EXAMPLE COMPLIANCE ASSURANCE MONITORING PLAN:
ELECTROSTATIC PRECIPITATOR FOR PM CONTROL

I. Background

A. Emissions Unit

Description:	2 Rotary Drum Dryers
Identification:	B1, B2
Facility:	Facility K Anytown, USA

B. Applicable Regulation, Emission Limit, and Pre-CAM Monitoring Requirements

Regulation:	OAR 340-21, permit
CAM Emission limits:	Particulate matter: 0.02 gr/dscf
Pre-CAM monitoring requirements:	Visible emissions, quarterly Method 9

C. Control Technology, Capture System, Bypass, PTE

Controls:	Electrostatic precipitator (ESP)
Capture System:	Closed-duct system
Bypass:	The dryer exhaust will bypass its associated ESP if the ESP is shut down while the process is operating. These periods are documented and reported.
PTE before controls:	5300 TPY
PTE after controls:	53 TPY (based on manufacturer's stated 99% efficiency of ESP)

II. Monitoring Approach

A. Indicators

Total power input to each ESP will be used as an indicator. Normal process operations will not produce conditions that adversely affect the ESP, so no process operational parameters will be monitored.

B. Measurement Approach

ESP secondary voltage and current are measured for each field, using a voltmeter and an ammeter. The total power (P) input to each ESP is the sum of the products of the secondary voltage (V) and current (I) in each field: $P = V_1I_1 + V_2I_2$. Voltage and current are measured continuously and used to calculate the power input every 15 minutes. The hourly average power input is calculated, and recorded once daily into a log book by an operator.

C. Indicator Range

An excursion is defined as an hourly average ESP power input less than 15 kW, which will trigger an alarm in the control room.

D. Performance Criteria

Data Representativeness:	The voltmeter and ammeter are part of the ESP design and included in their instrumentation. The power calculated is accurate to ±1 kW.
QA/QC Practices and Criteria:	Confirm the ammeter and voltmeter zero when each ESP is not operating, at least semi-annually. Perform all manufacturer's recommended maintenance.

III. Response to Excursion

Upon noting an alarm, an operator will immediately notify maintenance to inspect the ESP. Maintenance personnel will inspect the ESP within 4 hours of receiving notification and make needed repairs as soon as practicable.

JUSTIFICATION

I. Background

The pollutant-specific emission unit is an ESP on each horizontal rotary dryer, with a direct heat source of natural gas. Each ESP has two fields.

II. Rationale for Selection of Performance Indicators

In an ESP, electric fields are established by applying a direct-current voltage across a pair of electrodes: a discharge electrode and a collection electrode. Particulate matter suspended in the gas steam is electrically charged by passing through the electric field around each discharge electrode (the negatively charged electrode). The negatively charged particles 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 rapping the plates.

The secondary voltage drops when a malfunction, such as grounded electrodes, occurs in the ESP. When the secondary voltage drops, less particulate is charged and collected. Also, the secondary voltage can remain high but fail to perform its function if the collection plates are not cleaned, or rapped, appropriately. If the collection plates are not cleaned, the current drops. Since power is the product of the voltage and current, monitoring the power input will provide a reasonable assurance that the ESP is functioning properly.

III. Rationale for Selection of Indicator Ranges

The selected excursion level is an hourly average power input less than 15 kW. 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 ESP power was selected based upon the level maintained during normal operation and recent performance tests. The normal operating voltage is set at the highest level achievable without having an excessive spark rate. Based on field experience, power levels less than 5 kW during normal operation results in unacceptable opacity readings. During abnormal operation or a malfunction (such as grounded electrodes), the ESP power levels are appreciably lower than normal operational levels. Operational experience has indicated that the ESP typically operates in the range of 18 to 22 kW. If one field in the ESP goes out of service, the total power input drops below 15 kW.

The most recent performance test using Method 5 was conducted October 1, 2000. Three test runs were conducted on each ESP. During this test, the measured PM emissions for each unit averaged 0.018 gr/dscf. Visible emission opacity observations were not conducted during the particulate testing. During the performance tests, the measured particulate emissions were below the emission limitations of 0.02 gr/dscf; the ESP's were operating normally with power input within the range cited above.