Fugitive Emissions Management Plan

Momentive Specialty Chemicals Ltd (PP3238LX)

1. Background
2. Overview of Relevant Site Operations
3. Detailed Description
4. Summary of Features that Prevent or Reduce Fugitive Emissions
5. Site Changes from Previous Fugitive Emissions Management Plan
6. Site Emissions 2013
7. Actions Going Forward

1 - Background

In response to ref Table S1.4 (305-12-0081) in the Momentive Action Plan an updated Fugitive Emissions Management Plan has been drawn up. The previous Plan was submitted in 2009.

2 - Overview of Relevant Site Operations

The main areas of the site where such fugitive releases to air can occur are loading / un-loading points, pumps, transfer pipework, reactors, storage tanks and storage areas.

Raw materials are bought into site either in bulk via tankers or in IBCs / drums. Bulk tankers are off-loaded in Areas 10 and 15 to above ground bulk storage tanks which are locally vented.

By volume, the main raw materials are phenol and formaldehyde. The phenol and formalin tanks are heated and insulated.

Bulk materials are pumped directly to the reactors as required and liquids from containers are sucked in via a hose at the reactor floor or from the ground floor.

Emissions from the reactors are directed through the site scrubber.

Once the reaction is completed and after any required additions the resin is either pumped to a product tank or directly put into drums / IBCs. From a product tank the resin may go to a bulk tanker or into drums / IBCs which are then either stored in the warehouse or stacked outside on hard-standing ready to be loaded onto a vehicle. Product storage tanks which hold high free-formaldehyde grades have their vents connected to the scrubber along with their bulk loading point. The main drum-filling line is also connected to the scrubber.

In this report extracts from the COMAH Safety Report are used. While COMAH addresses major hazards and therefore does not directly consider fugitive emissions unless they can

cause or result in a major accident, the descriptive parts are equally valid for both purposes. Extracts from the COMAH Safety Report are shown in italics.

3 - Detailed Description

5.2.2.1.2 Hierarchical approach to selection of measures

- *The design of storage tanks is to BS2654 to ensure the tanks are manufactured to a recognized standard and quality.*
- *Pipework systems are designed to withstand the maximum pump pressures.*
- *The system for off-loading phenol from road tanker to storage tank incorporates a loading arm complete with dry break coupling to eliminate the potential of leakage during the transfer process*
- *The maintenance regime on site has identified the critical maintenance and inspections plans required to ensure the integrity of the equipment and prevent an MAH e.g. tank integrity inspections, vent checks, pipe work inspections, written schemes of examination for pipe work and pressure systems.*

5.2.2.1.3 Plant layout to limit risk during operation and maintenance

The main area 30 production building contains seven reactors (including 3 non-operational vessels) and associated equipment spread across 3 floors. There is adequate spacing between and around reactors to allow safe access for normal operation and maintenance activities. All process equipment located within building area is contained by a concrete bund with a stainless steel ACO drainage system leading to a sump, which has secondary containment.

The toxic storage tanks are located in concrete bunds with the transfer pump located outside of the main tank bund within a kerbed area to limit the spread of minor spills. The pump bund area is provided with a separate sump.

5.2.2.1.5 Measures to prevent release

For the toxic materials stored on site the (Formalin, Phenol and Furfuryl Alcohol) the bund capacities are sized to be a minimum volume of 110% of the toxic materials being stored. There are no un-sealed openings through the bund wall to allow materials to leak. Rainwater collected in the bund is pumped out using fixed or mobile pumping systems. The bunds are inspected as part of site inspection tours and rainwater is removed from the collection sumps as required. The bunds are also on an annual inspection regime, with the inspection being completed by our competent body. Road areas where materials are transferred also act as a bund with fully welded ACO drainage channel which transports any liquid to a collection sump. By keeping the tank bunds drained of water it is possible for operators, during regular trips to the bunded areas, to detect developing leaks and to take appropriate remedial action.

Dangerous substances in moveable containers such as IBC's and drums have the potential to be damaged during handling or storage. These materials are stored in designated storage

areas with kerbing and drainage into a bunded collection sump. There is a specifically designed storage area for drums / IBC's of highly/extremely flammable liquids (Highly flammable liquids and waste storage compound).

All process areas where dangerous substances are handled are bordered by either kerbings or drainage channels to allow spillages to be contained and isolated.

All pumps are located outside of the main tank bund within a kerbed area to limit the spread of minor spills. They are all electric motor driven with double mechanical shaft seals to prevent significant loss of fluid or magnetically coupled drives with zero leakage. Where mechanical seals are employed, the level of the buffer fluid is monitored weekly and an alarm generated to warn the operator of low sealant level (which could eventually result in fugitive emission from seal failure).

The system for off-loading phenol from road tanker to storage tank incorporates a loading arm complete with dry break coupling to eliminate the potential of leakage during the transfer process. Transfers from road tankers are only carried out by using the plant installed transfer pumps, and when off-loading formalin the tanker is not pressurised with air keeping the pressure in the flexible hoses to a minimum. The off-loading of Furfuryl alcohol requires air pressure in the road barrel up to 2barg until the pump takes over and the air pressure is removed. All off-loading points have a non-return valve manual valve and locking cap to be installed over the hose coupling point when not in use.

Pipework joint integrity has been reviewed to ensure gaskets meet the suitability requirements of the fluid type, along with the torque settings requirements for each type of joint. Phenol pipework systems are fully welded with the number of flange joints kept to a minimum.

Phenol and formalin pumps and remotely operated shut of valves (ROSOV) on the base of the tanks can be isolated locally and remotely limiting the potential for large releases. The roadway acts as tertiary containment leading to a sump pump to transfer to the effluent treatment system. The pump can be isolated locally and remotely, so any spillage of hazardous chemicals can be contained within the area. The ROSOV valves are tested monthly to ensure they close fully.

5.2.2.1.6 Foreseeable direct causes of major accidents

The site pipework specifications have specified temperature, pressure and corrosion allowances, with the site pipework systems being matched against fluid type and duty requirements. All hazardous pipe systems have a written scheme of examination in place which considers the degradation mechanisms specific to that system such as under lagging corrosion and stress corrosion cracking. The site is located close to the coast and has suffered in the past from stress corrosion cracking in lagged stainless steel pipework. The outcome from an extensive investigation resulted in an improved lagging requirement and a change to pipework decontamination procedures which removed the use of town's water for flushing to avoid chloride in the pipe.

All reactor vessels have been designed as pressure vessels, are protected from over pressure by bursting discs and have written schemes of examination. The vessels are heated and cooled using internal coils, failure of which would not result in MAH.

All storage tanks are located in bunds supported on a low concrete plinth capped with bitumen/sand mix. This ensures that the tank base is not in contact with any rainwater that may collect in the bund, preventing external corrosion of the tank base. Tanks are built to BS2654 and constructed of stainless steel or carbon steel depending on duty requirements. All tanks have 600mm fire relief manway to protect the tank against overpressure in the event of fire engulfment. Inspections are in place to check the tank vents where there is the potential for the product to block the vent.

Flexible hoses are used for the transfer of materials from road tankers apart for the phenol off-loading which utilises a loading arm and dry break coupling. The formalin off-loading hose is suitable for the use with 50% Formalin at 60ºC and is designed for the discharging of road tankers. It is the property of Momentive and is on a 6 month pressure test and inspection program. Hoses belonging to the haulage companies are maintained by them and may not be used beyond their period of inspection. A breakaway coupling has been installed on the formalin off-loading point as a mitigation measure against drive away.

The tank bund walls are constructed from reinforced concrete designed to withstand the hydrostatic loads of a tank failure and are capable of holding 110% of tank capacity in the case of toxic chemicals and diesel fuel oil.

To minimize the potential for loss of containment all maintenance tasks which involve breaking containment are controlled under a permit to work and lock out tag out. Permit-to-work is carried out following Barry standing procedure BSP1.03. This follows the guidance of HSG250, "Guidance on permit-to-work systems" and HSG253, "The safe isolation of plant and equipment". The procedure is used to control both general maintenance activities and those site activities with the potential to initiate major accidents, such as hot work in area where flammable atmospheres may be present.

5.2.2.1.7 Structure design

Pipework systems are specified by fluid type and installed in accordance with the sites piping standards. These standards draw upon and build on international standards such as ANSI and have been in place since the design and installation of the plant in 1990.

The reactors have all been designed and constructed as pressure vessels to BS5500 and the storage tanks to BS 2654. Detailed information is contained in Section 2 tables 2.3.4.2b, 2.3.4.2c. Each reactor is installed with a rupture disc located close to the reactor

All storage tanks are bolted to the floor and located in bunds supported on a low concrete plinth capped with bitumen/sand mix. The bunds have been designed to with stand the full hydrostatic load of a vessel failure.

Flexible hose for off-loading formalin is an anti-static composite hose designed for the use of off-loading tankers. The hose and assembling specification are in accordance with BS EN 13765.

5.2.2.1.8 Containment structure

To prevent the equipment design envelop being exceeded protection devices such as relief valves, bursting discs, alarms and hard wired trips are installed. Examples of the protection are given below:-

- *Hard-wired interlocks, which are independent of the tank level instruments and control system, prevent over-filling of the phenol and formaldehyde storage tanks. The furfuryl alcohol tank has an independent high-level switch which stops the off-loading sequence.*
- *A hard wired instrument protection system and bursting disc on the reactors prevent the vessel from being pressurized above its design pressure*
- *Pipework systems are designed to withstand the maximum pump pressures*

4 - Summary of Features that Prevent or Reduce Fugitive Emissions

1. The phenol and formaldehyde tanks are heated to a constant temperature and insulated. This reduces the effect of diurnal temperature variation.
2. The phenol off-loading system uses a dry-break coupling
3. The formalin off-loading pump utilises a double mechanical seal and the phenol off-loading system uses a magnetic drive pump
4. The storage tanks have level control systems including trips
5. The site scrubber reduces VOC emissions from the reactor headspaces and associated equipment, the main drumming point and from product storage tanks 5-V1514 / 5-1515 / 5-V1516
6. Displaced vapour from tanker loading from product storage tanks 5-V1514 / 5-1515 / 5-V1516 is directed to the scrubber
7. Open-ended lines are capped or blanked according to site requirements
8. Planned preventative maintenance and inspections system in place, e.g. pipelines, bunds, drains, storage tanks etc…
9. Administrative controls are in place including risk assessment, safe operating procedures, work instructions and training

5 - Site Changes from Previous Fugitive Emissions Management Plan

With regard to fugitive VOC emissions there have been no significant changes since 2008/9. Site volumes are currently lower resulting in a subsequent drop in fugitive emissions, e.g. less phenol and formalin deliveries.

Six sigma projects are continually being looked at and in certain cases they will overlap with emissions, e.g. steam trap improvements

6 - Site Emissions 2013

In 2013 it is estimated that there were 22kgs of phenol released to air from tanker off-loading activities from 417 deliveries and 45kgs of formaldehyde from 589 formalin deliveries.

7 - Actions Going Forward

- Continue to assess the effect of any site changes on fugitive emissions
- Continue to calculate fugitive emissions for reporting purposes
- Continue to look for improvements