

A

Regulation of Operations
61.65 (b 6 1 11)

To: Distribution

From: F. G. Jeanson
Date: November 24, 1985

Interoffice
Communication

Subject: EQUIPMENT OPENING PROCEDURES

VISTA

Attached are the equipment opening preparation procedures for equipment that may contain VCM. A review meeting for these procedures was held on September 26, 1985. Comments from this review meeting have been incorporated into these procedures.

Frank G. Jeanson

Frank G. Jeanson
Process Engineer

8P

c: JF, JWW, DWH, CRS, CWT, MLN, AHS, RAB, JLH, VEM, VLT

EQUIPMENT OPENING PROCEDURES

ABERDEEN CHEMICAL PLANT

I. Introduction

Prior to opening any vessel or piece of equipment the quantity of VCM it contains must be no more than 2.0% by volume at standard temperature and pressure or 25 gallons of VCM vapor at standard temperature and pressure (whichever is greater).

To insure compliance with this requirement the following procedures have been provided. These procedures will be used whenever equipment that may contain VCM is being prepared for opening to atmosphere. These procedures are broken down into the following categories.

- A. Vessels larger than 1250 gallons
- B. Vessels smaller than 1250 gallons
- C. Pumps, compressors, filter packs, and piping

Procedures for sampling and measuring the concentration of VCM in vessels of greater than or equal to 1250 gallons volume prior to opening are provided in Appendices B, C, and D.

II. Large Vessel Opening Preparation Procedures

The following procedures are to be used for preparing vessels that may contain VCM and are greater than 1250 gallons in capacity for opening to atmosphere. The vinyl reactors are not included in these procedures since their openings are governed by more stringent emission standards. There are two acceptable methods of preparing vessels greater than 1250 gallons for opening to atmosphere. These are given below.

- A. LARGE VESSEL PREPARATION BY DISPLACEMENT WITH WATER
 - 1. Isolate the vessel from the rest of the process.
 - 2. Fill the vessel up with water to displace the vapor space. The displaced vapor volume and water overflow should be lined up to go from the top of the vessel to the blowdown tank or the batch water strippers.
 - 3. After the vessel has been completely filled, isolate the inlet and outlet and sample the water in the vessel for VCM concentration per the sampling procedure in Appendix B.
 - a. If the VCM concentration is less than 53 PPM in the water sample, then the VCM concentration in the vapor space

EQUIPMENT OPENING PROCEDURES

ABERDEEN CHEMICAL PLANT

II. Large Vessel Opening Preparation Procedures - Continued

after dump will be within acceptable limits. If the VCM concentration in water is below 10 PPM it can be drained directly to the sewer; if it is above 10 PPM the water must be drained to the batch water strippers and stripped per normal procedures.

- b. If the VCM concentration is less than 150 PPM, but above 53 PPM, then drain the water to the batch water strippers or the blowdown tank. After draining, the vessel vapor space should be sampled for VCM concentration using the sample method in Appendix C.
- c. If the VCM concentration is greater than 150 PPM, the vessel should be closed off at the top and partially drained to the batch water strippers or the blowdown tank. Refill the vessel while pulling a vacuum on the top through the batch water strippers or the blowdown tank. After refilling, resample and follow steps a, b, and c until a concentration below at least 150 PPM is reached.

B. LARGE VESSEL PREPARATION BY STEAM STRIPPING

1. Isolate the vessel from the rest of the process.
2. Partially fill the vessel with water and steam strip while recovering until the one of the temperature/pressure limits given Appendix D is reached.
3. After the vessel has been stripped and isolated from recovery, the water in the vessel should be sampled per the sampling procedure in Appendix B. If the VCM concentration is less than 10 PPM, the water can be drained to the sewer; otherwise, drain the water to the blowdown tank or the batch water strippers. If preferred, sampling can be omitted and the vessel drained to the blowdown tank or batch water strippers.

EQUIPMENT OPENING PROCEDURES

ABERDEEN CHEMICAL PLANT

II. Large Vessel Opening Preparation Procedures - Continued

4. For the blowdown tank and the batch water strippers opening preparation, strip following normal procedures to one of the temperature/pressure limits given in Appendix D, then drain the water to the sewer or centrate tank.
5. After the vessel is drained, it can be opened to atmosphere.

Appendix A lists and gives the volumes for all the vessels in VCM service of 1250 gallons capacity or greater.

III. Small Vessel Opening Procedures

The following procedures are to be used for preparing vessels that may contain VCM and that are smaller than 1250 gallons in capacity for opening to atmosphere. This includes piping runs of more than 25 gallons in volume between isolation valves.

Normal procedures are as follows:

1. Isolate the vessel from the rest of the process.
2. Fill the vessel one-third to one-half full with water and steam strip until the recovery line gets hot and then strip for at least 15 minutes. After the time limit, cut off the steam.
3. Finish filling the vessel up with water to displace the vapor space.
4. Close the recovery outlet and drain the vessel to the batch water strippers or the blowdown tank.
5. The vessel can be opened to atmosphere.

Sampling of vessels of less than 1250 gallons capacity is not required.

IV. Pumps, Compressors, Filter Packs, and Piping That May Contain VCM

The following general procedures are to be used for the recovery systems or preparing pumps, compressors, filter packs, piping and other miscellaneous small equipment of less than 25 gallons of volume that may contain VCM for opening to atmosphere.

EQUIPMENT OPENING PROCEDURES

ABERDEEN CHEMICAL PLANT

IV. Pumps, Compressors, Filter Packs, and Piping That May Contain VCM - Continued

After isolating equipment, use the following procedure:

1. Connect a steam hose and a recovery hose to the piece of equipment (if there is not hard piping to the batch water stripper or the blowdown tank) and strip until the pressure in the piece of equipment is below atmospheric pressure.
2. Strip the unit for at least 15 minutes.
3. The equipment can be opened to atmosphere.

For small pieces of equipment (25 gallons volume or less) that do not have the facilities to do the above procedure use the following procedure.

1. Connect a recovery hose to the piece of equipment and recover the unit until a vacuum can be held on the piece of equipment with the recovery shut off.
2. The piece of equipment can be opened to atmosphere.

V. Safety

To eliminate the risk of overexposure to VCM, a fresh air mask should be worn when opening equipment that may have contained VCM, even after equipment opening procedures have been followed.

EQUIPMENT OPENING PROCEDURESABERDEEN CHEMICAL PLANTAPPENDIX A

Vessels larger than or equal to 1250 gallons that may contain VCM

<u>NAME</u>	<u>VOLUME, GAL</u>
VCM Sphere	640600
VCM Bullets (2)	61000 ea.
New Unit Fresh VCM Receiver	9275
New Unit Recovered VCM Receivers(2)	7390 (2) ea.
Old Unit Fresh Receiver	7390
Old Unit Recovered Receivers(2)	7390 ea.
New Unit Blowdown Tank	5922
Batch Water Strippers(2)	17380 ea.
New Unit K. O. Pots (2)	1541 ea.

EQUIPMENT OPENING PROCEDURES**ABERDEEN CHEMICAL PLANT****APPENDIX B****Water Sampling Procedure**

The following sampling method is to be used when sampling a vessel in VCM service that has been completely filled with water to displace VCM vapors. The sampling is done prior to opening the vessel to the atmosphere. This sampling method is based on Test Method 107 of the Federal VCM Emissions Regulations.

1. Obtain from the lab a 50 ml. glass vial, aluminum cap, teflon sealing disc, and cap crimpers.
2. Fill the 50 ml. vial with the water sample to overflowing so that a convex meniscus forms at the top. The excess water is displaced as the sealing disc is carefully placed, with the Teflon side down, on the opening of the vial.
3. Place the aluminum seal over the disc and the neck of the vial, and crimp into place.
4. Attach an identifying label with the date, time, and sample identification to the vial.
5. Take the sample to the G C lab for analysis and log it into the special sample log book. Include the date, time, sample identification, and that it is to be tested for VCM concentration.
6. Place the sample in the bench top refrigerator near the door to the development lab. The sample must be refrigerated until analyzed.
7. Analysis of samples must be run within 24 hours of when the sample was taken.

EQUIPMENT OPENING PROCEDURES**ABERDEEN CHEMICAL PLANT****APPENDIX C****Vessel Vapor Space Sampling Method**

The following sampling method is to be used to sample the vapor space of the vessels listed in Appendix A when the concentration of VCM in the displacing water is between 53 and 150 PPM. The sampling will be done with a TLV hydrocarbon detector and samples will be taken at the top, middle, and bottom of the vessel as described in 61.67(g)(5)(1)(A) of the EPA Regulations on National Emission Standards for Hazardous Air Pollutants.

1. The two TLV portable hydrocarbon detectors in the plant will be used to determine the concentration of VCM vapor in a vessel that has been drained of the displacing water if the VCM concentration in that water was between 53 and 150 PPM. A TLV detector will be used rather than a HNU detector because the TLV will be able to read up to the 2.0 vol% concentration limit. One TLV should be kept by the vinyl department and one by the safety department.
2. After draining the vessel, sample the vessel at three locations with the TLV detector. One measurement will be made within 6 inches of the vessel bottom, one near the vessel center and one near the vessel top.
3. Measurements are to be made at each location until the reading is stabilized. All hydrocarbons measured are to be assumed to be vinyl chloride.

EQUIPMENT OPENING PROCEDURES**ABERDEEN CHEMICAL PLANT****APPENDIX D****Vessel Steam Stripping Temperature/Pressure Limits**

Given below is a table of temperature/pressure limits that must be reached when steam stripping a vessel in preparation for opening to the atmosphere. The calculation of these limits is based on the equations in part 2 of this appendix.

Part 1: Table of Temperature/Pressure Limits For Steam Stripping

Select the temperature to which the vessel is being stripped under the temperature column. The vessel vapor space pressure must be equal to or less than the pressure given for that temperature for the VCM concentration to be less than 2% by volume at standard temperature and pressure.

<u>Stripping Temperature</u>	<u>Required Pressure</u>
215 °F	1.0 PSIG
210 °F	1.0 in HgVac
205 °F	3.0 in HgVac
200 °F	6.0 in HgVac
195 °F	8.0 in HgVac
190 °F	10.5 in HgVac
185 °F	12.0 in HgVac
180 °F	14.0 in HgVac

EQUIPMENT OPENING PROCEDURES

ABERDEEN CHEMICAL PLANT

Part 2: Vapor Space VCM Concentration Calculational Method

If the vessel has been steam purged, the VCM emissions can be calculated from the partial pressure of VCM in the vessel vapor space as follows:

- A. The partial pressure (mmHg) of vinyl chloride in the vessel vapor space will be determined from:

$$PPVC = 760 - VV - VPW$$

Where:

→ use actual atm press per Comp. Plan

PPVC = partial pressure of vinyl chloride in mmHg.

760 = atmospheric pressure at 0°C, in mmHg.

VV = absolute value of vessel vacuum in mmHg.

VPW = vapor pressure of water in mmHg at the vessel temperature

- B. The vessel vapor space volume (m³) will be determined from dimensions of the vessel.

- C. The vessel opening loss VCM emission (kg) will be determined by the following equation:

$$VOL = \frac{(PPVC) (VSV) (1.002)}{(273 + VT)}$$

Where:

PPVC = Partial pressure of vinyl chloride in mm Hg.

VSV = Vessel vapor volume in m³.

1.002 = Ideal gas constant for vinyl chloride

VOL = Kg of VCM released.

VT = Vessel Temperature in °C.