Health and Safety
Executive

HSE

Buncefield Focus Group

Work Group 4 Design and Maintenance

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UKOPA/06/0056

WG4 Sub groups 1 & 2 Scope

- WG4/1 Site Layout,Separation,Tanks, Bunds,Pipelines,Loading Facilities
- WG4/2 Control and Safety Systems,Valves,Control of Ignitions, Inspection,Test,Maintenance

Plant Design -Site Layout

- Separation distances
- Bunds Design and Construction
- Secondary containment
- Loading /Unloading Facilities

Plant Design -Tanks

- Tank Design and Construction Standards
- Clear Identification
- Safe Working Capacity
- Safety Margins
- Response Times for flow rates
- Condition Monitoring
- Independent inspection/Verification

Plant Design Issues -Valves

- Isolation Valves Firesafe?Inside Bund?
- ROSOV'S fitted on each tank?
- Valves leak tested?Frequency?
- Control and Trip function on same valve?
- Valve type-suitable for tight shut off?
- Failure rate known for reliability SIL calc?
- Test records and fault codes records?
- Valve position remote indication

Product Receipt Control (+WG3)

- Receipt Planning Procedures
- Tank and route plan
- Manual or systems control
- Transfer flow/tank level comparison
- Safety interlocking software alarms/trips
- Communications with Supplier/pipeline
- Communications with other operators

Product Transfer Control (+WG3)

- Flow Measurement
- Pipeline/Product/Route
- Receiving tank ID
- Cross checking Flow/level via SCADA
- Level monitoring in Tanks not filling
- Valve position detection and indication
- Who has overall control to stop/divert

Tank Level Measurement

- Level Indication method
- Level Display
- Tank Gauging Systems
- Control Room Information systems
- High Level alarm detection method
- High Level alarm signalling
- High level alarm –Response required?

Tank Overfill Protection Systems

- Design standard API 2350/IP Code Pt 2?
- Independent High High level detection
- System reliability? SIL3 REQUIRED (?)
- Type of instrument ,Failure Modes?
- Trip and Alarm function
- Direct connection to trip the valve?
- Human Intervention required to trip/divert
- Manual or other ESD systems

Incident Mitigation

- Leak Detection systems
- Bund sump level detection
- Gas Detectors
- CCTV
- Pipeline leak detection mass flow comparison
- Fire detection and fighting

Control of Ignitions

- DSEAR June 2006
- Area Classification
- Certified EX equipment
- Electrical and Mechanical to ATEX
- Mechanical ignition risk assessment
- Earthing and Bonding of all plant
- Ex equipment register and maintenance

Safety Instrumented Systems

- BS IEC 61511 Functional Safety of SIS
- SIL Assessed –SIL3 for extreme hazards
- Proof testing to comply with design calcs.
- Function testing of complete loop
- Records of tests and faults
- Testing of devices by immersion/physical method.
- Raising tank levels not recommended

BS IEC 61511 Good Practice

- Safety management system
- Functional safety assessment
- Independent audit
- Allocation of responsibilities
- Competence requirements
- System Performance Evaluation
- No overides on SIL 3 systems
- Human Factors assessment