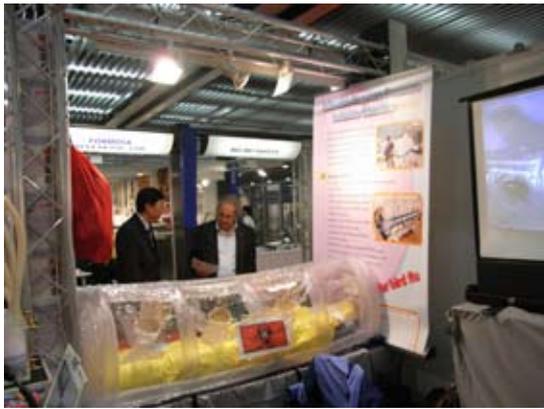




2007 Annual Report of Labor Safety and Health Research



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Institute of Occupational Safety & Health, Council of Labor Affairs Executive Yuan, Taiwan



Foreword

The Institute of Occupational Safety and Health (IOSH), a unit of the Council of Labor Affairs (CLA), is Taiwan's top agency for occupational safety and health. Our main tasks at IOSH include the detection and analysis of hazards in the workplace, and the proposal of solutions to those hazards.

The work of IOSH has evolved over the years, from the implementation of surveys, the establishment of basic data, and the introduction of methods and techniques in its initial period to strengthened research in the prevention of occupational injuries, the grasping of special safety and health issues, and the development of evaluation, management, and protective gear techniques and technologies. In line with the administrative needs of the CLA, in 2007 IOSH focused its efforts on the study of safety and health policy, the integration of innovative control techniques, the enhancement of guidance performance, and the heightening of international visibility. Among the main achievements of these efforts were the completion of working-environment surveys of three high-risk occupations; the extension of technology and provision of supervision for improvement, resulting in an average reduction of more than 20% in exposure concentrations and an average regulatory compliance of 93.8%; the implementation of needle-puncture reporting and a 38% reduction in the rate of puncture injuries; the development of bioaerosol capturing and detection equipment as well as other safety and health facilities for supply to industry; the collection and analysis of information on occupational injuries and illnesses as well as advanced-nation accident-reduction strategies for the CLA to use as a reference in revising laws and regulations, improving systemic applications, and setting standards; the compilation of ergonomic engineering work-posture illustrations and other technical manuals, and the provision of technical services; the publication of occupational safety and health periodicals and the dissemination of know-how through safety and health exhibitions; and the provision of occupational safety and health databank downloading and consultation services to more than 1 million persons.

This Annual Report covers the major projects undertaken and important results achieved during the period of Jan. 1 through Dec. 31, 2007. We hope that our descriptions of the different tasks and activities that were carried out in 2007 in line with the CLA's core administrative focus of a "Healthy Taiwan, Happy Workers" will leave everyone with a better understanding of IOSH and its work.

Jung-Sheng Shih
Chairperson, IOSH



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Annual Report

Section 1 The IOSH Mission

The Institute of Occupational Safety and Health (IOSH) was established under the Council of Labor Affairs (CLA), Executive Yuan in August 1992 and has become Taiwan's top occupational safety and health research agency. Its mission is to create a safe, healthy, and comfortable working environment by upgrading safety and health standards in the nation's workplaces, encouraging workers to pay more attention to safety and health in the workplace, reducing occupational accidents, and preventing occupational disease. The IOSH charter sets forth these research goals:

1. Provision of a scientific basis for decision-making and administration in the field of occupational safety and health.
2. Provision of solutions for crucial labor safety and health issues.
3. Provision of reference data for the formulation and revision of labor safety and health regulatory standards and management systems.
4. Heightening of technical standards for labor safety and health, and for inspection operations.
5. Provision of information needed for training and consultation in labor safety and health.

IOSH analyzed the characteristics of job-related disability and death among workers for the years 2005 and 2006 in order to gain a thorough understanding of occupational injury and illness, and to establish a localized safety and health databank. Key-point statistical analysis of types of disability and death in the fishery industry, in non-job-related traffic accidents, and in occupations covered by the Labor Safety and Health Law was carried out, scientific techniques were used, developmental priority was given to “the establishment of a safe and healthy working environment and the further reduction of occupational accidents” as contained in the CLA's medium-term (2005-2009) administrative plan, and “expanded assurance of worker safety” was pinpointed as the strategic performance goal in pursuit of the CLA's administrative vision: job security, income security, work safety, and strengthened protection of the right to work. IOSH has disseminated the results of its safety and health research among enterprises to help them establish international standards of safety and health as well as reinforce their safety and health management; it has worked with the private sector to disseminate safety and health technology, and to achieve a continued reduction in the incidence of occupational disease, disability, and death in high-risk jobs. The ultimate goal is to prevent injury and disease among workers, improve their physical and mental health, and meet the standards of the advanced countries.

This Annual Report covers the research work carried out by IOSH from Jan. 1 through Dec. 31, 2007, during which period 90 research projects were completed. The Institute promoted application of the results of its research by holding presentations, transferring technology, producing publications, issuing research papers, providing Internet retrieval, and holding exhibitions and seminars. These efforts included the publication of 105 periodicals, research reports, and technical series; the holding of 7 academic seminars; the publication of 38 IOSH research reports in domestic and foreign periodicals; the presentation of 60 reports at domestic and overseas academic conferences, and the transfer of three patents and technologies. IOSH also assisted with 18 occupational injury and disease surveys, and provided instrument calibration services to investigation agencies in 31 cases.

Section Two Organization and Personnel

IOSH is headed by a Chairperson, Vice Chairperson, and Chief Secretary, who oversee and direct the operations of the Occupation Safety Division, Occupational Health (Hygiene) Division, Analysis Methods Division, Occupational Medicine Division, and Exhibition Division. The research staff totals 65, including two contract employees and 19 alternative national service personnel. There are also four administrative units: Secretariat, Accounting Office, Personnel Office, and Civil Service Ethics Office. The organization chart is shown below:



IOSH Organization

Section Three Research Budget

IOSH Research Budget for 2007:

Budget Item	Annual Budget
Occupational Safety and health Research	NT\$204,512,496
Occupational Safety Division	NT\$42,801,191
Analysis Methods Division	NT\$35,646,364
Occupational Health (Hygiene) Division	NT\$55,079,370
Occupational Medicine Division	NT\$43,763,258
Exhibition Division	NT\$26,922,313



Section Four Key Research Projects and Results

IOSH focused on the following tasks in order to meet the targets of its administrative plan for 2007: strengthening of operational quality improvement and guidance for high-risk operations and emerging-industry workplaces; reinforcement of occupational safety management integration and research in accident prevention and safety monitoring; enhancement of research on working conditions and monitoring of occupational injury and disease, and vigorous promotion of health management in the workplace; reinforcement of occupational disease prevention management and research on control and prevention technology, and establishment of monitoring and assessment techniques; and expansion of education, extension, and consulting services, as well as international exchange, in regard to the results of research safety and health technology.

IOSH carried out the following tasks in 2007:

1. Conducting of working-environment surveys for high-risk occupations, and improvement of technological extension and guidance

- (1) Guidance in autonomous management and follow-up was provided to the medical equipment manufacturing industry, with assistance for the holding of 10 ethylene oxide hazard training sessions. Following this training there was an average 55.3% reduction in ethylene oxide exposure, with continuing improvement. In addition, an “Ethylene Oxide Exposure Risk Control Manual for the Medical Equipment Industry” was printed and supplied to industry associations and employers.
- (2) Guidance in occupational safety and health improvement on the systemic level was provided to 15 plants in the screen and plastic printing industry; this guidance boosted overall regulatory compliance in the industry to 93.8%, an improvement of 32.8 percentage points over the pre-improvement figure. Techniques for improving production processes were also completed; after two sessions of improvement each were carried out for screen printing plants and plastic printing plants, exposure to organic solvents declined by at least 20%. In addition, “A Practical Occupational Health Manual for the Printing Industry” and “Training DVD for the Prevention of Occupational Health Hazards in the Printing Industry” were produced and supplied to industry associations and employers using other similar production processes.
- (3) Sixty sessions of on-site working condition improvement in Chinese kitchens were carried out, with the use of a new type of range hood using an air-curtain generating device to control cooking fumes lowering the concentration of harmful substances in the air by more than 10% and a distributed-burn design reducing noise in the operating environment by over 10 dB.

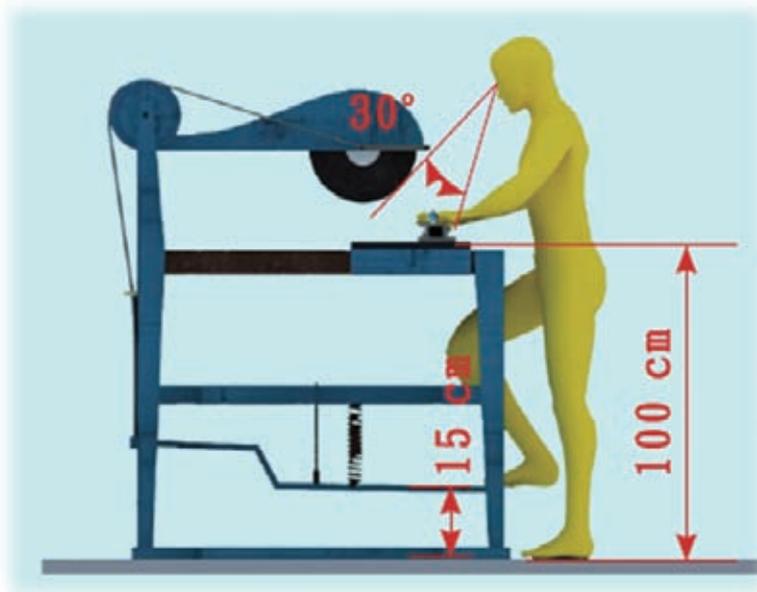


The new fume-control device, and patent certificate

- (4) Needle-puncture preventive strategies were mapped out for hospitals, intervention in actual hospital needle-puncture reporting by was used to raise the reporting rate, and educational publicity was used to reduce puncture incidents. Needle punctures in participating hospitals were reduced by 38%, from 4.7% of medical-care personnel annually prior to guidance to 2.9% after guidance. On-site guidance using anthropometric 3D graphs was carried out at more than 20 workplaces, and on-site inspection of 80 workplaces was completed.

2. Development of data on safety and health equipment for use by industry

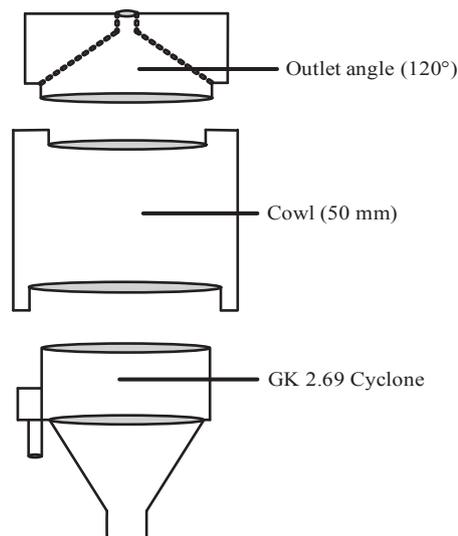
- (1) Anthropometric 3D graphs were used in carrying out on-site guidance for improvement at more than 20 representative workplaces, and 80 on-site inspections were completed.



An anthropometric 3D graph

- (2) Guidance inspections were carried out at boron-hydride dimethylamine plants and printed circuit board factories, and a method of analysis to determine workers' skin exposure to dimethylamine borine was established.

- (3) Verification and review of a Method of Biomonitoring Mercury in Urine by Cold Vapor Spectrophotometry were completed and provided for downloading by occupational disease and health inspection agencies as well as research institutions. People who work with mercury were helped to understand the total concentration of mercury in their bodies, which can be used as an index in improving the working environment and increasing the use of protective gear.
- (4) The Worker Exposure Assessment Database Management System developed by IOSH was used in calculating worker exposure risk and occupational safety risk estimation, and physiology-based toxicokinetics application software was developed and supplied to domestic man-made leather manufacturers for use in assessing workers' exposure to solvents and the threat to their liver function.
- (5) An Occupational Hazard Exposure and Positioning System was developed using radio frequency identification (RFID), and workplace noise determination was employed in developing an Automatic Continuous Monitoring System for Worker Exposure to Noise was completed. A Republic of China patent has been applied for, and the system will be supplied for use in making improvements by high-noise operators.
- (6) The specifications of respirable aerosol samplers currently on the market and the new filter holder developed by IOSH were used in developing a fibrous aerosol sampling computer simulation. Work on laboratory verification will be continued so as to assure that the new sampling method can replace the current fibrous aerosol sampling method. Patent applications have been submitted in Taiwan and the United States for the uniform-sampling filter holder, which can be supplied for use by operating environment sampling organizations.

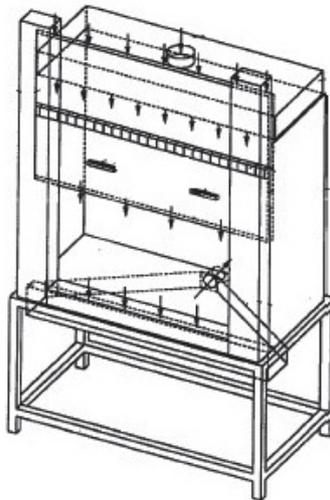


Fibrous aerosol sampler set proposed by IOSH

- (7) An RFID time-activity pattern recorder was developed to provide real-time knowledge of the source and quantity of nanoparticles in the workplace. The recorded was provided for use by nano-related industries.
- (8) A feasibility review of the use of static cyclones and fiber filters in nanoparticle sampling was completed and a design study for a nuclepore personal nanoparticle sampler was carried out for the use of nano-related industries in evaluating their operating environments. It was also determined that the traditional filter sampling method currently in use can be used to carry out nanoparticle evaluation, and this conclusion was provided to companies for use as a reference in evaluating exposure in the nanoparticle

operating environment.

- (9) A method of evaluating the protective performance of gloves used in nano-related industries was established using standard international procedures for evaluating the protective performance of gloves, and was provided to operators to prevent the threat of skin contact.
- (10) Germ and fungus sampling and analysis were carried out, with 1,664 samples being taken in MRT stations and 508 in aircraft passenger cabins, and a practicable strategy for bio-aerosol sampling was set up for operators to use in workplace evaluation.
- (11) A “Guide for the Prevention of Bio-hazards in College and University BSL2 Laboratories” was published for the reference of operators and the responsible authorities.
- (12) Guidelines for wind-tunnel experiments on scale-model suspended hoods were worked out, helping enterprises to utilize local exhaust ventilation, speed up the design and evaluation of equipment, and lower the cost of setting up occupational disease prevention and control facilities.
- (13) A new type of biological safety cabinet was developed and its performance validated; it has been patented in Taiwan, and patents have been applied for in the United States, Europe, and Japan. The technology has been transferred to the National Taiwan University of Science and Technology for provision to colleges and universities, hospitals and clinics,



Wind-curtain biological safety cabinet

- (14) The OCRA Index for the evaluation of repetitive-task musculoskeletal injuries and the HALTLV examination technique were brought in from the U.S. and Europe, and their localization for nine domestic operations was assessed. The results indicate that the OCRA Index has a better correlation with occupational injury ratios, and the HALTLV is simpler to use. The results of the study were provided for employers, occupational injury doctors, and the Bureau of Labor Insurance to use in judging occupational wrist disorders.
- (15) A software program for the analysis of shock vibration was written for use in the determination of vibration in workplaces with impulsive vibration exposure and for exposure data analysis needed to establish vibration exposure hazard assessment methods and carry out the training of hazard evaluation personnel. The results were provided for use in vibration exposure hazard evaluation management, and for use as a reference in formulating related exposure standards.
- (16) Preliminary testing of on-site applied noise improvement using an embedded digital signal processor

- (DSP) control module was carried out on a ventilation system model with airflow supplied by an axial flow blower. The results can be used as a reference for active noise control in ventilation ducts.
- (17) Performance enhancement evaluation of local exhaust ventilation equipment was carried out, and instructions for use were written. The results were put online for trial use and, after final modification, will be supplied for use by operators.
- (18) A study on “Occupational Health Advisory Mechanism for the Restaurant Industry” was carried out and an “Illustrated Ergonomic Working Posture Manual for Workplace Design Improvement” was produced. The former was done mainly for the restaurant industry to use as a reference in kitchen design and personnel management; the latter provides 100 working posture illustrations for industry to use in improving ergonomic engineering in the workplace.



Research Report and Technical Manual Published by IOSH

- (19) A study has confirmed that the wearing of impervious rubber gloves or protective clothing of C-grade film or better in semiconductor and flat-panel display industry workplaces where large amounts of tetramethylammonium hydroxide are used to clean solvents provides effective protection for at least two hours of working time, assuring the safety and health of workers who are accidentally sprayed with the chemical.
- (20) Occupational accident prevention and health management publicity materials suited to the culture and the needs of indigenous peoples were designed and indigenous teachers were trained, and the resources of the government and the private sector were integrated in the establishment of a supportive workplace safety network.
- (21) A study of metabolic syndrome in high-risk industries was carried out. Enterprise units can use the regular checking of waist size and blood pressure to screen out high-risk groups, and then can take steps to effect improvement. The prevention of metabolic syndrome can lower the incidence of cardiovascular disease and Type 2 diabetes. The results of the study were provided for employers and workers to use

managing health.

- (22) A worker depression screening scale was developed and a study on the prevention of suicide among workers was carried out. The resulting “Workplace Depression Self-prevention Manual” and research report can be used by the relevant industries and enterprise units.
- (23) A work-risk test scale for abnormal-temperature operations was developed for use by enterprise units, and practice in the advanced countries was taken into consideration in the development of a test chart for temperature and humidity in working environments that is suited to current conditions in Taiwan, as well as a semi-quantitative test chart for the evaluation of the risk of exposure to coldness and heat.
- (24) American, Japanese, European Union, and international (IEC) installation regulations for external shell-type anti-dust-explosion electrical apparatus were analyzed and an installation guide for such equipment was established. Two draft standards were also proposed, for adoption by the anti-explosion electrical equipment industry and for safety and health units, inspection units, and the Bureau of Standards, Metrology and Inspection, for electrical equipment used in explosive dust environments: “Part 0: General Rules” and “Part 1: External Shell Type.”
- (25) Standard operating procedures for advancing guardrails were completed and an inspection checklist along with an improved design and cost-effectiveness analysis for advancing guardrails were offered. The standard operating procedures were provided to enterprise units for reference and to the Council of Labor Affairs for use in revising laws and regulations and in systemic improvement.
- (26) European, American, and Japanese technical standards for joint flanges and grounding for the prevention of static electricity hazards were collated and a guide for joint flange and grounding in factories was established for use by enterprise units, safety and health agencies, and inspection agencies.
- (27) A comparison of structural criteria for intermediate supports for lifelines in different countries was carried out and a new type of intermediate support was developed, design criteria for intermediate supports were established, and application for a patent for the new-type intermediate support is planned. The design criteria will be provided to enterprise units for reference.
- (28) A technical guide for labor safety and health was compiled in accordance with work characteristics and types of machinery used in the paper-making industry, for use by paper-making industry associations and enterprise units.
- (29) A databank containing documentation templates for labor safety and health management systems in the construction industry and check lists for dangerous workplaces was established, and an entrance control module and dynamic safety monitoring module were developed. A construction safety risk management information system website was set up and application assessment was carried out. The results can be applied to safety management and self-inspection by enterprise units.
- (30) Applications of burning and explosion theories integrated and analyzed, and a commercial prototype of a fire simulation device was produced for display use at safety and health activities and for the simulation of experience by enterprise units.
- (31) Dust explosion pressure and maximum explosion scope definition for domestic industries that frequently use nano dust operations, such as aluminum, titanium, and iron, were established and planning was carried out for a strategy for the prevention of nano dust explosion in domestic industries. The results were provided to related enterprise units for reference and application.
- (32) Testing and evaluation methods for non-ionizing radiation-infra red and low-frequency magnetic fields in the operating environment were established for use as a reference in on-site occupational safety and



health management risk evaluation.

- (33) Techniques and criteria for the assessment of ventilation system performance were established, website and designated ventilation system data were collected, and requirements were proposed for methods of validating the performance of ventilation systems at the time of installation and for routine checkpoint work.
- (34) Evaluation was carried out of the potential risk to health of exposure to different biological hazards, and the results show that exposure to specific fungi in hospitals can affect the health of workers. Visible mold spots in hospitals, therefore, should be eliminated and an appropriate degree of indoor humidity maintained to avoid excessive dampness. In addition, measures for the prevention of health hazards should be formulated and provided to enterprise units.
- (35) The quality of workers' sleep was assessed to see how it related to work pressure and work performance, and to emphasize the importance of sleep quality to performance on the job. A promotional optical disk on "Knowing Sleep Apnea" was produced to persuade drivers to take sleep problems seriously, improve the quality of their sleep, and manage their own sleep health properly.

3. Research on Regulatory Provisions, and Strategies for System Promotion

- (1) Analytical research was carried out on the monitoring of domestic occupational health and disease (by county and city, type of cancer, 10 top causes of death, women, indigenous peoples, suicide). The collection of data for the labor insurance databank was continued, an occupational health and disease monitoring system was established, and occupational health data collected from different workplaces was integrated into a framework for an occupational safety and health information platform.
- (2) IOSH continued establishing its databank, which now contains 1.2 million items, on hearing, needle puncture, and blood lead reports, and on health inspections for the prevention of occupational disease. A domestic integrated and automatic occupational injury and disease monitoring system was established, with online enquiry of occupational injury and disease data by type of occupation, sex, and county or city added.
- (3) An occupational injury and disease monitoring system and health databank for indigenous peoples were established to provide immediate information of occupational injury indexes, trends in the incidence of occupational injury and disease, and intervention.
- (4) A complete databank of labor insurance health examinations for the prevention of occupational disease was established and 2005 labor insurance preventive health examination data from the Bureau of Labor Insurance were used to carry out an analytical study of the basic characteristics of examinees in 23 high-risk operations and of insured units, and of distribution by age, sex, occupation, and examination results, with the aim of establishing a health examination databank for workers in specified high-risk occupations in Taiwan and compiling a ranking of causes of death by occupation to use as a reference in the future study of occupational disease and risk factors.
- (5) A study of occupations with a high risk of metabolic syndrome and potential risk factors in Taiwan show the prevalence of metabolic syndrome at 19.4% for male workers and 14.8% for female workers. Occupations with a high risk of metabolic syndrome for males are manufacturing, construction, and business; for females, the occupations are business and farming, forestry, fishery, and animal husbandry. Excessive waist size and abnormal blood pressure are extremely important risk factors in metabolic syndrome.

- (6) An occupational injury databank system was established and reference provided for the analysis of injury-reduction data. Statistical data on occupational accidents among specified groups for which IOSH is responsible (fishermen, indigenous peoples, and foreign workers) is updated regularly, and numerical data on occupational accidents among these groups was provided to interministerial meetings on accident reduction for reference in the formulation of improvement strategies. Publicity was carried out and preventive measures offered in regard to frequent problems or causes associated with occupational injury.
- (7) A national questionnaire survey of the threat of worker exposure to chemical factors and a survey of exposure threat to 27 occupations in 600 companies in the manufacturing industry were carried out, and a data base with search and updating capability was produced. The results will help with calibrating and understanding the impact of standards for occupational disease exposure risk for this study, and will serve as a basis for worker protection and the formulation of policy.
- (8) A data base of worker cardiovascular disease records was established and job factors that induce acute cardiovascular disease were studied, the relationship of work characteristics and job pressures to coronary artery disease and stroke onset. The influence of social stratum, ..., and social support on cardiovascular disease among workers was also studied. The results of the study indicate that job pressures have some correlation with the incidence of cardiovascular disease, with the item "Is travel regularly required?" being the most obvious factor.
- (9) In line with the policies of the Executive Yuan's Sustainable Development Committee and of the CLA's policies on safety and health technology research, data on exposure parameters and data from the literature were collected for the establishment of a localized data base of risk-assessment exposure parameters to use as a reference assessing the risk of exposure to chemicals threats in the workplace.
- (10) Recommended exposure limits (REL) for workplace hazards in Taiwan were set up to use as a basis for permissible exposure limits (PEL). A general meeting of the Working Committee for the Review of Workplace Hazard Recommended Exposure Limits was convened; PEL documentary review was carried out for toluene, hexane, trichloroethylene, manganese and its compounds, and hydrogen sulfide, and the PELs were submitted to the Council of Labor Affairs.
- (11) The Department of Labor Safety and Health was assisted in carrying out policy research on the 2008 Globally Harmonized System of Classification and Labeling of Chemicals. Data were collected on the systems for the registration and management of hazardous materials in China, Japan, the United States, Canada, South Korea, New Zealand, and the European Union; then, in accordance with conditions in Taiwan, four proposals were submitted for hazardous material registration and management mechanisms for the Department of Labor Safety and Health to use in formulating strategy in regard to the Globally Harmonized System of Classification and Labeling of Chemicals.
- (12) Four meetings of the Committee for Workplace Environmental Testing Technology were convened and introduction and validation of five reference methods for the sampling and analysis of propylene glycol methyl ether, propylene glycon methyl ether acetate, dipropylene glycol methyl ether, formaldehyde, biphenyls, and hydrocarbons were carried out. The reference methods passed review by the working committee, and their adoption was recommended to the Council for Labor Affairs.
- (13) Approximately 1,180 pieces of survey data on exposure to hazardous materials were collected in coordination with labor inspections. In addition to helping with the inspection of samples, IOSH also made recommendations for policy implementation by the Council of Labor Affairs.
- (14) Data were collected on overall indoor air quality management strategy, testing methods, and sampling



techniques in the United States, Hong Kong, Singapore, Japan, and South Korea; these data were compared with indoor air quality policy in Taiwan, and the results were provided for reference in setting policy directions for domestic workplace air quality management.

- (15) Data on foreign worker numbers, source countries, employing industries, and injury statistics were collected from the United States, Canada, the United Kingdom, Finland, the European Union, Australia, New Zealand, Japan, South Korea, and Singapore, and information on foreign worker safety and health management systems in the U.S., the U.K., Australia, Japan, and Singapore are being gathered. The information is studied and suggestions made on the implementation of new measures and the reinforcement of existing measures by the Taiwan government.
- (16) Data on occupational injury prevention and rehabilitation systems and in the United States, Japan, South Korea, and Germany were collected and collated, and the results used, along with information from expert group meetings and interview materials, as a reference in establishing occupational injury prevention and rehabilitation systems in Taiwan.
- (17) Data were collected and compiled on foreign air circulation requirements and specifications in regard to specific hazardous materials, air-circulation data were collected from domestic and foreign safety and health websites, and information on air-circulation function requirements for 10 specific types of workplaces were collected and collated. Enterprise units were visited to survey and discuss the requirements of the existing air-circulation management system.
- (18) Testing was carried out on the effects of nanoparticles on cells, and on leakage at experimental areas where nanoparticle testing is carried out. Exposure evaluation techniques for nano work areas were developed, and 11 papers were presented at international nanotechnology and occupational and environmental health symposiums. The Japanese nanoparticle management system was introduced for reference by the Council of Labor Affairs.
- (19) A study of international trends in occupational injury and disease compensation and of directions for improvement in Taiwan was carried out, and the results were provided to the government for reference in the future reform of Taiwan's labor insurance injury and disease compensation.
- (20) A survey was carried out of the shift systems used for drivers and a study of physical and mental fatigue was conducted. The correlation between shift systems and fatigue, physical and mental health, and accident rates was studied with the aim of establishing future fatigue management indexes and formulating a reasonable shift-work time system that will protect the physical and mental health of professional drivers, avoid fatigue, and reduce traffic accidents.
- (21) The contact platform of the Occupational Injury Rehabilitation working group was used to review and integrate the CLA's occupational injury rehabilitation policy and implement the Occupational Injury Rehabilitation and Return to Work Plan, and to establish an occupational injury case management system that can provide Taiwan with complete occupational injury rehabilitation operations encompassing the establishment of an occupational injury reporting system that conforms to the needs of rehabilitation and the building and linking of an integrated occupational injury rehabilitation service system including medical care, medical rehabilitation, and the strengthening of abilities needed for returning to work, as well as case management and transition to occupational rehabilitation and job training, along with social welfare systems.
- (22) A study was carried out of the work factors leading to acute cardiovascular disease and their correlation with the nature of work, work pressure, and the occurrence of coronary artery disease and stroke. Such

complicating conditions as high blood pressure, hyperlipidemia, and diabetes remain the greatest threat factors in strokes, and the treatment of these complicating conditions was found to be the most important factor in stroke prevention. These results were provided to the CLA for use in formulating policy, revising laws and regulations, and establishing system improvement applications and standards.

- (23) Factors affecting the physical and mental health, family function, and work pressures of females employed in the special working conditions and shift systems of convenience stores were studied. The results of the study indicate that the sleep quality and family function of persons working mixed shifts in convenience stores, whether or not they are required to work night shifts, are worse than those of non-shift workers. The results were supplied to the CLA for use as a reference in formulating policy, revising laws and regulations, and establishing system improvement applications and standards.
- (24) A survey was carried out of the recognition of workplace safety and health conditions in Taiwan so as to gain an overall understanding of labor safety and health conditions and problems to use as a basis for labor safety and health administration, worker inspections, and directions of study.
- (25) A study of the maintenance of working ability in middle-aged and elderly workers was completed and a working-ability maintenance strategy was formulated for the CLA to use in establishing a health and physical fitness databank for middle-aged and elderly workers engaged in heavy work and in formulating working ability evaluation indexes.
- (26) Analysis was carried out of high-altitude work vehicle safety verification methods used in foreign countries, including inspection standards and means of verification along with related inspection requirements, and suggestions were made regarding regulations governing safety verification standards for high-altitude work vehicles in Taiwan. These can serve as a reference for the CLA's Department of Labor Inspection and Department of Labor Safety and Health, inspection agencies, and related enterprise units.
- (27) A study of remaining life assessment and assessment techniques for high-pressure gas vessels was carried out. Methods of assessing the remaining life of dangerous equipment were established for inspection agencies and enterprise units to use in carrying out inspections and estimating the remaining life of high-pressure gas vessels. The methods will be provided to the CLA's Department of Labor Inspection and Department of Labor Safety and Health, as well as inspection agencies and related enterprise units.
- (28) An analysis of occupational accidents happening during rooftop work was carried out and a rooftop operations safety index was established for use as a reference by the CLA's Department of Labor Safety and Health and Department of Labor Inspection, investigation agencies, and related enterprise units.
- (29) Statistical data on the types and causes of occupational accidents in public construction, and the linkage between those accidents and the management systems of the agencies in charge of the projects where the main accidents occurred, were analyzed and suggestions were submitted concerning Taiwan's public construction safety management mechanisms for use by the CLA as a reference in carrying out safety management in the implementation of domestic public construction projects.
- (30) Statistics on the types, causes, mediums, and work categories of building construction accidents over the years were analyzed, multivariate cause and linkage analysis was carried out, and construction accident potential and preventive measures were analyzed and the results provided for reference to the CLA's Department of Labor Safety and Health and Department of Labor Inspection, as well as investigation agencies and related enterprise units.
- (31) Risk assessment methods for mechanical equipment were established, along with quantitative and semi-



quantitative risk assessment guidelines for domestic hazardous mechanical equipment, and were provided to the Department of Labor Safety and Health to use as a reference in the revision of the safety inspection rules for dangerous mechanical equipment.

- (32) An analysis of the liquefied petroleum gas vessel management system in Taiwan was carried out and the results provided to the CLA's Department of Labor Safety and Health for use in determining liquefied petroleum gas vessel management policy.
- (33) A method for the analysis of styrene metabolites in urine was developed and related factory visits were carried out in order to study the effects of gene polymorphism on the biological exposure index (BEI). The results were supplied to the CLA for reference in the establishment of a BEI for exposure in styrene working environments.
- (34) A handbook of common deficiencies and improvement measures for the manufacturing and construction industries was compiled for adoption by the CLA, and auxiliary teaching exhibit objects were produced for display at appropriate safety and health exhibitions.
- (35) Data on integrated management strategies and testing and sampling methods for indoor air quality in the United States, Hong Kong, Singapore, Japan, and South Korea were collected and a comparison made with Taiwan's policies in regard to indoor air policy. The results were provided to the CLA and its Department of Labor Safety and Health for reference in establishing policy for air quality in indoor workplaces.
- (36) A broad-based survey and study of the status of mental and physical health among domestic physically handicapped workers of different age groups and professions were conducted, and a survey was carried out of repetitive musculoskeletal disorders among physically disabled workers as well as the ageing of work fitness in Taiwan. The results will be used in the establishment of work fitness ageing indexes and assessment methods for physically handicapped workers as well as measures for the strengthening of work fitness.
- (37) Strategies were planned for the prevention of industrial nano dust explosions in Taiwan. The strategies are to be adopted by the CLA's Department of Labor Safety and Health and Department of Labor Inspection, as well as investigative agencies.
- (38) Statistical analysis was carried out of the linkage of occupational accidents with mediums, type of work, and seniority of workers in the paper-making industry in Taiwan, for the reference of the Department of Labor Safety and Health, Department of Labor Inspection, and investigation agencies.

4. Strengthening of safety and health technology information services, provision of downloading and information services for data on labor safety and health technology, publication of labor safety and health periodicals, and propagation of safety and health know-how through safety and health exhibits:

- (1) Electronic versions of books and periodicals published by IOSH over the years were put online for free downloading. In 2007 these publications were surfed more than 1 million times and downloaded 250,000 times, resulting in the widespread dissemination of the results of IOSH research.
- (2) One thousand and one hundred copies each of the four issues of Volume 15 of the quarterly IOSH Journal and 750 copies each of Issues 81-86 of the Occupational Safety and Health Newsletter were published and supplied to scholars, experts, government agencies, enterprise units, and labor safety and health personnel for use as a reference in data enquiry, research and innovation, revision of laws, and safety and

health protection, as well as for stimulation of the exchange of academic information.

- (3) The Labor Safety and Health Exhibition Hall used lively display techniques to enhance safety and health concepts among students, workers, and others. Visitors totaled 12,300 during the year.
- (4) An “Our Body – Work Safety Exhibition” was held at the National Museum of Natural Science. More than 80,000 people visited the exhibit during its run From July 29 to the end of December 2007.



Work Safety Exhibition

- (5) A “Spring Industry and Commerce Exhibition” was held jointly with the Nantou County Government, and a four-day national roving exhibit on the prevention of occupational accidents was organized to promote the concept of occupational safety and health among the public. This activity attracted 40,000 visitors.
- (6) An event was held in cooperation with the Taipei County Government as part of the 2007 series of nation-wide activities to promote industrial safety. At the event, which attracted an estimated 10,000 participants, CLA Deputy Minister Kuo Fang-Yu and Taipei County Magistrate Hsi-Wei Chou jointly proclaimed “Labor safety begins with us!”



Taipei County Industrial Safety Week activities

- (7) The “Go Taiwan! Occupational Accident Prevention Exhibition and Tainan City Industrial Safety Week” was held, in cooperation with the Tainan City Government, at the Tainan Technology Industrial Park. IOSH research achievements and industrial safety marketing concepts were used to produce lively and interesting exhibition experiences, and Tainan City Mayor Hsu Tain-Tsair and CLA Minister Lee

Ying-yuan jointly proclaimed the goal of “Assured Industrial Safety, Zero Industrial Accidents.” Around 2,000 people attended.



Tainan City Industrial Safety Week activities

- (8) A “Occupational Accident Prevention and Labor Safety Family Education Event and Community Garden Party” was held, in cooperation with the Taipei City Government’s Labor Standards Inspection Office, at the Northern Taiwan Business Office of Chunghwa Telecom. About 1,800 people participated.



Taipei City Industrial Safety Week activities

- (9) Twenty-seven nation-wide traveling exhibit promotions were held in 2007, with assistance from the county governments of Nantou and Taoyuan, National Central University, Dongshi Industrial High School, Kaohsiung Harbor Bureau, Chongshi Senior High School in Yuanlin County, Tajen University, Taichung City Government, National Taiwan University, WuFeng Institute of Technology in Chiayi City, Nnan-Jeon Institute of Technology in Tainan County, AGC Display Glass Taiwan Co. in Yunlin County, Texas Instruments in Taipei County, the Taichung Export Processing Zone, and other organizations. These activities attracted a total of 102,909 participants during the year.
- (10) The “Hualien Road Run and Walk, and Go Taiwan! Occupational Accident Prevention” event was held, with cooperation from the Hualien County Government, in the Fenglin Town Citizen's Plaza in Hualien County. IOSH's research achievements and industrial safety marketing concepts were used to produce lively exhibition experiences that brought the participants more knowledge about occupational safety and health. The event attracted 2,500 participants.



Hualien County Government activities

- (11) An anti-drug campaign was carried out together with the Taiwan Indigenous Culture Promotion Association, with a stage play promoting the prevention of drug abuse by young people, aborigine singing and dancing, and educational activities advocating the building of a safe working environment. There was also a prize-giveaway quiz designed to increase attention to, and knowledge about, the prevention of occupational accidents among Taiwan's indigenous peoples.
- (12) IOSH cooperated with the Taichung City Government in organizing an “Invest in Industrial Safety” hike, and used the mobile safety and health exhibition trailer, a high-altitude work vehicle, and smoke-experience camp, along with static displays and hands-on learning, to boost the knowledge of the public about safety and health.



Activities of the Taichung City Government's Industrial Safety Week

- (13) The results of IOSH research in 2007 were presented to the nation's people in three events, one each in northern, central, and southern Taiwan, to give the public an understanding of the Institute's research efforts as well as to create opportunities for face-to-face exchange with enterprise units on ideas about safety and health. The presentations covered the results of 27 research projects under eight major topics related to labor health and safety problems and technologies: construction safety, nanotechnology, accident prevention among specific groups, occupational accident cases, control of contagious disease in the workplace, safety management, promotion of health in the workplace, and life and a healthy workplace. These studies and on-site application technologies were directed at safety and health issues in dangerous, high-risk, and emerging industries in Taiwan. A total of 709 persons attended.
- (14) Proceeds from the transfer of patents such as those for a Three-DOF Platform, Method for Removing Environmental Contaminants and Related Device, and Wireless Sensor and Real-time Monitoring System for Scaffold Structure Safety, and technologies such as Over-loading Cutout Devices for Truck Cranes, are growing rapidly each year, reaching NT\$1.95 million in 2007. These revenues will continue to be used for related research and the extension of the resulting technologies.



Patent certificates received by IOSH



Institute of Occupational Safety & Health