

Developing regulations for occupational exposures to health hazards in Malaysia

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Abstract

In Malaysia exposures in the workplace are regulated under the Factories and Machinery Act (FMA), 1967 and also under the more comprehensive Occupational Safety and Health Act (OSHA) enacted in 1994. With OSHA 1994 the philosophy of legislating safety and health in the workplace changed from one that was very prescriptive and containing detailed technical provisions under FMA, 1967 to one that is more flexible and encourages self-regulation under OSHA 1994. OSHA 1994 is supported by regulations, codes of practices and guidelines to further clarify the provisions in the Act. Under the FMA 1967 emphasis was on safety while with OSHA 1994 there has been equal emphasis on addressing health hazards in the workplace. Regulations for occupational exposures are developed by the Department of Occupational Safety and Health with tripartite and stakeholder consultation. When developing these regulations International Labor Organization Conventions, laws of other countries and occupational exposure standards adopted internationally are reviewed. The government also conducts surveys to collect information on both exposures and health effects in workplaces to have better understanding on specific occupational health problems. Effective law enforcement is crucial in ensuring compliance to safety and health law. The challenge at the moment is to ensure all employers and employees, particularly those in the small and medium enterprises, understand and comply with the provisions stipulated in the legislation.

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1. Introduction

Malaysia, a rapidly industrializing country, with the vision to achieve developed country status by the year 2020 has made tremendous progress in improving the safety and health of the country's workforce. This has been most marked over the past 10 years with the enactment of the Occupational Safety and Health Act 1994 (OSHA 1994). The OSHA 1994, enacted on 25th February 1994 marked an important milestone in Malaysia's occupational safety and health (OSH) history. With the increased coverage under the Act (all workers except those in the Armed Forces and work on board ships) and the objects of the Act

clearly defined multi-pronged efforts are being made to ensure safety and health of workers and also all those at workplace. This Act, with a long gestation period, based on the philosophy of self-regulation, was mooted in 1985 (Abu Bakar, 1997). The Act is based on a broad legislative framework placing the responsibility on employers to formulate and implement safe system of work and workers give their full cooperation. OSHA 1994 was promulgated based on philosophy that "the responsibility to ensure safety and health lies with those who create the risk and those who work with the risk" (Abu Bakar, 1996). Positive developments have occurred in all spheres in occupational safety and health (OSH) since the 1990s. These include the establishment of the National Institute of Occupational Safety and Health (NIOSH), separate professional societies for occupational physicians, safety practitioners and industrial hygienists, postgraduate training programs by universities

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and being identified as a priority area for research funded by the Ministry of Science and Technology.

Transforming Malaysia into a developed country by the year 2020 has its own costs to be born by the Malaysian workforce. Rapid industrialization has led to influx of not only state-of-the-art technology but also numerous new hazards to the country's work environment. To manage these hazards the government through its various Ministries and agencies and support from NIOSH, employer federations and trade unions, universities and safety and health professionals has developed various regulations and set occupational exposure limits (OEL) for these workplace hazards.

Occupational safety and health legislation in the country has evolved over a long period of time. In the legal context in Malaysia the hierarchy is in the order of Act, regulations, industry code of practice and guidelines. While the industry code of practice and guidelines to not have the force of law, they help to further clarify the provisions contained in the Act and Regulations. An Act, a statute passed by Parliament sets out duties and provisions including mechanisms for enforcement and penalties. Regulations and orders made under the Act are issued by the Minister and describe the requirements which apply to specific work situations.

In the last 40 years, the occupational safety and health legislation has undergone massive transformation from being too prescriptive and containing detailed technical provisions to being more flexible and encouraging self-regulation supported by codes of practices and guidelines (Singh, 2004). These changes have been necessary and consistent with the trend of legislation development in industrialized countries to face challenges of the new millennium. Development of occupational safety and health legislation is influenced by type of work activities in specific time periods. Early occupational safety and health legislation were linked to the tin mining industry (Abu Bakar, 1996). Hence early legislation, i.e., Boiler Enactments in the Malay States 1898, The Machinery Enactment 1913 and Machinery Ordinance 1953 gave more attention to safety issues related to activities and used of equipments and transport system (i.e., locomotive) in such industry. The safety and health of those working in the rubber plantations were covered under the Rump Labour Code 1933. Malaya obtained its independence from the British in 1957 and the country slowly began to industrialize in the 1960s.

2. Regulating exposures under the Factories and Machinery Act 1967

In 1967, with the enactment of Factories and Machinery Act 1967 more provisions related to occupational health were included. The Factories and Machinery (Safety, Health and Welfare) Regulations 1970 included more specific provisions to ensure a healthy work environment such as proper ventilation, air cleanliness, measures for controlling heat exposure, sufficient lighting, and supply of drinking water. Under these regulations, OEL were not specified

for any of the health hazards. Provisions for adequate ventilation were included where the number of air changes every hour should be not less than ten in the case of processes which generate little or no heat, smoke or fume. More frequent number of air changes is required, i.e., not less than twenty, for processes which generate earlier mentioned hazards.

The first regulation with regards to specific occupational health exposure was enacted through Factories and Machinery (Lead) Regulations 1984. These regulations for lead were promulgated based on an inter-ministerial industrial hygiene survey spearheaded by the Factories and Machinery Department following a report forwarded by a hospital concerning an employee employed in a battery manufacturing factory who was diagnosed to suffer from lead poisoning. Provisions in the lead regulations defined and established exposure standards for lead in the workplace, i.e., action level of $75 \mu\text{g}/\text{m}^3$ 8-h Weighted Average (TWA) and permissible exposure limit (PEL) of $150 \mu\text{g}/\text{m}^3$ 8-h TWA. Under these regulations the action level meant employee exposure, without regard to the use of respirator, to an airborne concentration of lead in the form of metallic lead, inorganic lead compounds, and organic lead soaps. Employee exposure monitoring was required to be conducted in all factories in which any lead process was used such as smelting of ores containing lead, lead burning, melting or casting of lead, buffing and manipulation, movement or other treatment of lead in particulate or molten form. The initial employee exposure monitoring results determined requirements for provision of control measures and initiation of medical surveillance program which are mandatory for those workers who are exposed to lead above the action level. Repeat exposure monitoring was required to be conducted every six months if levels were above the action level and this was carried out until two consecutive measurements, taken at least seven days apart, were below the action level. If the initial levels were above the PEL monitoring as conducted quarterly. The Regulations also detailed on method of exposure monitoring and the content of prescribed control measures to minimize health effect from lead exposure. Control measures included respiratory protection, protective work clothing and equipment, housekeeping, hygiene facilities and practices. Emphasis was also given on conducting appropriate medical surveillance for workers exposed to lead. The mainstay of medical surveillance comprised of biological monitoring in the form of regular blood sampling and analysis for blood lead at least every six months for workers with blood lead between $40 \mu\text{g}/100 \text{ml}$ but less than $60 \mu\text{g}/100 \text{ml}$, every three months if blood lead at or above $60 \mu\text{g}/100 \text{ml}$ but less than $80 \mu\text{g}/100 \text{ml}$ of blood and monthly if blood lead is $80 \mu\text{g}/100 \text{ml}$ of blood or above. OEL and frequency of blood sampling were adopted from existing international standards. However, while no specific health end points were used in determining this, medical examinations are to be conducted annually when blood lead levels are at or above $40 \mu\text{g}/100 \text{ml}$. Particular attention is to be given to

employees' history and physical examinations of teeth, gum, hematology, gastrointestinal track, renal, cardiovascular, and neurological systems. Specific investigations required under these regulations are full blood count and renal profile.

Considering the importance of such industrial hygiene activities to be conducted as an essential tool to determine exposure of health hazards, characterize risks and plan appropriate control measures in the workplace, the Factories and Machinery Department gave due attention and priority in developing the industrial hygiene unit which later grown into a division. Activities for capacity building of the hygiene division were planned systematically where more qualified officers were sent for training in this field. Other hygiene surveys were conducted including noise level measurements, heat stress evaluation, and monitoring of air contaminants such as asbestos and silica. Medical surveillance activities were also integrated into the survey to complement exposure data that had been gathered. The survey consisted of data collection on lung function testing and audiometric testing of workers in selected factories. Data gathered from these surveys were used as the basis of promulgating national standards for exposure in the workplaces. Following these intensive industrial hygiene and medical surveillance activities, several other regulations were enacted namely Factories and Machinery (Asbestos Process) Regulations 1986, Factories and Machinery (Noise Exposure) Regulations 1989, and Factories and Machinery (Mineral Dust) Regulations 1989. It is interesting to note that the Factories and Machinery (Asbestos Process) Regulations were promulgated the same year, 1986, the International Labor Organization Asbestos Convention (C162) "Convention Concerning Safety in the Use of Asbestos" was promulgated and the USA revised its Occupational Safety and Health Act (OSHA) Occupational Exposure to Asbestos, Tremolite, Anthophyllite, and Actinolite Standards. While the ILO C162 has no specific exposure indices, the PEL under OSHA Asbestos Standard was 0.2 fiber/ml whereas in Malaysia it was 1 fiber/ml (Rampal and Feitshans, 1990). With the Asbestos Process Regulations 1986, enclosed processes, wet manufacturing methods, exhaust equipment and use of PPE has reduced exposures in manufacturing facilities using asbestos. However there was serious concern that not enough was being done to protect those involved in construction and renovation work, shipyard work and those areas not covered under the Asbestos Process Regulations. These workplaces are now covered under OSHA 1994. Concept of safe use of asbestos has been promoted by the asbestos industry. A call to ban asbestos in the country has been made by the Consumer Association of Penang and supported by professional bodies because of the question whether the provisions needed to be in place for safe use can ever be attained in Malaysian workplaces (Rampal and Lim, 2002). The framework and approach in these regulations under FMA were similar to the earlier regulations on lead which emphasized on setting up exposure limits, conducting expo-

sure monitoring and medical surveillance and prescribing appropriate control measures.

3. Regulating exposures under the Occupational Safety and Health Act 1994

Under OSHA 1994, the National Council for Occupational Safety and Health Council was established. Among its powers included making reports and recommendations with regards to: changes to safety and health legislation; establishing adequate methods of control of industrial chemicals and fostering development and adoption of industry codes of practice. Under OSHA 1994, among the powers of the Minister of Human Resources are to make regulations to prescribe the standards in relation to use of, including standards of exposure to physical, biological, chemical or psychological hazards. The minister has also powers to make regulations on monitoring and control of exposures to ensure safe and healthy workplace environments. The Department of Occupational Safety and Health (DOSH), formerly known as the Factories and Machinery Department, enforces both FMA 1967 and OSHA 1994.

The first regulation controlling risks promulgated under OSHA 1994, Control of Industrial Major Accident Hazards Regulations (CIMAH) 1996, came as a result of lessons learnt from major accidents worldwide, e.g., release of methyl isocyanate in Bhopal, India in 1984 and locally, e.g., the Bright Sparklers incident, an explosion in a fire crackers factory in Malaysia in 1990. The CIMAH Regulations 1996 requires the employer to notify of major hazard installation, prepare emergency plan and notify major accident that occur in their premises. The Industrial Major Hazard Unit formed within DOSH addresses this issue.

In managing hazards in the workplace the industrial hygiene principles of hierarchy of controls and enforcement, engineering, and education as control methods are applied. Elimination of hazard is known to be the gold standard and given highest priority in the selection of control measures. The Occupational Safety and Health (Prohibition of Use of Substance) Order 1999 has been the first legislation that prohibited the use several hazardous substances for certain purposes (Malaysia 1999). The order prohibits the substances that include 4-aminodiphenyl, benzidine, 2-naphthylamine, 4-nitrodiphenyl, benzene, carbon disulphide, carbon tetrachloride, *n*-hexane, white phosphorus, and crocidolite from certain usage. Reasons for prohibition are due to severe health outcomes from exposure to the substances and most of the substances are confirmed human carcinogen as concluded by the International Agency for Research on Cancer (IARC). Prohibiting the use of substances at the workplace will prevent the occurrence of cancer among workers who are exposed to them (DOSH 2000).

The Malaysian government's seriousness in protecting the workforce from ill health due to exposure to chemicals became all the more evident when the Occupational Safety and Health (Use and Standards of Exposure of Chemicals

Hazardous to Health, {USECHH}) Regulations 2000 was enacted. More than 600 hazardous chemicals and their permissible exposure limits are listed in Schedule 1 with 34 hazardous chemicals mainly heavy metals and solvents listed in Schedule 2 that require medical surveillance as and when appropriate based on the Chemical Health Risk Assessment (CHRA). The Threshold Limit Values (TLVs) published by the American Conference of Government Industrial Hygienists (ACGIH) are the most influential occupational exposure limits internationally. Their advantage is they cover a large number of substances and are revised and updated every year (Hansso, 1998). Notwithstanding its limitations, they are preferred choice of standards to adopt when resources are limited. In Malaysia, the 1999 TLVs were adopted as the PELs for the majority of the chemicals in the USECHH Regulations. A CHRA is performed by a trained assessor to enable decisions to be made on appropriate control measures, induction and training of employees, health surveillance for employees exposed to hazardous chemicals. A manual of recommended practice for CHRA has been published by DOSH and made available for the assessor. The CHRA guide has provided a systematic approach of assessment that includes determining degree of hazards, evaluating exposure, assessing adequacy of control measures, and characterizing risks (DOSH 2000). Further actions to be taken by the employer are based on the risk decision obtained at the end of the assessment. These include medical surveillance that needs to be conducted by registered Occupational Health Doctors (OHD). A guideline on medical surveillance was published in 2001 to assist OHDs in fulfilling their duties to conduct medical surveillance as stipulated in USECHH Regulations 2000. Essential information for all 34 chemicals hazardous to health as listed in Schedule 2 is provided in the guideline such as physicochemical properties, toxicokinetic, health effects, and Biological Exposure Indices (BEI) for their references (DOSH 2001). The BEIs used are those developed by the American Conference of Governmental Industrial Hygienist (ACGIH).

Another guideline entitled 'Guidelines on Monitoring of Airborne Contaminant for Chemicals Hazardous to Health' was formulated in 2002 in accordance to provision in the Occupational Safety and Health (Use and Standards of Exposure of Chemicals Hazardous to Health) Regulations 2000 which requires approved method of monitoring exposure at the workplace. The guideline elaborates further on essential items such as sampling strategy, sampling technique for airborne contaminant, use of sampling equipments, and calculation of dust concentration (DOSH 2002). This was to ensure standardized and systematic techniques are used in conducting exposure monitoring so that the results can be ensured valid and reliable.

The Malaysian government also gives appropriate attention to hazards other than chemical substances. In 2003, Guidelines on Occupational Vibration have been formulated to provide guidance on how to prevent the risk of vibration related health problems. It outlined how exposure

to vibration can be measured, the vibration limits and appropriate control measures against vibration. The TLV for vibration that was adopted follows available international standards such as ISO 2631 (DOSH 2003). To address ergonomic problems in the workplace, the Department of Occupational Safety and Health has come out with 'Guidelines on Occupational Safety and Health in the Office' 'Guidelines on Standing at Work' and 'Guidelines on Occupational Safety and Health for Working with Video Displays Units.' The guides provide practical advice and standards to minimize health effects due to ergonomics problems in the workplace by giving guidance such as optimum comfort range for relative humidity, recommended air movement in a room, comfortable temperature, suitable light levels for interior lighting etc.

4. Procedures for developing standards in the Department of Occupational Safety and Health

DOSH has established work procedures according to International Standards Organization (ISO) standard for formulating standards. A standard under this procedure includes Act, regulation, industry of practice, order, and guidelines. The procedures in DOSH involve having two committees, the first for formulating the standards and the second committee for reviewing the draft standards. The procedures include receiving instructions from the Director General DOSH on a possible standard, establishing the committee to formulate the standard, determine whether there is a need for the standard, prepare a plan of action, collect information and data, develop the first draft which is checked by the review committee, revised and when satisfactory the Draft is sent to the Director General. Collecting information and data in establishing the standards involved a thorough process of reviewing OEL standards both regionally and internationally. Existing international standards are adopted. Feedback on this draft is obtained from clients and stakeholders and a final draft prepared and checked and finally approved by the Director General. The final draft is sent to the legal adviser of the Ministry/Attorney General based on the differing legal requirements of the different standards formulated for approval. When approved the standard is then distributed and printed. It is useful to note that client/stakeholder feedback and input has been an essential part of most of the standards established under OSHA 1994. Employer federations, trade union representatives and OSH professionals are consulted during these feedback sessions.

5. Implementation and enforcement

Implementation and enforcement of OEL at the workplace are carried out predominantly by the Department of Occupational Safety and Health (DOSH) and also other ministries that regulate other exposures. Enforcement is a regular activity of DOSH. However, shortage of staff precludes inspection of all workplaces in the country. Inspec-

tions of factories are to be carried out regularly every 15 months. Supplementary and special inspection may be also required. While there is no official statistic on compliance is available in Malaysian workplace, data showed that DOSH has carried out a total of 369 industrial hygiene inspections and more than 25,000 inspections to factories, machinery installations, and construction sites in the year 2003.

The chemical industry in Malaysia approach to encourage compliance with existing regulations is in the form of the “Responsible Care Program (RCP)” launched in 1994. The RCP initiated by the Chemical Industries Council of Malaysia (CICM) has developed various guiding principles and codes of practice which member companies are required to adhere to. However a number of outstanding issues including lack of trained personnel, deficiency in enforcement, right to know not assured, dependence on foreign workers with their cultural and ethnic differences and the small and medium industries not having the proper infrastructure in place has posed a problem in ensuring control of exposure in the workplace (Onn, 1996).

In Malaysia, responsibility in ensuring safety and health of the Malaysian workforce is not solely borne by the Ministry of Human Resources. Several other government agencies are also involved particularly in enforcing legislation related to safety and health. Pesticides Act 1974 was enacted mainly to regulate and ensure safety use of pesticides especially in agriculture sector and also general public. The law particularly emphasis on control of importation and manufacture of pesticides, control of presence of pesticides in food, reporting on death or injury occasioned by pesticides and procedure in analyzing pesticides (Malaysia 1974). Ministry of Science, Technology, and Innovation is the agency which plays an important role in enforcing Atomic Energy Licensing Act 1984 and its regulations. The Act provides regulations and control of atomic energy, establishes standards on liability for nuclear damage and matters connected to it (Malaysia 1984). It lays responsibility to the licensee to provide protection of health and safety of the workers from ionizing radiation such as monitoring of exposure to ionizing radiation, providing approved personnel monitoring devices and providing medical examination to exposed workers. In Radiation Protection (Basic Safety Standards) Regulations 1988 the standards for annual dose limit for whole body and partial body exposure of a worker to ionizing radiation are also stipulated. For example the annual dose limit for the whole body exposure of a worker is 50 millisieverts (mSv). Specific group of workers are prohibited to work in an area that expose them to ionizing radiation including pregnant women, nursing mothers, and person under sixteen years of age (Malaysia 1988).

6. Conclusion

Effective and efficient law enforcement is particularly vital in ensuring compliance to safety and health law in the country. Nevertheless all other stakeholders also need to share this responsibility in line with the self-regulation concept that has been put forward by OSHA 1994. For multinational companies operating in the country, they are highly recommended to use their own requirement and standards with regards to occupational safety and health as long as they meet minimum requirements as stipulated in the Malaysian legislation. While the efforts of the government are commendable, efforts by employers seem to be lacking especially those from the small and medium enterprises. Interest to control exposures and ensuring safety and health in the workplace is slowly becoming of interest to unions. Studies have shown awareness of OSHA 1994 and its effectiveness in meeting the objects of the Act needs to be improved and hence it is important that employers and employees know, understand and comply with the provisions stipulated in the legislation. To promote safety and health in the workplace it is important to ensure exposures to health hazards are regulated and well controlled. This is all the more as workplaces in the country are subjected to the phenomenon of globalization with introduction of new technologies, work organizations, work processes and substances (Rampal, 2000).

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