ICS environmental best practices factsheets

Fact-sheet - How to establish an action plan to achieve the environmental objectives?

What is the objective?

The manager in charge of the environmental management system (EMS)[1] needs to have a **system** in place to **control how the environmental objectives will be achieved**. A key element of this system is the Environmental Action Plan. This action plan shall determine for each environmental objective:

- What is/are the **target**(s);
- What will be done (**actions** to be taken);
- What **resources** will be required;
- Who will be **responsible;**
- How the results will be **evaluated**, including indicators for monitoring progress toward achievement of its measurable environmental objectives.

How to achieve this objective?

Step 1: **Create** a template for your action plan as per the model below.

Step 2: **Fill-in** the template with your environmental objectives, the targets, the responsible person, actions to be taken, etc.

EMS - Action plan to achieve environmental objectives

Factory name:		**Objective of this document:**	Follow-up on the actions taken to achieve the environmental objectives of the factory as per the Environmental policy (date:…) signed by (….).
Responsible person:			
Date of last update:			

Topic	Environmental objectives	Targets	Responsible person(s)	Actions to be taken	Resources required	Indicator for monitoring of progress	Achievements to date
Water	Reduce the water consumption in the production	20% water savings by 2020 compared to 2015	Mr. Rafiqul Islam, Environment & Compliance Manager Mr. Salam Hosain, Maintenance Manager	1) Replace old dyeing machines with new machines. 2) Implement a procedure to regularly inspect the pipelines and joints to avoid water leaks. 3) Install a water flow meter in the dyeing section	1) Investment for new machines: XXX USD 2) Cost of a water flow meter: XX USD	Water consumption in m3	October 2017: - Dyeing machines replaced with new machines: done for 50% of the machines …
	Extract less water from the ground	Rain water harvesting system to be implemented by January, 1st 2018					
Energy							

Step 3: **Update** on a regular basis (at least every month) the information about "**achievements to date**" (see red boxes) to indicate what is the status of implementation of the actions. When the objective is achieved, it can be written "DONE" for example.

Step 4: **Review** the environmental objectives and the target dates at least annually. If the objective was achieved, another objective can be added in the action plan.

- **Make it simple**! Don't put too many columns in your action plan and don't put too many objectives;
- Make sure the **objectives & target dates are realistic**! Don't be too ambitious but select target dates you will respect.

[1] An environmental management system (or commonly referred to as an EMS) is a set of practices and processes helping organizations to manage their environmental impacts and improve environmental performance caused by their products, services and activities. An environmental management system provides structure to environmental management and covers areas such as training, record management, inspections, objectives and policies.

Fact-sheet - How to establish an action plan to achieve the environmental objectives?

Common non-compliances

The factory is keeping the environmental objectives and action plan in different documents

The management shows different procedures for water savings and energy savings. Objectives are stated in the documents but the format of these documents is not the same and there is no documentation about the progress made so far. Therefore there is no system for the factory to easily monitor the actions undertaken and to measure the achievements on a regular basis.

There is no system to track the progress made to achieve the objectives

The factory has an action plan updated for the last time in March 2016 and there is no evidence of any achievement made so far:

EMS – Action Plan
Last update: 01/03/2016

Objectives	Actions to be implemented	Responsible person	Deadline
Eliminate use of carcinogenic chemicals in the production	Find alternative chemical(s) to replace chemical XXX.	Lab Manager	2018
Reduce the energy consumption	Replace 100% of the lights in the factory with LED lights.	Maintenance Manager	2017
	Install occupancy sensors, so lights go off automatically in unoccupied rooms.		
	…		
…			

Good practices

EMS – Action Plan
Last update: 08/01/2018| Updated by: Mr. Hans (Compliance Manager)

Objectives	Actions to be implemented	Responsible person	Achievements	Deadline
Eliminate use of carcinogenic chemicals in the production	Find alternative chemical(s) to replace chemical XXX.	Lab Manager	Alternative chemical found : YYY Order made on 15/12/2017 to replace current stock of chemical XXX	2018
Reduce the energy consumption	Replace 100% of the lights in the factory with LED lights.	Maintenance Manager	65% of lighting system changed	2017
	Install occupancy sensors, so lights go off automatically in unoccupied rooms.		….	
	…			
…				

Fact-sheet - How to establish an Environmental Awareness training?

What is the objective?

The factory should provide an environmental awareness training to all the employees for two main reasons:

1) **To inform** them about what are the environmental aspects and impacts of the production site and how they are controlled to avoid any risk of pollution and to ensure a safe working environment;
2) **To make them contribute** to the implementation of the EMS[2] and the environmental good practices in the factory (the training has to provide key examples of practices all employees can adopt to save water, save energy, reduce the waste generation, avoid incidents, etc.).

How to achieve this objective?

- **Who needs to be trained?** All the employees including the management.

- **What should be the content of this training?** See below a possible structure of this training:

1 - General awareness	2 - Factory specific environmental considerations	3 - Good practices
• What means "Environment"? • What are the major pollution problems nowadays affecting our country?	• What are the factory activities and processes with potential impacts on the environment? • How the factory is controlling the main environmental impacts to reduce the pollution generated? • What are the environmental objectives of the factory?	• How can employees save water and energy during their daily work? • How can employees contribute to a better waste management? • Other ideas of good practices employees can easily implement at work.

No generic training content ! Make sure the content of the training is aligned with the environmental policy and relevant given the factory's practices and processes.

- **What should be the frequency of the training?** New employees should be trained on environmental awareness as part of the induction training (short version of the content above) AND at least once a year a training should be provided to all employees.

- **Who should be the trainer?** Make sure **the trainer is competent**; the manager in charge of the compliance / the environmental coordinator with tasks and responsibilities related to the environmental topics in the factory should be the trainer (see fact-sheet about the manager in charge of the environmental compliance).

- **How to evaluate if the training is effective? Test the knowledge** of the workers trained after the training and **identify workers** who need to be trained again.

[2] An environmental management system (or commonly referred to as an EMS) is a set of practices and processes helping organizations to manage their environmental impacts and improve environmental performance caused by their products, services and activities. An environmental management system provides structure to environmental management and covers areas such as training, record management, inspections, objectives and policies.

Fact-sheet - How to establish an Environmental Awareness training?

Common non-compliances

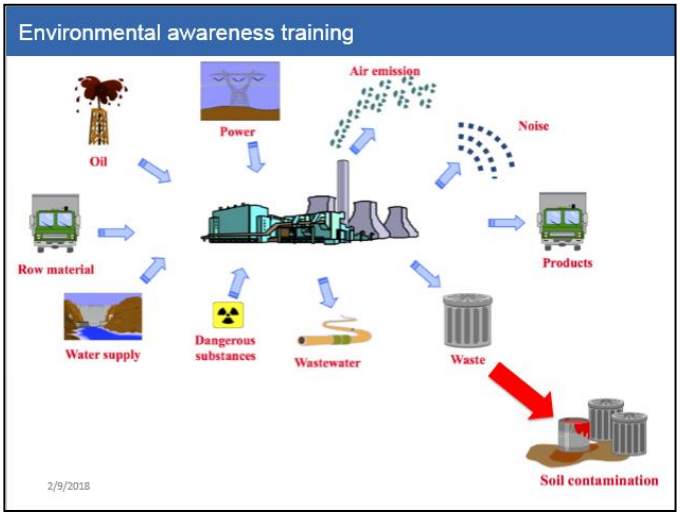
Environmental awareness training not effective

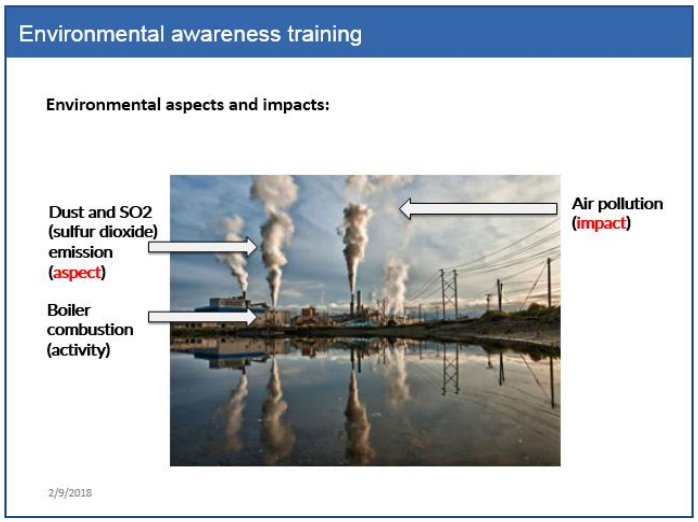
The employees are trained as per the records but based on interview they are not able to give examples of what are the potential pollution sources of the factory neither they can mention good practices to implement. What can be the root causes?

1) The content of the training is too generic;
2) The training was maybe not provided to all the employees but only some of them;
3) The trainer's knowledge is poor.

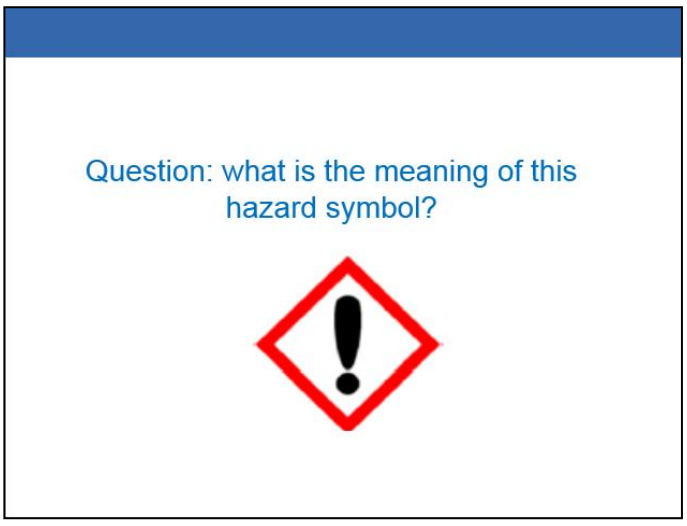
Good practices

Examples of slides that can be used to train the factory employees about environmental topics:





At the end of the training, the trainer can test the knowledge of the trainees organizing an oral quiz. See below examples of questions that can be asked to the trainees:



Fact-sheet - How to establish an Environmental Policy?

What is the objective?

The environmental policy is a core element of the EMS[3]. An environmental policy is a statement about the **commitments** of a factory regarding its environmental values and performance. It has to be **signed by the top management** to validate and approve the vision of the management about how to address environmental issues in the factory. It is **communicated internally** in order to ensure the awareness and enforcement of the environmental objectives and to make sure the factory practices are aligned with the commitments mentioned in this policy. Finally, this document has to be **available to stakeholders** as, in particular, current and potential clients have to be able to take into account these commitments to decide to continue or start the business with a factory.

How to achieve this objective?

The environmental policy should cover:

Introduction	• Provide a short description of the main activities of the factory and how they impact the environment.
Commitments	• To comply with laws & regulations and clients requirements regarding the environment; • To effectively manage all the significant environmental aspects to reduce as much as possible the pollution generated and to continually improve the environmental performance of the factory.
How to achieve these commitements?	• Explain what are the factory specific environmental objectives; • Explain how the factory is going to achieve these objectives (example: by educating and training the employees about the environmental issues, etc.); • Explain how the factory is controlling the enforcement of this policy (example: by monitoring the progress and follow-up on the environmental objectives).

The environmental policy shall be:

- **Dated and Signed** by the top management;
- **Communicated** within the organization;
- **Available** to interested parties (on the factory's website or sent by email to clients, etc.);
- **Reviewed** when there is a change in the factory activities, environmental impacts, objectives, etc.

Common non-compliances

Generic environmental policy

The environmental policy is mentioning very generic commitments such as "*we commit to protect the environment and control the pollution generated by our activities*" but:

1) There is no identification of the exact environmental impacts / sources of pollution of the factory;
2) There is no clear vision and approach from the factory to explain how they are going to achieve this objective.

[3] An environmental management system (or commonly referred to as an EMS) is a set of practices and processes helping organizations to manage their environmental impacts and improve environmental performance caused by their products, services and activities. An environmental management system provides structure to environmental management and covers areas such as training, record management, inspections, objectives and policies.

Fact-sheet - How to establish an Environmental Policy?

Environmental policy not dated and not signed by the top management

The environmental policy can be written by the compliance manager or any member of the management in charge of the Environmental Management System but then this document has to be submitted to the top management (the factory Director for example) so he/she can validate the content of this policy by signing it.
The date is important to know when the policy was reviewed for the last time.

No internal awareness about the environmental policy

Based on interview with the management, the content of the policy is not known. The root cause might be: no internal communication of the environmental policy. The factory should make sure there is a process to communicate the policy to all the relevant management members and an internal meeting should be organized on a regular basis to discuss and review the policy (at least once a year).

Good practices

See below an example of Environmental policy of an Electronic manufacturing company (not full version)[4]:

Environmental policy statement

COMPANY NAME is committed to operate in a way that is compatible with our environment, employees, and our customers. As a member of the global community, we recognize our responsibility to do our part in promoting sound environmental practices.

We do so by adhering to the following principles:

- Our operations and our products will comply with all applicable standards and regulations. This includes local regulations for handling hazardous waste within our facilities, as well as international standards and regulations such as RoHS and REACH to eliminate toxic materials from our products.
- (…)
- COMPANY NAME customers and end-users in Europe can send their COMPANY NAME products directly to COMPANY NAME for responsible processing and recycling.
- We will employ management systems and procedures throughout our operations to specifically minimize the use of hazardous materials by working closely with our suppliers, reduce the amount of energy required for our products through innovative designs, generate less waste by monitoring material usage, and promote recycling of materials in our packaging and processes.
- We will continue designing and manufacturing products and tools that promote energy savings. For example, (…).

We will continually review opportunities to improve our environmental performance by establishing goals and objectives, and by measuring our progress. Examples of improvements include eliminating paper manuals and other material from our product packaging, and providing our customers an abundance of product information online that would otherwise be printed.

We will communicate this policy of responsible environmental management to all our employees by providing the necessary training in all applicable procedures and practices, by informing suppliers of our environmental policy and encouraging them to adopt effective environmental management practices, and by soliciting input from employees, suppliers, and customers on meeting our environmental objectives.

Date:…

Signature of the CEO:…

[4] This is an example to show what could be a correct structure of the environmental policy. This document cannot be copied.

Fact-sheet - How to establish a Legal register?

What is the objective?

One of the priorities of an organization when implementing an EMS[5], is to have a **system in place to control the compliance** with the legal requirements and to be **up-to-date** with the local laws and regulations (in case of a change in the law, new regulation enforced, etc.). The management should have **tools and procedures** to monitor the legal compliance. A recommended tool to help the factory to remain up to date with the legal obligations and to accurately track its compliance performance and status is the **legal register**.

How to achieve this objective?

Step 1: Create a template for the legal register as per the model below.

Step 2: The legal requirements applicable to the factory are identified and specific information is collected (ex: the legal standards to comply with for the discharge of wastewater, etc.).

Step 3: Then, indicate in the legal register the compliance status of the factory: dates of validity of licenses/permits obtained, parameters to test when applicable, frequency of tests, etc.

Legal register

Factory name:		Objective of this document:	
Responsible person:			
Date of last update:			

Legal requirements			Factory compliance status								
Legislation	Chapter/ section/ schedule	Article/ Specific requirement / Standards	License/ Permit / Certificate obtained?	Licence / Permit / Certificate valid until?	Date for application for renewal for License, etc.?	Parameters to test	Frequency of testing/monitoring?	Date of last test	Tested parameters are within the limits as per law?	Date for next test?	Responsible person
Environmental Conservation Rules (ECR 97)	Schedule 4 - Standards for Sound	The ambient noise level must be within the limits as per law. Standards to comply with in Industrial area: at day: 75 dB and at night: 70 dB				Noise level to test in 4 points outside the factory: North, South, East, West at day and at night (unit: dB)	Once a year	25/01/2017 (test report from Qtex) test report.pdf	YES	**25/01/2018** (Qtex to be contacted end of 2017)	R. Hossain, Compliance Manager
Environmental Conservation Rules (ECR 97)	7- Procedure for issuing Environmental Clearance Certificate. & 8. Validity period of Environmental Clearance Certificate.	As per the SCHEDULE – 1 Classification of industrial units or projects based on its location and impact on environment, The factory is in RED category so the Environmental Clearance Certificate is requested. Each Environmental Clearance Certificate shall have to be renewed at least thirty days before expiry of its validity period.	YES	20/06/2018	**20/05/2018**						R. Hossain, Compliance Manager

Step 4: A member of the management has to be clearly designated to be in charge of the legal register and to monitor the updates in the legislation (the responsible person must be an internal employee). Then this person has to update the legal register as soon as there is a change in the legislation[6] and when there is an update in the compliance status (for example: new test conducted on-site, license renewed so date of expiry to be changed, etc.).

- **Determine** the frequency of the update of the legal register (once a month at least!);
- **Make sure** no legal requirement is missing in your legal register;
- **Highlight** in the legal register the dates for application of renewal of legal documents & dates of tests to be performed again (cells in yellow in the example above).

[5] An environmental management system (or commonly referred to as an EMS) is a set of practices and processes helping organizations to manage their environmental impacts and improve environmental performance caused by their products, services and activities. An environmental management system provides structure to environmental management and covers areas such as training, record management, inspections, objectives and policies.

[6] The factory can be informed about changes in the legislation through newsletter/emails sent by the industrial association (ex: BGMEA in Bangladesh, GMAC in Cambodia, etc.) or checking the government websites and communications.

Fact-sheet - How to establish a Legal register?

Common non-compliances

Without a legal register, common problems faced by the factories are:

- Expired permits and applications for renewal sent too late;
- Incorrect parameters tested by third party lab because the factory doesn't know exactly what to test and only relies on the third party expertise (mistakes can happen and the factory is not able to cross-check without a legal register).

The factory has only a list of legal requirements but not a legal register:

In the document, below, are indicated only the names of the reference laws related to environmental protection. There is no information about the exact requirements the factory has to comply with, neither is indicated the status of compliance of the factory for each requirement:

LIST OF ENVIRONMENTAL REGULATION AND LEGISLATION

Sl No	Name of the law/ordinance	Last Updated
1	প্রতিবেশগত সংকটাপন্ন এলাকা ব্যবস্থাপনা বিধিমালা	2016
2	ওজন স্তর ক্ষয়কারী দ্রব্য (নিয়ন্ত্রণ) বিধিমালা,	2004
3	ওজন স্তর ক্ষয়কারী দ্রব্য (নিয়ন্ত্রণ) বিধিমালা,	2014
4	বিপদজনক বর্জ্য এবং জাহাজ ভাঙ্গা বর্জ্য ব্যবস্থাপনা রুলস	2011
5	চিকিৎসা বর্জ্য(ব্যাবস্থাপনা ও প্রক্রিয়াজাত বিধিমালা)	2008
6	শব্দ দূষণ নিয়ন্ত্রণ বিধিমালা	2006
7	বাংলাদেশ পরিবেশ সংরক্ষন আইন	2010
8	বাংলাদেশ পরিবেশ সংরক্ষন আইন	2000
9	লেড-এসিড ব্যাটারী পুনঃপ্রক্রিয়াজাতকরণ সংক্রান্ত প্রজ্ঞাপন	2008
10	পরিবেশ আদালত আইন	2000
11	পরিবেশ সংরক্ষণ বিধিমালা	2010
12	পৌর এলাকার মাঠ ও জলাধার সংরক্ষণ আইন	2000
13	পরিবেশ দূষণ নিয়ন্ত্রণ অধ্যাদেশ	1977

Good practices

Example of legal register (extract):
Zoom on this document to see the legal register template of the factory ABC:

936,Vogra(Chowdhurybary),Joydevpur,Gazipur

LEGAL REGISTER (ENVIRONMENT)-2017

UP DATE: 02.01.17

Sl. No.	Name of Licence/ Certificate	Licence No.	Date of issue	Expiary Date	Validation Period	Application for renewal	Existing Law	Monitoring Tools	Monitoring Interval	Responsiblr Person	Remarks
1	Environmental Clearance Certificate (L)	[illegible]	11/8/2015	14/11/2016	1Year	14/11/2016 (Application)	Environmental Cobservation Rules, 1997 (No 7&8)	http://www.clcbd.org/document/680.html	Monthly		
2	Boilar Licence (L)	[illegible]	23/10/2016	23/4/2017	6 Month	23/3/2017	Boilar Act,1923 (Section 7/8)	http://boiler.gov.bd/eng/	Monthly		
3	Generator Waiver Certificate/BERC licence (L)	BERC/POWER / LWC 1563/1072/211 6, Dated: 14 June, 2015	13/6/2016	14/6/2019	3 Year	14/5/2019	Bangladesh Energy Regulation Commission Act, 2003 (Section 29) & Bangladesh Energy Regulatory Commission Licence Regulation ,2006 (Section 9)	http://www.berc.org.bd/	Monthly		

Fact-sheet - What are the tasks and responsibilities of the manager in charge of the environmental compliance?

What is the objective?

Why a manager should be appointed or recruited?

A member of the management should be **appointed** to hold the overall **responsibility** of the implementation of the environmental management system (EMS)[7]. It doesn't mean this person is in charge of every single task related to the environmental issues but he or she needs to make sure the system works and in particular, this person has two important responsibilities:

1) **Communicate and report** to the top management the status of implementation of the EMS;
2) **Coordinate** with other members of the management and subordinates the implementation of the EMS.

How to achieve this objective?

Step 1: **Write** a job description, for the manager in charge, mentioning his or her tasks and responsibilities. See the example[8]:

Manager (Environment)

Responsibilities and tasks

- Ensure the facility is in compliance with environmental regulations & permits (e.g. Air emissions, Wastewater, Waste, a general facility-wide environmental permit etc.) maintaining & updating a legal register for the follow-up;
- Write and maintain updated documents such as procedures, policy, inventories, records (for water consumption, etc.);
- Set and review improvement targets for energy use, water use, waste generation, chemicals use, GHG emissions, etc.;
- Coordinate a team to develop plans/strategies to make progress towards facility environmental reduction targets;
- Perform detail feasibility study on identifying water and energy savings opportunities;
- Dealing with the clients' environmental requirements and updating sustainability report to share with the top management;
- Develop a training program for employees for topics related to environment;
- Assess and work with the supply chain (suppliers or sub-contractors) to improve their environmental performance.

Step 2: **Appoint** a member of the management or **Recruit** a manager able to hold these responsibilities.

What should be the profile of the manager appointed or recruited?

- Experience in **compliance** (person used to deal with the legal requirements and clients requirements);
- Experience in dealing with **environmental topics** and/or a background in environmental sciences is a plus;
- Experience as a **team manager**/coordinator and the capacity to drive the topic among the management is a plus.

Step 3: **Communicate** internally about the position of the manager in charge and make sure this position is included in the **organization chart** (from this chart, it has to be clear who interacts and works with the manager in charge).

Important: this position is not required to be a full-time position; the designated manager can work 50% of his or her time on other tasks and 50% of his or her time on the environmental issues.

[7] An environmental management system (or commonly referred to as an EMS) is a set of practices and processes helping organizations to manage their environmental impacts and improve environmental performance caused by their products, services and activities. An environmental management system provides structure to environmental management and covers areas such as training, record management, inspections, objectives and policies.

[8] This example is indicative and the list of tasks and responsibilities proposed is not exhaustive.

Fact-sheet - What are the tasks and responsibilities of the manager in charge of the environmental compliance?

Common non-compliances

No job description and no position in the organization chart for the manager in charge of the EMS / Environment

Based on interview, Mr. Xu is the manager in charge of the EMS but there is no documented description of his tasks and responsibilities and his position as the environmental responsible is not indicated in the organization chart (Mr Xu appears as the Maintenance Manager). Therefore there is no evidence that this person is officially appointed to be in charge of the EMS.

Fact-sheet - How to monitor the energy consumption?

What is the objective?

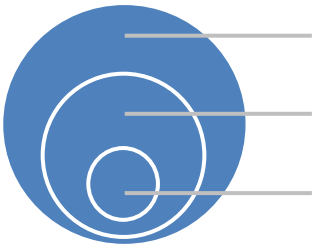
The term "Energy" covers all types of energy sources: electricity, fuel used for on-site transport, energy for supply to equipment and boilers (e.g. coal, coke, wood, fuel-oil, propane, LPG); and other forms of energy (e.g. steam and compressed air)[9].

Why the energy consumption of the factory has to be monitored?

1) To get a clear picture of **the energy use breakdown** in the factory and to **identify hot spots to save energy.**
2) To **calculate the indicators** such as "average electricity consumption per unit of product produced" and
   - **Measure** the energy savings achieved month by month or year by year;
   - **Compare** it with the average in the industry. This indicator helps the production site to know if its performance in terms of energy consumption is above the average (means savings are possible) or below the average (already a good performance).
3) To **calculate the Greenhouse Gases (GHG) emissions** related to the energy consumption so the carbon footprint[10] of the site is known.

How to achieve this objective?

Step 1: **Install** electricity meters to track the different uses of energy in the production site. Where energy meters should be installed? By order of priority:



1. **Factory level:** meters for total energy supply. Example: meter at electricity supply point(s)
2. **Section/process/utility level:** meters for different production sections, Effluent Treatment Plant (ETP), offices, etc.
3. **Single machines level:** meters for machines with high energy consumption

Step 2: Install steam meters (if relevant) at the boiler(s) level to start (then at pipelines level and equipment level). Compressed-air flow meters can be necessary as well if compressed-air is produced on-site;

- Regularly check the **calibration**[11] of the meters;
- Make sure a regular general **maintenance** of the meters is ensured.

Step 3: Write a procedure about how to take the readings from the meters and how often (daily for example);

Step 4: Appoint an employee[12] to:

- **Take the readings** from the meters and to **collect** from the energy bills the data about the energy consumption (ex: bill for natural gas purchased) and ask him to report the data in a dedicated notebook;
- **Compile** the monthly data in a file indicating clearly the energy consumption for each type of energy used in the factory (electricity, steam, natural gas, diesel, etc.).

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[9] Source: GSCP_**ENVIRONMENTAL IMPLEMENTATION GUIDELINES** - OCTOBER 2010.

[10] Carbon footprint: according to the UK Carbon Trust, a 'carbon footprint' is "the total set of greenhouse gases (GHG) emissions caused by an organization, event or product.

[11] Calibrate: to check a measuring instrument to see if it is accurate (Source: Cambridge Dictionary). The calibration of an instrument/tool assures that the measurement errors are minor (the error range is kept within the desired limits).

[12] The environmental manager can appoint an employee for the readings to take and data to report, then he or she should be in charge if the steps 5 and 6.

Fact-sheet - How to monitor the energy consumption?

Step 5: Analyze the energy consumption (compare the consumption month by month and monitor the indicators "electricity consumption per unit of product produced", "natural gas consumption per unit of product produced", etc.);

Compare your factory's performance with the average performance in your industry if data are available. See for example, data for the textile industry[13].

Step 6: **Calculate** the Greenhouse Gases (GHG) emissions of the factory if requested as per law or by your customer.

Common non-compliances

No analysis of the electricity consumption

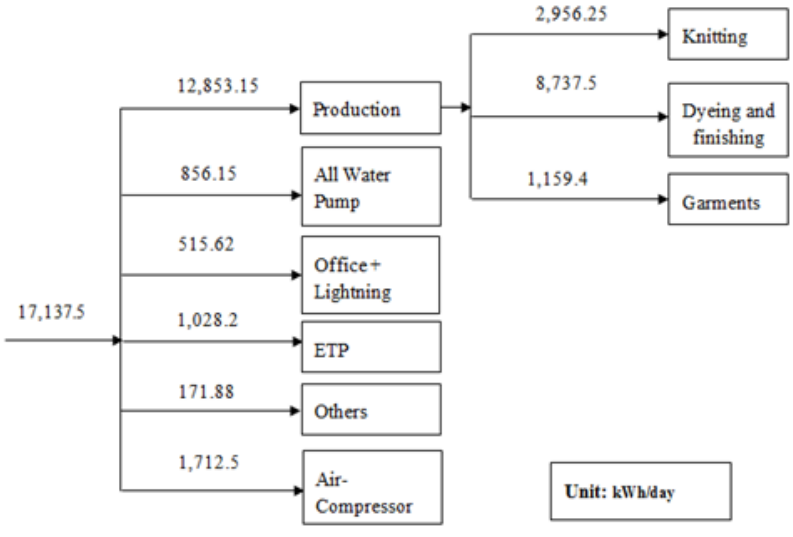
The factory keeps the electricity consumption records, day by day only, and there is no indicator "electricity consumption per unit of product produced" calculated and monitored on a monthly basis.
The factory explained they have implemented energy savings practices but there is no calculation of the kWh saved so there is no evidence of the effectiveness of the actions implemented and the factory cannot communicate on the energy savings targets met.

Not all the sources of energy are monitored

The factory keeps only the electricity consumption records but there is no record of the steam consumption and natural gas consumption. The factory is therefore not able to monitor the energy use breakdown. If the steam consumption is not monitored and not analyzed month by month, the factory might not notice an excessive steam consumption due to a steam leak (for example).

Good practices

The electricity consumption of a factory can be monitored for different sections and uses to get the diagram as below which clearly shows **the energy use breakdown** in the factory and helps to **identify hot spots to save energy**:



Electrical Energy Balance Diagram

[13] Water consumption average in textile industry: 111 L /kg of fabric
Electricity consumption average in textile industry: 0.75 kwh/kg of fabric
Steam consumption average in textile industry: 9 kg/ kg of fabric
Source: International standards as per IFC PaCT (Partnership for Cleaner Textile) programme

Fact-sheet - How to start saving energy?

What is the objective?

The term "Energy" covers all types of energy sources: electricity, fuel used for on-site transport, energy for supply to equipment and boilers (e.g. coal, coke, wood, fuel-oil, propane, LPG); and other forms of energy (e.g. steam and compressed air)[14].

Why should a production site save energy?

- **Save money** using less energy and, in particular, anticipate the increase in the energy costs;
- **Reduce the depletion of non-renewable energy sources** the production site depends on;
- **Reduce the product carbon footprint**[15] (indicator that can be requested by the customer);
- **Increase the productivity per energy input** (improve the efficiency of the management of the production).

How to achieve this objective?

- **Step 1**: From the easier approach to the most pro-active approach, the factory can:

Educate employees	• Raise awareness about how the efficient use of energy can have positive impacts and encourage employees to identify problems and find innovative solutions to reduce energy use on-site.
Energy use assessment	• Determine the baseline energy use and identify where the most energy use is coming from. A factory might have low electricity consumption but a high fuel consumption to generate steam for example, so the focus should be on how to optimize the generation of steam to reduce the fuel consumption. • In most of the production sites, the high energy consumption is coming from the use of energy to run motors/machines, air compressors, air-conditioning/ventilation equipment, refrigeration, etc.
Inspection & regular maintenance	• Write a procedure for regular inspection of machines, pipeline and areas where steam/compressed-air leaks can occur and appoint a manager to be in charge of this "Leak detection prevention programme": he or she will be in charge of the inspection, the maintenance and the report writing. ➢ Example: insulate equipment operating at high temperatures and significantly reduce steam consumption. ➢ Example: regular maintenance keeps motors running efficiently and identifies problems before a breakdown.
Minimize energy use for lighting	• Consider to use more energy-efficient lighting systems. • Take advantage of natural light by placing work areas near windows. • Install occupancy sensors, so lights go off automatically in unoccupied rooms. ➢ Example: replace incandescent lighting with compact fluorescent lighting or LED lighting.
Improve efficiency and recover energy	• Identify all the opportunities to recover heat from hot water, hot air and condensate. • Improve the heavy machines (boiler and generator) maintenance and efficiency ➢ Example: the efficiency of the coal-fired boiler can be improved by prescreening coal, annual boiler burner calibration, insulating the boiler casing and doors, and installing automated oxygen trim controls on the combustion feed inlets[16].

[14] Source: GSCP_**ENVIRONMENTAL IMPLEMENTATION GUIDELINES** - OCTOBER 2010

[15] Carbon footprint: according to the UK Carbon Trust, a 'carbon footprint' is "the total set of greenhouse gases (GHG) emissions caused by an organization, event or product.

[16] Useful links with examples of good practices to save energy: NRDC & GSCP.

Fact-sheet - How to start saving energy?

- **Step 2**: monitor and analyze the energy consumption data to **measure the energy savings achieved** after implementing the good practices as per the recommendations provided above (refer to the fact-sheet "Energy consumption monitoring").

Common non-compliances

No inspection to identify steam/compressed-air leaks

No regular inspection of the steam and air-compressed lines to detect and fix leaks:

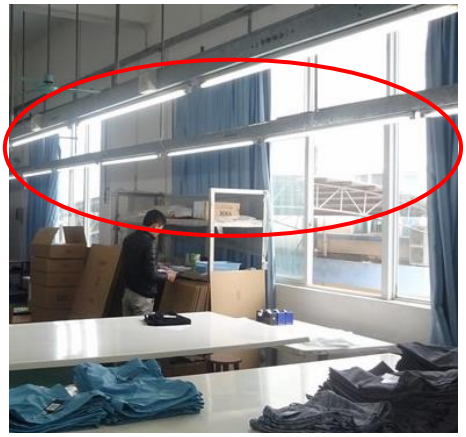


No proper insulation of the steam lines and poor maintenance

Steam lines not in good conditions so there is a risk of steam leaks in this ironing section:


No optimization of day light and lighting system

Picture on the left: The factory has installed tube lights all along the windows whereas the day light would be sufficient for the light intensity required in this production section. Picture on the right: lights never switched off in a storage area.




Fact-sheet - How to monitor the water consumption?

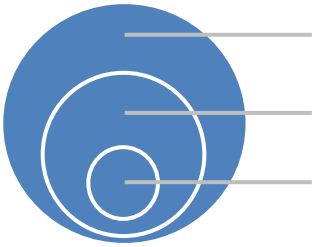
What is the objective?

Why the water consumption of the factory has to be monitored?

4) To get a clear picture of **the water use breakdown** in the production site and to **identify hotspots to save water**.
5) To **calculate the indicator** "average water consumption per unit of product produced" and
   - **Measure** the water savings achieved month by month or year by year;
   - **Compare** it with the average in the industry. This indicator helps the production site to know if its performance in terms of water consumption is above the average (means savings are possible) or below the average (already a good performance).

How to achieve this objective?

Step 1: **Install** water flow meters to track the different flows of water (incoming fresh water, hot water, wastewater, etc.). Where water flow meters should be installed? By order of priority:



1. **Factory level:** meters for total water supply. Example: meter at groundwater extraction.
2. **Section/process/utility level:** meters for different production sections, boilers, domestic use, etc.
3. **Single machine level:** meters for energy and water consuming machines.

Examples of water flow meters:

1. Factory level

Meter found outside the factory to measure the total groundwater consumption.

2. Section/process/utility level

Meter found inside a wet process section to measure the water consumption in a given section.

3. Single machine level

Meter found on a machine using water to measure the exact quantity of water used for this given machine.

Step 2: Write a procedure about how to take the readings from the meters and how often (daily for example);

Step 3: Appoint an employee to take the readings and report them in a dedicated note book / document;

Step 4: The manager in charge of the environmental compliance has to **compile** the monthly data in a file and **analyze** the water consumption (compare the consumption month by month and monitor the indicator "water consumption per unit of product produced").

Fact-sheet - How to monitor the water consumption?

- Regularly check the **calibration**[17] of the meters and make sure all meters are **in good conditions** (screen covered to prevent damages from long exposure to rainwater, dust, encrustation, etc.; see pictures of meters not in good conditions in the page 2 (first non-compliance));
- Clearly assign an employee to be responsible of the **maintenance** of the meters.

Common non-compliances

Improper maintenance of meter

On the picture: non readable digits on a dirty screen. The screen is not protected from rain and dust. There should be a cover to protect the screen.

Inaccessible location of meter

The meter is located on a pipeline not easily accessible to take the readings. For example, on the picture below: pipeline just below the roof of the shed.

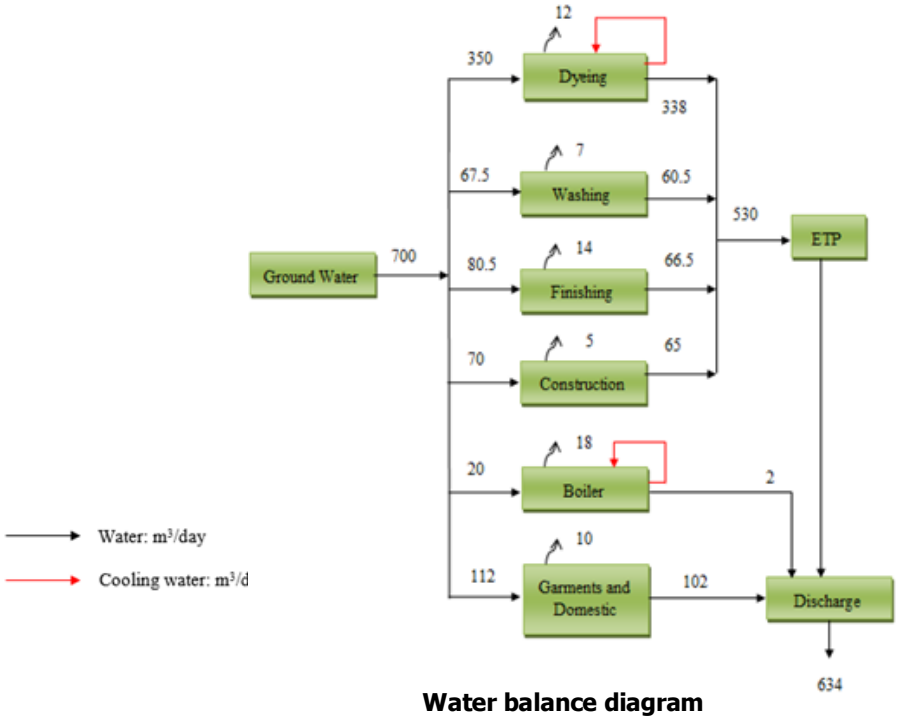
No analysis of the water consumption

The factory keeps the water consumption records, day by day only, and there is no indicator "water consumption per unit of product produced" calculated and monitored on a monthly basis.

The factory explained they have implemented water savings practices but there is no calculation of the volume of water saved in the water consumption records so there is no evidence of the effectiveness of the actions implemented and the factory cannot communicate on the water savings targets met.

Good practices

The water consumption of a factory can be monitored for different sections and uses to get the diagram as below which clearly shows **the water use breakdown** in the factory and helps to **identify hot spots to save water**:



Water balance diagram

[17] Calibrate: to check a measuring instrument to see if it is accurate (Source: Cambridge Dictionary). The calibration of an instrument/tool assures that the measurement errors are minor (the error range is kept within the desired limits).

Fact-sheet - How to start saving water?

What is the objective?

Why should a production site save water?

- **Save money** when the water has a cost or when the water needs to be treated prior use in the production;
- **Reduce the depletion of natural water sources** the production site depends on;
- **Reduce the product water footprint** (indicator that can be requested by the customer);
- **Increase the productivity** per water input (improve the efficiency of the management of the production);
- **Lower the wastewater discharge** (reduce the cost of treatment).

How to achieve this objective?

Step 1: the production site can work on water savings at different levels and taking into account different approaches:

Educate employees	• Raise awareness about how the efficient use of water can have positive impacts. • Encourage employees to identify problems and find innovative solutions to reduce water use within the company.
Inspection & regular maintenance	• Write a procedure for regular inspection of machines, pipeline and areas where water leaks can occur and appoint a manager to be in charge of this "Leak detection prevention programme": he will be in charge of the inspection, the maintenance and the report writing.
Minimize water use for cleaning	• Consider water from internal processes to be used for cleaning. • Fit hoses with high-pressure, low-volume nozzles with shut-off valves.
Chose water saving equipment & technologies	• Replace old machines with water-efficient machines well-known in your industry (for example, in textile, use low-liquor-ratio dyeing machines). • Identify new technologies used in your industry such as the ozone machine for textile.
Reuse process water & review/change processes	• Review the production processes (ex: remove desize step in denim treatment or schedule colors more carefully to minimize the need for extensive cleaning between batches in textile). • Consider opportunities to re-use the process water (for example water from cooling towers, water used to rinse, etc.)[18].

Step 2: monitor and analyze the production site water consumption data to **measure the water savings achieved** after implementing the good practices as per the recommendations provided above (refer to the fact-sheet "Water consumption monitoring").

Common non-compliances

Poor maintenance leading to significant water leaks in the production

The production site doesn't ensure a regular maintenance of equipment, pipelines and joints:

Employees not trained

No training provided to the employees to raise their awareness about easy practices they can implement to save water. Water hoses kept open:

Process water not re-used

The production site is not trying to find opportunities to re-use process water which is not polluted.

For example, in laundry operations, washing machines may be retrofitted with washer-extractors that capture water used in the final rinse stage and reuse it in the pre-soak or initial washing phase. This practice can allow the water consumption to be reduced by about 40%.

[18] Useful links with examples of good practices to save water: NRDC & GSCP.

Fact-sheet - How to establish a drainage plan?

What is the objective?

The objective is to have **a clear picture of all the wastewater flows generated** by the factory and to control **how and where they are discharged**. In particular, the point is to control that the drainage system ensures that no wastewater is discharged into the environment. Therefore the drainage plan is needed to identify:

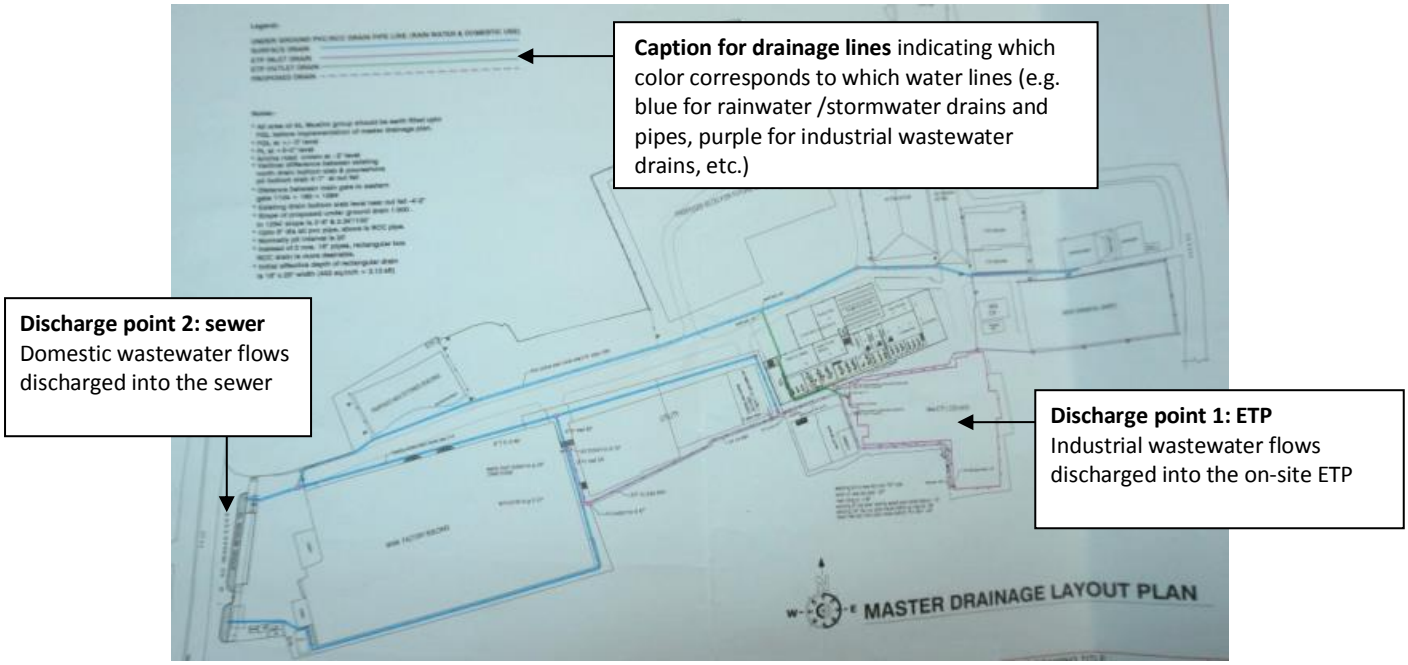
- Wastewater **discharge points**: sewer, effluent treatment plant (ETP)[19], etc.
- Different types of **drainage lines**: for domestic wastewater, industrial wastewater, rainwater/storm water, etc.

Indeed, rainwater drains and pipes have to be indicated as well in the drainage plan, to ensure there is no mix between the wastewater and the rainwater flows (rainwater should not enter in the industrial wastewater drains and vice versa).

How to achieve this objective?

Step 1: Get the drainage plan and make sure the drainage plan is up-to-date; it means that the drainage plan has to correspond to the current factory layout (for example, if a new building was constructed 1 year ago, this new building must be indicated on the current factory layout and on the drainage plan).

Step 2: Control the drainage plan is accurate: have to be indicated the different drainage lines with different colors and have to be clearly indicated all the discharge points. See example below:



Step 3: **Control** that no wastewater source point across the site is left apart (there is a drainage line for all sections/areas from where domestic or industrial wastewater is generated).

Step 4: Compare, observing visible / open drains across and around the factory, the drainage plan and the actual drainage system built on-site to make sure there is no inconsistency.

- **Request** a drain layer / plumbing engineer to inspect the drainage system and confirm the accuracy of your map;
- **Include** in drainage plan this header or footer to provide accurate details about the map:

Production site details	Plan name	Design by	Approved by	Date
Name Address	Drainage layout plan	Name of the Engineer in charge and engineering/plumbing company	Name of the manager in charge	When was prepared this plan

[19] See all the factsheets of Chapter 4 – Wastewater and Effluent

Fact-sheet - How to establish a drainage plan?

Common non-compliances

Drainage plan based on a factory layout not up-to-date

The factory drainage plan is not accurate since the date of the plan is 2016 and in 2017 a new production section was built on-site but the new building is not designed in the factory layout of the drainage plan. The new section is generating wastewater and based on documentation, there is no evidence this additional wastewater flow is directed to the ETP.

No proper drainage system to avoid the risk of mixing of rainwater and wastewater flows

There is an open drain for the industrial wastewater along the building of the factory (see picture below) so in case of rain, the rainwater will enter in this open pipeline and the risks are:

1) Overflow and risk of soil contamination nearby the drain;
2) Excessive volume of wastewater (mixed with rainwater) directed to the Effluent Treatment Plant (ETP). If overloaded, the ETP might not work properly. Moreover, rainwater is treated uselessly.

The factory should modify the drainage system to ensure no possible mixing of rainwater and wastewater. Moreover, the factory should ensure the rainwater is not directed to the ETP.

Fact-sheet – Effluent Treatment Plant (ETP) – Emergency response plan

What is the objective?

The objective is to:

- **Be prepared** to respond rapidly to an emergency situation impacting the ETP;
- **Prevent** possible financial losses resulting from a damaged ETP or equipment/facility affected by the incident;
- **Ensure** the safety of the workers / operators in charge of the ETP operations.

The ETP emergency response plan details the procedures to be followed in case of emergency. The analysis of the potential emergency situations will also help to take measure to prevent these incidents to happen.

How to achieve this objective?

Step 1: Identify the potential emergency situations and what could be the severity of each emergency situation according to the potential impacts on the environment, the ETP disruption level, the time estimated to fix the issue, etc.

Potential emergency situations:

- Power supply failure
- Flooding / effluent overflow
- Fire breakout
- Abnormal discharge in an ETP tank
- Wastewater spill
- Etc.

→

Severity level according to potential impacts (minor, significant and major):

Example: for emergency "Wastewater spill":

- Minor: minor spill, no risk of personnel injury, no contact with the soil and the breach in the pipeline/tank can be fixed within 24 hours;
- Significant: significant spill, contact with the soil/groundwater probable, important maintenance required to fix the problem so likely to take more than 24 hours;
- Major: massive disruption of the ETP causing major leaks, ETP operations must be stopped for several days, maybe weeks to fix the problem.

Step 2: Write the ETP emergency response plan. It should cover the chapters as follow:

- General list of contacts with phone numbers of people to be notified in case of emergency;
- For each emergency situation:
  - Actions to be taken to minimize the damage according to the level of severity (minor, significant and major) and who should be notified in this specific situation. See example below:

Emergency situation 1

Level of severity	What it means ?	Actions to be taken	Who should be notified?
Minor	Ex : minor spill, no risk of personnel injury, no contact with the soil and the breach in the pipeline/tank can be fixed within 24 hours	Ex: contact the technician for the maintenance of the pipeline leaking, request him to identify what could be the origin of the breach, clean-up the spill, etc.	Ex: ETP manager/in charge, Compliance Manager, Utility manager
Significant			
Major			

  - How to report the incident and to notify it to the responsible authorities;
  - Measures taken to prevent or minimize the recurrence of incidents.

Step 3: Communicate the ETP emergency response plan and **Train** the ETP operator and staff to make sure they understand the procedures to follow in case of emergency situation.

- **Update** the ETP emergency response plan: contact list to be updated yearly (or as soon as there is a change in the contact information) at least and overall document to be reviewed if there is any change in the ETP.
- **Practice** the ETP emergency response; an ETP emergency response drill should be conducted once a year.

Common non-compliances

No awareness about potential emergency situations

The factory has an ETP emergency response plan mentioning only the following natural disasters: earthquake, fire and flooding. In case of any of this emergency situation, the procedure is to shut down the ETP and stop the production. The factory has not identified potential emergency situations more likely to happen and there is no detailed action plan to follow adapted to the different situations that can happen.

Fact-sheet – Effluent Treatment Plant (ETP) – Operation & Maintenance manual

What is the objective?

The Effluent Treatment Plant (ETP) is a key operational control implemented by the factory to reduce the pollution load of its wastewater to the extent to meet the legal standards for the wastewater discharge. To achieve this objective, the factory should have a management system to:

- **Operate the ETP efficiently** with comprehensive guidance, procedure and necessary technical references;
- **Ensure the regular maintenance** required for the ETP effectiveness in the long run.

A key tool of this management system is the ETP operation and maintenance manual.

How to achieve this objective?

Step 1: Make sure you have the ETP operation and maintenance manual provided by the ETP manufacturer*. The content of the ETP operation and maintenance manual should cover:

- Description of the ETP process (technical information about the plant, its equipment and controls) ;
- Guidance regarding the day-to-day operation of equipment and systems for each treatment process ;
- Guidance regarding common problems;
- Recommended planning/schedule for inspection and maintenance (see on the right listing the daily control);
- Program for water sampling and/or water quality monitoring plan (see fact-sheet "Water quality testing");
- Schedule of routine meter readings, tests, chemical use, etc.;
- Guidance for emergency situations and emergency plan (see fact-sheet "ETP Emergency preparedness");

DAILY CONTROL

- Check the available quantity of reagent in the storage tanks;
- Check the dosing pumps and the dosage of the reagents;
- Clean the screening equipment at inlet;
- Clean the overflow channel of the purified water from the clarifier;

Step 2: Appoint the operator(s) in charge of the implementation of the instructions of the operation and maintenance manual; make sure they have the skills and competences to understand each requirement/procedure (see fact-sheet "ETP operator's skills and responsibilities").

Step 3: Develop templates or a log-book for the records of the regular maintenance operations with date and description of the maintenance and controls undertaken by the ETP operator(s).

- **Regularly check** if the ETP operator is reporting all the maintenance operations undertaken as per the templates provided ;
- **Compare** the frequency of the actions taken by the ETP operator (based on his or her operation records) with the recommended planning/schedule for inspection and maintenance operations indicated in the ETP operation and maintenance manual.

Two important remarks:

1) Don't rely on an incomplete operation and maintenance manual and don't assume the ETP operator can always "guess" what to do. If the manual is incomplete, ETP processes might not be well understood, important equipment might be left apart, the conditions of the tanks and pipes might deteriorate rapidly, etc. An incomplete manual leads to unefficient maintenance of the ETP, then additionnal risks and even costs when not maintained in a good working order.

2) The manual has to correspond to the ETP built on-site; compare the description of the ETP flow diagram/process chart in the manual with the ETP built on-site to make sure the manual is relevant to the characteristics and processes of the actual ETP. If the manual was not provided when the ETP was built, the factory should request an ETP engineer/manufacturer to come on-site to visit the ETP and establish the relevant manual to run efficiently this plant.

Fact-sheet – Effluent Treatment Plant (ETP) – Operation & Maintenance manual

Common non-compliances

No control of the screening system

The screening system is not effective because the screen is not well installed and no maintenance was undertaken to fix the problem:

Equipment corrosion

Due to a poor maintenance, the tanks and pipelines are rusted and this can lead to breaches in the equipment and wastewater leaking. In the picture below, there is a leak:

Unused equipment

The factory is supposed to use the sludge filter press to remove the water from the sludge but this equipment is not connected to the ETP and left apart in the treatment process (equipment rusted and abandoned on the side of the ETP):

Good practices

Example of a template used by a factory to record the ETP maintenance operations:

Detail of ETP Maintenence and Water Parameter

Date	Daily Dosing pump and dosing rate	Daily PH TDS HARDNESS	Daily Raw water pump	Daily High pressure pump	Monthly All water tank	Monthly Micrown filter	Monthly Carbon pre filter	Monthly R.O. memerance	Weekly Electric controler and panel and sefty trips	Weekly Water supply line and valves
01.08.2017	OK Tested	6.5/300/50	OK Tested	RUNING HPP-1	OK Tested	OK Tested	OK Tested	OK Tested	OK Tested	OK Tested
02.08.2017	OK Tested	7.0/300/55	OK Tested	OK Tested				REPAIR		
03.08.2017	OK Tested	7.0/350/50	OK Tested	OK Tested				MEMRAINCE		
04.08.2017	REPAIR NRV O	7.0/300/60	OK Tested	OK Tested				II HOUSING		
05.08.2017	OK Tested	7.0/350/65	GLAND & GREA	OK Tested						CLEANING TUBE SETTLER VALVES
06.08.2017	SUNDAY									
07.08.2017	OK Tested	7.0/300/50	OK Tested	OK Tested		Change Micron		REPAIR		
08.08.2017	OK Tested	7.5/300/50	OK Tested	OK Tested		Ftr Tank no.3		MEMRAINCE		
09.08.2017	OK Tested	7.0/350/60	OK Tested	RUNING HPP-1				II HOUSING	OK Tested	OK Tested

Fact-sheet – Effluent Treatment Plant (ETP) – Skills and responsibilities of the operator

What is the objective?

The objective is to make sure the staff is able to ensure a proper operation of the ETP. Therefore the factory needs to control that:

- The ETP operator is competent and knowledgeable to control the ETP;
- The ETP operator's tasks and responsibilities are clearly defined and followed.

How to achieve this objective?

Step 1: Recruit or appoint an ETP manager/operator who will be the responsible person for the overall ETP operation and maintenance. The profile of the ETP operator should be in line with the requirements below:

- Technical background experience in operating a wastewater treatment plant;
- Knowledge in microbiology and environmental chemistry and experience in sampling and testing water;
- Experience in performing daily checks of the wastewater treatment process;
- Understanding of the machinery used for wastewater treatment and pumping system;
- Ability to diagnose and correct wastewater treatment plant malfunctions;

Step 2: **Provide** clear duties and responsibilities to the ETP operator (who might share the tasks among his team) and make sure he/she knows how to use the ETP operation & maintenance manual and understands its content. Operator's tasks are:

- **Follow** the instructions of the ETP operation & maintenance manual;
- **Control** dosage of chemicals and nutrients based on the wastewater characteristics;
- **Operate** and maintain the screens, grit removal devices, pumps, aerators, etc.;
- **Perform** the daily, weekly and monthly controls and preventive maintenance operations and detect troubles*;
- **Ensure** the water quality monitoring before, during and after treatment**;

Step 3: **Request** the ETP operator to review and improve the ETP procedures and prepare formats for keeping the records (e.g. create templates for the records of ETP controls and maintenance, write water quality testing instructions, prepare ETP performance report, etc.). See on the right an example[20] of format for a daily task:

Computations of daily figures for the System:

Date / Month / Year	Daily Flow	Raw Effluent		Treated Effluent		Organic load removed	SS passed into outfall
		BOD	SS	BOD	SS		
	m³/day	mg/L	mg/L	mg/L	mg/L	Kg/day	Kg/day

*For the maintenance operations, the support of electrician and mechanical technicians will be required.

**For this task, the operator must have an experience as laboratory analyst; otherwise there should be a lab analyst in the staff. This person has knowledge in water chemistry, how to collect a sample, how to use the testing instruments, how to preserve the sample, etc.

- **Make sure there is a backup in case the ETP operator is not present:** during holidays and weekends, there should be staff coverage. A good practice would be to have a calendar indicating who is in charge of supervising the ETP when.

Common non-compliances

ETP operator not well trained and no tasks and responsibilities assigned

The factory is providing an ETP operation and maintenance manual and other instructions to run the ETP in English to an operator who speaks only the local language. The operator states that he doesn't need to follow the instructions but he is not able to explain clearly what are his tasks and responsibilities, how frequently he undertakes some maintenance checks, which parameters should be tested to control the compliance with the law, etc. There is no formal process in this factory to control the ETP operation and no evidence the ETP operator is qualified for the job.

[20] Source: Guideline for Operation & Maintenance of Effluent Treatment Plants, Maharashtra Pollution Control Board (India), November 2004

Fact-sheet – Effluent Treatment Plant (ETP) – Water quality testing

What is the objective?

The objective is to:

- **Control** the wastewater characteristics before, during and after the treatment to control and make sure the treatment process is adapted;
- **Ensure** the quality of water after treatment is within the limits as per law or as per the industry standard.

How to achieve this objective?

Step 1: Identify which water quality parameters should be tested before, during and after treatment.

Before treatment (ETP inlet)	During treatment	After treatment (ETP outlet)
➢ The untreated wastewater characteristics should have been known since the ETP construction project as the ETP has to be designed and built based on the pollution load of the wastewater to be treated. ➢ The parameters commonly checked at ETP inlet are: • pH, • TDS (Total dissolved solids), • Temperature, • DO (Dissolved oxygen), • BOD (Biological oxygen demand) • COD (Chemical oxygen demand) • Oil & grease.	➢ The ETP operation & maintenance manual should indicate which parameters the operator should test at which stages of the treatment. ➢ Testing of water parameters during the process is needed to control the effectiveness of the different treatment steps and to make adjustments if needed. ➢ The main important tests to be performed daily are: • pH in neutralization tank or before the aeration tank (biological process) • DO and Temperature in aeration tank • Mixed Liquor Volatile Suspended Solids (MLVSS) & (MLSS) in aeration tank	➢ The factory has to identify the **legal standards** applicable to its situation: industry standard if any, standard according to discharge point of wastewater after treatment (standard might be different if the wastewater goes to a sewer or to a natural source), local standard if any, etc. ➢ The factory might have to comply with other **standards as per its stakeholders requirements** (e.g. for textile, the buyers might ask the factory to comply with ZDHC Programme's Wastewater Guideline) ➢ Whatever is the law, the parameters tested at ETP inlet point should be tested at ETP outlet point to assess if the water quality after treatment expected is achieved.

Step 2: Define what should be the frequency of the testing. The frequency of testing should be indicated in the ETP operation & maintenance manual. Before treatment, the most important parameters to test are BOD and COD and they can be tested weekly (or monthly for BOD). After treatment, the factory has to refer to the legal requirements as a minimum and whatever is the law, it is recommended to follow this plan:

Daily	Weekly	Quarterly or twice a year
pH, color, DO	Temperature, COD and BOD (can be tested monthly if not possible weekly)	Heavy metals, ammonia, chromium, etc.

Step 3: Make sure you have all the instruments you need to perform the tests and make sure you have the testing procedures to test accurately each water quality parameter.

- **Request** calibration[21] certificates and testing procedures when you purchase testing instruments ;
- **Appoint** the ETP manager or a laboratory analyst to be in charge of the water testing and make sure he/she is qualified to collect the samples, perform the tests and report the data (see fact-sheet "ETP operator's skills and responsibilities").

[21] Calibrate: to check a measuring instrument to see if it is accurate (Source: Cambridge Dictionary). The calibration of an instrument/tool assures that the measurement errors are minor (the error range is kept within the desired limits).

Fact-sheet – Effluent Treatment Plant (ETP) – Water quality testing

Common non-compliances

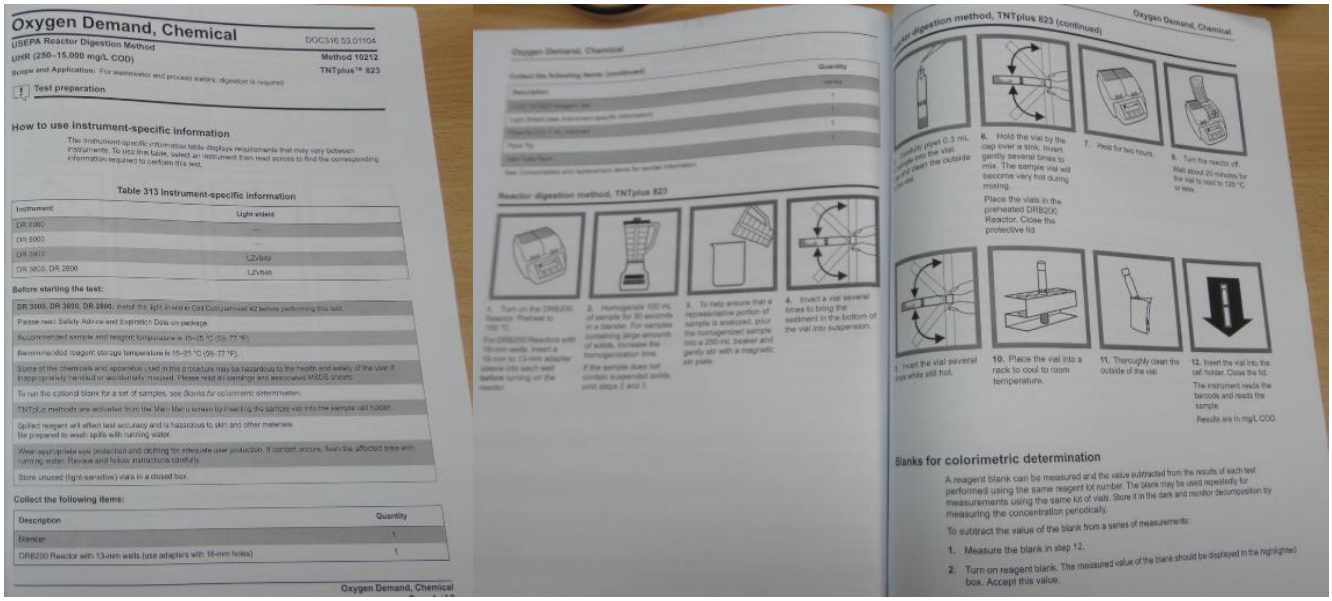
Water quality testing instruments not calibrated

The factory is using TDS and DO meters for the testing of the water quality after treatment but the ETP operator is not aware of the necessity to verify if the instruments are calibrated or not. Therefore, the results of the tests might not be accurate and reliable.

Good practices

The factory should have documented **instructions** about how to perform the water parameters tests.

For example, for the test of Chemical Oxygen Demand (COD), the below instructions can be kept by the ETP operator in the ETP laboratory:



Oxygen Demand, Chemical

USEPA Reactor Digestion Method

Method 10212

TNTplus™ 823

Test preparation

How to use instrument-specific information

Table 313 Instrument-specific information

Before starting the test:

Collect the following items:

Description | Quantity

Blender | 1

DRB200 Reactor with 13-mm wells (use adapters with 16-mm holes) | 1

Reactor digestion method, TNTplus 823

Blanks for colorimetric determination

A reagent blank can be measured and the value subtracted from the results of each test performed using the same reagent lot number. The blank may be used repeatedly for measurements using the same lot of vials. Store it in the dark and monitor decomposition by measuring the concentration periodically.

To subtract the value of the blank from a series of measurements:

1. Measure the blank in step 12.
2. Turn on reagent blank. The measured value of the blank should be displayed in the highlighted box. Accept this value.

Instructions must be in a language understandable by the person in charge to perform the water parameter test.

Fact-sheet - How to establish an air emissions inventory?

What is the objective?

The objective is to have **a clear picture of what are the emissions to air generated** by the factory, what are the different **sources of emissions** (point source emissions or fugitive emissions) and what are the **quantities** (exact or estimated) of substances emitted for each source identified in the factory. The air emissions inventory will allow the factory to identify the major sources of emissions to air and to implement actions to **control and reduce these emissions**.

How to achieve this objective?

Step 1: Create a template/format for your air emissions inventory. You can use a template as per the model below.
It is recommended to distinguish these two main categories of emissions:

- Point source emissions: emissions from stationary and identifiable sources such as the emissions from the stack of a generator (emitted through a single point source into the atmosphere – vent or stack);
- Fugitive emissions: fugitive source air emissions refer to emissions that are distributed spatially over a wide area and not confined to a specific discharge point. They originate in operations where exhausts are not captured and passed through a stack[22].

Air emissions inventory

Factory name:		**Objective of this document:** Identify the sources of emissions to air generated by the factory (date:….) signed by (….).
Responsible person:		
Date of last update:		

1 - Point source emissions

Activity/Section	Machine	Energy Source	Emission substance name		Quantity (as per test report)	Unit
Area in the factory: boiler(s) and generator(s) shed						
Steam production	Boiler	Coal	PM	Particulate Matter	xxx	mg/m3 or ppm
			SO2	Sulfur Dioxide	xxx	mg/m3 or ppm
			NOx	Nitrogen Oxide	xxx	mg/m3 or ppm
			CO	Carbon monoxide	xxx	mg/m3 or ppm
			…		xxx	mg/m3 or ppm
Energy production	Generator	Diesel				
…						

2 - Fugitive emissions

Activity/Section	Origin of emissions	Emission substance name		Quantity (estimated or as per test report)	Unit
Production sections					
Fiber production	Dust generated during operation (spinning, winding, etc.)	PM 2.5	Particulate Matter	xxx	µg/m3
		PM 10	Particulate Matter	xxx	µg/m3
Desizing and scouring processes	Organic solvents	VOC	Volatil organic compound	xxx	mg/m3
Printing process	Mineral spirit solvents in print pastes or inks	HC	Hydrocarbon		
		Ammonia	Ammonia		
		VOC	Volatil organic compound		
…					
Effluent Treatment Plant (ETP)					
…					

Step 2: Appoint a manager to fill-in and update this document on a regular basis. For each substance emitted in the air, the quantity indicated in this table must be verified cross-checking the air emissions test reports results.

Add in your template measures to control and reduce the emissions to air for each source: e.g. exhaust ventilation in the production sections, use of less volatile substances, air pollution control devices such as wet scrubbers, etc.

22 General EHS guidelines, air emissions and ambient air quality, IFC (International Finance Corporation), April, 2007

Fact-sheet - How to establish an ODS and F-gases equipment inventory?

What is the objective?

ODS (Ozone Depleting Substances) are responsible of the ozone layer depletion. Widely used ODS are gases such as chlorofluorocarbons (CFCs) and hydrofluorocarbons (HCFCs) used as refrigerants in air conditioning, chillers, etc. and halons used in firefighting equipment, for example. Note that other refrigerant gases used in refrigerant systems called F-gases such as HFCs are also damaging the environment (powerful greenhouse gases) so they should be controlled as well.
In order to manage and control the equipment that might contain ODS and F-gases, the factory should have an inventory.
The main objectives are to:

- **Identify** the potential sources of ODS and F-gases in the factory;
- **Avoid** the risk of ODS and F-gases leaks through regular inspections.

How to achieve this objective?

Step 1: Create a template/format for your inventory of equipment containing ODS and F-gases. You can use a template as per the model below.

Step 2: Identify all the equipment that might contain ODS or F-gases such as equipment for refrigeration, air-conditioning, fire suppression system and heat pump. For each equipment identified, fill-in the table as per the example:

ODS (Ozone Depleting Substances) and F-gases equipment inventory

Factory name:					Objective of this document: Identify the ODS equipment, ODS types and record the maintenance operations undertaken (date:….) signed by (….).			
Responsible person:								
Date of last update:								
Area/location	**Equipment**	**Refrigerant name**	**Charge/ Amount of gas (kg)**	**Quantity**	**Banned substance?**	**Frequency of maintenance and leak control**	**Last maintenance and leak control check**	**Certified contractors**
Offices	*Brand name* air conditioner (Model XXX)	R-22 (or HCFC-22 chlorodifluoromethane)	5 kg	3	YES	Once a year	22/03/2017	ABC Ltd.
	…							
Production section (building 1, floor 1)	Chiller							
Production section (building 1, floor 2)								
Canteen & kitchen	Fridge							
…								

Banned substance?

The substance can be banned by;

1) The Montreal Protocol (for ODS)[23] or;
2) The Kyoto Protocol (for F-gases)[24].

Frequency of maintenance and leak control

The frequency of the maintenance depends on the size of the equipment; the bigger is the amount of gas in the equipment the more the maintenance and leak checking has to be frequent. The service provider of the equipment should also indicate to the factory what should be the maintenance frequency. For refrigerant and air-conditioning systems, if the charge is less than 30kg, the checking can be annual.

Step 3: Test the equipment and repair leaks if any identified (external contractors could be appointed).

Step 4: Appoint a manager to update the inventory on a regular basis.

Write a ODS and F-gases phase-out procedure: this document should explain how you plan to phase-out the use of ODS and F-gases in your equipment and/or how do you plan to avoid purchasing any new equipment that might contain harmful gases for the environment.

[23] http://ozone.unep.org/en/treaties-and-decisions/montreal-protocol-substances-deplete-ozone-layer
[24] http://unfccc.int/kyoto_protocol/items/2830.php

Fact-sheet - How to control the final disposal of waste?

What is the objective?

Why the factory should control the final disposal of waste?

- **Responsibility**: even when removed from the production site, it is the responsibility of the factory to know what will be done with the waste generated. In particular, it is the responsibility of the factory to control the final waste disposal when the factory has the choice among different waste contractors.
- **Control and minimization of the environmental impact of the waste final disposal method**: the factory needs first of all to be aware of what could be the potential environmental impacts of the final disposal of the waste and based on this knowledge, the factory should try to take actions to avoid providing the waste to contractors that will not dispose/treat the waste in an environmental-friendly way.

The control of the final waste disposal is particularly important for **hazardous waste**[25] since there is a risk of soil, water and air contamination.

How to achieve this objective?

Step 1: Collect the information about the final waste disposal from your waste contractors to assess what are the potential environmental impacts of the different waste disposal methods. Focus on all the hazardous waste types generated in your factory. Example:

Type of waste	Final treatment/ disposal method	Environmental impacts
Contaminated dyes and chemicals packaging	Uncontrolled Landfill	**Air pollution**: Harmful gases (CO2 and Methane) are produced and contribute to the global warming[26]. **Soil and water pollution**: Harmful substances (in particular, heavy metals from the sludge) contaminate the soil and then the groundwater. ➢ Actions to be taken: avoid this final disposal option and consider other possibilities. How can the sludge be treated? ○ Cement industry (1st choice) ○ Controlled landfill (2nd choice) ○ Brickfield industry (3rd choice)
Sludge		
Empty drums	Re-used on local market	**Soil pollution**: if empty drums are not properly washed and chemical residues leak from these drums. ➢ Actions to be taken: ensure a proper process to rinse the drums and fully decontaminate them. See the fact sheet "Waste storage conditions".
…		

If you cannot get the information about the final waste disposal, **you have to request that this information is provided in the agreement/contract signed with the waste contractor**. Note that in some countries, this is a legal requirement that only authorized waste treatment companies can collect your waste and agreements must be signed. Moreover, you should have the waste contractors' licenses copies.

Step 2: Review the options you have for the waste collection when you have identified that the current final disposal method for a given waste is not environmental-friendly. Again, focus on the hazardous waste as a priority.

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[25] Hazardous waste: waste that because of its quantity, concentration, persistence or physical, chemical or biological characteristics may cause or significantly pose a substantial or potential hazard to human health or the environment when improperly treated, stored, transported or disposed.

[26] Global warming: the increase in Earth's average surface temperature due to rising levels of greenhouse gases (source: NASA.gov).

Fact-sheet - How to control the final disposal of waste?

- **Appoint** a manager to be in charge of identifying all the waste treatment companies/contractors available in your area and to collect the information about their practices;
- **Assess** the practices of the waste contractors: conduct audits or request them to fill-in a self-assessment questionnaire about their practices (do they assess the environmental impacts of their waste disposal practices? Etc.).

Common non-compliances

Sludge from ETP sent to brickfields whereas a cement factory is available in the area

The factory is sending the sludge to a brickfield nearby because they are not aware of the possibility to send the sludge to the cement industry where the sludge can be incinerated with lower environmental impact.

Fact-sheet - How to develop a waste inventory?

What is the objective?

The objective is to know what are the different waste types generated by the factory and what amount of waste is generated every month. A detailed waste identification and inventory will help the factory to work on the waste minimization (and therefore on the resource use optimization) and to better control the final waste disposal.

How to achieve this objective?

Step 1: Identify the waste types generated by your factory. For each section/activity, list the wastes generated and analyze if the waste is hazardous[27] or not, if it can be reused and where it is temporarily stored on-site:

Section/ Activity	Type of waste	Hazardous / Non-hazardous	Re-usable material?	Temporary storage area
Warehouse	Carton	Non-hazardous	Can be recycled offsite	Shed for non-hazardous waste
	Poly bags	Non-hazardous		
	…			
Production area				
Canteen				
Effluent treatment plant (ETP)				
…				

Step 2: Create a template/format for the waste inventory where you will indicate the amount of waste generated every month for each type of waste:

Waste inventory

Factory name:						Objective of this document: Record the quantity of waste generated on-site per type & nature of waste (date:….) signed by (….).				
Responsible person:										
Date of last update:										
Month	Hazardous waste					Non-hazardous waste				
	Chemical waste (packaging and other)	Sludge	Used oils	Fluorescent lamp tube	…	Paper packaging waste	Plastic packaging waste	Wood pallets	Textile leftovers	…
January	kg	kg	kg	kg		kg	kg	kg	kg	
February										
March										
April										
May										
June										

Step 3: Indicate the final waste disposal for each type of waste. You can include this information in your waste inventory or create another file:

Type of waste	Waste contractor	Disposal method
Carton	ABC Ltd.	Recycling
Poly bag		
Sludge	Cement DEF Ltd.	Burnt in a fluidized bed furnace
…	…	…

- **Request** the waste contractor to be transparent about the waste final disposal in the agreement signed (see fact sheet "How to control the final disposal of waste?");
- **Select** as much as possible (based on the choices you have) the waste contractors as per the lower environmental impact of their practices to treat the waste; for example, the sludge from the ETP should be rather sent to a nearby cement industry rather than sent to a waste dumping area where the sludge will contaminate the soil and the groundwater.

[27] Hazardous waste: waste that because of its quantity, concentration, persistence or physical, chemical or biological characteristics may cause or significantly pose a substantial or potential hazard to human health or the environment when improperly treated, stored, transported or disposed.

Fact-sheet - How to develop a waste management procedure?

What is the objective?

The objective of the waste management procedure is mainly to:

- **Provide** the main information about the waste generated on-site (types, nature, characteristics, amount, etc.);
- **Give** the instructions about how to collect, store and dispose the waste.

This document should help the factory to better control the waste generated on-site, properly collect and store the waste, make sure the workers are trained about the waste management and ensure there is a follow-up on the final waste disposal methods.

How to achieve this objective?

Step 1: Write your waste management procedure/policy. The content should cover the following topics:

- ✓ List of waste types generated by the factory (for each production section / activity / area) and average amount of each waste type generated per week or per month;
- ✓ Hazardous[28] waste identification: list of hazardous wastes;
- ✓ Waste inventory: who is in charge? To be updated how often? Records format?
- ✓ How to handle the waste? Importance of safety measures to ensure the workers/cleaners safety;
- ✓ How to store the waste? Importance of waste segregation and labeling;
- ✓ Waste management training: who is the trainer? Who should attend? Frequency of training? Content?
- ✓ Waste disposal: what is the final disposal for each waste type? What to expect from the contractors?
- ✓ Special instructions for specific waste type (e.g. medical waste, sludge[29], etc.).

Step 2: **Appoint** a manager/employee who will be in charge of the implementation of the instructions as per the waste management procedure. This person should be in charge of the training of the employees/cleaners who will be involved in the handling and storage of the waste (see fact-sheet: "How to establish a waste management training").

Step 3: Review and update your waste management procedure on a regular basis; a new waste type can be generated if there is any change in the production processes or a new raw material being used. Moreover, the factory might find ways to re-use one kind of waste instead of requiring a contractor to come and collect it.

- **Add** in your waste management procedure the good practices to minimize the waste generation and/or the opportunities to recycle the waste on-site.
- **Request** the manager appointed to control the implementation of the instructions to regularly inspect the waste storage conditions and control the waste collection practices so he/she can identify areas of improvement for a better waste management.

Common non-compliances

Generic waste management procedure

The factory has only a one page document where are listed the waste types generated by the production site and the only instruction is to segregate the hazardous waste from the non-hazardous waste. The factory is not indicating: which waste types are hazardous, how to safely collect the waste, how to train the staff, etc.

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[28] Hazardous waste: waste that because of its quantity, concentration, persistence or physical, chemical or biological characteristics may cause or significantly pose a substantial or potential hazard to human health or the environment when improperly treated, stored, transported or disposed.

[29] Sludge: means the residual, semi-solid material left from industrial and municipal wastewater and sewage treatment processes. It looks like a thick, soft or wet mud or a similar viscous mixture of liquid and solid components produced from a wastewater treatment process. Sludge can be highly hazardous.

Fact-sheet - How to develop a waste management procedure?

List of waste incomplete and hazardous waste identification incorrect

The factory did not identify all the waste types generated on-site and in particular, the medical waste was not identified by the factory as hazardous waste. The management did not analyze the characteristics of the waste to understand which waste is hazardous.

Examples of hazardous wastes:

- Sludge from industrial effluent treatment plant;
- Empty chemical containers;
- Medical waste;
- Electronic waste;
- Batteries;
- Fluorescent tube lights waste;
- Cleaning product waste;
- Waste oil;
- Grease and oil impregnated rags;
- …

Instructions mentioned in the waste management procedure not enforced

The factory has a waste management procedure mentioning clearly that the empty chemical drums should be rinsed before temporary storage but there is no process to wash these drums and residues of chemicals were found in the empty drums. This means the instructions in the procedure are not implemented and no-one is in charge to verify the implementation.

See below an example of inconsistency between a waste management procedure (picture 1) and the real situation on-site in a factory (picture 2):

Instructions for storage of empty chemical drums:

- Dedicated shed for empty drums;
- No empty drums to be found in the production sections;
- No empty drums to be found scattered around the factory;
- Hard-surfaced floor or secondary containment;
- Rainwater ingress prevented;
- Empty drums properly rinsed to remove residues;

(Picture 1: extract from a waste management procedure)

(Picture 2: waste storage area in the factory where we can see the empty drums in direct contact with the soil)

Fact-sheet - How to establish a waste management training?

What is the objective?

Why workers should be trained on waste management?

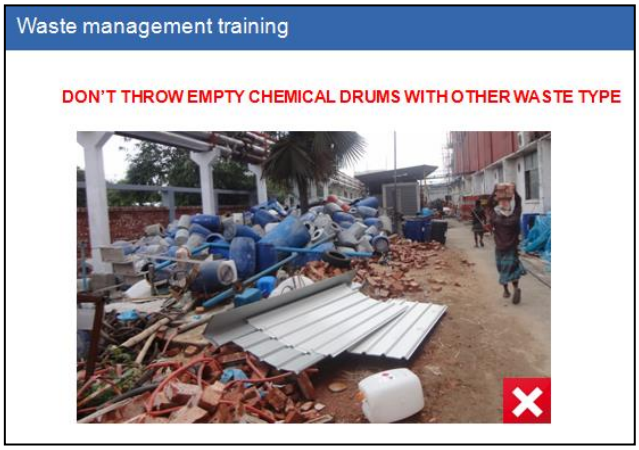
- **To be aware of** the types of waste generated on-site and to be able to identify hazardous waste[30];
- **To be instructed** about how to safely collect and store the waste;
- **To participate** to the implementation of good practices to improve the waste management.

How to achieve this objective?

Step 1: Identify who should be trained, what should be the content of the training, what will be the frequency of the training and what records you have to keep after each training. Example:

Trainees	All the workers/cleaners with tasks and responsibilities related to the waste handling and storage.
Content of the training	What are the different types of waste generated by the factory? Which wastes are hazardous? How to handle hazardous waste in a safe manner? What are the risks for health when handling hazardous wastes? How to store the waste? What are the specific instructions to follow for particular waste (e.g. medical waste, etc.)? Etc.
Frequency	According to law or within 1 month from the arrival of new workers (with tasks and responsibilities related to the waste management) and once or twice a year.
Records	List of participants + summary of content + dated records.

Step 2: Create visual and easy to understand presentation for the training content. See examples of slides below:



- **Appoint** a manager with experience and knowledge about waste management to be the trainer;
- **Assess** the knowledge of the workers after the training through written quizzes.

Common non-compliances

Irrelevant training content

The factory has a waste management training presentation but the content is not adapted to the real situations the cleaners/employees face when requested to collect and store the waste on-site. For example, the presentation shows how to handle some types of hazardous wastes not generated on-site and types of waste the workers have to deal with are not mentioned in the presentation such as medical waste, wasted oils, electronic waste, etc. The factory has to make sure the training content is adapted to the production site waste generation characteristics. The learning from the training must be applicable in the daily tasks of the employees/cleaners in charge of the waste management.

[30] Hazardous waste: waste that because of its quantity, concentration, persistence or physical, chemical or biological characteristics may cause or significantly pose a substantial or potential hazard to human health or the environment when improperly treated, stored, transported or disposed.

Fact-sheet - How to store hazardous waste on-site?

What is the objective?

The objective is to make sure the hazardous[31] wastes are temporarily stored in good conditions in order to:

- Avoid any risk of soil and groundwater contamination;
- Avoid non-hazardous wastes to become hazardous;
- Reduce the workers exposure to hazardous waste.

How to achieve this objective?

Step 1: Identify the hazardous waste types in your factory and evaluate the amount of hazardous waste that you will have to temporary store on-site before the collection by a waste contractor.

Step 2: Designate a shed/room/building big enough to store the hazardous wastes according to the estimated volume as per step 1. This designated area has to be exclusively used for hazardous wastes and should be away from the production sections (see step 5). Don't store non-hazardous waste in the same area to avoid the contamination of this waste.

Step 3: Segregate the hazardous wastes in different sections in the designated area or in different designated smaller areas in the factory. For example: there should be a section for empty chemical drums, a section for dyes containers, a section for fluorescent tube lights, a section for medical waste, etc. See picture 1 below.

Step 4: Ensure there is a hard-surfaced floor in the area to avoid any risk of hazardous substance contact with the soil and make sure the roof is in good conditions to prevent rainwater ingress.

Step 5: Restrict the access of this dedicated area(s) for hazardous waste to make sure only authorized workers to handle hazardous wastes can enter in this/these area(s) so you minimize the workers exposure to hazardous wastes.

Step 6: **Wash the empty chemical drums** before temporary storage to remove the chemical residues (Except if there is a legal obligation to let only authorized contractors decontaminate the empty chemical drums); designate an area to wash these drums and make sure the wastewater is directed to the Effluent Treatment Plant (ETP).

Step 7: Label the hazardous waste with hazardous characteristics for each type of waste.

Picture 1: dedicated shed for hazardous waste with different sections for different waste types. The storage area is covered to prevent rainwater ingress. The access to each section is restricted.

Picture 2: designated area to wash the empty chemical drums to remove the residues left inside these drums. The wastewater from the area to wash the empty drums is directly discharged into the receiving tank of the effluent treatment plant (see blue arrow).

Avoid creating hazardous waste from non-hazardous waste (e.g. fabric leftovers used in the chemical store to clean-up the chemical spills; these non-hazardous fabric waste pieces become hazardous after the contact with the spilled chemical).

[31] Hazardous waste: waste that because of its quantity, concentration, persistence or physical, chemical or biological characteristics may cause or significantly pose a substantial or potential hazard to human health or the environment when improperly treated, stored, transported or disposed.

Fact-sheet - How to store hazardous waste on-site?

Common non-compliances

No hard-surfaced floor in the empty chemical drums storage area

There is no hard-surfaced floor in the empty chemical drums storage area so chemical residues might contaminate the soil and the groundwater:

Holes in the roof of the empty chemical drums storage area

The roof of the waste storage area is not kept in good conditions: holes were found which means in case of rain, water will leak on the hazardous waste inside the area:

Improper sludge temporary storage conditions

The factory has not a dedicated and restricted area for the dried sludge bags; the bags are kept directly in contact with the soil and the rainwater infiltration is not prevented:

Waste scattered around the factory and outside the factory boundaries:

Good practices

Pictures showing proper waste storage conditions. On the two pictures on the left, the hazardous waste is stored in a dedicated area, under a roof, the floor is hard-surfaced and the area is kept closed. On the picture on the right, the dry sludge from the Effluent Treatment Plant is kept in closed bags, under a roof and the floor is hard-surfaced to avoid any contact with the soil.

Fact-sheet - How to establish a chemical inventory?

What is the objective?

The chemical inventory is needed to:

- **List** all the chemical products used and stored on-site (whatever is the use: for production processes, cleaning operations, wastewater treatment, spot removing, etc.);
- **Collect** the basic information about all these products: supplier name, SDS[32] availability, CAS number[33], stock, etc.

The objective of the chemical inventory is to get all the data in **one single format table** and to make sure the **content is up-to-date** and corresponds to the actual chemical products stock available on-site.

How to achieve this objective?

Step 1: Create a template for the chemical inventory as per the model below (if no template provided by your customer).

Step 2: Fill-in the columns as per the example below:

Chemical inventory template

Factory name:	
Responsible person:	
Date of last update:	

1	2	3	4	5	6	7		8
Area/ Process	**Chemical name / commercial name**	**Substances and CAS numbers**	**Type of chemical**	**Chemical supplier**	**Chemical Manufacturer**	**MSDS**		**Quantity stored on-site (to date*) *see date of last update**
						Original	**Local language short version**	
Denim washing	Oxalic acid	Oxalic Acid, Anhydrous (0.5%): 144-62-7 Oxalic Acid, Dihydrate (99.5%): 6153-56-6	Acid	Star syndicate	AquaPhoenix Scientific.Inc.	Yes	Yes	100 kg
Denim washing	Denimcol Binder PAC	2,2'-Oxybisethanol: 111-46-6	Binder	RH Corporation	CHT Bezema	Yes	to be prepared	80 kg

Indicate for which process or for which purpose the chemical is used

Indicate the name of the chemical as it appears on the label on the container

Indicate the substances (ingredients) of the chemical formula as per the label and SDS

CAS numbers, chemical supplier/manufacturer names and SDS are **key information**, in particular, when the factory will have to demonstrate that the chemicals used are in compliance with a Restricted Substances List (such as ZDHC MRSL)

This template is an example and showing the minimum requirements but columns can be added such as "chemical product provided with original label Yes/No", "chemical storage area", etc.

- **Appoint a manager** to be in charge of the chemical inventory update and write a process regarding how to update the inventory: what should be the frequency? E.g. As per new chemical orders arrivals;
- **Highlight** (e.g. with red text) the missing information or the pending task such as the SDS translation in local language. For missing inputs, the factory has to request the chemical supplier to provide the missing information.

[32] Safety Data Sheet (SDS or also mentioned as MSDS): is a document provided for each chemical product which lists the properties of this particular chemical product and provide information on how to safely use it, store it, dispose it, what to do in case of accident, etc.

[33] CAS number: "Chemical Abstract Service". It is an "ID number" specific to every chemical substance (ingredient of a chemical product).

Fact-sheet - How to establish a chemical inventory?

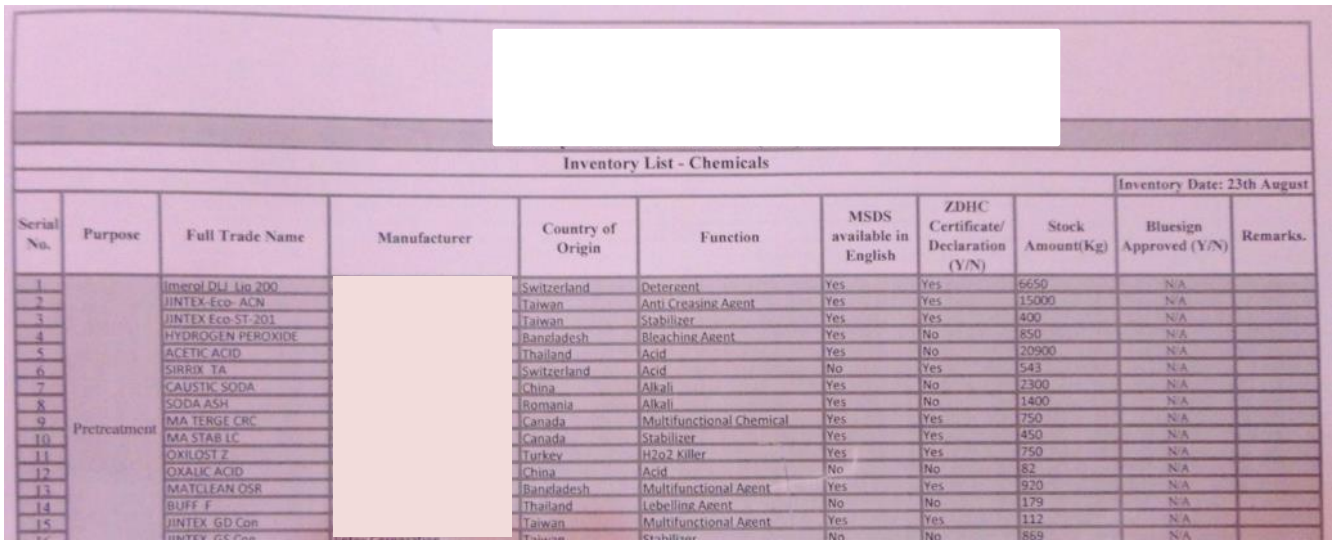
Common non-compliances

Chemical product found on-site not included in the inventory

The factory doesn't have a system to ensure that every chemical supplied is registered in the inventory. The inventory might not be updated regularly. Mistakes can also be related to inconsistencies between the name on the label, the name in the SDS and the name in the chemical order receipt. This is why it is important to cross-check all information provided by the chemical supplier.

Chemical inventory incomplete

Case 1: in the picture below, you can see a factory's chemical inventory where the CAS numbers are not indicated for the chemical substances of each product:

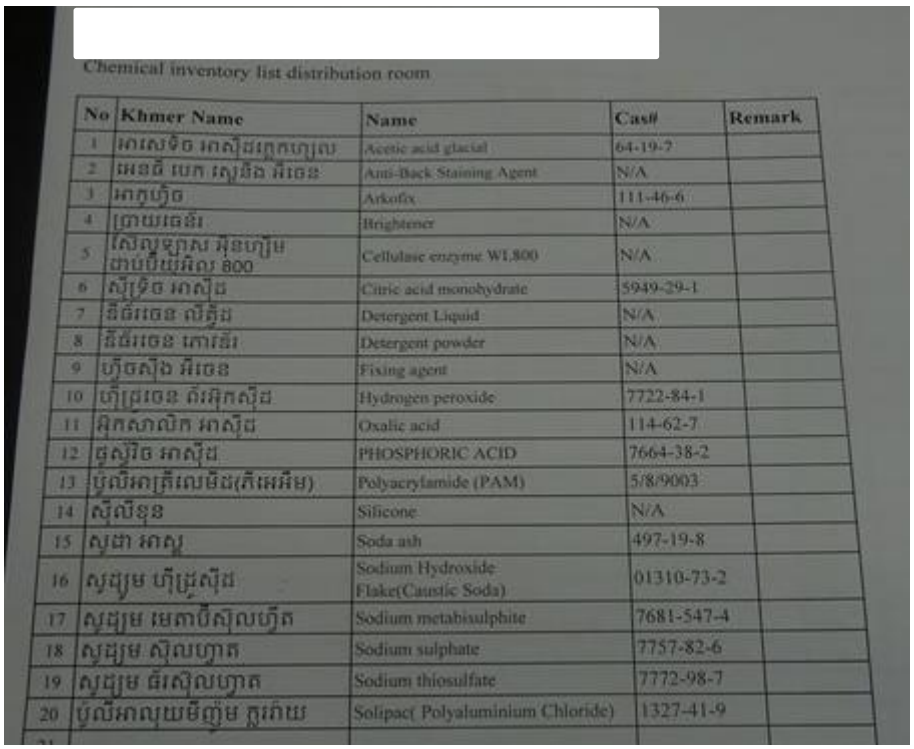


Inventory List - Chemicals

Inventory Date: 23th August

Serial No.	Purpose	Full Trade Name	Manufacturer	Country of Origin	Function	MSDS available in English	ZDHC Certificate/ Declaration (Y/N)	Stock Amount(Kg)	Bluesign Approved (Y/N)	Remarks.
1	Pretreatment	Imerol DLI Liq 200		Switzerland	Detergent	Yes	Yes	6650	N/A	
2		JINTEX-Eco- ACN		Taiwan	Anti Creasing Agent	Yes	Yes	15000	N/A	
3		JINTEX Eco-ST-201		Taiwan	Stabilizer	Yes	Yes	400	N/A	
4		HYDROGEN PEROXIDE		Bangladesh	Bleaching Agent	Yes	No	850	N/A	
5		ACETIC ACID		Thailand	Acid	Yes	No	20900	N/A	
6		SIRRIX TA		Switzerland	Acid	No	Yes	543	N/A	
7		CAUSTIC SODA		China	Alkali	Yes	No	2300	N/A	
8		SODA ASH		Romania	Alkali	Yes	No	1400	N/A	
9		MA TERGE CRC		Canada	Multifunctional Chemical	Yes	Yes	750	N/A	
10		MA STAB LC		Canada	Stabilizer	Yes	Yes	450	N/A	
11		OXILOST Z		Turkey	H2o2 Killer	Yes	Yes	750	N/A	
12		OXALIC ACID		China	Acid	No	No	82	N/A	
13		MATCLEAN OSR		Bangladesh	Multifunctional Agent	Yes	Yes	920	N/A	
14		BUFF F		Thailand	Lebelling Agent	No	No	179	N/A	
15		JINTEX GD Con		Taiwan	Multifunctional Agent	Yes	Yes	112	N/A	

Case 2: in the picture below, you can see a factory's chemical inventory where the area of use, chemical supplier name, commercial name, MSDS availability, etc. are missing:



Chemical inventory list distribution room

No	Khmer Name	Name	Cas#	Remark
1	អាសេទិច អាស៊ីដក្រេសហ្គ្រែល	Acetic acid glacial	64-19-7	
2	អេនធី បេក ស្ទេន ឌីចេន	Anti-Back Staining Agent	N/A	
3	អាកូហ្វីច	Arkofix	111-46-6	
4	ព្រាយចេនើរ	Brightener	N/A	
5	សែលុឡាស អ៊ិនហ្ស៊ីម ជាប់ប៊ីយ៉ូស៊ីល 800	Cellulase enzyme WL800	N/A	
6	ស៊ីទ្រិច អាស៊ីដ	Citric acid monohydrate	5949-29-1	
7	ឌីថឺរចេន លីក្វីដ	Detergent Liquid	N/A	
8	ឌីថឺរចេន ភោឌើរ	Detergent powder	N/A	
9	ហ្វីចស៊ីង អ៊ីចេន	Fixing agent	N/A	
10	ហ៊ីដ្រូចេន ពឺរអុកស៊ីដ	Hydrogen peroxide	7722-84-1	
11	អុកសាលិក អាស៊ីដ	Oxalic acid	114-62-7	
12	ផូស្វ័រ អាស៊ីដ	PHOSPHORIC ACID	7664-38-2	
13	ប៉ូលីអាគ្រីលេមីដ(ភីអេអឹម)	Polyacrylamide (PAM)	5/8/9003	
14	ស៊ីលីខុន	Silicone	N/A	
15	សូដា អាស	Soda ash	497-19-8	
16	សូដ្យូម ហ៊ីដ្រូស៊ីដ	Sodium Hydroxide Flake(Caustic Soda)	01310-73-2	
17	សូដ្យូម មេតាប៊ីស៊ុលហ្វីត	Sodium metabisulphite	7681-547-4	
18	សូដ្យូម ស៊ុលហ្វាត	Sodium sulphate	7757-82-6	
19	សូដ្យូម ធីរស៊ុលហ្វាត	Sodium thiosulfate	7772-98-7	
20	ប៉ូលីអាលុយមីញ៉ូម ក្លរ៉ាយ	Solipac(Polyaluminium Chloride)	1327-41-9	

Fact-sheet - How to label the chemical products?

What is the objective?

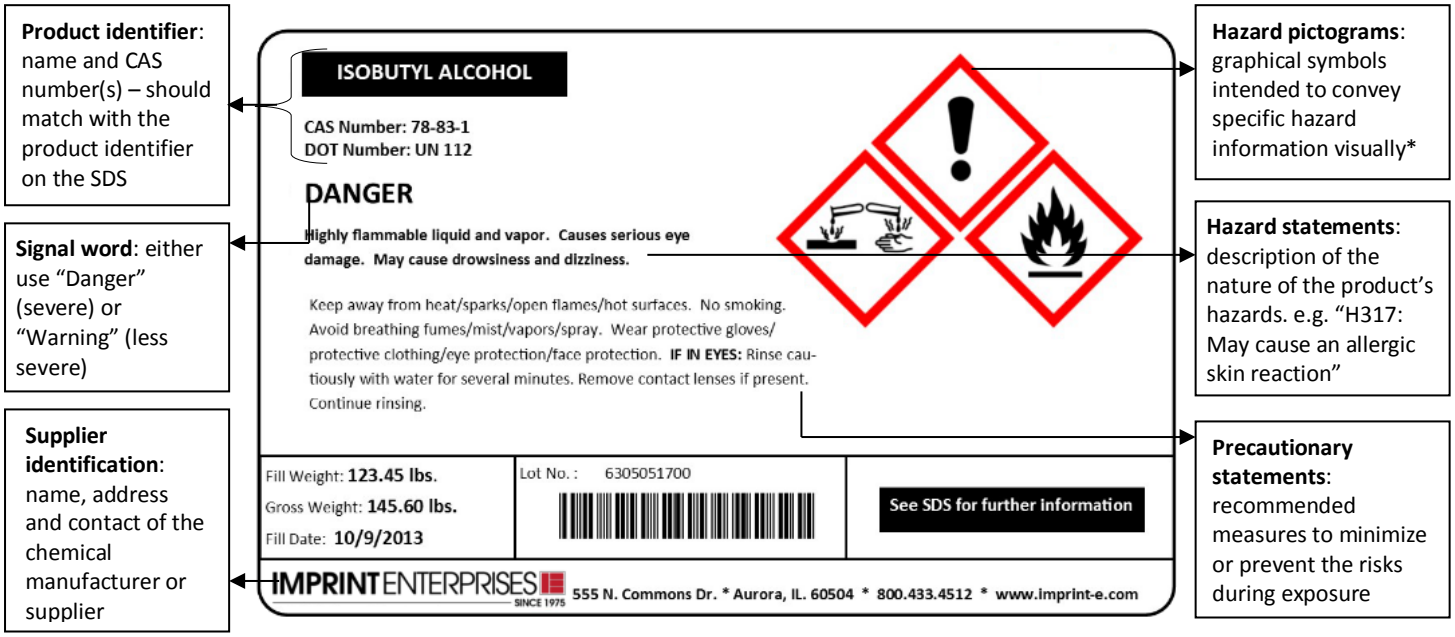
The objectives of the label are to:

- **Allow** a clear and immediate identification of the chemical and its hazards;
- **Determine** the actions to be taken in case of accident or emergency.

The factory should request and try to select only chemical suppliers able to provide the GHS standardized label[34] or the factory should take the initiative to adopt a standardized label to tag the chemicals on-site. The advantage is to harmonize the content and format of the label so it is easier to find and understand the information whatever is the chemical.

How to achieve this objective?

Step 1: **Make sure** it is written in your chemical purchase policy that the chemical supplier must provide the label with relevant information for each chemical supplied. The format of the label as per GHS should be:



*See, in the next page, the GHS hazard pictograms.

Step 2: Control if the label is available with all relevant information or not when a new chemical order is received.

Step 3: **Translate** the label in local language: product name, signal word, hazard statements and precautionary statements.

Step 4: **Make sure** the label in local language is visible and clearly readable for every chemical stored on-site.

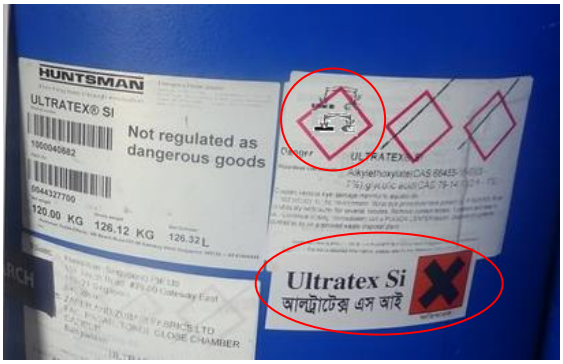
Step 5: **Train** the employees to explain them how to read and how to understand the information on the label.

- **Appoint a manager** to control: original label received, label translated in local language and affixed on each product;
- **Develop a template for the local language label**: it is easier for the employees to refer to the same format.

[34] The Globally Harmonized System of Classification and Labelling of Chemicals (**GHS**) is a system developed by the United Nations for standardizing and harmonizing the classification and labelling of chemicals globally. See GHS information website

Fact-sheet - How to label the chemical products?

Common non-compliances



Hazard pictograms not up-to-date

In the picture on the right, the original label is showing the GHS hazard pictogram for "corrosive" but the factory has affixed a local language label with another hazard symbol corresponding to the older system for hazard identification (EU hazard symbols not to be used anymore since 2009).

See below the GHS hazard pictograms/symbols.

Original label not corresponding to the content of the container

When the chemical containers are sent back to the chemical manufacturer and re-used, it can happen that the original label might not be removed whereas the container is refilled with a different chemical. This leads to labeling problems and to potential hazards.

Additional information

GHS hazard pictograms:

(Source: http://www.reach-compliance.ch/ghsclp/ghspictograms/index.html)

		
GHS01 Danger / Unstable, Explosive	GHS02 Danger or Warning / Flammable	GHS03 Danger or Warning/ Oxidising
		
GHS04 Warning / Compressed gas	GHS05 Danger or Warning / Corrosive cat. 1	GHS06 Danger / Toxic cat. 1 - 3
		
GHS07 Warning Toxic cat. 4 / Irritant cat. 2 or 3 Lower systemic health hazards	GHS08 Danger or Warning Systemic health hazards	GHS09 Warning (for cat. 1) (for cat. 2 no signal word) /Environment

Fact-sheet - How to establish a Chemical Management training?

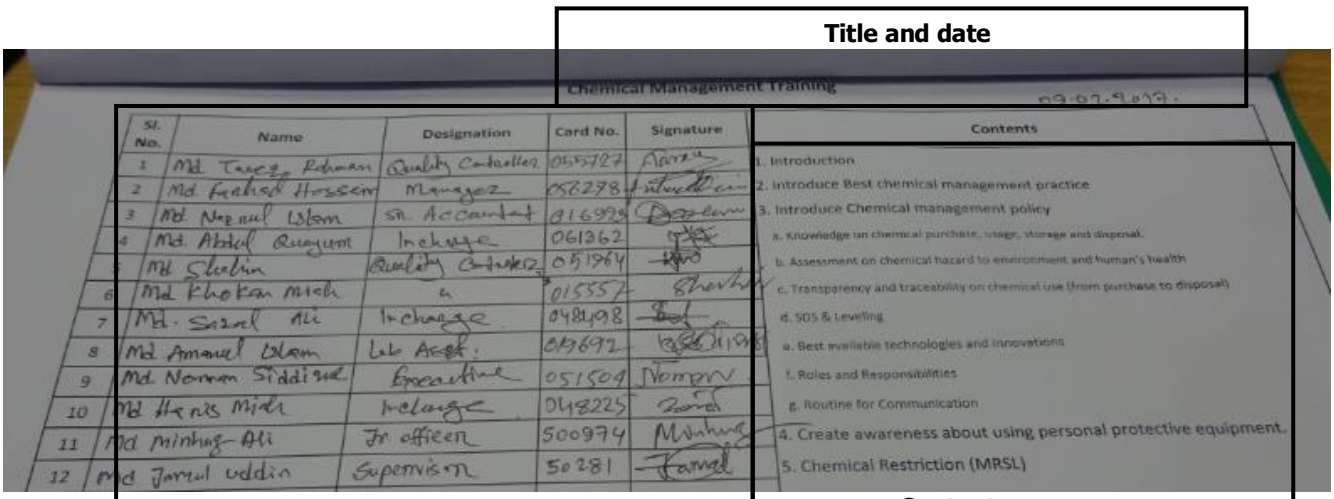
What is the objective?

Why workers should be trained on chemical management?

- To inform them about the **risks and hazards** they are exposed to when handling chemicals;
- To explain them how to avoid and/or reduce the risk of **chemical incidents** (explosion due to incompatible chemicals, chemical spill, etc.);
- To make them contribute to the implementation of good practices for a **better chemical management** (optimization of the use of this resource, proper storage conditions of chemicals, etc.).

How to achieve this objective?

Trainees	All the workers with tasks and responsibilities related to chemicals.
Content of the training	How to read a chemical label? How to read a SDS[35]? How to handle chemicals? How to store chemicals? How to dispose empty chemical drums? What to do in case of a chemical spill? How to identify the most hazardous chemicals? Which Personal Protective Equipment (PPE) to wear for different chemicals manipulation? Etc.
Frequency	According to law or within 1 month from the arrival of new workers and once or twice a year.
Records	List of participants + summary of content + dated records.



- If internal trainer, FIRST, assess the knowledge of the trainer and make sure he/she is able to train the workers ;
- Assess the knowledge of the workers after the training through written quizzes.

Common non-compliances

Ineffective training
Based on interview, the workers, even if trained, don't have a good understanding of the chemical hazards. The training was not effective.

Improper training records
Factory providing only a list of participants with no date, no information about the content of the training, etc. The records are incomplete.

No regular training or no training provided systematically to new workers
No evidence of any clear planning for the training programs and no evidence of training provided within one month for new workers.

[35] Safety Data Sheet (SDS or also mentioned as MSDS): is a document provided for each chemical product which lists the properties of this particular chemical product and provide information on how to safely use it, store it, dispose it, what to do in case of accident, etc.

Fact-sheet - Chemical spill response procedure and material

What is the objective?

The objective is for the factory to be **ready to respond** to a chemical spill in a **safe and environmental friendly** manner. In order to do so, the factory has to make sure:

- **Employees know** how to react in case of chemical spill;
- **Equipment and materials** needed to clean-up the spill are available as per the Safety Data Sheets (SDS[36]) of all chemicals used on-site;
- **Waste material** will be disposed as per law and as per the internal procedure of the factory.

How to achieve this objective?

Step 1: **Write** a chemical spill response procedure. The content should cover actions to be taken:

Prior clean-up	• Notify the senior manager, isolate the area, aerate, remove ignition sources, etc. • Check the SDS to know what are the chemical hazards, how the chemical might react, what Personal Protective Equipment (PPE) should be used, special requirements for clean-up.

During clean-up	• Based on SDS: select the chemical spill clean-up material as per the instructions in the SDS and follow the instructions (e.g. confine and contain spill with absorbent pads, neutralize acid if applicable*, etc.).
	• And internal instructions: general instructions can be given along with the SDS specific instructions:
	  ○ Locate spill kit/ spill control materials (absorbents, etc.) / chemical clean up kit;
	  ○ Choose appropriate PPE (goggles, face shield, impervious gloves, lab coat, apron, etc.);
	  ○ Confine and contain spill;
	  ○ Cover with appropriate absorbent material;
	  ○ Sweep solid material into a recipient (plastic dust pan or closed container).
	
	* Acids that may be neutralized include hydrochloric acid, sulfuric acid, nitric acid, and phosphoric acid.

After clean-up	• Mop floors after clean-up. Be sure to decontaminate broom, dustpan, etc. • Dispose the contaminated solid material as per law and as per the instructions for the temporary storage and disposal of hazardous waste generated on-site (e.g. contaminated absorbent sand can be mixed with the sludge from the treatment plant).

Step 2: Provide the chemical spill clean-up kit in every section where chemicals are used and stored:

- Absorbent material: sand (picture 1), absorbent pads, cat litter, sawdust (picture 2), absorbent socks (picture 3);
- Acid neutralizer - sodium bicarbonate, soda ash (picture 4) and Alkali (Base) Neutralizer - sodium bisulfate;
- Bucket or bag to collect the contaminated sand (or other absorbent material) used to clean-up the spill;
- PPE: gloves, respiratory mask, apron, etc.




[36] Safety Data Sheet (SDS or also mentioned as MSDS): is a document provided for each chemical product which lists the properties of this particular chemical product and provide information on how to safely use it, store it, dispose it, what to do in case of accident, etc.

Fact-sheet - Chemical spill response procedure and material

Step 3: **Train** the employees to explain them how to react in case of chemical spill and make sure they understand the safety measures to be taken before cleaning-up the spill and the importance to check the SDS of the chemical spilled.

- **Control** that all the SDS are available on-site so any worker authorized to clean-up a spill is able to check the section 6- *Accidental release measures*.
- **Appoint a manager** to control the chemical clean-up material and PPE are available as per the SDS.

Common non-compliances

Fabric left-over and rags used to clean-up the chemical spills

In the chemical store, the factory is using pieces of fabric to absorb the chemicals in case of incident/spill. There is no specific chemical spill clean-up material (acid neutralized is missing, for example, whereas acids are being used) and there is no procedure to dispose the contaminated rags.

Unsafe practices to handle chemicals

As per the picture below, the way the worker is pouring the chemical in the smaller container is not safe. There is a risk of chemical spill during this operation:

The factory should train workers about how to handle chemicals in a safe way in order to avoid the risk of chemical spill. Moreover, pumps could be used to transfer chemical volumes from large drums to small containers.

Fact-sheet - How to undertake the hazard identification?

What is the objective?

The objective of the hazard identification is for the factory to:

- **Identify and be aware** of the hazards types and hazard levels of each chemical used on-site*;
- **Take** the necessary control measures to store and handle the chemicals safely.

*Not all the chemicals are hazardous. Hazardous chemicals are defined as chemicals which have an inherent property to cause harm either to humans or the environment and/or cause damage through fire, explosion or through toxicity or corrosive properties.

How to achieve this objective?

Step 1: Create a template for the chemical hazard identification as per the model below[37].

Step 2: Fill-in the columns as per the example below:

Hazard identification template								
Factory name:								
Responsible person:								
Date of last update:								
1	2	4	5	6			7	8
Area/ Process	**Chemical name / commercial name**	**Hazard symbols**	**R Phrases-Hazard Risk Statements**	**Hazard Type**			**Health Control approach (Precautionary statements)**	**Storage safety measures**
				Physical (fire, explosion,	**Health**	**Environment**		
Dyeing	Acetic acid	Flammable Corrosive 	H226 - Flammable liquid and vapor H314 - Causes severe skin burns and eye damage	✓	✓		P280 - Wear protective clothing, protective gloves, eye protection, face protection P260 - Do not breathe mist, vapors, spray	P210 - Keep away from heat, sparks, open flames, hot surfaces. - No smoking P233 - Keep container tightly closed
Dyeing	Disperse Yellow 3	Carinogenic, irritant 	H317: May cause an allergic skin reaction H351: Suspected of causing cancer		✓		P280 - Wear protective clothing, protective gloves, eye protection, face protection. P261 - Avoid breathing dust/fumes/gas/mist/vapours/spray. P271: Use only outdoors or in a well-ventilated area.	P403+233: Store in a well ventilated place. Keep container tightly closed. P402: Store in a dry place.
Fabric finishing	Fabric softener 1511	No symbol (not classified as hazardous)	H316: Causes mild skin irritation		✓		P262: Do not get in eyes, on skin, or on clothing.	P402: Store in a dry place.

The hazard symbols and hazard statements are indicated both in the Safety Data Sheet (SDS) – section 2: Hazards identification - and on the chemical product label

Based on the hazard statements number:
H2XX: Physical
H3XX: Health
H4XX: Environment

Precautionary statements are indicated in the SDS – section 2 & section 8: Exposure controls/ personal protection - and on the label

Storage safety measures are indicated in the SDS – section 2 & section 7: Handling and storage – and on the label

- **The manager** in charge of the chemical inventory should be as well in charge of the hazard identification; for each new chemical order received on-site, the hazard identification should be undertaken.
- **Make sure you get the complete SDS and label information** for each chemical from the chemical supplier since this will be your source of information to undertake the hazard identification.

Common non-compliances

Generic information provided in the hazard identification table

The factory doesn't have the original complete SDS for all the chemicals used on-site so generic "health control approach" instructions were given such as "use mask, gloves, goggles and apron". In this situation, workers might be forced to use PPE (Personal Protective Equipment) not adapted to the chemicals they are handling.

[37] This template is an example but the factory can refer to other templates; the point is to highlight types, natures and levels of hazards and what safety measures should be taken to reduce the risk of incident and workers' exposure to hazards.

Fact-sheet - How to store the chemicals? Part I

What is the objective?

Why the factory should follow specific requirements for a proper and safe storage of chemicals?

- **To prevent and mitigate** the risk of incidents (chemical spill, incompatible chemicals reactions, fire, etc.);
- **To reduce and control the workers exposure** to chemical hazards (vapors, fumes, toxic dust, etc.)**;**
- **To keep the chemicals in good conditions** and avoid a waste or deterioration of chemicals.

To store the chemicals in safe conditions, this first fact-sheet will focus on three major requirements:

Dedicated & designated area | **Restricted access** | **Ventilation**

How to achieve this objective?

Step 1: **Make sure** all the chemicals are stored in **designated storage area(s)** that are only dedicated for that use.

- All chemicals are stored in the stores and no chemical stock is found outside these areas;
- In the storage area, only chemicals should be stored and no other material such as raw material, machines, etc.
- The area should be out of direct sunlight and away from any possible heat or ignition source*;

Step 2: Restrict the access to the chemical store(s) to only authorized personnel:

- Only trained workers with tasks related to the use and storage of chemicals should have access to the store;
- The entrance of the store should be restricted: door locked, list of authorized persons to enter posted, etc.

Step 3: Provide adequate ventilation installing exhaust fans, circular vents, etc.
The ventilation system is important, especially, for flammable, corrosive and toxic products, to exert fumes to the outside atmosphere, to disperse corrosive gases or mists and to ensure that the concentration of any toxic substance is as low as possible.

*In particular, no electrical equipment neither electrical connection should be present in the chemical store. Portable fire extinguishers should be positioned just outside the entrance to flammable storage areas. Fan motors and ventilation equipment motors must be non-sparking.

Common non-compliances

Chemical stored in open air

If the chemical store is too small, the factory might store chemicals outside the buildings. The heat from the exposure to the sunlight can accelerate the deterioration of a chemical quality:

No restricted access to the store

There is no door between the production section and the chemical store so any worker can have access to this restricted area and be exposed to chemical hazards:

Exhaust fan not working

The factory has installed exhaust fans in the chemical store but they are not working (not switched on or because of a poor maintenance). There is a lack of inspection of the chemical storage conditions:

Fact-sheet - How to store the chemicals? Part II

What is the objective?

Why the factory should follow specific requirements for a proper and safe storage of chemicals?

- **To prevent and mitigate** the risk of incidents (chemical spill, incompatible chemicals reactions, fire, etc.);
- **To reduce and control the workers exposure** to chemical hazards (vapors, fumes, toxic dust, etc.);
- **To keep the chemicals in good conditions** and avoid a waste or deterioration of chemicals.

To store the chemicals in safe conditions, this second fact-sheet will focus on the requirement:

Segregation of incompatible chemicals

How to achieve this objective?

Step 1: Identify the hazard classification of each chemical because chemicals must be segregated according to their hazard class (flammable, toxic, oxidizing, etc.). The hazard symbols must be visible on every hazardous chemical container (see fact-sheet "chemical label") in order to facilitate the identification.

Step 2: Segregate incompatible chemicals using a compatibility chart (see example on the right) and referring to the SDS section 10 - Stability and reactivity.

The degree of segregation will depend upon the risk: the more the risk is important the more drastic measures such as "isolation" would be recommended. The use of a physical boundary or the use of distance are alternatives and when the risk is lower, provision of separate secondary containments can be sufficient. See fact sheet "How to store chemicals? Part III".

			C	Xi, Xn	T, T+	F, F+	O	E
C			✓	✓	o	×	×	×
Xi Xn			✓	✓	✓	✓	o	×
T, T+			o	✓	✓	o	×	×
F, F+			×	✓	o	✓	×	×
O			×	o	×	×	✓	×
E			×	×	×	×	×	✓

C	corrosive
Xi	irritant
Xn	harmful
T, T+	toxic, highly toxic
F, F+	flammable, highly flammable
O	oxidizing
E	explosive

✓	Are allowed to be stored together
o	Are allowed to be stored together, subject to special precautions
×	Are not allowed to be stored together

- **Write** an internal procedure about how to segregate chemicals on-site;
- **Appoint a manager** to control regularly if the chemicals are stored and separated as per the internal procedure.

Common non-compliances

Containers have no label

Without label, the content of the chemical container cannot be verified and therefore the compatibility cannot be checked:

Drainage system along incompatible chemicals

Physical boundaries were provided in this store to separate the incompatible chemicals but there is no dedicated secondary containment for each container and a drainage line connecting the different sections so in case of leaks/spills, incompatible chemicals might be in contact. See fact sheet "How to store chemicals? Part III".

Fact-sheet - How to store the chemicals? Part III

What is the objective?

Why the factory should follow specific requirements for a proper and safe storage of chemicals?

- **To prevent and mitigate** the risk of incidents (chemical spill, incompatible chemicals reactions, fire, etc.);
- **To reduce and control the workers exposure** to chemical hazards (vapors, fumes, toxic dust, etc.);
- **To keep the chemicals in good conditions** and avoid a waste or deterioration of chemicals.

To store the chemicals in safe conditions, this fact-sheet will focus on the following major requirement:

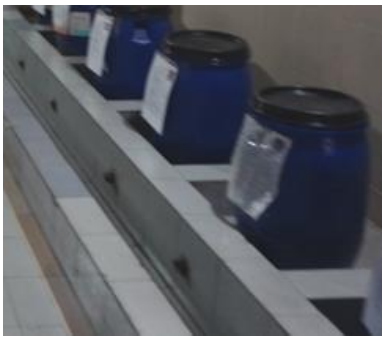
Secondary containment as a spill retention system

How to achieve this objective?

The secondary containment provides containment of liquid chemicals if the container leaks, spills, ruptures, etc., and prevents dispersion to other areas of the factory or to the environment.

The secondary containment can be either:

- A physical feature of the storage area (first and second pictures from the left)
- A stand-alone device (last picture)



Pictures 1 and 2 (from the left): secondary containment is a physical feature of the storage area. Picture 3 (right): stand-alone device to be used as a retention system.

Remark 1 – about the capacity of the secondary containment:
There are some recommendations on the capacity of secondary containment: "Appropriate secondary containment structures consist of berms, dikes, or walls capable of containing the larger of **110 % of the largest tank** or 25% percent of the combined tank volumes in areas with above-ground tanks with a total storage volume equal or greater than 1,000 liters and will be made of impervious, chemically resistant material." *General EHS Guidelines, Hazardous Materials Management, IFC, April 30, 2007.*



Pictures 1 and 2 (from the left): too many chemical containers stored in a secondary containment (retention system not adapted). Picture 3 (right): wood pallets are not a secondary containment (no system to retain any leak or spill).

Fact-sheet - How to store the chemicals? Part III

Remark 2 – about the necessity to verify if chemicals are compatible if stored in the same secondary containment:
Only compatible chemicals can be stored in the same secondary containment in order to avoid the risk of contact between chemicals that may react together. See fact sheet "How to store chemicals? Part II" to understand how to identify chemicals not compatible.

Common non-compliances

Secondary containment not properly used

The chemical store was arranged with a hard-surfaced structure to serve as a secondary containment but there are too many chemicals stored in it:

Secondary containment too small

Based on the IFC reference for the capacity of the secondary containment, the retention system in the picture below is not adapted since the container is too small:

Containment walls broken and not repaired

The physical boundary is not preventing the dispersion of the chemical spill and no action was taken to fix this broken berm:

Good practices

Fact-sheet - How to use the Safety Data Sheet (SDS)?

What is the objective?

What is a SDS?

A safety data sheet (SDS) or material safety data sheet (MSDS)[38], is a document which **lists the properties** of a particular chemical product and provides **information on how to safely use it, store it, dispose it**, etc.

Why the factory needs the SDS?

This document is a **ready reference and guideline** for the management, the workers and emergency personnel on how to handle or work with that substance in a safe manner. The SDS is also necessary **to control the compliance of the chemical product with a restricted substances list**: the CAS numbers[39] of the substances are indicated in the SDS.

How to achieve this objective?

Step 1: **Make sure** it is written in your chemical purchase policy that the chemical supplier must provide the SDS with relevant information for each chemical supplied. The format of the SDS is as per the following 16 sections:

1- Identification (substance & supplier)	9- Physical and chemical properties
2- Hazard identification	10- Stability and reactivity
3- Composition/information on ingredients	11- Toxicological information
4- First-aid measures	12- Ecological information
5- Fire-fighting measures	13- Disposal consideration
6- Accidental release measures	14- Transport information
7- Handling and storage	15- Regulatory information
8- Exposure controls/personal protection	16- Other information

Step 2: Control if the SDS is available or not when a new chemical order is received and update the chemical inventory.

Step 3: **Translate** or make sure you get the version of the SDS in local language (a SDS usually needs to be prepared by the chemical supplier in the language of its destination country but many factories might get only SDSs in English).

Step 4: **Display** the SDS in local language in the areas where chemicals are used and stored.

Pictures 1 and 2: examples of SDS in local language available nearby the chemical containers. Picture 1: in a chemical warehouse. Picture 2: in the storage area for chemicals used for the Effluent Treatment Plant (ETP). Wherever chemicals are used, SDS must be available and easily accessible.

[38] In countries that have adopted GHS, Safety Data Sheet (SDS) will be the only accepted name for the hazard communication document for chemicals. The Globally Harmonized System of Classification and Labelling of Chemicals (**GHS**) is a system developed by the United Nations for standardizing and harmonizing the classification and labelling of chemicals globally. See GHS information website

[39] CAS number: "Chemical Abstract Service". It is like an ID number specific to every chemical substance. In the SDS, you can see the CAS number of every component of the chemical product.

Fact-sheet - How to use the Safety Data Sheet (SDS)?

Step 5: **Train** the employees to explain them how to read and how to use the SDS.

- **Appoint a manager** to control: SDS are received, translated in local language, displayed in the factory and up-to-date ;
- **Develop a template for the local language SDS** If the local language SDS were not provided by the chemical suppliers. Moreover, it is easier for the employees to refer to the same format.

Common non-compliances

SDS not accessible

In the chemical store, the SDS is posted on the wall behind the batch of chemical containers so it is not accessible to the workers (and therefore not readable):

SDS not readable

The factory is not keeping the SDS in good conditions in the chemical store; the SDS are not regularly checked to make sure they are always readable (this SDS is not readable):

Generic SDS

The factory is not printing the individual SDS for each chemical but displaying a general SDS with basic information about the most common chemicals:

Fact-sheet - How to conduct a chemical spill response drill?

What is the objective?

The objective is to **train** the employees so they know how to **respond rapidly and safely to a chemical spill**. A proper response plan is essential to avoid any harm to the environment and the workers and to avoid any damage of the factory's equipment and facilities. The documentation of the emergency response plan and its communication among the employees is a first step but, without practice, it's not possible to know **how people will react** in the real event of an emergency situation and if the **response plan is adapted or not**. This is why performing regular drills is important.

How to achieve this objective?

Step 1: Identify potential scenarios of chemical spill incidents in your factory. Examples are given below:

- Chemical drums falling during unload from the transportation truck;
- Worker bumping into open chemical container by accident;
- Reaction of incompatible chemicals;
- Etc.

Step 2: Plan the chemical spill response drills; when do you want to conduct the drill? For which scenario? How long it should take? How often the drill should be performed? Where? When you have the answers to these questions, you can establish a drill planning for the year.

Step 3: Define who will attend the drill and who will monitor the drill. The person who will monitor the drill, has to fill-in a form that will be kept as the drill records. See below an example of form to fill-in for each drill performed:

Chemical spill response drill - form			
Report written by:		Report date:	
Date of the drill:		Time start:	
		Time end:	
List of workers participating to the drill:			
Manager in charge:			
Location:			
Drill scenario:			
Description of the actions taken during the drill:			
Comments about the attitude of the workers, gaps between the emergency plan and the drill result, etc.:			
Recommendations for improvement:			

The drill is also giving an **opportunity** to discuss about **how the incident could be avoided**. This can be added in the form.

Common non-compliances

Chemical spill response drill not properly documented

The factory confirms orally that a chemical spill response drill is performed every year. However, there is only the list of participants but no documentation about the exercise practiced and the comments of the manager in charge to monitor the drill.

Fact-sheet - How to develop an emergency response plan?

What is the objective?

The objective is to:

- **Be prepared** to respond rapidly to an emergency situation impacting the factory and the environment;
- **Ensure** the safety of the workers;
- **Prevent** possible financial losses resulting from the damages caused by the incident.

The emergency response plan details the procedures to be followed in case of emergency. The analysis of the potential emergency situations will also help to take measure to prevent these incidents to happen.

How to achieve this objective?

Step 1: Identify all the potential emergency situations per type of cause (natural, technological or human):

Natural causes	Technological causes	Human causes
Earthquake	Machine overheating	Chemical spill
Flood	Boiler explosion	Fire
Fire	ETP overflow	Explosion (incompatible chemicals stored together by an employee)
Etc.	Etc.	Etc.

Step 2: Assess the different levels of severity of the potential emergency situations. Example below:

Emergency situation : Chemical spill			
Level of severity	**Health & Safety**	**Environment**	**Laws & regulations**
Minor	Minor injury – first aid treatment	Negligible impact on flora and fauna, etc.	No legal requirement to notify minor spills
Significant	Injury requiring medical treatment	Short-term impact on sensitive environment	…
Major	Immediate danger to person (e.g. inhalation of hazardous gases)	Immediate risk of important soil or water pollution	…

Step 3: Write the emergency response plan. It should cover the chapters as follow:

- General list of contacts with phone numbers of people to be notified in case of emergency;
- For each emergency situation:
  - Actions to be taken to minimize the damage according to the level of severity (minor, significant and major) and who should be notified in this specific situation. See example below:

Emergency situation : Chemical spill			
Level of severity	**What it means ?**	**Actions to be taken**	**Who should be notified?**
Minor	Ex : minor chemical spill in the chemical store, no risk of personnel injury, no contact with the soil and the incident can be fixed within 24 hours	Ex: contact the manager in charge of the chemical store, ask a trained employee to clean-up the spill, identify the cause of the chemical spill, etc.	Ex: Manager in charge of the chemical store, Compliance Manager
Significant			
Major			

  - How to report the incident and to notify it to the responsible authorities;
  - Measures taken to prevent or minimize the recurrence of incidents.

Step 4: Communicate the emergency response plan and **Train** the management and employees to make sure they understand the procedures to follow in case of emergency situation.

Step 5: Practice the emergency response; emergency response drills should be conducted once a year at least for each potential emergency situation identified.

Update the emergency response plan: contact list to be updated at least once a year (or as soon as there is a change in the contact information) and overall document to be reviewed if there is any change in the factory practices and processes that can impact the emergency response plan.

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