A.8 SCRUBBER FOR PM CONTROL--FACILITY H

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EXAMPLE COMPLIANCE ASSURANCE MONITORING: SCRUBBER FOR PM CONTROL--FACILITY H

I. Background

A. Emissions Unit

Description:	Dry Dryers 1-4
Identification:	401, 403, 406, 407
Facility:	Facility H Anytown, USA

B. Applicable Regulation and Emission Limit

Regulation No.:	OAR 340-21, permit
Emission limits:	
Particulate matter:	0.2 gr/dscf (3 hour average)
Monitoring requirements:	Scrubber exhaust temperature

C. Control Technology

Wet scrubber

II. Monitoring Approach

The key elements of the monitoring approach are presented in Table A.8-1.

TABLE A.8-1. MONITORING APPROACH

I. Indicator	Wet scrubber exhaust temperature	Work practice: periodic check of scrubber water filter
Measurement Approach	The wet scrubber exhaust temperature is monitored with a thermocouple.	When the scrubber is shut down for weekly maintenance, the scrubber water filter is inspected and cleaned.
II. Indicator Range	An excursion is defined as a scrubber exhaust temperature greater than 150°F for a 6-minute period, continuously. Excursions trigger an inspection, corrective action, and a reporting requirement.	The filter will be replaced as needed; if there is excess buildup of particulate on the filter, the blowdown will be increased if necessary.
QIP Threshold[a]	Six excursions in a 6-month reporting period.	NA
III. Performance Criteria A. Data Representativeness[b]	The monitoring system consists of a thermocouple at the scrubber exhaust with a minimum accuracy of ±4°F or ±0.75%, whichever is greater.	The filter is visually inspected for holes or other damage.
B. Verification of Operational Status	NA	NA
C. QA/QC Practices and Criteria	The thermocouple will be calibrated annually.	NA
D. Monitoring Frequency	The scrubber exhaust temperature is measured continuously.	The filter is inspected and cleaned weekly.
Data Collection Procedures	Temperature is recorded as a 6-minute average by the DAS.	Maintenance records.
Averaging Period	6 minute average.	NA

[a]Note: The QIP is an optional tool for States; QIP thresholds are not required in the CAM submittal.
[b]Values listed for accuracy specifications are specific to this example and are not intended to provide the criteria for this type of measurement device in general.

MONITORING APPROACH JUSTIFICATION

I. Background

The pollutant-specific emission units are the four dry dryers (finish dryers) which dry wood chips. The dryers are Heil three pass horizontal rotary drum dryers, and burn natural gas or distillate fuel oil or receive heat indirectly from the boilers via steam. Dryers No. 1 and No. 2 are face material dryers; dryers No. 3 and No. 4 are core material dryers. The main wood species dried is Douglas fir. Wood entering the dryers may range from 10 to 20 percent moisture and exit with 4 to 6 percent moisture prior to particleboard production. The dryer exhaust streams are controlled by American Air Filter wet scrubbers. The scrubber water is filtered and recycled.

II. Rationale for Selection of Performance Indicators

The scrubber exhaust gas temperature was selected because it is indicative of scrubber operation and adequate water flow. When the water flow rate is sufficient, contact between the exhaust gas and the scrubber water causes the temperature of the exhaust gas to drop. The temperature range of the exhaust gas stream during normal operation was determined. With the scrubber water off, the scrubber exhaust is approximately 30°F hotter than normal. When the dryers and scrubbers are shut down for maintenance or cleaning, the temperatures drop.

The scrubber water is filtered and recycled, with a fixed amount of blowdown and makeup water. Checking the filter ensures particulate is being removed from the recycled water. Excess particulate in the scrubber water will reduce control efficiency. Any holes or degradation of the filter will be discovered during the weekly inspection.

The dryer exhaust will only bypass its associated scrubber if the scrubber is shut down for maintenance while the process is operating. These periods are documented and reported.

III. Rationale for Selection of Indicator Range

The selected indicator range for scrubber exhaust temperature is less than 150°F. An excursion is defined as any period during which the scrubber exhaust temperature exceeds 150°F for more than 6 minutes, continuously. When an excursion occurs, corrective action will be initiated, beginning with an evaluation of the occurrence to determine the action required to correct the situation. All excursions will be documented and reported. The level for the exhaust temperature was selected based upon the data obtained during normal scrubber operation and the performance test. Examination of operating data show that the scrubber outlet temperature increases slightly as the ambient temperature increases during the year. During normal operation, outlet temperatures approach 150°F during the summer months, and this value was selected as the upper indicator level (see Figure A.8-1 for a typical summer day's scrubber exhaust temperatures). No lower indicator level is necessary.

The most recent performance test using compliance test methods (ODEQ Method 7 for particulate) was conducted at this facility on April 9-11, 1996. Three test runs were conducted on each of the four dry dryers. During testing, the measured PM emissions ranged from 0.024 to 0.054 gr/dscf. During source testing, the scrubber exhaust gas temperatures ranged from 98° to 128°F, and dry dryer scrubber exhausts were found to be well below the compliance limit for particulate emissions. Dryer exhaust temperatures ranged from 149° to 162°F, 30 to 40 degrees hotter than the scrubber exhaust. During the emissions tests, the scrubber exhaust gas temperatures were measured continuously, and 6-minute averages were charted. The complete test results are documented in the test report dated April 1996. During the performance test, the measured particulate emissions were well under the emission limitation of 0.2 gr/dscf.

Three months of operating data (October through December 1996) were reviewed, which include dry dryer scrubber temperature alarm data, maintenance log book entries, and temperature graphs for those days on which alarms occurred. The scrubber temperature alarm was activated on 4 days out of the 3-month operating period for which data were collected. One alarm was caused due to a data processor malfunction, while the others were caused by lack of water flow to the scrubber or excess temperature during shutdown.

Based on the performance test data and a review of historical data, the selected QIP threshold for the wet scrubber exhaust gas temperature is six excursions in a 6-month reporting period (Note: Establishing a proposed QIP threshold in the monitoring submittal is optional). This level is less than 1 percent of the scrubber operating time. If the QIP threshold is exceeded in a semiannual reporting period, a QIP will be developed and implemented.

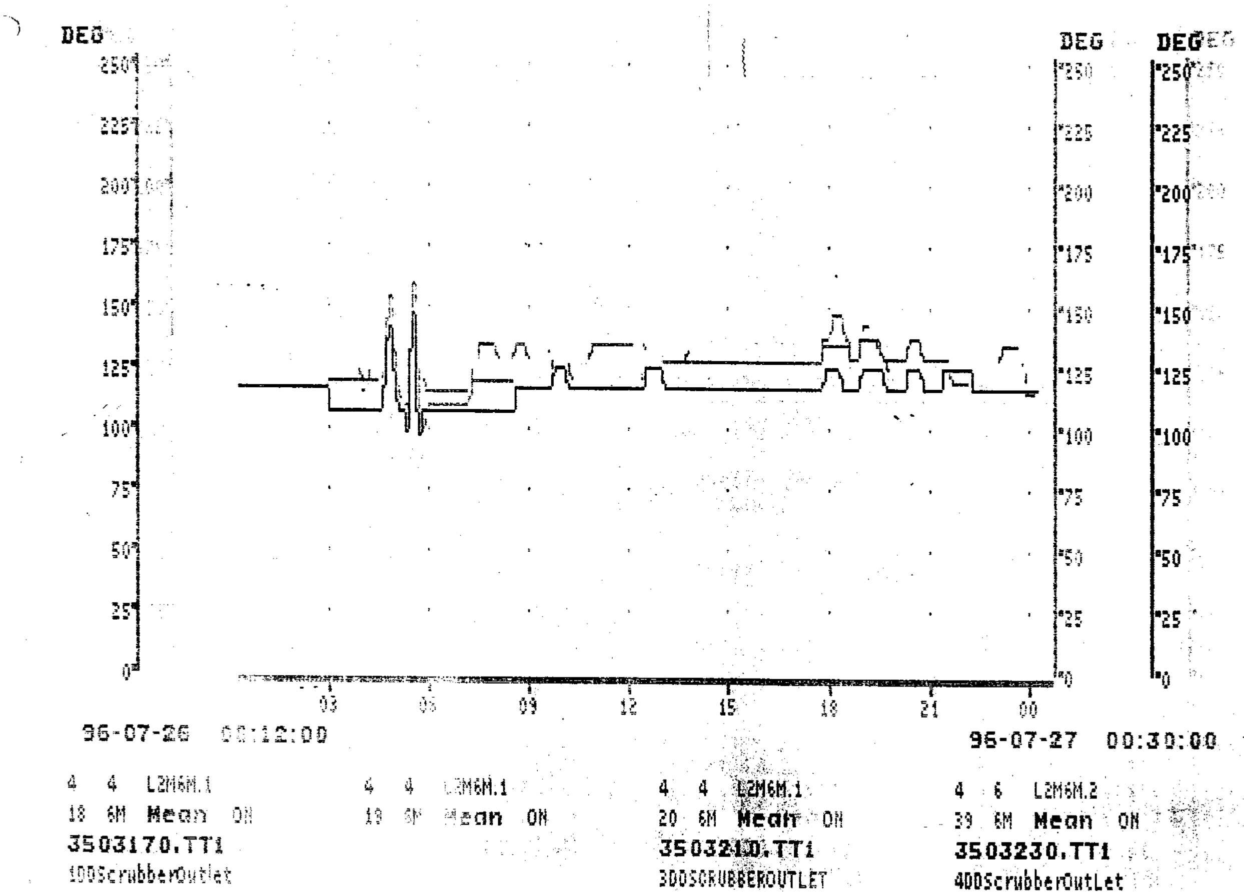

Figure A.8-1. Typical Scrubber Exhaust Temperature (7/27/96)

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A.9 WET ELECTROSTATIC PRECIPITATOR FOR PM CONTROL--FACILITY I

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EXAMPLE COMPLIANCE ASSURANCE MONITORING: WET ELECTROSTATIC PRECIPITATOR FOR PM CONTROL--FACILITY I

I. Background

A. Emissions Unit

Description:	Green Dryers No. 1 & 2
Identification:	203, 205
Facility:	Facility I Anytown, USA

B. Applicable Regulation, Emission Limits, and Monitoring Requirements

Regulation No.:	OAR 340-21, permit
Emission limits :	
Particulate Matter:	0.2 gr/dscf (No. 1) 0.1 gr/dscf (No. 2) (3-hour average)
Monitoring requirements:	WESP secondary voltage

C. Control Technology
Wet electrostatic precipitator (WESP).

II. Monitoring Approach

The key elements of the monitoring approach are presented in Table A.9-1.

TABLE A.9-1. MONITORING APPROACH

I. Indicator	WESP voltage.
Measurement Approach	The WESP voltage is measured using a voltmeter.
II. Indicator Range	An excursion is defined as a voltage less than 30 kV for more than 6 minutes, continuously. Excursions trigger an inspection, corrective action, and a reporting requirement.
QIP Threshold[a]	Six excursions in a 6-month reporting period.
III. Performance Criteria A. Data Representativeness[b]	The voltmeter is part of the WESP design and is included in the transformer/rectifier set. It has a minimum accuracy of ± 1 kV.
B. Verification of Operational Status	NA
C. QA/QC Practices and Criteria	Confirm voltmeter zero when unit not operating (at least semi-annually).
D. Monitoring Frequency	Measured continuously.
Data Collection Procedures	Recorded as a 6-minute average.
Averaging Period	6-minute average.

[a]Note: The QIP is an optional tool for States; QIP thresholds are not required in the CAM submittal.
[b]Values listed for accuracy specifications are specific to this example and are not intended to provide the criteria for this type of measurement device in general.

MONITORING APPROACH JUSTIFICATION

I. Background

The pollutant-specific emission units are green dryers No. 1 and No. 2. The dryers are three pass horizontal rotary drum dryers, with direct heat sources of sanderdust, natural gas, distillate fuel oil, boiler flue gas, or any combination thereof. Green dryer No. 1 was manufactured by Heil and green dryer No. 2 was manufactured by Westec America. Green wood shavings are dried in these dryers before mixing with dry wood shavings and drying in the dry dryers. Wood entering the green dryers may range from 25 to 50 percent moisture and exit with 15 to 20 percent moisture. The green dryer exhaust streams are each controlled by a Geoenergy WESP.

II. Rationale for Selection of Performance Indicator

In a WESP, electric fields are established by applying a direct-current voltage across a pair of electrodes: a discharge electrode and a collection electrode. Particulate matter and water droplets suspended in the gas stream are electrically charged by passing through the electric field around each discharge electrode (the negatively charged electrode). The negatively charged particles and droplets then migrate toward the positively charged collection electrodes. The particulate matter is separated from the gas stream by retention on the collection electrode. Particulate is removed from the collection plates by an intermittent spray of water. The WESP voltage was selected as a performance indicator because the voltage drops when a malfunction, such as grounded electrodes, occurs in the WESP. When the voltage drops, less particulate is charged and collected.

The dryer exhaust will bypass its associated WESP if the WESP is shut down while the process is operating. These periods are documented and reported.

III. Rationale for Selection of Indicator Range

The selected indicator level is a voltage of greater than 30 kV. An excursion is defined as any period during which the voltage is less than 30 kV for more than 6 minutes, continuously. When an excursion occurs, corrective action will be initiated, beginning with an evaluation of the occurrence to determine the action required to correct the situation. All excursions will be documented and reported.

The indicator range for the WESP voltage was selected based upon the level maintained during normal operation and during the performance test. The normal operating voltage is set at the highest level achievable without having an excessive spark rate. Based on field experience, voltage levels less than 30 kV during normal operation result in unacceptable opacity readings. During abnormal operation or a malfunction (such as grounded electrodes), the WESP kV levels are appreciably lower than normal operational levels. A time interval of 6 minutes was chosen to account for the routine 2-minute flush cycles the WESP's undergo, which cause the voltage to drop below 30 kV. Data obtained during the most recent performance test confirmed the unit was in compliance with the particulate matter emissions limit. During testing, the WESP's operated with voltages in the range of 34 to 45 kV.

The most recent performance test using compliance test methods (ODEQ Method 7 for particulate and RM 9 for visible emissions) was conducted on April 22 and 25, 1996. Three test runs were conducted on each dryer. During this test, the measured PM emissions ranged from 0.009 to 0.013 gr/dscf. Visible emission opacity observations were conducted during the particulate testing. All visible emissions observations during the performance test were 0 to 5 percent opacity (no reading exceeded the permit limit of 20 percent). During the emissions tests, the WESP voltages were measured continuously, and 6-minute averages were charted. During the performance test, the measured particulate emissions were well below the emission limitations (0.2 gr/dscf for green dryer No. 1 and 0.1 gr/dscf for green dryer No. 2). The complete test results are documented in the test report.

Indicator data for the period of October through December of 1996 have been reviewed. These data include 6-minute average WESP voltage graphs and copies of entries in the logbook used to record equipment malfunctions and maintenance. Voltage excursions resulting in an alarm occurred two times during the 3-month period on the WESP on dryer No. 1. One alarm was the result of recycle water overflow and one was the result of a full E-tube chamber. Voltage excursions resulting in an alarm occurred three times during the 3-month period on the WESP on dryer No. 2; once because the recycle water system was plugged, once due to a recycle flow warning, and once because 4 probes were misaligned. Normal operation was in the range of 40 to 50 kV, except during the short flush cycles. Based on the data collected, the indicator level of 30 kV is adequate.

Based on a review of historical data, the QIP threshold established for the WESP voltage is six excursions in a 6-month reporting period. This level is less than 1 percent of the WESP operating time. If the QIP threshold is exceeded in a semiannual reporting period, a QIP will be developed and implemented. (Note: Submitting a proposed QIP threshold with the monitoring approach is not required.)

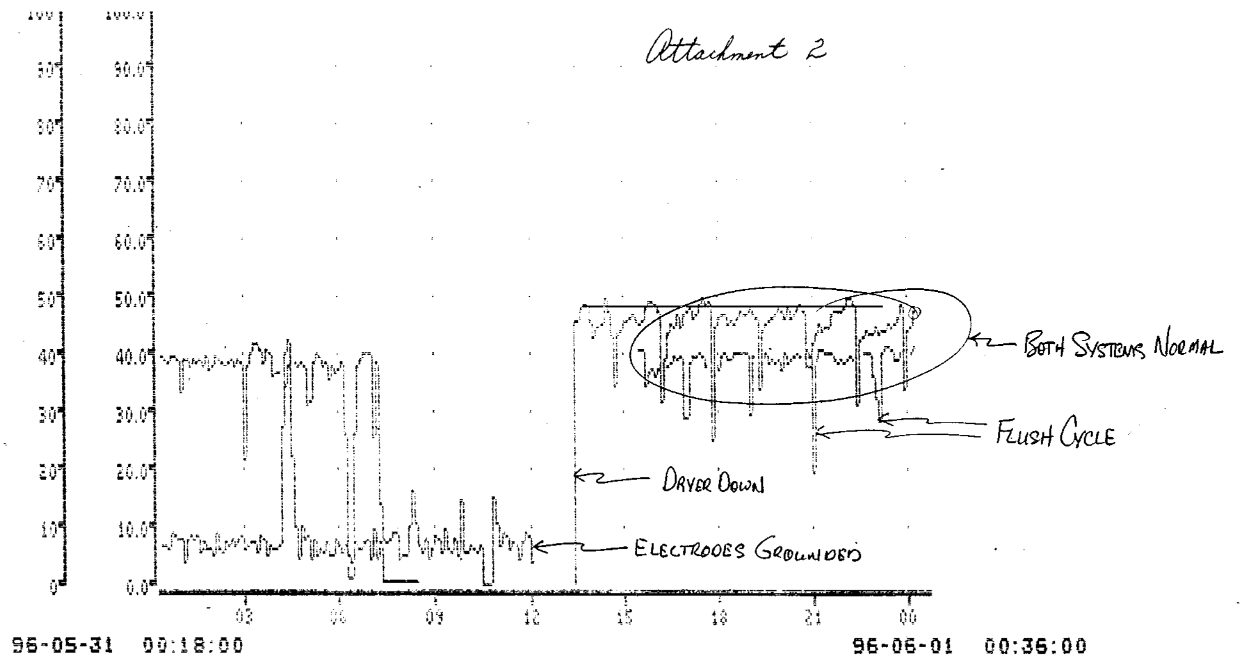

Figure A.9-1. WESP voltage levels.

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A.10 FABRIC FILTER FOR PM CONTROL--FACILITY J

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EXAMPLE COMPLIANCE ASSURANCE MONITORING:
FABRIC FILTER FOR PM CONTROL--FACILITY J

I. Background

A. Emissions Unit

Description:	Line 3 Particleboard Sander
Identification:	M2
Facility:	Facility J Anytown, USA

B. Applicable Regulation, Emission Limit, and Monitoring Requirements

Regulation No.:	OAR 340-21, permit
Emission limits:	
Particulate matter:	0.1 gr/dscf, 3 hr avg.
Monitoring requirements:	Visible emissions, periodic monitoring (RM22)

C. Control Technology

Pulse-jet baghouse operated under negative pressure.

II. Monitoring Approach

The key elements of the monitoring approach are presented in Table A.10-1.

TABLE A.10-1. MONITORING APPROACH

I. Indicator	Visible emissions	Pressure drop
Measurement Approach	Visible emissions from the baghouse exhaust will be monitored daily using EPA Reference Method 22-like procedures.	Pressure drop across the baghouse is measured with a differential pressure gauge.
II. Indicator Range	An excursion is defined as the presence of visible emissions. Excursions trigger an inspection, corrective action, and a reporting requirement.	An excursion is defined as a pressure drop greater than 5 in. H_2O. Excursions trigger an inspection, corrective action, and a reporting requirement. APCD bypass checked if less than 1 in. H_2O.
QIP Threshold[a]	The QIP threshold is five excursions in a 6-month reporting period.	None selected
III. Performance Criteria A. Data Representativeness[b]	Measurements are being made at the emission point (baghouse exhaust).	Pressure taps are located at the baghouse inlet and outlet. The gauge has a minimum accuracy of 0.25 in. H_2O.
B. Verification of Operational Status	NA	NA
C. QA/QC Practices and Criteria	The observer will be familiar with Reference Method 22 and follow Method 22-like procedures.	The pressure gauge is calibrated quarterly. Pressure taps are checked for plugging daily.
D. Monitoring Frequency	A 6-minute Method 22-like observation is performed daily.	Pressure drop is monitored continuously.
Data Collection Procedure	The VE observation is documented by the observer.	Pressure drop is manually recorded daily.
Averaging Period	NA	None.

[a]Note: The QIP is an optional tool for States; QIP thresholds are not required in the CAM submittal.

[b]Values listed for accuracy specifications are specific to this example and are not intended to provide the criteria for this type of measurement device in general.

JUSTIFICATION

I. Background

The pollutant-specific emission unit is the Line No. 3 Sander, which is used to sand particleboard to the customer's desired thickness. It is controlled by a Western Pneumatic pulse-jet baghouse with 542 bags, which filters approximately 50,000 ft^3 of air from the sander.

II. Rationale for Selection of Performance Indicators

Visible emissions was selected as the performance indicator because it is indicative of good operation and maintenance of the baghouse. When the baghouse is operating properly, there will not be any visible emissions from the exhaust. Any increase in visible emissions indicates reduced performance of a particulate control device, therefore, the presence of visible emissions is used as a performance indicator.

In general, baghouses are designed to operate at a relatively constant pressure drop. Monitoring pressure drop provides a means of detecting a change in operation that could lead to an increase in emissions. An increase in pressure drop can indicate that the cleaning cycle is not frequent enough, cleaning equipment is damaged, the bags are becoming blinded, or the airflow has increased. A decrease in pressure drop may indicate broken or loose bags, but this is also indicated by the presence of visible emissions, indicator No. 1. A pressure drop across the baghouse also serves to indicate that there is airflow through the control device.

III. Rationale for Selection of Indicator Ranges

The selected indicator range is no visible emissions. When an excursion occurs, corrective action will be initiated, beginning with an evaluation of the occurrence to determine the action required to correct the situation. All excursions will be documented and reported. An indicator range of no visible emissions was selected because: (1) an increase in visible emissions is indicative of an increase in particulate emissions; and (2) a monitoring technique which does not require a Method 9 certified observer is desired. Although RM 22 applies to fugitive sources, the visible/no visible emissions observation technique of RM-22 can be applied to ducted emissions; i.e., Method 22-like observations.

The selected QIP threshold for baghouse visible emissions is five excursions in a 6-month reporting period. This level is 3 percent of the total visible emissions observations. If the QIP threshold is exceeded in a semiannual reporting period, a QIP will be developed and implemented. (Note: Proposing a QIP threshold in the CAM submittal is not required.)

The indicator range chosen for the baghouse pressure drop is less than 5 in. H_2O. An excursion triggers an inspection, corrective action, and a reporting requirement. The pressure drop is recorded daily. As the pressure drop approaches 5 in. H_2O, the bags are scheduled for replacement. The bags are typically changed yearly. This indicator is also used to monitor for bypass of the control device. If the pressure drop falls below 1 in. H_2O during normal process operation, the possibility of bypass is investigated. No QIP threshold has been selected for this indicator.

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A.11 ELECTRIFIED FILTER BED FOR PM CONTROL–FACILITY K
(TO BE COMPLETED)

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A.12 FABRIC FILTER FOR PM CONTROL--FACILITY L

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EXAMPLE COMPLIANCE ASSURANCE MONITORING
FABRIC FILTER FOR PM CONTROL -- FACILITY L

I. Background

A. Emissions Unit

Description:	Ceramic Fiber Blanket Manufacture
Identification:	Zone 1 Node 8
Facility:	Facility L Anytown, USA

B. Applicable Regulation, Emission Limit, and Monitoring Requirements

Regulation:	Permit
Emission limits (particulate matter):	0.35 lb/hr
Monitoring requirements:	Bag leak detector required on baghouse exhaust

C. Control Technology

Pulse-jet baghouse operated under negative pressure

II. Monitoring Approach

The key elements of the monitoring approach are presented in Table A.12-1.

TABLE A.12-1. MONITORING APPROACH

I. Indicator	Triboelectric Signal
Approach	A triboelectric monitor is installed at the baghouse exhaust. An alarm will sound when the signal remains over a preset limit for 15 seconds to indicate a broken filter bag.
II. Indicator Range	An excursion is defined as a triboelectric signal greater than 70 percent of scale for 15 seconds. Excursions trigger an inspection, corrective action, and a reporting requirement. A triboelectric signal of zero during process operation will trigger an investigation for control device bypass.
III. Performance Criteria A. Data Representativeness	The data are collected at the emission point - the probe is located inside the baghouse exhaust duct. The triboelectric signal is directly proportional to the amount of particulate in the exhaust if factors such as velocity and particle size remain relatively constant.
B. Verification of Operational Status	NA
C. QA/QC Practices and Criteria	The triboelectric probe is inspected periodically (at least monthly) for dust buildup. The monitor has an automatic internal calibration function for the electronics.
D. Monitoring Frequency	The triboelectric signal is monitored continuously.
Data Collection Procedures	One hour of data are displayed on the monitor in the control room at 2 second intervals. When an alarm occurs (signal over 70 percent for 15 seconds), it is logged electronically. Six-minute averages also are archived on the computer network as a historical data record.
Averaging Period	None.

JUSTIFICATION

I. Background

The baghouse controls emissions from a ceramic fiberboard felting process and a production line in the spun fiber area that is used to manufacture ceramic fiber blankets used for insulation. The raw material (kaolin) is transferred to melting furnaces that are heated using electric current. The liquid melt stream flows from the bottom of the furnace and is spun into fiber in the collection chamber and formed into a fiber mat on a conveyor traveling below the chamber. Needling is used to lock the fibers together and an oven dries the blanket. The blanket then passes over a cooling table and is cooled by the passage of air through the blanket. It is then trimmed to size and packaged. Dust emission points ducted to the baghouse include the board felting process and cooling table.

The process stream exhaust is controlled by a pulse-jet baghouse operated under negative pressure. The controlled air stream is at ambient conditions. The baghouse was manufactured by Sly and is a single compartment baghouse containing 16 rows and a total of 176 bags. The air flow through the baghouse is approximately 12,000 dscfm. Air flow through the system is maintained by a single induced-draft fan downstream of the baghouse. The cleaned gas is exhausted from a 24-inch wide rectangular duct. The baghouse residue is continuously discharged from the collection hopper into a bin by a screw feeder.

II. Rationale for Selection of Performance Indicators

The bag leak monitor operates using the principles of frictional electrification (triboelectricity) and charge transfer. As particles in the baghouse exhaust gas stream collide with the sensor rod mounted on the inside of the exhaust duct, an electrical charge is transferred, generating a small current that is measured and amplified by the triboelectric monitor. The processing electronics are configured to produce a continuous output and an alarm at a specified level.

The signal produced by the triboelectric monitor is generally proportional to the particulate mass flow, but can be affected by changes in a number of factors, such as humidity, exhaust gas velocity, and particle size. However, in baghouse applications, these factors are not expected to vary considerably during normal operation. Therefore, an increase in the triboelectric signal indicates an increase in particulate emissions from the baghouse.

Pulse-jet baghouse filters are cleaned using a burst of air, which dislodges the filter cake from the bags and causes a momentary increase in particulate emissions until the filter cake builds up again. The triboelectric monitor can be configured with a short (or no) averaging time to display the baghouse cleaning cycle activity and monitor increases in a particular row's cleaning peak, or with a long signal averaging period to detect an overall increasing trend in the baghouse's emissions. Trends in the cleaning peaks are monitored and high cleaning peaks that may indicate leaking or broken bags requiring maintenance trigger an alarm.

Bypass of the control device will only occur if the baghouse fan is not operating. In this case, the triboelectric signal would be zero.

III. Rationale for Selection of Indicator Ranges

An excursion is defined as a triboelectric monitor signal greater than 70 percent of scale for 15 seconds. When an excursion occurs, corrective action will be initiated, beginning with an evaluation of the occurrence to determine the action required to correct the situation. All excursions will be documented and reported.

The triboelectric monitoring system has the capability for dual alarms: an early warning alarm and a broken bag alarm. The early warning alarm is set just above the normal cleaning peak height (40 percent of scale). The broken bag alarm was set by injecting dust into the clean air plenum of the baghouse and noting the signal level just before the point at which visible emissions were observed at the baghouse exhaust (70 percent of scale). A 15-second delay time is also used, so the alarm won't activate due to short spikes that are not associated with the cleaning cycle and do not indicate broken bags (e.g., a short spike due to a small amount of particulate that accumulates on the duct wall and then breaks free).

The most recent performance test using EPA Method 5 was conducted on April 22-24, 1997. Three Method 5 test runs (one 240-minute, one 384-minute, and one 288-minute run) were conducted, one test per day. The average measured PM emissions were extremely low: 0.01 lb/hr. During the emissions tests, the triboelectric signal was recorded continuously at a 1-second frequency. Figure A.12-1 shows the triboelectric signal for 1 hour during Run 2. The sharp peaks represent the brief increase in emissions immediately following the baghouse cleaning cycle, before the filter cake builds up again. All cleaning peaks shown on this graph are less than 35 percent of scale, which is below both alarm levels. There was one momentary spike that could not be explained. The alarms were not activated during the emission testing and the emissions were below the emission limit of 0.35 lb/hr.

Monitoring data for a period of approximately 2 months (January 29 - April 2, 1997) were reviewed, including 6-minute average archived triboelectric signal data and the electronic alarm log. Review of these data indicated that the early warning alarm was activated eight times and the broken bag alarm was activated once (i.e., there was one excursion). Based on all data reviewed, the selected indicator and indicator level appears to be appropriate for this facility.

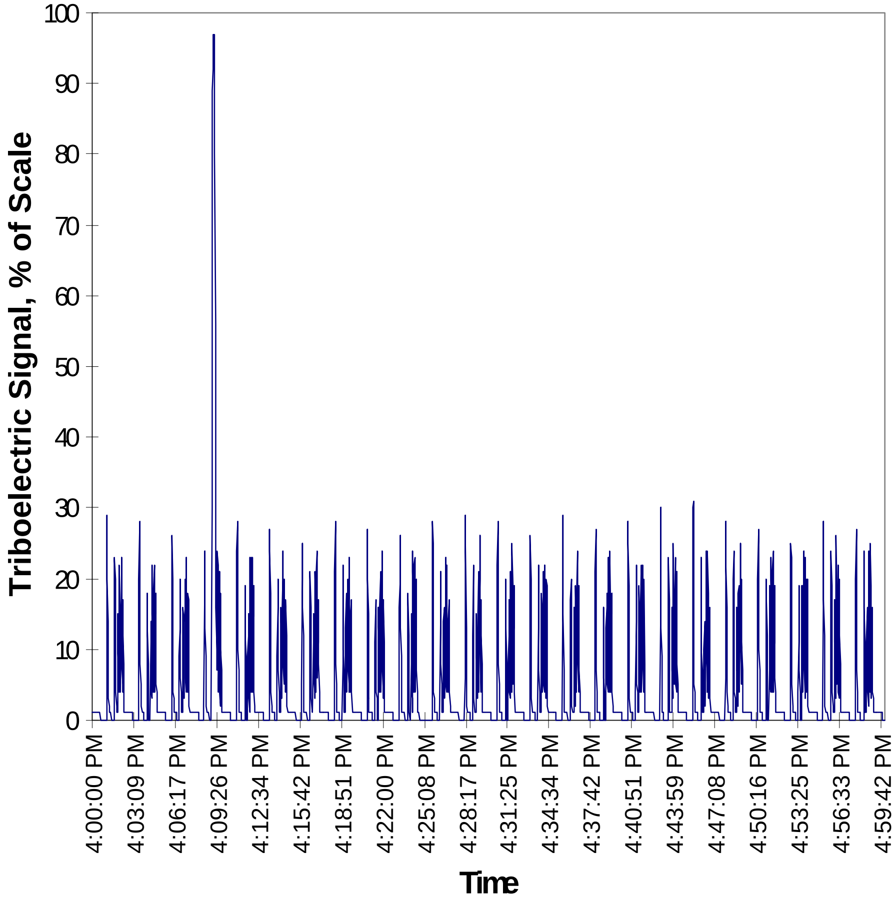

Figure A.12-1. Triboelectric signal during 1-hour of Method 5 Run 2.

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A.13 FABRIC FILTER FOR PM CONTROL--FACILITY M

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EXAMPLE COMPLIANCE ASSURANCE MONITORING:
FABRIC FILTER FOR PM CONTROL -- FACILITY M

I. Background

A. Emissions Unit

Description:	Primary nonferrous smelting and refining
APCD ID:	17-DC-001, 17-DC-002
Facility:	Facility M Anytown, USA

B. Applicable Regulation, Emission Limits, and Monitoring Requirements

Regulation:	Permit; OAR 340-025-0415, 340-021-0030
Emission limits:	
Opacity:	20 percent
Particulate matter:	0.2 gr/dscf
Monitoring requirements:	Visible emissions (VE), pressure drop, fan amperage, inspection and maintenance program

C. Control Technology:

Reverse-air baghouses operated under negative pressure

II. Monitoring Approach

The key elements of the monitoring approach are presented in Table A.13-1.

TABLE A.13-1. MONITORING APPROACH

	Indicator No. 1	Indicator No. 2	Indicator No. 3	Indicator No. 4
I. Indicator	Visible emissions	Pressure drop	Fan amperage	Inspection/maintenance
Measurement Approach	Method 9 observations performed daily.	Pressure drop through the baghouse is measured continuously using a differential pressure gauge.	Fan amperage is measured continuously using an ammeter.	Daily inspection according to I/M checklist; maintenance performed as needed.
II. Indicator Range	The indicator range is an opacity less than 20 percent (6-min. avg.). Excursions trigger an inspection, corrective action, and a reporting requirement.	The indicator range is a pressure drop between 5 and 15 in. H_2O. Excursions trigger an inspection, corrective action, and a reporting requirement.	The indicator range is fan amperage above 100. Excursions trigger an inspection, corrective action, and a reporting requirement. Fan operation also indicates control device is not being bypassed.	NA
III. Performance Criteria A. Data Representativeness[a]	Observations are performed at the baghouse exhaust while the baghouse is operating.	Pressure drop across the baghouse is measured at the baghouse inlet and exhaust. The minimum accuracy of the device is ±0.5 in. H_2O.	Fan amperage is measured at the fan by an ammeter. The minimum accuracy is ±5A.	Inspections are performed at the baghouse.
B. Verification of Operational Status	NA	NA	NA	NA
C. QA/QC Practices and Criteria	Observer is certified annually.	Pressure gauge calibrated quarterly. Pressure taps checked daily for plugging.	Fans checked during daily inspection. Ammeter zeroed when unit not operating.	Qualified personnel perform inspection.
D. Monitoring Frequency	Daily 6-minute observation.	Pressure drop is measured continuously.	Fan amps are monitored continuously.	Daily inspection.
Data Collection Procedures	Method 9 observations are conducted by a certified RM9 observer.	A strip chart records the pressure drop continuously.	A strip chart records the fan amps continuously.	Records are maintained to document the daily inspection and any required maintenance.
Averaging period	6 minutes	None	None	NA

[a]Values listed for accuracy specifications are specific to this example and are not intended to provide the criteria for this type of measurement device in general.

MONITORING APPROACH JUSTIFICATION

I. Background

Primary nonferrous metal smelting and refining operations include mining; drying; crushing, screening, and rejecting; calcining and melting; refining; casting; and other operations. The ore is dried to remove most of the free moisture. The dried ore is then calcined to remove the remaining free moisture and a portion of the chemically-combined moisture. A portion of the iron is reduced, using carbon. The ore is then melted and reduced. The refined metal is cast into ingots or shot, as requested by the customer.

The monitoring approach outlined here applies to melt furnace baghouses Nos. 1 and 2. These baghouses control dust from four 23 MW electric melt furnaces (Nos. 1 through 4) and two rotary kilns. They are ICA reverse-air baghouses with 12 compartments apiece; each compartment contains 128 bags. Air flow through each baghouse is maintained by two induced-draft variable speed fans downstream of each baghouse. The capacity of each baghouse is 275,000 acfm.

II. Rationale for Selection of Performance Indicators

Visible emissions (opacity) was selected as a performance indicator because it is indicative of good operation and maintenance of the baghouse. When the baghouse is operating optimally, there will be little visible emissions from the exhaust. In general, an increase in visible emissions indicates reduced performance of the baghouse (e.g., loose or torn bags). These emissions units have an opacity standard of 20 percent. A 6-minute Method 9 observation is performed daily.

The pressure drop through the baghouse is monitored continuously. An increase in pressure drop can indicate that the cleaning cycle is not frequent enough, cleaning equipment is damaged, or the bags are becoming blinded. Decreases in pressure drop may indicate significant holes and tears or missing bags. However, opacity is a much more sensitive indicator of holes and tears than pressure drop.

Good operation of the fan is essential for maintaining the required air flow through the baghouse. The fan amps setting is selected to be high enough to draw the air required to collect the dust from the four melting furnaces and two rotary kilns. Excess gas velocity can cause seepage of dust particles through the dust cake and fabric. Fan amperage is an indicator of proper fan operation and adequate air flow through the baghouse (the exhaust gas is not bypassing the baghouse).

Implementation of a baghouse inspection and maintenance (I/M) program provides assurance that the baghouse is in good repair and operating properly. Once per day, proper operation of the compressor is verified to ensure that the bags are being cleaned. Proper operation of the cleaning cycle facilitates gas flow through the baghouse and the removal of particulate, and also helps prevent blinding of the filter bags. Operation at low pressures can result in inadequate cleaning, especially near the bottoms of the bags. Other items on the daily I/M checklist include the dust pump, induced-draft fans, reverse air fan, dust screws, rotary feeders, bins, cleaning cycle operation, leak check, and compartment inspection for bad bags.

III. Rationale for Selection of Indicator Ranges

The indicator range for opacity is a 6-minute average opacity of less than 20 percent. This indicator range was selected based on the facility's permit requirements and historical operating data. Review of data collected in May 1997 indicate an average opacity of 10.9 percent (6-minute average) for baghouse No.1, with 6-minute daily average readings ranging from 2.9 to 19.8 percent. For baghouse No. 2, the average was 11.5 percent, with 6-minute average readings ranging from 3.1 to 18.8 percent. The 6-minute average is made up of observations taken at 15-second intervals.

The indicator range for baghouse pressure drop is a pressure drop between 5 and 15 in. H_2O. This range was selected based on historical data obtained during normal operation. The pressure drop is typically around 10 to 11 in. H_2O. A review of data collected during April and May of 1997 show a range of about 9 to 14 in. H_2O. The indicator range selected for the fan amperage is an amperage greater than 100. This range was set based on the level maintained during normal operation. The fan is operated at a high enough setting to draw the required air for dust collection from the four furnaces and two rotary kilns. It typically operates in the 100 to 157 amp range, with an average of 125 amps. When a problem with the baghouse is detected during an inspection, the problem is recorded on the inspection log and corrective action is initiated immediately.

The most recent performance test using compliance test methods (RM 5) was conducted on July 8-9, 1997. During this test, the average measured PM emissions were 0.080 gr/dscf for baghouse No. 1 and 0.053 gr/dscf for baghouse No. 2 (both were below the compliance limit of 0.2 gr/dscf). Opacity observations during testing averaged 17 percent for both baghouses. The complete test results are documented in the test report. Prior to the performance test, an inspection of the baghouse was performed to ensure that it was in good working order, with no leaks or broken bags.

A.14 SCRUBBER FOR PM CONTROL--FACILITY N

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EXAMPLE COMPLIANCE ASSURANCE MONITORING:
SCRUBBER FOR PM CONTROL--FACILITY N

I. Background

A. Emissions Unit

Description:	Wood Fiber Dryer
Identification:	Dryer No. 3
Facility:	Facility N Anytown, USA

B. Applicable Regulation, Emission Limit, and Monitoring Requirements

Regulation:	OAR 340-30-021
Emission limit:	
Particulate matter:	0.55 lb/1,000 sqft dried or 15.5 lb/hr total PM limit for all sources at MDF plant, excluding boiler, truck dump, and storage areas.
Monitoring requirements:	Pressure drop across wet scrubber, scrubber inlet and outlet temperature.

C. Control Technology

Wet scrubber

II. Monitoring Approach

The key elements of the monitoring approach are presented in Table A.14-1.

TABLE A.14-1. MONITORING APPROACH

	Indicator No. 1	Indicator No. 2
I. Indicator	Pressure drop across wet scrubber	Wet scrubber inlet and exhaust gas temperatures
Measurement Approach	The pressure drop is monitored with a differential pressure transducer.	The wet scrubber inlet and exhaust gas temperatures are monitored with RTD's.
II. Indicator Range	An excursion is defined as a pressure drop greater than 6.5 inches of water. Excursions trigger an inspection, corrective action, and a reporting requirement.	An excursion is defined as a 1-hour average scrubber exhaust gas temperature greater than 150°F. Scrubber inlet gas temperature must be greater than the exhaust gas temperature during scrubber operation. Excursions trigger an inspection, corrective action, and a reporting requirement.
III. Performance Criteria A. Data Representativeness[a]	The monitoring system consists of a differential pressure transducer which compares the pressure in the duct immediately upstream of the water spray to the atmospheric pressure. Its minimum accuracy is ±2 percent.	The monitoring system consists of two RTD's located in the ductwork immedately upsream and downstream of the scrubber. Their minimum accuracy is ±2 percent.
B. Verification of Operational Status	NA	NA
C. QA/QC Practices and Criteria	The differential pressure transducer reading is compared to a U-tube manometer monthly.	The RTD's are calibrated monthly by comparison to a calibrated thermocouple, and annually using a NIST traceable thermometer.
D. Monitoring Frequency	The signal from the differential pressure transducer is sampled several times per minute.	The signal from the RTD is sampled several times per minute.
Data Collection Procedures	1-minute averages are computed and displayed. The PC then computes a 1-hour average using each 1-minute average and stores it.	1-minute averages are computed and displayed. The PC then computes a 1-hour average using each 1-minute average and stores it.
Averaging Period	1-minute and 1-hour averaging periods.	1-minute and 1-hour averaging periods.

[a]Values listed for accuracy specifications are specific to this example and are not intended to provide the criteria for this type of measurement device in general.

JUSTIFICATION

I. Background

The pollutant-specific emission unit is a wood fiber dryer denoted as the face system and used in the manufacture of medium density fiberboard. Fiber from the dryer is removed by a low energy cyclone. The exhaust from the cyclone is ducted to the scrubber. In the last 20 feet of the duct, water is sprayed into the air stream. The emissions then enter the scrubber, where baffling removes the suspended water droplets. The temperature drop across the spray section and the pressure drop between the inlet to the spray section and the scrubber discharge are monitored.

II. Rationale for Selection of Performance Indicators

Pressure drop was selected as a performance indicator because it indicates the water level in the scrubber. Maintaining an adequate water flow insures adequate particulate removal. A high pressure drop indicates the water level in the scrubber is too high. Usually, high water level problems are caused by a malfunction of the scrubber water level controller. A low pressure drop is caused by a loss of water in the scrubber.

Temperature was selected because a temperature drop across the scrubber indicates that the water sprays are operating. A loss of temperature differential indicates little or no water is being applied to the exhaust gas stream, which in turn causes little particulate to be removed from the exhaust. The most common cause of water loss is plugged nozzles due to wood fibers in the recycled water.

Bypass of a scrubber only occurs if the scrubber is shut down during process operation. The dryer is then controlled only by the cyclone. These periods are documented and reported.

III. Rationale for Selection of Indicator Ranges

The selected indicator range for the scrubber exhaust gas temperature is less than 150°F (1 hour average). The selected indicator range for scrubber pressure drop is less than 6.5 in. H_2O. There is no lower limit for the pressure drop, since a high exhaust temperature will indicate a loss of water flow. When an excursion occurs, corrective action will be initiated, beginning with an evaluation of the occurrence to determine the action required to correct the situation. All excursions will be documented and reported.

The indicator levels for the scrubber pressure drop and inlet and exhaust gas temperatures are based on normal scrubber operation and performance test results. During source testing, the scrubber was operating under normal conditions and the average scrubber exhaust gas temperature was 132°F. With no water flowing through the scrubber, the exhaust temperature would be about 30 degrees hotter. Therefore, the exhaust temperature limit was set at 150°F. During the most recent performance test, the average pressure drop was 5.7 in. H_2O.

The most recent performance test using compliance test methods (ODEQ Method 7 for particulate) was conducted at this facility on November 20-21, 1996. Three test runs were conducted on the fiber dryer. During testing, the measured PM emissions from Dryer No. 3 averaged 0.008 gr/dscf (3.6 lb/hr). During the compliance test the scrubber exhaust particulate emissions were below the permit limit of 15.5 lb/hr. During the emissions test, the pressure drop and the scrubber inlet and outlet temperatures were measured continuously. The complete test results are documented in the test report.

Figures A.14-1 and A-14.2 show average hourly temperature and differential pressure data for scrubber No. 3 for the month of August 1997. The dips in the differential pressure and the temperatures indicate periods when the scrubber was not operating. Figure A.14-1 shows that the facility did not exceed the maximum outlet temperature limit of 150°F, and the inlet temperature exceeded the outlet temperature during periods of scrubber operation. The average hourly scrubber inlet temperature was 157°F, with a maximum hourly inlet temperature of 189°F, and the average scrubber outlet temperature was 129°F, with a maximum hourly outlet temperature of 142°F. The average temperature differential was 28°F. Figure A.14-2 shows that the facility did not exceed the maximum pressure drop during the month of August. The average differential pressure was 4.5 in. H_2O during the month of August, with a maximum of 6 in. H_2O.

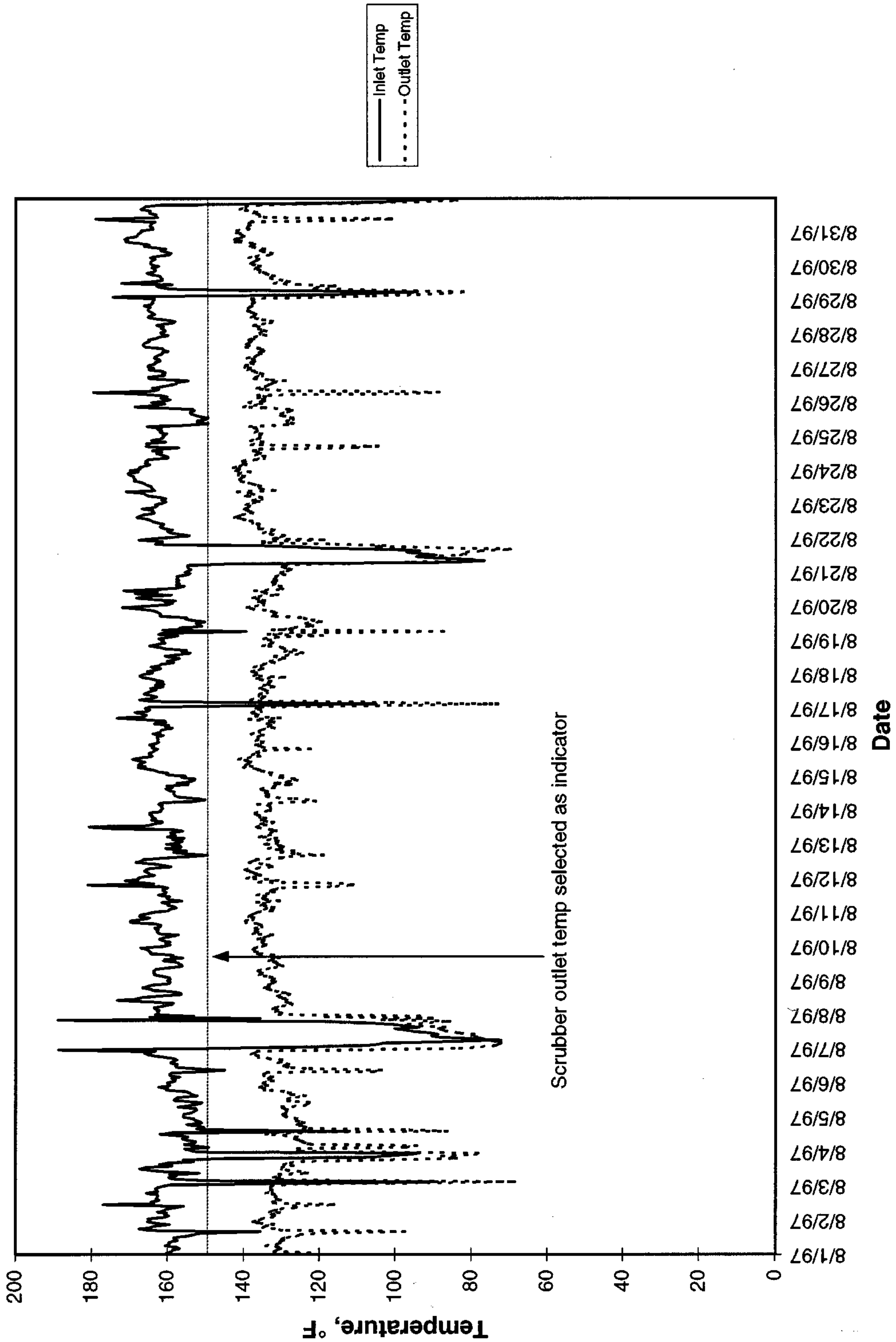

Figure A.14-1. August 1997 scrubber inlet and outlet temperatures.

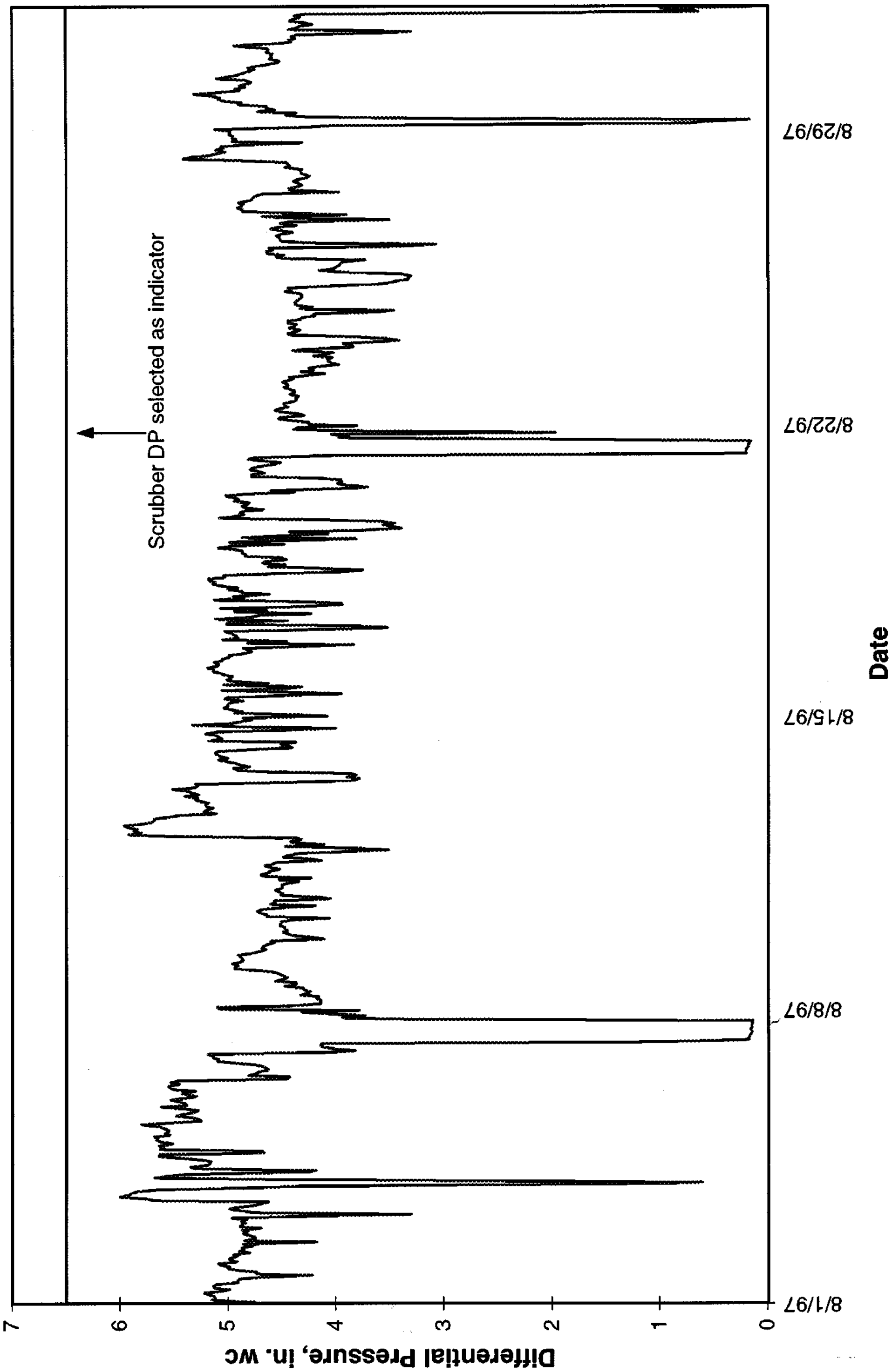

Figure A.14-2. August 1997 scrubber differential pressure.

A.15 VENTURI SCRUBBER FOR PM CONTROL--FACILITY O
(TO BE COMPLETED)

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