Leak and fire in an oil terminal
12 July 2017 and 8 August 2017
Amsterdam
The Netherlands

Management of Change
Root causes
Incident investigation
Hot spot work

THE ACCIDENT AND ITS CONSEQUENCES

The 12 July, the cargo of a ship at an oil terminal in Amsterdam was pumped to a storage tank. In the evening, the content of the tank (gas oil) was homogenized. Usually, homogenisation takes place by blowing nitrogen through an air cross at the bottom of the storage tank. Because the air cross was in maintenance and therefore not in use, it was decided to homogenise the liquid with air through the product line. After homogenisation it was recognised that about 100 litres of product had leaked through the dome of the tank into the tank pit. Because there was a lot of rain water in the pit, the floating gas oil was dispersed over a large area of the pit.

Four weeks later, at the same oil terminal, a fire in the tank pit occurred, which was caused by welding activities at the tank of the first example. The dry grass in the tank pit was still contaminated with gas oil and sparks ignited a fire.

THE ORIGIN AND THE CAUSES

1st incident

Around midnight, early morning of 12 July, the order was given to discharge gas oil from a sea vessel into a storage tank at the oil terminal up to 461 mm beneath the top edge of the tank. The maximum working level (MWL) of the tank is set to 400 mm beneath the top edge of the tank. This means that at that moment the maximum filling capacity was not recognised as critical. Following the filling of the tank, an order was given to homogenize the gas oil in the tank. This was done by injecting air through the product line. Early morning, it also rained heavily which eventually caused an excessive flood of water on the terminal and in the tank pit.

The nitrogen installation with which the homogenisation is normally performed could not be used. Therefore, no nitrogen or air could be blown through the air cross at the bottom of the tank. For this reason, it was decided to use a product pipe to blow air into the tank. After the job was done, it was noticed that product was released at the top of the tank (under the edge of the dome) and was present as a floating layer on the rain water in the tank pit.

- Direct cause according to the company : it is probable that the moving of air in the tank caused a wave higher than 461 mm, which caused the spill of gasoil leaking between tank roof and tank shell during the process of homogenisation.
- Root cause according to the company : the tank roof has been changed from an External Floating Roof (EFR) to a dome. A Management Of Change (MOC) was performed and the maximum working level could be changed to 400 mm from the tank roof. In the MOC, the filling level of the tank was considered as safe.

2nd incident

Leaking tank was emptied and cleaned for maintenance and in order to perform welding activities. On the specific day of the 2nd incident, a contractor was welding the railing of the roof of tank. This work was a small part of the overall maintenance that was going at that time on this tank. The welding work on that day was started on the north side of the tank and the welders were gradually advancing towards the east side of the tank. Around noon, a worker saw a patch of grass burning at the foot of the tank on the east side, directly under the place where the welders were working. The fire was controlled with a fire extinguisher which was near at hand. A total lot of 8 (m) x 2 (m) grass had been on fire.

- Direct cause according to the company: dry grass at the bottom of the tank caught fire due to the deposit of hot welding residues from above the tank.
- Root cause according to the company: due to the spill on 12 July, the grass in the tank pit died and the dry grass became combustible material. The Last Minute Risk Analysis (LMRA) did not mention the dry grass as combustible material.

FOLLOW-UP ACTION TAKEN

1st incident

After investigating the first incident by the company, the following recommendations were reported to the authorities in order to avoid similar incidents in the future:

- lowering the maximum working level (MWL) to 1000 mm instead of 400 mm;
- hire a cleaning company at an earlier stage to save on the costs of soil remediation;
- in the case of a change of the MWL, verify that all possibilities for liquid to flow out has been reviewed in the MOC.

2nd incident

After investigating the second incident by the company, the following recommendations were reported:

- keeping the area wet when performing welding operations at tank;
- clear instructions for the firefighter to recognize flammable material in time.

LESSONS LEARNT

From the examples mentioned above it is clear that the quality of incident reports is inadequate. The correct root causes that could explain direct cause are not described:

- The MOC alternative homogenization was inappropriate. What is the reason for it ? Why the MOC did not identified this?
- The dome of the tank turned out not to be closed. The cause of this structural mistake is not investigated.
- The dangers of contaminated tank pit bottom was not identified. What can explain it?

The consequence is that the recommendations identified to prevent similar incidents in the future, are incorrect. Unfortunately, this is a trend in many of the incident reports received by the competent authority. Thus in many cases, the legal obligation for a thorough investigation of the root causes of incidents, is not met. In view of this shortcoming, the competent authority must take corrective actions against the operators.

Guidance document for incident investigation

The Environmental Service North Sea Canal area (ODNZKG) has decided to stimulate structural improvement of accident reports. By communicating to companies why, which and how companies must provide information when submitting accident reports, ODNZKG expects to make a positive contribution to improving the quality of the reports. As a result, it is expected that correct root causes are better identified, and recommendations are formulated which may lead to substantial improvements. This insight will also contribute to a higher safety awareness for the companies. In addition to the preventative approach, ODNZKG also has the legal competence to deploy enforcement measures.

In the Netherlands, the obligations for providing information about incidents to the competent environmental authority is laid down in the Environmental Act (article 17.2). This article is not very clearly formulated, and can be interpreted in various ways. For this reason, ODNZKG has made a guidance document for the companies, in which the service indicates how it deals with the interpretations of the article mentioned above.

The guidance document is divided into the following parts:

- a flowchart to determine the use of the limited or extensive reporting requirements. This includes the assessment of whether there is a notification obligation in accordance with article mentioned above;
- requirements for a limited accident reporting;
- requirements for an extensive accident reporting.

In drafting the flowchart use is made of case-law jurisprudence, case studies, and other existing helpful material and schemes. The flowchart offers a step by step approach, with examples and/or an explanation for each step.

Following the flowchart it should be clear whether a company needs to submit a notification of an incident to the competent authority and when this is the case, which form of incident reporting will be needed.

The result is a guidance document for Seveso and Industrial Emission Directive 4 (IED4) companies, in which is indicated when an accident should be reported to the competent authority and what information should be supplied by the company, in case an accident report is needed.

When companies provide their information in accordance with the guidance document, the content of the document should be assessed uniformly. To do so, ODNZKG is developing an assessment protocol for the accident reports. In addition, the protocol describes the working process of ODNZKG to verify proper implementation and working of the recommended measures included in the accident reports.