Risk Management & Crisis Management

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The history of the safety policy

- Industrial revolution (1769)
- Titanic disaster (1912)
- IT revolution (1943)
- TMI accidents (1979)
- HOFE capsize (1986)
- Great East Japan Earthquake (2011)
- COSTA Concordia grounding (2012)

Age of technology
- SOLAS
- MARPOL

Age of human factors
- STCW
- Fail safe
- Automation

Age of safety management
- Safety culture
- ISM
Incidence of accidents at sea

- The number of accidents at sea / The number of world fleet

Source: LMIS
Oil spill accident with the tanker

The number of oil pollution accidents 1970-2010

Quantities of oil spilt 1975-2010

Source: ITOPF
1. safety level
2. hazards and risks
3. necessity of improvement of safety
4. measures for improving safety
5. prioritized in terms of cost effectiveness
Example acceptable risks

<table>
<thead>
<tr>
<th>Authority</th>
<th>Description</th>
<th>Criterion per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSE(1999)</td>
<td>Max. tolerable risk to workers</td>
<td>$10^{-3}$</td>
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<tr>
<td></td>
<td>Max tolerable risk to the public</td>
<td>$10^{-4}$</td>
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<tr>
<td></td>
<td>Negligible risk</td>
<td>$10^{-6}$</td>
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<tr>
<td>Netherlands Bottelberghs(1995)</td>
<td>Max tolerable risk for existing situations</td>
<td>$10^{-5}$</td>
</tr>
<tr>
<td></td>
<td>Max tolerable risk for new situations</td>
<td>$10^{-6}$</td>
</tr>
<tr>
<td>New South Wales</td>
<td>Sensitive developments(hospitals, schools, etc.)</td>
<td>$5 \times 10^{-7}$</td>
</tr>
<tr>
<td>Australia DUAP(1997)</td>
<td>Residential, hotels, tourist resorts, etc.</td>
<td>$1 \times 10^{-5}$</td>
</tr>
<tr>
<td></td>
<td>Commercial, retail, offices, etc.</td>
<td>$1 \times 10^{-5}$</td>
</tr>
<tr>
<td></td>
<td>Sporting complexes, active open space</td>
<td>$1 \times 10^{-5}$</td>
</tr>
<tr>
<td></td>
<td>Industrial</td>
<td>$5 \times 10^{-5}$</td>
</tr>
<tr>
<td>Western Australia EPA(1998)</td>
<td>Sensitive development(hospitals, schools, etc.)</td>
<td>$5 \times 10^{-7}$</td>
</tr>
<tr>
<td></td>
<td>Residential zones</td>
<td>$1 \times 10^{-5}$</td>
</tr>
<tr>
<td></td>
<td>Non-industrial(commercial, sporting, etc.)</td>
<td>$1 \times 10^{-5}$</td>
</tr>
<tr>
<td></td>
<td>Industrial</td>
<td>$5 \times 10^{-5}$</td>
</tr>
</tbody>
</table>
Safety level / ALARP (As Low As Reasonably Practicable)

Source: MSC75/INF6
Tanker Explosion

Ship’s name : Seikou-maru
Ship’s size : 998G/T
Date of occurrence : 29th May 2014
Cargo: Crude oil
Casualty : dead 1, injured 4
Gas poisoning

Ship’s name: Daini-Kyokuhou-maru
Ship’s size: 388G/ T
Date of occurrence: 7th Feb 2012
Cargo: chloroform (CHCl3)
Casualty: dead 1
Breaking hull of large container ship

Ship’s name: MOL COMFPRT
Ship’s size: 8110TEU
Date of occurrence: 17 June 2013
Cargo: Container

Photo by Mitsui O.S.K. Lines, Ltd.
Emerging issues & countermeasures

Aging workforce
Labor shortage
Low-cost competition

Education, training
Supporting system
Enhanced inspection

Proactive regulation
Rescue system

Growing in size
New cargo & fuel
Northern Sea route
Crisis management

Managing an organization to prevent an accident

Risk management

Crisis

Crisis management

Managing an organization to mitigate damages after a disaster

Dominant events

- Earthquake & tsunami
- Large oil spill
- Large chemical spill
- Fire
- Grounding
- Collision, etc.
Tsunami

• Lesson from The Great East Japan Earthquake
  18 oceangoing vessels suffered damage for the stranding and etc.
  (http://www.tb.mlit.go.jp/kinki/senpaku/tsunamijireiannai.html)

• Tsunami response manual and training is necessary.

• MLIT made the guidelines to make a tsunami response manual for ship. (http://www.mlit.go.jp/common/001037141.pdf)