PROCESS SAFETY MANAGEMENT PROGRAMS
– Regulator (OSHA) Approach

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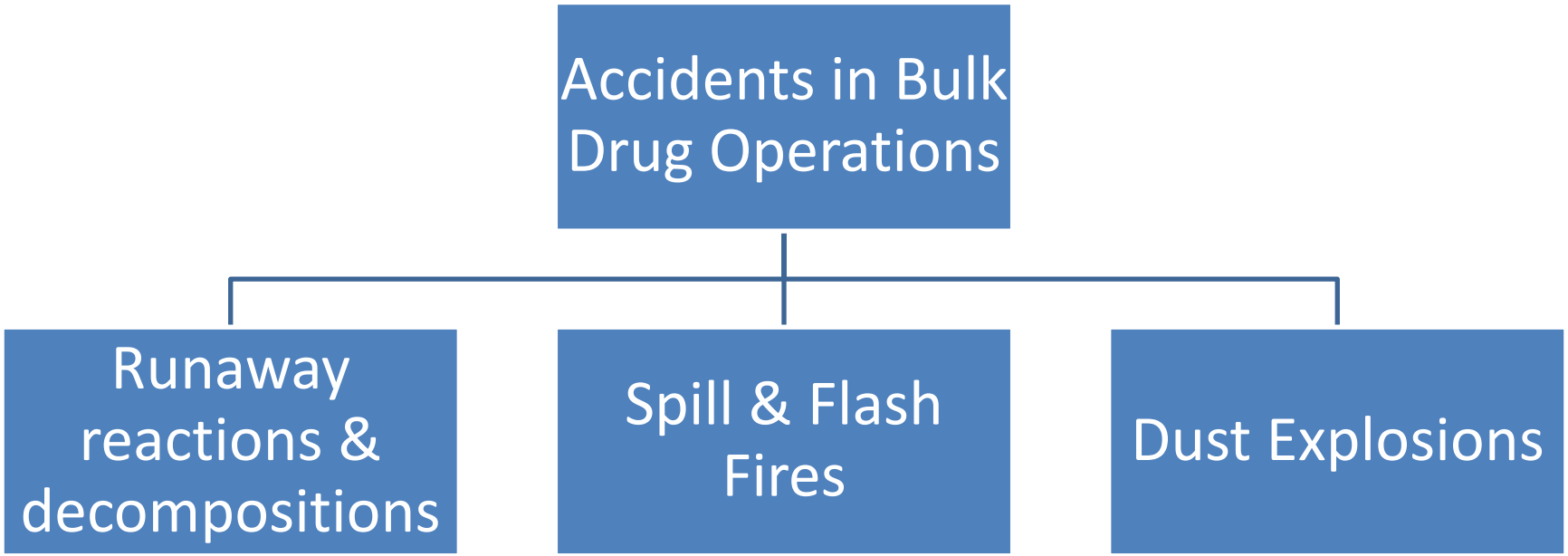
Indian Bulk Drug & Pharma Losses



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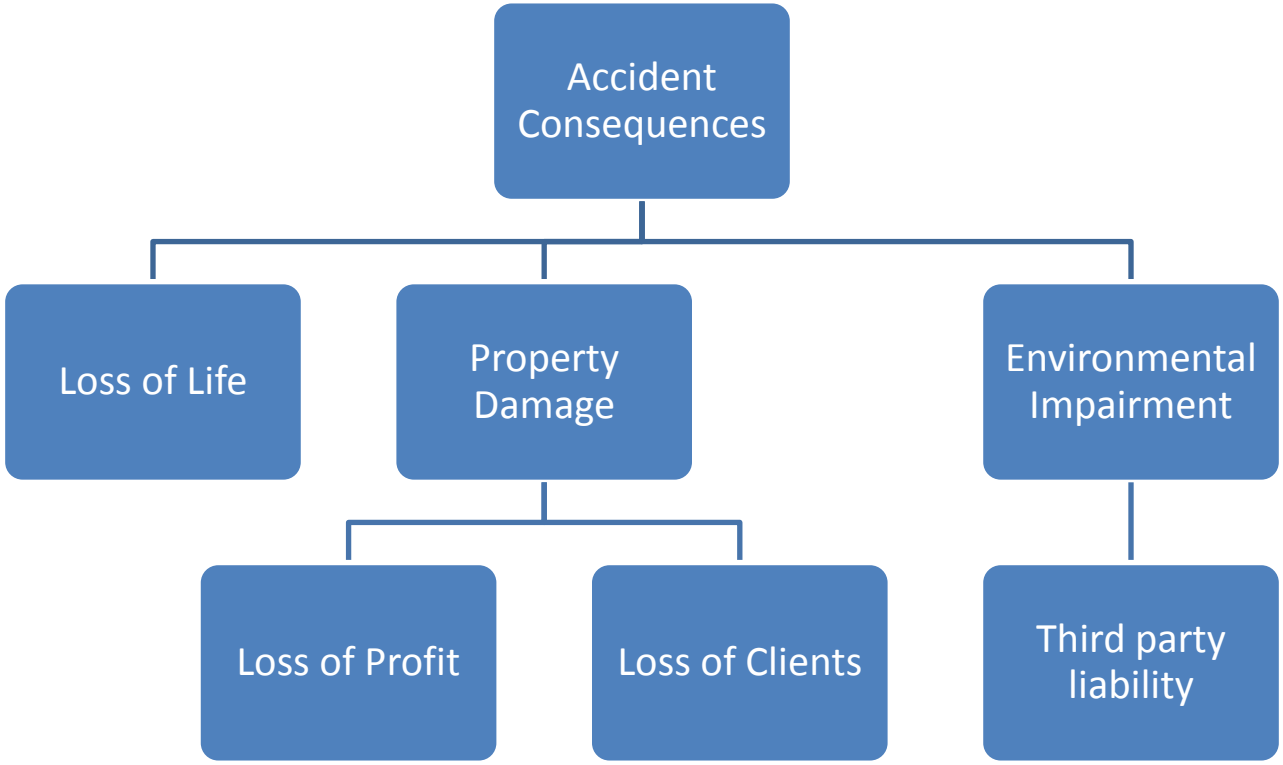

PROCESS SAFETY MANAGEMENT PROGRAMS – Regulators Approach

To address the risks relating to process plant, in U.S., Regulators (OSHA) (Occupational Safety and Health Administration) have zeroed on to following process safety management elements.

PROCESS SAFETY MANAGEMENT PROGRAMS – Regulators Approach

Process Safety Information

- MSDS
- Differential Scanning Calorimetry (DSC)
- Differential Thermal Analysis (DTA)
- Accelerating Rate Calorimetry (ARC)
- Reaction Calorimetry

Process Hazard Analysis

- HAZOP
- "What-If" Analysis
- Consequence Analysis
- Fault Tree

Employee Participation

- Research scientist
- Project professionals (Engineers)
- Manufacturing Chemist
- Maintenance
- Cross functional team for new technology transfer

PROCESS SAFETY MANAGEMENT PROGRAMS – Regulators Approach

Training & Contractor Safety

- Initial Training
- Refresher Training
- Documentation
- Evaluation & Training of specific work of contractor

Venting, Inerting & Relieving

- Vent & Dump tank sizing of Pressure relieving devices
- Explosion Panel Venting of Dryers
- Scrubbing of toxic chemicals
- Inerting of hazardous atmospheres

Mechanical Integrity

- Quality assurance program of mechanical integrity of equipments
- Periodic Inspections
- Routine maintenance procedures

PROCESS SAFETY MANAGEMENT PROGRAMS – Regulators Approach

Procedural Controls	• Management of Change for Process & Equipments • Permit Systems • Incident Investigation • Near miss investigations
Emergency Plan	• Scenario based plan using consequence modeling through accepted software like PHAST • Resource allocation & mock drills
Business Continuity Plan (BCP)	• Selection of team for creating BCP • Scenario based business continuity plan • Periodic review & updates

Runaway decomposition during hydrolysis

An intermediate compound after undergoing nitration was hydrolyzed and left in an atmospheric storage tank with vent open.

Suddenly the pressure started building up inside the vessel

Plant Personnel ran away

The explosion ripped through the plant **demolishing the brick walls**

The cause appears to be **run away decomposition**.

Run away decomposition during vacuum distillation

The plant was carrying out vacuum distillation of an intermediate

Suddenly the pressure surged and major explosion ripped through the plant.The reactor top vent through the roof and fell 500 meters away from the unit

The **plant conducted RSST study which indicated that the residue had a tendency to decompose so rapidly that theoretically within a minute a temperature of 6000 C can be obtained**

If a study would have been conducted prior to technology transfer this could have been avoided

Concluding Remarks

- The elements mentioned are critical to create safe working conditions. Experience shows if the top management do not actively participate in developing safety culture accidents do occur in regular frequencies. For a continued business operation it is essential that the top management regular involvement in safe operation of the plant.