

Inspection following a major accident: lessons learned for the chemical specialties industry

The Role of Authorities in Promoting Lessons Learned

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Technical Working for Seveso Inspections (TWG 2) and the EC Joint Research Centre (MAHB)

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Post-accident inspection

Post accident **inspection commission** is charged by **Ministry of Environment** and it is made up by

- ISPRA - *National Institute for Environmental Protection and Research*
- CNVVF - *National Fire Brigades*
- INAIL - *Workers' compensation Authority*

The **goal** of the inspection is to **learn lessons** for **preventing** future accidents and **mitigating** their consequences



Reports shared through the **eMARS** (European Major Accident Reporting System) database

The inspection **duties**:

- collect **documents** and evidences
- on-site **inspection** of **plants** and equipment
- **interviews** with workers **representatives**, internal **staff** and **subcontractors**



The site of the industrial establishment



The area within a **two-kilometers** include **industries** and populated **buildings, airport, port, lagoon**



The UT establishment used to **produce** highly reputed **specialties** for personal and **home care, paper, plastics, textiles, cosmetics, and other industries**



Involved substances

Tank TK 2.2 was likely to have been holding

WASTEWATER CONTAINING METHYL ALCOHOL, ETHYL ACRYLATE, WHITE SPIRIT, XYLENE (H226 - *Flammable liquid and vapor*; H411 - *Toxic to aquatic life with long-lasting effects*)

The amount directly involved in the event was 130 tonnes



| Other substances present at the establishment in the units affected (plants, units and storage on the forecourts) | |
|---|---------------------------------|
| 2-ethylhexyl-4-aminobenzoate | bis-Aminopropyl ethylenediamine |
| Xylene | tert-Butyl hydroperoxide |
| Acetone | tert-Butylamine |
| Methanol | Ammonia |
| Ethyl acrylate | Diisopropylamine |
| White spirit | Xylenic mixture |
| Morpholine | |

Accident dynamic

The accident occurred in the **morning** during **modification** works, by an **external firm**, which was connecting **tank TK 2.2 to the wastewater network**

One hour **before** the event, these **workers had cut the pipe** that was being worked on

The event occurred when **the cut pipe was being sealed**, while an **electric arc welder** was in use

The **trigger** gave rise to the **explosion and catastrophic rupture** of the atmospheric tank

An **internal domino effect** was generated, in a succession of **fires and explosions**



Emergency response

The **External Emergency Plan** (EEP) was activated by the **Prefect's** Office, following first notification from the **fire brigade**

People living in the industrial district **within 1 km** radius of the establishment were asked to **stay at home** with the **windows closed** until the emergency was over

Following intervention by the off-site external emergency services, the **fire** was brought **under control** at 14:00, and the **emergency** was declared **over** at 17:00

Approximately **30 fire brigade vehicles** attended with **90 firefighters**, including **from neighbouring** stations



Consequences on equipment and structure

Tanker Truck
>>

<< Plant Unit #3



Collapsed Fiberglass tank

IBC and DRUMS
>>>>



<<<<
Plant Unit #6

Damage to human health, environment and property

2 employees sustained burns to 30-40% of their bodies, hospitalised for 2 months, but at the end they recovered well

3 employees first degree burns to the face and neck; inhalation of toxic fumes; multiple bruises: they recovered in a couple of weeks

EUR 35,000,000 (*material losses*)

EUR 14,000,000 (*response, clean-up, restoration costs*)



No pollutants were found in the waters of the Lagoon, traces were found in the industrial canals



Lessons learned

- ✓ A risk analysis on all **changes** (**preliminary** risks, risks during **implementation** and risks during **operation**), resulting in the identification of **preventive and protective measures** to be implemented, as well as the related **training activities** for the staff
- ✓ Always keep systems subject to **modification works under isolated and inert conditions** to prevent the environmental conditions from changing, which could lead to the **formation of potentially flammable and/or explosive atmospheres**



Lessons learned

- ✓ The **work permit** process must always pay attention to: **checks** prior to and/or during the **performance of the activities**; **supervision** by the persons responsible; **formalization**
- ✓ Follow the **procedures** for the correct **positioning of stores of hazardous substances** and mixtures on the **forecourt** (e.g. tanks, drums, IBCs, etc.), including related fire **protection systems** and equipment, as a result of an appropriate **risk analysis**

Discussion

In **chemical** specialties industry there are many **SMEs with a poorer safety culture**. As **competition** is higher, technical interventions are done under **hurry**, and recognized **practices** are possibly **disregarded**. Experience and knowledge are forgotten, **risks are ignored** or misunderstood at all

The **lack/impooverishment of safety** culture makes internal organization **impervious** to external knowledge

The industrial **associations** should supply the **weakness** of single enterprise, with a capillary action to **disseminate knowledge** through their network



Conclusions



- Regulatory **authorities** have a huge responsibility. In particular, the mandatory **inspections**, required by the Seveso Directive, **should verify actual safety culture**
- In the chemical specialties sector, **inspectors should pay attention to the management of changes**, where recognized good practices may be forgotten, preferring **informal procedures**, which may cause **accidents** with flammable substances
- **Sample interviews** with personnel of all levels can be useful for inspectors to understand the level of **awareness and knowledge of the personnel**
- Inspectors **should prescribe** specific interventions for the **promotion of the safety culture**

Thanks for the attention!

Questions...???

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