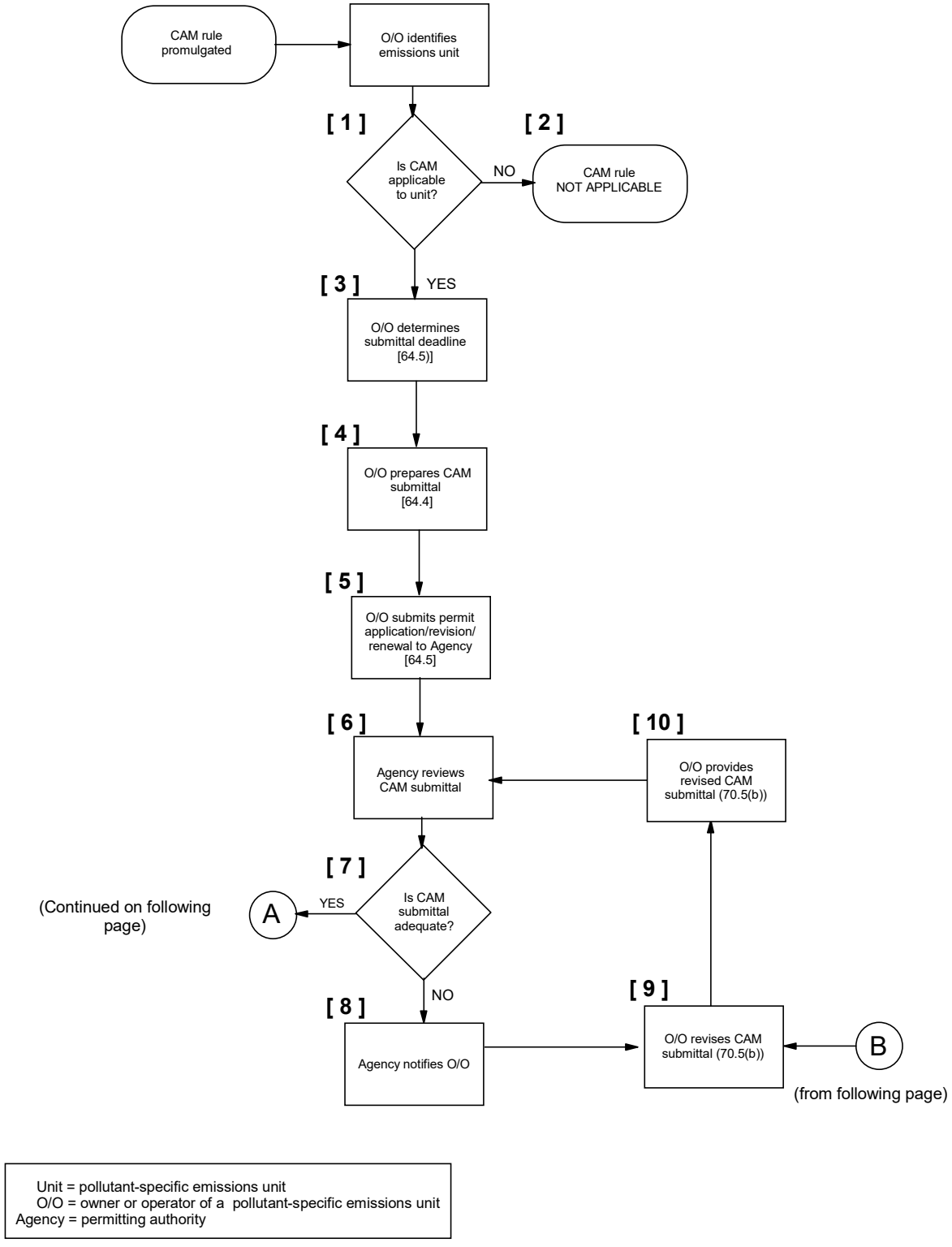

Figure 1-1. Flow diagram for CAM process.

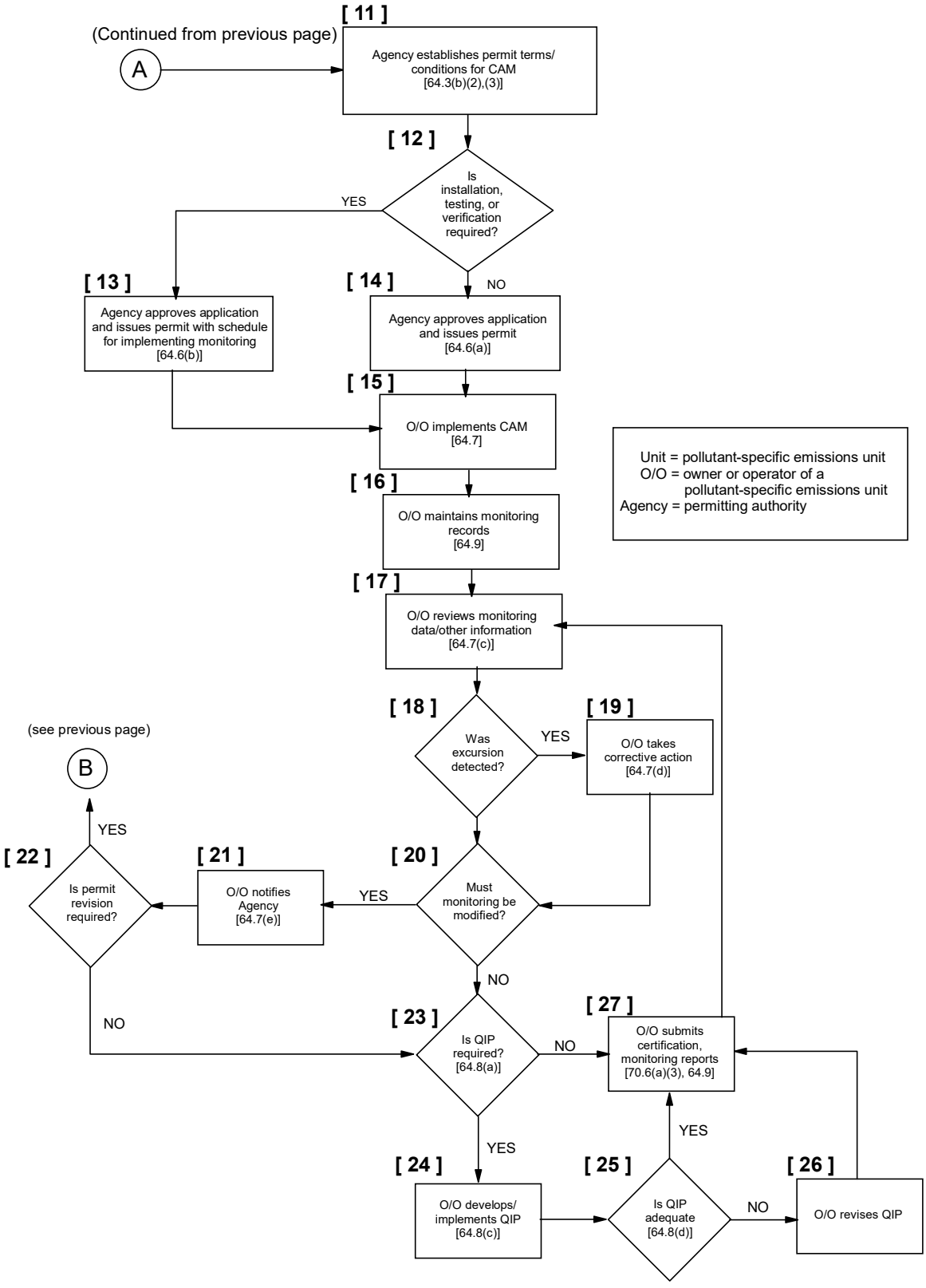

Figure 1-1. (continued)

Compliance Assurance Monitoring Review

I. CAM Submittal Requirements

Any "No" response indicates the CAM submittal does not meet the requirements of 40 CFR part 64.

64.4(a) Indicator Ranges, Designated Conditions, and Performance Criteria			
Does the submittal contain:	**Yes**	**No**	**NA**
Indicators that satisfy the design criteria at §§ 64.3(a)(1)-(2)?			
Ranges or designated conditions for the indicators, or the process by which such indicator ranges or designated conditions be established?			
Performance criteria that satisfy § 64.3(b)? *(see § 64.3(b) below)*			
Indicator ranges and **performance criteria** that will be used pursuant to § 64.3(d) for monitoring to be conducted by **CEMS, COMS or PEMS**? *(if applicable; see § 64.3(d) below)*			

64.3(b) Performance Design Criteria			
Does the submittal contain:	**Yes**	**No**	**NA**
Specifications that provide for obtaining **data representative** of the emissions or parameters being monitored (e.g., detector location, installation specifications)?			
Quality assurance and **quality control** practices that are adequate to ensure the continuing validity of the data?			
Specifications for the **frequency** of monitoring? *(see 11 and 12 below)*			
Specifications for the **data collection procedures** that will be used?			
For new or modified monitoring equipment, **verification procedures** to confirm the operational status of the monitoring? *(if applicable)*			
Specifications for the data **averaging period** for determining whether an excursion or exceedance has occurred? *(if applicable)*			
For **large PSEUs**, specifications for collecting **four or more data values per hour** (or a reduced data collection frequency approved pursuant to 64.3(b)(4)(ii)) on each parameter monitored and for averaging the values, as applicable, over the period determined pursuant to 64.3(b)(4)(i)? *(if applicable)*			
For **other than large PSEUs**, specifications for collecting one or more data values **at least once per day**? *(if applicable)*			

64.3(d) Special Criteria for CEMS/COMS/PEMS			
Does the submittal contain:	**Yes**	**No**	**NA**
1. The use of **CEMS, COMS, or PEMS** to satisfy part 64 requirements if such systems are already required under other authority of the Clean Air Act or state or local law? *(if applicable)*			
A requirement for **reporting exceedances** (or **excursions** if applicable to a COMS used to assure compliance with a particulate matter standard), consistent with any period for reporting of exceedances in an underlying requirement (or consistent with the averaging period established pursuant to 64.3(b)(4) if an underlying requirement does not contain a provision for establishing an averaging period)? *(if applicable)*			
2. For **COMS** used to assure compliance with a particulate matter standard, an **indicator range** consistent with paragraph 64.3(a)? *(if applicable)*			

64.4(b) Justification			
Does the submittal contain:	**Yes**	**No**	**NA**
3. **Justification** for the proposed elements of the monitoring?			
4. **All data** used to support the justification?			
5. **Explanation of any differences** from manufacturer recommendations for performance specifications proposed to satisfy § 64.3(b)(2) or (3)? *(if applicable)*			
6. Justification for the use of any "**presumptively acceptable monitoring**" approach? *(if applicable)*			

64.4(c) Existing Operating Parameter Data			
Does the submittal contain:	**Yes**	**No**	**NA**
7. Existing **operating parameter data** obtained during compliance or performance testing, a **test plan**, or **engineering assessment**? *(see 22 and 23 below)*			
8. **Documentation** that **no changes** to the PSEU, including the control device and capture system, have taken place since any performance or compliance tests were conducted? *(if applicable)*			
64.4(d) Test Plan and Schedule for Obtaining Data			
Does the submittal contain:	**Yes**	**No**	**NA**
If there are no existing test data, either: - a **test plan** and **schedule** for obtaining such data, or			

- indicator ranges (or procedures for establishing indicator ranges) that rely on **engineering assessments and other data**? *(if applicable)*			
If indicator ranges (or procedures for establishing indicator ranges) that rely on **engineering assessments and other data** are used (rather than test data or a test plan and schedule for obtaining data), a **demonstration** that factors specific to the type of monitoring, control device, or PSEU make compliance or performance testing unnecessary to establish indicator ranges? *(if applicable)*			

64.4(e) Plan and Schedule for Installation & Testing of Equipment			
Does the submittal contain:	**Yes**	**No**	**NA**
9. A **plan** and **schedule** for installing, testing and performing any other appropriate activities prior to use of the monitoring? *(if applicable)*			

II. CAM Permit Content Requirements

Any "No" response indicates the title V permit does not meet the requirements of 40 CFR part 64.

64.6(c) Minimum Requirements			
Does the permit specify:	**Yes**	**No**	**NA**
1. **Indicator(s)** to be monitored?			
2. **Means** or **device** to be used to measure the indicator(s)?			
3. **Performance requirements** established to satisfy § 64.3(b) or (d)?			
4. Means by which the owner or operator will **define** an **exceedance** or **excursion**?			
5. **Obligation** to conduct the monitoring and fulfill the other obligations specified in **§§ 64.7 through 64.9**?			
6. **Minimum data availability** requirement? *(if applicable)*			

64.6(d) Enforceable Schedule			
Does the permit specify:	**Yes**	**No**	**NA**
7. An **enforceable schedule** for any required installation, testing, or final verification of operational status? *(if applicable)*			

64.6(e) Submittal Disapproved by Permitting Authority			
Does the permit specify:	**Yes**	**No**	**NA**
8. At a minimum, monitoring that satisfies **§ 70.6(a)(3)(i)(B)** if the permitting authority disapproved the proposed monitoring? *(if applicable)*			
9. A **compliance schedule** for the source owner to submit an acceptable plan if the permitting authority disapproved the proposed monitoring? *(if applicable)*			

EXAMPLE COMPLIANCE ASSURANCE MONITORING

Thermal Incinerator for VOC Control: Facility A - Example 1

I. Background

A. Emissions Unit

Description:	Coater 1, Coater 2, and Coater 3
Identification:	Stack No. XXX/ Ct. YYYYY
Stack designation:	Incinerator
APC Plant ID No.	XXXXX
Facility:	Facility A Anytown, USA

B. Applicable Regulation, Emission Limit, and Monitoring Requirements

Regulation No.:	Permit
Regulated pollutant (PSEU):	VOC
Emission limit:	95 percent reduction
Monitoring requirements in permit:	Continuously monitor chamber temperature [NOTE 1]

C. Control Technology: Thermal oxidizer

II. Monitoring Approach

The key elements of the monitoring approach, including the indicators to be monitored, indicator ranges, and performance criteria are presented in Table A.1a-1.

Note that this CAM submittal is intended as an example of monitoring the operation of the incinerator and does not address capture efficiency. Capture efficiency is a critical component of the overall control efficiency of the air pollution control system, and indicators of the performance of the capture system should be incorporated into the monitoring approach. However, sufficient information was not available from this case study to include monitoring of the capture system performance.

III. Data Availability [NOTE 2]

The minimum data availability for each semiannual reporting period, defined as the number of hours for which monitoring data are available divided by the number of hours during which the process operated (times 100) will be:

Chamber temperature:	90 percent

The data availability determination will not include periods of control device start up and shut down. For an hour to be considered a valid hour of monitoring data, a minimum of 45 minutes of data must be available.

TABLE A.1a-1. MONITORING APPROACH

	Indicator No. 1	Indicator No. 2
I. Indicator	Chamber temperature	Work practice
Measurement Approach	The chamber temperature is monitored with a thermocouple.	Inspection and maintenance of the burner; observation of the burner flame.
II. Indicator Range	An excursion is defined as temperature readings less than 1500°F; excursions trigger an inspection, corrective action, and a reporting requirement.	An excursion is defined as failure to perform annual inspection or daily flame observation.
QIP Threshold[a]	No more than six excursions below the indicator range in any semi-annual reporting period.	Not applicable
III. Performance Criteria		
A. Data Representativeness[b]	The sensor is located in the incinerator chamber as an integral part of the incinerator design. The minimum tolerance of the thermocouple is ±4°F or ±0.75% (of temperature measured in degrees Celius), whichever is greater. The minimum chart recorder sensitivity (minor division) is 20°F.	Not applicable
B. Verification of Operational Status	Not applicable	Not applicable
C. QA/QC Practices and Criteria[b]	Accuracy of the thermocouple will be verified by a second, or redundant, thermocouple probe inserted into the incinerator chamber with a hand held meter. This validation check will be conducted at least annually. The acceptance criterion is ±30°F.	Not applicable
D. Monitoring Frequency	Measured continuously.	Annual inspection of the burner; daily observation of the burner flame.
Data Collection Procedure	Recorded continuously on a circular chart recorder.	Record results of annual inspections and daily observations.
Averaging Period	No average is taken.	Not applicable

[a]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.

Note: Capture efficiency is a critical component of the overall control efficiency of the air pollution control system, and indicators of the performance of the capture system should be incorporated into the monitoring approach. However, sufficient information was not available from this case study to include monitoring of the capture system performance.

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	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.
	A. Data Representativeness[b]		
	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.

EXAMPLE COMPLIANCE ASSURANCE MONITORING:
CARBON ADSORBER FOR VOC CONTROL--FACILITY E

I. Background

A. Emissions Unit

Description:	Chemical Process
Identification:	NA
Facility:	Facility E Anytown, USA

B. Applicable Regulation, Emission Limit, and Monitoring Requirements

Regulation No.:	Permit
Regulated pollutant (PSEU):	VOC
Emission limit:	95 percent reduction by cycle
Monitoring requirements:	Continuously monitor inlet and outlet VOC concentration.

C. Control Technology: Three carbon adsorbers

II. Monitoring Approach

The key elements of the monitoring approach for VOC, including the indicators to be monitored, indicator ranges, and performance criteria, are presented in Table A.5-1.

TABLE A.5-1. MONITORING APPROACH

I. Indicator	VOC removal efficiency
Measurement Approach	The inlet and outlet VOC concentrations are monitored with VOC analyzers.
II. Indicator Range	An excursion is defined as an efficiency less than 95.5 percent for each bed cycle. Excursions trigger an inspection, corrective action, and a reporting requirement.
QIP Threshold[a]	Six excursions per semiannual reporting period.
III. Performance Criteria	
A. Data Representativeness[b]	Two analyzers are installed on the carbon adsorber, one at the inlet and one at the outlet vent. The minimum accuracy is ±1 percent of span.
B. Verification of Operational Status	NA
C. Quality Assurance and Control Practices	Monthly calibration is performed on the analyzers using calibration gas. Maximum calibration drift is ±2.5 percent of span. Operators may request that additional calibration checks be performed in between the scheduled monthly checks. Monthly health checks of the monitors are also performed. Annual preventive maintenance procedures are performed.
D. Monitoring Frequency	VOC concentrations are measured every 2 minutes.
Data Collection Procedures	Efficiencies are determined (based on VOC concentration measurements) and recorded every 2 minutes.
Averaging Period	Average efficiencies are determined by cycle, per bed for tracking of the bed efficiency.

[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

Emissions from the chemical process are vented to three carbon adsorber beds in parallel. The emissions are vented to one or two of the three carbon adsorbers at all times; one or two beds are online while the other(s) is regenerating. The carbon adsorbers are used to recover VOC. Bypass of the control device is not possible based on the PSEU design.

II. Rationale for Selection of Performance Indicators

VOC emissions from the chemical process are recovered with three carbon adsorbers in parallel. Monitoring of the inlet and outlet VOC concentration to calculate the recovery efficiency of the control device has been selected as the monitoring approach. This monitoring method is a direct measure of the control device performance and provides the best assurance that the carbon beds are operating properly. A decline in recovery efficiency indicates reduced performance of the carbon adsorber. For this system, maintaining a high recovery efficiency is desirable because the recovered VOC is reused in the process. The facility opted to install VOC CEMS that provide a direct measure of recovery efficiency. This information allows the facility to maximize VOC recovery.

III. Rationale for Selection of Indicator Ranges

The selected indicator range is "greater than 95.5 percent efficiency for each carbon bed cycle." No upper indicator range limit is necessary. 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 selected QIP threshold level is six excursions per bed per semiannual reporting period. (Note: Establishing a proposed QIP threshold in the monitoring submittal is optional.) This level is less than 0.5 percent of the number of bed cycles in a semiannual reporting period. If the QIP threshold is exceeded in a semiannual reporting period, a QIP will be developed and implemented.

To monitor and evaluate performance, the carbon bed efficiency of each cycle for each bed is charted and evaluated using statistical techniques. The average and the upper and lower control limits (±3 standard deviations) are graphed. The process target level is 96 percent efficiency. The indicator range has been established at a level that is above the emission limitation (95 percent efficiency) but below the lower control limit during normal operating conditions.

Monitoring data were reviewed to determine whether the control efficiency is maintained during normal operation of the process and carbon adsorber. The average recovery efficiency per online cycle and the average daily efficiency for a 16-day period (May 6 to May 21, 1997) were reviewed for carbon bed 12; a total of 181 cycles for bed 12 were completed in these 16 days.

The cycle efficiency data are presented in Figure A.5-1. The average cycle efficiency ranged from 95.5 to 96.6 percent.

The upper and lower control limits (3 standard deviations) are 96.4 and 95.8 percent, respectively. During this 16-day period the selected indicator range of 95.5 percent (identified as the "lower specification" in Figure A.5-1) was exceeded once; i.e., one excursion occurred.

The daily average efficiencies are presented in Figure A.5-2. The daily average efficiencies ranged from 95.8 to 96.3 percent. During this 16-day period, the carbon adsorber bed was consistently operating with a recovery efficiency greater than or equal to 95 percent.

No performance test has been conducted on this control device and a performance test is not planned for the purpose of establishing the indicator range. The control efficiency is determined based upon the relative measurement of the inlet and outlet concentrations.

The monitors are calibrated monthly using calibration standards comprised of the single VOC present in the exhaust stream. Monthly calibrations were found to be sufficient based on calibration drift data collected over a 1 year period. These data indicate that calibration readings are consistent from month to month and rarely drift by more than ±2.5 percent of the span value.

Handout – CAM Applicability Exercise

A 100 MMBtu/hr natural gas-fired fortune-cookie incinerator has an electrostatic precipitator with 95% control efficiency for PM10 emissions, a scrubber with 60% control efficiency for SOx emissions, and low-NOx burners. The facility has been issued a Title V permit, which is now due for renewal. CAM has not been determined for this incinerator previously, and you are tasked with determining if the incinerator is subject to these requirements.

The operating permit has the following conditions:

- Emissions from this furnace shall not exceed any of the following emissions limits: NOx: 2.1 lb/MMBtu, SOx: 0.06 lb/MMBtu, PM10: 0.02 lb/MMBtu, VOC: 0.3 lb/MMBtu, and CO: 2.22 lb/MMBtu. [District NSR Rule]

- This incinerator shall not operate for more than 23 hours per day, nor more than 4,500 hours per year. [District NSR Rule]

The Major Source thresholds for the air basin in which this facility is located are as follows:

Pollutant	ton/year
NOx	25
SOx	70
PM10	70
CO	100
VOC	25

Question 1 – Which pollutants would be subject to CAM <u>based only on the control technology criteria</u>?

Question 2 – Of the remaining pollutants subject to CAM from Question 1, which pollutants are subject to CAM based on uncontrolled mass emissions?

Question 3 – What operating parameters would we choose to show a "reasonable assurance of compliance" should we choose to monitor the following indicators (ESP Voltage already done for you)?

Indicator	ESP voltage	VEE
Indicator range	20k Volts – 50K Volts – corrective action, reporting	
Measurement location	ESP voltage feed	
QA/QC	Annual cal, maintenance per manufacturer	
Frequency	At least once / day	
Data Collection Device	Voltage meters	
Averaging time	hourly	
QIP Threshold	< 10 excursions/qtr	