Summary of presentations:

**Hamdy Khalil, Woodbridge Foam**

**HS&E as strategic Imperative for Business Success-Industry Perspective**

*Note: Chemical Institute of Canada created a company safety award and Woodbridge Foam was the first recipient.*

Focusing on people is important - they are the most important asset. EH&S is number 1 objective in company; condition of employment. Critical and integrated part of company strategy. Must be part of change management and all other transformational processes. Legal penalties for violations can include fines and imprisonment for company leaders. Culture is the key component - must be shared by management and all employees. There is a natural link to Lean management practices; these tools keep safety as number 1 priority and ensure continual improvement. Company leadership must drive implementation. A system like -Plan -Do-Check-Act helps with continuous improvement. The entire production/supply chain (including distribution) must be considered. At Woodbridge, the policy is posted in many places and is signed by everyone. They have 5 guiding principles, agreed to by management and employee representatives:

1. All accidents are preventable, and all teammates behave as though they were
2. Our commitment to health and safety is based on caring
3. Managers feel responsible for health and safety and are held accountable accordingly
4. It is understood that we are ALL personally accountable for our own health and safety
5. Safety is a condition of employment

Safety is both a strategic and a tactical element. You need to have measurements to understand where you are and set improvement goals. Minimum expectations (standards) have to be set; they are universal and based on most stringent legislative requirements. There are sometimes cultural issues that have to be addressed; employees must realize that use of safety equipment/ppe does not indicate lack of knowledge, capability or strength (safety culture has to overcome other cultural issues). Company must provide systems and tools so that information is organized, easy to find, well documented, and current. Internal and external audits ensure compliance; management system reviews also ensure relevancy. Training is critical, and you also have to assess training effectiveness. On-line systems are quite flexible and accessible. Model: essential cornerstones, key drivers, workplace outcomes, results. Superior EH&S results lead to lower costs, improved employee relations, improved reliability and productivity, and increased organizational capability. Employee retention is also improved. Proactivity and individual ownership are key factors.

**Roland Andersson, Chemical Institute of Canada.**

**Process safety Management - Minimizing the Risk of a Catastrophic Accident.**

This talk focuses on incidents that extend beyond the plant fence line. For large companies, there are safety professionals and the safety leader has a full time job. For most medium and small companies, the production manager has the responsibility; much more ownership for assessing
risk and understanding regulations at all levels. Speaker has hands-on as well as leadership experience; to be a good leader the hands-on knowledge is critical for understanding risks. Assessing risk - must be continuous and not complacent. Example: 72 tanker cars & 5 engines parked on track in Canada on a 1.2 degree gradient. Train rolled into town, major explosion and fire that killed > 47 people and destroyed the town (investigation in process). West Texas ammonium nitrate fire had a major impact on the town; 15 people killed. (http://www.csb.gov/west-fertilizer-explosion-and-fire/) for video from US Chemical Safety Board). Donora, Pennsylvania incident (not discussed). Europeans set up process safety requirement years ago; Americans did this after Bhopal incident. However, these are only 2 regions. In 1979, a chlorine/propane train derailment in Mississauga resulted in the Canadian Chemical Manufacturers Assoication started working on a program that became Responsible Care. Canada does not have proscriptive rules on process safety; but Process Safety Management (PSM) Standard from CCA sets the standard and protocol for risk assessment. There are 12 elements in the PSM standard, and it takes a lot of work to implement these elements; each has multiple components. Take a commonsense approach: assess risks, get early buy in, develop initial plan (low cost) to get started. An example (restricting smoking) of when you need everyone to understand and contribute to the solution; tell them the truth and appeal to their common sense. Prevention and preparedness are important. Be sure you have current drawings/schematics of the site/process equipment. Use outside expertise when you can (your suppliers may be able to provide information and assistance). Be sure to have a complete inventory of chemicals (type and volume) to develop worst case scenarios. Work with local emergency services so first responders know what to do and what to avoid. Consider containment so that you have more layers of protection. Training and exercises for multiple scenarios are important, too. Test all aspects of emergency response. Cleanliness and organization create multiple benefits for employees, management, reduce accidents - EH&S has be to addressed on a daily basis.

Khalida Al-Dalama, Kuwait Inst. For Scientific Research
Kuwait Research activities in a safe and secure environment.
(slides not available to be shared).

While other speakers spoke about manufacturing; this talk focuses on a model research institute: Kuwait Institute for Scientific Research (KISR) and the way they address EH&S. They have a sector for safety and health that sets guidelines and monitors performance; they are ISO 9001 compliant. Working with all the centers to establish the program and regulations are followed. KISR focuses on petroleum, desert agriculture, marine biology, energy, natural and food resources, so has diverse labs and facilities. Developed a strategy plan so that by 2030, KISR will be internationally acknowledged as the region’s most highly respected STI and knowledge gateway and recognised as a driving force for sustainable economic prosperity and quality of life. Technology leadership, cross-disciplinary work, successful commercialization, and a culture of excellence are key to achieving this. Over 1200 staff members, 25% are international; there are a number of different sites for research and services. Research projects include how to manage production/recovery in a safety and environmentally sound manner. The research end product improves EH&S for the industry, including reducing environmental impact, mechanical
integrity, mitigation approaches. Key achievements address a range of issues of production including structural effects (corrosion, waste, etc). Expect that the facility for Petroleum research center will double in the next 10 years across all disciplines. Excellent and well equipped facilities with excellent housekeeping practices. Provide training to others. Leadership insists that international best practices have to be implemented in all facilities; included in performance process for all supervisors.

**Presentations by IUPAC Safety Training Fellows:**

a. Turkey, [Esma Toprak]
b. Ghana, [Godfred Nyarko]
c. Indian, [Gursharn Grover]
d. Nigeria, [Jonathan Babalola]
e. Summary and Picture. [All Speakers]

**Esma Toprak**  
**Rising Trend in Turkey, Occupational Health and Safety Applications During the Last Decade.**

Esma was trained in 2000 at BP Amoco Chemicals in Naperville, Illinois, USA and has made significant impact at the Boğaziçi University. During the training she recognized a number of gaps at her home institution and has focused on addressing them. These include creating department safety manual, short courses, seminars, and sharing best practices to students and staff, enforcing protective personal equipment usage, created a EH&S team, investing in safety showers and eye washers, drills for fire and earthquakes, and creating lab/process unit safety binders. Finances were limited - went to alumni advisory board and they provided support to purchase safety facilities and equipment. The transition to use the PPE was difficult but it has been established as routine expected practice. Collected feedback about the educational programs from students themselves and the feedback from company evaluation of the student. If the companies hosting interns are not following safety practices, university works with them to improve practices (or else they will not place students there). Companies provide feedback on the intern’s safety practices to University, too.

The chemical industry is growing quickly in Turkey with about 4000 producers; 70% of products are intermediate and raw materials, about 30% goes to consumers. Turkey is adopting to EU technical standards. In Turkey, the majority of accidents occur because of working conditions and lack of safety education, rather than personal mistakes. There are a number of root causes related to working conditions; some groups are more vulnerable than others. Accidents are more likely in textiles, mining, and dockyards. In June 2012 a OH&S law number 6331 that covers the framework for safety and is based on an EU directive. Regulation outlines key elements that must exist and applies to all public and private sectors. It covers the powers responsibilities, rights, and obligations of employees and employers. Risk assessment, emergency procedures, medical examination of employees, and other issues are covered. EH&S safety experts are a growing profession due to this law. Penalties are defined and enforced. Esma is happy to see these regulations evolve, but there is still many improvements required throughout society and the chemical sector.
Godfred Nyarko, Ghana  
Enhancing accident preventive culture through proactive safety awareness training.

In general, there are accidents across all sectors in Ghana due to lack of knowledge and awareness (example: 3077 fires in first half of 2013; 57 people died). Industrial accidents, commercial fires, road accidents, and academic lab incidents are key problems; due to lack of safety awareness and no national policy on occupational health and safety exists. Godfred thinks proactive and sustain safety training/awareness is needed along with the national policy. He has given training to students and instructors, workers and contractors, and adults and youth at churches. The topics are selected based on audience needs (lab safety, hazard identification, risk assessment, emergency preparedness and response, fire and road safety, etc). Pressure is being applied for the government to pass a policy on occupational health and safety. Financial and material support is needed, he has identified target sponsors to contact, and is trying to keep a focus on these key EH&S areas.

Gursharn Grover, India  
Initiatives in the pursuit of an advanced safety culture in chemical labs

India is a very large country, and he is focusing on the National Chemical Laboratory and the region first. There are about 1200 people at the facility, they have the largest number of PhD students in Chemical and Life Sciences in India. Most of the 550 PhD students arrive with very little safety training. Dr. Grover was trained in 2008 at Novozymes in Denmark. This is an enzyme production and R&D facility. Risk assessment is a fundamental pillar, along with accident reporting and investigations, preparation and use of MSDS, crises and disaster management, and environmental services. He learned to ask “why, why, why” during accident investigations to learn the real root cause. What changes has he made: safety orientation course for new entrants at NCL (35-40 people/month). Create lasting awareness about hazardous, toxic, or flammable chemicals; short courses once a month for 5 hours (3 modules), exhaustive courses (10 hours each, 6 modules); has had participation of more than 600 staff and students. Subjects include MSDS, risk assessment, systems, procedures and techniques, handling storage and disposal of chemicals, emergency procedures, ergonomics, case studies and video clips, and disaster prevention. Uses real-world examples to drive the point home. Offers best practices - likes the Chemical Safety Board videos. Also tries to reach students personally and touch their heart; his passion for this comes through. Helps them think through some scenarios. Compares the chemical safety pictograms to road signs - and why they should not be ignored. He has been invited to provide seminars and short courses at other R&D labs, universities, and institutions within India. Implemented solvent storage cans and cabinets, toxic and hazardous waste disposal system, emergency plans, mock drills, and risk assessments. Cost of solvent storage facilities was approximately $250K. There are no punitive actions yet, find this is counter productive. Focus more on education and examples to drive culture change and not simply compliance. Improvements in infrastructures and facilities, focus on safety norms, reduced number of incidents, response is quickly, and damage is minimal. Based on number of invitations to speak outside NCL, Grover and STP have a broader impact. The “mandate from IUPAC” provides significant support in driving changes. Received an award earlier this year. Even with this progress, major challenges and concerns still exist, such as disposal of solvents, effluent treatment, overcrowding of labs, safety awareness at lower levels of education, lack of ownership/awareness of chemical hazards, PPE, MSDS. While he has support from institution, could use more support and funding.
Jonathan Babalola, Nigeria
Lack, ignorance, and safety, the case study of a chemistry department in a developing country viz-a-viz IUPAC Safety training at Dow Chemical.

Jonathan trained with Dow Chemical in Terneuzen, Netherlands, in February 2013. Nigeria, with 168 million residents, has a North-South dichotomy with different cultures. Oil is a major source of income for the country; issues exist with this industry. Pipeline vandalization is a major issue; they export most oil and have a fuel scarcity. A major case of lead poisoning from a lead mining/exploration company due to lack of awareness of hazards. 85% of Nigeria lives on $2/day and 70% lives below poverty line. Ibadan is the first university in Nigeria and often sets the standards for all universities and has strong links with them. Jonathan hopes to drive changes for all universities as a result of this. During his training, he learned that safety is behavior based, must be part of the culture, and given constant attention. Investment of safety is a great gain and commitment should be to zero (accidents, incidents, excuses). His safety campaign is now on university website. Has held a fire drill; there were 2 fire incidents last year and emergency equipment didn’t work. the drill addresses this gap. Organized health topics that are easy to attend (ergonomics, blood pressure, etc). University has no structure for a Chemical Laboratory Safety. As a result of raising this issue, university purchased 2 fire trucks, have installed firefighting apparatus, created a safety committee, set up proper disposal of organic waste and installation of first aid boxes, better directions and labeling of offices/doors so emergency responders can find their way. A significant effort to renovate and reorganize the department chemical storage. Had outdated, unlabelled chemicals, dug, concrete linar, buried the materials. Repaired fume cupboards, purchased pipette fillers (so stop mouth pipetting) and more pipettes, repair gas pipelines, regular inspection of teaching and research labs, safety films and Dow safety academy videos. Will train ~100 students in CHE 195 course and reviewed curriculum, will incorporate information from US National Academy book on Chemical laboratory Safety and Security. Will provide safety training soon (waiting for a strike to be completed). Could not find safety goggles for purchase in Nigeria.