

IUPAC

International Union of Pure and Applied Chemistry

UNESCO

United Nations Educational, Scientific, and Cultural Organization

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United Nations Industrial Development Organization

SAFETY TRAINING PROGRAM

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**A REPORT OF THE TWO WEEKS SAFETY TRAINING PROGRAMME FOR MR KHISA
KELVIN THAT WAS HELD IN JAPAN FROM AUGUST 16 TO SEPTEMBER 2, 2002 WITH
SANKYO COMPANY ACTING AS THE HOST COMPANY.**

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Arigato Gozaimasu!

I DESCRIPTION OF RECEIVED TRAINING

1.0 INTRODUCTION

The Health and Safety Training that was contacted in Japan was based on the requirements for certification of companies for Occupational Health and Safety Assessment Series (OHSAS) 18001 and 18002. OHSAS 18001 gives the general Health and Safety specification requirements while OHSAS 18002 gives the guidelines for implementation. OHSAS 18001 is compatible with ISO 9001 (Quality) and 140001 (Environmental Management Systems) so as to facilitate the integration of Quality, Environmental and Occupational Health and Safety Management Systems. OHSAS specifications give requirements for an Occupational Health and Safety (OH&S) Management System that will enable an organization to control its OH&S risks and improve its performance.

This OHSAS specification is applicable to any organization that wishes to:

- Establish an OH&S management system to eliminate or minimize risks to employees and other interested parties who may be exposed to OH&S risks associated with its activities.
- Implement, maintain and continually improve an OH&S management system
- Assure itself of its conformance with its stated OH&S policy
- Demonstrate such conformance to others.
- Seek certification/registration of its OH&S management system by an external organization or
- Make a self-determination and declaration of conformance with this OHSAS specification.

2.0 OHSAS 18001 (OH&S MANAGEMENT SYSTEM ELEMENTS)

The organization shall establish and maintain an OH&S management system. There shall be an Occupational Health and Safety policy authorized by the organization's top management, that clearly states the overall health and safety objectives and a commitment to improving health and safety performance. It is essential that the OH&S policy is communicated and promoted by the top management in the organization. The elements of a successful OH&S management system is as shown below:

OH&S Policy
Planning
Implementation and Operation
Checking and Corrective Action
Management Review
Continual Improvement

2.1 The Policy

The management system requires that the policy:

- be appropriate to the nature and scale of the organization's OH&S risks;
- include a commitment to continual improvement;
- include a commitment to at least comply with current applicable OH&S legislation and with other requirements to which the organization subscribes;
- Be documented, implemented and maintained;
- Be communicated to all employees with the intent that employees are made aware of their individual OH&S obligations;
- Be available to interested parties; and
- Be reviewed periodically to ensure that it remains relevant and appropriate to the organization.

In establishing the OH&S policy, the management should consider the following items:

- Policy and objectives relevant to the organization's business as a whole.
- OH&S hazards of the organization
- Legal and other operational requirements
- Historical and current OH&S performance by the organization.
- Needs of other interested parties.
- Opportunities and needs for continual improvement.
- Resources needed.
- Contributions of the employees.
- Contributions of the contractors and other external personnel.

An effectively formulated and communicated OH&S policy should:

- Be appropriate to the nature and scale of the organization's OH&S risks (hazard identification, risk assessment and risk control are at the heart of a successful OH&S management system and should be reflected in the organization's OH&S policy). It should be consistent with the organization's vision, realistic and should neither overstate the nature of the risks the organization faces nor trivialize them.

2.2 PLANNING FOR HAZARD IDENTIFICATION, RISK ASSESSMENT AND RISK CONTROL

The organization is required to establish and maintain procedures for the on going identification of hazards, the assessment of risks, and the implementation of necessary control measures. The organization is required to ensure that the results of these assessments and the effects of these controls are considered when setting its OH&S objectives. This information should be documented and kept up to date. The Organization's methodology for hazard identification and risk assessment shall

- Be defined with respect to its scope, nature and timing to ensure that it is proactive rather than being reactive.
- Provide for the classification of risks and identification of those that are to be eliminated or controlled by known measures.
- Be consistent with the operating experience and the capability of risk control measures employed.
- Provide input into the determination of facility requirements, identification of training needs and/or development of operational controls.
- Provide for the monitoring of the required actions to ensure both the effectiveness and timeliness of their implementation.

2.2.1 Legal Requirements

The organization shall establish and maintain a procedure for identifying and accessing the legal and other OH&S requirements that are applicable to it. This information should be kept up to date and be communicated to the employees and other interested parties. The organization needs to establish and maintain an OH&S management programme(s) for achieving its objectives. This shall include the documentation of:

- The designated responsibility and authority for achievement of the objectives at relevant functions and levels of the organization; and
- The means and time scale by which objectives are to be achieved.

The OH&S management programme(s) needs to be reviewed at regular and planned intervals. They also need amendment so as to address changes to the activities, products, services, or operating conditions of the organization.

2.3 IMPLEMENTATION AND OPERATION

The roles, responsibilities and authorities of personnel who manage, perform and verify OH&S activities needs to be defined, documented and communicated in order to facilitate OH&S management. The ultimate responsibility for OH&S rests with top management. The organization needs to appoint a member of the top management to be responsible for ensuring that OH&S issues are properly implemented and made to perform.

2.3.1 Training, Awareness and Competence

Company personnel should be competent to perform tasks that may impact on OH&S in the work place. Competence here is defined in terms of appropriate education, training and experience. The organization shall establish and maintain procedures to ensure that its employees working at each relevant function and level are aware of:

- The importance of conformance to the OH&S policy and procedures and to the requirements of the OH&S management system.
- The OH&S consequences, actual or potential, of their work activities, and the OH&S benefits of personal improved performance.
- Their roles and responsibilities in achieving conformance to the OH&S policy and procedures and to the requirements of the OH&S management system, including emergency preparedness and response requirements.
- The potential consequences of departure from specified operating procedures.

2.3.2 Consultation and Communication

The organization shall have procedures for ensuring that pertinent OH&S information is communicated to and from employees and other interested parties. Each employee involvement and consultation arrangements need to be documented and interested parties informed. Employees shall be:

- Involved in the development and review of policies and procedures to manage risks
- Consulted where there are any changes that affect workplace health and safety
- Represented on health and safety matters
- Informed as to who is their employee OH&S representative and specified management appointee.

2.3.3 Documentation

The Organization needs to establish and maintain information that describes the core elements of the management system and their interactions and provides direction to related documentation. The company needs to establish and maintain procedures for controlling all documents and data required by this OHSAS specification so as to ensure that:

- They can be located easily
- They are periodically reviewed, revised as necessary and approved for adequacy by authorized personnel.
- Current versions of relevant documents and data are available at all locations where operations essential to the effective functioning of the OH&S system are performed.
- Obsolete documents and data are promptly removed from all points of issue and points of use or otherwise assured against unintended use
- Archival documents and data retained for legal or knowledge preservation purposes or both, are suitably identified.

Important forms of data include site plan(s), process flow charts, inventory of hazardous materials, monitoring data and work place environmental data.

2.3.4 Operational Control

The organization shall identify those operations and activities that are associated with identified risks where control measures need to be applied. There is therefore need for:

- Establishing and maintaining documented procedures to cover situations where their absence could lead to deviations from the OH&S policy and the objectives.
- Stipulating operational criteria in the procedures.
- Establishing and maintaining procedures related to the identified OH&S risks of goods, equipment and services purchased and/or used by the organization and communicating relevant procedures and requirements to suppliers and contractors.
- Establishing and maintaining procedures for the design of work place, process, installations, machinery, operating procedures and work organization, including their adaptation to human capabilities, in order to eliminate or reduce OH&S risks at their source.

2.3.5 Emergency Preparedness and Response

The Company shall establish and maintain plans and procedures to identify the potential for, and responses to, incidents and emergency situations, and for preventing and mitigating the likely illness and injury that may be associated with them. The organization shall review its emergency preparedness and response plans and procedures, in particular, after the occurrence of incidents of emergency situations. The organization shall also test such procedures where practicable.

2.4 CHECKING AND CORRECTIVE ACTION

The organization shall establish and maintain the procedures to monitor and measure OH&S performance on a regular basis. The procedures shall provide for:

- Both qualitative and quantitative measures, appropriate to the needs of the organization.
- Monitoring of the extent to which the organization's OH&S objectives are met.
- Proactive measures of performance that monitors compliance with the OH&S management programme, operational criteria and applicable legislation/regulatory requirements.
- Reactive measures of performance to monitor accidents, ill health, incidents and other historical evidence of deficient OH&S performance.
- Recording of data and results of monitoring and measurement sufficient to facilitate subsequent corrective and preventive action analysis.

2.4.1 Accidents, Incidents, non-Conformances and Corrective and Preventive Action

The Organization shall establish and maintain procedures for defining responsibility and authority for:

- The handling and investigation of (accidents, incidents, non-conformances)
- Taking action to mitigate any consequences arising from accidents, incidents or non-conformances.
- The initiation and completion of corrective and preventive actions.
- Confirmation of the effectiveness of corrective and preventive actions.

2.4.2 Records and Record Management

The Company needs to establish and maintain procedures for the identification, maintenance, and disposition of OH&S records, as well as the results of Audits and Reviews. OH&S records shall be legible, identifiable and traceable to the activities involved. The records shall be stored and maintained in such a way that they are readily retrievable and protected against damage, deterioration or loss. Their retention times shall be established and recorded.

2.4.3 Audit

The Organization shall establish and maintain an Audit programme and procedures for periodic OH&S management system Audits to be carried out, in order to:

- Determine whether the OH&S management system has been properly implemented and maintained; and
- Whether it is effective in meeting the organizations policy and objectives.

The Audit programme shall be based on the results of risk assessments of the organization's activities, and the results of previous Audits.

2.4.4 Management Review

The organization's top management shall, at intervals that it determines, review the OH&S management System, to ensure its continuing suitability, adequacy and effectiveness. The management review shall address the possible need for changes to policy, objectives and other elements of the OH&S management system, in light of Audit results, changing circumstances and the commitment to continual improvement.

3.0 (OHSAS 18002) HAZARD IDENTIFICATION, RISK ASSESSMENT AND RISK CONTROL

Measures for the management of risk should reflect the principle of elimination of hazards where practicable, followed in turn by risk reduction (reducing the likelihood of occurrence or potential severity of injury or damage) with the adoption of personal protective equipment (PPE) as a last resort. The organization should establish procedures for controlling its identified risks. The risk control procedures should be reviewed on a regular basis for their suitability and effectiveness, and changes that are identified as being necessary should be implemented. Examples of areas where risks do occur and proposed measures of intervention are as listed below:

3.1 Purchase and Transfer of goods and Services

- Approval to purchase or transfer hazardous chemicals and materials.
- Availability of documentation for the safe handling of machinery, equipment, materials, or chemicals at the time of purchase, or the need to obtain such documentation.
- Evaluation and periodic re-evaluation of the OH&S competence of contractors.
- Approval of the design of OH&S provisions for new plant or equipment.

3.2 Hazardous Tasks

This include the following

- Identification of hazardous tasks.
- Pre-determination and approval of working methods.
- Pre-qualification of personnel for hazardous tasks
- Permit-to-work systems, and procedures controlling the entry and exit of personnel to hazardous work sites.

3.3 Hazardous Materials

- Identification of inventories, and storage locations
- Safe storage provisions and control of access.
- Provision and access to material safety data and other relevant information.

3.4 Maintenance of Safe Plant and Equipment

These include the following:

- Provision, control and maintenance of the organizations plant and equipment.
- Provision, control and maintenance of Personal Protective Equipment (PPE)
- Segregation and control of access.

- Inspection and testing of OH&S related equipment and high integrity systems such as (operator protection systems, guarding and physical protection, shut down systems, fire detection and suppression equipment, handling equipments, radiological sources and safeguards, essential monitoring devices, local exhaustion ventilation systems, and medical facilities and related provisions).

4.0 EMERGENCY PREPAREDNESS

The organization should develop an emergency plan(s), identify and provide appropriate emergency equipment, and regularly its response capability through practice drills. Practice drills should aim to test the effectiveness of the most critical parts of the emergency plans and to test the completeness of the emergency planning process. While desktop exercises can be useful during the planning process, practice drills should be as realistic as possible so as to be effective.

4.1 Emergency Plan

The emergency plan(s) should outline the actions to be taken when specified emergency situations arise, and should include the following:

- Identification of potential accidents and emergencies.
- Identification of the person to take charge during the emergency.
- Details of actions to be taken by personnel during an emergency, including those actions to be taken by external personnel who are on the site of the emergency, such as contractors or visitors (who can be required to move to specified assembly points).
- Responsibility, authority and duties of personnel with specific roles during the emergency (fire wardens, first aid staff, toxic spillage specialists).
- Evacuation procedures.
- Identification and location of hazardous materials, and emergency action required.
- Interface with external emergency services.
- Communication with statutory bodies.
- Communication with neighbors and the public.
- Protection of vital records and equipment.
- Availability of necessary information during the emergency (plant lay out drawings, hazardous materials data, procedures, work instructions and contact telephone numbers).

The involvement of external agencies in emergency planning and response should be clearly documented. These agencies should be advised as to the possible circumstances of their involvement and provided with such information, as they require to facilitate their involvement in response activities.

4.2 Emergency Equipment

Emergency equipment needs should be identified, and equipment should be provided in adequate quantity. This should be tested at specified intervals for continuing operability. Examples include the following items:

- Alarm systems
- Emergency lighting and power
- Means of escape
- Safe refuges
- Critical isolation valves, switches and cut-outs
- Fire fighting equipment.
- First aid equipment (including emergency showers, eye wash stations)
- Communication facilities.

4.3 Practice Drills

Practice drills should be carried out according to a pre-determined schedule. Where appropriate and practicable, the participation of external emergency services in practice drills should be encouraged. Typical outputs include the following items:

- Documented emergency plans and procedures.
- Emergency equipment list.
- Test records for emergency equipment.
- Records of the following (practice drills, reviews of practice drills, recommended actions arising from the reviews, progress against the achievement of recommended actions).

5.0 EVALUATION OF OCCUPATIONAL HEALTH AND SAFETY ISSUES AT INDUSTRIAL AND RESEARCH INSTITUTION LEVEL.

On Job training visits were organized to fourteen institutions that included six companies and eight research institutes/centres. The Companies visited with an aim of ascertaining how they manage their safety issues included Sankyo's Tanash, Odawara, Hiratsuka and Onahama Plants, Fuji Film Makers, Tokyo Eco (Hitachi Group) and Research Institutes namely the Sankyo Research Centre, National Institute of Industrial Safety, Tokyo Metropolitan Research Institute for Environmental protection, Bosai-Kan Life Safety Learning Centre, The Chemical Society of Japan, Tokyo Sanitary Landfill, Port of Tokyo and the Tokyo Metropolitan Environmental Centre. At each of the plants or institutions/centers visited, the following safety issues were emphasized:

5.1 Sankyo Tanash Plant

This is a Bakers yeast plant that was established in 1940. The Occupational Health and Safety interventions at the Plant included the following:

- All the raw material storage tanks are banded to ensure that in the event of a leakage, overflow or spillage, all the materials are recovered without contaminating the environment.
- Fire extinguishers that are operational and frequently serviced, are placed at well-determined designated and marked places so as to facilitate a rapid response to a spontaneous fire out break.
- Each floor of the plant has an emergency shower system in case an employee seeks to wash off a corrosive chemical splash.
- The company has in place eye wash stations to facilitate a quick response to washing out a chemical that has spilled into the eyes.
- There are strong warnings prohibiting the use of fire in areas that have inflammable substances.
- Hazardous wastes are segregated, and stored separately in well-marked zones in containers that can contain spillages in the event of an earthquake. The stores are securely locked and keys are in possession of a senior company employee.
- Solid wastes generated on the plant are segregated into plastics, glass, cans, rubber and batteries for on ward recycling.
- Company dormitories are fitted with “Oriro” Descenters. These are belts/ropes that can provide alternative evacuation routes for house occupants in the event of any emergency.
- An operational fire-fighting engine.

5.2 Sankyo Research Laboratories

Sankyo has 12 research laboratories. All these laboratories prioritize occupational Health and Safety and even go beyond to also conserve the neighboring environment. Notable safety issues at the laboratories included:

- All experiments that involve the use of toxic or hazardous materials are undertaken in hoods with air sucking mechanisms.
- All the laboratories are fitted with organic solvent traps to ensure zero solvent emissions into the air. The organic solvents are then collected and incinerated.
- Each laboratory is fitted with smoke detectors that will automatically put on an alarm system in the event that fire breaks out.
- On an annual basis, all employees are trained on how to escape in the event that there is a fire out break within the company premises.
- The laboratory doors are automated in the sense that they will automatically close and prevent the spread of the fire.
- Selected windows of the laboratory are marked with inverted red triangles to enable fire fighters to easily gain entry into the laboratories incase fire erupts.

- In order to minimize risks associated with hydrogen explosions, the hydrogen use chamber is fitted with explosion safety valves which are located on the top most floor of the laboratory.
- Danger escape routes are pinned on the walls and thoroughly explained to all employees.
- Employees use safety helmets at all the risky areas of the laboratories.

5.4 Sankyo Odawara Chemicals Plant

This is an antibiotics Plant. In order to enhance safety at the plant, the following steps have been put in place:

- All hydrogenation facilities are located out side the main buildings so as to reduce the risks for an explosion. The chamber is fitted with double valves to ensure that there is no possibility for the hydrogen leakage. Fire arrestors are installed in the hydrogen buildings.
- There is in place a solvent adsorption apparatus.
- There is a stand by fire truck to respond rapidly to any emergency before external help is sought if necessary.
- Fire extinguishers are put in designated places as per the Japanese Service Law of Japan.
- All employees are supplied with protective ware.
- The company has in place a huge mobile carbon dioxide fire extinguisher that weighs 1,400 kg for purposes of fighting fire emanating from inflammable solvent fires and electrical caused ones. The system has two exhausters, the top one that lasts 40 seconds and the bottom one that can last 240 seconds in service.
- Signs restricting the use of fire in dangerous zones are well posted.
- The management of explosive Gas storage chambers is assigned to specific individuals that will be held accountable for any eventualities.

5.5 Sankyo Hiratsuka Plant

This plant is for tablet packaging. The safety issues addressed by the plant include the following:

- That all employees working in the plant have to put off their shoes and change to disinfected company uniform before gaining entry into the plant.
- Routine washing of hands with disinfectants and drying before embarking on duty (to eliminate dirt and dust).
- To avoid contamination by human contact, all the weighing of materials is computerized.
- All the company buildings are ringed with a 3 metre wide aggregate zone between the plants and the wall. This serves to prevent insect contamination of the drugs.

- After a play break all employees should brush their shoes and clothes before entering the building.
- The lighting system is automated with sensors in such a way that it comes on automatically when humans enter the rooms and goes off when they leave. The mechanism is meant to ensure that insects are not attracted into the building.
- The lighting system is of selected frequency that repelling to insects.
- There is an Air Shower system that all employees must make a complete turn through before entering the building. The air shower is meant to blow off insects.
- There is alternate opening of the doors with an aim of limiting the chances for insect entry into the plant.
- Smoke sensors are installed in the warehouse and doors are automated to close automatically so as to prevent the spread of the fire.
- To increase the packaging and the un packaging efficiency upon an order being made from the warehouse, the warehouses are automated and fitted with Laser Guided Vehicles. Very few humans man the entire process of receiving and dispatching the drugs from the warehouse. Less congestion and reduced human risks.
- A 60,000-litre capacity water reservoir is in the company premises to be used to fight fire in the event of such an emergency.
- Electricity generation is from solar and not natural gas that has many entailing risks.
- Storey buildings are fitted with fire ladders to provide alternative escape routes.
- Automatic solvent sensors are fitted to monitor the solvent concentration in the working environment. Excess solvent concentration sets on an alarm system.
- Emergency water showers are in place.
- Eye wash stations have been installed.
- Hoods and draught chambers are fitted with scrubbers.
- Use of inert nitrogen atmospheres when dealing with explosive materials and also control static explosions.
- Use of safety clothing and equipment (cloves, helmets, goggles, gas masks, special material laboratory coats, use of static explosion proof mats)
- All the storage tanks for solvents, wastewater etc are banded and have a five-year routine maintenance schedule.
- All drains from the solvent storage tanks are fitted with functional solvent traps.
- Lighting Arrestors are installed on all high-rise buildings.

5.6 Sankyo Onahama Plant

The plant was established in 1987 for purposes of manufacturing Pravastatin Sodium Starts. The Safety and Environmental measures at the Sankyo's Onahama Plant are as stated below:

Hard Side

1. Fire Sensor: 24 hour surveillance
2. fire protection system (provided with alarms connected to gate keepers house, and the office engineering section, also monitored for 24 hours).
3. Fire fighting equipment: Chemical fire engine.
4. Security: Infrared Sensor.

Soft Side

1. Safety and Sanitation Committee: meets once a month.
2. Self-fire response team, has been organized at the firm.
3. Practice drills of fire response and evacuation: done once in a year.
4. Emergency information network for nights and holidays set up at the plant.
5. Inspection of emergency response equipment: once a month.
6. Safety Patrol: once a month (safety and sanitation committee members)
7. Compliance Assessment: once a year (headquarters and on-site Audit).
8. Medical Examination: once a year
9. Environmental management committee: meets once a year
10. Evaluation of the work environment: once a year (done by out side contractor).

The following safety issues were experienced during the walk through of the plant:

- Fire sensors (infrared) that are monitored on a 24-hour basis with an alarm system connected to the gatekeepers' house and the engineering section.
- Company has a chemical fire engine in place.
- The company has a 200-tonne water reservoir on the compound for purposes of being used to fight fire in the event of such an emergency.
- Infrared monitors are mounted in critical locations to monitor danger.
- Each section has routine health and safety meetings, undertakes safety audits, and fire response and evacuation drills.
- All explosive solvents are dealt with in an inert nitrogen environment.
- Strict adherence to standard operating procedures (SOPs).
- All dangerous and rotating parts of the plant are covered with meshes to ensure worker safety and the names of those in charge are written on such vessels.
- Fire extinguishers are correctly designated and marked locations. Carbon dioxide extinguishers are used for fighting electric and solvent fires, as water use here is not effective).
- Emergency showers are on each floor of the plant.
- Eye wash stations are on each floor of the plant buildings.
- Fermentation tanks are washed with compressed water and with strict oxygen monitoring to ensure the safety of the cleaners (use portable oxygen meters). When the oxygen content in the drying room becomes less than 18%, an automatic alarm system turns on. The fermentation tanks should be fitted with oxygen-meter, gas detectors and fresh air packs.

- The company piping system is distinguished with colors (Red for steam, Blue/white for water, and black/red for alkali. This ensures safety in the handling and management of repairs.
- Steam lines are strictly lagged.
- Steam splash is prevented through a cone shaped design (inverted funnel)
- Banding of sulphuric and alkali storage tanks.
- Use of corrosion resistant protective ware.
- Fire sensors are fitted to raise an alarm to all employees in case that there is a fire out break.
- The entire plant is fitted with computer controlled production alarms.
- Dust collection suction systems are operational in all dust-contaminated environments. Wearing of dust masks is also encouraged.
- There is a functional public address system to be used to spread quick messages in the event of an emergency.
- Use of electrostatic shoes is encouraged in zones that experience electrostatic electricity.
- First Aid tool kits are located in critical points of the plant (high risk areas).

In summary, the following safety measures were in operation at the plant

1. Fire Protection (powder fire extinguisher, carbon dioxide gas extinguisher, foam extinguisher, smoke, temperature detector). Connected directly with fire alarm that lets the guard office know about the fire.
2. Static Electricity (earth removing of static electricity, safety shoes for static electricity, use of an earth mat, static electricity checker for safety of shoes, of which electrical conductivity is always checked before work begins every morning).
3. Earth Quake (seismograph in guard office)
4. Thunder (lightning arrestor).

5.7 Shimizu Corporation.

This is one of the leading construction companies in Japan. The Company has developed a Safety Manual for the Construction Industry to be used by foremen and newly recruited workers. The Safety Manual was developed using the Guidelines on Occupational Health and Safety Management Systems for the Construction Industry of Japan. Principle contents of the Safety Manual are:

1. Importance of Safety (do not repeat tragedies, management efforts may be wiped out, repeated accidents damages the company reputation, safety improves company productivity).
2. Safety Rules in Construction Work Places (safety rules, work procedures and work manuals, and safety and health statutes must be fully implemented at construction sites).

3. How to enhance safety (safety work cycles, morning safety meetings, advance inspection of work procedures, safety inspection by site manager/safety patrols, guidance and supervision during work, coordination of safe work processes, cleaning up of each work area, checking work sites at the end of work, danger prediction activities, safety patrols).
4. Safety Manuals for Newly Assigned Workers (checking the work site, clothing appropriately for work, safety helmets, safety belts).
5. Ten Safety Principles:
 - Use safety helmets and clothing correctly.
 - Inspect machines and tools in advance of their use.
 - Follow all instructions of operation chiefs and supervisors and correctly carry out operations.
 - Use safety belts where there is any risks of falling.
 - Never enter any areas posted with keep-out signs or other dangerous places.
 - Immediately notify your supervisor upon finding any unsafe conditions.
 - In joint operations, follow established procedures and signals for safety.
 - Handle electrical machinery and hazardous materials with care under established operational procedures.
 - Operate vehicle-type construction machines and mobile cranes only after confirming safety in terms of surrounding areas.
 - Ensure that work sites are always well-arranged and cleaned up after operations.

Shimizu Corporation is also actively involved in the restoration of contaminated soils and ground water in Japan. The exercise involves surveys and measures concerning heavy metal pollution and Volatile organic compounds. Exposure was made to key examples of countermeasure soil and water contamination restoration technologies. These included the following:

- Sampling (soil check simplified method, buggy mounted type sampling technology for underground substances).
- Soil gas examination methods (Gas Detection Tube Method, Hexane absorbing method, Carbon Adsorption/Electromagnetic Desorption/Mass Spectroscopy, Absorption/Thermal-Desorption/Gas Chromatography method).
- Simplified Heavy Metal Measuring Method (Accelerated Extraction/ Elution in Hydrochloric Acid for Measuring Metallic Pollutants).
- In Situ Decomposition Technologies
- In Situ Extraction Technologies
- In Situ Containment Technologies
- Treatment Technologies
- Decomposition technologies of Volatile Organic Compounds.

5.8 Tokyo Eco and the Hitachi Group

Tokyo Eco is involved in the active business of recycling television sets, air conditioners, refrigerators and washing machines. This was in response to the newly enacted recycling law. The company has a capacity of recycling 400,000 equipments in a year. The recycling chain is from the consumer to the retailer, to the collecting points and then the recycling company, the Tokyo Eco. Recycling ensures a sustainable use of the resources and also ensures human safety since the solid wastes will not be scattered in the environment to facilitate breeding of vermin. The recycling rate for air conditioners and television sets is over 80% while that of refrigerators and washing machines is less than 60%. The consumer meets part of the recycling cost. The Hitachi Group owns up to 48% of the shares in Tokyo Eco.

The basic policy for Occupational Health and Safety at Hitachi has the following provisions:

1. Construct a systematic safety management system, and urge managers to set up examples for others.
2. Make genuine safety improvements to equipment and production processes.
3. Enhance safety awareness, and establish a work place with good communication by improving safety education levels.
4. Ensure the physical and mental health of our employees, and create a comfortable work place.
5. Reinforce health and safety management at branch offices and production sites.
6. Strictly enforce countermeasures for dangerous management practices (promote disaster prevention activities against earth quakes, fires and explosions).

The company is planning to introduce an Occupational Health and Safety System that provides a high level of health and safety standards that can be maintained and improved upon under the supervision of qualified employees.

5.9 The Central Break water Outside Landfill Site and The New Sea Area Land Reclamation Site (Tokyo).

The Following are the steps followed in the management of wastes at this landfill:

- Collection and Transport: Is done by Tokyo's 23 wards and the means of transportation is either by road, using trucks, shipment and even at times use of containerization.
- Intermediate Treatment: is done before land filling with an aim of reducing the space that the waste could occupy. Bulky waste is crushed and compacted. Iron contained in waste is collected and recycled. Non-inflammable waste crushed and compacted. Crushed waste is separated in iron, aluminium, non-inflammable substances, and other waste. Iron and aluminium are collected and recycled. Some wastes are eventually incinerated.

- Landfill: Buried waste is covered with soil properly, and then further waste is buried on it. This is referred to as a Sandwich type of Landfill. The advantages of a sanitary type landfill (waste does not get scattered, odor of waste does not spread, harmful insects are prevented from breeding and hatching, waste is prevented from firing as air is cut off). Incineration ash, sludge are fallen into the hole. The patrol car monitors the whole landfill site to check progress of land fill work, control extermination of harmful insects, find dangerous substances and deal with any truck accidents on site. . Methane gas stagnating in waste is bled through pipes because such gas will cause spontaneous fires. At times water is sprinkled to prevent fire. Methane gas is used fro generating power.

5.10 Fuji Film-Japan

The Company has adopted a recycling oriented production system. The recycling technology saves on raw materials and protects the environment through dematerialization. The adopted steps are:

- Product Design (reuse/recycle design techniques). Adaptation for assembly.
- Production Systems (assembly technology and adaptation for recyclable materials).
- Development of production technology
- Recycling (reuse/recycling systems)
- Improvement of reusability and reliability.

Fuji Film’s “ Quick Snap” is manufactured by a circulatory closed loop production system, which from the product planning stage, focuses on reuse and recycling. A comprehensive environmental management system directs the further reduction of waste emissions, of energy and water usage, and of harmful substances with environmental effects as well as providing preventive measures against environmental damage in case of accidents or disasters. The Fuji Color “Quick Snap” inverse manufacturing factory follows the following steps:

- Sorting
- Disassembly (reusable, recyclable parts, resources to raw materials).
- Inspection
- Manufacturing process
- Shopping of Quick Snap
- Retailer
- Customer
- Mini lab/Developers agent
- General laboratory
- Forwarder
- Use Quick Snap
- Goes to sorting once again.

All water used at the factory is purified with a wastewater treatment system, and then it is pumped into the carp pond before being released into the local river. The health appearance of these carps is a living guarantee of the purity of the water in which they live. They act as biological indicators of pollution.

5.11 Tokyo Metropolitan Government

Numerous urban plans are concentrated in Tokyo, and the inhabitants of the city are recipients of the blessings. But, there is a down side to this: aggravated air pollution, negative impacts of toxic chemicals, increasing waste, and many other signs of a worsening environment becoming readily apparent in the Tokyo metropolis. The Tokyo Metropolitan Government (TMG) has put in place anti-pollution research activities that aim to tackle industrial pollution that worsened during the days of rapid economic growth. TMG is taking action the lives and health of its citizens through efforts such as the Country's first enactment of vehicle exhaust gas emission control regulations for diesel vehicles.

To be able to achieve the objectives of its mandate, TMG is actively involved in research and monitoring of trends with a focus in the following areas:

- Urban Air Pollution
- Counter measures against vehicle pollution.
- Aquatic environmental pollution
- Noise and urban vibrations.
- Soil pollution, ground water and ground subsidence.
- Waste and recycling.
- Hazardous chemical control measures.
- Expanding the Greenery in Tokyo.
- To cut down on the Generation of Green House Gases.
- Application of Environmental Impact Assessments.
- Promotion of Environmental Education.
- Enforcement of Environmental Standards.

5.12 National Institute of Industrial Safety

The institute conducts a wide range of industrial safety research that includes investigations on the causes of industrial accidents and the appropriate techniques for their prevention. In Japan, the areas of emphasis are related to large sized equipment use in construction, the adoption of new technologies, system safety, automatically controlled equipment, ergonomics, and the processing of newly introduced hazardous/unstable substances in chemical plants.

The institute is now undertaking research in Mechanical and System Safety, Construction Safety, Chemical Safety, Physical engineering Safety, interdisciplinary and human science safety.

Mechanical and System Safety

- Fracture Prevention of Materials
- Safety requirements for lifting and construction appliances
- Safety requirements for machines and equipment
- Safety requirements for human-machine interface systems

Construction Safety

- Preventing the collapse of temporary structures
- Prevention of accidents during earth work
- Preventing falls
- Safety evaluation for new construction methods.

Chemical Safety

- Evaluation of thermal decomposition hazards
- Prevention of gaseous explosions
- Prevention of the ignition and explosion of dusts
- Prevention of run away reactions in chemical processes

Physical Engineering Safety

- Prevention of electrostatic hazards and nuisances
- Preventing the malfunctioning of electronic equipment and systems due to electromagnetic noise
- Prevention of electric shock and hazards due to electric equipment
- Application of electronic and electrical technologies to industrial safety.

Interdisciplinary and Human Science Safety

- Statistical study of occupational accidents
- Promotion of safety culture
- Improvement of fall protection devices
- Study of communication error
- Cognitive psychological study by means of simulations.
- Information technology and work place safety.

5.13 The Chemical Society of Japan

A visit was organized to the Chemical Society of Japan with an aim of establishing how they have managed to link up the Japanese industry with Japanese universities especially in the area of Occupational Health and Safety Research. The society was in possession of good journals in the area of Occupational Health and Safety.

6.0 The 5S Philosophy in the Japanese Industry

The basis for enhanced Occupational Health and Safety status of the Japanese firms is the 5 S Philosophy. The Philosophy provides the necessary five keys to a total quality Environment. Luckily, for my Country, the 5S can be translated into 5K with the same meaning. This is going to form the basis of our Total Quality Environment Management Strategy in Kenya.

Meaning of 5S	English Translation	Kiswahili Translation
Seiri	Organization	Kuungana
Seiton	Neatness	Kupanga
Seiso	Cleaning	Kusafisha
Seiketsu	Standardization	Kuendeleza
Shitsuke	Discipline	Kufundisha
5S (Japan)		5K (Kenya)

5 S is intended to eliminate waste.

- Seiri/Organization (this means to put things in order/organize them in accordance with specific rules and principles). It means to distinguish between the necessary and the unnecessary, to make hard decisions and to implement stratification management to get rid of the unnecessary. The emphasis is on stratification management and dealing with causes to get rid of the unnecessary and to nip causes before they become problems).
- Seiton/Neatness (means having things in the right places or right lay out so that they can be used in a hurry. It is a way of eliminating the searches. Emphasis is on functional management and search elimination. Once everything has a right place so that it is functionally placed for quality and safety, you have a neat work place).
- Seiso/Cleaning: means getting rid of waste, grime and foreign matter and making things clean. Cleaning is a form of inspection.
- Seiketsu/standardization: means continually and repeatedly maintaining your organization, neatness and cleaning. It embraces both personal cleanliness and that of the environment. Innovation and total visual management are used to attain and maintain standardized conditions so that you can always act quickly.
- Shitsuke/Discipline: means instilling the ability to do things the way they are supposed to be done. The emphasis is on creating a work place with good habits and discipline. By teaching everyone what needs to be done and having everyone practice, bad habits are broken and good habits are formed.

II PLANS FOR KNOWLEDGE DISSEMINATION IN KENYA

The knowledge acquired will be disseminated to Kenyan industrialists in her four major industrial towns namely Nairobi, Mombasa, Kisumu and Nakuru. The mode of out reach to the industrialists will be through the following core activities:

- Occupational Health and Safety awareness raising workshops in the four Kenyan towns listed above. The workshops will expose industrialists to the provisions made available by the Occupational Health and Safety Assessment Series (OHSAS) 18001 and 18002.
- Training of Trainers (TOTs) in the areas of how to undertake Safety Audits at plant level. This aims at creating a reliable pool of consultants that will be equipped with contemporary skills and knowledge of assisting industrialists to implement Occupational Health and Safety Management Systems.
- To undertake Safety Audits in Selected industrial sectors of Kenya.
- Set up Sector wise Occupational Health and Safety Demonstration Projects that will show the overall economic and environmental benefits of setting up a successful occupational health and safety program for interested entrepreneurs. They will be encouraged to go for OHSAS Certification.
- To disseminate Occupational Health and Safety information to industrialists who are operating processes with inherent safety concerns.
- To work with universities and other tertiary Science colleges with an aim of modernizing their Occupational Health and Safety Curricular so that it can incorporate modern tools of health management such as OHSAS 18000 Series.
- Work with interested stakeholders in the development of Health and Safety Manuals for Selected Sectors in both English and “Kiswahili”-Local Language.
- Work with relevant Government line Ministries to propose and implement realistic Occupational Health and Safety Policies for onward implementation by the Directorate of Occupational Health and Safety in Kenya.

The tasks listed above will be undertaken jointly by the

- Kenya National Cleaner Production Centre (KNCPC)
- Directorate of Occupational Health and Safety (DOHS)
- National Environment Management Authority (NEMA)

III SUGGESTIONS FOR PROGRAM IMPROVEMENT

- In order to standardize and compare the health and safety course issues between countries and be able to determine the scope and desired level of coverage for the trainees, I wish to suggest that IUPAC develops both the course content and training materials for the trainees and the host company in advance so that the two parties are guided on what is expected of them. This will reduce the task of the host company to that of practical exposure as opposed to both theoretical discussions and field visits.

- Certificates should be issued to all Health and Safety Trainees and should bear the logos of IUPAC, UNIDO, and UNESCO.
- The course period should be extended from the current 2 weeks to at least 1 month. This will be sufficient to cover all the important issues of health and safety.
- Trainees should be supported financially and materially to undertake work shops, seminars, conferences, training sessions, demonstration projects on Health and Safety after their training. This way the impact will be immediate and bigger.