# ALLEGHENY COUNTY HEALTH DEPARTMENT
## AIR QUALITY PROGRAM

May 11, 2011

**SUBJECT:** Synthetic Minor Operating Permit
Pressure Chemical Co.
3419 Smallman Street
Pittsburgh, PA 15201-1915

**RE:** Synthetic Minor Operating Permit File No. 0032
Research & Development Chemical Manufacture

**TO:** Sandra L. Etzel
Chief Engineer

**FROM:** Helen O. Gurvich
Air Quality Engineer

**FACILITY DESCRIPTION:**

The Pressure Chemical Co. is located at 3419 Smallman St., Pittsburgh, Allegheny County and is a synthetic minor source of volatile organic compounds (VOC) and hazardous air pollutants (HAPs) as defined in section 2103.20.b.4 of Article XXI and a minor source of all other criteria pollutants. The business at Pressure Chemical Co. consists of a mixture of work, including manufacture of low volume products, process research and development, and scale up and chemical pilot-scale work for a variety of customers. The components of this facility are as follows:

1. Chemical Manufacturing Process
2. Boilers
3. Oil Heaters
4. Miscellaneous

**OPERATING PERMIT APPLICATION COMPONENTS:**

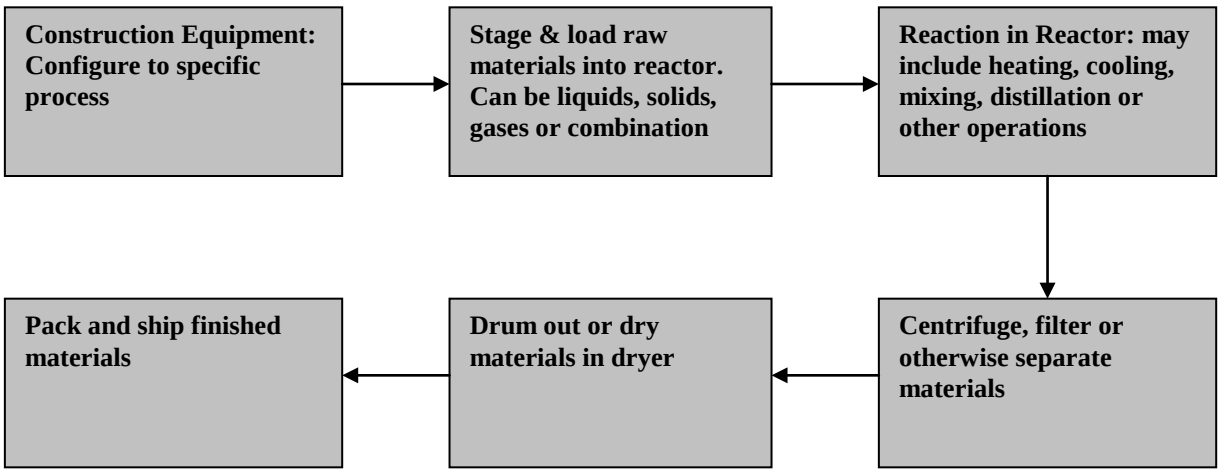
1. Operating Permit Application No. 0032, dated February 25, 2008.
2. Amended Operating Permit Application, dated March 24, 2008.
3. Amended Operating Permit Application, dated April 21, 2008.
4. Pressure Chemical Co. letter with additional information dated November 19, 2008.
5. Pressure Chemical Co. letter with additional information dated January 9, 2009.
6. Pressure Chemical Co. letter with additional information dated February 24, 2009.
7. Pressure Chemical Co. email with additional information dated July 10, 2009.

**PROCESS DESCRIPTIONS:**

The nature of operations at Pressure Chemical Co. (PCC) is such that the equipment configuration is continually adapted to meet the needs of a wide range of processes and customers. Organic and inorganic chemicals, polymers, and pharmaceutical intermediates are manufactured in small batch reactors ranging from glassware to 1,000 gallon pressure vessels. The type, size and duration of the equipment used and the development runs being customer dependent are extremely variable with no fixed set of process equipment. The following facility process equipment description reflects the range of the equipment typically used at the facility.

1. Glass lined reactors ranging in size from 20 to 1,000 gallons.
2. High-pressure reactors ranging in size from < 10 to 1,000 gallons.
3. Tubular high-pressure reactors < 5 gallons.
4. Alloy high-pressure reactor < 5 gallons
5. Reactors ranging in size from 20 to 80 gallons.
6. Glass pilot plant reactor system
7. Special alloy reactor, 400 gallons.
8. Short path distillation apparatus, internal/external condensers < 10 liters.
9. Filtration, drying and process heating equipment.

**Typical Process Flow Diagram:**




**EMISSION SOURCES OF MINOR SIGNIFICANCE:**

1. Three natural gas fired water heaters at 0.75 MMBtu/hr each and natural gas fired office HVAC heaters no.1, 2, 3, 11 & 19 combined are a source of minor significance with potential emissions of all criteria pollutants less than one ton per year.

2. One 600 kW natural gas fired emergency generator has emissions of minor significance.

3. The Burnham Low Pressure Boiler at 0.385 MMBtu/hr is a source of minor significance with potential emissions of all criteria pollutants less than one ton per year.

4. Natural gas fired plant HVAC heaters no.7, 8, 9, 10, 12 & 13 combined are a source of minor significance with potential emissions of all criteria pollutants less than one ton per year.

**EMISSION CONTROLS:**

| | High Bay Scrubber | Glass Lab Scrubber | TJ's Scrubber |
|---|---|---|---|
| Make | Manufactured by FRP Fabricators | Manufactured by Harrison Plastics | Manufactured by Harrison Plastics |
| Type | Packed bed | Packed bed | Packed bed |
| Mist eliminator | 4" deep mesh | Mesh | Mesh |
| Scrubbing liquid | Sodium hydroxide typically, other liquids as needed | Sodium hydroxide typically, other liquids as needed | Sodium hydroxide typically, other liquids as needed |
| Bed depth | 10 feet | 7 feet | 8 feet |
| Pressure drop | 9" $H_2O$ | 9" $H_2O$ | 9" $H_2O$ |
| Scrubbing liquid;<br>Flowrate<br>Inlet temperature<br>Outlet temperature | <br>200 gpm<br>Typically ambient<br>Typically ambient | <br>50 gpm<br>Typically ambient<br>Typically ambient | <br>120 gpm<br>Typically ambient<br>Typically ambient |
| Pollutant | Acid gases; particulate | Acid gases; particulate | Acid gases; particulate |
| Control efficiency | 95% for acid gases | 75% for organic compounds | 75% for organic compounds |
| Stack | S01 | S03 | S02 |

**Condensers that serve drying units**

PCC proposes to utilize three condensers in conjunction with existing vacuum systems that serve the Stokes, Abbe, and Devine Dryers. PCC proposes that each condenser will have an operational limit on the outlet vapor temperature of the stream being scrubbed. The proposed operational limit is $100^0$F. This maximum temperature will assure the most efficient vapor removal of the solvents and was selected as the lowest temperature needed to condense any of the typical VOCs used over the past 2 years.

Other portable and temporary scrubbers, adsorbers or other pieces of equipment are used on a case-by-case basis depending upon the project, the chemicals being emitted, emission rate, equipment being used, and a variety of other factors.
Knockout pots, condensers, or other similar appurtenances are used on certain equipment set ups to control emissions. Below is a list of some of the specific additional emission control equipment which is in use at this time:

- Portable scrubber (Typically consist of the following: scrubber reservoir, containing a scrubbing solution; pump; vacuum ejector; associated piping).
- Small Carbon Units (These are typically small, packaged units containing under 1,000 pounds of activated carbon designed to handle flow rates of under 5,000 CFM).
- T-1000 (This is a 1000 gallon reservoir which is used to bubble process vent streams through a liquid to remove contaminants. It also has a vacuum ejector).

**EMISSION CALCULATIONS:**

The emission calculations for this proposed Operating Permit were reviewed by the County and found to be done according to currently acceptable methods and based on valid data and assumptions. See the Operating Permit Application, Attachment 4 and additional information, submitted to the Department at February 24, 2009, for the facility emission calculations and Form Ks for potential and actual emissions of all applicable criteria pollutants and HAPs for the facility.

Emissions are calculated using a Mass Balance approach as follows:

**Emissions = Initial Inventory + Inputs – Outputs – Final Inventory**

1) The **Initial Inventory** at the beginning of a period is determined as the sum of:
    - the ERP Inventory Control System, for Raw materials and Products (amount on hand at beginning of year);
    - the Waste Database, used to track all waste materials (amount on hand at beginning of year);
    - on the quantities of materials "in process" in the production areas (amount of materials "in process" such as in reactors).
2) The **Inputs** to the plant are determined as the sum of:
    - Purchases of materials as received and tracked by Purchase Order in ERP System (based upon purchase an inventory records);
    - Incoming materials, such as those supplied by a customer (used when a solvent comes in for a job, such as a material in a solution of methanol).
3) The **Outputs** to the plant are determined as the sum of:
    - Shipments of materials as recorded in the ERP System (used final products contain solvents, such as a solution in methanol);
    - Materials consumed by chemical reaction (used when a solvent is consumed by chemical reaction);
    - Wastes generated and shipped out as tracked in ACCESS (amount of waste shipped out as aqueous, flammable, or "Oddball" waste.
    - Handwritten waste logs shall be maintained for a minimum of 5 years.
4) The **Final Inventory** at the end of the period is determined using the same methods as Initial Inventory:
    - the ERP Inventory Control System, for Raw materials and Products (amount on hand at end of year);
    - the Waste Database, used to track all waste materials (amount on hand at end of year);
    - on the quantities of materials "in process" in the production areas (amount of materials "in process" such as in reactors).

**Limitations**

Pressure Chemical Company is a synthetic minor source of volatile organic compounds (VOC) and hazardous air pollutants (HAPs) based on the purchase limitations. The purchase limitations were established for individual HAPs, total HAPs, and total VOCs based on a 12 (twelve) month rolling total.
PCC established limit purchases such that the total emissions on these materials not exceed 80% of the EPA threshold for Major Sources.

Purchase Limit = Target Emission Limit/Emission Percentage

*Limits for Individual HAPs:*

Methanol: 340,425 lbs/yr on a 12 month rolling total.
Toluene: 179,775 lbs/yr on a 12 month rolling total.
Hexane: 213,333 lbs/yr on a 12 month rolling total.
Methylene Chloride: 432,432 lbs/yr on a 12 month rolling total.

*Limits for total HAPs*: 677,966 lbs/yr on a 12 month rolling total.
*Limits for total VOCs*: 987,654 lbs/yr on a 12 month rolling total.

*New HAPs:*
New individual HAP purchases (i.e. HAPs not listed specifically above) will be limited to less than 8 tons (16,000 lbs) per year on a 12 month rolling total. If purchases may exceed this limit, PCC will submit a permit application revision with estimated emissions and proposed purchase limitations based upon available processing data. This figure is based upon an assumed worst-case emission rate of 25% of a purchase limit of 32 tons, thus limiting the maximum emissions of the new HAP to 8 tons.

**MAXIMUM POTENTIAL EMISSIONS SUMMARY:**

| Pollutant | Methanol | Toluene | Hexane | Methylene Chloride | Total HAP | Total VOC |
|---|---|---|---|---|---|---|
| Max Emissions | 8 tons/yr[1] | 8 tons/yr[1] | 8 tons/yr[1] | 8 tons/yr[1] | 20 tons/yr[1] | 40 tons/yr[1] |

[1]A year is defined as any 12 consecutive months.

## APPLICABLE REQUIREMENTS:

### Article XXI, Requirements for Issuance:

The requirements of Article XXI, Parts B and C for the issuance of synthetic minor operating permits have been met for this facility. Article XXI, Part D, Part E & Part H will have the necessary sections addressed individually.

### RACT:

Plan Approval Order and Agreement Upon Consent Number 261, dated June 11, 1997 (RACT Order No. 261), submitted to the US EPA as a site specific SIP revision to Allegheny County's portion of the PA SIP, has established VOC RACT for the facility RACT as proper operation and maintenance of process and control equipment and work practices to minimize VOC/HAP emissions. Order no. 261 has been incorporated into this permit. See Operating Permit no. 0032 for specific conditions.

### 40 CFR PART 61, National Emission Standards for Hazardous Air Pollutants:

The requirements of 40 CFR PART 61, National Emission Standards for Hazardous Air Pollutants, were found not to be applicable to this facility due to the fact Pressure Chemical Company is a synthetic minor source of HAPs.

### 40 CFR PART 63, National Emission Standards for Hazardous Air Pollutants for Source Categories:

The requirements of 40 CFR PART 63, National Emission Standards for Hazardous Air Pollutants for Source Categories, were found not to be applicable to this facility due to the fact Pressure Chemical Company is a synthetic minor source of HAPs.

### 40 CFR 64, Compliance Assurance Monitoring:

The requirements of 40 CFR 64, Compliance Assurance Monitoring, were found not to be applicable to this facility due to the fact Pressure Chemical Company is a synthetic minor source of VOC and HAPs and a minor source of all other criteria pollutants.

## REGULATED POLLUTANTS WITH NO ESTABLISHED REGULATORY EMISSION LIMITATION:

Section 2103.12.a.2.B of Article XXI requires that RACT be applied to pollutants regulated by Article XXI without established regulatory emission limitations. RACT for all pollutants not specified in applicable regulations, or prior permits has been determined to be proper operation and maintenance of equipment according to accepted combustion and good engineering practices, therefore, the emission limitations for these pollutants will be the maximum potential emissions under proper operation of the equipment as specified in operating permit 0032.

## METHOD OF COMPLIANCE DETERMINATION:

Compliance with the conditions of this permit will be insured by the records of material purchasing (VOC and HAPs) and mass balance records per individual batch processed at the facility. Such records shall be kept by batch or campaign of batches. The waste that goes out should be analyzed and result of the analysis should be submitted to the Department. Also, the emission standards set in this permit will be demonstrated through periodic testing, every five

years, to quantify VOC and HAP emissions from the stacks and to determine efficiency. See Operating Permit no. 0032 for specific conditions.

**RECOMMENDATIONS:**

The facility is in compliance with all applicable Federal, State and County regulations and it is recommended that the Operating Permit No. 0032 be issued.