PROPOSED ADDENDA TO EPA/AUTO PROTOCOL FOR COMPLIANCE ASSURANCE MONITORING

This document presents procedures that satisfy EPA Compliance Assurance Monitoring (CAM) rule requirements applicable to VOC (Volatile Organic Compound) emission control devices for coating processes for automobiles and light duty trucks. These CAM procedures are presented as addenda to the Protocol for Determining the Daily Volatile Organic Compound Emission Rate of Automobile and Light Duty Truck Topcoat Operations, (EPA-450/3-88-018) ("EPA/Auto Protocol"). The VOC emission control devices involved are: (1) oxidizers used on the exhaust from ovens, spraybooths, or concentrators, and (2) spraybooth VOC capture and control devices (concentrators). The CAM rule requires procedures for equipment covered by a Part 70 "significant permit revision" during the term of a source's initial Title V permit, or upon renewal of that permit, whichever occurs first. 40 C.F.R. 64.5(a). A company or facility may submit alternative monitoring plans to a state or local agency.

SECTION "AA"-- OXIDIZER EFFICIENCY

I. Background

Conventional and regenerative thermal or catalytic oxidizers are used to control VOC emissions from automotive coating processes. They may be used in several different portions of the coating process. Oxidizers are commonly used on the oven exhaust, but may also be installed on portions of the spraybooth exhaust stream, on the exhaust from spraybooth emissions adsorber concentrator equipment, or on the exhaust from flash-off areas.

The EPA/Auto Protocol specifies procedures for testing the VOC capture and destruction efficiency performance of oxidizers. Testing results using the Protocol's procedures demonstrate that the oxidizer operating temperature is an appropriate parametric for VOC efficiency performance of oxidizers. A specified minimum temperature, therefore, can be used to initiate a process review and any necessary follow-up action. Other key parameters that can lead to degradation in environmental performance will be monitored on a less frequent basis, such as valve leakage and catalyst activity.

The plant's VOC emissions performance is a function of several factors used to determine compliance. Thus, a change in operation of the oxidizer does not, by itself, indicate non-compliance with VOC emission limits.

From the performance tests, a credit is established for the VOC emissions reduction from the oxidizer. This oxidizer VOC emissions credit is one element in the equation (e.g., combined with other coating system control elements, such as paint application transfer efficiency, low VOC paint, spraybooth

controls) used to determine the plant's VOC emissions performance. Thus, an apparent drop in oxidizer operating temperature below a specified level does not, by itself, indicate non-compliance with the VOC emission limits. A significant temperature drop, however, is an indication of a change in operation of the oxidizer that may have an adverse impact on performance of the control device. Specifying the minimum oxidizer temperature is also supported in the existing Standards of Performance for Automobile and Light Duty Truck Surface Coating Operations (NSPS) in 40 CFR Part 60, Subpart MM.

Bypass of oxidizers is an unusual event that is typically monitored and reported in accordance with local permitting requirements for control equipment malfunctions. If such requirements do not exist, the Title V operating permit must include such requirements for CAM purposes, consistent with 64.3(a)(2), and identify which bypass events constitute excursions.

This Section provides a procedure for determining the acceptable indicator range beyond which a review of the oxidizer operating system will be required and, when necessary, corrective action taken. Specific record-keeping and reporting actions are included.

II. Monitoring Approach

A. Indicator Range and Data Collection

1. Thermal Oxidizer:

a) Combustion Chamber Temperature:

During coating operations, a three-hour period (as described in Section II.B.2) during which the average operating temperature measured is lower than a specified value by more than 28ºC (50ºF) will require a review of the process. This involves checking to confirm that an excursion has occurred (e.g., check for false readings or faulty equipment). If there is an excursion, the facility must record it and, when necessary, initiate corrective action.

The specified value for each oxidizer is the average temperature during the most recent control device performance test at which the destruction efficiency was determined. The temperature sensor is to be located in the combustion chamber or exhaust stream of the combustion chamber as recommended by the manufacturer and/or consistent with the configuration utilized to measure the combustion chamber temperature during the most recent control device performance test.

b) Example:

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The average operating temperature during the most recent performance test at which the destruction efficiency of the control device was determined was 1350/F. A three-hour period during which the average temperature measured is below 1300/F would require a review of the process. If there is an excursion the facility must record it and, when necessary, initiate corrective action. If the review of the process indicates that the readings were false because the meter was malfunctioning, an excursion would not be confirmed, and the readings would not be recorded as an excursion (although the facility would retain the records of the temperature readings as required by the Clean Air Act Title V regulations). Corrective action would be taken to repair the monitoring system and summary information on the monitoring system malfunction would be reported in the periodic report.

c) Example, Deliberate Intermittent Cutbacks:

If the temperature drops below 1300/ F because of planned energy savings during non-production periods (e.g., temperature cutbacks over a lunch hour production break), but the temperature is raised above that level as production resumes, there is no excursion. The time periods of the temperature cutbacks would not be figured in the three-hour averages.

2. Catalytic Oxidizer:

a) Catalyst Inlet Temperature:

During coating operations, a three-hour period (as described in Section II.B.2) during which the average temperature measured is lower than a specified value by more than 28ºC (50ºF) will require a review of the process. This involves checking to confirm that an excursion has occurred (e.g., check for false readings or faulty equipment). If there is an excursion, the facility must record it and when necessary, initiate corrective action.

The specified value for each oxidizer is the average temperature during the most recent performance test at which the VOC destruction efficiency of the control device was determined. The temperature sensor should be located between the burner and the catalyst as recommended by the manufacturer and/or consistent with the configuration utilized to measure the combustion chamber temperature during the most recent control device performance test. The minimum temperature should be maintained even when the production rate drops below 80% of the normal level or the performance test production rate.

b) Differential Temperature (DT) Across the Catalyst:

In addition (except during low production conditions described in Section II.A.2.c, or for Regenerative Catalytic Oxidizers), if the average DT across the catalyst bed for a three-hour period is

less than 80% of the temperature difference measured during the most recent control device performance test for destruction efficiency, the facility must initiate a process review. This involves checking to confirm that an excursion has occurred (e.g., check for false readings or faulty equipment). If there is an excursion, the facility must record it and, when necessary, initiate corrective action. If the temperature difference is not maintained, the catalyst may be sampled and tested to assure appropriate performance properties, as a "corrective action."

c) Low Production Conditions:

There are occasional periods of low production associated with plant shutdowns or model changes that occur for extended periods. Major model changes can lead to several weeks of low production rates related to installation and evaluation of new tools and equipment. During periods of low production at less than 80% of the performance test production rate, the minimum inlet temperature must be maintained as above and, in addition, a positive temperature gradient across the catalyst bed must be maintained.

d) Example:

The average inlet operating temperature during the most recent control device performance test for determining the destruction efficiency was 800/F. Therefore, a three-hour period during which the average temperature measured is below 750/F would require a review of the process. If there is an excursion, the facility must record it and, when necessary, initiate corrective action. In addition, the DT across the catalyst averaged 100/F during the control device performance test. The average production rate during the performance test was 30 vehicles/hour. Therefore, a three-hour period during which the average DT is below 80/F (80% of the test DT) would require a process review (provided low production conditions do not apply -- in this example, the average production rate during the period is at least 24 vehicles/hour or 80% of the performance test production rate). If there is an excursion, the facility must record it and, when necessary, initiate corrective action.

3. Regenerative Oxidizers (Thermal and\or Catalytic):

a) For regenerative thermal oxidizers, the above monitoring for Thermal Oxidizers is required in addition to the monitoring in this section.

b) For regenerative catalytic oxidizers, only the above monitoring of the catalyst inlet temperature is required in addition to the monitoring in this section.

c) For regenerative catalytic oxidizers, the ongoing performance of the catalyst shall be checked

by examining representative samples and/or testing them as necessary for activity level (conversion efficiency and surface area). The catalyst shall be inspected or tested as recommended by the manufacturer and replaced as appropriate.

d) For both thermal and catalytic regenerative oxidizers, an inspection of valve conditions is required. This inspection may consist of a visual examination of the oxidizer valve or measurement of VOC emissions, with any significant increase in VOC concentration noted. Maintenance must be performed in accordance with the results of the inspections up to and including the replacement of the valves.

4. Excursions:

a) A temperature excursion is defined as a confirmed three-hour period during which the average of the monitored values fails to meet the specified temperature requirements. After becoming aware that there has been a temperature change that does not satisfy the specified value or DT, an investigation shall begin as soon as practical. One common practice has been to calculate the three-hour average temperature when the temperature recorder indicates readings below the specified temperature. The facility may calculate a temperature average for the relevant rolling or non-rolling three-hour block of time, or may simply initiate an investigation at that time. Another common practice is to calculate average temperature for specified three-hour periods (e.g., beginning with the operation of the unit for the day, 6 a.m. - 9 a.m., 9 a.m. - 12 noon). An investigation involves checking to confirm that an excursion has occurred (e.g., check for false readings or faulty equipment). If there has been an excursion, it shall be recorded and, when necessary, corrective action shall begin as soon as practical.

b) As applicable based on the equipment, a maintenance excursion is defined as a failure to check valve leakage and/or catalyst activity at the frequency specified below or a failure to perform the maintenance that an inspection report recommends.

5. Data Availability:

All available relevant data will be provided except for monitoring malfunctions, associated repairs, and required quality assurance or control activities (including calibration checks and required zero and span adjustments). The owner or operator shall conduct all monitoring in continuous operation (or shall collect data at all required intervals) at all times that the pollutant-specific emissions unit is operating. A monitoring malfunction is any sudden, infrequent, not reasonably preventable failure of the monitoring equipment to provide valid data. Monitoring failures that are caused in part by poor maintenance or careless operation are not malfunctions. Minimum data availability requirements may be specified in Title V operating permits to individual facilities for each required parameter for the averaging periods in

a reporting period, and may be especially appropriate for parameters measured continuously.

B. Performance Criteria

1. Indicator Range:

The indicator ranges for temperature measuring devices and maintenance requirements are addressed in Sections II.A.1, II.A.2 and II.A.3.

2. Monitoring Frequency and Averaging:

The temperature shall be monitored continuously (i.e., at least every 15 minutes), and the temperature recorded at least every 15 minutes (minimum of four equally-spaced readings per hour). The three-hour average temperature shall be calculated as the average of the readings (except that an average need only be calculated if readings occur below the specified temperature level).

The minimum frequency of assessment of catalyst activity is annually, except that less frequent assessments may be agreed to by the permitting agency based on the availability of data to support less frequent assessments (e.g., historical data from the facility or data provided by the manufacturer/catalyst vendor for similar sources). The minimum frequency of assessment of regenerative valves is annually. All maintenance identified in the inspections must be performed as soon as practicable.

3. QA/QC Procedures:

Accuracy of the thermocouple will be verified by a second, or redundant, thermocouple probe inserted adjacent to the primary thermocouple. This validation check will be conducted at least annually. The acceptance criterion is ±30/ F. Alternatively, the thermocouple system can be re-calibrated annually. The temperature-measuring device shall meet current NSPS Subpart MM requirements of ±4/F or ±0.75% of the temperature measured in degrees F, whichever is greater. If a chart recorder is utilized, the minimum chart recorder sensitivity (minor division) is 20/ F.

III. Record-keeping

Records relevant to the above requirements currently specified by the underlying regulation and/or Title V operating permit will be maintained at the site and include:

A. Description of operating, temperature-measuring devices (e.g., automatic strip charts, digital data acquisition systems).

B. Data from the temperature-measuring devices and any temporary data logged manually as back up.

C. Inspection reports and maintenance performed in response to recommendations in inspection reports.

D. Excursions.

E. Monitoring system malfunctions.

F. Corrective actions taken.

G. Calibration records.

IV. Periodic Reporting

Periodic reporting required by the underlying regulations and/or Title V operating permit should include the following items (at least semi-annually):

A. Date, time, and duration of excursions.

B. Description of corrective action taken.

C. Date corrective action was initiated and completed.

D. Summary information on the number, duration, and cause for monitor downtime incidents (other than downtime associated with zero and span or daily calibration checks, if applicable).

V. Alternative Methods

An alternative to the above monitoring approach may be negotiated with the permitting agency.

SECTION "BB" - SPRAYBOOTH CONCENTRATOR VOC CAPTURE AND CONTROL

I. Background

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This Section describes monitoring procedures when the VOC emissions from controlled sections of spraybooths are directed to a concentrator system. These concentrators include both an "adsorption phase" and a "desorption phase" to produce a concentrated effluent. VOC from the desorption phase is either oxidized, or collected and removed, for VOC emissions reduction credit. Alternatively, the controlled sections of the spraybooth exhaust may flow directly to an oxidizer, as described in Section "AA".

These procedures provide for determining an acceptable indicator (or indicators) to determine when a review of the control system will be required and, when necessary, corrective action taken. Specific reporting and record-keeping procedures are included. Other key parameters that can lead to degradation in environmental performance will be monitored on a less frequent basis, such as desorption\reactivation fan operation, concentrator rotational speed, and concentrator media activity.

The plant's VOC emissions performance is a function of several factors used to determine compliance. Thus, a change in operation of the spraybooth VOC control equipment does not, by itself, indicate non-compliance with VOC emission limits.

During the VOC emission tests using the EPA/Auto Protocol to determine the pounds of VOC per gallon of solids applied, the level of spraybooth VOC control may be demonstrated for emissions reduction credit. This spraybooth VOC reduction credit is one element in the equation used to determine the plant's VOC emissions performance (combined with other coating system control elements, such as oven incineration, low VOC paint, and improved coating application efficiency). Thus, a change in operation of the spraybooth VOC control equipment does not, by itself, indicate non-compliance with VOC emission limits. Such a condition, however, may have an adverse impact on performance of the control device. It is appropriate, therefore, to initiate a process review and when necessary, corrective action.

Bypass of adsorbers is an unusual event that is typically monitored and reported in accordance with local permitting requirements for control equipment malfunctions. If such requirements do not exist, the Title V operating permit must include such requirements for CAM purposes, consistent with 64.3(a)(2), and identify which bypass events constitute excursions.

II. Monitoring Approach

The monitoring approach applies to the primary control equipment that concentrates the VOC emissions, and uses inlet temperature to the desorption/reactivation zone of the concentrator as the indicator that VOCs are being removed from the appropriate area of the concentrator system. The release of VOCs from the concentrator media is a direct function of the temperature in the

desorption/reactivation zone. Maintaining the inlet temperature within the appropriate range provides assurance that the VOCs are being released to the secondary device (capture or destruction) as designed for the system. The specific parameter values shall be developed from the manufacturer's recommendations, operating experience, or a performance test.

In order to confirm that the concentrator is continuing to operate as intended, the following additional parameters will be monitored periodically:

1) Verify that the desorption/reactivation fan is operating normally.

2) Verify the rotational speed (revolutions per hour) of the concentrator to confirm that it is operating at the nominal speed used during the performance test.

3) Check and record the ongoing performance of the adsorbent materials by examining representative samples and testing them per manufacturer recommendation. The adsorbent shall be replaced as appropriate. Alternatively, performance can be checked with a flame ionization detector (FID), photo ionization detector (PID), or other appropriate equipment or methodologies.

A. Indicator Range and Data Collection

1. Concentrator:

a) Desorption/reactivation zone inlet temperature:

During coating operations, a three-hour period (as described in Section II.B.2) during which the average inlet temperature measured from the desorption/reactivation zone is lower than a specified value will require a review of the process. This involves checking to confirm that an excursion has occurred (check for false readings or faulty equipment, etc.). If there is an excursion, the facility must record it and, when necessary, initiate corrective action.

The specific parameter value shall be developed from the manufacturer's recommendations, operating experience, and a performance test. The specified value for each facility is the average temperature during the most recent control device performance test at which the VOC destruction efficiency was determined. The desorb inlet temperature is measured with a thermocouple, and the temperature sensor is to be located in the inlet stream of the desorption/reactivation zone and/or as recommended by the manufacturer and/or consistent with the configuration utilized to measure the temperature during the most recent control device performance test.

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b) Desorption/reactivation fan operation:

The facility will select an indicator(s) of performance for the desorption/reactivation fan operation, such as: rpm, amps, static pressure, or flowrate. The specified value of the indicator range for the parameter(s) is selected by the facility based upon the system design specifications, operating experience (historical data), and/or data obtained concurrent with an emissions performance test.

c) Rotational speed of concentrator:

The indicator of performance is the rotational speed of the concentrator (e.g., revolutions per hour [rph]). The indicator range is the nominal speed at which the concentrator operated during the most recent emissions performance test. However, the indicator range for the rotational speed may be changed if an engineering evaluation is conducted and a determination made that the change in speed will not impact compliance with the emission limit.

d) Performance of the adsorbent materials:

The performance of the adsorbent material will be verified by examining representative samples and testing the performance (adsorbent activity) per the manufacturer's recommendation. The results shall be assessed (e.g., compared to historical results and/or results for new adsorbent) and the adsorbent shall be replaced as appropriate.

Alternatively, performance can be checked with a portable flame ionization detector (FID), photo ionization detector (PID), or other appropriate equipment or methodologies. In this case, the concentration of the adsorber outlet stream, or the percent reduction in concentration of the inlet/outlet stream measurements are compared to historical data from performance tests. The results shall be assessed and the adsorbent shall be replaced as appropriate.

2. Excursions:

a) Desorption/reactivation zone inlet temperature:

An excursion is defined as a confirmed three-hour period during which the average of the monitored values fails to meet the specified temperature requirements.

After becoming aware that there has been a temperature change that does not satisfy the specified value an investigation shall begin as soon as practical. One common practice has been to calculate the three-hour average temperature when the temperature recorder indicates readings below the specified temperature. The facility may calculate a temperature average for the relevant rolling or non-rolling

three-hour block of time, or may simply initiate an investigation at that time. Another common practice is to calculate average temperature for specified three-hour periods (e.g., beginning with the operation of the unit for the day, 6 a.m. - 9 a.m., 9 a.m. - 12 noon). An investigation involves checking to confirm that an excursion has occurred (e.g., check for false readings or faulty equipment). If there has been an excursion, it shall be recorded and, when necessary, corrective action shall begin as soon as practical.

b) Desorption/reactivation fan operation:
An excursion is a failure to perform the periodic check of fan operation and/or a monitored parameter value outside the established indicator range.

c) Rotational speed of concentrator:
An excursion is a failure to perform the periodic check of concentrator rotational speed and/or a monitored parameter value outside the established indicator range.

d) Performance of the adsorbent materials:
An excursion is a failure to perform the periodic inspection and testing of the adsorbent performance (activity).

3. Data Availability:

All available, relevant data will be provided except for monitoring malfunctions, associated repairs, and required quality assurance or control activities (including calibration checks and required zero and span adjustments). The owner or operator shall conduct all monitoring in continuous operation (or shall collect data at all required intervals) at all times the pollutant-specific emissions unit is operating. A monitoring malfunction is any sudden, infrequent, not reasonably preventable failure of the monitoring equipment to provide valid data. Monitoring failures that are caused in part by poor maintenance or careless operation are not malfunctions. Minimum data availability requirements may be specified in Title V operating permits to individual facilities for each required parameter for the averaging periods in a reporting period, and may be especially appropriate for parameters measured continuously.

B. Performance Criteria

1. Indicator Range:

The indicator ranges are addressed in Section II.A.1 above.

2. Monitoring Frequency and Averaging:

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The temperature shall be monitored continuously (i.e., at least every 15 minutes), and the temperature recorded at least every 15 minutes (minimum of four equally-spaced readings per hour). The three-hour average temperature shall be calculated as the average of the readings (except that an average need only be calculated if readings occur below the specified temperature level).

The minimum frequency for observing and recording the fan operation for desorption/reactivation airflow is monthly.

The minimum frequency for observing and recording the rotational speed of the concentrator is annually.

The minimum frequency for observing and recording the adsorbent activity level is annually; except that less frequent assessments may be agreed to by the permitting agency based on the availability of data to support less frequent assessments (e.g., historical data from the facility or data provided by the manufacturer/catalyst vendor for similar sources). The general guideline to follow is that newer equipment requires less frequent adsorbent activity testing relative to older equipment.

3. QA/QC Procedures:

Accuracy of the thermocouple will be verified by a second, or redundant, thermocouple probe inserted adjacent to the primary thermocouple. This validation check will be conducted at least annually. The acceptance criterion is ±30/ F. Alternatively, the thermocouple system can be re-calibrated annually. The temperature-measuring device shall meet current NSPS Subpart MM requirements of ±4/F or ±0.75% of the temperature measured in degrees F, whichever is greater. If a chart recorder is utilized, the minimum chart recorder sensitivity (minor division) is 20/ F.

III. Record-keeping

Records relevant to the above requirements currently specified by the underlying regulation and/or operating permit will be maintained at the site and include:

A. Description of operating temperature-measuring devices (e.g., automatic strip charts, digital data acquisition systems).

B. Data from the temperature-measuring devices and any temporary data logged manually as back up. Log/data of fan operation for the desorption/reactivation airflow, concentrator rotational speed, and concentrator activity results and the rationale for the determination of the frequency of concentrator activity.

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C. Excursions.

D. Monitoring system malfunctions.

E. Corrective actions taken.

F. Calibration records.

IV. Periodic Reporting

Periodic reporting required by the underlying regulations and/or operating permit should include the following items (at least semi-annually):

A. Date, time, and duration of excursions.

B. Description of corrective action taken.

C. Date corrective action was initiated and completed.

D. Summary information on the number, duration, and cause for monitor downtime incidents (other than downtime associated with zero and span or daily calibration checks, if applicable).

V. Alternative Method

An alternative to the above monitoring approach may be negotiated with the permitting agency.