Addressing Industrial Hygiene Challenges in Emerging Economies

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Maharshi Mehta, CSP, CIH
President
International Safety Systems, Inc.,
Washingtonville New York, USA
www.issehs.com
Global Presence

USA: Washingtonville, (NY), Houston (TX), Norman (OK)
Mexico: Mexico City
Brazil: Sao Paolo
India: Vadodara, Mumbai, Bangalore, Hyderabad, Gurgaon
China: Shanghai
Agenda

- Emerging Economies - manufacturing growth
- Challenges
- Regulatory landscape India and China
- Addressing challenges
- Approaches adopted
- Lessons Learned
- What participants would like to learn
Paradigm shift-Economy and hence EHS Priorities

- Percent share of global GDP
  - OECD 65% in 2011 to 42% in 2060
  - Non OECD, emerging BRIC countries (Brazil, Russia, India and China): 35% in 2011 to 58% in 2060

- Percent annual growth
  - OECD ~3%
  - Non OECD ~ 8%

Organization for Economic Cooperation and Development
Paradigm shift - Labor Force - Hence EHS Priorities

CIA World Fact Book
http://www.indexmundi.com/map/?t=0&v=72&r=xx&l=en
EHS Challenges

- Industrial Hygiene Professionals
  - 37 CIHs for working population of > 1 billion in India and China
  - < 5 degree programs in Industrial Hygiene in Asia
  - Two degree programs in India
- Infrastructure
  - Accredited laboratories—Quality Assurance in sample collection and analysis
  - Availability of monitoring instruments, maintenance and calibration
- Corporate IHs trying to manage programs across the globe
  - Travel time, budgetary constraints, time difference
- Country Specific Regulatory Requirements
  - Does not provide reliable and reproducible exposure monitoring data
Larger EHS Challenges – Unorganized sector

- 86% or 395 million worked in the unorganized sector
- Generating 50.6 percent of the country's GDP
- No concept of EHS at all
- No concerns about liability, public image


New York Manhole Covers, Forged Barefoot in India
EHS Priorities

- Process Safety
- Industrial Hygiene
- Environment
- Safety
- Contract Manufacturing Sites
Regulatory Requirements
Emerging Economies

- More stringent
  - Exposure limits lower than OECD countries (China, Russia)
  - Physical agents such as Vibration and EMF are regulated (e.g., Brazil)
  - Detailed requirements (Risk assessment in Malaysia)

- Less stringent
  - Confined space entry
  - Lockout Tag out
China Industrial Hygiene & Indoor Air Quality Regulations Framework


Rules on Workplace Occupational Hygiene Supervision (2012) / 工作场所职业卫生监督管理规定

GB 50325-2006 Code for indoor environmental pollution control of civil building engineering / 民用建筑工程室内环境污染控制规范
Management of Occupational Health Impact Projects

/职业病危害项目申报管理办法

GBZ2 - 2007 State Occupational Health Standards of PRC titled Occupational Exposure Limits for Hazardous /工作场所有害因素职业接触限值

GBZ 1 - 2010 Hygienic Standards for the Design of Industrial Enterprises / 工业企业设计卫生标准

GB/T 18883-2002 Indoor Air Quality Standard / 室内空气质量标准

GBZ 159 – 2004 Specifications of air sampling for hazardous substances monitoring in the workplace /工作场空气中有害物质监测的采样规范

GBZ/T 189.8 – 2007 Measurement of Physical Agents in Workplace Part 8: Noise /工作场所物理因素测量 第八部分: 噪声

GBZ/T 160 Series of Hazardous Substances Analysis Methods / 国家标准－检测方法详表

GBZ 188 – 2007 Guideline of Occupational Health Surveillance / 职业健康监护技术规范
Investigation and Management on Occupational Disease / 职业病危害事故调查处理办法

Rules on Classification Management of Occupational Disease Hazard for Industrial Construction Project (2012)

建设项目职业病危害风险分类管理目录（2012年版）

Rules on Registration of Occupational Disease Hazards (2012)

职业病危害项目申报办法 安监总局 总局令第 48 号

Rules on Occupational Medical Surveillance (2002)

职业健康监护管理办法
China-Unique IH Requirements

- Hazard communication in labor contract
- Health impact assessment
- Report processes with potential health risk to Local Safety Bureau and get approval
- Monitoring annually to once every year to 3 years by Safety Bureau & MOH qualified third party (normally CDC, listed in Local MOH website)

- Occupational Health Medical Surveillance
- Occupational Health/Safety License
Recent proposed amendments

- Definition of Factory for application of Factories Act
- Working of females after working hours
- Prohibition of pregnant women from working near moving machineries

http://labour.nic.in/upload/uploadfiles/files/latest_update/what_new/53994ae87860bBriefforNIC.pdf

http://labour.nic.in/upload/uploadfiles/files/latest_update/what_new/53994ae87860bBriefforNIC.pdf
India: Legislative Framework

- Indian Factories Act 1948, amended in 1987
  - 2014 amendments are in Parliament
  - Federal Law provides framework for detailed State rules

- State Rules
  - Each state defines specific rules for each of the Sections of the Factories Act
  - Most are similar

- Other regulations
  - Boilers
  - Explosives
  - Petroleum
  - Link for Act/Model Rules:
    http://www.dgfasli.nic.in/statutes5.htm
Key Industrial Hygiene Requirements - India

- Chapter IV A, Section 41f: Permissible limits of exposure of chemical and toxic substances based on ACGIH TLV are listed (~1980 TLVs)
- General Duty Clause Section 14 on Dust and Fumes
- 8 hour TWA noise exposure limit is 90 dBA at 5 dB Exchange rate (Similar to OSHA USA). Action Level is not defined.
- Qualifications of competent person to conduct “workplace Monitoring” are defined.
- Specific sampling and analytical methods are not defined.
- Illumination levels, Wet Bulb Temperature requirements for different Dry Bulb Temperatures are defined.
Requirements in Factories Act and not in OSHA

- Factories Act Sec 31, State Rule 61:
  - Pressure vessel design and testing requirements including hydrostatic test requirements
- Requirements for full time trained Safety Officer
  - Qualifications are listed
- Requirements of full time welfare officer
- Structural stability certificate initially and 5 years thereafter
- Maximum weight allowed to be carried is specified
- Minimum Illumination level specified as 30 Lux
Detailed Requirements in OSHA and not in Factories Act

- OSHA 1910.119 Process Safety management
  - Although requirements on hazard analysis such as HAZOP is in place

- OSHA 1910.114 on color codes and 145 on signs

- OSHA 1910.Subpart I on PPE
  - Although general requirements on PPE is in place (Sec 35 on protection of eyes)

- OSHA 1910.97 Non Ionizing radiation
Japan Industrial Regulations Framework

- Laws
  - Enforcement
    - Orders
      - Ordinances
        - Guidelines
Japan Industrial Regulations Framework

Industrial Safety and Health Law
Working Environment Measurement Law
Pneumoconiosis Law
Industrial Accident Prevention Organization Law

Enforcement Order of the Industrial Safety and Health Act
- Working Environment Measurement Standards
- Working Environment Evaluation Standards
- Enforcement Order of the Working Environment Measurement Law
Enforcement Ordinance of the Working Environment Measurement Law
Enforcement Ordinance of Pneumoconiosis Law
Japan Industrial Regulations Framework

Ordinance on Industrial Safety and Health

Ordinance on Prevention of Lead Poisoning

Ordinance on Prevention of Ionizing Radiation Hazards

Ordinance on Prevention of Hazards Due to Dust

Ordinance on Prevention of Health Impairment due to Asbestos

Ordinance on Authorized Inspection Agency, etc

Guidelines on Occupational Safety and Health Management Systems

Guidelines for Risk Assessment

Standards for Investigation by Carcinogenicity Studies
Key Industrial Hygiene Requirements - Japan

- Licensed and Qualified Health Officer
- Working Environment Measurement
  - Area samples collected for chemicals
  - Noise sampled with Sound Level Meter with A-weighted
- Specific requirements for medical surveillance and occupational physician
**Challenge: Variability in Exposure Limits**

### Examples of Chemicals with Lower OELs in China

<table>
<thead>
<tr>
<th>Chemical/OEL</th>
<th>China PC-TWA</th>
<th>ACGIH TLV-TWA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercury (Elemental and Inorganic Forms)</td>
<td>0.02 mg/m³</td>
<td>0.025 mg/m³</td>
</tr>
<tr>
<td>Xylene</td>
<td>50 mg/m³</td>
<td>(11.5 ppm)</td>
</tr>
<tr>
<td>Toluene</td>
<td>50 mg/m³</td>
<td>(13.3 ppm)</td>
</tr>
<tr>
<td>Acetone</td>
<td>300 mg/m³</td>
<td>(126.4 ppm)</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>20 mg/m³</td>
<td>(17.5 ppm)</td>
</tr>
</tbody>
</table>

GBZ2.1 - 2007 State Occupational Health Standards of PRC titled Occupational Exposure Limits for Hazardous
Approaches

- **Education at foundation**
  - University level IH programs
  - Short term courses
  - Company specific courses

- **Raising awareness**
  - Conferences
  - One day seminars
India: Master in Industrial Hygiene and Safety Program

- Two programs offered in Gujarat and Tamilnadu
- First started at Saradar Patel University in Gujarat in 1997
- In collaboration with the Department of Environmental and Industrial Hygiene at University of Cincinnati
All students of the first batch at AIHCE, Toronto
B.V.M. ENGINEERING COLLEGE
MASTER IN INDUSTRIAL HYGIENE PROGRAMME
SINCERELY THANK
UNIVERSITY OF CINCINNATI • EXCEL INDUSTRIES, INDIA,
PFIZER INC. • NEW YORK, AND
ALL THOSE WHO DONATED THESE
VALUABLE BOOKS.

DECEMBER 1998
Master in Industrial Hygiene and Safety

- First time in India started 15 years ago
- 300+ graduates
- 7 CIHs
- 2 CIHs and CSPs
- One semester on safety added
  - Program then is recognized by government as essential qualification to work as “safety officer”
First National Conference in Industrial Hygiene
Core Competencies – BOHS/OHTA Training Modules

- 7 Modules, each of 5 days
- Upon Completion of 6 modules, written exams and interview from BOHS – Diploma in Occupational Hygiene
- Conducted India, China, Brazil
- All training material is available for free (www.ohlearning.com)
Core Competencies - Applied IH Training

- Company specific 4 day onsite Workshops on Applied Industrial Hygiene-30 workshops done covering ~1000 line managers

- Applied IH on Webex
  - 18 training programs, 4 hours/day, 4 days
  - Interactive, with polling questions and workshop assignments
  - Video of faculties and instrumentation
  - 250 employees covered in nine training programs, 2 years
Augmenting Efforts in China

Status

- MPH and Safety programs at university levels exist
- Some of the core IH courses are also taught
- Started new degree program in IH is difficult
- Infrastructure and faculty support in occupational medicine and science seem to exist
Approaches: Unorganized sector

- Provide cost effective or no cost consulting using funds from grants and donations
  - Silicosis among agate polishing workers – exposure assessment conducted and respirators provided
- EHS professionals working in organized industries provide education and intervention
- Offer cost effective exposure control measures
- Sound EHS program as prerequisite of doing business
Conclusions

- While EHS challenges are enormous, successful models to address the challenges do exist.
- Part-time opportunities also exist for EHS professionals from around the world to work in emerging economies.
- Our existence would be most meaningful if our energies are utilized where the need is significant.
Internet Links for more information

- China Safety Bureau Website for IH Regulations

- China MOH Website for IH Regulations
  - http://www.jdzx.net.cn

- Indian Factories Act 1948
  - http://www.dgfasli.nic.in/statutes1.htm

- Japan health and safety related regulations

- Korea health and safety related regulations
  - http://www.law.go.kr/engLsSc.do?menuId=0&p1=&subMenu=5&query=Occupational+safety+and+health+act&x=0&y=0#libgcolor0