



Lower-tier establishment in a chemical park: Characteristics and challenges in the monitoring practice

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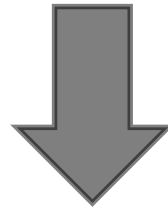


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Some facts

- ✓ It is a lower-tier establishment with a petrochemical plant,
- ✓ In a chemical park.
- ✓ There is a plant fire brigade for the whole chemical park.
- ✓ There are also upper-tier establishments located.



It triggers a significant major accident scenario due to the handling of explosive substances.



Major accident scenario

B L E V E

→ **B**oiling **L**iquid **E**xpanding **V**apour **E**xplosion

“... is a hazardous phenomenon that can occur when a vessel containing a pressurized liquid fails, leading to very rapid vapourization of the liquid in the vessel with a large blast effect. The most dangerous BLEVEs concern flammable substances, in particular butane, propane or LPG, where a massive fireball is generated after the inflammation of the large vapour cloud.” (<https://risk-engineering.org/concept/BLEVE>)



- **In this case due to the handling of explosive substances (propylene). It may be caused by underfiring (pool fire).** (www.firerescue1.com)



The plant

... is surrounded by different plants that handle different substances.

... has a sloping surface for the drainage of flammable liquids to avoid underfiring.

... has gas detectors, water curtains, a water sprinkler system and acoustic alarms.

... has a large surrounding explosion-proof zone.



Differences lower- / upper- tier establishments

LOWER- TIER

- Major-accident prevention policy (MAPP)
- ...
- Land-use planning on request
- Information to the public
- Inspections less frequent (3 years)

UPPER- TIER

- **Safety report** and integrated Major-accident prevention policy (MAPP)
- **Emergency plans**
- Land-use planning
- Further information to the public
- Inspections more frequent (1 year)



Characteristics and challenges: Exemplary situations

1. Modifications of the plant

2. Ordering of a plant fire brigade

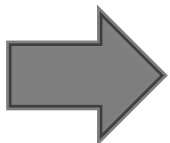
3. Flaring activities



1. Modifications

Modification regarding fire protection isolation

- ... to prevent corrosion under isolation and resulting leakages.
- There is no safety report according to the Seveso III Directive, only the major-accident prevention policy (MAPP).
 - Therefore there was no detailed description of the major accident scenarios, including measures for prevention and limitation.
 - The systematic hazard analyses were not directly available.
 - The documentation was insufficient.

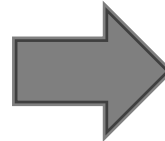


It was difficult to adequately assess the modification, especially regarding the hazardous situation.



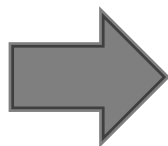
1. Modifications

What did we do?



What did we find out?

- We requested
 - the systematic hazard analysis, in this case a layer of protection analysis (LOPA).
 - the relevant P&I- diagrams.
- The major accident scenarios relevant to this modification:
 - Pool fire,
 - Jet Fire,
 - BLEVE.



In the case of modifications in upper-tier establishments, the safety report with the detailed description of major accident scenarios can be used to analyse the situation.



2. Plant fire brigade

Ordering of a plant fire brigade for the chemical park

... by colleagues from another department of the same authority.

Their questions

*Only for upper-tier establishments
and
what is the major hazard?*

*The major hazard
originates from the
lower-tier establishment.
It's a BLEVE.*

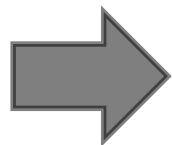
Our answers



2. Plant fire brigade

Important facts about the lower-tier establishment:

- It can trigger a domino effect within the chemical park (e.g. with toxic substances) and the resulting obligations.
- This also affects the internal emergency plans of neighbouring establishments and the entire chemical park.
- Other plants have acoustic alarms, focused on this plant only.
→ This is explained during inspections.



Normally there are **no** emergency plans for lower-tier establishments. In this case it exists because the plant is in a chemical park.



3. Flaring activities

- ... are an integral part of the plant's safety shutdown system in addition to the blow-down-system.
- Risk assessments of the plant's technology are more difficult due to the comparative lack of information.
- ... cause disturbances with external effects for the chemical park and the neighbourhood.
- Normally there is **less** information to the public, but for this plant we have the whole information because it is located in a chemical park.



Summary of characteristics and challenges

Less information

- on emergency plans
- to the public
- because there is no safety report

Information have to be requested additionally.

Risk assessments of the plant's technology and the hazardous situation are more difficult.

Lower-tier establishments may be underestimated in regard of the potential risk they may cause.

There must be awareness of being a Seveso establishment.

... and more



Thank you for your attention!

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