Significant Incident Report No. 256

Subject: Process tank roof bursts due to uncontrolled reaction

Date: 21 November 2017

Summary of incident

Note: The Department of Mines, Industry Regulation and Safety's investigation is ongoing. The information contained in this significant incident report is based on materials received, knowledge and understanding at the time of writing.

In May 2017, during a maintenance shutdown at a processing plant, a tank that normally held sulphuric acid slurry was temporarily used for storing limestone slurry.

When the tank was returned to service, it was drained of limestone slurry and filled to launder level with acidic slurry. However, although the tank had been emptied, limestone residue had accumulated at the bottom. When the tank was filled with acidic slurry and the agitator turned on, there was a rapid acid-base reaction between the free sulphuric acid and limestone, liberating carbon dioxide gas which could not readily escape. The tank's fibreglass roof burst and about 10,000 litres of hot slurry (87°C) escaped from the tank.

A process technician working on the platform of the tank fled the bulk of the hot slurry by jumping over a nearby handrail onto an adjacent tank platform. He was treated for minor injuries, including burns.

Failed tank. Left. Damage to tank roof; cross indicates where the process technician was standing prior to tank failure. Right. Arrow indicates the escape path taken by the process technician over the handrails using the actuator. Note the slurry (at ground level) in foreground of pictures.

Direct causes

- The reaction between the free sulphuric acid and limestone in solution resulted in the uncontrolled liberation of carbon dioxide gas.

Note: The rate of reaction was increased by the high temperature of the slurry (87°C) and agitation of the solution, which made the residual limestone more readily available for reaction with the free acid.

Contributory causes

- The risk assessment was not adequate and failed to identify the hazard associated with mixing of the acid slurry with limestone that might accumulate on the bottom of the tank.
- Control measures, such as cleaning the tank to remove residual limestone before refilling it with acidic slurry, were not implemented.
- There was only one means of access or egress from the tank platform.

Actions required

Change management

Significant changes at a mining operation should prompt the completion of a risk assessment that adequately identifies the potential impact of the proposed change on the working environment.

- Develop and implement change management procedures to identify the potential impact of the proposed changes on the working environment.
- A risk assessment should identify hazards, and assess and control all risks that may arise from the change, including those to workers. As part of the risk assessment process:
  - consult with those who may be affected by the change
  - provide them, in so far as is practicable, with adequate information, instruction, training and supervision about the change.

Plant

Responsible persons are reminded that under the Mines Safety and Inspection Regulations 1995 the following requirements apply to plant.

- Employers must ensure that plant at the mine is used only for the purpose for which it was designed, unless the employer has determined, and a competent person has assessed, that a proposed change in use does not present an increased risk of exposure to any hazard [r. 6.21(a)].
- So far as is practicable, an emergency exit is provided from each treatment plant and building on the surface of the mine [r. 4.31(a)]. In addition to the usual means of access.

Further information

- Department of Mines, Industry Regulation and Safety, Mining safety publications, www.dmp.wa.gov.au/Safety/Mining-Safety-publications-16162.aspx

Consultation at work – code of practice

Effective safety and health supervision in Western Australian mining operations – guideline

This Significant Incident Report was approved for release by the State Mining Engineer on 21 November 2017