

Connecticut Department of

**ENERGY &  
ENVIRONMENTAL  
PROTECTION**

**BUREAU OF AIR MANAGEMENT  
NEW SOURCE REVIEW PERMIT  
TO CONSTRUCT AND OPERATE A STATIONARY SOURCE**

Issued pursuant to Title 22a of the Connecticut General Statutes (CGS) and Section 22a-174-3a of the Regulations of Connecticut State Agencies (RCSA).

<b>Owner/Operator</b>	Hampford Research, Incorporated
<b>Address</b>	54 Veterans Boulevard, Stratford, CT 06615
<b>Equipment Location</b>	54 Veterans Boulevard, Stratford, CT 06615
<b>Equipment Description</b>	Organic Synthesis Facility
<b>Town-Permit Numbers</b>	178-0120
<b>Premises Number</b>	223
<b>Stack Number</b>	1, 3 and 4
<b>Modification Issue Date</b>	May 4, 2016
<b>Prior Permit Issue Date(s)</b>	February 1, 2001 (Original) September 11, 2007 (Minor Modification)
<b>Expiration Date</b>	None

/s/Anne Gobin for  
Robert J. Klee  
Commissioner

May 4, 2016  
Date

This permit specifies necessary terms and conditions for the operation of this equipment to comply with state and federal air quality standards. The Permittee shall at all times comply with the terms and conditions stated herein.

## PART I. DESIGN SPECIFICATIONS

### A. General Description

Hampford Research, Incorporated is a custom manufacturer of electronic and dental chemical additives, specialty monomers, photoinitiators, and other specialty organic chemicals. The production plant consists of reactors, condensers, pilot units, filtration units, dryers, and ancillary equipment, such as vacuum pumps, receiving tanks, chillers and centrifuges. Many of Hampford Research, Incorporated's batch processes are interrelated; products are often made in one reactor and then transferred to another reactor for further processing.

This permit applies to the aggregate equipment listed in Part I.B.

### B. Equipment Design Specifications

All process manufacturing equipment is located in two interconnected buildings (54 Veterans Boulevard and 301 Barnum Avenue Cut Off).

#### Equipment List:

Emissions Unit	Emissions Unit Description	Control Unit Description
EU-1	<b>Pilot line No. 1</b> 24 ft <sup>2</sup> P-1 secondary condenser (HXA-P1) 27.5 ft <sup>2</sup> P-1 condenser (HX-P1) 50 gallon pilot reactor (P-1) P-1 Receiver A (TP-1a) P-1 Receiver B (TP-1b)	Ethylene Glycol Convault Tank (CV-3) Glycol Chiller 1 (GC- 2016A) Glycol Chiller 2 (GC-2016B) Packed Tower Caustic Scrubber (SC-2) Demister/Condenser Column (HX-Stk3) Demister Column Pre Condenser (HXP-Stk3)
EU-2	<b>Pilot line No. 2</b> 27 ft <sup>2</sup> P-2 condenser (HX-P2) 30 gallon pilot reactor No.2 (P-2) 5 gallon P-2 receiver tank (TP-2)	
EU-3	<b>Pilot line No. 3</b> 50 gallon pilot reactor No. 3 (P-3) 35 ft <sup>2</sup> P-3 condenser (HX-P3) 25 gallon P-3 receiver tank (TP-3)	
EU-4	<b>Pilot line No. 4</b> 100 gallon pilot reactor No. 4 (P-4) 45 ft <sup>2</sup> P-4 condenser (HX-P4) 50 gallon P-4 receiver tank (TP-4)	
EU-5	<b>Pilot line No. 5</b> 100 gallon pilot reactor No. 5 (P-5) 55 ft <sup>2</sup> P-5 condenser (HX-P5) 50 gallon P-5 storage tank (TP-5)	
EU-6	<b>Pilot line No. 6</b> 200 gallon pilot reactor No. 6 (P-6) 47 ft <sup>2</sup> P-6 condenser (HX-P6) 30 gallon P-6 charge vessel (P6-WT1) 50 gallon P-6 charge vessel (P6-WT2) 125 gallon P-6 receiver tank (TP-6)	

**PART I. DESIGN SPECIFICATIONS, continued**

Emissions Unit	Emissions Unit Description	Control Unit Description
EU-8	<b>Pilot line No.7 (Old P-9)</b> 50 gallon pilot reactor (P-7) 30 ft <sup>2</sup> P-7 condenser (HX-P7)	Ethylene Glycol Convault Tank (CV-3) Glycol Chiller 1 (GC- 2016A) Glycol Chiller 2 (GC-2016B) Packed Tower Caustic Scrubber (SC-2) Demister/Condenser Column (HX-Stk3) Demister Column Pre Condenser (HXP-Stk3)
EU-7	<b>Pilot line No. 8</b> 50 gallon pilot reactor (P-8) 30 ft <sup>2</sup> P-8 condenser (HX-P8)	
EU-9	<b>Reactor line No. 1</b> 500 gallon reactor No. 1 (R-1) 47 ft <sup>2</sup> R-1 secondary condenser (HXA-R1) 100 ft <sup>2</sup> R-1 condenser (HX-R1) 200 gallon R-1 receiving tank (TR-1)	
EU-10	<b>Reactor line No. 2</b> 47 ft <sup>2</sup> R-2 secondary condenser (HXA-R2) 150 ft <sup>2</sup> R-2 condenser (HX-R2) 750 gallon reactor No. 2 (R-2) 500 gallon R-2 weight tank (R2-WT) 125 gallon R-2 receiver tank (TR-2)	
EU-11	<b>Reactor line No. 3</b> 125 ft <sup>2</sup> R-3 condenser (HX-R3) 750 gallon reactor No. 3 (R-3) 200 gallon R-3 receiver tank (TR-3)	
EU-12	<b>Reactor line No. 4</b> 2000 gallon reactor No. 4 (R-4) 47 ft <sup>2</sup> R-4 secondary condenser (HXA-R4) 333 ft <sup>2</sup> R-4 condenser (HX-R4)	
EU-13	<b>Reactor line No. 5</b> 200 ft <sup>2</sup> R-5 condenser (HX-R5) 1000 gallon reactor No. 5 (R-5)	
EU-14	<b>Reactor line No. 6</b> 1000 gallon reactor No. 6 (R-6) 500 gallon R-6 weight tank (TR-6) 200 ft <sup>2</sup> R-6 condenser (HX-R6) 20 ft <sup>2</sup> R-6 wt tank condenser (HX-TR6)	
EU-15	<b>Reactor line No. 7</b> 500 gallon reactor No. 7 (R-7) 120 ft <sup>2</sup> R-7 condenser (HX-R7) 50 ft <sup>2</sup> TR-7 condenser (HX-TR7) 350 gallon R-7 receiver tank (TR-7) 150 gallon R-7 receiver tank (TR-7A)	
EU-16	<b>Reactor line No. 8</b> 2000 gallon reactor No. 8 (R-8) 333 ft <sup>2</sup> R-8 condenser (HX-R8)	
EU-17	<b>Reactor line No. 9</b> 1000 gallon reactor No. 9 (R-9) 240 ft <sup>2</sup> R-9 condenser (HX-R-9) 50 ft <sup>2</sup> TR-9 condenser (HX-TR-9) 750 gallon R-9 receiver tank (TR-9) 250 gallon TR-weight tank (TR-9A)	

**PART I. DESIGN SPECIFICATIONS, continued**

Emissions Unit	Emissions Unit Description	Control Unit Description
EU-18	<b>Reactor line No. 10</b> 200 gallon reactor No. 10 (R-10) 47 ft <sup>2</sup> R-10 secondary condenser (HXA-R10) 100 ft <sup>2</sup> R-10 condenser (HX-R10) 200 gallon R-10 receiver tank (TR-10)	Ethylene Glycol Convault Tank (CV-3) Glycol Chiller 1 (GC- 2016A) Glycol Chiller 2 (GC-2016B) Packed Tower Caustic Scrubber (SC-2) Demister/Condenser Column (HX-Stk3) Demister Column Pre Condenser (HXP-Stk3)
EU-19	<b>Reactor line No. 11</b> 500 gallon reactor No. 11 (R-11) 47 ft <sup>2</sup> R-11 secondary condenser (HXA-R11) 150 ft <sup>2</sup> R-11 condenser (HX-R11)	
EU-20	<b>Reactor line No. 12</b> 500 gallon reactor No. 12 (R-12) 47 ft <sup>2</sup> R-12 secondary condenser (HXA-R12) 150 ft <sup>2</sup> R-12 condenser (HX-R12)	
EU-21	<b>Reactor line No. 13</b> 200 gallon reactor No. 13 (R-13) 47 ft <sup>2</sup> R-13 secondary condenser (HXA-R13) 102 ft <sup>2</sup> R-13 condenser (HX-R13)	
EU-22	<b>Reactor line No. 16</b> 500 gallon reactor No. 16 (R-16) 47 ft <sup>2</sup> R-16 secondary condenser (HXA-R16) 141 ft <sup>2</sup> R-16 condenser (HX-R16) 200 gallon R-16 receiver (TR-16)	
EU-23	<b>Plant vacuum pumps</b> 125 cfm vacuum pump No. 1 (VP-1) 30 ft <sup>2</sup> VP-1 condenser (HX-VP1)	
EU-24	<b>Plant vacuum pumps</b> 125 cfm vacuum pump No. 2 (VP-2) 70 ft <sup>2</sup> VP-2 condenser (HX-VP2)	
EU-25	<b>Plant vacuum pumps</b> 75 cfm vacuum pump No. 4 (VP-4) 30 ft <sup>2</sup> VP-4 condenser (HX-VP4)	
EU-26	<b>Plant vacuum pumps</b> 75 cfm vacuum pump No. 7 (VP-7) 25 ft <sup>2</sup> VP-7 condenser (HX-VP7)	
EU-86	<b>Plant vacuum pumps</b> 200 cfm vacuum pump No. 13 (VP-13) 25 ft <sup>2</sup> VP-7 condenser (HX-VP13)	
EU-27	<b>Filter</b> 42 inch filter No. 1 (F-1)	
EU-28	<b>Filter</b> 32 inch filter No. 2 (F-2)	
EU-29	<b>Filter</b> 18 inch filter No. 3 (F-3)	
EU-30	<b>Filter</b> 32 inch filter No. 4 (F-4)	
EU-31	<b>Filter</b> 23 inch filter No. 5 (F-5)	
EU-32	<b>Filter</b> 42 inch filter No. 6 (F-6)	

**PART I. DESIGN SPECIFICATIONS, continued**

Emissions Unit	Emissions Unit Description	Control Unit Description	
EU-33	<b>Pressure filter</b> 24 inch pressure filter No. 1 (PF-1)	Ethylene Glycol Convault Tank (CV-3) Glycol Chiller 1 (GC-2016A) Glycol Chiller 2 (GC-2016B) Packed Tower Caustic Scrubber (SC-2) Demister/Condenser Column (HX-Stk3) Demister Column Pre Condenser (HXP-Stk3)	
EU-34	<b>Pressure filter</b> 36 inch pressure filter No. 2 (PF-2)		
EU-35	<b>Pressure filter</b> 28 inch pressure filter No. 3 (PF-3)		
EU-36	<b>Pressure filter</b> 24 inch pressure filter No. 4 (PF-4)		
EU-37	<b>Centrifuge No. 1</b> 48 inch x 30 inch centrifuge No. 1 (C-1) 300 gallon centrifuge No. 1 receiver tank (C1-LT)		
EU-38	<b>Centrifuge No. 2</b> 48 inch x 30 inch centrifuge No. 2 (C-2) 650 gallon centrifuge No. 2 liquor tank (C2-LT ) 75 gallon centrifuge No. 2 receiver tank (C2-RT)		
EU-39	<b>Centrifuge No. 3</b> 32 inch x 20 inch centrifuge No. 3 (C-3) 260 gallon centrifuge No. 3 receiver (C3-LT)		
EU-40	<b>Centrifuge No. 4</b> 24 inch x 12 inch centrifuge No. 4 (C-4)		
EU-41	<b>Centrifuge No. 5</b> 24 inch x 14 inch centrifuge No. 5 (C-5)		
EU-42	<b>Centrifuge No. 6</b> 30 inch x15 inch centrifuge No. 6 (C-6)		
EU-43	<b>Vacuum tray dryer No. 1 and 2</b> 234 ft <sup>2</sup> vacuum tray dryer No. 1 & No. 2 (VTD-1/2) 300 ft <sup>2</sup> VP-3 pre-condenser (HXP-VP3) 25 ft <sup>2</sup> VP-3 condenser (HX-VP3) 75 cfm VTD-1 vacuum pump (VP-3) 25 ft <sup>2</sup> VP-3 condenser (HX-VP3a)		
EU-44	<b>Laboratory tray dryer No. 1</b> 9 ft <sup>2</sup> laboratory tray dryer (LTD-1)		N/A
EU-45	<b>Laboratory tray dryer No. 2</b> 18 ft <sup>2</sup> laboratory tray dryer (LTD-2)		
EU-46	<b>Air tray dryer</b> 158 ft <sup>2</sup> air tray dryer (ATD-1)		
EU-47	<b>Vacuum tray dryer No. 3</b> 100 ft <sup>2</sup> vacuum tray dryer No. 3 (VTD-3) 25 ft <sup>2</sup> VP-6 pre-condenser (HX-VTD3) 25 ft <sup>2</sup> VP-6 condenser (HX-VP6) 75 cfm VTD-3 vacuum pump (VP-6)	Ethylene Glycol Convault Tank (CV-3) Glycol Chiller 1 (GC-2016A) Glycol Chiller 2 (GC-2016B) Packed Tower Caustic Scrubber (SC-2)	
EU-48	<b>Vacuum tray dryer No. 4</b> 100 ft <sup>2</sup> vacuum tray dryer No. 4 (VTD-4) 25 ft <sup>2</sup> VP-11 condenser (HX-VP11) 75 cfm VTD-4 vacuum pump (VP-11)	Demister/Condenser Column (HX-Stk3) Demister Column Pre Condenser (HXP-Stk3)	

**PART I. DESIGN SPECIFICATIONS, continued**

Emissions Unit	Emissions Unit Description	Control Unit Description
EU-49	<b>Vacuum tray dryer No. 5</b> 60 ft <sup>2</sup> vacuum tray dryer No. 5 (VTD-5) 25 ft <sup>2</sup> VP-12 condenser (HX-VP12) 75 cfm VTD-5/6 vacuum pump (VP-12)	Ethylene Glycol Convault Tank (CV-3) Glycol Chiller 1 (GC-2016A) Glycol Chiller 2 (GC-2016B) Packed Tower Caustic Scrubber (SC-2) Demister/Condenser Column (HX-Stk3) Demister Column Pre Condenser (HXP-Stk3)
EU-50	<b>Vacuum tray dryer No. 6</b> 20 ft <sup>2</sup> vacuum tray dryer No. 6 (VTD-6)	
EU-51	<b>Vacuum tray dryer No. 7</b> 148 ft <sup>2</sup> vacuum tray dryer No. 7 (VTD-7) 25 ft <sup>2</sup> VP-10 condenser (HX-VP10) 125 cfm VTD-7 vacuum pump (VP-10)	
EU-53	<b>Still No. 2</b> 15 gallon still No. 2 (S-2) 10 ft <sup>2</sup> S-2 condenser (HX-S2)	
EU-54	<b>Still No. 3</b> 47 ft <sup>2</sup> S-3 condenser (HX-S3) 60 gallon still No. 3 (S-3) 325 gallon S-3 weight tank (S3-WT1) 325 gallon S-3 weight tank (S3-WT2) 80 gallon S-3 receiver tank (TS-3)	
EU-55	<b>Still No. 4</b> 100 gallon still No. 4 (S-4) 300 gallon S-4 weight tank (S4-WT) 80 gallon S-4 receiver tank (TS-4) 62 ft <sup>2</sup> S-4 Condenser (HX-S4)	
EU-56	<b>Still No. 5</b> 100 gallon still No. 5 (S-5) 47 ft <sup>2</sup> S-5 condenser (HX-S5) 25 gallon S-5 receiver (TS-5)	
EU-57	<b>Process tank No. 2</b> 750 gallon process tank (T-2)	
EU-58	<b>Process tank No. 3</b> 500 gallon process tank (T-3) 25 ft <sup>2</sup> T-3 condenser (HX-T3)	
EU-59	<b>Process Tank No. 4</b> 200 gallon process tank (T-4) 25 ft <sup>2</sup> T-4 condenser (HX-T4)	
EU-60	<b>Process Tank No. 5</b> 200 gallon process tank (T-5) 47 ft <sup>2</sup> T-5 condenser (HX-T5)	
EU-61	<b>Process Tank Line No. 6</b> 3,000 gallon process tank (T-6)	N/A

**PART I. DESIGN SPECIFICATIONS, continued**

Emissions Unit	Emissions Unit Description	Control Unit Description
EU-65	<b>Lab hood</b> 2,000 cfm lab hood No. 2 (LH-2)	N/A
EU-66	<b>Lab hood</b> 2,000 cfm lab hood No. 3 (LH-3)	
EU-67	<b>Lab hood</b> 2,000 cfm lab hood No. 4 (LH-4)	
EU-68	<b>Lab hood</b> 2,000 cfm lab hood No. 5 (LH-5)	
EU-69	<b>Lab Hood</b> 2,000 cfm lab hood No.6 (LH-6) QA/QC lab	
EU-70	<b>Lab Hood</b> 2,000 cfm lab hood No. 7 (LH-7) QA/QC lab	
EU-71	<b>Lab Hood</b> 2,000 cfm lab hood No. 8 (LH-8)	
EU-72	<b>Lab Hood</b> 2,000 cfm lab hood No. 9 (LH-9)	
EU-85	<b>Rotary dryer No. 1</b> 20 ft <sup>2</sup> rotary vacuum dryer No. 3 (RVD-3) 75 cfm RVD-1 vacuum pump (VP-9) 25 ft <sup>2</sup> VP-9 pre condenser (HXP-VP9) 25 ft <sup>2</sup> VP-9 condenser (HX-VP9)	Ethylene Glycol Convault Tank (CV-3) Glycol Chiller 1 (GC-2016A) Glycol Chiller 2 (GC-2016B) Packed Tower Caustic Scrubber (SC-2) Demister/Condenser Column (HX-Stk3) Demister Column Pre Condenser (HXP-Stk3)
EU-84	<b>Rotary dryer No. 2</b> 28 ft <sup>2</sup> rotary vacuum dryer No. 2 (RVD-2) 75 cfm RVD-2 vacuum pump (VP-8) 25 ft <sup>2</sup> VP-8 pre condenser (HXP-VP8) 25 ft <sup>2</sup> VP-8 condenser (HX-VP8)	
EU-73	<b>Rotary dryer No. 3</b> 25 ft <sup>2</sup> rotary vacuum dryer No. 3 (RVD-3) 25 ft <sup>2</sup> VP-5 condenser (HX-VP5) 75 cfm RVD-3 vacuum pump (VP-5)	
EU-74	<b>Pressure Filter dryer No. 1</b> 25 ft <sup>2</sup> PFD-1 condenser (HX-PFD1) 0.4 m <sup>2</sup> pressure filter dryer No. 1 (PFD-1) 500 gallon PFD-1 receiving tank (TPFD-1)	
EU-75	<b>Laboratory Reactor</b> 5 gallon autoclave	N/A
EU-76	<b>Process Tank</b> 30 gallons (T-30)	Ethylene Glycol Convault Tank (CV-3) Glycol Chiller 1 (GC-2016A) Glycol Chiller 2 (GC-2016B) Packed Tower Caustic Scrubber (SC-2) Demister/Condenser Column (HX-Stk3) Demister Column Pre Condenser (HXP-Stk3)
EU-77, EU-86	<b>Fuel Burning Equipment</b> Two - 100 horse power plant steam boiler. There are two of these. Primary burns natural gas and the secondary burns oil. Should we list the second?	N/A
EU-78	Ethylene Glycol Convault Tank	6,000 gallons

## PART I. PROCESS DESCRIPTION, continued

### Control Equipment List

Equip ID	Description	Size
EU-79	Glycol Chiller 1 (GC-2016A)	89 ton
EU-80	Glycol Chiller 2 (GC-2016B)	89 ton
EU-81	Packed Tower Caustic Scrubber (SC-2)	5,000 cfm
EU-82	Demister/Condenser Column (HX-Stk3)	10 ft x 16 in. Diameter
EU-83	Demister Column (HXP-Stk3 – pre condenser)	256 ft <sup>2</sup>

### C. Control Equipment Design Specifications

1. Emissions from all of the equipment listed in Part I, Section B, shall be vented to the control systems described below:
  - a. Condenser (EU 83; PHX-01)  
256 square foot shell-and-tube  
Type of coolant: ethylene glycol  
Control efficiency: 50%  
Collection efficiency: 90%  
Pollutant(s) controlled: VOCs/HAPs/Acetone  
**Condensers operating under reflux conditions, which are required for processing, are not considered control devices.**
  - b. Scrubber (EU-81; SC-2)  
Packing material: 1" polypropylene TriPac  
Packed height: 3' 6"  
Type of flow: countercurrent  
Gas flow rate: 5,000 scfm at 68 °F  
Control efficiency: 9%  
Collection efficiency: 90%  
Pollutant control: acetic acid
  - c. Demister Column (EU-82; PHX-01)  
Face velocity: vertical flow  
Pressure drop across mist eliminator (inches H<sub>2</sub>O): 1.0  
Control efficiency: estimated control efficiency of 50% in series with the condenser.  
Collection efficiency: 90%, in series with condenser

## **PART I. PROCESS DESCRIPTION, continued**

### **D. Stack Parameters**

Stack 1: Catch Tank  
Maximum gas flowrate: 10 acfm  
Minimum distance to property line: 53.1 ft  
Minimum stack height: 32.5 ft

Stack 3: Demister Column  
Maximum gas flowrate: 10 acfm  
Minimum distance to property line: 50.0 ft  
Minimum stack height: 30.1 ft

Stack 4: Scrubber (SC-2)  
Maximum gas flow rate: 5000 acfm  
Minimum distance to property line: 55.0 ft  
Minimum stack height: 32.8 ft

## **PART II. OPERATIONAL CONDITIONS**

Notwithstanding the design specifications or description provided in Part I, above, the Permittee of the subject source shall comply with the following operating requirements.

### **A. Operating Parameter Limitations**

#### **Controls**

1. Surface condenser

The control efficiency attained by the surface condenser is a function of the condenser inlet temperature. The minimum condenser inlet temperature shall be 40 °F.

2. Scrubber

The scrubber shall be operated during processes where an acid is used as a solvent. Minimum flow rate of caustic solution through scrubber: 50 gallons/minute.

### **B. Emission Limits**

The Permittee shall not exceed the emission limits stated herein at any time.

#### **VOC Emissions**

1. All equipment listed in this permit shall not emit VOC (highly photochemically reactive solvents as defined in RCSA Section 22a-174-20 (f)), in excess of 8.0 pounds per hour or 40.0 pounds per day from each piece of equipment.
2. All equipment listed in this permit shall not emit VOC (non-highly photochemically reactive solvents as defined in RCSA Section 22a-174-20 (f)), in excess of 160.0 pounds per hour or 800.0 pounds per day from each piece of equipment.

## **PART II. OPERATING REQUIREMENTS, continued**

3. The total VOC emissions for all equipment listed in this permit shall not exceed 24.9 TPY of VOC.

### **Hazardous Air Pollutants (HAP) Emissions**

1. All equipment at this premises shall emit total annual methylene chloride emissions less than 9.9 TPY.
2. Emissions of HAPs, subject to Section 112(b) of the Clean Air Act, shall be less than 9.9 tons per year for any individual HAP and less than 24.9 tons per year for any combination of HAPs for all equipment at this premises.
3. Acetone Emissions

Annual Acetone emissions for equipment listed in this permit shall not exceed 24.9 TPY.

Demonstration of compliance with the above VOC, HAPs, and Acetone emission limits shall be met by calculating the emission rates using emission factors from the following source:

Mass balance of materials/solvents used and product formed from each process. The mass balance will be calculated using the procedures presented in Appendix B.

The above statement shall not preclude the commissioner from requiring other means (e.g. stack testing) to demonstrate compliance with the above emission limits, as allowed by state or federal statute, law or regulation.

### **C. Hazardous Air Pollutants**

1. This equipment shall not cause an exceedance of the Maximum Allowable Stack Concentration (MASC) for any hazardous air pollutant (HAP) emitted and listed in RCSA Section 22a-174-29. [STATE ONLY REQUIREMENT]
2. The Permittee shall keep records of all compounds used, and MSDS's or technical data sheet.

Note: The emissions from any new compounds, for production or trial runs, shall be counted toward any applicable emission limit in this permit.

## **PART III. MONITORING, RECORD KEEPING AND REPORTING REQUIREMENTS**

- A.** The Permittee shall monitor and record the temperature at the discharge of the chiller system on a continuous basis. The Permittee shall include an alarm set at 40 °F that will indicate a temperature exceedance. The Permittee will also record each alarm occurrence and document the duration, emissions, and resolution of each temperature exceedance.
- B.** The Permittee shall continuously monitor and record the flow rate of caustic solution through the scrubber using a flow meter. Scrubber operation shall be monitored and maintained on a daily basis and recorded in a scrubber log.

### PART III. MONITORING, RECORD KEEPING AND REPORTING REQUIREMENTS, continued

- C. The Permittee shall make and keep records of the hourly, daily, monthly and 12 consecutive months VOC emissions for all equipment listed in this permit. The VOC emissions shall be based on any consecutive 12 month time period and shall be determined by adding the current month's VOC emissions to that of the previous 11 months. The Permittee shall make these calculations within 30 days of the end of the previous month.
- D. The Permittee shall make and keep hourly records for non-highly photochemically and highly photochemically reactive VOCs emissions for all the equipment listed in this permit.
- E. The Permittee shall make and keep records of the 12 consecutive months of acetone and methylene chloride emissions for all the equipment listed in this permit. The acetone and methylene chloride emissions shall be based on any consecutive 12 month time period and shall be determined by adding the current month's acetone and methylene chloride emissions to that of the previous 11 months. The Permittee shall make these calculations within 30 days of the end of the previous month.
- F. The Permittee shall make and keep records of the daily and monthly HAP emissions for all the equipment listed in this permit.
- G. The Permittee shall make and keep records of the 12 consecutive months HAP emissions for all the equipment listed in this permit. The HAP emissions shall be based on any consecutive 12 month time period and shall be determined by adding the current month's HAP emissions to that of the previous 11 months. The Permittee shall make these calculations within 30 days of the end of the previous month.
- H. The Permittee shall maintain a list of equipment in the Synthesis Facility and will include **new and existing equipment added into the Synthesis Facility or its emission control equipment after the permit is issued**. Such additional equipment shall not result in an increase of the emissions limits contained in PART II. Section B. (Emission Limits) of this permit. Frequency of notification regarding the addition of such additional equipment and the information contained in these notifications shall be as follows:
  - 1. For equipment installed which falls **within the specifications listed in Appendix A, New Equipment Specifications**, the Permittee shall maintain a record of the equipment added to the premises. Information included in the record shall be as follows:
    - a. the reactor emission unit (EU) number, Equipment Identification number where the reactor will be placed,
    - b. the reactor type, capacity, and all specification details as it relates to Appendix A, and
    - c. the date the reactor is placed into service. Notification shall be made to the Connecticut DEEP **within 90 days of placing equipment into service**.

**PART III. MONITORING, RECORD KEEPING AND REPORTING REQUIREMENTS,  
continued**

2. For equipment which **does not fall within the specifications detailed in Appendix A**, but subject to the emission limits of the permit, notification shall be made to the Connecticut DEEP **30 days prior of placing equipment into service**. Information included in the notification shall be as follows:
    - a. the equipment emission unit (EU) number and Group Emission Unit (GEU) number where the equipment will be placed,
    - b. the type of unit and its capacity,
    - c. a demonstration of compliance with RCSA, including, but not limited to, RCSA Section 22a-174-29, and
    - d. a demonstration of compliance with all emission limitations included in this permit.
  3. At a minimum, every five years from the issuance of this minor modification (Application No. 201601509), the Permittee shall submit a modification to update the list of equipment in Part I of this permit.
- I. The Permittee shall maintain records of the composition of all products manufactured at the premises in one confidential file.
  - J. The Permittee shall make and keep daily records of production. Such records shall contain the following information:
    1. date and time product was produced;
    2. equipment used to produce the product;
    3. description of product, including name;
    4. quantity of product produced;
    5. time of each batch;
    6. number of batches per day; and
    7. quantity of raw material usage, process waste, recovered solvents, and final product yields for each batch.
  - K. The Permittee shall keep records of all compounds used, Safety Data Sheets (SDS), technical data sheets, purchase orders, invoices, and other documents necessary to verify information and calculations for all materials which contain VOCs and/or HAPs which are used or stored at the premises.
  - L. The Permittee shall keep accurate annual records of all quantity and type of waste manifested as waste material.

- M. The Permittee shall make and keep all required records on the premises to determine compliance with the terms and conditions of this permit in accordance with RCSA Section 22a-174-4. Such records shall be made available upon request by the commissioner and kept for the duration of the permit or for the previous five years, whichever is less.

**PART IV. STACK EMISSION TEST REQUIREMENTS: None at this time**

**PART V. SPECIAL REQUIREMENTS**

- A. The Permittee shall comply with all applicable sections of the following National Emission Standards for Hazardous Air Pollutants Standard (NESHAP) at all times.

Title 40 CFR Part 63, Subpart A and VVVVVV – NESHAP for Chemical Manufacturing Area Sources

Copies of the Code of Federal Regulations (CFR) are available online at the U.S. Government Printing Office website.

- B. The Permittee shall not cause or permit the emission of any substance or combination of substances which creates or contributes to an odor beyond the property boundary of the premises that constitutes a nuisance as set forth in RCSA Section 22a-174-23. [STATE ONLY REQUIREMENT]

- C. The Permittee shall operate this facility at all times in a manner so as not to violate or contribute significantly to the violation of any applicable state noise control regulations, as set forth in RCSA Sections 22a-69-1 through 22a-69-7.4. [STATE ONLY REQUIREMENT]

**PART VI. ADDITIONAL TERMS AND CONDITIONS**

- A. This permit does not relieve the Permittee of the responsibility to conduct, maintain and operate the regulated activity in compliance with all applicable requirements of any federal, municipal or other state agency. Nothing in this permit shall relieve the Permittee of other obligations under applicable federal, state and local law.
- B. Any representative of the DEEP may enter the Permittee's site in accordance with constitutional limitations at all reasonable times without prior notice, for the purposes of inspecting, monitoring and enforcing the terms and conditions of this permit and applicable state law.
- C. This permit may be revoked, suspended, modified or transferred in accordance with applicable law.
- D. This permit is subject to and in no way derogates from any present or future property rights or other rights or powers of the State of Connecticut and conveys no property rights in real estate or material, nor any exclusive privileges, and is further subject to any and all public and private rights and to any federal, state or local laws or regulations pertinent to the facility or regulated activity affected thereby. This permit shall neither create nor affect any rights of persons of municipalities who are not parties to this permit.

## **PART VII. ADDITIONAL TERMS AND CONDITIONS, continued**

- E.** Any document, including any notice, which is required to be submitted to the commissioner under this permit shall be signed by a duly authorized representative of the Permittee and by the person who is responsible for actually preparing such document, each of whom shall certify in writing as follows: "I have personally examined and am familiar with the information submitted in this document and all attachments thereto, and I certify that based on reasonable investigation, including my inquiry of those individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief. I understand that any false statement made in the submitted information may be punishable as a criminal offense under Section 22a-175 of the Connecticut General Statutes, under Section 53a-157b of the Connecticut General Statutes, and in accordance with any applicable statute."
- F.** Nothing in this permit shall affect the commissioner's authority to institute any proceeding or take any other action to prevent or abate violations of law, prevent or abate pollution, recover costs and natural resource damages, and to impose penalties for violations of law, including but not limited to violations of this or any other permit issued to the Permittee by the commissioner.
- G.** Within 15 days of the date the Permittee becomes aware of a change in any information submitted to the commissioner under this permit, or that any such information was inaccurate or misleading or that any relevant information was omitted, the Permittee shall submit the correct or omitted information to the commissioner.
- H.** The date of submission to the commissioner of any document required by this permit shall be the date such document is received by the commissioner. The date of any notice by the commissioner under this permit, including but not limited to notice of approval or disapproval of any document or other action, shall be the date such notice is personally delivered or the date three days after it is mailed by the commissioner, whichever is earlier. Except as otherwise specified in this permit, the word "day" means calendar day. Any document or action which is required by this permit to be submitted or performed by a date which falls on a Saturday, Sunday or legal holiday shall be submitted or performed by the next business day thereafter.
- I.** Any document required to be submitted to the commissioner under this permit shall, unless otherwise specified in writing by the commissioner, be directed to: Office of Director; Engineering & Enforcement Division; Bureau of Air Management; Department of Energy and Environmental Protection; 79 Elm Street, 5th Floor; Hartford, Connecticut 06106-5127.

## APPENDIX A

### STANDARD REACTOR SPECIFICATIONS

**Type:** Glass lined or metal alloy vessels, complete with agitator and jacket for heating/cooling reactor contents

**Capacity:** 200 gallons or greater

**Operating Ranges:**

Reactor Pressure Rating: 25 psi minimum

Design Operating Pressures: 0-15 psia

Design Operating Temperatures: -20 °C to 250 °C

**Vent Connections:**

Main Vent: Stack 2 (scrubber) and/or Stack 3 (demister)

Emergency Release Vent: Stack 1 (Vent Catch Tank)

**Utilities:**

Heating: Steam or Hot Oil Closed Loop System

Cooling: Tower Water or closed loop refrigerant system

**Pollution Control:**

Primary Condenser: Size of condenser determined by the condenser ratio, as defined below:

$$\frac{\text{reactor jacket surface area (sq ft)}}{\text{condenser surface area (sq ft)}}$$

- A minimum ratio of 1.8 is required. (i.e. a 500 gal vessel w/jacket area of 80 sf -144 sf condenser min)
- Secondary Condenser: A minimum condenser ratio of 0.24 is required.

## APPENDIX B

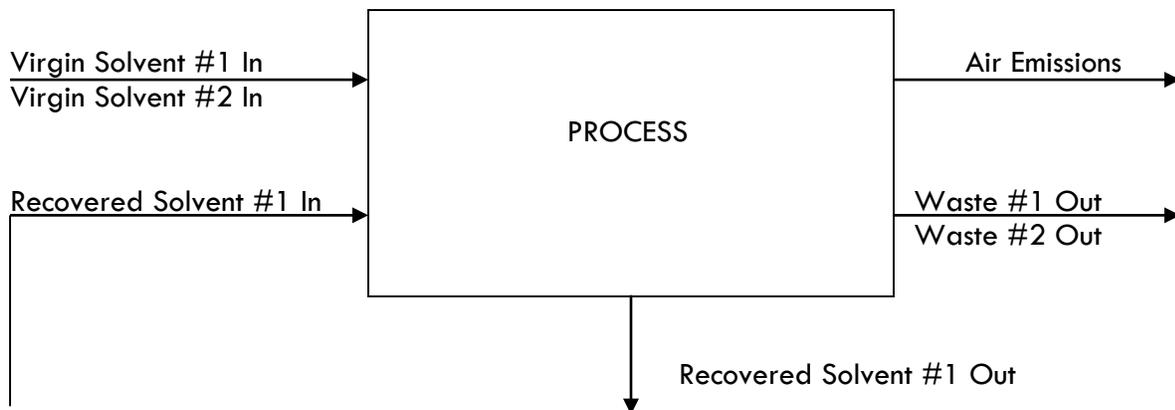
### EXAMPLE PROCESS MASS BALANCE CALCULATION

Emissions are calculated using a two-step mass balance approach. The following mass balances are calculated:

Step 1 - Process Emission Calculation – Determines the total solvent emissions from an individual process.

Step 2 – Unit Operation (Equipment) Emission Calculation – Determines equipment emissions within a specific production lot of material, using the process emission calculation for verification.

#### STEP 1 - PROCESS EMISSIONS SAMPLE CALCULATION

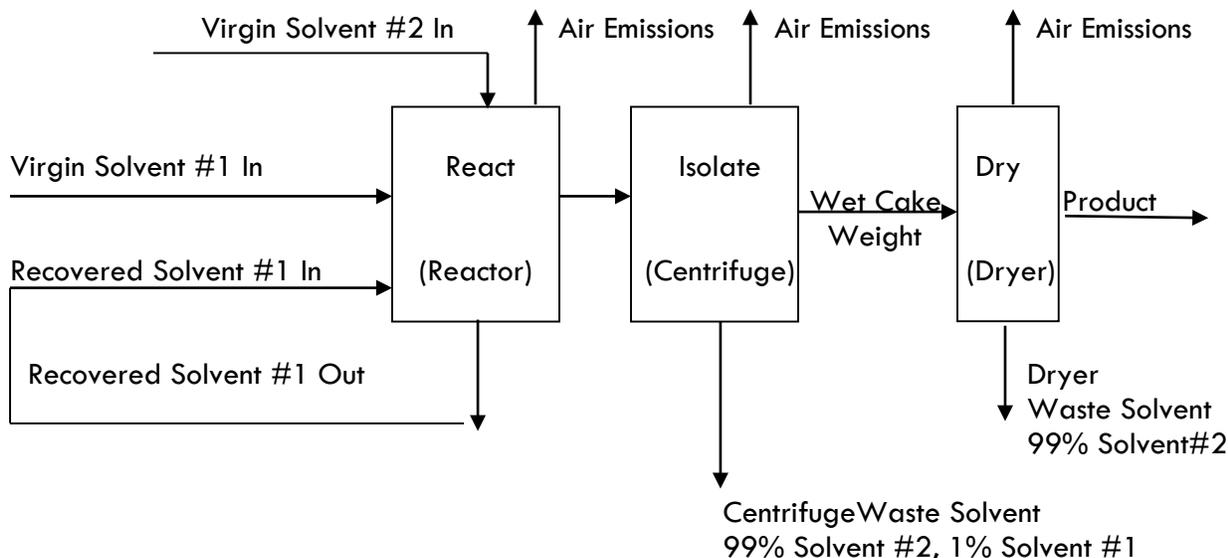


Raw material usage, process waste, recovered solvents and final product yields are weighed and recorded for each production lot of material. Process specific Chemical Operating Procedure (COPs) forms are used to manually collect and record this data for each production batch. The COPs data is entered into an inventory database used to control plant raw materials, recovered solvents, waste and manufactured products. Process wastes have %VOC calculated for each shipment, therefore waste analyticals are used to calculate the net solvent in all waste transferred. The process emission calculations would be performed on each VOC/HAP as follows:

$$\begin{aligned} \text{Calculated Solvent \#1 Air Emissions} = & \text{Virgin Solvent \#1 In} \\ & + \text{Recovered Solvent \#1 In} \\ & - \text{Recovered Solvent Out} \\ & - \text{Net Waste \#1 Out} \end{aligned}$$

$$\begin{aligned} \text{Calculated Solvent \#2 Air Emissions} = & \text{Virgin Solvent \#2 In} \\ & - \text{Net Waste \#2 Out} \end{aligned}$$

## STEP 2 - EQUIPMENT EMISSIONS SAMPLE CALCULATION



The process is broken down into Unit Operations, and further analyzed using mass balance techniques. Waste %VOC numbers are generated using GC and/or HPLC.

### REACTOR CALCULATIONS

Greater than 99% of all Solvent #1 handling is performed in the Reactor, therefore it is assumed all Solvent#1 emissions come from the Reactor.

$$\begin{aligned} \text{Reactor Solvent \#1 Air Emissions} = & \text{Virgin Solvent \#1 In} \\ & + \text{Recovered Solvent \#1 In} \\ & - \text{Recovered Solvent Out} \\ & - \text{Net Waste \#1 Out} \end{aligned}$$

$$\text{Reactor Solvent \#2 Air Emissions} = \text{Negligible (Calculations documenting negligible emissions required)}$$

### CENTRIFUGE EMISSIONS

$$\begin{aligned} \text{Centrifuge Solvent \#1 Air Emissions} = & \text{Negligible (Calculations Required)} \\ \text{Centrifuge Solvent \#2 Air Emissions} = & + \text{Virgin Solvent \#2 In} \\ & - \text{Centrifuge Net Waste Solvent Out} \\ & - (\text{Wet Cake Weight} - \text{Final Product Yield}) \end{aligned}$$

### DRYER EMISSIONS

$$\begin{aligned} \text{Dryer Solvent \#1 Air Emissions} = & \text{Negligible (Calculations Required)} \\ \text{Dryer Solvent \#2 Air Emissions} = & + \text{Wet Cake Weight} \\ & - \text{Final Product Yield} \\ & - \text{Dryer Net Waste Solvent \#2 Out} \end{aligned}$$