

Safety Training Program

Safety is our first priority. We often hear that statement in industrial settings. But it isn't universally practiced. Several years ago, the IUPAC Committee on Chemistry and Industry (COCI), with support from UNESCO and UNIDO, developed a program to enable the development of stronger safety cultures in developing countries. The IUPAC Safety Training Program offers chemical professionals the opportunity to visit an industrial host with strong environmental, health, and safety (EH&S) programs and to observe first-hand what is required to create and sustain that culture. Once they have completed the training, the STP Fellows develop an implementation plan that describes how they will realize the value of the training by driving improvements back home. STP Fellows are typically invited to share updates at the IUPAC Congress/General Assembly STP Workshops. These presentations illustrate the impact of the program, as Fellows describe the improvements in the use of personal protective equipment, safety devices, waste handling methods, pre-task analysis, etc. These sessions also inspire the workshop attendees to investigate opportunities for hosting STP trainees.

The biggest challenge to sustaining this program has been identifying host institutions that are willing to share their EH&S expertise with the STP trainees. After attending the STP workshop in 2011 in Puerto Rico, Dr. Al Ribes contacted the Responsible Care Leader at Dow Chemical, Terneuzen, Netherlands, to determine if Dow would be willing to participate in this program. Dow had provided similar learning experiences to fellows from OPCW and was very willing to host two trainees. A team then initiated discussions with COCI to identify the trainees and schedule the training.

In February 2013, two STP trainees from Africa arrived at Dow. Jonathan Babalola, Sub-Dean of Sciences and a Reader in Physical Chemistry, University of Ibadan, Nigeria, had been waiting for a training opportunity for almost 10 years. John Mumbo, Compliance and Enforcement Officer, National Environmental Management Authority, Kenya, had learned about the program while working on a UNIDO funded project on Cleaner Production. Upon their arrival at Dow, they were required to view a safety video and complete a test before they could enter the site.

During the training, John and Jonathan met with a number of EH&S professionals and laboratory staff members who covered topics such as safety equipment, management system requirements, compliance to regulations, emergency preparedness and response, training programs, hazardous materials, strategic plan-

ning, process safety, reactive chemicals, and industrial hygiene. Tours were provided of the manufacturing site, as well as R&D laboratories. Throughout the visit, they asked probing questions to understand the underlying objectives of each program, as well as its effectiveness. While the training sessions were lead by EH&S professionals, they also had the opportunity to talk with other employees to understand the safety culture: that each person has a responsibility and a role to play. The trainees learned the expression, "zero accidents, zero injuries, zero excuses".

They each developed a plan of action to be implemented in their own institution upon their return. The actions were classified as immediate, medium-term, or long-term. Here are some highlights:

- Redesign their approach to training with an emphasis on behavioral change and intrinsic values
- Review the environmental impact assessments and audit to prioritize safety
- Improve laboratory safety standards, including installation of safety devices and equipment and guidelines for inspections of laboratories
- Include EH&S in the departmental strategic plan
- Integrate an emergency security services (ESS) within EH&S
- Include remediation of contaminated sites as an activity under rehabilitation of degraded sites
- Develop policies on safety
- Include safety practices into curricula at University level and implement safety education before the first-year practical exam



Jonathan Babalola and John Mumbo Review Laboratory Safety Practices and Equipment at Dow Chemical, Terneuzen, Netherlands

In April 2015, Bayer CropScience, in Research Triangle Park (RTP), North Carolina, hosted Dr. Ahmed Fahmy A.

Youssef, Associate Professor of Chemistry, Cairo University. Dr. Youssef is a professor of analytical chemistry who also works on numerous projects in his home country of Egypt to address problems related to chemical waste management, environmental protection, and air pollution monitoring. His goal was to increase his practical knowledge of environmental process safety management programs.



Dr. Youssef with Bayer CropScience hosts. Left to right: Laura McConnell, Lennie Scott, Bob Lockemer, Ahmed Youssef, Rehan Baig, and Darren Deonarine

In advance of his visit, members of the Bayer CropScience Quality, Health, Safety and Environment (QHSE) team, Patrick Ragan, Rehan Baig, and Lennie Scott, developed a detailed agenda with a variety of training sessions and off-site visits, including a Bayer production facility in West Virginia, a local landfill waste disposal facility, and the chemical waste handling facility at North Carolina State University. Dr. Youssef was invited to attend the Global QHSE North America Spring Community Meeting, where he gave a brief presentation about his work, and he attended the 11th Global Congress on Process Safety in Austin, Texas. He also paid a visit to the IUPAC Secretariat office in RTP.

Overall, the STP was quite positive and beneficial for both the host team and fellows, leading to increased global communication on chemical safety. Dr Youssef's training was financially sponsored by the Civilian Research and Development Fund (CRDF) and the Chemical Security Program (CSP) of the US.

COCI continues to maintain contact and provide support for STP Fellows. Safety Training Program workshops are held in conjunction with each IUPAC General Assembly/World Chemistry Congress (A workshop is being planned for the coming GA in São Paulo). Speakers represent industrial, academic, and governmental institutions. Fellows provide updates on the improvements they have made in their home institutions and within their region or country. Jonathan Babalola has

IUPAC Safety Training Project Fellows 2000-2015

August 2015: Ms. Christine Ashaolu (Nigerian Government Regulatory Agency, Abuja, Nigeria) trained at National Silicates, a PQ Company, Toronto, Canada

April 2015: Prof. Ahmed Youssef (University of Cairo, Egypt) trained at Bayer Crop Science, Research Triangle Park, NC, USA

May 2014: Eng. Noha Zenhom (FEI-ECO, Cairo, Egypt) trained at Woodbridge Group, Mississauga, Toronto Canada

February 2013: Jonathan O Babalola (University of Ibadan, Nigeria) and John O Mumbo (National Environment Management Authority, Kenya) received training at Dow Benelux BV, Terneuzen, The Netherlands

June 2008: Dr. Gursharn Singh Grover (National Chemical Laboratory, India) trained at Novozymes, Denmark

January 2007: Prof. Fabian Benzo (Universidad de la República, Montevideo, Uruguay) and Dr. Godfred Ansah Nyarko (Tema Lube Oil Company Ltd., Ghana) visited Mitsui Chemicals (Japan)

November 2005: Prof. Said Mohamed Mahmoud Bayomi (Mansoura University, Egypt) received training at the facilities of the pharmaceutical company AstraZeneca in the UK

October 2004: Mr. Isiaka O. Bakare (Rubber Research Institute of Nigeria) visited Mitsui Chemicals Co. sites in Japan

October 2003: Ms. Jane B. Nyakang'o (UNIDO Kenya National Cleaner Production Centre) and Ms. Ana Luisa Arocena (CEMPRE Uruguay) trained at the BP Chemicals Technology Center in Naperville, Illinois, USA and the acrylonitrile production plant in Lima, OH, USA

September 2002: Mr. Zhang GuoHong (Sinopec, China) received training at BP Chemicals Inc. USA research facilities in Naperville, IL and production facilities in Lima, OH

August 2002: Mr. Kelvin Khisa (UNIDO Kenya National Cleaner Production Centre) trained at Sankyo Co., Ltd production and research facilities in Japan

June 2002: Mr. Tersoo Charles Gwaza (Shell Petrochemical Development Co, Nigeria) received training at Sasol Chemical Industries, South Africa

August 2000: Prof. Ali El-Emam (Mansoura University, Egypt) trained at Bristol-Myers Squibb in the USA

April 2000: Ms. Esma Toprak (Bogazici University, Turkey) trained at BP Chemicals Inc in Naperville, IL, USA; a side visit was arranged to the Illinois Institute of Technology

shared examples of improvements he drove in Nigeria, including improved waste disposal, safety training and behavior, and emergency response. Several STP Fellows are now collaborating on initiatives to develop Regional Safety Training Centers to expand the reach of this program. The first Regional Safety Training was organized by Professor Fabian Benzo, an STP Fellow from Uruguay. It was held in Spanish at the University of Montevideo in October 2016 (see www.iupac.org/project/2016-021-1-022). A proposal is now being developed to stage a regional STP in India in 2017 and work is starting on regional training in Africa. Efforts like these promise to drive improvements in EH&S practices, policies, and behaviors, and should reduce the number and severity of incidents.

COCI has a list of qualified applicants who are seeking this training. Applicants for the program should be trained scientific or chemistry professionals who are working in industrial, academic, or government institutions. They should have already achieved a position that enables them to drive changes in their organization, so that the benefits of the training can best be realized. A letter of support from their home institution is required. COCI handles the vetting of the applications to ensure

that requirements are met. Anyone interested in hosting STP trainees is encouraged to contact COCI.

COCI and the STP Fellows appreciate the support of host companies, trainers, and sponsors of the Safety Training Program. Their dedication and efforts are making a difference and improving environmental, health, and safety practices. Together, we are driving behavioral and cultural changes to achieve the program's vision: zero accidents, zero injuries, and zero excuses.

References

1. Safety Training Program - Call for Host Companies, *Chem Int*, Sep 2006, p. 21
2. Safety Training Fellows Visit Japan, South Africa, and USA in 2002 and 2003, by Mark C. Cesa, *Chem Int*, Nov 2003, p. 12
3. IUPAC/UNESCO/UNIDO Safety Program Trains Two Scientists in United States, by Mark C. Cesa *Chem Int*, March 2001

For more information and comments, contact COCI chair Bernard West <bernard.west@sympatico.ca>
www.iupac.org/body/022

Books and publications hot off the press.
See also www.iupac.org/what-we-do

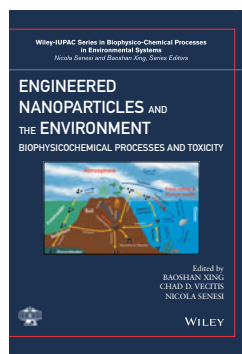
Bookworm

Engineered Nanoparticles and the Environment: Biophysicochemical Processes and Toxicity

Baoshan Xing, Chad D. Vecitis, and Nicola Senesi (Eds)

Wiley 2016, ISBN: 978-1-119-27582-4

Engineered nanoparticles (ENP, 1-100 nm) are found in an increasing number of consumer and food products (such as shampoos, paints, chewing gums) and applications (e.g., biomedical, electronic, industrial, and environmental) due to the rapid development and implementation of nanotechnology. This technology is one of the most promising new research areas of the 21st century and will have dramatic impacts across all scientific fields. Due to their anticipated high-volume production and widespread use, ENP will be unavoidably introduced into the environment during the intentional application, accidental release, and end of life-cycle disposal of ENP-enabled products. For example, ENP have already been reported to enter the environment



as a result of ENP-containing paint. Recent toxicological data raises concern over the environmental and health impact of ENP, which will largely be determined by their fate, distribution, and bioavailability. However, there is also a great deal of potential benefit to society and the world in the discovery, synthesis, and application of nanoma-

terials. There is a need to systematically collect, integrate, and disseminate the latest information, data, and knowledge on all the aspects related to ENP and the environment (e.g., detection, toxicity, transformation, modeling, application). This interdisciplinary book uses a systematic approach, bringing together world-renowned international scientists on the subject matter in order to integrate the latest discoveries and developments in, as well as the future prospects for,