Section 48 - Reactor Processes and Distillation Operations in the Synthetic Organic Chemical Manufacturing Industry.

11/29/94

a. Applicability.

1. This Section applies to any vent stream that originates from a process unit in which a reactor process or distillation operation is located at a facility within the synthetic organic chemical manufacturing industry (SOCMI).

2. This Section does not apply to the following operations:

   i. Any reactor process or distillation operation that is designed and operated in a batch mode is not subject to the provisions of this Section.

   ii. Any reactor process or distillation operation that is part of a polymer manufacturing operation is not subject to the provisions of this Section.

   iii. Any reactor process or distillation operation that operates in a process unit with a total design capacity of less than 1 gigagram per year (1,100 tons per year) for all chemicals produced within that unit is not subject to the provisions of this Section except for the reporting/recordkeeping requirements listed in paragraph (f)(4) of this Section.

   iv. Any vent stream for a reactor process or distillation operation with a flow rate less of than 0.0085 standard cubic meters per minute (scmm) or a total volatile organic compound (VOC) concentration of less than 500 parts per million by volume (ppmv) is not subject to the provisions of this Section except for the performance testing requirement listed in paragraphs (d)(4)(ii) and (d)(9) and the reporting/recordkeeping requirements listed in paragraph (f)(3) of this Section.

3. Existing sources affected by this Section shall comply with the provisions of this Section as soon as practicable, but no later than April 1, 1996. New, modified, or reconstructed sources affected by this Section shall comply with the provisions of this Section upon start-up.

4. Any facility that becomes or is currently subject to the provisions of this Section

by exceeding the applicability threshold in paragraph (a)(2) of this Section shall remain subject to these provisions even if its emissions later fall below the applicability threshold.

5. Any facility that is currently subject to a state or federal rule promulgated pursuant to the Clean Air Act Amendments of 1977 by exceeding an applicability threshold is and shall remain subject to these provisions, even if its throughput or emissions have fallen or later fall below the applicability threshold.

b. Definitions. As used in this Section, all terms not defined herein shall have the meaning given them in the November 15, 1990 Clean Air Act Amendments (CAAA), or in Section 2 of Regulation 24.

"Batch mode" means a non-continuous operation or process in which a discrete quantity or batch of feed is charged into a process unit and distilled or reacted at one time.

"Boiler" means any enclosed combustion device that extracts useful energy in the form of steam.

"By compound" means by individual stream components, not carbon equivalents.

"Continuous recorder" means a data recording device that records an instantaneous data value at least once every 15 minutes.

"Distillation operation" means an operation in which one or more feed stream(s) are separated into two or more exit stream(s). Each exit stream has component concentrations different from those in the feed stream(s). The separation is achieved by the redistribution of the components between the liquid and vapor-phase as they approach equilibrium within the distillation unit.

"Distillation unit" means a device or vessel in which distillation operations occur, including all associated internal components (such as trays or packing) and accessories (such as reboilers, condensers, vacuum pumps, stream jets, etc.), plus any associated recovery system.

"Engineering assessment" means the use of documented estimation methods or procedures or sound judgment. Engineering assessment includes, but is not limited to, previous test results that are representative of current operating practices at the process unit, bench-scale or pilot-scale test data that are representative of the process under representative operating conditions, a specification or implication of the maximum flow rate within a permit limit applicable to the process vent, a design analysis based on accepted chemical engineering principles, measurable process parameters, or physical or chemical laws or properties. Examples for analytical methods include, but are not limited to, the use of material balances based on process stoichiometry to estimate the maximum VOC concentration, the estimation of the maximum flow rate based on physical equipment design parameters such as pump or blower capacities, the estimation of the total organic compound (TOC) concentration based on saturation conditions, and the estimation of the maximum expected net heating value based on the stream concentration of each organic compound, or, alternatively, as if all TOCs in the stream were the compound with the highest heating value. All data, assumptions, and procedures used in engineering assessments shall be documented.

"Flame zone" means the portion of the combustion chamber in a boiler that is occupied by the flame envelope.

"Flow indicator" means a device that indicates whether gas flow is present in a vent stream.

"Halogenated vent stream" means any vent stream that is determined to have a total concentration of halogen atoms (by volume) contained in organic compounds of 200 ppmv or greater, as determined by Method 18 in **Appendix "E"** of Regulation 24 or by engineering assessment or process knowledge that no halogenated organic compounds are present. For example, 150 ppmv of ethylene dichloride would contain 300 ppmv of total halogen atoms.

"Primary fuel" means the fuel that provides the principal heat input to the device. To be considered primary, the fuel must be able to sustain operation without the addition of other fuels.

"Process heater" means a device which transfers heat that is liberated by burning fuel to fluids contained in tubes, including all fluids except water that is heated to produce steam.

"Process unit" means equipment that is assembled and connected by pipes or ducts to produce, as intermediates or final products, one or more SOCMI chemicals. A process unit can operate independently if it is supplied with sufficient feed or raw materials and sufficient product storage facilities.

"Product" means any compound or SOCMI chemical that is produced as that chemical for sale as a product, by-product, co-product, or intermediate, or for use in the production of other chemicals or compounds.

"Reactor process" means a unit operation in which one or more chemicals, or reactants other than air, are combined or decomposed in such a way that their molecular structures are altered and one or more new organic compounds are formed.

"Recovery device" means an individual unit of equipment, such as an adsorber, a carbon adsorber, or a condenser, that is capable of and used for the purpose of recovering chemicals for use, reuse, or sale.

"Recovery system" means an individual recovery device or series of such devices applied to the same vent stream.

"Synthetic organic chemical manufacturing industry" or "SOCMI" means the industry that produces, as intermediates or final products, one or more of the chemicals listed at 40 Code of Federal Regulations (CFR) Part 60.489 (July 1, 1992).

"Total organic compounds" or "TOC" means those compounds measured according to the procedures of Method 18 in **Appendix "E"** of Regulation 24.

"Total resource effectiveness index value" or "TRE index value" means a measure of the supplemental total resource requirement per unit reduction of VOCs associated with a process vent stream, based on the vent stream flow rate, the emission rate of VOCs, the net heating value, and the corrosion properties (whether or not the vent stream contains halogenated compounds), as quantified by the equations provided in paragraph (d) of this Section. The TRE index is a decision tool used to determine if the annual cost of controlling a given vent gas stream is acceptable when considering the emissions reduction achieved.

"Vent stream" means any gas stream which discharges directly from a distillation operation or reactor process to the atmosphere or which discharges indirectly to the atmosphere after diversion through other process equipment. The definition of vent stream excludes relief valve discharges and equipment leaks including, but not limited to, pumps, compressors, and valves.

c. Standards.

1. For individual vent streams within a process unit with a TRE index value of less than or equal to 1.0, the owner or operator shall comply with the standards in paragraphs (c)(1)(i), (c)(1)(ii), or (c)(1)(iii) of this Section.

i. Reduce emissions of TOC (less methane and ethane) by 98 weight-percent, or to 20 ppmv, on a dry basis corrected to 3 percent oxygen, whichever is less stringent. If a boiler or process heater is used to comply with this standard, the vent stream shall be introduced into the flame zone of the boiler or process heater.

ii. Combust emissions in a flare. Flares used to comply with this standard shall comply with the requirements of 40 CFR Part 60.18 (July 1, 1992). This flare operation requirement does not apply if a process, not subject to this Section, vents an emergency relief discharge into a common flare header and causes the flare servicing the process subject to this Section to be out of compliance with one or more of the provisions of 40 CFR Part 60.18 (July 1, 1992).

iii. Use a product recovery device or process modification to increase the TRE index value to greater than 1.0 at the outlet of the final recovery device.

2. For each individual vent stream within a process unit with a TRE index value of greater than 1.0, the owner or operator shall maintain vent stream parameters that result in a calculated TRE index value of greater than 1.0 without the use of a VOC control device. The TRE index shall be calculated at the outlet of the final recovery device.

d. Test Methods and Procedures for Total Resource Effectiveness Index Value Determination, Performance Testing, and Exemption Testing. The following methods shall be used as reference methods to demonstrate compliance with paragraph (c) of this Section:

1. The TRE index value of the vent shall be calculated using the following equation:

$$TRE = \frac{1}{E_{TOC}} [a + b(Q_s) + c(H_T) + d(E_{TOC})]$$

where:

TRE = TRE index value.

Q_s = Vent stream flow rate standard cubic meters per minute at a standard temperature of 20 degrees Celsius (°C).

H_T = Vent stream net heating value (megajoules per standard cubic meter), as calculated in paragraph (d)(6)(vi) of this Section.

E_{TOC} = Hourly emission rate of TOC (minus methane and ethane) (kilograms per hour), as calculated in paragraph (d)(6)(iv) of this Section.

a,b,c,d = Coefficients presented in Table 1.

i. The owner or operator of a vent stream shall use the applicable coefficients in Table 1 to calculate the TRE index value based on a flare, a thermal incinerator with 0 percent heat recovery, and a thermal incinerator with 70 percent heat recovery, and shall select the lowest TRE index value.

ii. The owner or operator of a unit with a halogenated vent stream, determined as any stream with a total concentration of halogen atoms contained in organic compounds of 200 ppmv or greater, shall use the applicable coefficients in Table 1 to calculate the TRE index value based on a thermal incinerator and a scrubber.

TABLE 1. COEFFICIENTS FOR TOTAL RESOURCE EFFECTIVENESS FOR NON-HALOGENATED AND HALOGENATED VENT STREAMS

		Value of Coefficients			
Type of Stream	Control Device Basis	a	b	c	d
Non-halogenated	Flare	2.129	0.183	-0.005	0.359
	Thermal incinerator 0 percent heat recovery	3.075	0.021	-0.037	0.018
	Thermal incinerator 70 percent heat recovery	3.803	0.032	-0.042	0.007
Halogenated	Thermal incinerator and scrubber	5.470	0.181	-0.040	0.004

2. For the purpose of demonstrating compliance with the TRE index value, engineering assessment may be used to determine the process vent stream flow rate, the net heating value, and the TOC emission rate for the representative operating condition expected to yield the lowest TRE index value.

   i. If the TRE index value calculated using such engineering assessment is greater than 4.0, the owner or operator shall not be required to perform the test methods and procedures specified in paragraph (d)(4) of this Section.

   ii. If the TRE value calculated using such engineering assessment is less than or equal to 4.0, the owner or operator shall perform the test methods and procedures specified in paragraph (d)(4) of this Section.

3. For the purpose of demonstrating compliance with the control requirements of this Section, the process unit shall be run at representative operating conditions and flow rates during any performance test.

4. The following methods in **Appendix "E"** of Regulation 24, shall be used to demonstrate compliance with the emission limit or percent reduction efficiency requirement listed in paragraph (c)(1)(i) of this Section.

   i. Method 1 or 1A, as appropriate, shall be used for the selection of the sampling sites. The control device inlet sampling site for the determination of vent stream molar composition or TOC (less methane and ethane) reduction efficiency shall be located after the last recovery device but prior to the inlet of the control device, prior to any dilution of the process vent stream, and prior to release to the atmosphere.

ii. Method 2, 2A, 2C, or 2D, as appropriate, shall be used for the determination of the gas stream volumetric flow rate.

iii. The emission rate correction factor, integrated sampling, and analysis procedure of Method 3 shall be used to determine the oxygen concentration ($\%O_{2d}$) for the purpose of determining compliance with the 20 ppmv limit. The sampling site shall be the same as that of the TOC samples, and samples shall be taken during the same time in which the TOC samples are taken. The TOC concentration, corrected to 3 percent oxygen (C_c), shall be computed using the following equation:

$$C_c = C_{TOC} \times \frac{17.9}{20.9 - \%O_{2d}}$$

where:

C_c = Concentration of TOC (minus methane and ethane), corrected to 3 percent oxygen on a dry basis (parts per million by volume).

C_{TOC} = Concentration of TOC (minus methane and ethane) on a dry basis (parts per million by volume).

$\%O_{2d}$ = Concentration of oxygen on a dry basis (percent by volume).

iv. Method 18 shall be used to determine the concentration of TOC (less methane and ethane) at the outlet of the control device when determining compliance with the 20 ppmv limit, or at both the control device inlet and the outlet when the reduction efficiency of the control device is to be determined.

A. The minimum sampling time for each run shall be 1 hour, in which either an integrated sample or four grab samples shall be taken. If grab sampling is used, the samples shall be taken at 15-minute intervals.

B. The emission reduction (R) of TOC (less methane and ethane) shall be determined using the following equation:

$$R = \frac{E_i - E_o}{E_i} \times 100$$

where:

R = Emission reduction (percent by weight).

E_i = Mass rate of TOC (minus methane and ethane) entering the control device (kilograms of TOC per hour).

E_o = Mass rate of TOC (minus methane and ethane) discharged to the atmosphere (kilograms of TOC per hour).

C. The mass rates of TOC (E_i, E_o) shall be computed using the following equations:

$$E_i = K_2 \left(\sum_{j=1}^{n} C_{ij} M_{ij} \right) Q_i$$

$$E_o = K_2 \left(\sum_{j=1}^{n} C_{oj} M_{oj} \right) Q_o$$

where:

C_{ij}, C_{oj} = Concentration of sample component "j" of the gas stream at the inlet and outlet of the control device, respectively, on a dry basis (parts per million by volume).

M_{ij}, M_{oj} = Molecular weight of sample component "j" of the gas stream at the inlet and outlet of the control device, respectively (grams per gram-mole).

Q_i, Q_o = Flow rate of the gas stream at the inlet and outlet of the control device, respectively (dry standard cubic meters per minute).

K_2 = Constant, 2.494 x 10^{-6} (parts per million)$^{-1}$(gram-moles per standard cubic meter)(kilograms per gram)(minutes per hour), where standard temperature for (gram-moles per standard cubic meter) is 20°C.

D. The TOC concentration (C_{TOC}) is the sum of the individual components and shall be computed for each run using the following equation:

$$C_{TOC} = \sum_{j=1}^{n} C_j$$

where:

C_{TOC} = Concentration of TOC (minus methane and ethane) on a dry basis (parts per million by volume).

C_j = Concentration of sample component "j" on a dry basis (parts per million by volume).

n = Number of components in the sample.

v. When a boiler or process heater with a design heat input capacity of 44 megawatts or greater, or a boiler or process heater into which the process vent stream is introduced with the primary fuel, is used to comply with the control requirements in paragraph (c)(1)(i) of this Section, an initial performance test shall not be required.

5. When a flare is used to comply with the control requirements of paragraph (c)(1)(ii) of this Section, the flare shall comply with the requirements of 40 CFR Part 60.18 (July 1, 1992).

6. The following test methods found in **Appendix "E"** of Regulation 24 shall be used to determine compliance with the TRE index value.

i. Method 1 or 1A, as appropriate, shall be used for the selection of the sampling sites.

A. The sampling site for the vent stream molar composition determination and flow rate described in paragraphs (d)(6)(ii) and (d)(6)(iii) of this Section shall be, except for the situations outlined in paragraph (d)(6)(i)(B)(1) of this Section, after the final recovery device, if a recovery system is present, prior to the inlet of any control device, and prior to any post-reactor or post-distillation unit introduction of halogenated compounds into the process vent stream. No traverse site selection method is needed for vents smaller than 10 centimeters (3.9 inches) in diameter.

B. If any gas stream other than the reactor or distillation vent stream is normally conducted through the final recovery device:

(1) The sampling site for the vent stream flow rate and molar composition shall be prior to the final recovery device and prior to the point at which any non-reactor or non-distillation stream or stream from a non-affected reactor or distillation unit is introduced. Method 18 shall be used to measure organic compound concentrations at this site.

(2) The efficiency of the final recovery device is determined by measuring the organic compound concentrations using Method 18 at the inlet to the final recovery device, after the introduction of all vent streams, and at the outlet of the final recovery device.

(3) The efficiency of the final recovery device determined according to paragraph (d)(6)(i)(B)(2) of this Section shall be applied to the organic compound concentrations measured according to paragraph (d)(6)(i)(B)(1) of this Section to determine the concentrations of organic compounds from the final recovery device

attributable to the reactor or distillation vent stream. The resulting organic compound concentrations shall then be used to perform the calculations outlined in paragraph (d)(1) of this Section.

ii. The molar composition of the vent stream shall be determined as follows:

A. Method 18 shall be used to measure the concentration of organic compounds, including those containing halogens.

B. American Society for Testing and Materials (ASTM) Method D1946-77 shall be used to measure the concentration of carbon monoxide and hydrogen.

C. Method 4 shall be used to measure the content of water vapor.

iii. The volumetric flow rate shall be determined using Method 2, 2A, 2C, or 2D, as appropriate.

iv. The emission rate of TOC (minus methane and ethane) (E_{TOC}) in the vent stream shall be calculated using the following equation:

$$E_{TOC} = K_2 \left(\sum_{j=1}^{n} C_j M_j \right) Q_s$$

where:

E_{TOC} = Emission rate of TOC (minus methane and ethane) in the sample (kilograms per hour).

K_2 = Constant, 2.494 x 10^{-6} (parts per million)$^{-1}$(gram-moles per standard cubic meter)(kilograms per gram)(minutes per hour), where standard temperature for (gram-moles per standard cubic meter) is 20°C.

C_j = Concentration of compound "j", on a dry basis (parts per million), as measured by Method 18, as indicated in paragraph (d)(4)(iv) of this Section.

M_j = Molecular weight of sample "j" (grams per gram-mole).

Q_s = Vent stream flow rate (standard cubic meters per minute) at a temperature of 20°C.

v. The total process vent stream concentration (by volume) of compounds containing halogens (ppmv by compound) shall be summed from the individual concentrations of compounds containing halogens that were measured by Method 18.

vi. The net heating value of the vent stream shall be calculated using the following equation:

$$H_T = K_1 \sum_{j=1}^{n} C_j H_j \; (1 - B_{ws})$$

where:

H_T = Net heating value of the sample (megajoules per standard cubic meter), where the net enthalpy per mole of vent stream is based on combustion at 25°C and 760 millimeters of mercury, but the standard temperature for determining the volume corresponding to one mole is 20°C, as in the definition of Q_s (vent stream flow rate).

K_1 = Constant, 1.740×10^{-7} (parts per million)$^{-1}$(gram-moles per standard cubic meter)(megajoules per kilocalorie), where standard temperature for (gram-moles per standard cubic meter) is 20°C.

B_{ws} = Water vapor content of the vent stream, proportion by volume; except that if the vent stream passes through a final steam jet and is not condensed, it shall be assumed that $B_{ws} = 0.023$ in order to correct to 2.3 percent moisture.

C_j = Concentration on a dry basis of compound "j" (parts per million), as measured for all organic compounds by Method 18 and measured for hydrogen and carbon monoxide by the ASTM Method D1946-77.

H_j = Net heat of combustion of compound "j" (kilocalories per gram-mole), based on combustion at 25°C and 760 millimeters of mercury. The heats of combustion of vent stream components shall be determined using ASTM Method D2382-76 if published values are not available or cannot be calculated.

7. Each owner or operator of an affected facility seeking to comply with paragraphs (c)(1)(iii) of this Section or (c)(2) of this Section shall recalculate the flow rate and TOC concentration for that affected facility whenever process changes are made. Examples of process changes include changes in production capacity, feedstock type, or catalyst type, or whenever there is replacement, removal, or addition of recovery equipment. The flow rate and VOC concentration shall be recalculated based on test data, or on best engineering estimates of the effects of the change to the recovery system.

8. Where the recalculated values yield a TRE index of less than or equal to 1.0, the owner or operator shall notify the Department within 1 week of the recalculation and shall conduct a performance test according to the methods and procedures specified in paragraph (d)(4) of this Section.

9. For the purpose of demonstrating that a process vent stream has a VOC concentration of less than 500 ppmv, the following procedures shall be used:

    i. The sampling site shall be selected as specified in paragraph (d)(4)(i) of this Section.

    ii. Method 18 or Method 25A in **Appendix "E"** of Regulation 24 shall be used to measure the VOC concentration; alternatively, any other method or data that has been validated according to the protocol in Method 301 of 40 CFR, Part 63, **Appendix "A"** may be used.

    iii. Where Method 18 is used, the following procedures shall be used to calculate ppmv TOC concentrations:

        A. The minimum sampling time for each run shall be 1 hour, in which either an integrated sample or four grab samples shall be taken. If grab sampling is used, the samples shall be taken at approximately equal intervals of time, such as at 15-minute intervals during the run.

        B. The concentration of TOC (minus methane and ethane) shall be calculated using Method 18 according to paragraph (d)(4)(iv) of this Section.

iv. Where Method 25A is used, the following procedures shall be used to calculate (ppmv) TOC concentrations:

A. Method 25A shall be used only if a single VOC is greater than 50 percent of total VOCs, by volume, in the process vent stream.

B. The process vent stream composition may be determined by either process knowledge or by test data collected using an appropriate EPA Method or a data collection method validated according to the protocol in Method 301 of 40 CFR Part 63, **Appendix "A"** (July 1, 1992). Examples of information that could constitute process knowledge include calculations based on material balances, process stoichiometry, or previous test results, provided that the results are still relevant to the current process vent stream conditions.

C. The VOC used as the calibration gas for Method 25A shall be the single VOC present at greater than 50 percent of the total VOC by volume.

D. The span value for Method 25A shall be 50 ppmv.

E. Use of Method 25A is acceptable if the response from the high-level calibration gas is at least 20 times the standard deviation of the response from the zero calibration gas when the instrument is zeroed on the most sensitive scale.

F. The concentration of TOC shall be corrected to 3 percent oxygen using the procedures and equation provided in paragraph (d)(4)(iii) of this Section.

v. The owner or operator shall demonstrate that the concentration of TOC (including methane and ethane) measured by Method 25A is less than 250 ppmv with a VOC concentration of less than 500 ppmv to qualify for the low-concentration exclusion.

e. Monitoring Requirements.

1. The owner or operator of an affected facility that uses an incinerator to seek compliance with the TOC emission limit or the percent reduction specified in paragraph (c)(1)(i) of this Section shall install, calibrate, maintain, and operate, according to manufacturer's specifications, a temperature monitoring device that is equipped with a continuous recorder and that has an accuracy of ±1 percent of the temperature being measured, expressed in degrees Celsius or ±0.5°C, whichever is greater.

    i. Where an incinerator other than a catalytic incinerator is used, a temperature monitoring device shall be installed in the firebox.

    ii. Where a catalytic incinerator is used, temperature monitoring devices shall be installed in the gas stream immediately before and after the catalyst bed.

2. The owner or operator of an affected facility that uses a flare to seek compliance with paragraph (c)(1)(ii) of this Section shall install, calibrate, maintain, and operate, according to manufacturer's specifications, a heat-sensing device, such as an ultraviolet beam sensor or a thermocouple, at the pilot light to indicate the continuous presence of a flame.

3. The owner or operator of an affected facility that uses a boiler or process heater with a design heat input capacity of less than 44 megawatts to seek compliance with paragraph (c)(1)(i) of this Section shall install, calibrate, maintain, and operate, according to manufacturer's specifications, a temperature monitoring device in the firebox. The monitoring device shall be equipped with a continuous recorder and shall have an accuracy of ±1 percent of the temperature being measured, expressed in degrees Celsius or ±0.5°C, whichever is greater. Any boiler or process heater in which all vent streams are introduced with primary fuel is not subject to this requirement.

4. The owner or operator of an affected facility that seeks to demonstrate compliance with the TRE index value limit specified in paragraphs (c)(1)(iii) or (c)(2) of this Section shall install, calibrate, maintain, and operate, according to manufacturer's specifications, the following equipment:

    i. Where an absorber is the final recovery device in the recovery system, the following monitoring equipment is required.

        A. A scrubbing liquid temperature monitor equipped with a continuous recorder.

        B. A specific gravity monitor equipped with continuous recorders.

ii. Where a condenser is the final recovery device in the recovery system, a condenser exit (product side) temperature monitoring device that is equipped with a continuous recorder and that has an accuracy of ±1 percent of the temperature being monitored, expressed in degrees Celsius or ±0.5°C, whichever is greater.

iii. Where a carbon adsorber is the final recovery device unit in the recovery system, an integrating regeneration stream flow monitoring device with an accuracy of ±10 percent, that is capable of recording the total regeneration stream mass flow for each regeneration cycle; and a carbon bed temperature monitoring device with an accuracy of ±1 percent of the temperature being monitored, expressed in degrees Celsius, or ±0.5°C, that is capable of recording the carbon bed temperature after each regeneration and within 15 minutes of completing any cooling cycle.

iv. Where an absorber is used to scrub halogenated streams after an incinerator, boiler, or process heater, the following monitoring equipment is required for the scrubber.

A. A pH monitoring device equipped with a continuous recorder.

B. Flow meters equipped with a continuous recorder to be located at the scrubber influent for liquid flow and at the scrubber inlet for gas stream flow.

5. The owner or operator of a process vent using a vent system that contains bypass lines that could divert a vent stream away from the combustion device shall either:

i. Install, calibrate, maintain, and operate a flow indicator that provides a record of vent stream flow at least once every 15 minutes (the flow indicator shall be installed at the entrance to any bypass line that could divert the vent stream away from the combustion device to the atmosphere); or

ii. Secure the bypass line valve in the closed position with a car-seal or a lock and key type configuration. A visual inspection of the seal or closure mechanism shall be performed at least once every month to ensure that the valve is maintained in the closed position and that the vent stream is not diverted through the bypass line.

f. Reporting/Recordkeeping Requirements.

1. Each owner or operator with a reactor process or distillation operation subject to this Section shall keep records of the following parameters that are measured during a performance test or TRE determination, as specified in paragraph (d) of this Section, and that are required to be monitored, as specified in paragraph (e) of this Section.

i. Where an owner or operator subject to the provisions of this Section seeks to demonstrate compliance with paragraph (c)(1)(i) of this Section through the use of either a thermal or catalytic incinerator:

A. The average firebox temperature of the incinerator (or the average temperature upstream and downstream of the catalyst bed for a catalytic incinerator), measured at least every 15 minutes and averaged over the same time period of the performance testing.

B. The percent reduction of TOC achieved by the incinerator, determined as specified in paragraph (d)(4) of this Section; or the concentration of TOC (ppmv, by compound) at the outlet of the control device, on a dry basis, corrected to 3 percent oxygen, determined as specified in paragraph (d)(4) of this Section.

ii. Where an owner or operator subject to the provisions of this Section seeks to demonstrate compliance with paragraph (c)(1)(i) of this Section through the use of a boiler or process heater:

A. A description of the location at which the vent stream is introduced into the boiler or process heater.

B. The average combustion temperature of the boiler or process heater with a design heat input capacity of less than 44 megawatts measured at least every 15 minutes and averaged over the same time period of the performance testing.

C. Any boiler or process heater in which all vent streams are introduced with primary fuel is not subject to these requirements.

iii. Where an owner or operator subject to the provisions of this Section seeks to demonstrate compliance with paragraph (c)(1)(ii) of this Section through the use of a smokeless flare; flare design (i.e., steam-assisted, air-assisted, or non-assisted), all visible emission readings, heat content determinations, flow rate measurements, and exit velocity determinations made during the performance test, continuous records of the flare pilot flame monitoring, and records of all periods of operations during which the pilot flame is absent.

iv. Where an owner or operator subject to the provisions of this Section seeks to demonstrate compliance with paragraphs (c)(1)(iii) or (c)(2) of this Section:

A. Where an absorber is the final recovery device in the recovery system, the exit specific gravity (or alternative parameter which is a measure of the degree of absorbing liquid saturation, if approved by the Department), and the average exit temperature of the absorbing liquid, measured at least every 15 minutes and averaged over the same time period of the performance testing (both measured while the vent stream is normally routed and constituted).

B. Where a condenser is the final recovery device in the recovery system, the average exit (product side) temperature, measured at least every 15 minutes and averaged over the same time period of the performance testing while the vent stream is routed and constituted normally.

C. Where a carbon adsorber is the final recovery device in the recovery system, the total stream mass or volumetric flow, measured at least every 15 minutes and averaged over the same time period of the performance testing (full carbon bed cycle), the temperature of the carbon bed after regeneration (and within 15 minutes of completion of any cooling cycle(s)), and the duration of the carbon bed steaming cycle (all measured while the vent stream is routed and constituted normally).

D. As an alternative to paragraphs (f)(1)(iv)(A), (f)(1)(iv)(B), or (f)(1)(iv)(c) of this Section, the concentration level or reading indicated by the organics monitoring device at the outlet of the absorber, condenser, or carbon adsorber, measured at least every 15 minutes and averaged over the same time period as the performance testing while the vent stream is normally routed and constituted.

E. All measurements and calculations performed to determine the flow rate and the VOC concentration, heating value, and TRE index value of the vent stream.

2. Each owner or operator with a reactor process or distillation operation seeking to comply with paragraphs (c)(1)(iii) or (c)(2) of this Section shall also keep records of the following information:

i. Any changes in production capacity, feedstock type, or catalyst type, or of any replacement, removal, and addition of recovery equipment or reactors and distillation units.

ii. Any recalculation of the flow rate, TOC concentration, or TRE index value performed according to paragraph (d)(7) of this Section.

3. Each owner or operator with a reactor process or distillation operation seeking to comply with the flow rate or VOC concentration exemption level specified in paragraph (a)(2)(iv) of this Section shall keep records to indicate that the stream flow rate is less than 0.0085 scmm or that the VOC concentration is less than 500 ppmv.

4. Each owner or operator with a reactor process or distillation operation seeking to comply with the production capacity exemption level of 1 gigagram per year (1,100 tons per year) shall keep records of the design production capacity or of any changes in equipment or process operations that may affect the design production capacity of the affected process unit.

5. Each owner or operator with a reactor process of distillation operation subject to the provisions of this Section shall comply with the following requirements:

i. Initial compliance certification as specified in Section 5(a) of Regulation 24.

ii. Reports of excess emissions as specified in Section 5(b) of Regulation 24, in addition to any other excess emissions reporting mandated by the State of Delaware.