Process Safety and Risk Management

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The DuPont Approach to Managing Process Safety Risk

Four Key Steps involving PSM applied to all Manufacturing Operations on a Global Basis:

1. Establishing a safety culture
2. Providing management leadership and commitment
3. Implementing a comprehensive PSRM program
4. Achieving operating excellence through operational discipline

Process Safety and Risk Management

Concept:

Application of management controls to hazardous processes and operations in a way that hazards are identified, understood, and controlled so that process-related injuries and incidents can be eliminated.

Focuses on These Resources:

- Technology
- Facilities
- Personnel

Process Safety and Risk Management Model

Auditing

Process Technology

Operating Procedures and Safe Practices

Emergency Planning and Response

Management of Change

Management of Change

Incident Investigation and Reporting

Process Hazards Analysis

Contractor Safety and Performance

Training and Performance

Quality Assurance

Management of "Subtle" Change

Prestart-Up Safety Reviews

Mechanical Integrity

General Aspects of PSM

- Application of the global PSM model for two main types of manufacturing/operations within each process and site
  - Higher Hazard Processes (HHP)
  - Lower Hazard Operations (LHO)
- Integrated system to identify, manage and reduce process related hazards and risks
- Basic platform to assimilate other SHE needs and issues related to process operations (one system vs five)
- A highly effective method to manage change across manufacturing and R&D
- A tool to achieve and maintain regulatory compliance

Technology Spokes

- Process Technology
  - Hazards of materials
  - Process Design Basis
  - Equipment Design Basis
- Process Hazards Analysis
  - New or modified Facilities
  - Baseline and cyclic PHA's which include consequence analysis and layers of protection
  - Human factors, facility siting, ISP
- Operating Procedures and Safe Work Practices
  - Detailed Operating procedures and standard conditions
  - Specific work practice requirements
    - Work Permits
    - Alarm and interlock bypasses
    - Integrity checks
- Management of Change
  - SHE implications of change
  - Trial Evaluation
  - Impact on hazards and technology

Facilities Spokes

- Mechanical Integrity
  - Maintenance Procedures
  - Testing and Inspection
  - Mechanic Training and Qualification
  - Reliability Engineering Analysis
  - Quality control for spare parts
- Quality Assurance
  - Bridge gap between design and initial installation
  - Detailed Equipment Specifications
  - Procurement, Evaluation, and Acceptance through field installation
- Pre Start-up Safety Review
  - Final checkpoint for new or modified equipment
  - Facility safe to operate IAW PSM req's
- Management of Subtle Change
  - Minor field changes not considered Replacement in Kind (RIK)
  - Appropriate review and authorization

Personnel Spokes

- Training and Performance
  - Basic Skills, knowledge, job task focus
  - Ability to conduct tasks IAW operating procedures and process technology
  - Refresher training and skill demo
- Contractor Safety
  - Selection based on past performance
  - Contractor qualifications and training
  - Knowledge of hazards and controls
  - Field Auditing
- Incident Investigation
  - Standard reporting and investigation of incidents
  - Detailed root cause failure analysis with systemic key factors
  - Tracking and communicating findings
- Management of Change - Personnel
  - Standard reporting and investigation of incidents
  - Detailed root cause failure analysis with systemic key factors
  - Tracking and communicating findings

Personnel Spokes (cont'd)

- Management of Subtle Change
  - Manage changes in line organization to maintain knowledge and expertise
  - Demonstrate competency within 90 days
- Emergency Planning and Response
  - Written procedures for emergency conditions (roles, communication, equipment)
  - Coordination with external resources
  - Routine exercises with critiques
- Auditing
  - 1st party site based PSM audit process to measure performance on 14 elements
  - 2nd party PSM audit procedures and scoring
  - Audit protocols and reporting/trending
  - Collection and tracking of recommendations

Operational Discipline

Leadership by example

Sufficient and capable resources

Employee involvement

Active lines of communication

Practice Consistent with Procedures

Strong teamwork

Common shared values

Up to date documentation

Absence of shortcuts

Excellent Housekeeping

Highly Toxic Materials (HTM) Management

- Separate HTM guardian teams for highly toxic materials - all global user sites
- Special focus to ensure absolute consistency in handling our most hazardous toxics (combination of acute toxicity and high vapor pressure)
- Individual Guardian Manuals - prescriptive reqs on HTM safety technologies, procedures, and materials
- Separate 2nd party audit process (3 yr frequency)
- Guardian team Leaders participate on external industry groups where they exist (e.g. ACC phosgene panel , HCN users group)
- Also includes a Transportation Risk Assessment methodology

DuPont Highly Toxic Materials

- Anhydrous Hydrogen Fluoride
- Anhydrous Hydrogen Chloride
- Phosgene
- Hydrogen Cyanide
- Oleum/sulfur trioxide
- Methylamines
- Titanium tetrachloride
- Fluorosulfonic acid
- Anhydrous ammonia
- Perfluoroisobutylene
- Chlorine
- Sulfur Dioxide
- Methyl Chloroformate
- Butyl isocyanate

DuPont PSM Intranet Website - Tools, Better Practices, Training

Product Stewardship

Process Safety Management

Fire Protection Management

Distribution

Community Awareness

Emergency Response

Leadership Team/Networks

PSM Elements

PSM Performance and Metrics

Process Incidents and Key Learnings

Knowledge Sharing, Training and Education

Inherently Safer Processes and Technology

EPA Risk Management Program (RMP)

Highly Toxic Safety Guardian Committees and Toxic Material Manuals

Other PSM Links

SHE Auditing
SHE Training

Information Management Tools

Responsible Care®

SHE Excellence Center

LEGAL
MSDS Central
SHE Managers
SHE Performance Updates
SHE Newsletter

PSM Incident Reporting

- Mandatory internal incident classification and reporting standard (global)
- Evaluation and scoring process for PSM related incidents
- Three main categories of PSM incidents which also dictate internal reporting
- Category A and B incidents are corporate performance measures; Category C are used for trends/key learnings

Category A - 130 points or more	**CEO reporting - w/in 24 hrs**
Category B - 75-125 points	**Corporate reporting - w/in 72 hrs**
Category C - 50-70 points	**Corporate reporting** - when report is completed

Classification (Scoring) Model

- Ten (10) key parameter with Scale of 0-220 pts
- Site and business is accountable to score and report
- Automatic Category A criteria (injuries, off site, $'s)
- Incident Investigation team random review of incidents for proper evaluation (15%)
- 2nd party audits also evaluate incidents/scoring
- Incident scoring parameters include:

Type of material (hazard)
Quantity released
Potential quantity
Degree of control
Functionality of safety devices
Actual on site impact
Potential on site impact
Actual off site impact
Potential off site impact
Monetary impact

Corporate PSM Metrics

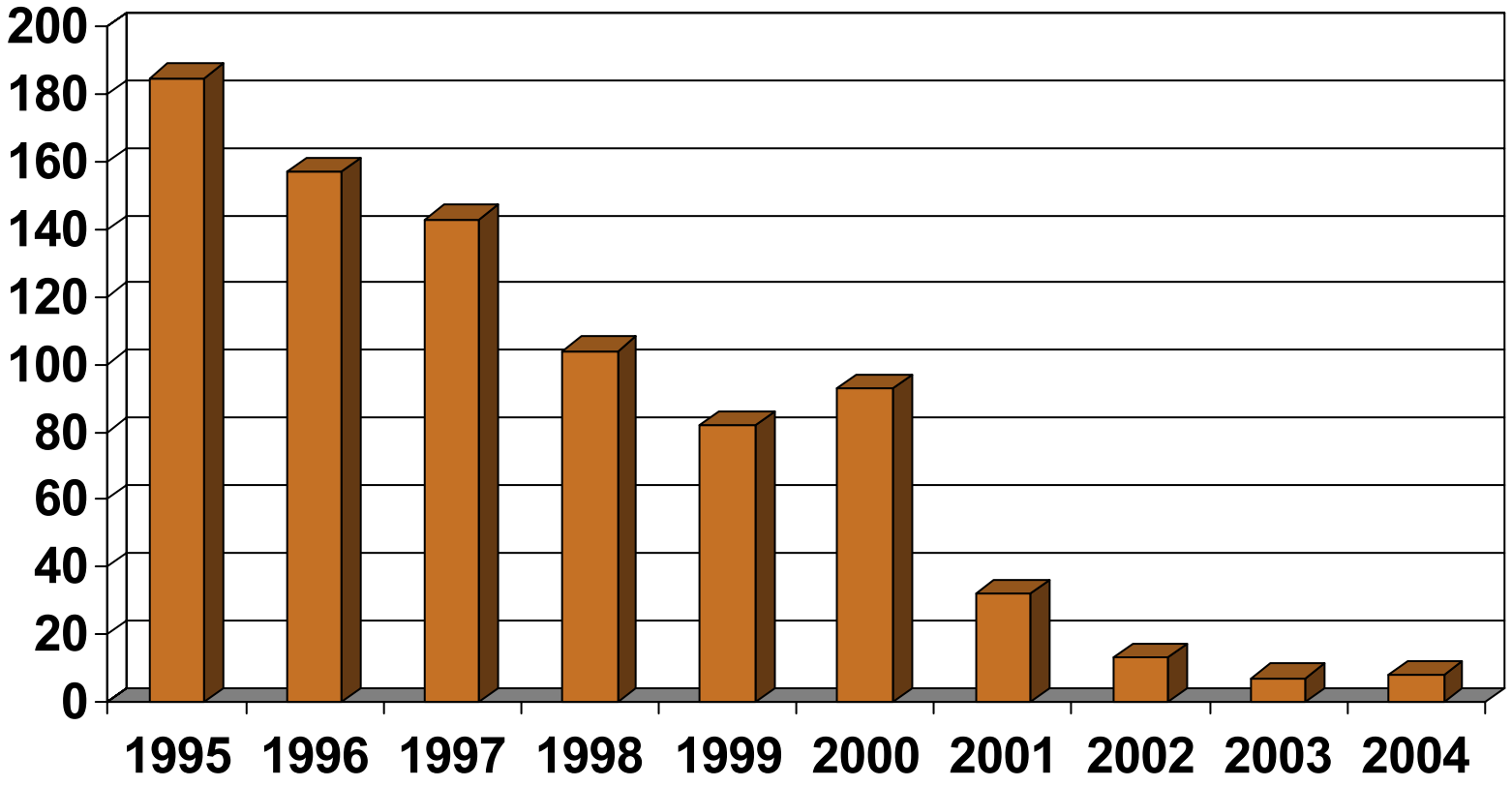
Lagging/Trailing

- Number of Category A and B PSM incidents
- Number of process related LWC's
- Elements of PSM requiring improvement in reported incidents
- Costs associated with PSM incidents

Leading

- Second Party PSM Audits completed vs schedule
- Trends in scores of PSM audits (composite and by element)
- HTM Audits completed vs schedule
- Open and overdue 2nd party audit recommendations (data reporting every 6 months)
- Category C incident trends
- Completion of PSM Network COT's (annual)
- Status of integration plans/goals for new acquisitions
- Review and revision of internal standards per schedule

RECENT HISTORY - PROCESS INCIDENTS (75 points or more)



PSM is a Journey, not a destination, focused on continuous improvement risk reduction, and injury prevention !