


Incident Title		Toxic Chemical Release	
Incident Type		Toxic Gas Release	
Date		15 th November 2014	
Country		USA	
Location		La Porte, TX	
Fatalities		Injuries	Cost
4		0	Unknown
Incident Description		Operators of a Lannate® insecticide manufacturing process were attempting to clear a hydrate blockage in the methyl mercaptan feed line between the methyl mercaptan storage tank and the reaction section by pouring hot water on the outside of the pipe to melt it. In order to prevent over-pressure of the line as the hydrate plug melted, isolation valves between the methyl mercaptan feed line and the vent gas header were temporarily cracked open. The pressure in the vent gas header began to rise but this was incorrectly assumed to be a consequence of liquid accumulation in the vent gas header to the downstream incinerator/vent gas scrubber (a common occurrence), so the header was drained through a hose to an open floor drain. Almost 24,000 lb (10,900 kg) of highly toxic methyl mercaptan was released to atmosphere inside the enclosed, unventilated manufacturing building via the drain.	
 <p>Credit: US Chemical Safety Board</p>		<p>Basic cause of the fatalities was a combination of asphyxia and acute exposure (by inhalation) due to a toxic gas release in a confined space.</p> <p>Critical factors included: 1) The manufacturing building ventilation fans were not in service, 2) The manufacturing building gas detection system had alarms display automatically on the control board but relied on verbal communication by the control board operator to order evacuation of the building, 3) The control board operator was focussed on correcting a high pressure condition in the process and did not realise the gas detector alarms were indicating a major gas release in the building, 4) The control board operator failed to mention a toxic gas release when requesting assistance from emergency response team to rescue personnel, 5) Operators entered the building without respiratory protection in an attempt to rescue colleagues.</p> <p>Root causes included: 1) Inadequate process safety management system resulting in 2) Inadequate process hazard analysis (hydrate formation in methyl mercaptan feed line), 3) Inadequate engineering design (pockets in vent gas header pipe, ventilation system designed to prevent flammable gas concentration exceeding 25% of lower exposure limit rather than to avoid exceeding danger to life concentration threshold), 4) Inadequate toxic gas detection system (alarm set point too high, absence of visual/audible alarms in manufacturing building), 5) Inadequate operator training (troubleshooting, hazard awareness, ventilation fan criticality), 6) Inadequate maintenance of safety-critical equipment (ventilation fans), 7) Normalisation of deviance (operators frequently drained vent gas header and used methyl mercaptan odour to help locate leaks), 8) Inadequate personnel protective equipment (respiratory protection for vent gas header draining), 9) Inadequate control of work (absence of work permit for vent gas header draining), 10) Poor communication (failure to alert emergency response team to toxic gas release), 11) Failure to enforce procedures (emergency procedure required manufacturing building access to be restricted when ventilation fans not in service), 12) Failure to learn (past toxic gas release incidents - e.g. Bhopal).</p>	
Incident Analysis		<p>Basic cause of the fatalities was a combination of asphyxia and acute exposure (by inhalation) due to a toxic gas release in a confined space.</p> <p>Critical factors included: 1) The manufacturing building ventilation fans were not in service, 2) The manufacturing building gas detection system had alarms display automatically on the control board but relied on verbal communication by the control board operator to order evacuation of the building, 3) The control board operator was focussed on correcting a high pressure condition in the process and did not realise the gas detector alarms were indicating a major gas release in the building, 4) The control board operator failed to mention a toxic gas release when requesting assistance from emergency response team to rescue personnel, 5) Operators entered the building without respiratory protection in an attempt to rescue colleagues.</p> <p>Root causes included: 1) Inadequate process safety management system resulting in 2) Inadequate process hazard analysis (hydrate formation in methyl mercaptan feed line), 3) Inadequate engineering design (pockets in vent gas header pipe, ventilation system designed to prevent flammable gas concentration exceeding 25% of lower exposure limit rather than to avoid exceeding danger to life concentration threshold), 4) Inadequate toxic gas detection system (alarm set point too high, absence of visual/audible alarms in manufacturing building), 5) Inadequate operator training (troubleshooting, hazard awareness, ventilation fan criticality), 6) Inadequate maintenance of safety-critical equipment (ventilation fans), 7) Normalisation of deviance (operators frequently drained vent gas header and used methyl mercaptan odour to help locate leaks), 8) Inadequate personnel protective equipment (respiratory protection for vent gas header draining), 9) Inadequate control of work (absence of work permit for vent gas header draining), 10) Poor communication (failure to alert emergency response team to toxic gas release), 11) Failure to enforce procedures (emergency procedure required manufacturing building access to be restricted when ventilation fans not in service), 12) Failure to learn (past toxic gas release incidents - e.g. Bhopal).</p>	
Lessons Learned		1) Inherently safer design (ISD) reviews of the manufacturing building, dilution air ventilation systems and pressure relief systems should be conducted for any processes involving toxic process streams.	
More Information		1) "Toxic Chemical Release at the DuPont La Porte Chemical Facility", US Chemical Safety and Hazard Investigation Board, Report No. 2015-01-I-TX (2019): https://www.csb.gov/dupont-la-porte-facility-toxic-chemical-release/	
Industry Sector		Process Type	Incident Type
Agrochemicals (Manufacture)		Insecticide	Toxic Gas Release
Equipment Category		Equipment Class	Equipment Type
Not equipment-related		Not applicable	Not applicable