Risk management in process industry – practical approach in Poland

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Office of Technical Inspection is a Polish inspection body (established 100 year ago) in order to ensure safety of technical devices and installations.

Office's main task is to assess the conformity of technical equipment with relevant regulations and specifications during design, manufacture and service.

Our duties also include safety & failure analyses as well as distribution of information concerning the problems of technical safety.

Office of Technical Inspection is a non-profit organization, independent both in its finance and technical activities.
29 Branch Offices covering the whole territory of Poland and Central Laboratory in Poznan

1500 highly qualified and competent engineers and inspectors
UDT activity as a third party

UDT

INSPECTION

- lifting equipment
- pressure equipment

UDT-CERT *

separate in-house organization

CONFORMITY ASSESSMENT
(12 directives)

CERTIFICATION
- quality systems
- personnel (incl. NDT personnel and welders)
- products

*) UDT-CERT is an independent structure in view of financial issues, activity, data base
Special activities of Division of Functional and Process Safety:

1. Process industry safety analysis:
   i. HAZOP
   ii. LOPA or QRA

2. RBI eg. -Reliability-based Inspection

3. SIL allocation and validation

4. SIL certification

5. Explosive atmospheres - ATEX

6. Certification of Functional Safety Expert
The Hazards-Related Assessment Process

Preliminary Hazard Analysis (PHA; preliminary HAZOP study & C-HAZOP)

Study:
- HAZOP
- C-HAZOP
- R-HAZOP
- F-HAZOP

Final Hazard Analysis:
- LOPA
- QRA
- SIL

Fire Safety & Explosion Protection Analysis

Emergency Plan & Crisis Management

Construction Safety Study acc. to EU directives eg. directives PED, ATEX, etc.

Safety Management System, eg. prevention & mitigation plans.

Validation & Independent Hazard-Related Audits.

Development Application Stage

Design Commissioning Stage

Construction & Operational Stage
La vérité sort de la bouche des enfants
Contribution of failures to explosions in gas-fired plants

- Process Safety Management: 70.9%
- Equipment Failure: 12.5%
- Poor Maintenance: 12.5%
- Lacking Equipment: 8.3%
- Safety culture
General assumption: Risk is not spreaded steadily on a plant
Common errors - development stage

Technique: PHA or preliminary HAZOP and C-HAZOP

Weak points:

a. lack of maturity of technology and/or technical documentation

b. lack of implementation of contracted technical specification
Common errors - design stage

Technique: HAZOP (F-*, R-*, C-*)

Weak points:

1. no risk matrix
2. lack of interest of end-user
3. formal qualitative analysis
1. unacceptable risk level
2. tolerable-unacceptable risk level
3. tolerable risk level
4. acceptable risk level
Common errors - construction & commissioning stage

1. Lack of experience with conformity assessment procedures

2. Not certified staff and service for emergency shut down systems or lock systems

3. Not enough reliable device applied to control loops or ESD loops
Common errors - operational stage

1. lack of dynamics plant analysis
Maximum airborne concentration of ammonia

3 min. after pipe interruption

Dispersion of ammonia vapour cloud near ground
Maximum airborne concentration of ammonia

9 min. after pipe interruption

Dispersion of ammonia vapour cloud near ground
Maximum airborne concentration of ammonia

15 min. after pipe interruption

Dispersion of ammonia vapour cloud near ground
Dispersion of ammonia vapour cloud near ground

21 min. after pipe interruption
Dispersion of ammonia vapour cloud near ground

26 min. after pipe interruption
Dispersion of ammonia vapour cloud near ground

36 min. after pipe interruption

Study Folder: scen1 prez
Audit No: 536
Model: Wizard Model
Weather: Category 2/F
Material: AMMONIA
Averaging Time: Toxic (600 s)
Height: 0 m
Concentration
Time: 2138 s

Cloud Footprint

Dispersion of ammonia vapour cloud near ground
Dispersion of ammonia vapour cloud near ground

53 min. after pipe interruption
Dispersion of ammonia vapour cloud near ground

73 min. after pipe interruption
Herd of deer under ammonia storage tanks in ZAK

Winter 2006.

Thank you for your attention!