(2) Comply with the requirements of this subpart for Group 1 batch process vents.

(g) *Group 2 batch process vents with annual emissions less than the level specified in §63.1323(d).* The owner or operator of a Group 2 batch process vent with annual emissions less than the level specified in §63.1323(d) shall comply with paragraphs (g)(1), (g)(2), (g)(3), or (g)(4) of this section.

(1) The owner or operator of the affected source shall comply with the requirements in paragraphs (g)(1)(i) through (g)(1)(iv) of this section.

(i) The owner or operator shall establish a batch mass input limitation that ensures emissions do not exceed the level specified in §63.1323(d).

(ii) Over the course of the affected source's ''year,'' as reported in the Notification of Compliance Status in accordance with §63.1335(e)(5)(viii), the owner or operator shall not charge a mass of HAP or material to the batch unit operation that is greater than the level established as the batch mass input limitation.

(iii) The owner or operator shall comply with the recordkeeping requirements in §63.1326(d)(1), and the reporting requirements in §63.1327(a)(2), (b), and (c).

(iv) The owner or operator of the affected source shall comply with §63.1323(i) when process changes are made.

(2) Comply with the requirements of paragraph (f)(1) of this section;

(3) Comply with the requirements of paragraph (f)(2) of this section; or

(4) Comply with the requirements of paragraph (h) of this section.

(h) Owners or operators of Group 2 batch process vents are not required to establish a batch mass input limitation if the batch process vent is Group 2 at the conditions specified in paragraphs (h)(1) and (h)(2) of this section and if the owner or operator complies with the recordkeeping provisions in §§63.1326(a)(1) through (3), 63.1326(a)(9), and 63.1326(a)(4) through (6) as applicable, and the reporting requirements in §63.1327(a)(5), (a)(6), and (b).

(1) Emissions for the single highest-HAP recipe (considering all products that are produced in the batch unit op-

eration) are used in the group determination; and

(2) The group determination assumes that the batch unit operation is operating at the maximum design capacity of the TPPU for 12 months.

[61 FR 48229, Sept. 12, 1996, as amended at 64 FR 11549, Mar. 9, 1999; 65 FR 38112, June 19, 2000; 66 FR 36938, July 16, 2001]

§ 63.1323 Batch process vents—methods and procedures for group determination.

(a) *General requirements.* Except as provided in paragraph (a)(3) of this section and in §63.1321(b)(1), the owner or operator of batch process vents at affected sources shall determine the group status of each batch process vent in accordance with the provisions of this section. This determination may be based on either organic HAP or TOC emissions.

(1) The procedures specified in paragraphs (b) through (g) of this section shall be followed to determine the group status of each batch process vent. This determination shall be made in accordance with either paragraph (a)(1)(i) or (a)(1)(ii) of this section.

(i) An owner or operator may choose to determine the group status of a batch process vent based on the expected mix of products. For each product, emission characteristics of the single highest-HAP recipe, as defined in paragraph (a)(1)(iii) of this section, for that product shall be used in the procedures in paragraphs (b) through (i) of this section.

(ii) An owner or operator may choose to determine the group status of a batch process vent based on annualized production of the single highest-HAP recipe, as defined in paragraph (a)(1)(iii) of this section, considering all products produced or processed in the batch unit operation. The annualized production of the highest-HAP recipe shall be based exclusively on the production of the single highest-HAP recipe of all products produced or processed in the batch unit operation for a 12 month period. The production level used may be the actual production rate. It is not necessary to assume a maximum production rate (*i.e.,* 8,760 hours per year at maximum design production).

(iii) The single highest-HAP recipe for a product means the recipe of the product with the highest total mass of HAP charged to the reactor during the production of a single batch of product.

(2) The annual uncontrolled organic HAP or TOC emissions and annual average batch vent flow rate shall be determined at the exit from the batch unit operation. For the purposes of these determinations, the primary condenser operating as a reflux condenser on a reactor or distillation column, the primary condenser recovering monomer, reaction products, by-products, or solvent from a stripper operated in batch mode, and the primary condenser recovering monomer, reaction products, by-products, or solvent from a distillation operation operated in batch mode shall be considered part of the batch unit operation. All other devices that recover or oxidize organic HAP or TOC vapors shall be considered control devices as defined in §63.1312.

(3) The owner or operator of a batch process vent complying with the flare provisions in §63.1322(a)(1) or §63.1322(b)(1) or routing the batch process vent to a control device to comply with the requirements in §63.1322(a)(2) or §63.1322(b)(2) is not required to perform the batch process vent group determination described in this section, but shall comply with all requirements applicable to Group 1 batch process vents for said batch process vent.

(b) *Determination of annual emissions.* The owner or operator shall calculate annual uncontrolled TOC or organic HAP emissions for each batch process vent using the methods described in paragraphs (b)(1) through (b)(8) of this section. To estimate emissions from a batch emissions episode, owners or operators may use either the emissions estimation equations in paragraphs (b)(1) through (b)(4) of this section, or direct measurement as specified in paragraph (b)(5) of this section. Engineering assessment may be used to estimate emissions from a batch emission episode only under the conditions described in paragraph (b)(6) of this section. In using the emissions estimation equations in paragraphs (b)(1) through (b)(4) of this section, individual component vapor pressure and molecular weight may be obtained from standard references. Methods to determine individual HAP partial pressures in multicomponent systems are described in paragraph (b)(9) of this section. Other variables in the emissions estimation equations may be obtained through direct measurement, as defined in paragraph (b)(5) of this section, through engineering assessment, as defined in paragraph (b)(6)(ii) of this section, by process knowledge, or by any other appropriate means. Assumptions used in determining these variables must be documented. Once emissions for the batch emission episode have been determined using either the emissions estimation equations, direct measurement, or engineering assessment, emissions from a batch cycle shall be calculated in accordance with paragraph (b)(7) of this section, and annual emissions from the batch process vent shall be calculated in accordance with paragraph (b)(8) of this section.

(1) TOC or organic HAP emissions from the purging of an empty vessel shall be calculated using Equation 2 of this subpart. Equation 2 of this subpart does not take into account evaporation of any residual liquid in the vessel.

$$E_{episode} = \frac{(V_{ves})(P)(MW_{wavg})}{RT}\left(1 - 0.37^{m}\right) \quad [Eq. 2]$$

Where:

$E_{episode}$ = Emissions, kg/episode.
V_{ves} = Volume of vessel, m³.
P = TOC or total organic HAP partial pressure, kPa.
MW_{wavg} = Weighted average molecular weight of TOC or organic HAP in vapor, determined in accordance with paragraph (b)(4)(i)(D) of this section, kg/kmol.
R = Ideal gas constant, 8.314 m³·kPa/kmol·K.
T = Temperature of vessel vapor space, K.
m = Number of volumes of purge gas used.

(2) TOC or organic HAP emissions from the purging of a filled vessel shall be calculated using Equation 3 of this subpart.

$$E_{episode} = \frac{(y)(V_{dr})(P^2)(MW_{wavg})}{RT\left(P - \sum_{i=1}^{n} P_i x_i\right)}(T_m) \quad \text{[Eq. 3]}$$

Where:

$E_{episode}$ = Emissions, kg/episode.
y = Saturated mole fraction of all TOC or organic HAP in vapor phase.
V_{dr} = Volumetric gas displacement rate, m³/min.
P = Pressure in vessel vapor space, kPa.
MW_{wavg} = Weighted average molecular weight of TOC or organic HAP in vapor, determined in accordance with paragraph (b)(4)(i)(D) of this section, kg/kmol.
R = Ideal gas constant, 8.314 m³·kPa/kmol·K.
T = Temperature of vessel vapor space, K.
P_i = Vapor pressure of TOC or individual organic HAP i, kPa.
x_i = Mole fraction of TOC or organic HAP i in the liquid.
n = Number of organic HAP in stream. Note: Summation not applicable if TOC emissions are being estimated.
T_m = Minutes/episode.

(3) Emissions from vapor displacement due to transfer of material into or out of a vessel shall be calculated using Equation 4 of this subpart.

$$E_{episode} = \frac{(y)(V)(P)(MW_{wavg})}{RT} \quad \text{[Eq. 4]}$$

where:

$E_{episode}$=Emissions, kg/episode.
y=Saturated mole fraction of all TOC or organic HAP in vapor phase.

V=Volume of gas displaced from the vessel, m³.
P=Pressure in vessel vapor space, kPa.
MW_{wavg}=Weighted average molecular weight of TOC or organic HAP in vapor, determined in accordance with paragraph (b)(4)(i)(D) of this section, kg/kmol.
R=Ideal gas constant, 8.314 m³δkPa/kmolδK.
T=Temperature of vessel vapor space, K.

(4) Emissions caused by the heating of a vessel shall be calculated using the procedures in either paragraphs (b)(4)(i), (b)(4)(ii), or (b)(4)(iii) of this section, as appropriate.

(i) If the final temperature to which the vessel contents is heated is lower than 50 K below the boiling point of the HAP in the vessel, then emissions shall be calculated using the equations in paragraphs (b)(4)(i)(A) through (b)(4)(i)(D) of this section.

(A) Emissions caused by heating of a vessel shall be calculated using Equation 5 of this subpart. The assumptions made for this calculation are atmospheric pressure of 760 millimeters of mercury (mm Hg) and the displaced gas is always saturated with volatile organic compounds (VOC) vapor in equilibrium with the liquid mixture.

$$E_{episode} = \left[\frac{\dfrac{\sum_{i=1}^{n}(P_i)_{T1}}{101.325 - \sum_{i=1}^{n}(P_i)_{T1}} + \dfrac{\sum_{i=1}^{n}(P_i)_{T2}}{101.325 - \sum_{i=1}^{n}(P_i)_{T2}}}{2}\right] * (\Delta\eta)\left[\frac{(MW_{WAVG,T1}) + (MW_{WAVG,T2})}{2}\right] \quad \text{[Eq. 5]}$$

Where:

$E_{episode}$ = Emissions, kg/episode.
$(P_i)_{T1}$, $(P_i)_{T2}$ = Partial pressure (kPa) of TOC or each organic HAP i in the vessel headspace at initial (T1) and final (T2) temperature.
n = Number of organic HAP in stream. Note: Summation not applicable if TOC emissions are being estimated.
$\Delta\eta$ = Number of kilogram-moles (kg-moles) of gas displaced, determined in accordance with paragraph (b)(4)(i)(B) of this section.
101.325 = Constant, kPa.
$(MW_{WAVG,T1})$, $(MW_{WAVG,T2})$ = Weighted average molecular weight of TOC or total organic HAP in the displaced gas stream, determined in accordance with paragraph (b)(4)(i)(D) of this section, kg/kmol.

(B) The moles of gas displaced, $\Delta\eta$, is calculated using Equation 6 of this subpart.

$$\Delta\eta = \frac{V_{fs}}{R}\left[\left(\frac{Pa_1}{T_1}\right)-\left(\frac{Pa_2}{T_2}\right)\right] \quad [Eq.\ 6]$$

Where:

$\Delta\eta$ = Number of kg-moles of gas displaced.
V_{fs} = Volume of free space in the vessel, m³.
R = Ideal gas constant, 8.314 m³·kPa/kmol·K.
Pa_1 = Initial noncondensible gas partial pressure in the vessel, kPa.

Pa_2 = Final noncondensible gas partial pressure, kPa.
T_1 = Initial temperature of vessel, K.
T_2 = Final temperature of vessel, K.

(C) The initial and final pressure of the noncondensible gas in the vessel shall be calculated using Equation 7 of this subpart.

$$Pa = 101.325 - \sum_{i=1}^{n}\left(P_i\right)_T \quad [Eq.\ 7]$$

Where:

Pa = Initial or final partial pressure of noncondensible gas in the vessel headspace, kPa.
101.325 = Constant, kPa.
$(P_i)T$ = Partial pressure of TOC or each organic HAP i in the vessel headspace, kPa, at the initial or final temperature (T1 or T2).
n = Number of organic HAP in stream. Note: Summation not applicable if TOC emissions are being estimated.

(D) The weighted average molecular weight of TOC or organic HAP in the displaced gas, MW_{wavg}, shall be calculated using Equation 8 of this subpart.

$$MW_{wavg} = \frac{\sum_{i=1}^{n}(mass\ of\ C)_i\ (molecular\ weight\ of\ C)_i}{\sum_{i=1}^{n}(mass\ of\ C)_i} \quad [Eq.\ 8]$$

where:

C=TOC or organic HAP component
n=Number of TOC or organic HAP components in stream.

(ii) If the vessel contents are heated to a temperature greater than 50 K below the boiling point, then emissions from the heating of a vessel shall be calculated as the sum of the emissions calculated in accordance with paragraphs (b)(4)(ii)(A) and (b)(4)(ii)(B) of this section.

(A) For the interval from the initial temperature to the temperature 50 K below the boiling point, emissions shall be calculated using Equation 5 of this subpart, where T_2 is the temperature 50 K below the boiling point.

(B) For the interval from the temperature 50 K below the boiling point to the final temperature, emissions shall be calculated as the summation of emissions for each 5 K increment, where the emissions for each increment shall be calculated using Equation 5 of this subpart.

(1) If the final temperature of the heatup is at or lower than 5 K below the boiling point, the final temperature for the last increment shall be the final temperature for the heatup, even if the last increment is less than 5 K.

(2) If the final temperature of the heatup is higher than 5 K below the boiling point, the final temperature for

the last increment shall be the temperature 5 K below the boiling point, even if the last increment is less than 5 K.

(3) If the vessel contents are heated to the boiling point and the vessel is not operating with a condenser, the final temperature for the final increment shall be the temperature 5 K below the boiling point, even if the last increment is less than 5 K.

(iii) If the vessel is operating with a condenser, and the vessel contents are heated to the boiling point, the primary condenser, as specified in paragraph (a)(2) of this section, is considered part of the process. Emissions shall be calculated as the sum of emissions calculated using Equation 5 of this subpart, which calculates emissions due to heating the vessel contents to the temperature of the gas existing the condenser, and emissions calculated using Equation 4 of this subpart, which calculates emissions due to the displacement of the remaining noncondensible gas in the vessel. The final temperature in Equation 5 of this subpart shall be set equal to the exit gas temperature of the condenser. Equation 4 of this subpart shall be used as written below in Equation 4a of this subpart, using free space volume, and T is set equal to the condenser exit gas temperature.

$$E_{episode} = \frac{(y)(V_{fs})(P)(MW_{wavg})}{RT} \quad [Eq. 4a]$$

where:

$E_{episode}$=Emissions, kg/episode.
y=Saturated mole fraction of all TOC or organic HAP in vapor phase.
V_{fs}=Volume of the free space in the vessel, m³.
P=Pressure in vessel vapor space, kPa.
MW_{wavg}=Weighted average molecular weight of TOC or organic HAP in vapor, determined in accordance with paragraph (b)(4)(i)(D) of this section, kg/kmol.
R=Ideal gas constant, 8.314 m³δkPa/kmolδK.
T=Temperature of condenser exit stream, K.

(5) The owner or operator may estimate annual emissions for a batch emission episode by direct measurement. If direct measurement is used, the owner or operator shall either perform a test for the duration of a representative batch emission episode or perform a test during only those periods of the batch emission episode for which the emission rate for the entire episode can be determined or for which the emissions are greater than the average emission rate of the batch emission episode. The owner or operator choosing either of these options shall develop an emission profile for the entire batch emission episode, based on either process knowledge or test data collected, to demonstrate that test periods are representative. Examples of information that could constitute process knowledge include calculations based on material balances and process stoichiometry. Previous test results may be used provided the results are still relevant to the current batch process vent conditions. Performance tests shall follow the procedures specified in paragraphs (b)(5)(i) through (b)(5)(iii) of this section. The procedures in either paragraph (b)(5)(iv) or (b)(5)(v) of this section shall be used to calculate the emissions per batch emission episode.

(i) Method 1 or 1A, 40 CFR part 60, appendix A as appropriate, shall be used for selection of the sampling sites if the flow measuring device is a pitot tube. No traverse is necessary when Method 2A or 2D, 40 CFR part 60, appendix A is used to determine gas stream volumetric flow rate.

(ii) Annual average batch vent flow rate shall be determined as specified in paragraph (e) of this section.

(iii) Method 18 or Method 25A, 40 CFR part 60, appendix A, shall be used to determine the concentration of TOC or organic HAP, as appropriate. Alternatively, any other method or data that has been validated according to the applicable procedures in Method 301 of appendix A of this part may be used. The use of Method 25A, 40 CFR part 60, appendix A shall conform with the requirements in paragraphs (b)(5)(iii)(A) and (b)(5)(iii)(B) of this section.

(A) The organic HAP used as the calibration gas for Method 25A, 40 CFR part 60, appendix A shall be the single organic HAP representing the largest percent by volume of the emissions.

(B) The use of Method 25A, 40 CFR part 60, appendix A 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.

(iv) If an integrated sample is taken over the entire batch emission episode to determine the average batch vent concentration of TOC or total organic HAP, emissions shall be calculated using Equation 9 of this subpart.

$$E_{episode} = K \left[\sum_{j=1}^{n} \left(C_j\right)\left(M_j\right) \right] AFR\left(T_h\right) \quad [Eq.\ 9]$$

Where:

$E_{episode}$ = Emissions, kg/episode.
K = Constant, 2.494×10^{-6} (ppmv)$^{-1}$ (gm-mole/scm) (kg/gm) (min/hr), where standard temperature is 20 °C.
C_j = Average batch vent concentration of TOC or sample organic HAP component j of the gas stream, dry basis, ppmv.
M_j = Molecular weight of TOC or sample organic HAP component j of the gas stream, gm/gm-mole.
AFR = Average batch vent flow rate of gas stream, dry basis, scmm.
T_h = Hours/episode
n = Number of organic HAP in stream. Note: Summation not applicable if TOC emissions are being estimated using a TOC concentration measured using Method 25A, 40 CFR part 60, appendix A.

(v) If grab samples are taken to determine the average batch vent concentration of TOC or total organic HAP, emissions shall be calculated according to paragraphs (b)(5)(v)(A) and (b)(5)(v)(B) of this section.

(A) For each measurement point, the emission rate shall be calculated using Equation 10 of this subpart.

$$E_{point} = K \left[\sum_{j=1}^{n} C_j\, M_j \right] FR \quad [Eq.\ 10]$$

Where:

E_{point} = Emission rate for individual measurement point, kg/hr.
K = Constant, 2.494×10^{-6} (ppmv)$^{-1}$ (gm-mole/scm) (kg/gm) (min/hr), where standard temperature is 20 °C.
C_j = Concentration of TOC or sample organic HAP component j of the gas stream, dry basis, ppmv.
M_j = Molecular weight of TOC or sample organic HAP component j of the gas stream, gm/gm-mole.
FR = Flow rate of gas stream for the measurement point, dry basis, scmm.
n = Number of organic HAP in stream. Note: Summation not applicable if TOC emissions are being estimated using a TOC concentration measured using Method 25A, 40 CFR part 60, appendix A.

(B) The emissions per batch emission episode shall be calculated using Equation 11 of this subpart.

$$E_{episode} = (DUR) \left[\sum_{i=1}^{n} \frac{E_i}{n} \right] \quad [Eq.\ 11]$$

where:

$E_{episode}$=Emissions, kg/episode.
DUR=Duration of the batch emission episode, hr/episode.
E_i=Emissions for measurement point i, kg/hr.
n=Number of measurements.

(6) Engineering assessment may be used to estimate emissions from a batch emission episode, if the criteria in paragraph (b)(6)(i) are met. Data or other information used to demonstrate that the criteria in paragraph (b)(6)(i) of this section have been met shall be reported as specified in paragraph (b)(6)(iii) of this section. Paragraph (b)(6)(ii) of this section defines engineering assessment, for the purposes of estimating emissions from a batch emissions episode. All data, assumptions, and procedures used in an engineering assessment shall be documented.

(i) If the criteria specified in paragraph (b)(6)(i)(A), (B), or (C) are met for a specific batch emission episode, the owner or operator may use engineering assessment, as described in paragraph (b)(6)(ii) of this section, to estimate emissions from that batch emission episode, and the owner or operator is not required to use the emissions estimation equations described in paragraphs (b)(1) through (b)(4) of this section to estimate emissions from that batch emission episode.

(A) Previous test data, where the measurement of organic HAP or TOC emissions was an outcome of the test, show a greater than 20 percent discrepancy between the test value and the value estimated using the applicable equations in paragraphs (b)(1) through (b)(4) of this section. Paragraphs (b)(6)(i)(A)(*1*) and (*2*) of this section describe test data that will be acceptable under this paragraph (b)(6)(i)(A).

(*1*) Test data for the batch emission episode obtained during production of the product for which the demonstration is being made.

(*2*) Test data obtained for a batch emission episode from another process train, where the test data were obtained during production of the product for which the demonstration is being made. Test data from another process train may be used only if the owner or operator can demonstrate that the data are representative of the batch emission episode for which the demonstration is being made, taking into account the nature, size, operating conditions, production rate, and sequence of process steps (*e.g.,* reaction, distillation, etc.) of the equipment in the other process train.

(B) Previous test data obtained during the production of the product for which the demonstration is being made, for the batch emission episode with the highest organic HAP emissions on a mass basis, show a greater than 20 percent discrepancy between the test value and the value estimated using the applicable equations in paragraphs (b)(1) through (b)(4) of this section. If the criteria in this paragraph (b)(6)(i)(B) are met, then engineering assessment may be used for all batch emission episodes associated with that batch cycle for the batch unit operation.

(C) The owner or operator has requested and been granted approval to use engineering assessment to estimate emissions from a batch emissions episode. The request to use engineering assessment to estimate emissions from a batch emissions episode shall contain sufficient information and data to demonstrate to the Administrator that engineering assessment is an accurate means of estimating emissions for that particular batch emissions episode. The

request to use engineering assessment to estimate emissions for a batch emissions episode shall be submitted in the Precompliance Report required under § 63.1335(e)(3).

(ii) Engineering assessment includes, but is not limited to, the following:

(A) Previous test results, provided the tests are representative of current operating practices;

(B) Bench-scale or pilot-scale test data obtained under conditions representative of current process operating conditions;

(C) Flow rate, TOC emission rate, or organic HAP emission rate specified or implied within a permit limit applicable to the batch process vent; and

(D) Design analysis based on accepted chemical engineering principles, measurable process parameters, or physical or chemical laws or properties. Examples of analytical methods include, but are not limited to:

(*1*) Use of material balances;

(*2*) Estimation of flow rate based on physical equipment design such as pump or blower capacities;

(*3*) Estimation of TOC or organic HAP concentrations based on saturation conditions; and

(*4*) Estimation of TOC or organic HAP concentrations based on grab samples of the liquid or vapor.

(iii) Data or other information used to demonstrate that the criteria in paragraph (b)(6)(i) of this section have been met shall be reported as specified in paragraphs (b)(6)(iii)(A) and (b)(6)(iii)(B) of this section.

(A) Data or other information used to demonstrate that the criteria in paragraph (b)(6)(i)(A) or (b)(6)(i)(B) of this section have been met shall be reported in the Notification of Compliance Status, as required in § 63.1327(a)(6).

(B) The request for approval to use engineering assessment to estimate emissions from a batch emissions episode as allowed under paragraph (b)(6)(i)(C) of this section, and sufficient data or other information for demonstrating to the Administrator that engineering assessment is an accurate means of estimating emissions for that particular batch emissions episode shall be submitted with the Precompliance Report, as required in § 63.1335(e)(3).

(7) For each batch process vent, the TOC or organic HAP emissions associated with a single batch cycle shall be calculated using Equation 12 of this subpart.

$$E_{cycle} = \sum_{i=1}^{n} E_{episode_i} \qquad [Eq. 12]$$

Where:

E_{cycle}=Emissions for an individual batch cycle, kg/batch cycle

$E_{episode\,i}$=Emissions from batch emission episode i, kg/episode

n=Number of batch emission episodes for the batch cycle

(8) Annual TOC or organic HAP emissions from a batch process vent shall be calculated using Equation 13 of this subpart.

$$AE = \sum_{i=1}^{n} (N_i)(E_{cycle_i}) \qquad [Eq. 13]$$

where:

AE=Annual emissions from a batch process vent, kg/yr.

N_i=Number of type i batch cycles performed annually, cycles/year

$E_{cycle\,i}$=Emissions from the batch process vent associated with a single type i batch cycle, as determined in paragraph (b)(7) of this section, kg/batch cycle

n=Number of different types of batch cycles that cause the emission of TOC or organic HAP from the batch process vent

(9) Individual HAP partial pressures in multicomponent systems shall be determined using the appropriate method specified in paragraphs (b)(9)(i) through (b)(9)(iii) of this section.

(i) If the components are miscible, use Raoult's law to calculate the partial pressures;

(ii) If the solution is a dilute aqueous mixture, use Henry's law constants to calculate partial pressures;

(iii) If Raoult's law or Henry's law are not appropriate or available, the owner or operator may use any of the options in paragraphs (b)(9)(iii)(A), (B), or (C) of this section.

(A) Experimentally obtained activity coefficients, Henry's law constants, or solubility data;

(B) Models, such as group-contribution models, to predict activity coefficients; or

(C) Assume the components of the system behave independently and use the summation of all vapor pressures from the HAPs as the total HAP partial pressure.

(c) [Reserved]

(d) *Minimum emission level exemption.* A batch process vent with annual emissions of TOC or organic HAP less than 11,800 kg/yr is considered a Group 2 batch process vent and the owner or operator of said batch process vent shall comply with the requirements in §63.1322(f) or (g). Annual emissions of TOC or organic HAP are determined at the exit of the batch unit operation, as described in paragraph (a)(2) of this section, and are determined as specified in paragraph (b) of this section. The owner or operator of said batch process vent is not required to comply with the provisions in paragraphs (e) through (g) of this section.

(e) *Determination of average batch vent flow rate and annual average batch vent flow rate.* The owner or operator shall determine the average batch vent flow rate for each batch emission episode in accordance with one of the procedures provided in paragraphs (e)(1) through (e)(2) of this section. The annual average batch vent flow rate for a batch process vent shall be calculated as specified in paragraph (e)(3) of this section.

(1) Determination of the average batch vent flow rate for a batch emission episode by direct measurement shall be made using the procedures specified in paragraphs (e)(1)(i) through (e)(1)(iii) of this section.

(i) The volumetric flow rate (FR_i) for a batch emission episode, in standard cubic meters per minute (scmm) at 20 °C, shall be determined using Method 2, 2A, 2C, or 2D, 40 CFR part 60, appendix A, as appropriate.

(ii) The volumetric flow rate of a representative batch emission episode shall be measured every 15 minutes.

(iii) The average batch vent flow rate for a batch emission episode shall be calculated using Equation 14 of this subpart.

$$AFR_{episode} = \frac{\sum_{i=1}^{n} FR_i}{n} \qquad [Eq. 14]$$

Where:

AFR$_{episode}$ = Average batch vent flow rate for the batch emission episode, scmm.
FR$_i$ = Flow rate for individual measurement i, scmm.
n = Number of flow rate measurements taken during the batch emission episode.

(2) The average batch vent flow rate for a batch emission episode may be determined by engineering assessment, as defined in paragraph (b)(6)(i) of this section. All data, assumptions, and procedures used shall be documented.

(3) The annual average batch vent flow rate for a batch process vent shall be calculated using Equation 15 of this subpart.

$$ AFR = \frac{\sum_{i=1}^{n}(DUR_i)(AFR_{episode,\,i})}{\sum_{i=1}^{n}(DUR_i)} \qquad [Eq.\ 15] $$

Where:

AFR = Annual average batch vent flow rate for the batch process vent, scmm.
DUR$_i$ = Duration of type i batch emission episodes annually, hrs/yr.
AFR$_{episode,\,i}$ = Average batch vent flow rate for type i batch emission episode, scmm.
n = Number of types of batch emission episodes venting from the batch process vent.

(f) *Determination of cutoff flow rate.* For each batch process vent, the owner or operator shall calculate the cutoff flow rate using Equation 16 of this subpart.

CFR = (0.00437) (AE) − 51.6 [Eq. 16]

where:

CFR = Cutoff flow rate, scmm.
AE = Annual TOC or organic HAP emissions, as determined in paragraph (b)(8) of this section, kg/yr.

(g) *Group 1/Group 2 status determination.* The owner or operator shall compare the cutoff flow rate, calculated in accordance with paragraph (f) of this section, with the annual average batch vent flow rate, determined in accordance with paragraph (e)(3) of this section. The group determination status for each batch process vent shall be made using the criteria specified in paragraphs (g)(1) and (g)(2) of this section.

(1) If the cutoff flow rate is greater than or equal to the annual average batch vent flow rate of the stream, the batch process vent is classified as a Group 1 batch process vent.

(2) If the cutoff flow rate is less than the annual average batch vent flow rate of the stream, the batch process vent is classified as a Group 2 batch process vent.

(h) *Determination of halogenation status.* To determine whether a batch process vent or an aggregate batch vent stream is halogenated, the annual mass emission rate of halogen atoms contained in organic compounds shall be calculated using the procedures specified in paragraphs (h)(1) through (h)(3) of this section.

(1) The concentration of each organic compound containing halogen atoms (ppmv, by compound) for each batch emission episode shall be determined after the last recovery device (if any recovery devices are present), based on any one of the following procedures:

(i) Process knowledge that no halogens or hydrogen halides are present in the process may be used to demonstrate that a batch emission episode is nonhalogenated. Halogens or hydrogen halides that are unintentionally introduced into the process shall not be considered in making a finding that a batch emission episode is nonhalogenated.

(ii) Engineering assessment as discussed in paragraph (b)(6)(i) of this section.

(iii) Average concentration of organic compounds containing halogens and hydrogen halides as measured by Method 26 or 26A, 40 CFR part 60, appendix A.

(iv) Any other method or data that has been validated according to the applicable procedures in Method 301 of appendix A of this part.

(2) The annual mass emissions of halogen atoms for a batch process vent shall be calculated using Equation 17 of this subpart.

$$E_{halogen} = K\left[\sum_{j=1}^{n}\sum_{i=1}^{m}\left(C_{avg_j}\right)\left(L_{j,i}\right)\left(M_{j,i}\right)\right]AFR \qquad [Eq.\ 17]$$

Where:

$E_{halogen}$ = Mass of halogen atoms, dry basis, kg/yr.
K = Constant, 0.022 (ppmv)$^{-1}$ (kg-mole per scm) (minute/yr), where standard temperature is 20 °C.
AFR = Annual average batch vent flow rate of the batch process vent, determined according to paragraph (e) of this section, scmm.
$M_{j,i}$ = Molecular weight of halogen atom i in compound j, kg/kg-mole.
$L_{j,i}$ = Number of atoms of halogen i in compound j.
n = Number of halogenated compounds j in the batch process vent.
m = Number of different halogens i in each compound j of the batch process vent.
C_{avg_j} = Annual average batch vent concentration of halogenated compound j in the batch process vent as determined by using Equation 18 of this subpart, dry basis, ppmv.

$$C_{avg_j} = \frac{\sum_{i=1}^{n}\left(DUR_i\right)\left(C_i\right)}{\sum_{i=1}^{n}\left(DUR_i\right)} \qquad [Eq.\ 18]$$

Where:

DUR_i = Duration of type i batch emission episodes annually, hrs/yr.
C_i = Average batch vent concentration of halogenated compound j in type i batch emission episode, ppmv.
n = Number of types of batch emission episodes venting from the batch process vent.

(3) The annual mass emissions of halogen atoms for an aggregate batch vent stream shall be the sum of the annual mass emissions of halogen atoms for all batch process vents included in the aggregate batch vent stream.

(i) *Process changes affecting Group 2 batch process vents.* Whenever process changes, as described in paragraph (i)(1) of this section, are made that affect one or more Group 2 batch process

vents and that could reasonably be expected to change one or more Group 2 batch process vents to Group 1 batch process vents or that could reasonably be expected to reduce the batch mass input limitation for one or more Group 2 batch process vents, the owner or operator shall comply with paragraphs (i)(2) and (3) of this section.

(1) Examples of process changes include the changes listed in paragraphs (i)(1)(i), (i)(1)(ii), and (i)(1)(iii) of this section.

(i) For all batch process vents, examples of process changes include, but are not limited to, changes in feedstock type or catalyst type; or whenever there is replacement, removal, or modification of recovery equipment considered part of the batch unit operation as specified in paragraph (a)(2) of this section; or increases in production capacity or production rate. For purposes of this paragraph (i), process changes do not include: Process upsets; unintentional, temporary process changes; and changes that are within the margin of variation on which the original group determination was based.

(ii) For Group 2 batch process vents where the group determination and batch mass input limitation are based on the expected mix of products, the situations described in paragraphs (i)(1)(ii)(A) and (B) of this section shall be considered to be process changes.

(A) The production of combinations of products not considered in establishing the batch mass input limitation.

(B) The production of a recipe of a product with a total mass of HAP charged to the reactor during the production of a single batch of product that is higher than the total mass of HAP for the recipe used as the single

highest-HAP recipe for that product in the batch mass input limitation determination.

(iii) For Group 2 batch process vents where the group determination and batch mass input limitation are based on the single highest-HAP recipe (considering all products produced or processed in the batch unit operation), the production of a recipe having a total mass of HAP charged to the reactor (during the production of a single batch of product) that is higher than the total mass of HAP for the highest-HAP recipe used in the batch mass input limitation determination shall be considered to be a process change.

(2) For each batch process vent affected by a process change, the owner or operator shall redetermine the group status by repeating the procedures specified in paragraphs (b) through (g) of this section, as applicable; alternatively, engineering assessment, as described in paragraph (b)(6)(i) of this section, may be used to determine the effects of the process change.

(3) Based on the results from paragraph (i)(2) of this section, owners or operators of affected sources shall comply with either paragraph (i)(3)(i), (ii), or (iii) of this section.

(i) If the group redetermination described in paragraph (i)(2) of this section indicates that a Group 2 batch process vent has become a Group 1 batch process vent as a result of the process change, the owner or operator shall submit a report as specified in § 63.1327(b) and shall comply with the Group 1 provisions in §§ 63.1322 through 63.1327 in accordance with § 63.1310(i)(2)(ii) or (i)(2)(iii), as applicable.

(ii) If the redetermination described in paragraph (i)(2) of this section indicates that a Group 2 batch process vent with annual emissions less than the level specified in paragraph (d) of this section, that is in compliance with § 63.1322(g), now has annual emissions greater than or equal to the level specified in paragraph (d) of this section but remains a Group 2 batch process vent, the owner or operator shall comply with the provisions in paragraphs (i)(3)(ii)(A) through (C) of this section.

(A) Redetermine the batch mass input limitation;

(B) Submit a report as specified in § 63.1327(c); and

(C) Comply with § 63.1322(f), beginning with the year following the submittal of the report submitted according to paragraph (i)(3)(ii)(B) of this section.

(iii) If the group redetermination described in paragraph (i)(2) of this section indicates no change in group status or no change in the relation of annual emissions to the levels specified in paragraph (d) of this section, the owner or operator shall comply with paragraphs (i)(3)(iii)(A) and (i)(3)(iii)(B) of this section.

(A) The owner or operator shall redetermine the batch mass input limitation; and

(B) The owner or operator shall submit the new batch mass input limitation in accordance with § 63.1327(c).

(j) *Process changes to new SAN affected sources using a batch process.* Whenever process changes, as described in paragraph (j)(1) of this section, are made to a new affected source producing SAN using a batch process that could reasonably be expected to adversely impact the compliance status (*i.e.,* achievement of 84 percent emission reduction) of the affected source, the owner or operator shall comply with paragraphs (j)(2) and (3) of this section.

(1) Examples of process changes include, but are not limited to, changes in production capacity, production rate, feedstock type, or catalyst type; replacement, removal, or addition of recovery equipment considered part of a batch unit operation, as specified in paragraph (a)(1) of this section; replacement, removal, or addition of control equipment associated with a continuous or batch process vent or an aggregate batch vent stream. For purposes of this paragraph (j)(1), process changes do not include process upsets or unintentional, temporary process changes.

(2) The owner or operator shall redetermine the percent emission reduction achieved using the procedures specified in § 63.1333(c). If engineering assessment, as described in paragraph (b)(6)(i) of this section, can demonstrate that the process change did

not cause the percent emission reduction to decrease, it may be used in lieu of redetermining the percent reduction using the procedures specified in §63.1333(c).

(3) Where the redetermined percent reduction is less than 84 percent, the owner or operator of the affected source shall submit a report as specified in §63.1327(d) and shall comply with §63.1322(a)(3) and all associated provisions in accordance with §63.1310(i).

§ 63.1324 Batch process vents—monitoring equipment.

(a) *General requirements.* Each owner or operator of a batch process vent or aggregate batch vent stream that uses a control device to comply with the requirements in §63.1322(a) or §63.1322(b), shall install the monitoring equipment specified in paragraph (c) of this section. All monitoring equipment shall be installed, calibrated, maintained, and operated according to manufacturer's specifications or other written procedures that provide adequate assurance that the equipment would reasonably be expected to monitor accurately.

(1) This monitoring equipment shall be in operation at all times when batch emission episodes, or portions thereof, that the owner or operator has selected to control are vented to the control device, or at all times when an aggregate batch vent stream is vented to the control device.

(2) Except as otherwise provided in this subpart, the owner or operator shall operate control devices such that the daily average of monitored parameters, established as specified in paragraph (f) of this section, remains above the minimum level or below the maximum level, as appropriate.

(b) *Continuous process vents.* Each owner or operator of a continuous process vent that uses a control device or recovery device to comply with the requirements in §63.1322(a)(3) shall comply with the applicable requirements of §63.1315(a) as specified in §63.1321(b).

(c) *Batch process vent and aggregate batch vent stream monitoring equipment.*

The monitoring equipment specified in paragraphs (c)(1) through (c)(8) of this section shall be installed as specified in paragraph (a) of this section. The parameters to be monitored are specified in Table 7 of this subpart.

(1) Where an incinerator is used, a temperature monitoring device equipped with a continuous recorder is required.

(i) Where an incinerator other than a catalytic incinerator is used, the temperature monitoring device shall be installed in the firebox or in the ductwork immediately downstream of the firebox in a position before any substantial heat exchange occurs.

(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) Where a flare is used, a device (including but not limited to a thermocouple, ultra-violet beam sensor, or infrared sensor) capable of continuously detecting the presence of a pilot flame is required.

(3) Where a boiler or process heater of less than 44 megawatts design heat input capacity is used, a temperature monitoring device in the firebox equipped with a continuous recorder is required. Any boiler or process heater in which all batch process vents or aggregate batch vent streams are introduced with the primary fuel or are used as the primary fuel is exempt from this requirement.

(4) Where a scrubber is used with an incinerator, boiler, or process heater in concert with the combustion of halogenated batch process vents or halogenated aggregate batch vent streams, the following monitoring equipment is required for the scrubber.

(i) A pH monitoring device equipped with a continuous recorder to monitor the pH of the scrubber effluent.

(ii) A flow measurement device equipped with a continuous recorder shall be located at the scrubber influent for liquid flow. Gas stream flow shall be determined using one of the procedures specified in paragraphs (c)(4)(ii)(A) through (c)(4)(ii)(C) of this section.

(A) The owner or operator may determine gas stream flow using the design

329