Preventing Fires & Spills from Tank Overflow

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SALLYANNE OFNER
LEVELESE, INC.

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Overfill Has Caused Great Fires with Great Loss of Life & Property

- Molassas & Alcohol Boston, 1919
  - Overfilled
  - Killed 21

- Gulf Oil Refinery, Philadelphia, 1975
  - Hi Alarm & Gauging Failure
  - 8 firemen killed, Closed for a year

- Buncefield terminal, 2005
  - Gauge & Alarm Failure
  - Resulted in revised Codes

Philadelphia Gulf Refinery Fire

- Tanker filling crude tank under bridge; overflowed into bunker
  - Vapors flowed over bunker to boiler 300 ft away
  - Flashed Back
  - Burned about a week
- Budget didn't permit purchase of a remote gauging/alarm interlock system in 1974
- Procedures were violated
  - Gauger did not observe procedures
  - Float alarms didn't interlock & shut off flow
- Results
  - 8 firemen lost
  - Primary highway entrance to Phila closed for several months
  - Refinery closed months with lost production

Buncefield UK - 2005

- Unattended product terminal
- Overfill for hours from pipeline
- Gauge failed to indicate level rise for 2 hours
- Hi alarm switch failed
- Vapor cloud flowed over bunkers to ignition
- Triggered revised standards for independent level measurement & shutdown systems
  - NFPA 30
  - API 2350

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Which Standard

- NFPA-30 when
  - Tanks have 1320 gallons or less
  - Single tank
  - Indoor

- API 2350 when
  - Tanks contain more than 1320 gallons
  - Tanks are filled from a pipeline
  - Multiple tanks in close proximity

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API 2350

Management System Overfill Prevention Process

- Formal Risk Assessment: Individual & Overall
- Formal written operating procedures and practices with safety and emergency response
- Trained & qualified personnel
- Functional equipment
- Scheduled inspection and maintenance programs for instrumentation
- Systems to address both normal and abnormal conditions
- Management of change process
- A system to deal with overfill near misses and incidents
- A system to share lessons learned

API 2350 Detail

Categorize each vessel's overflow risk

- Category 1 Manual

- Category 2 Sensor + Alarms Notify Operator

- Category 3 Redundant Sensors & Alarm
  - Notifies Operators
  - Shuts Off Flow

- Category 4 Automatic Shutoff

More Fuel Tanks in Buildings for Backup Power

- Often in basements or on rooftops
  - Some have overflowed
- NFPA 30 21.7 calls for
  - Audible & visual alarm at 90% full
  - Shutoff at 95%
- System strategy:
  - Monitor continuous level
  - Shutoff w/monitor + Independent

Fuel Tanks in Buildings for Backup Power

- Often in basements or on rooftops
  - Some have overflowed
- NFPA 30 for >1320 Gal Tanks
  - Independent sensor/alarms
  - Audible & visual alarm at 90% full
  - Shutoff at 95%
- System strategy:
  - Monitor continuous level
  - Shutoff w/monitor + Independent

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Types of Level Shutoff Point Level

- Capacitance/RF
- Displacement
- Float
- Pressure
- RADAR
- Thermal
- Ultrasonic







Overflow Is Easy To Prevent

- Pays for itself in lower insurance rates
- Follow standards
- Plan protection
- Use Reliable, Redundant Sensing
- Integrate into a reliable interlock system

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Prevent This