OVERVIEW OF INHERENT SAFETY AND SECURITY

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OUTLINE

- Big picture
- Management systems
- Meaning of inherent safety / security
- Role and importance of inherent safety / security
- Inherent safety / security and government legislation and regulations

“There are many ways of going forward, but only one way of standing still.”
Franklin D. Roosevelt
THE BIG PICTURE

- Safety and security are two *sureties* that companies must manage to stay viable
  - Along with profitability!
- All sureties should be addressed by a *management system*
## EXAMPLES OF MANAGEMENT SYSTEMS

<table>
<thead>
<tr>
<th>SURETY</th>
<th>SPECIFICATION</th>
<th>EDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental protection</td>
<td>ISO 14001</td>
<td>1996</td>
</tr>
<tr>
<td>Occupational health and safety</td>
<td>BSI OHSAS 18001</td>
<td>1999</td>
</tr>
<tr>
<td>Information security</td>
<td>BS 7799:2</td>
<td>2002</td>
</tr>
<tr>
<td>Pollution prevention, distribution, product stewardship, process</td>
<td>ACC Responsible Care® Management System (RCMS)</td>
<td>2003</td>
</tr>
<tr>
<td>safety, employee health and safety, security, and community awareness</td>
<td></td>
<td></td>
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<tr>
<td>and emergency response</td>
<td></td>
<td></td>
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<tr>
<td>Cyber security - chemical sector</td>
<td>CIDX</td>
<td>2004</td>
</tr>
<tr>
<td>Food safety</td>
<td>ISO 22000</td>
<td>2005</td>
</tr>
<tr>
<td>Occupational health and safety</td>
<td>ANSI Z10</td>
<td>2005</td>
</tr>
<tr>
<td>Control system security</td>
<td>ISA SP99</td>
<td>2006</td>
</tr>
</tbody>
</table>
SIGNIFICANCE OF MANAGEMENT SYSTEMS

ISO 14001 was in use by about 37,000 organizations in 112 countries in 2001.
KEY ELEMENTS OF SECURITY MANAGEMENT SYSTEMS

- Risk and vulnerability assessment
- Security measures and safeguards
- Security procedures
- Emergency response and crisis management
- Reviews, audits and inspections
- Etc.

SECUREGUARDS AND SAFEGUARDS

- Prevention
  - Inherent safety
  - Physical security
  - Information security
  - Computer security

- Control
  - Materials tracking, accounting and screening
  - Secure shutdown procedures

- Detection
  - Chemical releases
  - Monitoring process variables

- Mitigation
  - Chemical antidotes
  - Engineered safeguards
  - Emergency response

- Buffer zones
MEANING OF INHERENT SAFETY / SECURITY

- Ideally safety and security should be designed into a plant
  - “benign by design” approaches

- Inherent safety approaches reduce or eliminate process hazards
  - in ways that are permanent and inseparable from the design

- Inherent security approaches reduce or eliminate process threats and vulnerabilities in a similar way
# INHERENT SAFETY APPROACHES

<table>
<thead>
<tr>
<th>Method</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensification</td>
<td>Minimization of inventories of hazardous materials</td>
</tr>
<tr>
<td>Substitution</td>
<td>Replacement of hazardous materials with safer materials</td>
</tr>
<tr>
<td>Attenuation</td>
<td>Use of hazardous materials under the least hazardous conditions</td>
</tr>
<tr>
<td>Limitation</td>
<td>Changes in designs or conditions to reduce potential effects</td>
</tr>
<tr>
<td>Simplification</td>
<td>Reduction in process complexity to reduce the opportunity for error</td>
</tr>
<tr>
<td>Other means</td>
<td>Using designs that avoid potential domino effects</td>
</tr>
</tbody>
</table>
INHERENT SECURITY APPROACHES

- See afternoon presentation
ROLE AND IMPORTANCE OF INHERENT SAFETY / SECURITY

- Inherently safer approaches eliminate or reduce hazards
  - Using measures that are considered to be an integral part of the process
ROLE AND IMPORTANCE OF INHERENT SAFETY / SECURITY (CONT'D.)

- Traditional safety approaches add safeguards in layers after hazards have been identified
  - Often reduces the risk
    - But adds complexity, costs, and potential for unrecognized hazard scenarios
Application of inherently safer approaches does not necessarily eliminate the need for layered safeguards

Preferred first approach for managing risks from accidents

Same is true for inherent security
INHERENT SAFETY / SECURITY AND GOVERNMENT LEGISLATION AND REGULATIONS

- Regulators favor inherent safety / security approaches, e.g.
  - New Jersey, Best Practices Standards at TCPA / DPCC Chemical Sector Facilities November, 2005

- Inherently Safer Technology is a key element in both
SUMMARY

- Inherent safety / security makes sense
- Challenge is in implementation
- Prescriptive approach not likely to work
- Need performance-oriented, risk-based method

“The only real mistake is the one from which we learn nothing.”

John Powell
FURTHER INFORMATION

- Technical papers on safety and security:
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