



CEFIC SEMINAR ON TRANSPORT RISK ASSESSMENT

Accident scenarios with potential high consequences

ACCIDENT TYPES

- Loss of containment
 - High energy required
 - Kinetic energy: high speed
 - Potential energy: fall
 - Nature of the product
 - Gas: higher shell thickness but small leaks can generate high consequences
 - Liquid: larger leaks required
- Vicinity of the accident
 - Highly populated area (rail vs. road)
 - Traffic density (congested areas)
 - Environment sensitive area (pollution)
 - Presence of other Dangerous Goods (domino effect)
- Leaking transport equipments are out of this scope – control in loading facilities



RTC falling down at low speed from shunting yard



Empty RTC L4BH after high speed derailment



Viareggio "small" leak RTC



Viareggio accident location in high population density area

SCENARIOS ANALYSIS

- UVCE (Unconfined Vapor Cloud Explosion)
 - Flammable cargo (gas or liquid)
 - Delayed ignition
 - Instantaneous impact
 - High impact range
 - Nearby populated areas will be impacted

- Hot BLEVE (Boiling Liquid Expanding Vapor Explosion) – ECE WG
 - Flammable liquid, flammable gas or peroxide
 - Heating source or exothermic reaction necessary
 - Takes time to develop
 - High impact range
 - Nearby populated areas will be impacted

SCENARIOS ANALYSIS

- Toxic vapor cloud release
 - Toxic gas or toxic volatile liquid (toxic by inhalation hazard – TIH)
 - Instantaneous impact
 - High impact range
 - Nearby populated areas will be impacted

- Pool Fire
 - Flammable liquid
 - No instantaneous impact – time needed to have sufficient leaked product
 - Ignition source needed
 - Impact by thermal radiation or fire propagation
 - Impact limited to direct surroundings
 - Presence of other Dangerous Goods (e.g. other Rail Tank Cars in same train) could create domino effect (such as a BLEVE). A pool fire under the leaking tank could also generate a BLEVE.

SCENARIOS ANALYSIS

- Jet fire
 - Flammable pressurized cargo (gas or liquid)
 - Same conditions as UVCE but with instantaneous ignition
 - Instantaneous impact
 - Fire propagation risk
 - Impact limited to direct surroundings
 - Presence of other Dangerous Goods (e.g. other Rail Tank Cars in same train) could create domino effect, like BLEVE

- Liquid or solid spillage of environmentally hazardous substance
 - Low energy accident can be sufficient for creating leak
 - Close proximity of a sensitive zone is required
 - Instantaneous impact
 - Potential high impact range