CAST Analysis of the Buncefield Incident
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Buncefield, UK - 11 December 2005

- 250,000 litres of gasoline overfilled a storage tank
- Huge vapour cloud and explosion
- 20 tanks engulfed
- 40 injuries, no fatalities
- Major environmental pollution
Accident consequences not recognised

Hazard – overfill of gasoline storage tank
Accident consequences:
• Believed to be bund fire
• Not considered a “Major Accident” under the regulations
• Even a bund fire should have been a Major Accident
Actual consequences:
• Very large explosion
• Bund overtopping – multi-tank fire
Key Messages

- Unsafe Control Actions:

1. Supervisor – Organisational issues

2. Trip System – engineering procurement – Safety Guided Design
Level gauge did not work

- Which tanks are filling
- Tank level

Shift Handover

Close command

Valve

Level display Level alarm

Level Gauge

Tank
Defects not communicated

Operations Manager

Critical Defect Log Template

Completed Critical Defect Log

Control Room Supervisor

Faults – 14 in 3 months

Tank Gauging
Overlapping responsibilities

- Total Head Office
- HOSL Board
- Terminal Manager
- Operations Manager
- Site Policies
- Policy implementation
- Loss Control Manual Support
- Seveso Directive duties Resources
- Critical Defect System
- Shift Handover System
- Specification for Tank Gauging Display
Independent High Level Switch (IHLS)

Diagram:
- **Computer**
  - Close command to **Valve**
  - High level signal to **IHLS**
- **Valve**
- **IHLS**
  - Level to **Tank**
- **Tank**
IHLS - The padlock problem

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Contracted out engineering

Engineering Manager
(Customer)

Motherwell
(System Integrator)

Trip System Requirements

Order for switch

TAV
(Component Supplier)

Switch
User Manual

Installation

Trip System

User Manual

Trip System

Order for switch
Safety Guided Design – Intent Specification

- IHLS Requirements:
  1. In the event of high tank level, provide an alarm to the supervisor and send a signal to close the valve.
  2. Must be able to be tested to ensure that it functions.

- TAV’s constraint on the maintenance technicians:
  1. Replace the padlock on the IHLS after testing.
     Rationale: To prevent the test lever from falling or being left in the test position, which would inhibit the functioning of the trip in the event of a real high level.

- Intent Specification - common basis for communication
- Could have changed design to avoid this constraint
Conclusions

- CAST highlights organisational design flaws
- Safety Guided Design facilitates communication between, customer, integrator and component suppliers
Thank you

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