

REPORT

IUPAC – UNESCO – UNIDO Safety Training Program

Mitsui Chemicals, Inc. (MCI)– Japan

June, 12th –July, 4th 2007

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HOST COMPANY

Mitsui Chemicals, Inc. (MCI) is a chemical company from Japan that was founded in 1997 from the merger of Mitsui Petrochemical Industries, Ltd. and Mitsui Toatsu Chemicals, Inc. The products supplied by MCI are used in common products in an immense variety of areas and they are divided in four segments: Functional chemicals and engineering materials (i.e. semiconductors materials), Functional polymeric materials (i.e. elastomers), Basic chemicals (i.e. phenol) and Petrochemicals (i.e. polyethylene).

MCI has a head office located in Tokyo, five manufacturing sites (Ichihara Works including Mobarra Center, Nagoya Works, Osaka Works, Iwakuni-Ohtake Works, and Omuta Works) and a Research and Development Laboratory (Sodegaura Center) with 12.473 consolidated employees and 4.459 non-consolidated employees. In addition, MCI have 68 consolidated subsidiaries and 63 non-consolidated subsidiaries and affiliates with 2.121 employees located in United States, Europe and Asia.

MCI is implementing responsible care initiatives and promoting activities in many areas such as environmental preservation, disaster prevention, occupational safety and health, and product safety. MCI has a management system integrating an environmental management system (ISO 14001: year 2004 version), a quality management system (ISO 9001: year 2000 version) and an occupational safety and health management system (OHSAS 18001).

Related to the communication of chemicals hazards, MCI is revising the classifications as well as the Material Safety Data Sheets (MSDS) and container labels to keep abreast of the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) for all chemical substances and products handled.

TRAINING DESCRIPTION

Topics covered

- ***Environment & Safety Management (ESM) activities audit***

Before training began in Japan, I was asked to identify the current status of my workplace in SHE (Safety, Health & Environment) management level, completing a checklist for a SHE management activity audit. The checklist consists of the subjects to be managed, items and the check items. The subjects dealt with the 6M, e.g. Management, Man, Method, Material, Machine and Media. The items had 26 classifications from A to Z. The check items had 400 questions.

During training we discussed the results obtained from the completion of the checklist (identification of the weak points on SHE) and studied the aspects to be improved (countermeasures).

- ***Production plants safety activities***

- **Basic thoughts on prevention of accidents and ways to lead**

- ✓ The five causes of accidents: management causes, safety control causes, human causes, unsafe behavior causes, and unsafe situation causes.

- ✓ The four pillars of safety management: establishment of a whole company safety control system, thorough line management, self-management by each worker, and equipment management (100% safety).
- ✓ Thinking course why an accident took place.
- ✓ Accident pyramid and prevention of human errors.
- ✓ Relationship between safety measures and accident potential.
- ✓ Safety measures by 5M techniques.
- ✓ Preventive measures and human errors.

Safety activities

- ✓ Prevent human errors: study of occurrence mechanism of human error (brain conscious levels); tools to prevent human errors (danger prediction and danger confirmation through finger pointing calls).
- ✓ Danger prediction: objective (what kind of danger factors are hidden in the existing conditions), principles (sharp sensitivity, high concentration, high willingness), actions (discussion, agreement, selection of actions, object decision, practice by each worker).
- ✓ Finger pointing calls: procedure (senses, postures).
- ✓ Study of meanings and implementing procedures of improvement activities (improvement activities report, personal proposal improvement).
- ✓ Plant activities: workshop improvement procedures, 5S system to improve workplace organization, points of safety for ensuring safety in the workplace, safety measures used by Japanese manufacturers for general purposes and for general machinery and equipment.

- ***Works Environment & Safety Management***

General provision

- ✓ Study of purpose and definition of terms on the ESM system.
- ✓ Safety and environment administration manual.

Environment & Safety Management policy

- ✓ Study of overall intention and belief concern ESM: 4 levels of thought (belief, principle, concept, design).

Management plans

- ✓ Study of environment and safety effect assessments, requirement of law and regulation, target works document and ESM plan.
- ✓ Establishment of ESM Yearly Subjects by T-type matrix.
- ✓ PDCA regarding the EH&S management yearly plan.

Administration & Implementation

- ✓ Assessing organization/responsibility, training, information, communication and control/procedures for routine work/emergency action management.
- ✓ How to communicate: reporting, contacting, and consulting.

Assessment & Corrective Actions

- ✓ Study of verification and monitoring/measurement, non-conformities, environmental and safety records, and internal audit of environment and safety.

Review of Environment & Safety Management

- ✓ Study of procedures of ESM review.

- ***Process accident prevention***

Static Electricity

- ✓ Hazards of static electricity. The generation of static electricity and electrostatic charge. Electrostatic charge phenomenon of static electricity. Examples of the electrostatic charge. Marginal electric shock generation by discharge from human body. Example computation of electric discharge energy. Minimal ignition energy.

- ✓ Failures caused by static electricity: fire and explosion, electric shock, production failures. Last case examples of accidents in MCI.
- ✓ Safety measures for static electricity. Prevention measures of explosion and fire.
- ✓ Static electricity experiments.

Hazop studies

- ✓ Introduction to the technique: What is the HAZOP? HAZOP outline study.
- ✓ Basic procedures: guide words, the deviation list, and the cause list of deviations.
- ✓ Study of implementation procedures of HAZOP: a guide to Hazard and Operability studies.
- ✓ Process safety case study by HAZOP assesment.

Disaster management

- ✓ Taking actions in cases when occupational accident and injuries occurred.

- ***Environment management***

- ✓ Organization of the Environmental & Safety Department.
- ✓ Environmental safety and health policy.
- ✓ Environmental measures for chemical industries.
- ✓ Agreement on environmental preservation.

- ***Safety engineering***

- ✓ What is Safety Engineering?
- ✓ How to evaluate Hazards.
- ✓ Examples of safety evaluation.
- ✓ A method for estimating LFLs of vapor mixtures containing heteroatoms.
- ✓ Laboratory training.

Places visited

- Iwakuni-Ohtake Works June, 18th – 28th
- Sodegaura Research and Development Center July, 2nd – 3rd
- Tokyo Center Office June, 14th and July 3rd

Trainers

- Mr. Osamu Usui (General coordinator)
- Mr. Masayuki Shimizu (General trainer)
- Mr. Yoshinori Taniguchi (Static electricity, Hazop studies)
- Mr. Teruo Takahashi (Environment management)
- Ms. Yuriko Ikuta (Environment management)
- Mr. Hiroshi Yamanaka (Safety engineering)

Materials

- UNESCO ESM Training Materials (MCI Japan), 305 pages.
- Company documents (CSR report, corporate profile, plant description).

Methodology

- Explanation of subjects by trainer followed by discussions.
- Use of the material handed out.
- Practical examples and exercises.
- Projection of videos (Introduction of Iwakuni-Ohtake works, Sodegaura Research and Development Center introduction, danger prediction, addressing by finger pointed calls, hazards evaluation tests).
- Experiments (static electricity, laboratory tests for hazard evaluation of chemicals).
- Tours (Iwakuni-Ohtake plant: general tour, activated sludge process equipment and power plant. Sodegaura Research and Development Center: general tour).

TRAINING RESULTS

- To have an important starting point for reviewing the aspects to be improved in my workplace from the results of checklist for SHE management activities audit.
- To see the usefulness of the systematization in many areas (5M technique to safety measures, 5W1H technique to design concrete plans, 5S system to improve workplace organization, T-type matrix to establish ESM yearly subjects).
- To become aware of the concept of Finger Pointing Calls.
- To know with more depth, and to have the possibility of applying the Hazop method.
- To learn about the residue management in industry and view the differences with the residue management in college laboratories.
- To have new tools, experiences and examples, to develop my teaching activity.
- To reaffirm the importance and validity the GHS (Globally Harmonized System of Classification and Labelling of chemicals) and the OHSAS 18000 standards (Occupational Health and Safety Assessment Series), since both systems are implemented in Mitsui Chemicals, Inc.
- Also, I had the opportunity to make small contributions, by showing the concept of the “triangle of the habits”, provide information on data bases of chemicals and to share my experience of how from an accident I suffered, a Safety Department in the Chemistry College was created and an obligatory course on safety must be taken by the chemistry students.

Other training results

The Safety Training Program not only enriched me in the professional area, but also in the culture and human aspects. I had the opportunity to meet people from different countries and cultures (Japan, Ghana, Singapore). I also had an opportunity to know many beautiful and interesting places (Iwakuni, Hiroshima, Kyoto and Tokyo), history, geography, religion, technology and the typical food in Japan. All of this experiences results very enriching and pleasant for me.

APPLICATION PLANS

The application of the knowledge acquired will take place in two different aspects: management and teaching.

Management

- I will take all the steps available to me to advance in the implementation of a safety management system in the Chemistry College.
- I will attempt to implement a safety management system, according to OHSAS 18001 standard, in the industry.

Teaching

- I will share the experience and knowledge acquired in the Safety Training Program in the following activities:

Risk prevention in the laboratories; course to undergraduate students in the Chemistry College.

Occupational safety and health; course to undergraduate students in the Chemistry College.

Safety in the laboratories; course to chemicals professionals in the Chemistry College.

A model of the occupational safety management for the chemical industry; course to engineering and chemistry professionals in the Engineering College.

Occupational Health and Safety Management System; course to professionals in the Uruguayan Standard Institute (ISO representative), in which I am the teacher.

At the end of this report I attached the Outline of training report presented in MCI (Iwakuni-Othake Works), that contain my spiritual and material commitments and how to apply each training item in my organization.

Finally, I am studying the possibility of presenting a project to IUPAC related to teaching of chemical safety in the Latin-American Universities, making good use of the knowledge's acquired in the IUPAC-UNESCO-UNIDO Safety Training Program, my experience in the Chemistry Faculty of Uruguayan University and my knowledge of the safety conditions in other universities of the region.

SUGGESTIONS ABOUT SAFETY TRAINING PROGRAM

I reaffirm the suggestions of previous trainees, which were considered in my program. So, I do not have new suggestions to improve the Safety Training Program.

GENERAL CONCLUSIONS

The training offered by Mitsui Chemicals, Inc. under IUPAC-UNESCO-UNIDO Safety Training Program, was a very valuable experience. The training improved my knowledge in SHE and my general culture.

The subjects discussed, the trainers, the methodology employed, and the written materials that were handed out to us, were excellent.

As a result of the training I have more and better tools to improve the safety and health conditions in the chemical area in my country, both in the academic and in the industrial sectors.

I am very grateful to have had this opportunity, and I am looking forward to continue to collaborate with STP Program.

ACKNOWLEDGEMENTS

I would like to thank the IUPAC-UNESCO-UNIDO Safety Training Program for given me this opportunity. I am particularly thankful to **Dr. Mark Cesa**, for the interest in my participation in the program in three different occasions and for the continuous support and for answering patiently all my questions about the program.

I am very grateful to Mitsui Chemical, Inc. for the excellent quality of the hosting, including comfortable hotels, very interesting sightseeing, goods restaurants, friendly environment and perfect arrangements. I also thank all the members of Mitsui Chemical, Inc. that I met for their cooperation and support during my staying. Special thanks to **Mr. Osamu Usui** for his effort in ensuring the success of the training, to **Mr. Masayuki Shimizu** for his attitude, patience and willingness to teach and to **Mr. Hideki Fujimori**, **Mr. Hideo Toyoda** and **Mr. Hiroshi Yamanaka** for guiding to historical and memorable places in Japan and other logistics.

I also appreciate the invitation and encouragement of **Dr. Aldo Bologna Alles** to apply to the IUPAC-UNESCO-UNIDO Safety Training Program.

“Each new disease or death of a worker is showing us that we have delayed too much in putting the moral, science, and the technology into the service of man”

IUPAC-UNESCO-UNIDO SAFETY TRAINING PROGRAMME

Mitsui Chemicals, Inc. – Japan

OUTLINE OF TRAINING REPORT

I. Commitment

1.- Spiritual



My interest in safety began with an accident that occurred to me (**PROBLEM**). Thanks to this I had the **OPPORTUNITY** to participate of the IUPAC-UNESCO-UNIDO Safety Training Programme at Mitsui Chemicals, Inc. Now, I have a new **OPPORTUNITY** to improve safety and health of colleagues and students in the College of Chemistry (**GOOD PURPOSE**), that requires **PERSEVERANCE** and **FAITH** in order to take shape.

2. Material

Apply and disseminate the knowledge acquired.

Apply: I will make as well as possible to advance in the implantation of safety management system.

Dissemination: I will share my experience in different courses to undergraduates and graduates.

II. Outline

Training items	Point of training	How to apply to Chemistry College
1.- ESM audit	Start point	Take account the weak points for safety management planning.
2.- Plant safety activity	New culture	Take account the Safety Measures by 5M Techniques in operational control. Transmission the concept of Finger Pointed Calling
3.- Work's ESM	Planning	Using T-type for establishment of Safety Management yearly plan
4.- Process accident prevention	Operational control	Prevent accidents caused by static electricity, especially in transfer of inflammables liquids, and to reinforce this subject in the courses. Apply "Taking action flow in cases when occupational injuries occurred".
5.- Environment management	-----	Is not applicable in colleges in the same form that is done in industries.