3.0 CAM ILLUSTRATIONS

This chapter introduces illustrations of the types of monitoring that generally satisfy the requirements of the CAM rule. Sections 3.1 and 3.2 describe the purpose and format of the illustrations, Section 3.3 presents general information about the illustrations and their use. Section 3.4 discusses presumptively acceptable CAM. The illustrations of CAM are presented in Appendix B.

3.1 PURPOSE OF ILLUSTRATIONS

The purpose of the illustrations is to give examples of the types of monitoring (i.e., indicators or combinations of indicators) that may be used in conjunction with specific types of emission control methods to provide a reasonable assurance of compliance with emission limitations. Each illustration corresponds to a specific combination of pollutant, control method, and monitoring approach.

The combinations of pollutant and control device type have been designated as "categories" for organizational purposes. Table 3-1 provides a list of potential categories of CAM illustrations. The control devices listed are based on controls identified in the Aerometric Information Retrieval System (AIRS) data base; selected control devices and their AIRS identification codes are given in Table 3-2. For each illustration category or designation, the list includes examples of emissions units to which the illustration may apply. The table also indicates which illustrations have been drafted to date. This list of illustrations is not meant to be all-inclusive. Emission units with control technologies other than those listed in Table 3-1 may be subject to CAM, and monitoring approaches other than those addressed in these **nonprescriptive** illustrations may be acceptable for satisfying the requirements of Part 64. Facilities are encouraged to consider not only the monitoring approaches included in the CAM illustrations presented but other options that provide a reasonable assurance of compliance.

The CAM illustrations presented in Appendix B are not meant to be examples of monitoring approach submittals; CAM submittals are addressed in Chapter 2 and Appendix A of this document. A CAM submittal provides all the monitoring information that is required [§ 64.4] to be submitted to the permitting authority for a PSEU.

TABLE 3-1. POTENTIAL CAM ILLUSTRATIONS

Control	Pollutant	Emissions units	Category
Fabric filter	PM	Furnace, kiln, dryer, incinerator, material processing & handling, industrial process vents	1 (a,b,c,d,e) *
ESP	PM	Furnace, kiln, dryer, incinerator, material processing & handling	2 *
Wet ESP	PM	Insulation mfg.	3
Wet scrubber	PM	Furnace, kiln, dryer, incinerator, material processing & handling	4 (a)*
Wet scrubber	SO_2	Combustor	5*
Spray drying	SO_2	Combustors, furnaces, boilers	6 *
Wet scrubber	TRS	Smelt dissolving tank, furnace	7
Wet scrubber	Fluorides	Phosphate fertilizer manufacturing, primary aluminum processing	8
Absorber	VOC	Polymer mfg., distillation units, air oxidation units, misc. reactors	9
Afterburner	PM	Saturator, blowing still	10
Thermal incinerator	CO	FCCU catalyst regeneration, petroleum refining	11 (a,b) *
Oxidation control	SO_2	Sulfur recovery, sweetening units	12
Reduction and incineration	SO_2	Sulfur recovery, sweetening units	13
Combustion	TRS	Furnaces, combustors	14
Incinerator	TRS	Smelt dissolving tank, kraft pulp wall processes	15
Thermal incinerator	VOC	Coating, spraying, printing, polymer mfg., distillation units, wastewater treatment units, equipment leaks, air oxidation units, misc. SOCMI units	16(a,b,c)*
Catalytic combustor	PM	Wood heater	17
Catalytic oxidizer	VOC	Coating, spraying, printing, polymer mfg., distillation units, wastewater treatment units, equipment leaks, air oxidation units, misc. SOCMI units	18*
Flare	CO, VOC	EAF, coke oven batteries, misc. SOCMI units	19
Condenser	VOC	Coating, polymer mfg., distillation units, equipment leaks air oxidation units, misc. reactors, pharmaceuticals	21*
Gravel bed filter	PM	Kiln, cooler, dryer	22
Carbon adsorber	VOC	Coating, spraying, printing, polymer mfg., distillation units, wastewater treatment units, dry cleaning, degreasing, pharmaceuticals, leaks	23*
Cyclone	PM	Combustors, mineral processing, furnaces, kilns	24 (a,b)*
Gravity collector	PM	Combustors, mineral processing, furnaces, kilns	25 *
Flue gas desulfurization	SO_2	Boiler	26
Acid plant neutralization	SO_2	Furnace	27
Dual absorption system	SO_2	Sulfuric acid production	28
Dry sorbent injection	SO_2	Combustor	29
Water injection	NO_x	Turbines	30
Ext. column absorption	NO_x	Nitric acid production	31
Selective cat. reduction	NO_x	Nitric acid production	32(a,b)

*Indicates illustrations already drafted.

TABLE 3-2. SELECTED AIRS IDENTIFICATION CODES FOR CONTROL DEVICES

AIRS Code		Description of control method
001 002 003	Wet scrubber:	High efficiency Medium efficiency Low efficiency
004 005 006	Gravity collector:	High efficiency Medium efficiency Low efficiency
007 008 009	Centrifugal collector:	High efficiency Medium efficiency Low efficiency
010 011 012	Electrostatic Precipitator (ESP):	High efficiency Medium efficiency Low efficiency
013	Gas scrubber, general	
014 015	Mist eliminator:	High Velocity Low Velocity
016 017 018	Fabric filter:	High Temperature Medium Temperature Low Temperature
019 020	Catalytic:	Afterburner Heat Exchanger
021 022	Direct flame:	Afterburner Heat Exchanger
023	Flaring	
026	Flue gas recirculation	
028 032	Injection:	Steam or Water Ammonia
034 035 036 037 038	Scrubbing:	Wellman-Lord/Sodium Sulfate Magnesium Oxide Dual Alkali Citrate Process Ammonia
039	Catalytic oxidation-flue gas desulfurization	
040	Alkalized alumina vapor space tank	
041 042	Limestone injection:	Dry Wet
043 044	Sulfuric acid plant:	Contact Process Double Contact Process
045	Sulfur plant	
047	Vapor recovery system	
048	Activated carbon adsorption	
049	Liquid filtration system	

TABLE 3-2. (continued)

AIRS Code		Description of control method
050 051	Gas absorber column:	Packed Tray Type
052	Spray tower	
053 055	Scrubber:	Venturi Impingement plate
056 057	Dynamic separator:	Dry Wet
058 059 063 064	Filter - Mat or panel Metal fabric filter screen Filter:	 Gravel bed Annular ring
065	Catalytic reduction	
066	Molecular sieve	
067 068 069 070	Scrubbing:	Wet lime slurry Alkaline fly ash Sodium carbonate Sodium-alkali
071	Fluid bed dry scrubber	
072 073 074	Condenser:	Tube and shell Refrigerated Barometric
075 076 077	Cyclone: Single Multi without fly ash reinjection Multi with fly ash reinjection	
079	Dry electrostatic granular filter	
080	Chemical oxidation	
081	Chemical reduction	
082	Ozonation	
083	Chemical neutralization	
084	Activated clay adsorption	
085	Wet cyclonic separator	
086	Water curtain	
087	Nitrogen blanket	
098	Moving bed dry scrubber	
101	High Efficiency Particulate Air (HEPA) Filter	
107	Selective Noncatalytic Reduction (SNCR) for NO_x	

3.2 FORMAT OF ILLUSTRATIONS

Figure 3-1 presents the general format for CAM illustrations and provides a brief description of the elements that comprise an illustration.

1. APPLICABILITY

1.1 Control Technology
Type of control device (e.g., wet scrubber) or method to monitor (e.g., work practices). [The numbers listed in this section are the AIRS control device identification codes.]

1.2 Pollutants
Primary: The pollutant specified in the applicable requirement for the emissions unit (e.g., VOC).
Other: Other pollutants that may be controlled incidentally by the control device or method (e.g., organic HAP's)

1.3 Process/Emissions Unit
Some examples of types of emission units subject to the applicable requirement (e.g., boiler).

2. MONITORING APPROACH DESCRIPTION

2.1 Indicators Monitored
The indicators of control method performance that are to be monitored to satisfy CAM. In many cases, only one indicator (e.g., pressure drop) may be monitored to assure compliance with the applicable requirement. In other cases, two or more indicators may be monitored.

2.2 Rationale for Monitoring Approach
Short justification for the adequacy of the monitoring approach for assuring compliance with the applicable requirement (e.g., scrubber efficiency increases with pressure drop).

2.3 Monitoring Location
Suggested locations for monitoring the indicator of control technology performance (e.g., across venturi throat).

2.4 Analytical Devices Required
Examples of the instruments, devices, or other relevant equipment that could be used to perform the type of monitoring addressed in the illustration (e.g., differential pressure gauges). Information on various types of parameter measurement equipment are presented in Chapter 4, Monitoring Equipment Technical Reference.

2.5 Data Acquisition and Measurement System Operation
For each parameter that is to be monitored, the frequency of monitoring, applicable units of measurement, and options for recording the monitoring data.

2.6 Data Requirements
Types and amounts of data and other information needed to establish the indicator ranges.

2.7 Specific QA/QC Procedures
Calibration, maintenance and operation of instrumentation that would be required to assure proper QA/QC for the given monitoring.

2.8 References
Numbered references to the bibliography provided at the end of the CAM illustrations section, listing those that were used for the illustration and would be useful for generating a CAM plan.

3. Comments

Additional explanation or comments on the illustration.

Figure 3-1. CAM illustration format.

3.3 ILLUSTRATIONS

The CAM illustrations completed to date are presented in Appendix B. Additional illustrations will be added to the Appendix as they become available. The illustrations are organized by control method, according to the order presented in Table 3-1.

Section 3.3.1 presents general comments that pertain to the illustrations.

3.3.1 General Information

3.3.1.1 Multiple Monitoring Approaches

For some categories of control device/pollutant combinations, multiple CAM illustrations have been presented; that is, multiple monitoring approaches have been identified. The monitoring approach for a PSEU should be evaluated on a case-by-case basis. Depending upon the PSEU, any of the multiple approaches presented (or other approaches not presented) might be appropriate. In other cases, because of the specific design and operating conditions of the PSEU, not all of the approaches presented would be applicable to, or sufficient for, the specific unit. For example, for a thermal incinerator used for VOC control on a process where capture efficiency is not a factor, an illustration that presents monitoring of the temperature of the combustion chamber as the only parameter monitored might be appropriate. On the other hand, if the capture efficiency of the VOC fume is a factor in the control system performance, a monitoring approach that also incorporates an indicator for monitoring capture efficiency (such as flow) would be appropriate.

Also, approaches presented separately in different illustrations can be combined to establish a complete monitoring approach. For example, for the fabric filter/PM category, periodic (daily) visible emission monitoring is presented as a separate illustration of a monitoring approach. This monitoring can be combined with other illustrations presented for baghouses, such as the continuous monitoring of baghouse pressure drop, (or other approaches not presented) to provide the overall monitoring approach selected for a PSEU for inclusion in a CAM submittal.

3.3.1.2 Frequency of Data Recording

For large pollutant specific emission units (i.e., PSEU's with the potential to emit, calculated <u>including</u> the effect of control devices, the applicable regulated air pollutant in an amount equal to or greater than 100 percent of the amount, in tons per year, required for a source to be classified as a major source), CAM requires the owner or operator to collect four or more data values equally spaced over each hour and average the values, as applicable, over the applicable averaging period, for each parameter monitored [§ 64.3(b)(4)(ii)].

Some of the illustrations presented in Appendix B may indicate a reduced data collection frequency. These monitoring approaches may not be acceptable for large units unless approved by the permitting authority or used in conjunction with the monitoring of other parameters for which the data collection frequency is at least four times per hour. However, the permitting authority may approve a reduced data collection frequency, if appropriate, based on information presented by the owner or operator concerning the data collection mechanisms available for a particular parameter for a particular pollutant-specific emissions unit (e.g., integrated raw material or fuel analysis data, noninstrumental measurement of waste feed rate or visible emissions, use of a portable analyzer or alarm sensor).

3.4 PRESUMPTIVELY ACCEPTABLE CAM

Monitoring identified by the Administrator as presumptively acceptable monitoring satisfies the requirements of the CAM Rule's Monitoring Design Criteria [§ 64.3]. These requirements include both general criteria [§ 64.3(a)] and performance criteria [§ 64.3(b)].

The general criteria set guidelines for:

(a) Designing an appropriate monitoring system; and

(b) Setting the appropriate parameter range(s).

The performance criteria require:

(a) Data representativeness;

(b) A method to confirm the operational status of the monitoring equipment (for new or modified monitoring equipment only);

(c) Quality assurance and quality control procedures; and

(d) Specifications for the monitoring frequency and data collection procedure.

The owner or operator may propose presumptively acceptable monitoring without additional permit content or justification, except that for new or modified monitoring systems the owner/operator must submit information on the method to be used to confirm operational status of the monitoring equipment.

The monitoring requirements for all NSPS and NESHAP in 40 CFR 60 and 40 CFR 61 were reviewed with respect to meeting each of the Part 64 criteria listed above, with the exception of the criterion for verifying operational status for new systems. Because this requirement applies only to new systems, it is not appropriate to include this criterion in the evaluation of presumptively acceptable monitoring. Instead the expectation is that an owner/operator proposing monitoring that involves a new system does need to provide information on the approach to be used for confirming operational status of a new system even for presumptively acceptable monitoring.

Table 3-3 lists the rules that incorporate presumptively acceptable monitoring. The monitoring approaches presented in the table are presumptively acceptable for the same type of emissions units for which the monitoring in the cited rules apply, with the caveat that all the elements of the monitoring approach presented in the rule are incorporated into the monitoring proposed by the source owner to satisfy CAM (e.g., setting of parameter ranges, frequency of measurement and data collection, averaging times, and quality assurance/control procedures and frequency).

Many of the rules that were reviewed have monitoring requirements that satisfy some or most of the criteria. An important criterion that is absent in all of the Part 60 and 61 rules is the establishment of monitoring requirements for capture efficiency, for rules in which capture efficiency is a factor in determining compliance with the regulation. Because establishing

parameters for monitoring capture efficiency, if applicable, is an important criterion of CAM (see § 64.3), these regulations were not considered to be presumptively acceptable. Typically, the criterion that was not met for many of the other rules was the criterion for quality assurance and quality control procedures. Rules that simply stated: "calibrate according to manufacturer's recommendations" were not considered to satisfy the Part 64 QA/QC procedures requirement. As a minimum, the frequency of QA/QC procedures or calibrations should be specified.

Rules that are missing only one or two CAM performance criteria (e.g., acceptable calibration drift or calibration frequency) but are acceptable with respect to all other criteria have been identified as "Conditionally Presumptively Acceptable Rules" and are listed in Table 3-4. This means that information to address the criterion not included in the rule must be included with the CAM submittal. For new or modified monitoring equipment, verification procedures to confirm the operational status of the monitoring also must be included in the CAM submittal.

Rules that require flares to meet 40 CFR 60.18 (general control device requirements) have been determined to be presumptively acceptable for CAM. These rules do not specifically meet all of the Part 64 criteria (specifically, neither the rules nor Part 60.18 establish QA/QC practices or a frequency of calibration). Nonetheless, because the required monitoring is limited to the continuous monitoring of the presence of a pilot flame (yes/no) and because Part 60.18 stipulates design criteria for flares, the lack of specific QA/QC practices is not considered a deficiency for this control device/monitoring combination. If the sensor fails, the lack of a pilot flame will be indicated and corrective action will be required.

The use of CEMS that provide results in units of the standard for the pollutant of interest and meet the criteria presented in § 64.3.(d)(2) is presumptively acceptable CAM; specific regulations utilizing CEMS have not been listed in the table as a matter of convenience. Note, however, that rules using continuous VOC monitors have been included because (a) in many cases, the emission limit is not expressed as a concentration limit (the CEMS does not provide data in units of the standard), so consideration must be given to whether CAM monitoring design criteria (e.g., establishing an indicator range and averaging time) are addressed; and (b) some rules require parameter monitoring or continuous VOC emissions monitoring.

TABLE 3-3. PRESUMPTIVELY ACCEPTABLE MONITORING[a]

Subpart	Source category	Emissions unit	Control device	Pollutant	Required monitoring
NSPS (40 CFR 60)					
VV	Equipment leaks of VOC in the SOCMI	Equipment leaks captured by closed vent system	Flare	VOC	Continuous presence of pilot flame
DDD	VOC emissions from polymer industry	Process vents	Flare	VOC	Continuous presence of pilot flame
GGG	Equipment leaks of VOC in petroleum refineries	Equipment leaks captured by closed vent system	Flare	VOC	Continuous presence of pilot flame
III	SOCMI air oxidation unit processes with VOC emissions	Reactors and recovery systems	Flare	VOC	Continuous presence of pilot flame
KKK	Equipment leaks of VOC from onshore natural gas processing	Equipment leaks captured by closed vent system	Flare	VOC	Continuous presence of pilot flame
NNN	VOC emissions from SOCMI distillation operations	Distillation units	Flare	VOC	Continuous presence of pilot flame, and indicator of diversion of gas flow from flare
QQQ	VOC emissions from petroleum refinery wastewater systems	Wastewater systems	Flare	VOC	Continuous presence of pilot flame
RRR	VOC emissions from SOCMI reactor processes	Reactor processes	Flare	VOC	Continuous presence of pilot flame, and indicator of diversion of gas flow from flare
NESHAP (40 CFR 61)					
F	Vinyl chloride	Ethylene dichloride, vinyl chloride, and polyvinyl chloride plants	Flare on relief valve	VOC	Continuous presence of pilot flame
J	Equipment leaks of benzene	Equipment leaks captured by closed vent system	Flare	Benzene	Continuous presence of pilot flame
V	Equipment leaks	Equipment leaks captured by closed vent system	Flare	VHAP	Continuous presence of pilot flame
Y	Benzene from benzene storage vessels	Benzene storage vessels with closed vent system	Flare	Benzene	Continuous presence of pilot flame
BB	Benzene emissions from benzene transfer operations	Tank truck, rail, and marine vessel loading racks	Flare	Benzene	Continuous presence of pilot flame
FF	Benzene waste operations	Chemical manufacturing plants, coke by-product plants, and petroleum refineries	Flare	Benzene	Continuous presence of pilot flame

[a]Monitoring is presumptively acceptable only if it complies with all monitoring provisions stipulated in the subpart.

TABLE 3-4. CONDITIONALLY PRESUMPTIVELY ACCEPTABLE RULES

Subpart	Source category	Emissions unit	Pollutant	Control	Required monitoring	Additional conditions to be met (must be specified in CAM submittal)
NSPS (40 CFR 60)						
DDD	VOC emissions from polymer industry	Polymer manufacturing processes	VOC	Thermal incinerator	Temperature (continuous)	Specify device calibration frequency
				Catalytic incinerator	Temperature differential across catalyst bed (continuous)	Specify device calibration frequency
				Boiler/ process heater[a]	Temperature (continuous)	Specify device calibration frequency
				Carbon adsorber	Outlet organics concentration (continuous)	If monitor does not meet PS 8 or PS 9, specify device calibration frequency and accuracy
				Absorber	• Outlet organics concentration (continuous), or • Temperature (continuous), and • Liquid specific gravity (continuous)	If outlet organics concentration monitored, If monitor does not meet PS 8 or PS 9, specify device calibration frequency and accuracy If temperature and specific gravity monitored, Specify device calibration frequency
				Condenser	• Outlet organics concentration (continuous), or • Temperature (continuous)	If outlet organics concentration monitored, If monitor does not meet PS 8 or PS 9, specify device calibration frequency and accuracy If temperature monitored, Specify device calibration frequency
				All	Bypass: Flow indicator downstream of each valve that would allow bypass (15 min.) and/or check bypass valves/car seals monthly.	None

TABLE 3-4. (continued)

Subpart	Source category	Emissions unit	Pollutant	Control	Required monitoring	Additional conditions to be met (must be specified in CAM submittal)
III	SOCMI air oxidation unit processes VOC emissions	Reactors and recovery systems	VOC	Thermal incinerator	• Temperature continuous) • Bypass: hourly indication of flow	Specify device calibration frequency
				Catalytic incinerator	• Temperature differential across catalyst bed (continuous) • Bypass: hourly indication of flow	Specify device calibration frequency
				Boiler/ process heater[a]	• Temperature (continuous) • Bypass: hourly indication of flow	Specify device calibration frequency
				Carbon adsorber	Outlet organics concentration (continuous)	If monitor does not meet PS 8 or PS 9, specify device calibration frequency and accuracy
				Absorber	• Outlet organics concentration (continuous), or • Temperature (continuous), and • Liquid specific gravity (continuous)	If outlet organics concentration monitored, If monitor does not meet PS 8 or PS 9, specify device calibration frequency and accuracy If temperature and specific gravity monitored, Specify device calibration frequency
				Condenser	• Outlet organics concentration (continuous), or • Temperature (continuous)	If outlet organics concentration monitored, If monitor does not meet PS 8 or PS 9, specify device calibration frequency and accuracy If temperature monitored, Specify device calibration frequency

TABLE 3-4. (continued)

Subpart	Source category	Emissions unit	Pollutant	Control	Required monitoring	Additional conditions to be met (must be specified in CAM submittal)
LLL	On-shore natural gas processing: SO_2 emissions	Sweetening units	SO_2	Incinerator with oxidation or reduction system	• Outlet temperature (continuous • SO_2 concentration	Specify data collection procedures
NNN	VOC emissions for SOCMI distillation operations	Distillation units	VOC	Thermal incinerator	• Temperature (continuous) • Bypass: hourly indication of flow	Specify device calibration frequency
				Catalytic incinerator	• Temperature differential across catalyst bed (continuous) • Bypass: hourly indication of flow	Specify device calibration frequency
				Boiler/ process heater[a]	• Temperature (continuous) • Bypass: hourly indication of flow	Specify device calibration frequency
				Carbon adsorber	Outlet organics concentration (continuous)	If monitor does not meet PS 8 or PS 9, specify device calibration frequency and accuracy
				Absorber	• Outlet organics concentration (continuous), or • Temperature (continuous), and • Liquid specific gravity (continuous)	<u>If outlet organics concentration monitored</u>, If monitor does not meet PS 8 or PS 9, specify device calibration frequency and accuracy <u>If temperature and specific gravity monitored</u>, Specify device calibration frequency
				Condenser	• Outlet organics concentration (continuous), or • Temperature (continuous)	<u>If outlet organics concentration monitored</u>, CEMS must meet PS 8 requirements <u>If temperature monitored</u>, Specify device calibration frequency

TABLE 3-4. (continued)

Subpart	Source category	Emissions unit	Pollutant	Control	Required monitoring	Additional conditions to be met (must be specified in CAM submittal)
PPP	Wool Fiberglass Insulation Manufacturing Plants	Rotary spin wool fiberglass manufacturing lines	PM	WESP	• Primary and secondary current and voltage (4h), • Inlet water flow rate (4h), and • Total solids content of inlet water (daily)	• Increase monitoring frequency for large units • Data representativeness criteria (i.e., measurement location) • Data averaging period, if applicable
QQQ	VOC emissions from petroleum refinery wastewater systems	Oil-water separator tanks for >16 L/sec, drain systems	VOC	Thermal incinerator	Temperature (continuous)	Specify device calibration frequency
				Catalytic incinerator	Temperature differential across catalyst bed (continuous)	Specify device calibration frequency
				Carbon adsorber	Outlet organics concentration (continuous)	If monitor does not meet PS 8 or PS 9, specify device calibration frequency and accuracy
				All	Bypass: Flow indicator on vent stream to control device to ensure vapors are being routed to device.	None
RRR	VOC emissions from SOCMI reactor processes	Reactors	VOC	Thermal incinerator	• Temperature (continuous) • Bypass: hourly indication of flow	Specify device calibration frequency
				Catalytic incinerator	• Temperature across catalyst bed (continuous) • Bypass: hourly indication of flow	Specify device calibration frequency
				Boiler/process heater[a]	• Temperature (continuous) • Bypass: hourly indication of flow	Specify device calibration frequency
				Carbon adsorber	• Outlet organics concentration (continuous)	If monitor does not meet PS 8, specify device calibration frequency and accuracy
				Adsorber	• Outlet organics concentration (continuous), or • Temperature (continuous), and • Liquid specific gravity (continuous)	<u>If outlet organics concentration monitored</u>, If monitor does not meet PS 8, specify device calibration frequency and accuracy <u>If temperature and specific gravity monitored</u>, Specify device calibration frequency
				Condenser	• Outlet organics concentration (continuous), or • Temperature (continuous), and • Liquid specific gravity (continuous)	<u>If outlet organics concentration monitored</u>, If monitor does not meet PS 8, specify device calibration frequency and accuracy <u>If temperature and specific gravity monitored</u>, Specify device calibration frequency
NESHAP (40 CFR 61)						

TABLE 3-4. (continued)

Subpart	Source category	Emissions unit	Pollutant	Control	Required monitoring	Additional conditions to be met (must be specified in CAM submittal)
L	Benzene from coke by-product recovery plants	Process vessels, storage tanks, tar intercepting sumps	Benzene	Thermal incinerator	• Temperature (continuous) • Bypass: Inlet gas flow indicator (hourly) or outlet gas flow indicator (15 min.) or monthly check of locked bypass valves (e.g., car seal)	Specify device calibration frequency
				Catalytic incinerator	• Temperature differential across catalyst bed (continuous) • Bypass: Inlet gas flow indicator (hourly) or outlet gas flow indicator (15 min.) or monthly check of locked bypass valves (e.g., car seal)	Specify device calibration frequency
				Regenerative carbon adsorber	Benzene or organics concentration (continuous)	If monitor does not meet PS 8 or PS 9, specify device calibration frequency and accuracy
BB	Benzene emissions from benzene transfer operations	Tank truck, rail, and marine vessel loading racks	Benzene	Thermal incinerator	Temperature (continuous)	Specify device calibration frequency
				Catalytic incinerator	Temperature differential across catalyst bed (continuous)	Specify device calibration frequency
				Boiler/ process heater[a]	Temperature (continuous)	Specify device calibration frequency
				Carbon adsorber	Outlet organics concentration (continuous)	If monitor does not meet PS 8 or PS 9, specify device calibration frequency and accuracy
				All	Bypass: Flow indicator downstream of each valve that would allow bypass (15 min.) and/or check bypass valves/car seals monthly.	None

TABLE 3-4. (continued)

Subpart	Source category	Emissions unit	Pollutant	Control	Required monitoring	Additional conditions to be met (must be specified in CAM submittal)
FF	Benzene waste operations	Chemical manufacturing plants, coke by-product plants, & petroleum refineries	Benzene	Thermal incinerator	Temperature (continuous)	Specify device calibration frequency
				Catalytic incinerator	Temperature differential across catalyst bed (continuous)	Specify device calibration frequency
				Boiler/ process heater[a]	Temperature (continuous)	Specify device calibration frequency
				Carbon adsorber	Outlet organics or benzene concentration (continuous)	If monitor does not meet PS 8 or PS 9, specify device calibration frequency and accuracy
				Condenser	• Outlet organics or benzene concentration (continuous), or • Outlet temperature (continuous) and • Coolant exit temperature (continuous)	<u>If outlet organics concentration monitored</u>, If monitor does not meet PS 8 or PS 9, specify device calibration frequency and accuracy <u>If temperatures monitored</u>, Specify device calibration frequency Specify device accuracy
				All	Bypass: Flow indicator every 15 min. or locked bypass valves (e.g., car seal).	None

[a]Note that temperature monitoring is only required for boilers or process heaters with a design heat capacity of <150 million Btu/hr (44 MW).