IUPAC Training Program Report at

Bayer CropScience

Research Triangle Park, North Carolina

United States of America

Prepared by

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Table of Contents

Acknowledgments

I'd like to express my deep thanks for all who support me for this Training program.

Dr. Bernard West: Thank you for encouraging me to apply for this proficiently training program and your follow up the success of my training program

Galaal Elsamadicy and Cynthia O'Connor: Thank you for the successful organization and all kinds of support for my visit to the States for the STP program.

I have not enough words to express my sincere thanks to Bayer CropScience (BCS) for the very successful training program that I have. Thanks for all Bayer members helping me to have nice time.

Dr. Laura McConnell: Thanks you for coordination of the training program with Bayer CropScience, your effort for North Carolina State University visit and all of your help, care and support during my stay in North Carolina.

Lennie Scott: Deep thanks for your help, selection of the training topics; caring about all lectures, site visits program and support during my stay in North Carolina. I am happy to work with proficiently expert like you.

Rehan Baig: Deep thanks for your selection of the training topics, preparation of the training agenda, your help for site visit & your help for attending the 11th Global Congress on Process safety.

Acronyms

BCS: Bayer CropScience

CEHM: Cairo University for Environmental Hazard Mitigation

QHSE: Quality, Health, Safety and Environment

HSE: Health, Safety and Environment

IUPAC: International Union of Pure Applied Chemistry

NC: North Carolina

NCS: North Carolina State University

RTP: Research Triangle Park

STP: Safety Training Program

I. Executive Summary

Bayer CropScience hosted me, Dr. Youssef, from Egypt for one month, April 2015, as an IUPAC Safety training program (STP) participant. This program was conducted in the Company location in the Research Triangle Park in Raleigh, North Carolina. The training program provided an opportunity to learn not only chemical safety and chemical security, but also process risk analysis and Hazardous Waste Management. Site visits were conducted in this program for the Bayer production facility in West Virginia including, Wastewater treatment unit and Landfill Waste Disposal facility. In addition, two site visits were performed to Hazardous waste packaging and transportation Contractor Company for Bayer and also to North Carolina State University. April was a lucky month for me since I had the chance to attend two important activities, the first is the Global QHSE North America 2015 Spring Community Meeting for Bayer, in North Carolina, and the second is 11th Global Congress on Process Safety, in Austin, Texas. Also, I had an intensive course for Chemical Safety and practical spill control procedure in chemistry labs. The training program was covering OSHA, Hygiene, remediation, MSDS and QHSE Auditing Programs for Bayer in addition to environmental regulations applied in the United States, EPA, RCRA, etc.

During the four weeks, I worked with subject matter experts in different sectors. I received a lot of information and knowledge that can be implemented not only in Egypt but also in Libya during my activity for the chemical management project in Tripoli University.

Based on my new knowledge, I am going to develop new system for chemical management in Cairo University including HSE system, chemical storage & inventory procedures, waste disposal system in addition to improving the system of chemical accessibility or security.

II. The IUPAC Safety Training Program

The IUPAC Training for Safety and Environmental Protection in Chemical, Pharmaceutical and Biotechnological Research and Production is an activity undertaken by the Committee on Chemistry and Industry (COCI).

Each scientist or engineer accepted into the Safety Training Program is assigned to an IUPAC Company Associate in an industrialized country. The period of training is typically one to three weeks. Accommodation, subsistence and travel expenses are provided for all trainees. In recent years, Fellows from Turkey, Egypt, Nigeria, Kenya, China, and Uruguay, have received training at host companies in the USA, Japan, South Africa, UK, The Netherlands and Canada. In 2012, CRDF Global is proud to partner with the International Union of Pure and Applied Chemistry (IUPAC) to support trainees of the IUPAC Safety Training Program (STP). This partnership, which was highlighted in the November/December 2012 edition of Chemistry International, the news magazine of IUPAC, supports future IUPAC STP grantees to participate in one to three weeks of individualized chemical safety and security training for mid-career chemistry scientists, technicians, engineers and academics at IUPAC affiliated companies around the world. Alumni are encouraged to apply lessons-learned during the STP in their home country or facility. Additionally, IUPAC invites each STP alumni to present on the successes of their follow-up activities at the annual IUPAC Congress.

III. Heath, Safety and Environment in Egypt

In Egypt, the earliest legislation on occupational health was enacted on 5th July 1909. It concerned the employment of children in cotton ginning factories. Since then, a number of Acts have been issued at varying intervals all

of which included sections dealing with the health and welfare of factory workers. Employment of workers, employment conditions and agencies competent in occupational safety and health as well as penalty clauses are covered by the Act No. 91 (5 April 1959).

The first comprehensive Labour Law, numbered 91, issued on 5 April 1959 replaced: Act No. 48 (1933) governing the employment of juvenile workers of both sexes in industry; Act No. 80 (1933)concerning the employment of women in industry; Act No 147 (1935) fixing the number of hours of work in certain industries; Act No. 317 (1952) on individual contracts of employment; Act No.46 (1958) organizing work in mines and quarries; and Act No.14 (1959) governing vocational rehabilitation and employment of disabled persons.

Regulations developed and expanded gradually in order to cover all hazards and economic sectors. It should be noted that the Egyptian legislation relating to OSHA was extensively up-dated in July 2003. It now covers a great part of the requirements and provision entailed in major. The International Labour Organization (ILO) Conventions related to occupational safety and health.

For the environmental sector, in June 1997, the responsibility of Egypt's first full time Minister of State for Environmental Affairs was assigned as stated in the Presidential Decree no.275/1997. From thereon, the new ministry has focused, in close collaboration with the national and international development partners on defining environmental policies, setting priorities and implementing initiatives within a context of sustainable development. According to the Law 4/1994 for the Protection of the Environment, the Egyptian Environmental Affairs Agency (EEAA) was restructured with the new mandate to substitute the institution initially established in 1982. At the central level, EEAA represents the executive arm of the Ministry. The principal function

of the agency, preparing the necessary plans for Environmental protection and Environmental development projects, following up their implementation, and undertaking Pilot Projects.

The Egyptian environmental Law was modified and updated with law 9/2009 and many updates were performed in 2011, 2012 and 2015.

IV. Cairo University and Environmental Hazardous Mitigation Center

It is the oldest second University in Egypt after Al-Azhar University and the Third oldest Arabic University after Al Qarween University. The University was started as separate schools, for, Engineering (1820), Agriculture (1823), Medicine (1827), Veterinary Medicine (1827), Pharmacy (1829), Commerce (1837), Law (1868) and Dar Ulum (1872). The Modem University was established under the name of the Egyptian University (1908) and the name changed to be known as Princess Fouad University. After 1952 revolution, it was called Cairo University. It is located in Giza City, west of Cairo City. Three graduate members of Cairo University have gained the Nobel Prize. In 2004 it was classified as one of the best 500 Universities in the world. The number of students in Cairo University Campus is about 200,000 students in 18 Faculties. The chemistry Department was established in 1925 and now it has researcher groups in different chemistry fields including Analytical Chemistry, Inorganic Chemistry, Organo-Metallic, Physical Chemistry, Renewable Energy, Biochemistry, Organic Synthesis, Nanotechnology and Biotechnology.

Cairo University Center for Environmental Hazard Mitigation (CEHM) was established in 1991 through cooperation between USDA (United States Department of Agriculture) and the Egyptian Ministry of International Co-operation in Egypt. Washington University St. Louis, MO and Argonne National Laboratory, Argonne, IL were supporting CEHM for five years starting from

1995. CEHM started with four Labs, (1) Information and data analysis Laboratory for computation, image processing, database and geographical information system (GIS), (2) Environmental Chemistry Laboratory, (3) Air Quality Monitoring Laboratory for calibration and maintenance of CEHM equipment and Egyptian national air pollution monitoring network equipment and (4) Environmental Geophysical Laboratory for monitoring seismic activity and construct land use maps for new urban communities. Only the Chemistry laboratory and Air Quality Laboratories are still active. The Centre was involved in many national and international activities such as Environmental Information Monitoring Program for monitoring of air pollution (Funded by DANIDA), Cairo Air Improvement Project (CAIP, Funded by USAID), *Cairo Regional Area Transportation Study (CREATS). Funded by JICA and CityZine Mega City Project.*

- **Hosting Basel *Convention* Regional Center.**
- **Environmental Measurements activities & preparation of EIA studies & Amendment plans for the different industrial sectors.**

Topics covered during the training program

The program agenda of the training covered the following topics:

- **QHSE Overview**
- **RTP Industrial Hygiene Program**
- **US Environmental Laws/Regulations: Air, Water, Waste, Hazardous. Substances**
- **Environmental Programs: Audits, Waste Management, Permits**
- **RTP Waste Management**
- **Risk Management Program, Center of Chemical Process Safety (CCPS), Chemical Safety Board (CSB)**
- **Bayer Process Safety and Risk Management Program**

- **Elements of Process Safety Management (OSHA),**
- **Remediation Overview**
- **ISO Standards; BCS QHSE Auditing Program;**
- **Pesticide Registration, Environmental Safety**
- **Laboratory Safety and Chemical Hygiene Training**
- **BCS Medical Programs**
- **Safety Data Sheets (SDS) Overview**
- **Occupational Safety Program Overview**

In addition to the above topics, other activities include:

- **Site visits to Hazardous Waste Management facility, North Carolina State University and Institute Industrial Park (including chemical production facility of Bayer, Wastewater treatment unit and hazardous landfill area).**
- **Global QHSE North America 2015 Spring Community Meeting.**
- **11thGlobal Congress on Process Safety, 2015, Austin.**

Lennie Scott and Rehan Baig prepared a professional agenda for the present training program. They kept me busy with lectures and visits. I received a lot of information during this training.

The lecture of Lennie Scott covered wide topics about QHSE, the Environmental Laws and Regulations for air, water, waste management, air & water permits and environmental risk analysis (4 matrices system). I had huge information from his experience in this area. In addition, during his lectures we discussed some issues about the Egyptian Environmental Laws and how most of the Egyptian limits are close to the EPA limits or derived from EPA. During my stay in Bayer, Lennie supported me with a lot of text books and training documents to have more experience about the environmental regulations.

Rehan Baig's lectures covered different topics including the elements of Process Safety Management (OSHA), Risk Management Program (EPA), Center of Chemical Process Safety (CCPS), Chemical Safety Board (CSB), Bayer Process Safety and Risk Management Program. The lecture of chemical process safety was very interesting and I received some information that was known for the first time. Rehan provided me the links for very important and useful websites that will help me for more understanding of OSHA & CSB programs and materials.

The lecture included Bayer CropScience (BCS) overview, ISO Standards and BCS QHSE Auditing Program Program by Deonarine. These lectures explained for me the different business branches for Bayer, ISO standard applied and how they audit the different production facilities.

Dan Young covered the topic of Chemical Laboratory safety and Spill Control Training. The training included the regulation for chemical handling, personnel protective equipment, hazard identification, etc. in addition; practical training for chemical spill control was conducted by the end of the day.

I had a discussion with Teresa Calhoun about the medical program in BCS. She explained how BCS is supporting employee health through the on-site medical facilities and the medical insurance program.

Steve Earnest presented the development of Safety Data Sheet (SDS) in Bayer CropScience. This sheet involves a lot of information, research, experiments, tests, etc. There is standard method for data collection and sheet development. The most difficult part in SDS development is the stability and toxicity study for the active material and its degradation products.

Laura McConnell presented a very interesting topic about Pesticide Registration and Environmental Safety. She explained the USA regulations for

registration of new pesticide active ingredients. A lot of studies and experiments are required to have all the information that should be covered during the registration process. This may take several years to have the required data. We discussed also how the registration process is proceeding in Egypt.

Bob Lockemer presented an important lecture entitled "Environmental Remediation - Technical Guidance", where I received an overview about the environmental remediation issues (sources, impacts, legal liability, costs and accounting) and processes for environmental remediation (management, investigation, risk assessment, conceptual site model, remediation and monitoring). His lecture and discussion was very important for me because I had a previous discussion with Libyan colleagues about large amounts of storage of obsolete pesticides in highly contaminated areas. This project was supposed to be started 10 months ago, but due to the critical situation in Libya, it was stopped and maybe I can continue after the situation becomes stable. I am sure that the content of this lecture will help me in the future.

Spill Control Training program – Bayer CropScience - RTP

V. Visit to Hazardous Waste Storage Area in Bayer CropScience

Bayer CropScience in RTP has a storage area for hazardous and radioactive waste, where the hazardous waste is collected from the different labs and stored for short time before transfer to the treatment facility outside the company. My visit to this area gave me information about the standard required for preparation of such areas. Outside the storage facilities, there is safety shower and inside there is a ventilation system, spill control tray, fire fitting system and signs for the hazardous nature of the waste.

VI. Visit to the Different Laboratories in Bayer CropScience

Laura McConnell arranged a one day visit to the different labs in Bayer CropScience. This day was one of the most interesting days in my visits. I had open discussion with the experts in the different labs. In this day, I had information about how they study the aerobic and an aerobic degradation of the pesticides, residual analysis and photo-degradation of pesticides. Also, I had information about the most advanced techniques that are applied for pesticides analysis using the GC-MS and GC-MS-MS. The visit was expanded to explanation of how the hazardous waste is collected inside the Labs, how to use the first aid and emergency kits in emergency cases etc.

In my opinion this was one of the most useful days due to experience exchange through practical two ways discussion.

VII. Visit to the Greenhouse in Bayer CropScience

Bayer CropScience opened its newest research facility, a greenhouse that is planned to be used for research. Through research and development initiatives, scientists will grow solutions to meet the world's increasing demand

for food and more productive farmlands. This investment in research and people will help drive their developments in producing crops even more efficiently and sustainably.

My visit to the greenhouse was very interesting. They explained for me how the greenhouse system controls the conditions, the crops under study. Having such technology is very important in supporting the state-of-the-art research.

VIII. Visit to Bee Care Center in Bayer CropScience

The North American headquarters of Bayer CropScience in Research Triangle Park brings together significant technological, scientific and academic resources with goals of promoting improved honey bee health, product stewardship and sustainable agriculture. Their "Bee Care Center" houses a full laboratory with a teaching and research apiary, honey extraction and hive maintenance space; interactive learning center; and meeting, training and presentation facilities for beekeepers, farmers and educators, as well as office space for a full staff and graduate students. On-site honey bee colonies, pollinator-friendly gardens and a screened hive observation area serve to further education and collaboration that will foster significant improvement in honey bee health and stewardship measures and best management practices.

"Honey bees are essential to modern agriculture production, and the North American Bee Care Center helps in facilitating the research needed to help honey bees meet the increasing global demand for crop pollination," said Jim Blome, president and CEO of Bayer CropScience LP. "Healthy honey bees mean a more substantial and nutritious food supply for us all, and we understand the many complex issues affecting honey bees' ability to thrive, including disease, parasites such as Varroa mites, genetics and more."

A hub for worldwide honey bee health initiatives, the Center supports scientific research and development, and education of the public on honey bees' integral role in agriculture. The Center serves as a hub for premier technological, scientific and academic resources to protect and improve honey bee health and sustainable agriculture. Additionally, the North American Bee Care Center is targeting LEED Silver certification. The environmentally sustainable facility will help Bayer CropScience reduce its carbon footprint in an effort to promote corporate environmental stewardship. Products and technology developed at the Center will control parasitic mites in honey bee hives, help manage a Healthy Bees program, assess the safety of crop protection products to bees, and much more.

I had two visits to the Bee care center. In those visits I had detailed information about the Bee's life and how the honey is produced and then extracted. In addition, when we opened the Bee colony (or cell) atthis location, we found a highly organized wax frame with honey content and a huge number of Bees inside in high activity. The energy of operation for this center is also a renewable oneas it utilizes solar panels.

IX. QHSE North America Community Spring Meeting

One of the most important meetings that I had in this program was the QHSE meeting for North America Bayer Cropscience April 21 to April 23, 2015. This meeting is the QHSE annual meeting of Bayer, but this one was special for several reasons. I met most of the QHSE members not only from RTP but also from all Bayer locations in North America, Canada, South America and Europe. In this meeting I received a lot of information and experience from presentations which covered interesting topics such as environmental update for Bayer, driving procedures, raw material testing, plant and process safety,

security, incident investigation etc. Such meetings are very important for updating their communications, information and experience exchange. I had discussion with most of the attendees during the coffee breaks, lunches and dinner.

In this meeting I d the chance to present my IUPAC Training program to the audience and also my activity in Egypt and in the Middle East about Chemical Management. I had a 30 min presentation and I presented my project for the Chemical Management in Tripoli University. I was pleased with their comments and questions at the end of the presentation. I had open discussions with some Bayer personnel during dinner about this project and I received very important and useful comments from them, which will help me in the future.

X. Hazardous Waste Treatment Facility Visit, Veolia

Veolia is one of the biggest companies that provide public authorities and industries with a range of water, waste-management and energy services vital to human development and sustainable performance around the world. Bayer contracted this company for hazardous waste transportation, storage, treatment and disposal. Lennie Scott arranged for a visit to their Hazardous waste storage site in North Carolina. Two employees from Veolia explained how they do packing for the hazardous waste collected from the different locations and the method of storage until transfer to the treatment facilities. The wastes are segregated according to their compatibility in mobile trucks, which is unique idea for this company. They explained how they document the amount and types of wastes collected. In addition they explained the site operation, security control, emergency plan, spill control in addition to how can they observe and control site from their mobiles.

A visit to Veolia Company for waste treatment – North Carolina

XI. Visit to the Institute Industrial Park – West Virginia

Lennie Scott and Rehan Baig arranged for an interesting and important visit to the institute industrial park in West Virginia. We drove for six hours to this location, where there are production facilities of Bayer in addition to the wastewater treatment facility unit and the hazardous waste landfill area. The visit was conducted for three days. The visit started with a meeting with the facility managers and the QHSE team. Fieldvisit was conducted for more than 4 hours to explain the facility operation and control. In addition they explained how they do risk assessment and auditing for each part in the production facility to be sure that the production plant is always safe for operation. The visit was extended to the quality control laboratories and the wastewater sampling lab where wastewater samples are collected, documented and stored for analysis.

Institute Industrial Park Visit – West Virginia

The visit was conducted for the wastewater treatment facility, equalization tank area, treatment area and the control room area. The hazardous landfill area is very close to the production facility where the hazardous waste is transferred by trucks for disposal. Finally as this area is closed it will be covered by grass as a green area.

During the site visit, I had a very interesting city tour with Lennie, Charleston city, and also I had dinner with some of the facility members discussing different interesting issues such as the history of the production facility in WV, my training program, etc.

The program of this visit was very interesting and I had new information and experiences about the chemical production facilities which I have never know before this visit.

XII. Visit to North Carolina State (NCS)

Laura arranged for a meeting with NCS University HSE group to explain for me how they implement the safety regulations and Hazardous Chemicals and Hazardous Waste management inside the university. The university provides the students and the employees with all documents required to provide them with background information to establish safe working practices for hazardous material/processes use and handling. These documents function as both a training tool and a reference source. In addition the university provides the post-graduate students with risk analysis and process safety including selection of the most appropriate equipment that can be used in their newly developed experiments. Also they provide the faculty members with a hazardous waste pick up system from the different labs.

After finishing the meeting and the presentation provided by the University team, we started a tour in the collection and storage area for the hazardous waste inside the university. This area is classified by physical parries to segregate the different wastes according to their chemical compatibility. The storage areas are labeled with different signs indicated the type of reactivity of each waste container. All wastes collected are documented and checked by the safety team before and after transfer from the lab to the storage room. For volatile hazardous waste, there are large metallic containers that can be used to store the small volumes collected from labs. These containers are grounded and kept in well ventilated areas, where they are transferred to the treatment facility after filling the container.

Hazard Waste Storage Area – North Carolina State University

In this location, there are special containers that have to be used for disposal of radioactive waste, such as C-14, which is used in some research laboratories.

The NC safety teams were willing to answer any question and they said for me to contact them at any time if the need any help or have a question. This visit gave me good experience about development of safety and waste disposal program in universities.

XIII. Travel &Transportation

IUPAC, Bayer CropScience and CRDF helped me to have my VISA in time. The invitation letters and Department of State's letter were very helpful to have my visa in time. It took only one week, which is unusual. This gave me the chance to start the training program in time.

The flights from Cairo to North Carolina were good, but going back was very long trip as I had 9-hours transit in London.

Transportation from and to Bayer CropScience was mostly done by my friends from Bayer, Laura, Lennie, Rehan and Kadria. Hyatt Hotel Bus Shuttle is not covering CropScience location.

XIV. 11th Global Congress on Process Safety

From its initial meeting in 2005, GCPS has grown into the world's largest gathering practitioners from industry, regulatory bodies and academia. Presented by CCPS and the AIChE Safety & Health Division, this annual event now draws attendees from around the globe.

2015 AIChE Spring meeting & 11th Global Congress on Process Safety was held in Hilton Austin & Austin Convection Center, Austin, Texas on April 26-30, 2015. CRDF fully supported my attendance to this conference, which is one of the most important conferences about process safety. The conference covered broad subjects and topics such as Environmental, Education, Management, Computing systems and technology, Process development, Process research and innovation, Pilot plants, Fuel and petrochemicals, Global congress on process safety, and others. Many of these topics are interesting to me and I went through the program to select the lectures that I was interested in attending. The presentations of the environmental division were very useful for me such as Process Research and Development for Industrial Sustainability, Environmental Issues and Controls in Selected Industrial Sectors and Environmental water solutions. Due to the large number of parallel presentations, I did not have enough time to attend all topics that I was interested in, so I selected other lectures about the process safety and risk analysis to attend. In the poster section, there were many interesting topics

such as application of risk analysis and risk assessment for research laboratories.

The Hilton Conference Hall has many activities such as presentation panels and exhibitions for the different Service Companies in process safety, new production technologies, risk analysis and risk assessment programs, air dispersion models for pollutant emissions and waste management and waste treatment technologies etc. I had discussion with many of the representatives of these companies and we exchanged business cards for future cooperation.

11th Global Congress on Process Safety – Picture with the Bayer members

Although I had limited time due to a flight cancelation from North Carolina to Austin for the first day of the conference, the conference was very useful and helpful for me not only due the lectures but also due to building new relationships and new communications with a large number of other companies in different fields in chemical production and management.

During dinner, I had a good time with Bayer experts from the different sites. Rehan Baig was very cooperative and helpful for me to have a good time with this conference. I was so happy to share dinner with the Bayer members.

XV. Last meeting in Bayer CropScience

This meeting was very important and interesting because it reflects how much the Bayer team is keen about having feedback about the present training program. This meeting was organized by the QHSE team, Bob Lockemer, Lennie Scott, Rehan Baig and Darren Deonarine in addition to Laura. They asked about the defects and how to improve this program in the future. They also asked what they needtoneed to add or remove from this program. My answer was that this program was very interesting for me and I was satisfied with the program agenda. I mentioned to them that this time, April, was very critical due to the different activities that are held in this month. I asked them to keep this time as the optimum time for running such training. If this time is not available, they have to look for the experience of the coming trainee. If the trainee is a professor, they can do two weeks training in Bayer CropScience (RTP) and two weeks training in NCS University. If he is engineer, it could be two weeks in RTP and two weeks in the industrial institute park in West Virginia or any other production facility.

In my case, I was so happy with my visit and my program because although I am professor in Cairo University, I am also involved in some industrial activities in Egypt as consultant and this program increased my skills in the industrial filed.

From left to right, Laura McConnell, Lennie Scott, Bob Lockemer, Rehan Baig and Darren Deonarine.

XVI. Visit to the IUPAC Office

The new IUPAC Secretariat office moved to a new location in the Research Triangle Park (RTP) about 1 mile from the old location in RTP, Durham, North Carolina. I am happy to be the first visit or to the new location. I was the first visitor to sign into the visitor's book in the new location. I met Dr. Lynn M. Soby, (Executive Director) and I had very interesting discussions with her about my activity in the IUPAC Training Program, how I joined this program and how I am going to apply the new information that I received in this program in Egypt. In addition we talked about the IUPAC meeting in South Korea and how the Koreans are interested in this meeting, August 2015, and how they are prepare for having a very interesting and wonderful meeting and conference.

A visit to the IUPAC Office in RTP, North Carolina

XVII. Action Plan in Egypt

Many faculties (schools) of Cairo University received accreditation by the end of 2014. Faculty of Science is one of those that had the accreditation for the graduation programs. Based on this information, we are now looking for our problems and preparing action plans to overcome these problems. Chemical safety, security and waste disposal are the most important examples of these problems. Cairo University has begun planning for chemical waste collection and disposal in a safe manner. We have hired a private company to pick up the expired chemicals from the different Departments in Faculty of Science as a first step in our chemical management program as I discussed with the decision makers in Cairo University. They welcome the concept of development of a fully integrated system for chemical management starting from chemical safety to security and disposal. As a first step in this program, the Vice Dean of Faculty of Science for the Environmental sector and the head of chemistry department asked me to prepare the first presentation to inform the young demonstrators

and researchers about this program in order to be involved in the development of a safety culture in the chemistry department as prototype in Cairo University. Also, we are in discussions about modification of our practical part for the students to move towards the green chemistry by replacing all of the experiments involving hazardous chemicals with less hazardous ones and/or by applying experiments where the yield of these experiments can be used as raw materials for the higher level students or for researchers as starting materials. In addition, we are in discussions about preparation of a safety orientation program for all students in the first week of the fall of 2015-2016 semester in Faculty of Science. Development of such programs requires not only a qualified team for implementation of this concept, but also it requires financial support and time. In my opinion, just starting to think about the hazardous effect of chemicals and how to manage chemicals in my University is a good starting point for us because this is the first time that this concept has been discussed at high level. I suggested that this program should contain:

1. **Written standards for chemical handling in the chemistry labs, General chemical safety manual.**
2. **Standards for waste disposal.**
3. **Standards for chemical storage.**
4. **Applying the concept of risk assessment and risk analysis before starting any new experiment in the research labs.**
5. **Standards for purchasing of chemicals and the method of transportation from the different companies to the Cairo University campus.**
6. **Chemical inventory system which allows the periodic check about the amount of chemicals that we have and their expiration dates, so we can manage our needs correctly.**

7. **Practical training about first aid and fire-fighting.**
8. **Development of an Emergency plan and drilling for evacuation process for buildings.**

The present IUPAC training program gave me the chance to meet a lot of people that can possibly help me for development of this program. Most of people that I met in the IUPAC STP program said "feel free to contact us for any question or any help." Thank you IUPAC and for all of those people.

"Safety First, Safety Always"

XVIII. Suggestion for the IUPAC Training Program

The present training program is very useful and very important especially for the developing countries. The culture of chemical safety should be disseminated not only among the production facilities but also in research institutions through the IUPAC programs. Cooperation between IUPAC and big companies with highly qualified expertise, such as Bayer CropScience, is very important in supporting such programs. The IUPAC meeting in Korea can be considered as a starting point for development of a list of cooperative companies to IUPAC that can accept the IUPAC trainee in a regular manner to save the time for looking for a hosting company. This cooperation also can be extended to universities or institution such as North Carolina State University.

Increasing the number of the trainees per year should also be considered. IUPAC should increase the awareness about its activities especially for this training program because a lot of people do not know about these important training activities and how to apply for it. IUPAC can share in Chemistry conferences with a member or video conference to announce about the new activities and support that can be shared in.

Other Environmental training programs can be considered in the future such as remediation, mercury waste management, treatment of oil and gas formation water, etc. These programs are very important and capacity building, for expertise, in expertise, in developing countries is required.

XIX. Copy of certificates

Bayer CropScience

Certificate of Completion

This Certifies That

Dr. Ahmed Fahmy Youssef

has completed the requirements of

QHSE Spring 2015 Community Meeting

and is awarded this certificate

Given at Bayer CropScience North America GQHSE

This 23rd Day of April Year of 2015.

Patrick Ragan, Vice President GQHSE North America

QHSE NORTH AMERICA

Bayer CropScience

Certificate of Completion

This Certifies That

Dr. Ahmed Fahmy Youssef

has completed the requirements of

Chemical and Environmental Risk Management April 1st, 2015 -May 1st, 2015

and is awarded this certificate

Given at Bayer CropScience North America GQHSE

This 1st Day of May Year of 2015

QHSE NORTH AMERICA

Patrick Ragan, Vice President GQHSE North America

Bayer CropScience

certifies that:

Dr. Ahmed Fahmy Youssef

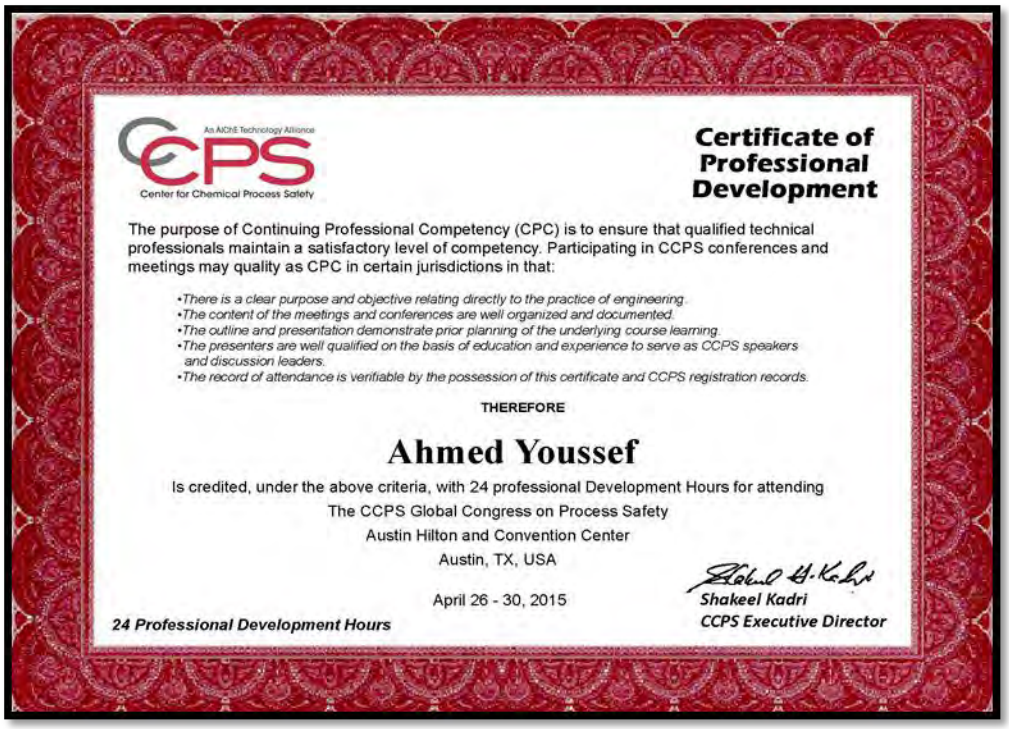
Cairo University

has successfully completed 4 hours of laboratory safety and chemical hygiene training in accordance with OSHA requirements in 29 CFR 1910.1450(f).

Certification Date: April 17, 2015

Daniel J. Young

Daniel J. Young, Instructor, Certified Environmental, Health and Safety Trainer



An AIChE Technology Alliance

CCPS

Center for Chemical Process Safety

Certificate of Professional Development

The purpose of Continuing Professional Competency (CPC) is to ensure that qualified technical professionals maintain a satisfactory level of competency. Participating in CCPS conferences and meetings may quality as CPC in certain jurisdictions in that:

- *There is a clear purpose and objective relating directly to the practice of engineering.*
- *The content of the meetings and conferences are well organized and documented.*
- *The outline and presentation demonstrate prior planning of the underlying course learning.*
- *The presenters are well qualified on the basis of education and experience to serve as CCPS speakers and discussion leaders.*
- *The record of attendance is verifiable by the possession of this certificate and CCPS registration records.*

THEREFORE

Ahmed Youssef

Is credited, under the above criteria, with 24 professional Development Hours for attending

The CCPS Global Congress on Process Safety

Austin Hilton and Convention Center

Austin, TX, USA

April 26 - 30, 2015

24 Professional Development Hours

Shakeel Kadri

CCPS Executive Director