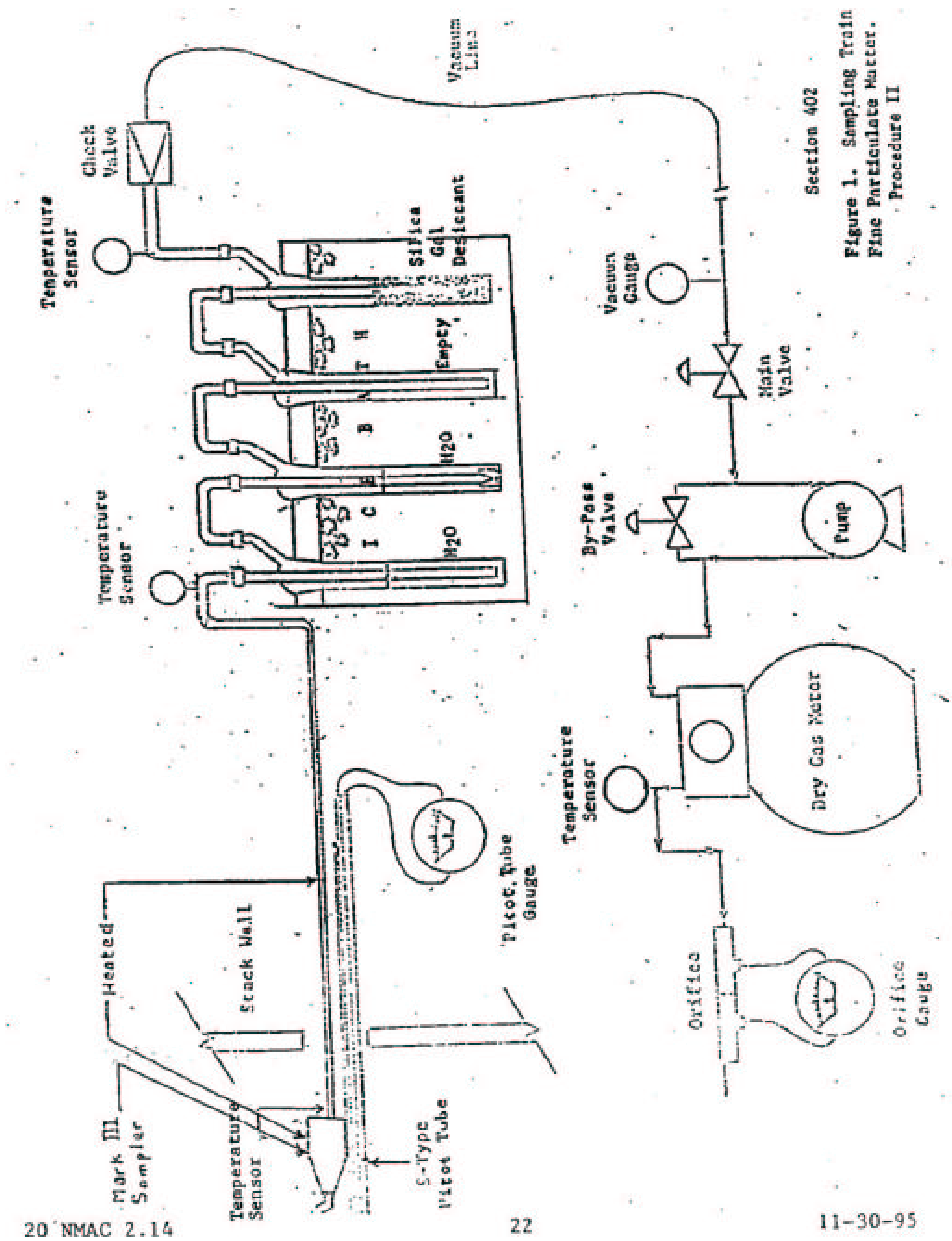
(2) Percent of Particles Less Than Two Microns: The data obtained from the Mark III Sampling shall be used to determine the quantity of particulate matter larger than two microns Equivalent Aerodynamic Diameter and the quantity of particulate matter less than two microns Equivalent Aerodynamic Diameter. Particulate matter larger than two microns equivalent aerodynamic diameter shall be defined to be the particulate matter collected on the glass fiber collection discs from plates numbered 1, 2, 3, and 4 and the material brushed and washed from the nozzle, the impactor inlet cone and the zero stage plate. Particulate matter less than two microns equivalent aerodynamic diameter shall be defined to be the particulate material collected on the glass fiber collection discs from plates numbered 5, 6, 7 and 8 and the particulate matter collected on the glass fiber filter. The sum of the mass' of the particulates which are greater than two microns Equivalent Aerodynamic Diameter and the particles less than two microns equivalent aerodynamic diameter is the total particulate collected for the purposes of determining percent less than two microns. After determining the quantity of particulate collected, determine the percent by mass of the total particulate collected which is compassed of particles of less than two microns equivalent aerodynamic diameter.

(3) Loading of Particles Less Than Two Microns: The percentage by mass of particles as determined from the Mark III sampling results as described in the previous paragraph is applied to the total mass loading in pounds per million British Thermal Units as determined by US EPA Method 5. The resulting loading in pounds per million British Thermal Units of particulates less than two microns equivalent aerodynamic diameter shall be used to determine compliance with the particulate emission limitations contained in subsection B of 20.2.14.202 NMAC and subsection B of 20.2.14.203 NMAC.

G. Acceptable results: Validity of each run shall be determined by calculating the actual flow through the particle separator from the recorded data. If the flowrate is within 10% of the calculated flow from Figure 4 (20.2.14.405 NMAC), the run will be considered valid. Deviations from isokinetic sampling rate by more than 10% shall invalidate the test.

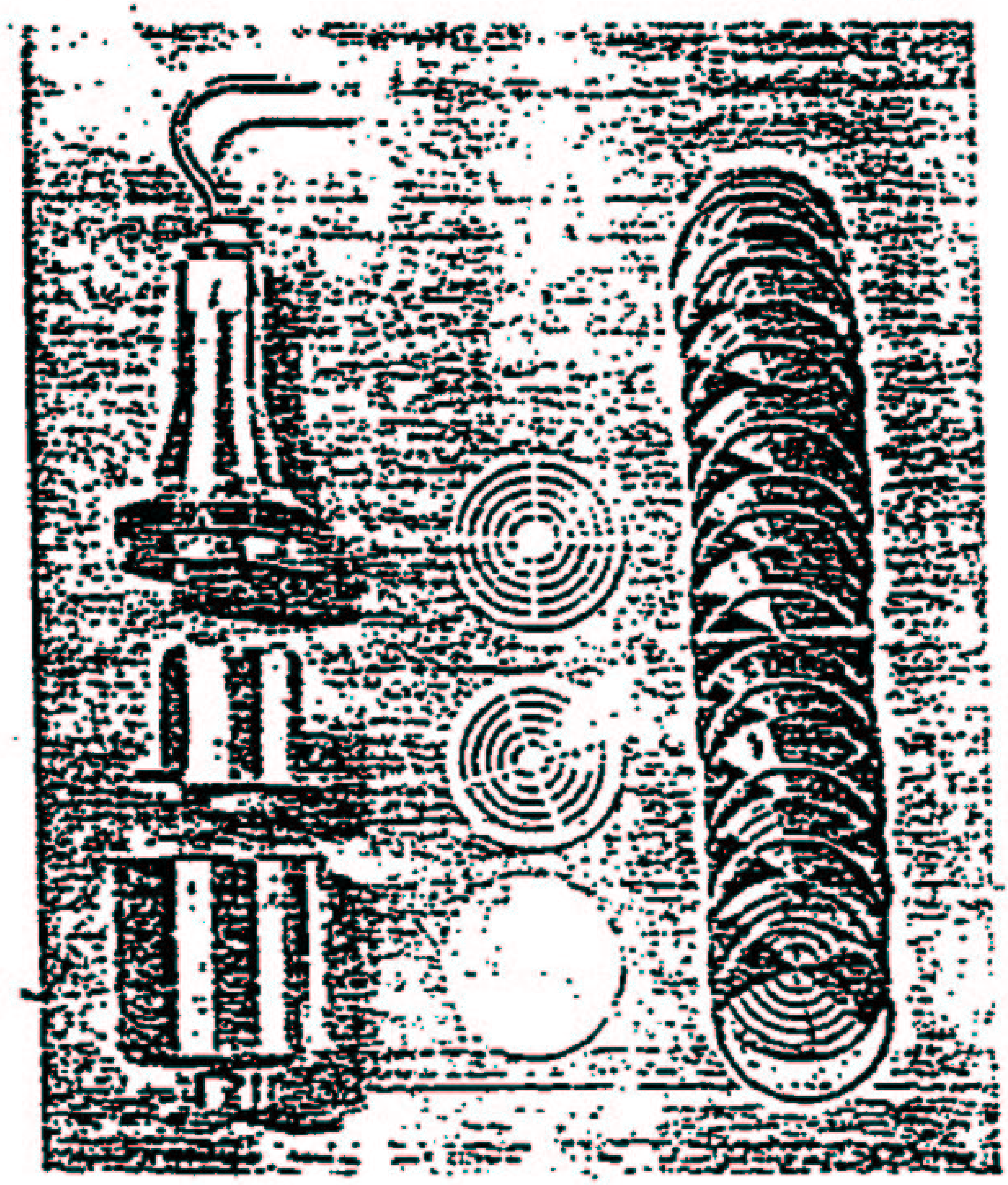
[11/30/95; 20.2.14.401 NMAC - Rn, 20 NMAC 2.14.401 10/31/02]

20.2.14.402 SAMPLING TRAIN FOR FINE PARTICULATE MATTER, PROCEDURE II: Figure 1.



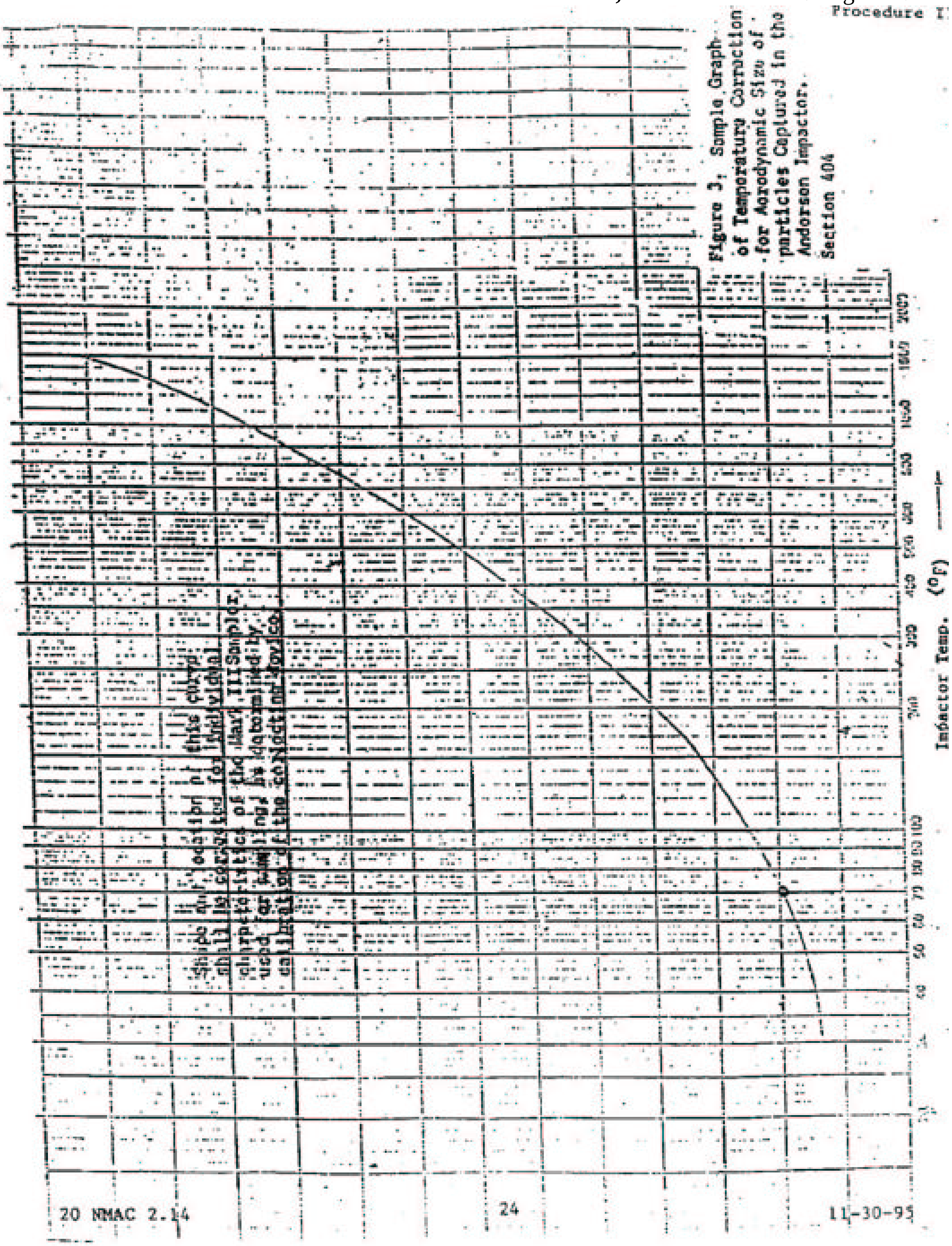
[11/30/95; 20.2.14.402 NMAC - Rn, 20 NMAC 2.14.402 10/31/02]

20.2.14.403 ARRANGEMENT OF IMPACTION PLATES AND FILTER IN THE ANDERSON IMPACTOR, PROCEDURE II: Figure 2.



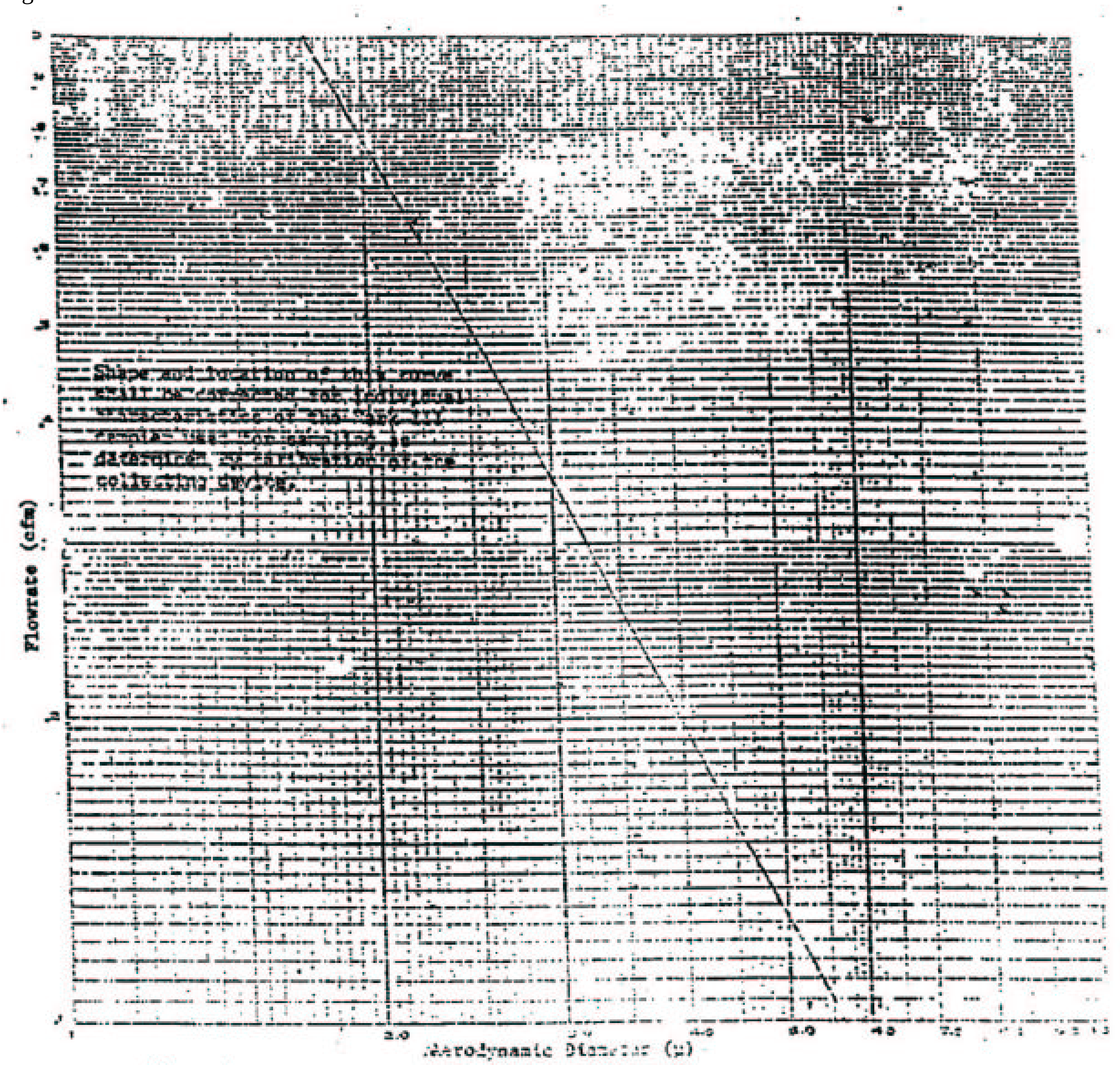
[11/30/95; 20.2.14.403 NMAC - Rn, 20 NMAC 2.14.403 10/31/02]

20.2.14.404 SAMPLE GRAPH OF TEMPERATURE CORRECTION FOR AERODYNAMIC SIZE OF PARTICLES CAPTURED IN THE ANDERSON IMPACTOR, PROCEDURE II: Figure 3.



[11/30/95; 20.2.14.404 NMAC - Rn, 20 NMAC 2.14.404 10/31/02]

20.2.14.405 SAMPLE GRAPH OF AERODYNAMIC DIAMETER VS. FLOWRATE THROUGH PLATE #4 OF THE ANDERSON IMPACTOR (50% IMPACTION EFFICIENCY), PROCEDURE II:
Figure 4.



[11/30/95; 20.2.14.405 NMAC - Rn, 20 NMAC 2.14.405 10/31/02]

HISTORY OF 20.2.14 NMAC:
Pre-NMAC History: The material in this part was derived from that previously filed with the Commission of Public Records-State Records Center and Archives.
HSSD 70-1, Ambient Air Quality Standards And Air Quality Control Regulations, 01/27/70.

History of Repealed Material: [RESERVED]

Other History:
HSSD 70-1, Ambient Air Quality Standards And Air Quality Control Regulations, (relating to that portion numbered 504) filed 01/27/70, was **renumbered** into first version of the New Mexico Administrative Code as 20 NMAC 2.14, Particulate Emissions From Coal Burning Equipment, filed 10/30/95.
20 NMAC 2.14, Particulate Emissions From Coal Burning Equipment, filed 10/30/95, was **renumbered, reformatted and replaced** by 20.2.14 NMAC, effective 10/31/02.