Abstracts

THE IUPAC-UNESCO-UNIDO SAFETY TRAINING PROGRAM
Dr. Mark C. Cesa, Coordinator Safety Training Program

While industries in developed countries are introducing sophisticated safety measures covering operational, health and environmental aspects in close interaction with governments and the public, there is a gap between developed and developing countries in safety education, research and implementation of technical measures. The increase in chemical production and consumption in the developing world makes it essential to promote interactions to disseminate state-of-the-art knowledge on safety and environmental protection in chemical production. The International Union of Pure and Applied Chemistry (IUPAC), the United Nations Educational, Scientific, and Cultural Organization (UNESCO), and the United Nations International Development Organization (UNIDO) have implemented a joint training program for safety and environmental protection in chemical, pharmaceutical and biotechnological research and production. The IUPAC-UNESCO-UNIDO Safety Training Program allows safety training experts from developing countries to learn about safety and environmental protective measures by visiting and working in plants of IUPAC Company Associates in the industrialized world. The Program is part of a broadly based safety initiative by the IUPAC Committee on Chemistry and Industry that also includes sponsorship of Workshops on Safety in Chemical Production.

Safety Training Program Fellows are professional scientists and engineers who are currently involved at a supervisory or managerial level in chemical companies, government institutions or scientific institutions; engaged in aspects of safety and environmental protection in chemical, pharmaceutical, or biotechnological production or in the teaching of these fields; and have the ability to influence safety practices in their places of employment and elsewhere within their home country. Since 2000, eight Fellows from China, Egypt, Kenya, Nigeria, Ghana, India, Turkey, and Uruguay have received training in areas such as process safety management, environmental protection, HAZOP/HAZAN analysis, Responsible Care, ISO 9000 and 14000 series initiatives, and Legislative measures and interaction between industry, universities, government and the public. Fellows are required to submit a detailed report on their training and are then expected to disseminate and implement their learnings in their home countries. Our recent trainees have an impressive record of success in effecting positive change in health, safety and environmental quality, and the Safety Training Program looks forward to continuing to contribute to capacity building in the developing world.

Chemical Sensitivities
Mr. Roger K. Bentley

Asthma and dermatitis through chemical exposure are widely known, but this paper reviews also some of the lesser known causes and effects including multiple chemical sensitivity.

Allergic reactions can be very specific, or a person may be sensitive to several or many chemicals. Some people develop multiple chemical sensitivity where they are unable to tolerate even the lowest exposure to a wide range of chemicals. Typical symptoms include headaches, lethargy, fatigue and nausea.
Professional Responsibility in Health and Safety in Biodiesel Manufacture
Dr. Stephen W. Harper*, Janet C. Etchells, Andrew J. Summerfield and Amanda Cockton
(Health and Safety Executive, UK)

Increases in automotive fuel prices have prompted motorists to search for alternate cheaper fuels including Biodiesel. Whilst biodiesel can be made simply if done properly, production by the unwary has resulted in a spate of health and safety incidents.

As this is a chemical process, when should our professional responsibility end? At the process design stage or later?

1. A simple process to convert vegetable and animal oils into an alternative and “green” fuel for diesel engines has resulted in a rapid increase in the number of producers of biodiesel in the last 3 - 4 years, particularly in small companies and amongst the general public. However, the manufacture of bio-diesel can be hazardous if suitable precautions are not taken, as it involves the storage, handling and use of hazardous substances. Unfortunately, a significant number of the new biodiesel producers have little / no experience of chemical processing. In addition, the benefits have prompted some equipment manufacturers to produce conversion kits that have become hazardous when used. In some cases, the instructions have been found to be inadequate, so that the hazards have not been fully understood by the end user. A number of serious accidents and injuries have already occurred around the world and there is concern that, as the number of producers grows, this trend may increase.

2. In order to avoid this happening in the UK, HSE is producing free basic guidance on the measures necessary to achieve safe production of biodiesel through their website, and detailed instructions for enforcement staff to assess such processes. The guidance is being produced by a small group of safety professionals (Regulatory and Specialist Inspectors) consisting of experienced post-graduate Chemists and Chemical Engineers.

3. The manufacture of biodiesel is an example of how in the UK professional responsibility in health and safety matters extends beyond the design and supply of a process. The goal is to ensure that any person carrying out the process will remain safe as they should be competent and adequately trained, and that other people and the environment remain unharmed and unaffected by the activity.

4. This presentation reviews the basic process, identifying the main physical and chemical hazards that need to be assessed to produce a safe process operation. Some of the incidents are also discussed. In addition, the presentation considers some typical equipment arrangements and the risks they may present.

Managing Chemical Products Safely in Supply Chains
Mr. Christopher J. P. Eacott

The principles and practices by which chemical products can be safely manufactured, handled, used and disposed of, have been established especially over the past 20 years under the global chemical industry’s Responsible Care and product stewardship initiatives.

Despite the evidence that robust product stewardship programmes help to reduce business risks and can lead to business advantages, the widespread implementation of meaningful product stewardship programmes has been one of the most challenging aspects of health, safety and environment management in the chemical manufacturing and using industry sectors.

Business managers want to know that the effort put into working closely with suppliers and customers to improve overall product safety performance in their supply chains achieves positive results, and preferably adds to, or at least protects, the financial bottom-line.
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<th>INERTIA</th>
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<tr>
<td>Business case not always clear</td>
<td>Understanding &amp; managing product risks helps protect business</td>
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<tr>
<td>Little / no customer pressure</td>
<td>Customers value help with HS&amp;E matters</td>
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<tr>
<td>No serious accidents or incidents - yet</td>
<td>Helps uncover new business opportunities</td>
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<td>Takes effort to define ‘who needs to do what’ – throughout the supply chain</td>
<td>Sound chemicals management can add value to a company</td>
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<td>Expert resources may be lacking</td>
<td>Contributes to compliance with modern chemicals legislation e.g. REACH in the EU</td>
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A business team which experiences significant discomfort about the state of chemicals management within some or all of its supply chains will want to initiate many or all of the following ‘getting started’ measures:

- appointment of a product stewardship co-ordinator
- high-level gap-analysis to define priorities for action, identify resource requirements etc.
- establishment of a cross-functional product stewardship steering group, which includes senior managers
- securing expert resources knowledgeable about the assessment of chemical hazards and risks
- training of business personnel in their product stewardship roles and responsibilities
- generation and provision of safe-use and -handling information

### Improving HSE culture in China

**Mr. Zhang Guo Hong**, Senior EHS Consultant, ACE EHS (Shanghai) Company Ltd Shanghai, China, 200122

HSE culture, as an organization culture, it is not only safety, but also occupational health and environment are given priority when people think and act. HSE culture development and improving are like to climb a revolution ladder, which from bottom to top are divided into Fundamental level /reactive level, Awareness /dependence, Skills /independence, Excellence /inter-dependent, World Class etc. 5 steps.

Each step or phase has its distinct characteristic and need to progress on the one before. Many enterprises with the philosophy of excellence or world class HSE culture from developed county invested or set up business unit in china and would like to set up excellence or world class HSE culture in China. Many of them always thought they would be success to set up an excellence HSE culture in china if the highest EHS level of management were followed up strictly, unfortunately, they couldn’t achieve their original expectation.

The majority HSE culture of china are very different with developed country, and also as in different business and different area in China even china business units would like to accept and learn the excellence HSE culture currently.

A good organization HSE culture is the embodiment of effective programs, decision making and accountability at all levels. You need to know your HSE culture class, and you need to local safety philosophy of management and staff and its culture distinct characteristic when you hope to set up excellence HSE culture in China.

Only knowing your current HSE culture, localizing your HSE management measures and programs with the HSE culture phase characteristic, the success to set up world class HSE culture will be got in the future.
The IUPAC-UNESCO-UNIDO Safety Training Program (STP) take place during three weeks in 2007 at Mitsui Chemicals Inc., a leader chemical company of Japan. The training includes theory, practical examples, drills, projection of videos, experiments and plant tours.

The more relevant results of training were:

1) The usefulness of the tools 6M, 5W + 1H, 5S and T-type matrix (establishment of early subjects).
2) Became aware of the concept of Finger Pointing Calls, know with more depth the Hazop method and improving awareness about the hazards of static electricity.
3) Reaffirm the importance and validity of the OHSAS 18000 standards and the GHS (Globally Harmonized System of Classification and Labelling of chemicals).

I had the opportunity to apply the knowledge acquired during training, both in industry and in University. In industry, I remarked the status of GHS in Japan (particularly in Mitsui Chemicals Inc.) in events that take place in Uruguay and Paraguay and continued assist a Uruguayan company in the implementation of GHS. Also, I share the experience of Mitsui Chemicals about accidents caused by static electricity and recommended safety measures for risk control of static electricity in a production plant of powder products. Finally, I explain the usefulness of the Hazop method, and I will have the opportunity to apply them in 2009 in the project phase of a production plant.

In the College of Chemistry, I will promote the use of safety containers against static electricity to storage flammable liquids and advance in the implementation of OHSAS 18000 standards applying the tools learned. Also, I shared my experience and knowledge acquired in the STP in courses to undergraduate students and graduates in the College of Chemistry, in the Uruguayan Standard Institute and in a new course to graduates, originated from the STP, in the College of Engineering.

Nowadays I am working, with the collaboration of some members of the IUPAC-COCI Committee, in a draft project for the creation of a safety regional focal point to form persons that contribute to diffuse a preventive safety culture in chemicals industries and colleges of Latin-American.

Finally, I consider that the IUPAC-UNESCO-UNIDO STP is markedly useful and very important to improve the safety formation of persons and to promote the responsible use of chemicals in developing countries.

PROMOTING HEALTH, SAFETY AND ENVIRONMENTAL (HSE) CULTURE - AN ACTIVE INGREDIENT IN INDUSTRIAL HSE MANAGEMENT SUCCESS
Mr. Godfred A. Nyarko, Tema Lube Oil Company Limited, PMB, Tema, Ghana

HSE issues and concerns are major emphasis of the workplace’s agenda. Just as top management commitment is essential to the success of any organization’s HSE programme, promotion of organization- wide HSE culture is also an active ingredient in industrial HSE management success.

After the Safety Training Program at Japan in 2007, many HSE activities including Toolbox Talks, Safety Walks, HSE Committee Meetings, Emergency Drills and Potential Incident
Reporting were promoted at the workplace. Also, an HSE Potential Incident Reporting Award Scheme has been instituted to recognize and encourage staff to continue reporting.

These activities have resulted in an improved HSE work culture, wider awareness of staff, visitors and contractors on issues regarding HSE by significant reduction in accident cases. The improvement measures are being tracked and evaluated quarterly by management.

**Safety Training Programme – learning’s, applications, challenges and path forward**  
**Dr. Gursharn Singh Grover**, National Chemical Laboratory Pune, India

The paper presents highlights of the STP undertaken at Novozymes A/S, Denmark, with emphasis on the unique learning’s including risk assessment studies, use of MSDS, the systems of Crisis management and early recovery etc. The paper further details the steps taken in applying the learning from the STP to make improvements in the workplaces, communities, and governments, the challenges and a path forward.

At National Chemical Laboratory, Pune (workplace) - safety audits, improved accident investigation strategy, risk assessment etc have been initiated. A better and efficient solvent storage and disposal system is being launched. Many other safety practices are being strengthened.

Experiences and critical observations of the workshops and lecture programmes organized in colleges & universities and national laboratories will be shared and discussed. A new relationship has been initiated with National Safety Council, an autonomous body set by the Government of India, and safety awareness programmes have been organized at national level with this forum.

The feedbacks from some of these workshops and lecture programmes have indicated a quality improvement in the general awareness for safety and procedures for handling and use of chemicals. This has also led to requests for more such programmes in colleges and other institutes.

The paper will highlight several major challenges having systemic, social and financial deficiencies, and need to be looked into seriously. These include proper application of chemical safety regulations, least concern about hazardous, toxic or flammable nature of chemicals, inadequate reference to MSDS and SOP’s, willful disregard in use of PPE, facilities for disposal of waste chemicals and flammable solvents, overcrowding of labs etc.

In order to look into the above challenges and to substantially improve the status of compliance with safety norms, a path forward has been chalked out that will be presented.

Finally, the paper will be wrapped up with a few suggestions to make the Safety training programme and its follow-up more fragrant and healthier.

**Integrating Safety at an Oil & Gas Production Facility; loop from IUPAC-UNESCO-UNIDO Fellowship Experience.**  
**Mr. Tersoo Charles Gwaza**, Shell Petroleum Development Company, Port Harcourt, Nigeria.

The demand for accountability and deployment of safe work environment gives no room for complacency in the business world today. It is key to sustainability of any viable business as negligence brings about reputation issues and can even lead to litigation. This has become more critical given the increased knowledge base across the globe on Environmental and Safety issues.

The world today depends more on chemicals and related substances more than ever before, the anxiety of the populace on safety of the process associated with production of this chemicals makes it imperative for a step change to achieve best safety and Environmental practices. An early exposure to some best practices worth replicating during my experience as an IUPAC-UNESCO-
UNIDO safety fellow has sustained my interest to add value and influence safety best practice in my place of work.

As a fellow, I visited Sasol Chemical Industries in South Africa; Sasol converts coal into value-added synfuels and Chemicals through unique Fischer-Tropsch technologies. The group also refines crude oil into liquid fuels. I focused on the following:

- Aspects of responsible care and integrated approach for SHE, Occupational Hygiene, Process safety management with emphasis on HAZOP awareness, Material Safety Data Sheets (MSDS), Hazard Identification Risk Assessment (HIRA) and Top set accident investigation technique.

This fellowship provided a vital base and has given the impetus for my involvement on key issues of safety. Part of my current commitment includes:

- Production Facility Inspections.
- Leading Safety awareness Campaigns.
- Coordination of Hazards Management Workshops.
- Driving actions to manage the integrity of Safety Critical Equipment (SCE).
- Sharing Learning from Investigation of Incidents.

Production facilities in the Oil & Gas Industries have a lot of process Hazards, the need for asset integrity and strict compliance with Corrective and Preventive maintenance is very vital in preventing incidents. A deliberate plan for facility inspections to monitor the state of facilities & Safety Critical Equipment (SCE), tracking actions that require attention has proved very useful in the deployment of the entire Hazard Management Process. Results: Improved integration of Safety at work.

**Collaboration of Industry, Universities and Government for Upgrading Occupational Health and Safety in Turkey**

Ms. Esma Toprak, Chief Chemical Engineer in the Department of Chemical Engineering at Boğaziçi University, Istanbul, Turkey

The latest outlook on Chemical Industry in Turkey is as follows:

- Ensuring the recording of the unrecorded economy
- Studies for the improvement of the investment on OH&S
- The Process of harmonization with EU Regulations

Goal of the companies must be: Safety and Productivity, recent and Future Investment in Safety, Contacts with Government Bodies, insurers and OH&S professionals. According to the survey about worldwide occupational injuries; Turkey unfortunately happens to be 1st in Europe and 3rd in the world. Large corporations and the ones that have joint venture with foreign companies are very sensible about OH&S procedures and hire professionals while investing on safety equipment.

Occupational injury happens every 6 minutes, and every 6 hours employee loses his life due to these incidents in Turkey:

- 50% of these injuries can be prevented very easily.
- 48% of these injuries can be prevented by working systematically (taking safety precautions)
- 2% cannot be prevented.

These incidents occur mostly in small and medium sized enterprises. Since:

- They are less safe, apply unsafe practices
- They have poor knowledge of OH&S
- They have fewer budgets for OH&S
- Low compliance with laws, rules and regulations
- Higher incidence of occupational injury and day losses
- Higher severity of injuries

Main goal should be reaching and dealing with these enterprises.
Survey must be done 100 small business operators in suburbs of Istanbul or Ankara at different industries; Metal manufacturing, electrical work, leather finishing, textiles, printing, restaurants, plastics, shoe manufacturing, etc. This survey should be done by university students who already have safety knowledge.
- Face to face interviews must be on these topics:
  - Educational background
  - Business experience
  - Number and the type of staff

What Government has done, and future plans
Turkish Government and ILO (International Labor Organization) had a Project ISAG. It was funded by European Union ISAG 1 has been completed in 2006. It was a good example of teamwork of university, government and the industry. Since it has intensive industrial area, and University of Kocaeli helped for this project, Pilot area was selected in Kocaeli; Result was great, ISGUM Kocaeli laboratory was established, many seminars were given, many laboratories upgraded Now ISAG2 project is on the way:

Main strategy is developing the concept of OH&S. Main Procedure is social dialog. This New Project has:
- Mobile Laboratories (6 Buses that are fully furnished with medical and chemical testing instruments),
- establishing PPE Test Labs,
- and enforcement of regional Labs (Istanbul, Adana, İzmir, Zonguldak, and Kayseri)

The recent global economic crisis affected the Turkish Industry along with many other industries around the world. During this turmoil, the companies went on cutting their budgets mostly on OH&S expenditure. At this point, students of universities and technical schools must voluntarily work with the government and industry in order to upgrade Occupational Health and Safety.

The impact of environmental safety and management training on research institutes in Nigeria
Mr. Isiaka O. Bakare, Rubber Research Institute of Nigeria, Benin City - 300001, Nigeria.

Lack of environmental and safety management consciousness among Technical Staff and Scientists in Research Institutes in Nigeria has been identified as the main reason for the poor safety procedures and practices in our Laboratories in the country. The need for safety training in the various research institutes in the country is conceived. Scientists and Technical staff in some research institutions were recently trained. Laboratory Safety Committee was established in these institutions to advise the management, monitor and ensure compliance to safety rule and regulation in their institutes. Also, basic laboratory safety materials were also provided for the use of staff. Fresh graduate and undergraduate students from tertiary institution on mandatory industrial training program placement at Rubber Research Institute of Nigeria were also trained on laboratory safety and management. Some commercial laboratories staffs within the southern part of the country, laboratory chemicals and equipment suppliers/ sales representatives were also trained. These achievements and difficulties experienced during this safety training are discussed. The extent to which the trained personnel have adopted and incorporate the safety training in their daily laboratory management is also evaluated.