

Process Safety Performance Improvement Journey

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Purpose

The purpose of this presentation is to

- **review the process applied**
- **highlight the improvement areas identified**
- **discuss the future plans to expand this effort in a broader industry**

Agenda

- **Who is Air Products ?**
- **Air Products Total Safety Philosophy**
- **Process Safety Performance monitoring**
- **Process Safety Event (PSE) Data Analysis**
- **Trends**
- **Major improvement areas in hardware and operation**
- **Ongoing and future plans**

Who Is Air Products?

- **Global atmospheric, process and specialty gases, performance materials, equipment and services provider**
- **Serving industrial, energy, technology and healthcare markets worldwide**
- **Fortune 500 company**
- **Operations in over 50 countries**
- **21,200 employees worldwide**
- **Known for our innovative culture and operational excellence**
- **Corporate responsibility commitment**



Who Is Air Products?

- **Plants and equipment range from small cryogenic customer supply systems, to large air separation plants, to large H₂/CO production plants, to large chemical plants, and very large energy plants.**
- **Air Products also produces plants and equipment for sale plus operates customer-owned equipment and plants via operate and maintain service offerings.**
- **The company manufactures or handles several hundred different hazardous materials.**
- **The scope and size of these major business areas and many other minor activities makes the Process Safety Incident & Near Miss program challenging to manage.**



Air Products Total Safety Philosophy [1975]

- Nothing is more important than safety...not production, not sales, not profits.
- All accidents and injuries are preventable...not inevitable.
- Safety is a management responsibility...and safety can be managed.
- Safety is an individual responsibility...and a condition of employment.
- Safety is a way of life...around the clock.

Process Safety Performance monitoring

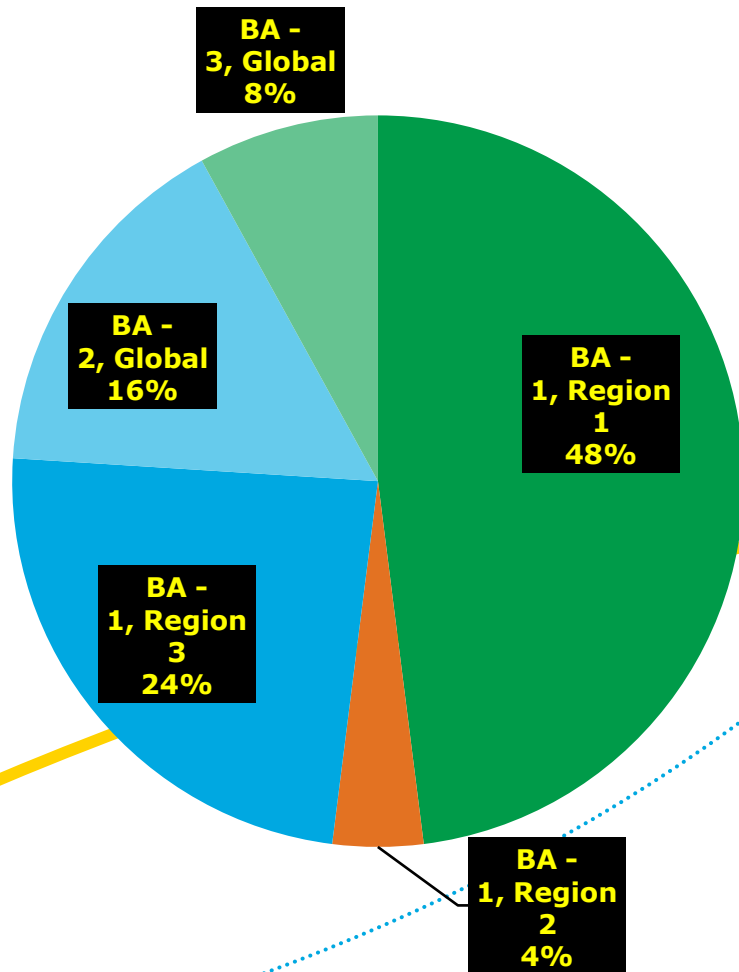
- **The company began monitoring its process safety performance in 2007, initially using CCPS Process Safety Metrics**
- **The API-754 metric system was applied from 2010**
- **Tier 1, Tier 2 and Tier 3 process safety incidents continue to be reported and analysed and trends are identified**

Process Safety Event (PSE) Data Analysis

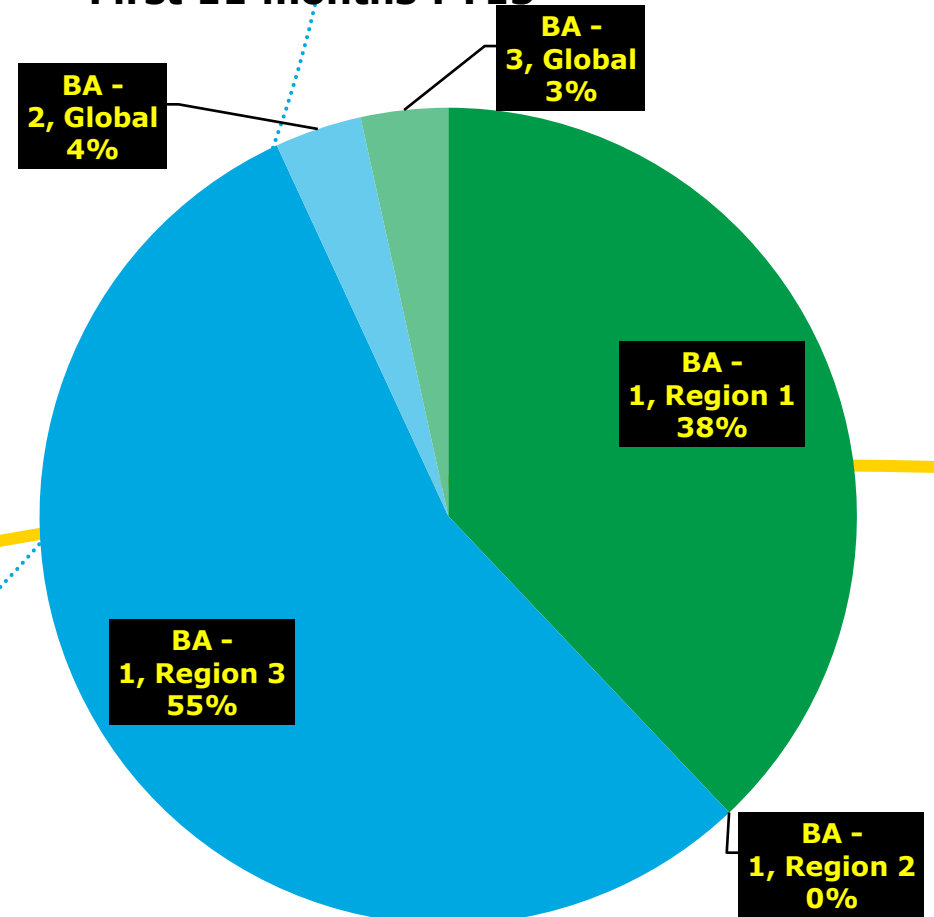
- **Following the 2014 corporate restructuring, Air Products PSE are now analyzed**
 - at the global level
 - at the major Business Unit (BA) level
 - at regional level (Americas, Europe/Middle East/Africa, Asia) where appropriate
- **Data Trends are analyzed -some examples:**
 - KPI numbers and severity
 - KPI trends by plant technology
 - KPI incidents which have resulted in injuries
 - KPI incidents which have resulted in fires
 - Quantity of hazardous material which has been released in the incidents
 - Themes in hardware and operation involved

Business/Regional trends

Total KPIs by business - First 11 months FY15

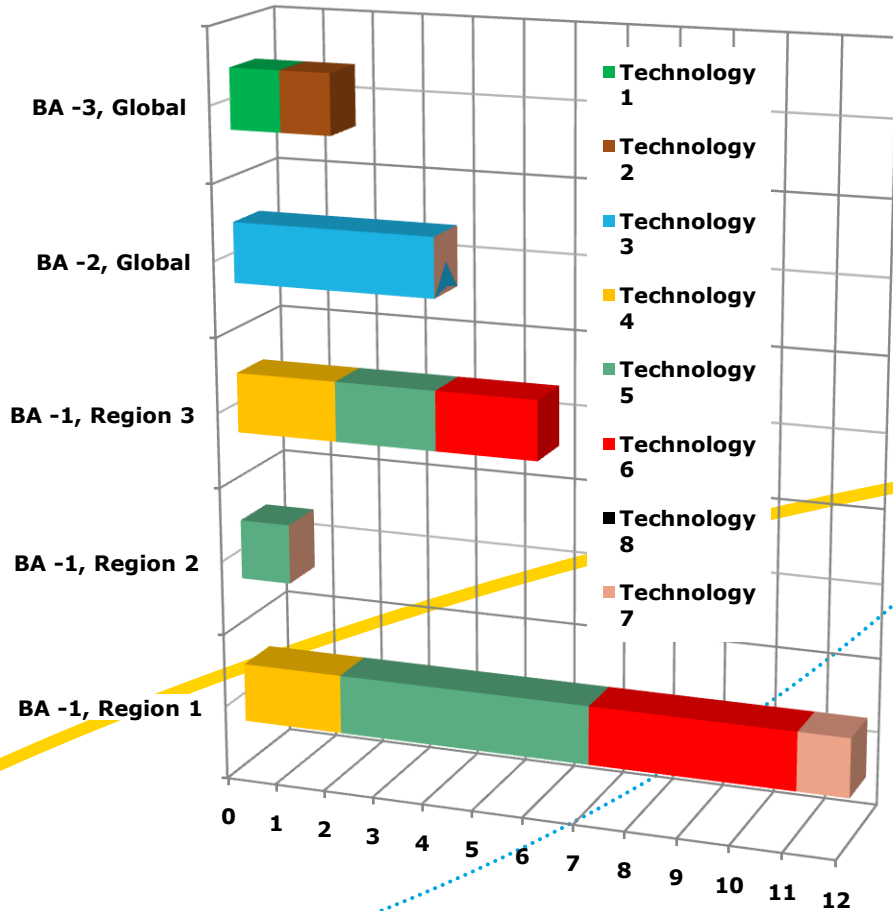


Total severity points by business - First 11 months FY15

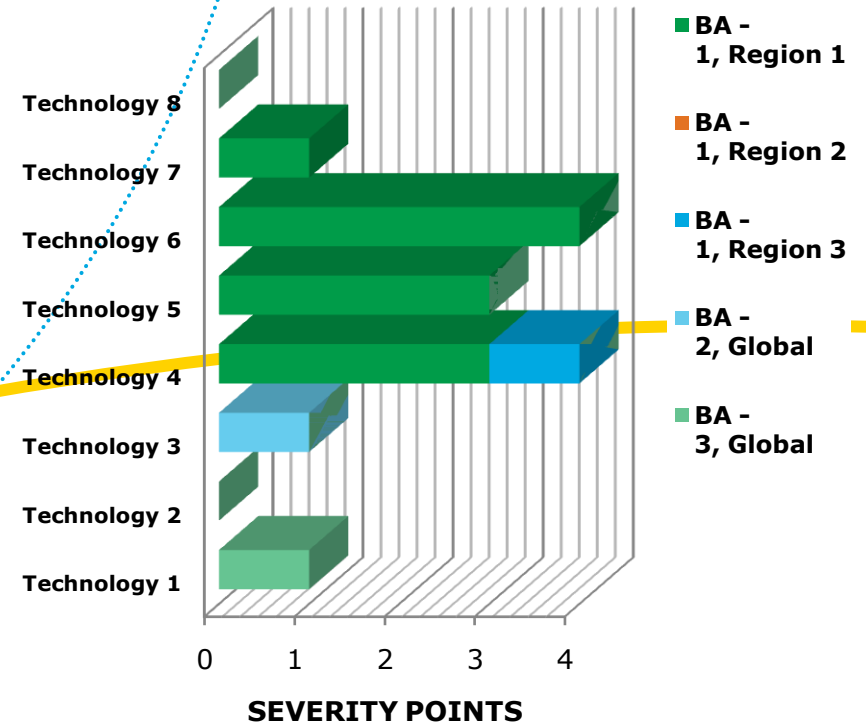


Business/Technology trends

First 11 MONTHS FY15 - Process Safety KPIs by Business Area / Technology



First 11 MONTHS FY15 - Severity points by business



Major improvement areas in hardware and operation identified through trends

Top 8 themes involved in Tier 1 and 2 KPI incidents over a 6 years period

- Valve put into wrong position 15%
- Pipework leakage/rupture 15%
- Hose /hose connection related 10%
- Vessel overfill/overflow/venting 9.5%
- Other valve problems 5.1%
- Flammable/toxic gas compressors 4.3%
- Pumps 4.3%
- Oil fires 3%
- *Other which were difficult to categorize into common themes* 33.8%



Ongoing and future plans

- **Internal**

- **Focussed mechanical integrity improvement programs, improved procedures and operational discipline, design and safeguard improvements, as appropriate to each theme**

- **External industry**

- **Process Safety Task Force in the industrial gas industry formed**
- **Developing common industry Process Safety Event (PSE) database for industry trend analysis and improvement programs**
- **Identifying areas for improved standards in the industry**
- **Active participation in CCPS, IPSG and other industry Process Safety bodies**

Thank you
tell me more