

IUPAC TRAINING ON CHEMICAL SAFETY MANAGEMENT

Part 1: Solvay Warrington Site Training Report

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Acknowledgement

I wish to sincerely thank the entire team that made these training a reality. Much appreciation goes to International Union for Pure and Applied Chemistry (IUPAC) for initiating this program and sourcing for a host industry and Solvay Company for accepting to host us for the three weeks in Warrington (UK) and NOH (Brussels, Belgium). My special acknowledgement go to Bernard West (IUPAC), Dr. Paul Baekelmans (Solvay NOH), Coërs, Pierre (Solvay NOH) Patrick Vandenhoeke (Solvay NOH), Craig Barraclough (Solvay, Warrington), Martin Griffiths (Solvay Warrington), Wayne Allen (Solvay Warrington), Richard Tarver (Solvay Warrington), John McDonagh (Solvay Warrington) Hitchin, Julie (Solvay Warrington), Jean Allen (Solvay Warrington) and the entire Solvay Warrington plant for technical and non-technical staff for their support during the training.

I will also wish to thank the management of the Kenya National Cleaner Production Centre (KNCPC) for permitting me to attend the training for the three weeks. Special recognition to the Director, Dr. Jane Nyakang'o and the HR Manager Mr. Geoffrey Murage for the logistical arrangements by The Centre that enabled me attend the training.

3 BEST PRACTICES IN CHEMICAL SAFETY MANAGEMENT IN SOLVAY, WARRINGTON BUSINESS UNIT

This four day hands on training enabled me pick some of the best practices in a chemical manufacturing plant on Safety Health and Environment, Management Systems, Resource Use and Efficiency, Performance Monitoring and Reporting, Policies, Regulations and Legal Frameworks, Human Capacity Building and Innovations and Technology Use amongst others. It is important to point out that whereas the operations at the plant can be classified as high risk, the plant has operated without any major incident. And with the ever changing market dynamics and prices, the plant has ensured proactivity to ensure wastages are minimized while producing.

Some of the best practices in the plant are discussed below.

3.1 Top Management Commitment towards safety

The MD Mr. Craig's presentation on the first day of the training on the Plant Safety and Safety Programs being undertaken by Solvay, Warrington almost made me think he was the Safety Manager. As the training progressed, I basically realized that all the Managers link their work with safety. The plant visits and interactions with the different levels of management during the training cemented my observations that the top management was committed to continually promote safety in the plant. The top management visit the plant at least twice a week and wherever there are challenges, they are discussed and solved by the team and the affected workforce.

3.2 On line Pre plant visit safety tips

This enables a visitor to understand the plant and the safety requirements before visiting. By so doing, it reduces the amount of time spent to get access to the plant.

3.3 Voluntary Approaches on Safety and Environment

The plant is proactive on protecting its workers and environment. The good working relationship between the plant and the regulators enables the regulators to only visit the plant as a requirement as opposed to visiting to enforce. The different voluntary programs like the Solvay Care Management System, Responsible Care, etc have standards that once met ensure compliance internally.

3.4 Community Involvement

The development of a magazine that is distributed to the neighbourhood promotes a peaceful co-existence with the neighbours. This also creates a feedback mechanism from the neighbours on what the plant can do to improve on Safety and Environment.

3.5 Close Working Relationship with Regulatory Agencies

Unlike in our country where the regulators have a poor working relationship with the industries, the plant has a well-established working relationship with the regulatory agencies. The sharing of

information on the performance of the plant with the regulators is open and it enables the regulators to advice on improvements. This is not common in our country.

3.6 Safety as part of the More Future

Programs that are being developed by Solvay Company incorporate Safety as one of the key components. This clearly indicates that safety is prioritized in Solvay.

3.7 Safety and Resource Use

The clear linkage that exists between safety and resource use is very encouraging. A spillage, leakage or an overflow is not only investigated as a safety issue but also on how much of the resources go into wastage as a result of the spillage or leakage.

3.8 Contractors Adhering to Solvay Safety Rules and Procedures

Contracts are signed with a safety perspective. All workers who are contracted adhere to the safety requirements of the company.

3.9 Safety and Work Competence

It was encouraging to note that workers are also appraised on the basis of their understanding of the safety issues in their work stations. This is administered by workers who have been in the plant longer.

3.10 Technology and Safety (Plant Fire Detective System)

The use of technology to enhance safety is very encouraging. The installed fire detective system in the entire plant to protect it is very encouraging as this lowers the risk of loosing the entire plant incase of fire.

The raw material receiving pumps are also automated such that a truck can not load Hydrogen in a receiving pump if it was not recorded as so since the pump will not open. This I find to be an important safety and material management feature.

3.11 Safety Awareness Materials (The 8 Life Saving Rules on Playing Cards and Note Books)

The 8 Solvay Life Saving Rules (work at height, work on powered systems, line breaking, work in confined spaces, work in explosive atmosphere, lifting, excavation and traffic) being part of the writings on the playing cards spreads the message to all within and without Solvay as this leisure activity of playing cards can involve even people not working in Solvay.

3.11 Positive Safety Discussions

The fact that workers can note and share a discussion on safety motivates these workers. This is not common as most of the companies tend to recognize those who come up with innovation that are not focusing on Safety but on production.

4. IMPROVEMENT OPPORTUNITIES

4.1 Good House Keeping

When repairs are undertaken, the replaced parts or materials need to be taken and kept in the correct waste collection areas for safe disposal. Given that the plant does not have many people manning different sections of the plant, it may take some time for a material that was left by the repairer to be noticed.

The labeling and signage should also be adhered to. The labs and workshops where different materials, equipment or reagent are kept should stick to the labels. This is critical since if a different personality other than the regular worker in that place is called upon to assist while the regular is absent (due to an emergency on the regular that will make him/her not to report to work that day) the operations of that area will go on smoothly. It also avoids a mix up.

4.2 Adherence to the Safety and Hygiene Rules in all Areas

It is important for all workers to observe and adhere to the set rules and regulations in all working areas. The lab especially is critical and eating in the lab should be discouraged.

4.3 Waste Management

All workers and contractors should be encouraged to ensure that the waste they generate in the course of their work is placed in the designated waste bins within the plant. This will not only ensure proper waste management but it also ensures a safe working environment.

5. SOME CHALLENGES OF THE TRAINING

The organization of the training in Warrington was very smooth. The fact that the program on the training was availed the first day of the training was proof enough that the team was well prepared to carry out the training. It is also worth noting that for the four days, the management arranged a dinner with different management teams. It is during this dinner that I was able to freely get additional information and clarifications on some of the aspects I could not understand well during the training hours at the plant. It also gave the management teams an opportunity to know who am, what I do in KNCPC and what KNCPC does in general and how it was related with the training. This gesture gave us an opportunity of knowing some few places within Warrington and some history and culture of the British People.

The assignment of one person to take us to and from the plant to the hotel proved an important gesture and on this I wish to thank the Solvay Warrington plant management and especially Mrs. Julie Hitchin.

I wish to note that the Warrington phase had little logistical challenges that can be improved. They include:

- a) ***Logistical information on Credit Card Guarantee requirement by the Hotel*** – This is important information that all trainees need to have prior to their travel for the training. It enables the trainees to make adequate arrangements to avoid any inconvenience once you arrive at the hotel.
- b) ***Full information on the costs covered by both the institution and trainee*** – It is important that the trainees get the full details on the costs covered by both parties. The Solvay Warrington management was able to take the trainees for dinner. It was important that the trainees are made aware that the dinner cost for example was to be met by them. For the other days when the trainees were not in the plant, lunch cost was to be catered by them equally. This information can assist the trainee make adequate arrangement with the employer on how this cost is to be catered.
- c) ***All trainees to provide their latest bio data before the training commences*** – The period between the application for the training and the training was long. For instance I applied for the training in 2008 and got a go ahead to be trained in 2017. The information about myself and my expectations on the training then and now have drastically changed. I will advise that IUPAC and the host industry develop a simple template that is sent to the trainees on their latest information. The filled template should then be shared with all the facilitators of the training.
- d) ***Trainees to adhere to the selected training topics*** – It is important to note that the trainers were adequately prepared to share their experiences in the topics they were handling. Since we had different experiences amongst the trainees, at times some topics were not adequately covered because of the assumptions that all of us knew much about them.
- e) ***Lack of a training report format*** – It will be very important if IUPAC and the host industry develop a reporting format for reporting by the trainees on the report. This will ensure uniformity in reporting, adequate reporting and also timely reporting

6. UPSCALING THE EXPERIENCES FROM THE TRAINING

This training is meant to increase the skills on Chemical Safety Management to me and also KNCPC. It is also meant to increase the linkage between KNCPC, the regulatory agencies and other stakeholders on Chemical Management.

The upscaling of the knowledge from the training will be achieved in two levels namely:

- a) Regular KNCPC programs
- b) Phased Donor and Government KNCPC Projects and programs

6.1 Regular KNCPC Programs

KNCPC is a nodal quasi government institution in Kenya that provides capacity building activities on Resource Efficient and Cleaner Production (RECP) that basically entails the promotion of Sustainability Programs/Circular Economy activities on Raw Materials Management, Water and Waste water Management, Energy Management etc. Other than capacity building, the Centre also provides policy advice, undertakes assessments and other consultancies along the same line.

The Centre trains industries, policy makers, government institutions, private sectors amongst others on Resource Efficient and Cleaner Production, Waste Management, Environmental Impact Assessment and Audit (EIA/EA), Strategic Environmental Assessment (SEA), Climate Change, Occupational Health and Safety, Energy Management, Life Cycle Assessment (LCA), Clean Development Mechanism (CDM), Green Economy amongst many programs. These training programs are normally done in the Centre and also in the premises depending on the clients' need.

The Occupational Health and Safety training program is normally done twice a year in the Centre. Our last training will be in September this year. Chemical Safety management is one of the main topics that is covered in this training. Of importance to note is that am one of the trainers on this program and other training program.

It is also worth noting that during our EIA/EA training that runs for 3 weeks and we are currently running the training (5th-23rd June 2016), safety is one of our main topics. The safety training covers both the practices at the industry level and the regulatory requirements.

Other than the trainings, the Centre undertakes assessments for various clients with an aim of developing a management plan that is implemented on the best practices. Thus the training enabled me pick some of the best practices that I will share with the Kenyan industries that we are currently working with in our regular programs

6.2 Phased Donor and Government KNCPC Projects and programs

KNCPC has been running different programs and projects that are funded by different agencies and partners. The programs that we have recently run and some that are still active on chemical safety include the following:

- a) ***Promotion of innovative chemicals management approaches in the in the region (African Region)*** – This is a UNIDO funded project that is jointly being implemented by KNCPC and Egypt National Cleaner Production Centre (ENCPC). The project will address three main target groups/categories:
 - 1) Producers of chemicals (synthesis of chemicals; sub-sectors such as production of acids, dyestuffs, etc.)
 - 2) Formulators of chemical products (sub-sectors such as production of printing inks, paints, fertilizers, etc.)

3) Industrial users of chemical products (sub-sectors such as metal finishing, surface coating, furniture, plastic and foam products. Etc)

This project targets to work over 5 chemical industries in Kenya to promote innovative chemical management approaches where responsible care will be one of the key approaches together with RECP.

- b) ***Switch Africa Green (SAG): Promoting Sustainable Consumption and Production Practices and Eco-entrepreneurship: Greening SMEs Leather Clusters and Leather Tanning Industry in Kenya*** - The overall objective of the this project is to “Contribute to production processes, sustainable consumption, and eco-entrepreneurship”. The proposed intervention has a strong logical link with the overall goal of SWITCH Africa in that it will generate growth, create jobs and also reduce poverty as it is targeted at SMEs. It will contribute to improved productivity, reduction in the production and proper management of physical and liquid waste. Finally, a critical barrier for leather products from Eastern Africa would be overcome. As such, compliance towards greener production could avail markets and entry of the final leather products that are otherwise not available through eco-labeling
- I) Improve SMEs competitiveness through energy, space and machinery optimization by promoting joint use under Clusters; Cluster formation would promote joint action in procurement, production and marketing, which will lead to a decrease in the cost of production, consequently enhancing competitiveness, sales growth, employment creation and reduction in carbon emission.
 - II) Promote recycling and reduction in the use of chemicals with a negative impact to the environment; the centralization of SMEs would enable the generation of optimal amounts of waste to support the production of small leather articles out of the off cuts. Tanneries would be assessed to gauge if they are using chemicals that are in line with EU REACH Directive.
 - III) Develop a roadmap for improving effluent management and quantification of carbon footprint of the leather sector: The developed guidelines will be used to improve effluent management and also quantification of carbon emission in line with the new Pilot Project of Carbon footprint quantification.

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Part 2: Solvay NOH Training Report

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I will also wish to thank the management of the Kenya National Cleaner Production Centre (KNCPC) for permitting me to attend the training for the three weeks. Special recognition to the Director, Dr. Jane Nyakang'o and the HR Manager Mr. Geoffrey Murage for the logistical arrangements by The Centre that enabled me attend the training.

1.0 INTRODUCTION

This training program was meant to enhance chemical safety management skills and experiences to the selected trainees. The learning by doing proved to have a long lasting experience in the trainees and it covered most of the aspects in safety ranging from policy and regulations to the practical aspects by the workers such as behavioral safety.

The experiences from this training are meant to be cascaded through capacity building and partnership programs in the countries of the trainees.

2.0 TRAINING PROGRAM

The training program was tailored to cover almost all the aspects on safety and environment at a corporate level for a Head Quarter that is in charge of several business units involved in Chemicals Manufacturing. The systems and programs that the corporate wants implemented and those that it is developing and planning to roll out for implementation by its business units were also incorporated in this training.

Attending some of the planned meetings that are related to safety and induction of new managers was also an idea that enhanced the training program as it gave a firsthand experience to the trainees on how the challenges on safety and environment in the plant are handled.

The guided walk through in the labs, firefighting equipment training site and store, waste management sites, processing plants and workshops while looking for/at specific aspects on safety during the training proved to be important as it blended the theoretical aspects with what is implemented in these sites.

The training program is as presented and discussed below:

Day 1: 08/05/2017

1. Presentation of R&I corporate and the 3 entities in Brussels:

One vision...



The slide features a central collage of four images: an airplane in flight, a modern building with circular windows, a heart rate monitor with a heart symbol, and scientists in a laboratory. The text is arranged around these images in blue and white boxes.

Solvay's Vision for Research & Innovation (R&I)

Lead Solvay into new growth territories
with breakthrough innovation in the field of sustainable chemistry

Deliver Value
Improve competitiveness & create new business opportunities thanks to

- Customer intimacy & market proximity
- Leverage of synergies within the Group
- Innovation excellence
- Eco-designed products

At the hearth of global innovation eco-system

Our researchers worldwide partner with academia, industrials, start-ups and venture capital to develop breakthrough solutions addressing global challenges

The department has 3 laboratories:

- a) Analytical laboratories (30 people)
- b) Material testing and processing (11 people)
- c) Architected Materials & Coatings (16 people)

The **VISION for Analytical and Material testing and processing:** is to be a key and differentiating enabler of success, creating more value to the Group throughout competitive and well aligned competencies, working in close partnership with GBUs, corporate R&I and Industrial teams in a problem solving approach.

The MISSION is more specifically:

- To provide, develop, renew and share state-of-the-art capabilities in order to support our customers in their strategy of innovation and growth
- To respond efficiently to all Solvay GBUs and Corporate needs, with reliable and on-time results, in a competitive and cost effective way, in order to gain full satisfaction and to establish true partnership relations

Architected Materials & Coatings is a laboratory dedicated to research activities for example in batteries area

2. Safety organization & actors: who does what?

i) HSE corporate:

Ensure uniform and best-in-class HSE management to deliver best risk management performance by:

- SHAPING: Defining HSE/Responsible Care policies and strategy and ensuring their deployment
- SAFEGUARDING: Auditing and controlling
- DEPLOYMENT: Implementing Group's programs and global processes to deploy Group strategy
- SERVICING: Delivering expertise to businesses and functions
- TALENT MANAGEMENT: Ensuring functional management of the entire HSE/Responsible Care domain
- PROSPECTIVE: Contributing to Group's overall strategic development

ii) Internal Service for Prevention and Protection at Work (SIPP) is managed by Pierre Depret

It contributes, in accordance with Group policy, health and human safety, environmental management and sustainable development of the Solvay Campus activities.

Business areas (in the ESS scope: Safety, Health, and Environment) include:

- Risk analysis
- Workstation Analysis
- Ergonomics and Industrial Hygiene
- Prevention and monitoring of claims
- Awareness, information and training
- Regulations and standards
- Site security and internal emergency plan

SIPP has the following actors:

- Team of intervention: First-aid workers, fire brigades
- Team of evacuation

c) ARSSE: people relay for safety health environment

iii) Safety organization in R&I laboratories:

HSE Coordinator: Anne-Françoise Pattoux (links between SIPP and HSE corporate for R&I)1
ARSSE / entity

iv) Risk assessments:

Introduction to Solvay Tools to perform risk assessment according de HSE corporate procedures

v) Critical Task analysis: to identify the physical risks at the work place

o Methodology:

- a) Working place identification
- b) Description of each task
- c) Frequency of the task
- d) For each task : which are the Feared Event
- e) Description of Collective Protection and his status : Choice between 3 status:
 1. Coll. Prot. With human action
 2. Incomplete Coll. Prot.
 3. Coll. Prot. in bad condition
- f) Evaluation of the Hazard severity of the danger (selection in a predefined list) → next page see an example for High/low temperature
- g) Elements increasing probability
 1. Deteriorated or damaged equipment
 2. Bulky objects, Exiguous zone
 3. Low lighting level, Low visibility
 4. Work in a non-ergonomic posture ex: with hands above the head, static posture, etc.)
 5. Repeating one action 3 times during the task
 6. Repeating one action 10 times or more during the task

Gross risk (automatically calculated and display)

Description of PPE

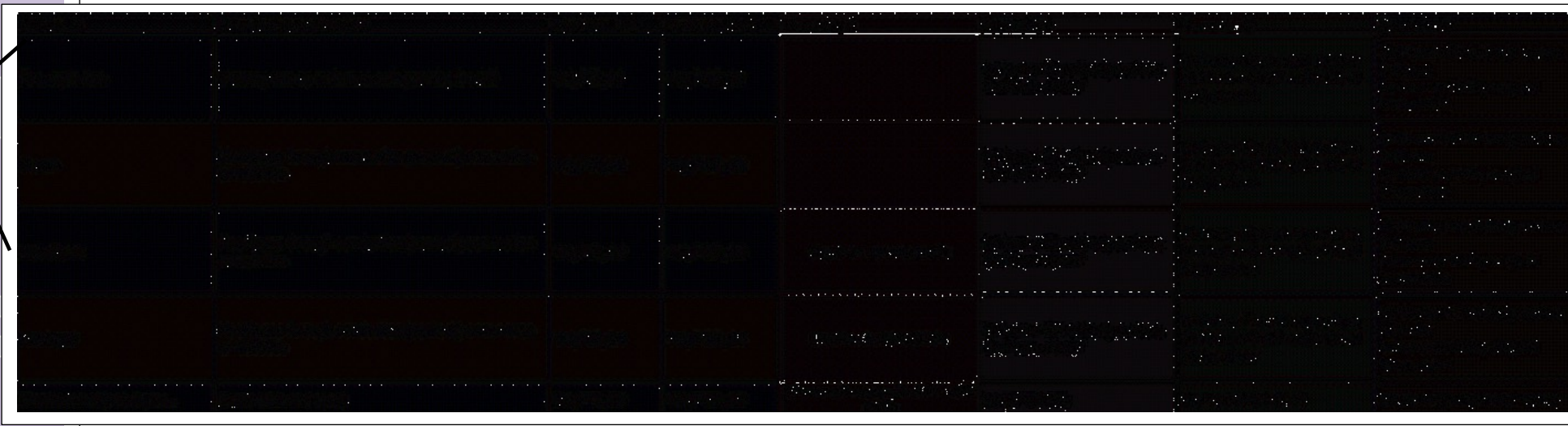
What we do to reduce probability: signs, barricade, specific training,

Residual risk (automatically calculated and display)

Green result → OK

Red result → actions needed

Electricity
Ionising and non-ionising radiation
High / low temperature
Fall (person or object)
Moving parts / Traffic
High pressure
Bump / Contact
Ergonomic Biomechanical strain
Chemical products
Oxygen depletion
Animals



Day 2: 09/05/2017

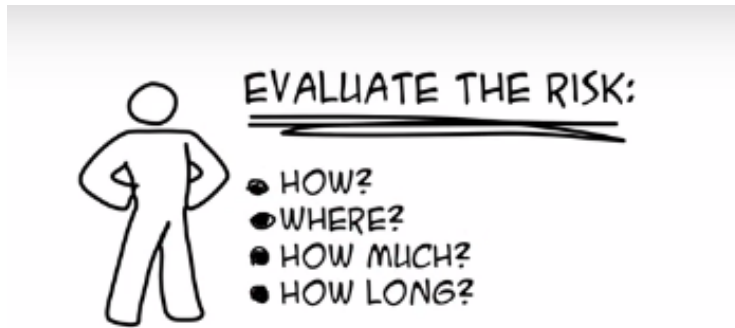
Risk assessments: Critical task analysis

Morning, we perform assessments in Microscopy Laboratory (Analytical department): analysis of tasks and equipment used to prepare samples for microscopy)

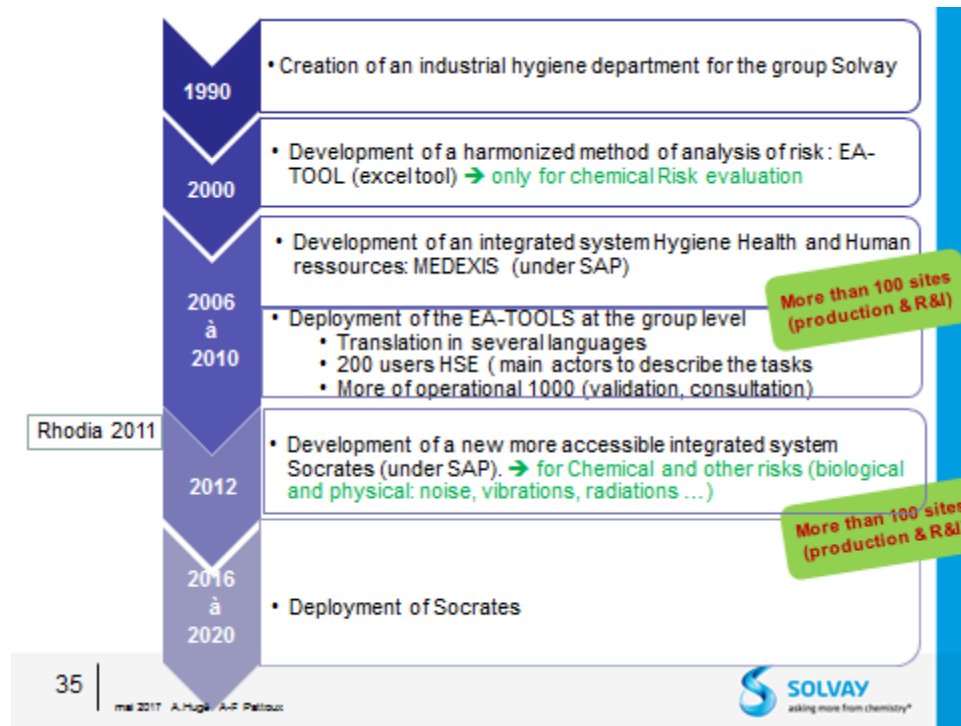
Tools presentation to preform chemicals risks assessment according de HSE corporate procedures:

Chemicals assessments and others risks (biological, physics noise, radiations, etc...)

A complex problem



Historical review



The new Solvay tools Socrates :

The objective of the tool is to alert on the potential exposures to allow us to identify quickly the tasks which are critical before the operators perform the task. So that we can install, if necessary, collective or personal protections

It is not easy to make this evaluation due to the R&I laboratories reality:

- A number of manipulated chemicals very important
- A very polyvalent staff who works from an activity to the other one
- The difficulty to anticipate and thus describe certain tasks. Indeed, in research, the operating conditions change in functions of the results. Not a lot of standardized works

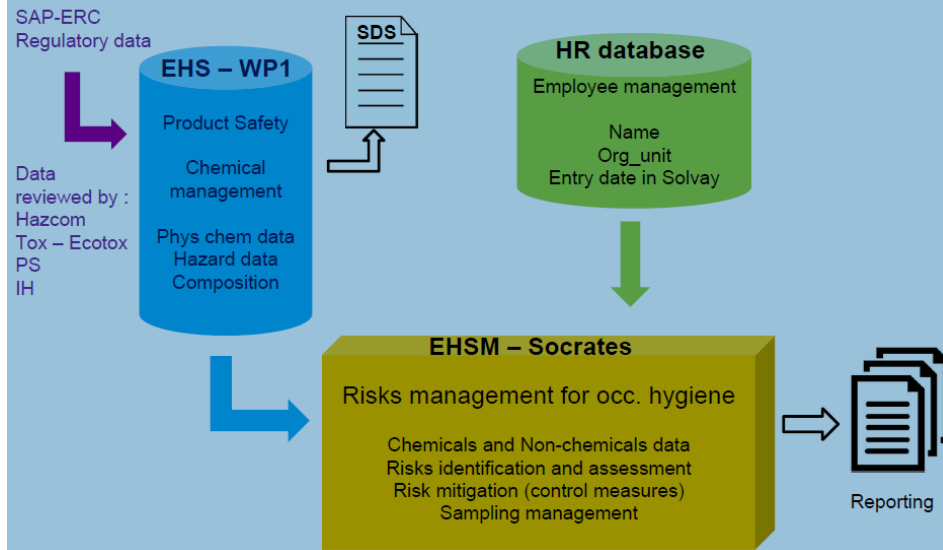
The tool must be simple and allow to take into account this reality → Solvay developed a tool.

Socrates is an integrated tool:

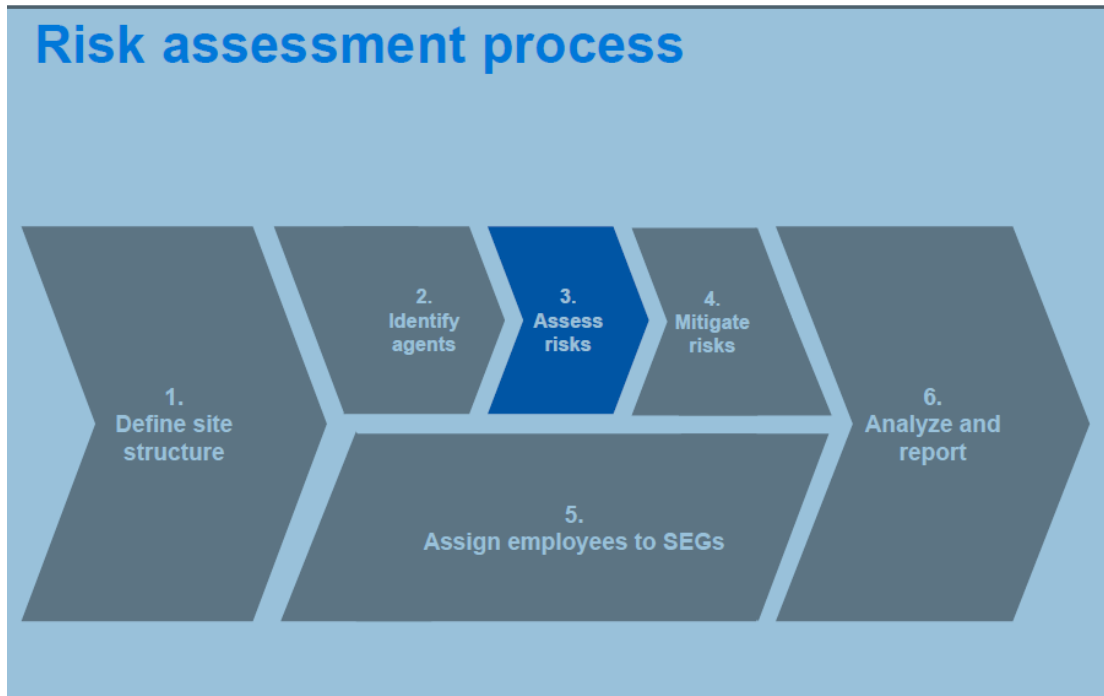
- The tool allows a direct access to the data validated by experts as the data of danger of substances, exposure limit values. The people in the laboratories have no time to collect the useful information and do not have expertise to validate some of these data.

The Safety Data Sheet of our suppliers are indeed sometimes incomplete or contradictory from a supplier to another one

3. Socrates tool - EHSM interface with other SAP modules



- Because the staff is very polyvalent the tool allows to assess the risk for a SEG (similar exposure group= people who have the same exposure profile (same tasks, same chemicals, in the same quantities and conditions)) .
The operators are linked to one or more SEG.
We don't need to describe all the tasks for each operator => assessment is faster
- The tool allows the discrimination of what is a critical task or not.
The integration of a pre-screening tools allows the highlighting of the most critical tasks
When a task is identified as critical, we use another integrate tool allowing a more elaborate evaluation by an expert.
- The tool includes the manager in the process via the systematic transmission of the assessments results and a request of validation.
It is an important point because it is to the manager that returns the responsibility of what is made within its laboratories and thus of the exposure profile of his team
- The tool gives an exposure profile including all the types of risks, chemical but also physical, biological.
Thus the doctor receives a precise mapping of the risks for a similar exposure group and also for a given worker.
- Beyond the evaluation of the risk, this type of tool is very formative, he allows the people on the ground to understand the influence of various factors on the exposure level what incites them to respect laboratories good practices and HSE rules



Day 3: 10/05/2017

1. What's about training?

Types of HSE trainings:

- **Legal obligations = authorizations**
 - External trainer
 - Obtaining of a time-limited certificate
 - recycling compulsory (defined frequency)
 - Control and reception of scaffolding
 - Conduct of a vehicle of service
 - Conduct of hydraulic hoist with mobile nacelle
 - Conduct of a forklift truck (Clarck)
 - Handling by hoisting devices (overhead crane to driver on the ground)
 - Use of a electric pallet truck
 - Industrial first-aid worker + FIREMAN
 - Risk of ionizing radiation
- **Compulsory trainings for Solvay**
 - Extinction of fire
 - Operator of laboratory –Good laboratory practices
 - Works with pressure equipment
 - Manual handling +use of a manual or electric pallet truck
 - Handling and connecting gas cylinders

Use of joins SWAGELOK
 Handling of barrels(trunks)
 Manual handling of loads
 Manipulation with fluorhydric acid
 Team member of first intervention – EdPI
 Team member of second intervention – EdSI
 Works with flammable substances and liquefied gases and works in zone EX
 Works in height
 Team member of evacuation (participate in the evacuation) - Basic rules for evacuation
 Welding works

- **Others**
 - Animation of team, motivation and respect for rules
 - Role and commitment of the hierarchical line in favour of the safety

Preventive observation - POP

Follow-up in R&I laboratories

Name of the formation		Date of the last training			Frequency of the training (number of years)	Validity date
Habilitation	secouriste industriel (recyclage)	Meurat Matthieu	29/09/2016	1	29/09/2017	29/09/2017
Habilitation	secouriste industriel (recyclage)	Robert Serge	23/02/2016	1	23/02/2017	23/02/2017
Formation à des risques définis	manutention manuelle +utilisation d'un transpalette manuel ou électrique	Meurat Matthieu	30/05/2016	5	30/05/2021	30/05/2021
Formation à des risques définis	manutention manuelle +utilisation d'un transpalette manuel ou électrique	Delcourt Dominique	30/05/2016	5	24/03/2020	24/03/2020
Formation à des risques définis	manutention manuelle +utilisation d'un transpalette manuel ou électrique	Robert Serge	30/05/2016	5	30/05/2021	30/05/2021
Formation à des risques définis	manutention manuelle +utilisation d'un transpalette manuel ou électrique	Housiaux Daniel	30/05/2016	5	30/05/2021	30/05/2021
Formation à des risques définis	manutention manuelle +utilisation d'un transpalette manuel ou électrique	Houba Michel	30/05/2016	5	30/05/2021	30/05/2021
Formation à des risques définis	manutention manuelle +utilisation d'un transpalette manuel ou électrique	Cutaia Daniele	30/05/2016	5	30/05/2021	30/05/2021
Formation à des risques définis	manutention manuelle +utilisation d'un transpalette manuel ou électrique	Bulnes José	30/05/2016	5	30/05/2021	30/05/2021
Formation à des risques définis	Manutention et raccordement bouteilles de gaz	Robert Serge	29/11/2016	3	29/11/2019	29/11/2019
Formation à des risques définis	Manutention et raccordement bouteilles de gaz	Meurat Matthieu	29/11/2016	3	29/11/2019	29/11/2019
Formation à des risques définis	Manutention et raccordement bouteilles de gaz	Cutaia Daniele	29/11/2016	3	29/11/2019	29/11/2019
Formation à des risques définis	Manutention et raccordement bouteilles de gaz	Houba Michel	29/11/2016	3	29/11/2019	29/11/2019
Formation à des risques définis	Manutention et raccordement bouteilles de gaz	Delcourt Dominique		3	30/12/2016	30/12/2016
Formation à des risques définis	Manutention et raccordement bouteilles de gaz	Bulnes José	29/11/2016	3	29/11/2019	29/11/2019

Validity date

Green: training is OK

Yellow: training needed in the year

Red : training no valid, operator is not authorized to perform the task

Training as objective in the R&I HSE ROADMAP

Assurer la formation du personnel au poste de travail			
Identifier les besoins de formation			100%
			100%
Planifier les formations			
Taux de participation aux formations			80%
Extinction feu			90%
Mettre en place la formation "risques labos" avec le SIPP (contenu, planification)			Formations planifiées
Participation du personnel de laboratoire à la formation "risques labos"			50%

Objectives 2017

2. Laboratories visit: Material Testing and Processing

Activities presentation:

- Machining operations (polymers on solid state):
 - Saws, milling machine, crusher → Main risks: cut, abrasion, projection of pieces of polymers
 - Press → Main risks: burn, crushing
- Mechanical tests (polymers on solid state):
 - Traction, compression, flexion, creep in flexion, creep in traction → Main risks: projection of pieces of polymers, crushing, manipulation of charge

Rheological evaluation (polymers on melted state):

Capillary and dynamical viscosity measurements → Main risks: burn, chemicals exposure (powder, fumes if degradation occurs...), projection of little pieces of polymers (cleaning operations)

Processing hall

Extrusion, injection, compounding machines : → Main risks: burn, manipulation of charge, cut, rotating parts, chemicals exposure (powder, additives, fumes if degradation occurs...), projection of little pieces of polymers (cleaning operations)

How control the risks

- Based on the Critical tasks analysis, display at each working place of an instruction (FIPoT) at the post of work resuming:
 - Names of the authorized operators
 - All the tasks (steps)
 - Residual risk associated to each task
 - PPE and the rules to minimize the risk
- 5S labialization: to avoid the incidents and the accidents everything on its place

3. Risk assessment for Nano particules: Nanotools

Solvay approach and tool presentation → See already sent files

4. 5S deployment in R&I laboratories

Methodology

First step

- 3h training for all people (in meeting room)
- Before deployment, entity is divided into zones (no too large area)
- For each zones a group of people (first line managers included) responsible for the deployment

Second step (less than 15 days after the training)

Objectives: Establish the zero point of the zone

Time needed depend of the area (large zone, a lot of equipment or not...)

- Visit of the zone all together
 - Visualization of the anomalies
 - Taking of photos “before”
 - Indicate each action with a sticker (post-it)
- In a meeting room
 - Discussion about identified actions
 - Validation by the manager of the zone
 - Recording of actions+photos in a follow-up folder (+ WHO DO WHAT?)

Third step

Start from the end of the second step and must be ended within 3 months

- People realize the actions which are in their charge (but the stickers stay in place)

Fourth step

- New visit of the zone all together
 - Study of the evolution of the actions
 - Comparison with the results of the first visit
 - Taking of photos “after”
 - Elimination of the sticker (post-it) if the action is finished

Fifth step:

- Writing and display of the standards at working places

Audit and labialization:

- External audit

Follow and progress:

- Control with a check list once a week

External audit once a year

5. Learn from the experiences

Reporting HSE (Group tool) for all accident

- In case of accident, the site director or his representative (SIPP) declare de fact in the tool
- Data analyzed at the level of the group
- Communication to all the employees of the Solvay group:
 - HSE results (number and percentage of lost time accident, medical treatment accident ..)
 - Learning lesson bulletin (bound to the gravity of certain accidents)
 - Thematic presentation (bound to the recurrence of a typology of accident)

Reporting (Click here)

- [LTA Declaration Form to COMEX](#)
- Declare an accident into the [Teamsites Accident List \(+User Manual\)](#)
- Record monthly data into the [Technical Reporting RT English / French \(+User Manual\)](#)
- List of accidents in Excel (with analyses by nature of injuries, causes, etc.) extracted from Teamsites
- [Safety Statistics of Sites, GBU's and Zones in Excel from RT](#)

OUFTI: a tool of statement, follow-up and recording of the incidents (no human impact)

- Tool used on the site of Brussels
- Every person who notices an anomaly or an incident use a form (on-line) to declare
- The SIPP asks the implementation of certain actions and make the follow-up

POP: Program of preventive observation

- Objectives and values: continuous improvement of the level of safety and the individual behavior, implication of the staff, the promotion of the safe behavior, the transparency

Mechanism: identification of the safe and not safe behavior, the feedback in the observed, the information feedback

- Only the people formed in the dialogue of safety (assertivity) can make these observations

Day 4: Thursday 11/05/2017

1. Critical task analysis:

We perform assessments in *X-ray diffraction and fluorescence* (Analytical laboratories): analysis of tasks and equipment used to prepare samples for X-Ray diffraction and fluorescence. We also assess the risk of an X-Ray diffractometer

2. Visit to the dispatching (control room)

Presentation of the GTC (Centralized Technical management)

In laboratories or technical installations, all the critical elements as ventilation, gas detector, equipment to control and regulate temperature and humidity ...are connected with a centralized system. In case of problem, an alarm is send to the control room.

In this room an operator is present day and night, 7days/7 days, and he has all the instructions to act in case of emergency.

- Laboratories visit: Architected Materials & Coatings

A Lab designed for nanoparticles manipulation:

- restricted access by control (Key badge),
- SAS and changing room: operator need to change the laboratory coat before entrance to the lab and leave the dedicated laboratory coat before to go out of the lab

- Cleaning procedure
- Fume hoods with alarm and flow regulation,
- small lab dedicated to ultra-sonication activities to separate activities who generate noise , PPE= hearing protection
- Weighing station and special PPE for activities with nanopowder (Control banding Level 4 or 5)
- Oxygen level detector (presence of nitrogen gas in the lab) and procedure in case of emergency

A lab dedicated for batteries activities

- Presentation of the activities by the research in charge of the project
- Working with a glove box and ergonomical problems links to this work

3. Discussion with Paul Baekelmans

4. Discussion with Noémie Lagneau and Patrick Vandenhoeke

Day 5: Friday 12/05/2017

- Mrs Sandra. Quintino (Hazard Communication and EH&S Management Corporate Manager)
- Mrs Patricia Villers (Product stewardship PSMS (Product Safety Management System))
- Mrs Valérie Verlinden (Reach Expert) - (European product regulation)
- Mr Eric Van Miert (Head of Toxicology Unit – Toxicologist) - classification, corporate organization, testing for tox : principles, tox in GHS, ...
- Mr Jean-Bernard Savoye (Occupational safety corporate expert) – Group programs in occ safety
- Mr Pierre Coërs (sustainability stakeholder relations) - strategic sustainability assessment of product portfolio (SPM method)- corporate ext reporting on HSE

Day 6 - day 8 (15 – 17.05. 2017)

- Visits and walk through in the workshops, labs, waste management sites, firefighting stations and training facilities etc

3 BEST PRACTICES IN CHEMICAL SAFETY MANAGEMENT IN SOLVAY, NOH – BRUSSELS. BELGIUM

This eight day hands on training enabled me pick some of the best practices in a chemical manufacturing plant on Safety Health and Environment, Management Systems, Resource Use and Efficiency, Performance Monitoring and Reporting, Policies, Regulations and Legal Frameworks, Human Capacity Building and Innovations and Technology Use amongst others. It is important to point out that whereas the operations at the different sites can be classified as high risk, the plant has operated without any major incident.

Some of the best practices in the plant are discussed below.

3.1 Top Management Commitment towards safety and willingness to share

The willingness of the top management to allow other partners to come to their facilities to come and learn on some of the best practices on chemical safety management is a clear testimony that Solvay is committed to share some of the best practices to the world.

3.2 Voluntary Approaches on Safety and Environment

The site is proactive on protecting its workers and environment. The good working relationship between the plant and the regulators enables the regulators to only visit the site as a requirement as opposed to visiting to enforce. The different voluntary programs like the Solvay Care Management System, Responsible Care, etc have standards that once met ensure compliance internally.

3.3 Close Working Relationship with Regulatory Agencies

Unlike in our country where the regulators have a poor working relationship with the industries, the plant has a well-established working relationship with the regulatory agencies. The sharing of information on the performance of the plant with the regulators is open and it enables the regulators to advice on improvements. This is not common in our country.

3.4 Safety as part of the More Future

Programs that are being developed by Solvay Company incorporate Safety as one of the key components. This clearly indicates that safety is prioritized in Solvay.

3.5 Contractors Adhering to Solvay Safety Rules and Procedures

Contracts are signed with a safety perspective. All workers who are contracted adhere to the safety requirements of the company.

3.6 Fire Fighting Training Station

The existence of a fire fighting training station which is used to train and retrain workers enhances the skills of the workforce to fight fire. It is important that the trainees go through a

real firefighting situation which enables them equip themselves with the right PPEs, equipment, skills etc.

3.7 Existence of the Internal Service for Prevention and Protection at Work (SIPP)

The existence of this unit that works on prevention ensures that there is a preventive approach to the occurrence of an accident or incident. This puts more emphasis on prevention.

4. IMPROVEMENT OPPORTUNITIES

4.1 Good House Keeping (5S)

The labeling and signage should also be adhered to. The labs and workshops where different materials, equipment or reagent are kept should stick to the labels. This is critical since if a different personality other than the regular worker in that place is called upon to assist while the regular is absent (due to an emergency on the regular that will make him/her not to report to work that day) the operations of that area will go on smoothly. It also avoids a mix up.

4.2 Lab Staff Adhering to Safety Procedures

It is important for all workers to observe and adhere to the set rules and regulations in all working areas. The lab especially is critical that all the set procedures are following when undertaking any testing.

4.3 Review on the many standards Implemented especially in the Lab

Solvay has adopted many standards. Some of these standards have almost the same requirements and are attributed to meeting some cost to maintain them. It will be important for Solvay to critically analysis all the standards and subscribe to those their clients need.

5. SOME CHALLENGES OF THE TRAINING

The organization of the training in Brussels NOH was very smooth. It is also worth noting that for the eight days, the management arranged a lunch with the organizers.

I wish to note that the Solvay, NOH phase had some logistical challenges that can be improved. They include:

- a) ***Lack of on line Pre plant visit safety tips*** – For anybody visiting the Solvay NOH, once you are at the main gate, that is when you are taken through the safety induction. This tends to lengthen the amount of time the visitor spends before accessing the site.

- b) ***Only French is the language for the safety Video exams-*** Given that this is the head office for other business units, visitors from all walks of life are bound to visit. Since Safety induction is key, it will be worth translating the safety video and even examine the visitors in the languages that they can follow e,g English, Portuguese, Spanish, Chinese, etc
- c) ***Logistical information on Credit Card Guarantee requirement by the Hotel*** – This is important information that all trainees need to have prior to their travel for the training. It enables the trainees to make adequate arrangements to avoid any inconvenience once you arrive at the hotel.
- d) ***Full information on the costs covered by both the institution and trainee*** – It is important that the trainees get the full details on the costs covered by both parties. It was important that the trainees are made aware that the dinner cost for example was to be met by them. For the other days when the trainees were not in the plant, lunch cost was to be catered by them equally. This information can assist the trainee make adequate arrangement with the employer on how this cost is to be catered.
- e) ***All trainees to provide their latest bio data before the training commences*** – The period between the application for the training and the training was long. For instance I applied for the training in 2008 and got a go ahead to be trained in 2017. The information about myself and my expectations on the training then and now have drastically changed. I will advise that IUPAC and the host industry develop a simple template that is sent to the trainees on their latest information. The filled template should then be shared with all the facilitators of the training.
- f) ***Trainees to adhere to the selected training topics*** – It is important to note that the trainers were adequately prepared to share their experiences in the topics they were handling. Since we had different experiences amongst the trainees, at times some topics were not adequately covered because of the assumptions that all of us knew much about them.
- g) ***Lack of a training report format*** – It will be very important if IUPAC and the host industry develop a reporting format for reporting by the trainees on the report. This will ensure uniformity in reporting, adequate reporting and also timely reporting

6. UPSCALING THE EXPERIENCES FROM THE TRAINING

This training is meant to increase the skills on Chemical Safety Management to me and also KNCP. It is also meant to increase the linkage between KNCP, the regulatory agencies and other stakeholders on Chemical Management.

The upscaling of the knowledge from the training will be achieved in two levels namely:

- a) Regular KNCPC programs
- b) Phased Donor and Government KNCPC Projects and programs

6.1 Regular KNCPC Programs

KNCPC is a nodal quasi government institution in Kenya that provides capacity building activities on Resource Efficient and Cleaner Production (RECP) that basically entails the promotion of Sustainability Programs/Circular Economy activities on Raw Materials Management, Water and Waste water Management, Energy Management etc. Other than capacity building, the Centre also provides policy advice, undertakes assessments and other consultancies along the same line.

The Centre trains industries, policy makers, government institutions, private sectors amongst others on Resource Efficient and Cleaner Production, Waste Management, Environmental Impact Assessment and Audit (EIA/EA), Strategic Environmental Assessment (SEA), Climate Change, Occupational Health and Safety, Energy Management, Life Cycle Assessment (LCA), Clean Development Mechanism (CDM), Green Economy amongst many programs. These training programs are normally done in the Centre and also in the premises depending on the clients' need.

The Occupational Health and Safety training program is normally done twice a year in the Centre. Our last training will be in September this year. Chemical Safety management is one of the main topics that is covered in this training. Of importance to note is that am one of the trainers on this program and other training program.

It is also worth noting that during our EIA/EA training that runs for 3 weeks and we are currently running the training (5th-23rd June 2016), safety is one of our main topics. The safety training covers both the practices at the industry level and the regulatory requirements.

Other than the trainings, the Centre undertakes assessments for various clients with an aim of developing a management plan that is implemented on the best practices. Thus the training enabled me pick some of the best practices that I will share with the Kenyan industries that we are currently working with in our regular programs

6.2 Phased Donor and Government KNCPC Projects and programs

KNCPC has been running different programs and projects that are funded by different agencies and partners. The programs that we have recently run and some that are still active on chemical safety include the following:

- a) ***Promotion of innovative chemicals management approaches in the in the region (African Region)*** – This is a UNIDO funded project that is jointly being implemented by KNCPC and Egypt National Cleaner Production Centre (ENCPC). The project will address three main target groups/categories:

1) Producers of chemicals (synthesis of chemicals; sub-sectors such as production of acids, dyestuffs, etc.)

2) Formulators of chemical products (sub-sectors such as production of printing inks, paints, fertilizers, etc.)

3) Industrial users of chemical products (sub-sectors such as metal finishing, surface coating, furniture, plastic and foam products. Etc)

This project targets to work over 5 chemical industries in Kenya to promote innovative chemical management approaches where responsible care will be one of the key approaches together with RECP.

b) ***Switch Africa Green (SAG): Promoting Sustainable Consumption and Production Practices and Eco-entrepreneurship: Greening SMEs Leather Clusters and Leather Tanning Industry in Kenya*** - The overall objective of the this project is to “Contribute to

production processes, sustainable consumption, and eco-entrepreneurship”. The proposed intervention has a strong logical link with the overall goal of SWITCH Africa in that it will generate growth, create jobs and also reduce poverty as it is targeted at SMEs. It will contribute to improved productivity, reduction in the production and proper management of physical and liquid waste. Finally, a critical barrier for leather products from Eastern Africa would be overcome. As such, compliance towards greener production could avail markets and entry of the final leather products that are otherwise not available through eco-labeling

- I) Improve SMEs competitiveness through energy, space and machinery optimization by promoting joint use under Clusters; Cluster formation would promote joint action in procurement, production and marketing, which will lead to a decrease in the cost of production, consequently enhancing competitiveness, sales growth, employment creation and reduction in carbon emission.
- II) Promote recycling and reduction in the use of chemicals with a negative impact to the environment; the centralization of SMEs would enable the generation of optimal amounts of waste to support the production of small leather articles out of the off cuts. Tanneries would be assessed to gauge if they are using chemicals that are in line with EU REACH Directive.
- III) Develop a roadmap for improving effluent management and quantification of carbon footprint of the leather sector: The developed guidelines will be used to improve effluent management and also quantification of carbon emission in line with the new Pilot Project of Carbon footprint quantification.