MAJOR HAZARD INSTALLATION REGULATIONS

CLASSIFICATION AND MAJOR INCIDENT PREVENTION POLICY
ESTABLISHMENT vs INSTALLATION

- SITE CALLED ESTABLISHMENT NOW, NOT INSTALLATION
- ESTABLISHMENT MADE UP OF INSTALLATIONS ON THE SITE
- ESTABLISHMENT UNDER ONE BUSINESS MANAGEMENT
- ESTABLISHMENT IS COMPANY (e.g. AB Ltd.) OR ORGANISATION (e.g. MUNICIPALITY)
Establishment AB Ltd

Installation A
Production

Installation B
Storage and distribution
Pipe rack
CLASSIFICATION

CLASSIFICATION MUST BE DONE BY ORGANISATION (AIA CAN ASSIST)

• THREE MAJOR HAZARD LEVELS:
  • HIGH HAZARD ESTABLISHMENT
  • MEDIUM HAZARD ESTABLISHMENT
  • LOW HAZARD ESTABLISHMENT

• CLASSIFICATION BASED ON TOTAL MAXIMUM INVENTORY FOR EACH SUBSTANCE PRESENT ON THE SITE (NOT IN EACH CONTAINER)
CLASSIFICATION OF ESTABLISHMENT

- QUANTITIES IN TABLES ANNEXURES 1 AND 2
- ANNEXURE 1 - NAMED SUBSTANCES
- ANNEXURE 2 - LISTED SUBSTANCES
- EACH 3 COLUMNS OF QUALIFYING QUANTITIES:
  - COLUMN 3 < SITE QUANTITY → HIGH
  - COLUMN 2 < SITE QUANTITY < COLUMN 3 → MED
  - COLUMN 1 < SITE QUANTITY < COLUMN 2 → LOW
## Named Substance

### ANNEXURE 1 NAMED SUBSTANCES

<table>
<thead>
<tr>
<th>Substance</th>
<th>Ps</th>
<th>Dc</th>
<th>D</th>
<th>LOW</th>
<th>MEDIUM</th>
<th>HIGH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia anhydrous</td>
<td>pass</td>
<td>decompose</td>
<td>detonation</td>
<td>5</td>
<td>50</td>
<td>200</td>
</tr>
<tr>
<td>Ammonium nitrate (fertiliser NPK, Dc Ps-ND&lt;sub&gt;test&lt;/sub&gt;)</td>
<td>500</td>
<td>5,000</td>
<td>10,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ammonium nitrate (fertiliser LAN SAN Ps-ND&lt;sub&gt;test&lt;/sub&gt;)</td>
<td>125</td>
<td>1,250</td>
<td>5,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ammonium nitrate (Technical, PPAN, ANS&gt;80%)</td>
<td>35</td>
<td>350</td>
<td>2,500</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ammonium nitrate (Contaminated, fail ND&lt;sub&gt;test&lt;/sub&gt;)</td>
<td>1</td>
<td>10</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potassium nitrate (fertiliser prill, granules)</td>
<td>500</td>
<td>5,000</td>
<td>10,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potassium nitrate (fertiliser crystals)</td>
<td>125</td>
<td>1,250</td>
<td>5,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bromine</td>
<td>2</td>
<td>20</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chlorine</td>
<td>1</td>
<td>10</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## NAMED SUBSTANCES cont.

<table>
<thead>
<tr>
<th>ANNEXURE 1 NAMED SUBSTANCES</th>
<th>LOW</th>
<th>MEDIUM</th>
<th>HIGH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethylene-imine, Fluorine</td>
<td>1</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Formaldehyde ≥ 90%, Hydrogen</td>
<td>0,5</td>
<td>5</td>
<td>50</td>
</tr>
<tr>
<td>Hydrogen chloride (liquefied gas)</td>
<td>2,5</td>
<td>25</td>
<td>250</td>
</tr>
<tr>
<td>Hydrogen fluoride</td>
<td>0,5</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Liq&gt;&gt;flam gas LPG and natural gas</td>
<td>5</td>
<td>50</td>
<td>200</td>
</tr>
<tr>
<td>Acetylene</td>
<td>ethylene-</td>
<td>propylene oxide</td>
<td>0,5</td>
</tr>
<tr>
<td>Methanol</td>
<td>50</td>
<td>500</td>
<td>5,000</td>
</tr>
<tr>
<td>Methyl isocyanate</td>
<td>0,015</td>
<td>0.15</td>
<td>0.15</td>
</tr>
<tr>
<td>Oxygen</td>
<td>20</td>
<td>200</td>
<td>2,000</td>
</tr>
<tr>
<td>Toluene diisocyanate</td>
<td>1</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>Carbonyl dichloride (phosgene)</td>
<td>0,03</td>
<td>0.3</td>
<td>0.75</td>
</tr>
</tbody>
</table>
## NAMED SUBSTANCES cont.

<table>
<thead>
<tr>
<th>ANNEXURE 1 NAMED SUBSTANCES</th>
<th>LOW</th>
<th>MEDIUM</th>
<th>HIGH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulphur dichloride</td>
<td>0,1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Sulphur dioxide</td>
<td>0,5</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Sulphur trioxide</td>
<td>1,5</td>
<td>15</td>
<td>75</td>
</tr>
<tr>
<td>Polychlorodibenzo-furans and -dioxins</td>
<td>0,0001</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>CARCINOGENS concentration &gt;5% wt</td>
<td>0,05</td>
<td>0.5</td>
<td>2</td>
</tr>
<tr>
<td>Petroleum products: gasolines, naphtha's, kerosene's, gas oils</td>
<td>250</td>
<td>2 500</td>
<td>25 000</td>
</tr>
<tr>
<td>(including diesel fuels, heating oils, gas oil blends)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Substances Categories

## Annexure 2 Listed Substances

<table>
<thead>
<tr>
<th>Category</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Acute Toxic (R26, LC50 &lt; 100 ppm)</td>
<td>0,5</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Acute Toxic (R23, LC50 &gt; 100 ppm)</td>
<td>5</td>
<td>50</td>
<td>200</td>
</tr>
<tr>
<td>Oxidising Gasses (provides O₂ e.g. H₂O₂)</td>
<td>5</td>
<td>50</td>
<td>200</td>
</tr>
<tr>
<td>Flammable Liquid FP 23°C - 60°C</td>
<td>500</td>
<td>5 000</td>
<td>50 000</td>
</tr>
<tr>
<td>Highly Flammable, (pyrophoric)</td>
<td>5</td>
<td>50</td>
<td>200</td>
</tr>
<tr>
<td>Highly Flammable liquids, (Fp &lt; 23°C)</td>
<td>500</td>
<td>5 000</td>
<td>50 000</td>
</tr>
<tr>
<td>Extremely Flammable (FP&lt;0°C, BP&lt;35°C)</td>
<td>1</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>(a) Very toxic to aquatic organisms</td>
<td>10</td>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td>(b) Toxic to aquatic organisms, cause long term adverse effects</td>
<td>20</td>
<td>200</td>
<td>500</td>
</tr>
<tr>
<td>(a) Reacts violently with water e.g. Na, K</td>
<td>10</td>
<td>100</td>
<td>500</td>
</tr>
<tr>
<td>(b) In contact with water, liberates toxic gas</td>
<td>5</td>
<td>50</td>
<td>200</td>
</tr>
</tbody>
</table>
SMALL QUALIFYING QUANTITIES

- IF NO INDIVIDUAL SUBSTANCE COMPLY IN ANNEXURE 1 & 2 THEN:

  - AGGREGATE: \( \sum_{i=1}^{n} \frac{Q_i}{Qui} \)
  
  - Qi - QUANTITY OF MATERIAL
  
  - Qui - QUALIFYING QUANTITY ANNEXURE 1 &2

- IF \( \sum_{i=1}^{n} \frac{Q_i}{Qui} > 1 \) THEN EITHER LOW, MEDIUM OR HIGH ESTABLISHMENT
EXAMPLE: SMALL QUANTITIES

- Site installations: Ammonia 40, Sulphur dioxide 3, Chlorine 2, Diesel 1500 tonnes
- Hi-mhe? → NH₃ 40<200, SO₂ 3<20, Cl₂ 2<25, Diesel 1500<25000. ∴ Not Hi-mhe
- Aggregate: 40/200+3/20+2/25+1500/25000 = 0.49<1. ∴ Not Hi-mhe
- Med-mhe? → NH₃ 40<50, SO₂ 3<5, Cl₂ 2<10, Diesel 1500<2500. ∴ Not Med-mhe, but see next..
- Aggregate: 40/50+3/5+2/10+1500/2500 = 2.2 >1. ∴ Confirmed Med-mhe
INSIGNIFICANT QUANTITIES

• 2% RULE: IF QUANTITY OF SUBSTANCES IS SMALL, INSIGNIFICANT, IT CAN BE IGNORED WHEN DECIDING HIGH, MEDIUM OR LOW ESTABLISHMENT, PROVIDED BOTH:
  a) QUANTITY LESS THAN 2% OF QUALIFYING
  b) CANNOT INITIATE A MAJOR HAZARD

• IF SITE MHE DUE TO OTHER SUBSTANCES, MUST INCLUDE SMALL QUANTITY SUBSTANCES IN THE QRA
NEED TO CLASSIFY HIGH, MEDIUM OR LOW

- Total methanol = 200+3+5+295 = 503 tonnes
- Medium mhe qualification = 500 tonnes; Site Medium mhe
- Column & reflux drum together, treat as one
- Far apart from tanks, cannot create major hazard on tanks
- \((3+5)/500 \times 100 = 1.6\% < 2\% \) \: Can ignore distillation
- Then 200+295 = 495 < 500 \: Not Medium mhe
- \: Classify as Low mhe
PIPLINES - CROSS COUNTRY

• PIPELINE ANY SIZE OR CONSTRUCTION MATERIAL

• UNDERGROUND IN A TRENCH

• CLASSIFIED PIPELINE ALWAYS A HIGH HAZARD ESTABLISHMENT
PIPELINES – ACROSS FENCE

- PIPELINE FROM ONE ESTABLISHMENT TO ANOTHER VIA PUBLIC AREA
MAJOR HAZARD PIPELINE

- FLUID FLAMMABLE i.e. FP < 60°C e.g. ether
- BOILING POINT < 5°C at ATMOSPHERE e.g. LPG
- FLAMMABLE GAS LEL P > 8 BAR e.g. NATURAL GAS
- FLAMMABLE LIQUID, LIQ-GAS MIX VP >1.5 bara AT 20°C OR $T_{Liq}$ e.g. CRUDE OIL
- TOXIC OR VERY TOXIC FLUID AT 20°C, 1 bara, and LIQUID OR GAS e.g. AMMONIA
• TOXIC LIQUID AT 20°C VP > 0.4 bar
• VERY TOXIC FLUID AT 20°C VP > 0.001 bar, OR LIQUID AT P > 4.5 bara
• OXIDISING LIQUID e.g. H₂O₂, LO2
• FLUID REACTING VIOLENTLY WITH WATER e.g. SULPHURIC ACID
• ACRYLONITRILE
• CARBON DIOXIDE
• PETROL
CLASSIFICATION SUMMARY

• IDENTIFY HAZ MATERIALS (SUBSTANCES)
• DETERMINE TOTAL QUANTITY OF EACH
• IF NAMED, LARGE INVENTORIES, APPLY ANNEXURE 1 FOR HIGH, MEDIUM AND LOW
• NOT NAMED, LARGE INVENTORIES, APPLY ANNEXURE 2 FOR HIGH, MEDIUM AND LOW
• SMALL INVENTORY, NO QUALIFICATION, DO AGGREGATION TEST TO SEE IF CAN IGNORE
• INSIGNIFICANT QUANTITY, NO QUALIFICATION, DO 2% RULE, SEE IF CAN IGNORE IN TOTAL
TECHNICAL REQUIREMENTS

- **HIGH (NEED LICENCE TO OPERATE)**
  - SAFETY REPORT
  - MAJOR INCIDENT PREVENTION POLICY
  - QUANTITATIVE RISK ASSESSMENT
  - EMERGENCY PLAN

- **MEDIUM**
  - MAJOR INCIDENT PREVENTION POLICY
  - QUANTITATIVE RISK ASSESSMENT
  - EMERGENCY PLAN

- **LOW**
  - QUANTITATIVE RISK ASSESSMENT
  - EMERGENCY PLAN
MEDIUM HAZARD

INSTITUTE A MAJOR INCIDENT PREVENTION POLICY:
• AIMS + PRINCIPLES + COMMITMENT+ ACTIONS TO CONTROL MAJOR INCIDENT HAZARDS
• SAFETY MANAGEMENT SYSTEM IN PLACE
• ORGANISATIONAL STRUCTURE SENIOR MANAGEMENT Endorsed
• ROLES AND RESPONSIBILITIES DEFINED
• TRAINING NEEDS IDENTIFIED
• PRACTICES AND PROCEDURES IN PLACE
• RESOURCES AVAILABLE TO IMPLEMENT POLICY
• PEOPLE PERFORMANCE MEASURED, ACCOUNTABLE
• WORKER INVOLVEMENT
MAJOR ACCIDENT PREVENTION POLICY

Costain recognises that some of its activities are associated with major accident or process safety risks to people, the environment and its business; we are committed to managing our activities in design, construction, operation and maintenance of facilities such that all reasonably practicable measures are taken to prevent major accidents and to limit their consequences to people and the environment. Our approach has four focus areas:

1. Process safety leadership (mindful leadership)

We will ensure that sufficient resources and personnel are in place to manage the potential major hazards of our operations effectively, allocating roles and responsibilities; we will identify competence requirements, then train or recruit suitable personnel and monitor their performance.

Costain's directors and managers will demonstrate commitment by upholding this policy in practice whilst engaging the workforce on the subject of major accident prevention in a two-way process. Similar communication processes will be developed with stakeholders including clients, neighbours, competent authorities and partners.

We will have a process to identify regulatory and other industry requirements and to verify compliance with these.

2. Risk identification and assessment

We will systematically identify and evaluate risk, and limit the consequences of major hazards associated with our activities, or the equipment and schemes we design, in both normal and abnormal conditions. This will also cover data and physical security.

We will adopt a hierarchical approach to risk reduction, starting with inherent safety, ensuring that measures are put in place to render the risks as low as reasonably practicable and that these are recorded so that the risks are clearly understood by management, clients and other stakeholders.

3. Risk management

We will develop procedures and systems of work, which allow safe and sufficiently secure design, construction, operation and maintenance of assets. This includes identifying and operating within safe limits and routine inspection and maintenance of safety-critical equipment.

We will manage any changes to facilities, structures, organisation, systems and procedures to ensure the continued effective control of major accident hazards, in particular assessing readiness for equipment safe start-up, temporary works or temporary conditions.

We will apply a systematic process to identify foreseeable major emergencies and prepare, test, review and update emergency plans to control major accidents.

4. Review and improvement

We will monitor the effectiveness of the SHE management system in achieving the objectives of this policy by the reporting of process safety performance indicators. This will include reporting, investigating and learning from major accidents, near misses and non-compliances and ensuring that any identified improvements are suitably prioritised, scheduled and progressed.

We will arrange for periodic, systematic audit of the continuing effectiveness of the Costain SHE management system in delivering this policy, recording any findings and implementing changes as necessary.

Signed: ..................................................  Date: 6th February 2015

A Wyllie (Chief Executive Officer)
SAFETY MANAGEMENT SYSTEM

- IDENTIFICATION AND EVALUATION OF MAJOR HAZARDS i.e. LIKELIHOOD + SEVERITY (RISK ASSESSMENT)
- PROCEDURES FOR SAFE OPERATION, CONTRACTORS
- MAINTENANCE SYSTEM, INTEGRITY ASSURANCE
- MANAGEMENT OF CHANGE (MODIFICATIONS)
- EMERGENCY PLANS i.e. prepare, test and review
- MONITORING PERFORMANCE
- AUDITS AND REVIEWS OF EFFECTIVENESS
END

MAJOR HAZARD ESTABLISHMENT CLASSIFICATION AND MAJOR INCIDENT PREVENTION POLICY