Jas Singh PhD, CIH

Occupational Exposure Limits (OEL’s) in China and India
CHINA OELS
China’s IH Regulatory Framework

- **Law**
  - Code of Occupational Disease Prevention of PRC, by the People’s Congress 2002

- **Regulations**
  - by State Council

- **Sector Rules**
  - by Ministry of Health, and State Administration of Work Safety

- **Standards**
  - GBZ National Standards (230+)
  - OELs – GBZ 2.1 and 2.2-2007
China’s IH Standards System

- PPE
- Hazard Communication
- Exposure Monitoring Methods
- Engineering Control Management Program

OELs

- Inventory of IH Hazards
- Inventory of Highly Toxic Chemicals
- Chemical, Physical and Biological Hazardous Agents

- Occupational Medical Surveillance
- Biological Monitoring
- Inventory of Occupational Disease Diagnosis

Hygienic Standard for the Design of Industrial Enterprises
## China’s OEL History

<table>
<thead>
<tr>
<th>OLEs standard</th>
<th>OEL Category</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interim Hygienic Standard for the design of industrial enterprises</td>
<td>53 MAC of hazardous substances</td>
<td>1956</td>
</tr>
<tr>
<td>Hygienic Standard for the design of industrial enterprises</td>
<td>60 MAC of hazardous gas vapor and dust, 32 MAC of aerosol</td>
<td>1963</td>
</tr>
<tr>
<td>“Hygienic Standard for the design of industrial enterprises” (TJ36-79)</td>
<td>120 MAC of hazardous substances which include 111 toxicant and 9 dust</td>
<td>1973-1979</td>
</tr>
<tr>
<td>Speed up revising, augmenting, introducing and standardizing</td>
<td>Developing rapidly since 2002 when Code of Occupational Disease Prevention of PRC came into effect</td>
<td>1990s-present</td>
</tr>
</tbody>
</table>
The OEL Development Process

1. Make a proposal of developing OELs
   - Any organization and individual

2. Review proposal and determine development organization
   - Administrative Department of Ministry of Health

3. Develop Standards of OELs
   - Development organization/institute

4. Technical Review of OELs
   - National Occupational Health Standardization Technical Committee

5. Approve and Release OELs
   - Ministry of Health
China’s IH OEL Development Process

- China’s IH OELs is issued by Ministry of Health of RPC, the latest OELs are published as National Compulsory Standard
  - GBZ 2.1-2007 Chemical agents
  - GBZ 2.2-2007 Physical agents

- China’s IH OELs development principle:
  - “Take health as the primary consideration, strive for economic feasibility and technological feasibility”

- China’s IH OELs development basis:
  - Revising, Augmenting, Introducing and Standardizing other countries’ and organizations’ OELs like TLVs, PELs, MAK etc.
  - Toxicology and Epidemiology studies
GBZ 2.1-2007

“Occupational exposure limits for hazardous agents in the workplace Part 1: Chemical hazardous agents” involves:

- 339 chemical toxicants
- 47 dust
- 2 biological agents (Beauveria bassiana & Subtilisins)

PC-TWA  (Permissible Concentration – Time Weighted Averaged)
PC-STEL  (Permissible Concentration – Short Term Exposure Limit)
MAC-Ceiling (Maximum Allowable Concentration)
China’s IH OELs – Physical Agents

GBZ 2.2-2007

“Occupational exposure limits for hazardous agents in the workplace Part 2: Physical agents” involves 12 physical agents in the workplace:

1. Ultra high frequency radiation
2. High frequency electromagnetic electric field
3. Power frequency electric field
4. Laser
5. Microwave
6. Ultraviolet
7. Heat stress
8. Noise
9. Hand-transmitted vibration
10. Meteorology in the coal mine
11. Classification of physical workload
12. Heart rate on physical work
# Comparison: China’s OELs, TLVs and PELs

<table>
<thead>
<tr>
<th>Hazardous Agents</th>
<th>China’ OEL PC-TWA (mg/m³)</th>
<th>ACGIH TLV TWA (mg/m³)</th>
<th>US OSHA PEL TWA (mg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methanol</td>
<td>25</td>
<td>262</td>
<td>262</td>
</tr>
<tr>
<td>Lead</td>
<td>0.03</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>n-Hexane</td>
<td>100</td>
<td>172</td>
<td>300</td>
</tr>
<tr>
<td>Dimethylformamide</td>
<td>20</td>
<td>36</td>
<td>35</td>
</tr>
<tr>
<td>Crystalline Silica/Quartz (respirable)</td>
<td>10%≤free SiO₂≤50%</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>50%&lt; free SiO₂≤80%</td>
<td>0.3</td>
<td>0.025</td>
</tr>
<tr>
<td></td>
<td>free SiO₂&gt;80%</td>
<td>0.2</td>
<td>10/ (%SiO₂+2)</td>
</tr>
<tr>
<td>Noise (8hr per day)</td>
<td>85dbA</td>
<td>85dbA</td>
<td>90dbA</td>
</tr>
</tbody>
</table>
Limitations

Limited number
Only 339 OELs compare to almost 800 TLV’s

Revision
OELs to be revised almost every 5 years, while TLVs and BEI issued each year.
Democratic Republic of India
Grim Statistics

The number of fatal accidents in India is very high.

Takala estimates 36,740 fatal accidents in the year 1994. Smith goes up to 150,000 killed workers in 1993, whereas the official figure given by the Ministry of Labour is 1624.

Only eight percent of the Indian workforce is employed in the organized sector, therefore the law will not reach the bigger part of it.
OHS in India - Challenges

- Huge workforce in unorganized sector
- Availability of cheap Labor due to high unemployment
- Lack of data on occupational diseases
- Meager public spending on health
- Inadequate implementation of existing legislation
- Large numbers of unrecognized / unreported occupational injuries and illnesses
- Shortage of trained and skilled OHS professionals
- Multiplicity of statutory controls
- Apathy of workers and management towards preventive measures
- Infrastructure problems
- Lack of a coherent national policy on occupational health
DGFASLI is a technical arm of the Government of India under the Ministry of Labor and advises on matters related to safety, health and welfare of workers in factories and docks. Its main functions include:

- Coordination of the administration of Factories Act in the state
- Technical guidance, advice to chief Inspectors;
- Training of factory inspectors, management & supervisory personnel, workers, trade union leaders, safety committee members and professionals engaged in factories and docks.

*Directorate General Factory Advice Service and Labor Institutes*
A Brief Look At The Factories Act
Worker Health & Safety is regulated under the Factories Act, 1948 (amended in 1987) and extends to whole of India. The enforcement of the rules is the responsibility of the states as in the case of environmental regulations.
Inspection of Factories By District Inspectors

- Health
- Safety
- Welfare facilities
- Working hours
- Employment of young persons
- Annual Leave with wages etc.
Factories Act, 1948

41F. Permissible Limits of Exposure of Chemical and Toxic Substance

1) The maximum permissible threshold limits of exposure of chemical and toxic substances in manufacturing processes (whether hazardous or otherwise) in any factory shall be of the value indicated in the Second Schedule.

2) The Central Government may, at any time, for the purpose of giving effect to any scientific proof obtained from specialised institutions or experts in the field, by notification in the Official Gazette, make suitable changes in the said Schedule.
Health

- Cleanliness
- Disposal of wastes and effluents
- Ventilation and temperature
- Dust and fume
- Artificial humidification
- Over-crowding
- Lighting
- Drinking water
- Latrines and urinals
Hazardous Substances

The occupier must notify the Chief Inspector before they begin to occupy or use any premises as a factory or when recommencing manufacturing work in a factory.

The government can form a site appraisal committee to assess the request and the occupier has an obligation to disclose all information concerning the hazardous process.
Noise

Action levels for noise at work at 90 dbA limit under the Indian regulations (the 85 dbA limit has been considered). If above 85 dbA, employers must evaluate the need for PPE and other hearing conservation measures.
Radiation - Ionizing

And the Radiation Protection Rules 1971
(RPF-1971)

The Act provides control over premises where radioactive substances are handled or radiation generating equipment is operated. The Act exercises control over the possession, use, sale, import, transport and disposal of radioactive materials.
Radiation – Non-Ionizing

“There is an increased recognition of hazards posed by non-ionization radiation sources. Recently the Supreme Court of India has admitted a petition file by an NGO highlighting the need for standards for electromagnetic radiation emitted by cell phone towers, microwave ovens, TV remotes, etc.”
## Permissible Limits of Exposure (mg/m³)

<table>
<thead>
<tr>
<th>Substance</th>
<th>ACGIH</th>
<th>OSHA</th>
<th>INDIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asbestos</td>
<td>0.1 f/cc</td>
<td>0.1 f/cc</td>
<td>2 f/cc</td>
</tr>
<tr>
<td>Benzene</td>
<td>1.6</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>Beryllium</td>
<td>0.002</td>
<td>0.002</td>
<td>0.002</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>28</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Hexavalent Cr (Sol)</td>
<td>0.05</td>
<td>0.1</td>
<td>0.50</td>
</tr>
<tr>
<td>Hexavalent Cr (insol)</td>
<td>0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manganese fume</td>
<td>0.2</td>
<td>5 ©</td>
<td>1.0</td>
</tr>
<tr>
<td>Total Dust</td>
<td>10</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>Vinyl Chloride</td>
<td>2.5</td>
<td>2.5</td>
<td>10</td>
</tr>
</tbody>
</table>
## Comparing Exposure Limits

(8-hour TWA, mg/m$^3$)

<table>
<thead>
<tr>
<th>CHEMICAL</th>
<th>Chinese OEL</th>
<th>INDIA</th>
<th>OSHA PEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMF</td>
<td>20</td>
<td>------</td>
<td>30</td>
</tr>
<tr>
<td>Toluene</td>
<td>50</td>
<td>375</td>
<td>754</td>
</tr>
<tr>
<td>n-Hexane</td>
<td>100</td>
<td>------</td>
<td>180</td>
</tr>
<tr>
<td>IPA</td>
<td>350</td>
<td>------</td>
<td>980</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(IBA 150)</td>
<td></td>
</tr>
</tbody>
</table>
“Oscar Fernandes says Amendments in Factories Acts, 1948 in Final stage”
February 10th, 2009
Minister of State for Labour and Employment Oscar Fernandes

“National policy on safety, health and environment to become operational”
June 29th, 2009
Minister of State for Labour and Employment Harish Rawat
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