



# 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

- <u>ISPRA</u> National Institute for Environmental Protection and Research
- <u>CNVVF</u> National Fire Brigades
- <u>INAIL</u> Workers' compensation Authority

The goal of the inspection is to <u>learn lessons</u> for preventing future accidents and mitigating their consequences

eMARS



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 reputated 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 offsite 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





Collapsed Fiberglass tank

<< Plant Unit #3











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# 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

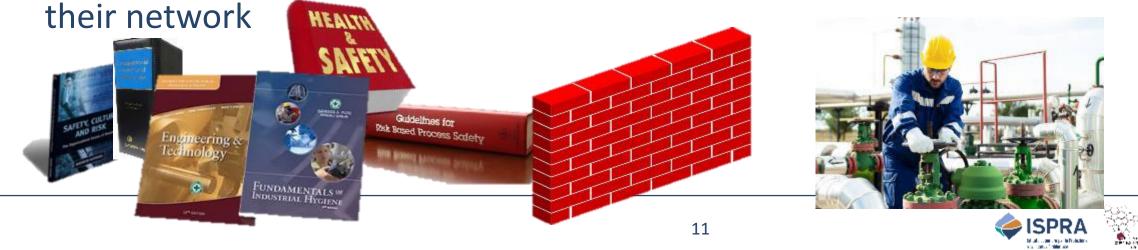


## Discussion

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/impoverishment 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



# 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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