Facility Site Info & Permits

Your responses to the site information questions will be used to categorize your factory for comparative analytics. Please complete this section first before moving on to other sections of the module.

You will also be asked for information on your site's permits on this page. The purpose of this section is to determine your compliance status with relevant environmental permits. Please include adherence to any rules or regulations your facility is required to follow such as permits, authorizations, licenses, registrations, certificates or other compliance documentation. Examples of non-permit requirements to include are annual required government reports and required registration of specific chemicals.

Please note that the Site Info and Permits section is NOT SCORED. This means that you do not get points for being in compliance. However, you must have a valid operating license to earn any points in the Facilities Environmental Module. If you answer "No" to "Does your factory site have a valid operating license?", you will score ZERO for the entire module.

Country or Region

Select the country or region your facility is located in

Industry Sector

Select which sectors apply to your facility's production (i.e. the types of products you are manufacturing or processing)

Facility Type

Please select all types that apply to your site

Example: If you are a Cut-Sew facility that also does screen printing or wet processing on site you would select **both** Final Product Assembly AND Printing, Product Dyeing and Laundering.

Example for Hardgoods: If you are a facility that undertakes final product assembly and manufactures hard components on site, you would select both Final Product Assembly AND Hard Product Component & Trim Production (Plastic, Metal, Wood).

Final Product Assembly - facilities involved in finished goods production/ final product assembly

Printing, Product Dyeing and Laundering - facilities that are involved in the printing and dyeing of materials, including wet processing, and laundering.

Material Production (textile, rubber, foam, insulation, pliable materials) - facilities that manufacture and assemble materials (e.g. textiles, leathers, plastics, insulation, foams, metals, wood, carbon fiber, etc.)

Hard Product Component & Trim Production (Plastic, Metal, Wood) - facilities that manufacture hard products components (e.g. metal bars, plastics hooks, electronics, etc.) or facilities that manufacture product trims (e.g. zippers, buttons, labels, etc.)

Chemical & Raw Material Production - facilities that manufacture chemicals and raw material

Packaging Production - facilities that manufacture packaging materials

Other

You will be asked to select which processes are conducted at your facility based on the facility type you select. (E.g. printing, gluing)

Facility Processes

Select which manufacturing processes apply to your facility

Material Types

Select material types that your facility either produces OR works with/processes. See definition of materials in the How to Higg guide glossary section.

How many days did your facility operate in this reporting year?

Enter a total number (not a range) of days that the facility operated in the reporting year. Operating days are considered days when production and/or production related activities (e.g. product/raw material loading/shipment) were conducted at the facility. Any operating day where the number of hours in operation OR the number of workers is less than 50%, then count the day as 0.5 day. Where the number of hours in operation OR the number of workers is greater than 50%, then count the day as 1 day.

Total Number of Employees: please enter the average number (*not* a range) of full-time and temporary employees that worked at the facility in this reporting year. The calculation guidance below applies for both full-time and temporary employees.

How To Track Facility Data:

Facility's should establish a process to track the number of workers in each pay period (e.g. weekly, bi-weekly, monthly). The average number of employees (full-time or temporary) can then be determined using the following guidance:

1. Add the total number of employees your facility paid in all pay periods during the year.
2. Count the number of pay periods your facility had during the year.
3. Divide the number of employees by the number of pay periods.
4. Round the answer to the next highest whole number to get the annual average number of employee (full-time or temporary)

For example:

- Pay period 1: 520 employees
- Pay period 2: 525 employees
- Pay period 3: 545 employees
- **Average number of employees: 530** [(520+525+545)/3]

For Higg FEM Verification, it is recommended that summaries of this data available in a format that is easy to review [e.g. spreadsheet (e.g. Microsoft Excel) or similar data analytics program that allows export of data in a human readable format (e.g. Excel, csv)] and any relevant supporting evidence be readily available for review.

How This Will Be Verified:

- **Documentation Required:**
  - Payroll/accounting records that show number of each worker category (full-time and temporary) in each pay period.
  - Payroll/accounting records that show the number pay periods in the reporting year.

What was your facility's annual volume?

Report the total amount of product shipped/sold in the last calendar year.

Total amount of product shipped/sold should not include the total amount of rejects in the last calendar year.

Why we use shipped/ sold quantity instead of annual production output?

The main rational is to create a consistent production metric that all facilities are able to track and the data are more comparable for industry benchmarking at the end. Besides, using shipped/ sold amount as the metric is to discourage excessive or unnecessary production including leftover, semi-products, samples and rejects which are also an environmental concern.

We understand that some products may have to be shipped / sold after the calendar year that they are actually manufactured. The limitation of using shipped/ sold quantity is - the reported energy, water and waste amounts are not covering the products being made in the same calendar year but shipped in the following year, instead they would cover some products which are shipped in the same year but actually being produced in the previous year. By considering this as a usual practice in the factory every year, the impact to the total shipped/ sold quantity should be relatively limited. However, if there is any exceptional case that may cause a significant impact on the environmental performance of the facility (e.g. demonstrate improved energy / water consumption), we encourage the factories to communicate to relative stakeholders to explain for their situation if needed.

Select a unit:

- *Cubic meters (m^3)*
- *Kilogram*
- *Meter*
- *Standard Allowed Minutes (SAM)*
- *Square yard*
- *Unit (piece or pair)*

UNITS: *Your annual unit will be used to normalize baselines, targets, and reductions in the Higg Energy, Water, and Waste sections and may also be used for benchmarking purposes. Please select the unit that best represents how your factory tracks annual volume. This may mean that you need to do a unit conversion in order to select a unit from the provided list. For example, if you track annual volume in square feet you will need to convert to square yards.*

Reporting Standard Allowed Minutes in the FEM

Different products utilize different amounts of time and resources during production which will in turn will influence resource consumption (i.e. energy, water used, etc.). The unit Standard Allowed Minute (SAM) is a metric that provides an indicator of the time allowed to produce a product by workers including general allowances (e.g. efficiency, machine, personal, fatigue allowances, etc.). This production metric can be used to then relate resources consumption and the environmental impact to different types of products or be added together and used as a metric to normalize resource consumption and environmental impacts for production over period of time (e.g. a calendar year). It should be noted that the SAM will vary by the type of product (e.g. shorts versus a jacket).

Year on year, tracking of SAM against energy, water and other parameters will allow facilities to review the efficiency of resource consumption and help inform performance improvement.

When reporting production volume in SAM, the user must report the TOTAL SUM of SAM for the reporting year and **not** the INDIVIDUAL SAM for each product type that is manufactured in your facility.

Once individual SAM values are known for a specific product, the product SAM can be multiplied by the number of products shipped / sold. This is done across all product types / categories and the total is calculated to arrive at the TOTAL SAM. This total is reported as the "Annual Volume".

Example for Apparel facility:

Product type	**Processes**	**SAM per piece**	**Number of products shipped/ sold in reporting year**	**Total SAM per product type**
Polo shirt	Cutting Sewing Packaging	15	100,000	15 x 100,000= 1,500,000
V-neck shirt	Cutting Sewing Packaging	12	500,000	12 x 500,000 = 6,000,000
			Total SAM	**7,500,000**

Example for Hardgoods facility:

Product type	**Processes**	**SAM per piece**	**Number of products shipped/ sold in reporting year**	**Total SAM per product type**
Rucksack	Cutting Gluing Sewing Assembly	45	20,000	45 x 20,000= 900,000

	Packaging			
Tent	Cutting Gluing Sewing Assembly Packaging	60	30,000	60 x 30,000= 1,800,000
Camping table	Cutting Assembly Packaging	150	10,000	150 x 10,000 = 1,500,000
			Total SAM	**4,200,000**

There are different approaches to calculating SAM, however if a consistent methodology is used across all products, this will produce comparable data that can be compared year over year. Below are some resources that look at the different methods of determining SAM (which is often used interchangeably with Standard Minute Value or SMV):

- https://www.ilo.org/global/publications/ilo-bookstore/order-online/books/WCMS_PUBL_9221071081_EN/lang--en/index.htm
- https://www.onlinetextileacademy.com/sam-standard-allowed-minute/
- https://www.onlineclothingstudy.com/2011/02/how-to-calculate-sam-of-garment.html#:~:text=Standard%20allowed%20minutes%20(SAM)%20%3D,%2B0.048)%20%3D%200.31%20minutes.
- https://ordnur.com/apparel/standard-minute-value-smv-garments-calculation-importance/

If you would like to request the addition of a missing unit, please go to **https://support.higg.org** and select "Feedback" to submit feedback for consideration.

How To Track Facility Data:

Facility's should establish a process to track the amount of product shipped/sold in the last calendar year. For FEM Verification, it is recommended that summaries of this data (e.g., daily, weekly, monthly records) be tracked in a format that is easy to review [e.g. spreadsheet (e.g. Microsoft Excel) or similar

data analytics program that allows export of data in a human readable format (e.g. Excel, csv)] and any relevant supporting evidence be readily available for review during Verification.

How This Will Be Verified:

- **Documentation Required**
  - Production, sales, product shipment records that show the quantity of products shipped/sold in the reporting year.

Does your facility have onsite water treatment (i.e. Pre-treatment and/or Wastewater treatment)?

Suggested Upload: Facility's water treatment process flow and/or hydraulic diagrams

Reference**:** https://www.wateractionplan.com/management-and-use-of-chemical-products

How This Will Be Verified:

Yes

- **Documentation Required**
  - Facility's water treatment flow chart and hydraulic diagrams
  - Permits, if required

(NEW) Has your facility participated in industry programs related to sustainability or have sustainability related certificates valid during the reporting year?

Technical Guidance:

Industry Programs enable facilities to build robust programs and practices that can improve overall sustainability or specific impact areas. There are a wide range of industry programs related to Environmental Sustainability that are focused on supporting facilities in identifying environmental impacts and providing solutions or standards of practice that can help mitigate impacts to the environment (e.g. Apparel Impact Institute's Clean by Design, Textile Exchange's Global Recycled Standard (GRS), ZDHC CleanChain, bluesign System Partner, etc.)

Facilities can select programs from the list in the Higg FEM or select Other to add programs that are not listed. **Note:** Brand or customer-specific auditing schemes that include environmental aspects should

not be reported in this question as the focus is on broader industry sustainability programs or initiatives such as those listed in the Higg FEM.

Facilities can also use the listed programs to identify industry programs or initiatives that can be considered for adoption.

How This Will Be Verified:

- **Documentation Required:**
  - Documentation of ALL programs the facility has participated or enrolled in, which includes the name of the program, any certification or declaration of enrolling the program.
  - Result of the industry program (e.g. certification), if applicable.
- **Interview Questions to Ask:**
  - Facility staff responsible for managing or implementing the program are knowledgeable on the program's requirements or initiatives and what is required to meet or maintain the program requirements (e.g. certification maintenance)
- **Inspection - Things to Physically Look For:**
  - Facility practices and onsite observations align with the reported program requirements or initiatives.

Permits

The purpose of this section is to determine your compliance status with relevant environmental permits. Please include adherence to any rules or regulations your facility is required to follow such as permits, authorizations, licenses, registrations, certificates or other compliance documentation. Examples of non-permit requirements to include are annual required government reports and required registration of specific chemicals.

Please note that all documents uploaded, including required upload and suggested upload, throughout the Higg FEM are visible to the stakeholder that your facility shared their module to.

Please note that this section is NOT SCORED. This means that you do not get points for being in compliance. However, you must be in compliance to earn any points in the Facility Environmental Module. **If your factory site does not have a valid and current operating license you will score zero points for the entire module.**

1. Does your factory site have a valid operating license, if required by law?

Please upload a copy of the operating license

What is the intent of the question?

Your factory must meet basic local regulations before proceeding to beyond-compliance sustainability behavior. This question is intended to confirm that you have a valid operating license before proceeding on to complete the Higg Index.

Technical Guidance:

If you answer "No" or “Unknown” to “Does your factory site have a valid operating license?”, you will score ZERO points for the entire Facility Environmental Module. This is because a valid and current operating license is required to score points in the Facility Environmental Module.

If you have an expired operating license, you must answer “no” to this question, even if you are in the process of updating your operating license. A current and valid operating license is required to answer “Yes” to this question.

If an operating license is not required by law, you should answer “Yes” to this question and upload proof that an operating license is not required by local law.

How This Will Be Verified:

Yes

- **Documentation Required:**
  - Copy of update-to-date business license, if applicable and any other relevant licenses
- **Interview Questions to Ask:**
  - Who in the facility is responsible for ensuring the business license is kept up to date?
  - What is the procedure for updating the business license?
  - Should the person responsible for updating the business license be out of the office, what is the backup plan to ensure the business license is up to date?
- **Inspection - Things to Physically Look For:**
  - Name on Business License matches the business name found on the facility premises.

2. Did your facility receive any government-issued environmental violation records in 2021?

If yes, please describe the violation and your site's action plan to improve

Suggested Upload: Copies of violation notices

Does your facility currently have any records in the Institute of Public & Environmental Affairs (IPE) database?

Suggested Upload: IPE database records

If yes, has your facility supplied enterprise feedback to the database and/or taken steps to remove the record(s) from the database?

What is the intent of the question?

Your factory must meet basic local regulations before proceeding to beyond-compliance sustainability behavior. This question is intended to confirm that you have a process to manage local permits and compliance.

Technical Guidance:

IPE Guidance (Chinese Links)

If based in China, here is the link to the IPE Database references in this question: http://www.ipe.org.cn/IndustryRecord/Regulatory.aspx

Record removal:

- Record removal guidance document (Chinese) (click "监管记录处理方式"): http://www.ipe.org.cn/GreenSupplyChain/SupplyGCA.aspx
- If your site has a violation record and would like to supply enterprise feedback to IPE and/or take steps to remove the record from the database, please contact ipe@ipe.org.cn

IPE Guidance (English Links)

If based in China, here is the link to the IPE Database references in this question: http://wwwen.ipe.org.cn/IndustryRecord/Regulatory.aspx.

Record removal:

- Record removal guidance document (English) (click "Approaches to Record Removal"): http://wwwen.ipe.org.cn/GreenSupplyChain/SupplyGCA.aspx
- If your site has a violation record and would like to supply enterprise feedback to IPE and/or take steps to remove the record from the database, please contact ipe@ipe.org.cn

New to IPE? To get started with IPE, please visit their informational pages here:

- Introduction to Data: http://wwwen.ipe.org.cn/InfoDetail/Show.aspx?id=18638&jid=18637&bid=18644&isnb=1
- User Guide: http://wwwen.ipe.org.cn/InfoDetail/Show.aspx?id=18636&jid=18635&bid=18646&isnb=1
- Link to register for a corporate user account (required to search a list of suppliers/save information for export): http://wwwen.ipe.org.cn/User/UserRegister.aspx

How This Will Be Verified:

Yes

- **Documentation Required**:
  - Copy of government-issued violation record
  - IPE database records
- **Interview Questions to Ask:**
  - Reason for the government-issued violation record?
  - Have the issues listed in the violation record been addressed? Please describe how and provide evidence (e.g. new equipment installed and operating, test results showing compliance, etc.)
  - What steps have been taken to remove the facility from the IPE list? (if applicable)
- **Inspection - Things to Physically Look For:**
  - Evidences of issues listed on the violation record in the facility
  - Action plans to address issues along with responsible staff and tracked progress
  - Communications with IPE showing how the issue is being addressed (if applicable)

3. Please complete the following questions to provide details on your facility's environmental permits requirements and compliance status

Please note that licenses/permits for hazardous waste contractors will be requested in the Waste section.

Technical Guidance:

Maintenance of environmental permit requirement and compliance status is recommended as part of your environmental management processes. Some examples of permits are:

Air permits

- Include permits or requirements for air emissions from stacks of utilities (boilers, diesel generators, etc.)

Chemicals permit may include:

- Requirements for chemical management permit or agreement, such as an approved chemical list, chemical classification system, safe chemical handling procedures or chemical disposal (ZDHC Chemicals Management Manual)
- Compliance with REACH (ZDHC Chemicals Management Manual)
- Include compliance or all laws / regulations / permits needed for specific chemicals. For example: Potassium Permanganate is controlled for purchasing and registration with police office is required in some locations. This is not a permit, but registration required by law - therefore it must be included here.

How This Will Be Verified:

- **Documentation Required:**
  - Copies of ALL up-to-date environmental permits/registrations which are applicable to the facility as at the date/year when the verification takes place, as well as any applicable permits/registrations for the reporting year.
- **Interview Questions to Ask:**
  - Who in the facility is responsible for ensuring permits are kept up to date?
  - What is the procedure for updating the permits?
  - Should the person responsible for updating the permits be out of the office what is the backup plan to ensure permits are up to date?
- **Inspection - Things to Physically Look For:**
  - Name on permits matches the business name found on the facility premises.
  - Address on permits matches the location of the facility.

Environmental Management System (EMS)

An Environmental Management System (EMS) is a holistic strategy and process to identify, track and manage the environmental impacts of your facility over time. While it's possible to make incremental environmental improvements at your facility without a comprehensive plan, your facility can only maximize environmental performance by setting a long-term strategy that will inform decision-making on environmental management.

The Higg Environmental Management System (EMS) section requires you to:

- Identify staff responsible for coordinating environmental management activities and ensure technical competence
- Identify significant environmental impacts associated with current operations
- Set a long-term environmental management strategy
- Develop a system to ensure compliance with all laws, regulations, standards, codes and other legislative and regulatory requirements
- Continuously maintain all factory equipment
- Engage facility leadership and workers on environmental strategy and performance
- Engage with subcontractors and upstream suppliers on environmental performance using the Higg Index
- Engage with local stakeholders on environmental performance improvements

EMS - Level 1

1. Are one or more employees at your facility responsible for coordinating your facility's environmental management activities?

If yes, please answer the following questions for each:

- **Name**
- **Job Title**
- **Time spent on environmental management:**
- **Select environmental topic (select all that apply):**
    - Energy
    - Water
    - Wastewater
    - Air Emissions
    - Waste
    - Chemical Management
- **Description** (*description of employee's roles and responsibilities*)

Upload: Environmental management team organization chart

Answer Yes *if you have any full-time, half-time, part-time, seasonal or contract employees working on environmental management in your facility.*

You can provide details on up to six employees. If you wish to provide details on more than six employees, please upload these details in a document.

What is the intent of the question?

This question is intended to confirm who in your facility is/are responsible for managing environmental impact areas.

The first step to demonstrate that environmental improvement is a core focus in your business strategy is to have dedicated staff responsible for managing environmental impacts.

Technical Guidance:

Facilities should have clearly defined roles and responsibilities for any staff responsible for coordinating environmental management activities at the facility. These employees must deal directly with environmental management and have defined roles for that purpose. The roles could be either required in their job description or accountabilities or designated by relevant system documents to oversee or coordinate. An environmental management team organizational chart and clear job descriptions could help to keep the members accountable to their roles.

If one person has multiple responsibilities, you have the option to indicate multiple responsibilities within the environmental topics and description section.

How This Will Be Verified:

Yes

- **Documentation Required:**
  - Environmental Management Team organization chart and job descriptions records
  - Supporting documentation:
    - Employee Name(s)
    - Job Title(s)
    - Time Spent on each area (General environmental management, Energy, Water, Wastewater, Air, Waste, etc.)
    - Performance and project plans for various environmental initiatives

- **Interview Questions to Ask:**
  - Management can clearly articulate the roles and responsibilities of those responsible for coordinating environmental management activities
  - Key Employees responsible for coordinating environmental management activities can demonstrate that they understand and are able to explain their roles

- **Inspection - Things to Physically Look For:**
  - Evidence to support that the Environmental Management Team is appropriately staffed and capable for the facility operations and size.
  - How many personnel are part the environmental team?
  - Are there enough environmental personnel part of the team to handle the breadth and depth of environmental impacts created by the facility?
  - Can they demonstrate reductions in environmental impact as a result of the programs they have implemented?

2. Does your facility have a company environmental management strategy that guides long-term decision-making on environmental management?

Select all topics covered by this strategy:

- Energy
- Water
- Wastewater
- Air
- Waste
- Chemical Management

Upload Environmental Management Strategy

Answer Yes *if you have a documented environmental strategy in place that sets forth environmental priorities, goals, and actions for 3+ years. A good environmental strategy should:*

1) *address your facility's significant environmental impacts and compliance obligations as prioritized in your environmental impact assessment;*
2) *be supported by facility leadership;*
3) *be communicated to all employees. To ensure environmental objectives are carried out, your strategy should include plans for achievement that detail: what will be done, what resources will be required, who will be responsible, when it will be completed, and how results will be evaluated (reference: ISO 14001).*
4) *If you have an environmental strategy that aligns with requirements in ISO 14001 and plans for 3+ years into the future, you may answer Yes to this question.*

What is the intent of the question?

This question is intended to drive your facility to go through a strategy development process to confirm long-term goals for environmental improvements and investments. Holistic environmental management needs leadership support to work. Having a long-term sustainability strategy built into your business is an important sign of a mature management approach.

A documented environmental policy and/or strategy can be used by an organization to reduce impacts and to improve environmental performance and efficiency. It offers a structured way to incorporate environmental considerations into day-to-day operations and long-term planning. It requires and proposes continual improvement of environmental performance.

One option for facilities to build a holistic environmental management system pairs the environmental policy and/or strategy with consistent completion and continuous improvement of the Higg FEM.

A facility is advised to follow an internationally recognized EMS standard, for example ISO 14001. Refer to the following guidance on how to create an environmental management system and strategy:

- ISO 14001 Environmental management systems — Requirements with guidance for use: https://www.iso.org/iso-14001-environmental-management.html
- This support site contains examples and templates for setting EMS policies and strategies: http://www.epd.gov.hk/epd/misc/env_management_sme/eng/um_main1.htm

Technical Guidance:

In order to set up meaningful and effective EMS system, a facility has to first carry out an environmental impact assessment (EMS Question 3) to identify the most significant environmental impacts at the facility. Then formal documentation and clear environmental policy can be created that describes the site's activities, products, and services including a commitment to continual improvement and prevention of pollution. Once there is a clear understanding of the key environmental impacts to focus on, an overarching environmental strategy and measurable environmental targets can be created. Targets should drive continuous improvement of environmental performance in the medium to long term (3+ years). Both policy and strategy should be reviewed regularly by facility management.

In addition, relevant staff should be trained to implement and maintain the EMS including environmental policies and procedures and address potential consequences of departure from procedures.

How This Will Be Verified:

Yes

- **Documentation Required:**
  - The company's environmental strategy is signed off by factory management and there is a long-term strategy that extends 3+ years into the future
  - The company environmental strategy should provide a direction and a plan of actions designed to achieve goals within a defined timeline. The strategy document should be well written and endorsed by the company management or authorized committee to guide planning, decision making and activities that impact on the environmental improvement and target achievement. Including items such as; consumption reduction, emission reduction, cost saving target, or changing staff practice to reduce water consumption, waste reduction and resource conservation, etc.

- **Interview Questions to Ask:**
  - Management is able to explain the long-term strategy in place
  - Key employees involved with implementing the long-term strategy is able to explain their role

- **Inspection - Things to Physically Look For:**
  - Evidence that the long-term strategy is in place and working, such as:
    - Compliance with environmental regulations
  - Regular and frequent tracking of all environmental impacts
  - Action plans and/or capital improvement plans for improving equipment or process efficiency

- Reduction targets and reductions for key environmental impacts (e.g. energy, water, waste)
- The use of renewable energy
- Community service projects including tree planting, etc.

Other References:

- These questions can be used to inform responses to The Sustainability Consortium's Home and Apparel Textiles Toolkit. The Air Quality - Manufacturing, Greenhouse Gas Emissions Intensity - Manufacturing, Greenhouse Gas Emissions - Supply Chain, Water Use - Supply Chain, and Wastewater Generation - Supply Chain Key Performance Indicators cover reductions in environmental impacts in product production. These TSC KPIs can be used to answer EMS questions 1.2 and 2.2 environmental impact management and reduction associated with products produced at the facility.
- ISO 140001 Standard: https://www.iso.org/iso-14001-environmental-management.html

3. Has your facility identified the significant environmental impacts associated with current operations within the factory premises?

Upload: a) Environmental impact analysis and aspect evaluation

***Answer Yes** only if you have an environmental impact assessment that shows significant environmental impacts from current factory operations.*

What is the intent of the question?

The intent of this question is to demonstrate the value of conducting a holistic assessment of the greatest environmental risks to your facility's operations. Knowing your facility's greatest risks will help you prioritize improvement actions in the forthcoming sections of this module.

An environmental impact assessment is used to identify and characterize potential and actual adverse risks to the environment from the presence and operations of your facility.

The environmental impact assessment is comprised of numerous impact areas, including wastewater, extraction of water, other sources of incoming water, solid and liquid waste, stationary and fugitive emissions, storage of gases and liquids, noise and vibrations. The results will enable facility management to identify the source, magnitude and urgency of specific risks related to the location and operation of the facility.

This information will support the creation of necessary risk mitigation and elimination strategies to minimize harm to the environment. The environmental impact assessment is an iterative process that will continuously evaluate any new risks associated with the location and/or operations of the facility.

Technical Guidance:

A facility should check laws and regulations to determine whether their local government has rules governing the process of evaluating likely environmental impacts of the facility's operation (i.e. Environmental Impact Assessment) that should be followed. If there are no local regulations, an impact assessment can be conducted following an internationally recognized EMS framework, such as

1. International Finance Corporation IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts [January 1, 2012]: https://www.ifc.org/wps/wcm/connect/8804e6fb-bd51-4822-92cf-3dfd8221be28/PS1_English_2012.pdf?MOD=AJPERES&CVID=jiVQIfe
2. World Bank Environmental, Health and Safety General Guidelines [April 30, 2007]: https://www.ifc.org/wps/wcm/connect/29f5137d-6e17-4660-b1f9-02bf561935e5/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES&CVID=jOWim3p

3. ISO 14001:2015, clause 6.1.2 identifies the requirements for assessing environmental aspects, impacts and their significance. Certification to ISO 14001:2015 is an acceptable means for demonstrating conformance with this requirement.
4. Environmental permit application and permit requiring controls based on the impacts described in the application together are also an acceptable means of demonstrating conformance with this requirement. A summary of environmental impacts and their significance derived from the permit application and the permit shall be acceptable. If permit is not renewed at a frequency stipulated by regulation, then the impacts should be assessed every three years against any changes in the operation as a general good practice.

These standards and guidelines can be used by facilities to evaluate environmental risks and impacts at the facility level.

How This Will Be Verified:

Yes

The environmental impact assessment must be available, comprehensive of all environmental impacts, and completed in accordance with any applicable standards, rules, or regulations.

- **Documentation Required:**
  - Environmental impact analysis and aspect evaluation and/or latest local government environmental assessment report

- **Interview Questions to Ask:**
  - Can factory management demonstrate awareness and understanding of the significant aspects and impacts associated with the employment site?
  - Can factory management demonstrate knowledge of laws and regulations concerning environmental management?

- **Inspection - Things to Physically Look For:**

- All environmental aspects associated within the factory's control or influence are included in the report
- All environmental impacts covered by local regulation must be included as well
- The assessment must include an analysis of the significance/importance of the different environmental impacts. The process for evaluating the significance of environmental impacts must be done periodically in order that the document be reproducible for comparing results.

4. Does your facility have a program or system in place to review and monitor environmental permit status and renewal (where appropriate) and ensure compliance?

Upload: a) List of required permits needed for your facility to operate and calendar of permit activities; b) Documentation of programs or systems in place to review and monitor environmental permit status, renewals, and ensure you are meeting the legal requirement.

***Answer Yes** if you have a program or process to monitor compliance with environmental permits and rules.*

What is the intent of the question?

The intent of this question is to ensure the facility has the ability to take action and manage a process (or standard operating procedure) maintaining compliance with environmental permits.

Staying in compliance with regulations is a fundamental business practice. Facility must ensure basic compliance is met before moving on to performance improvements and reductions.

Permits have legal requirements that must be met as well as expiration of the permits. Response to this question will explain how your standard management practices are followed by the facility to maintain the validity of the permits legally including expiration.

Technical Guidance:

At a minimum it is advised to create a regularly updated document that tracks your environmental permit review and update approach on a set schedule. The content of the tracking document can include environmental impact areas, permit name, permit status, permit number, valid period, requirements, key responsible person for ensuring compliance, etc. You may also go further and create a detailed standard operating procedure to monitor compliance of all the permit requirements.

Here is an example template for tracking permits: https://howtohigg.org/fem-landing/fem-templates/

How This Will Be Verified:

Yes

- **Documentation Required:**
  - Local environmental permit requirement for the facility's corresponding country or locality
  - List of required permits needed for facility to operate
  - Permits listed in the Permits section on Site Info
  - Documentation of the program or system in place to review and monitor environmental permit status and renewal and ensure you are meeting the legal requirement
  - Elements include:
    - Internal review mechanism
    - Responsible staff/party
    - Environmental permits renewal process
    - Timeframe to renew the permits to ensure compliance
    - Action plan if the environmental permits expire

- **Interview Questions to Ask:**
  - Management is able to explain the process and calendar for ensuring permits are meeting the legal requirements
  - Key employees involved in the process are able to explain their role and responsibilities for contributing to the success of the program in place for ensuring the permits are meeting the legal requirements

- **Inspection - Things to Physically Look For:**
  - Permits in good standing for all permits listed to operate facility

5. Does your facility maintain a documented system to identify, monitor and periodically verify all laws, regulations, standards, codes and other legislative and regulatory requirements for your significant environmental impacts?

Select all topics covered by the system:

- Energy
- Water
- Wastewater
- Air
- Waste
- Chemicals

Are the findings used to set an improvement plan that is regularly reviewed?

Upload: Documentation of your system to identify, monitor, and periodically verify all laws, regulations, standards, codes, and other legislative and regulatory requirements for your significant environmental impacts

***Answer Yes** only if you have a system to monitor requirements.*

What is the intent of the question?

The intent of this question is to evaluate if your management has a process (or standard operating procedure) that insures the facility is taking action from laws, regulations, standards, codes and other legislative and regulatory requirements for your significant environmental impacts outside of legal permits. (This is not inclusive of legal permits. See Question #4).

In many cases, facilities may have a valid permit but they are actually not complying with all local environmental requirements or don't have a program to identify which laws are applicable to the factory. Examples: 1) facility has valid permit but they don't know which regulations they should check against for legally restricted chemicals; 2) Water recycling/ energy efficient machineries are required by the local government but there is no specified timeline for facility to complete or no specified legal consequence on the environmental permit if they don't change the machines.

Facilities are also required to monitor and verify industry requirements. An example might be a facility in China required to disclose on the IPE program.

Your manufacturing organization may monitor and verify regulations at the parent company level or at the facility level. The response will identify your management practices that maintain business continuity.

Technical Guidance:

Setting up a process for identifying, monitoring and verifying environmental compliance should be part of your formal environmental management system. The process has to be documented (for example, through a standard operating procedure), maintained and executed by qualified personnel that have a good understanding of environmental regulations. Periodic review and updates of environmental regulations have to be conducted and documented.

Here is an example template for tracking local regulations: https://howtohigg.org/fem-landing/fem-templates/

How This Will Be Verified:

Yes

- **Documentation Required**

- Documentation of the facility's system to identify, monitor, and periodically verify all laws, regulations, standards, codes, and other legislative and regulatory requirements for the facility's significant environmental impacts. Facility should follow the most stringent of national level, provincial level, or industrial requirements.
- System should include the following elements:
  - Scope of regulatory requirement to be monitored
  - Responsible staff/party
  - Internal review & tracking mechanism
  - When does this occur?
  - How often does it occur?
  - What is the process to update the content?
  - Who reviews and approves the content?
  - Action plan for any non-compliance?
- Examples of standards and codes:
  - Use of chemicals in the work of safety conventions
  - Regulations on the management of ozone depleting substances
  - Cleaner Production Promotion National Law
  - Energy management standard
  - Energy saving technology standard
  - Energy saving facility and their assessment standard

- **Interview Questions to Ask**

  - Management is able to describe the system used in the facility to identify, monitor, and periodically verify all laws, regulations, standards, codes, and other legislative and regulatory requirements for your significant environmental impacts
  - Key Employees who are part of the system should be able to clearly explain their role in ensuring all regulatory requirements are met

- **Inspection - Things to Physically Look For**

  - Evidence to support there is a system in place that is being used in the facility to identify, monitor, and periodically verify all laws, regulations, standards, codes, and other legislative and regulatory requirements for your significant environmental impacts

(NEW) Does your facility have documented procedures that enable workers to report environmental emergencies/violations?

Suggested uploads: Documentation of procedures in place to enable workers to report environmental emergencies/violations

***Answer Yes** if you have a documented procedure that enables workers to report environmental emergencies/violations.*

What is the intent of the question?

The intent is to ensure workers have a proper channel to report for environmental emergencies/ violations.

This is critical to prevent facilities from covering up any violations and/or delaying the necessary corrective actions to reduce environmental contamination.

Technical Guidance:

It is every worker's obligation to report suspected or actual violations of regulation. The facility needs to set up and document a procedure which allow workers to report environmental emergencies/ violations. The document should clearly mention the steps and responsible contacts the workers can report to. The facility should also make a statement to guarantee there will be no workers punished or retaliated against for reporting truthful information to a law enforcement.

How This Will Be Verified:

Yes

- **Documentation Required**
  - Documentation of procedures for workers to report environmental emergencies/violations

- **Interview Questions to Ask:**
  - Are workers aware of the procedures to report environmental emergencies/ violations?
  - Is management held accountable for ensuring that there are no negative consequences towards employees who report grievances?

- **Inspection - Things to Physically Look For**
  - Documented procedures or policy of reporting environmental emergencies/violations are accessible by workers.

6. Does your facility have a process and schedule to maintain all equipment?

Upload: Maintenance schedule

***Answer Yes** if you maintain all equipment since this is important for managing emissions to air, energy efficiency, water efficiency, and other environmental impacts.*

What is the intent of the question?

The intent is for your facility to have appropriate maintenance procedures for managing emissions to air, energy efficiency, water efficiency etc. Maintenance can help your facility ensure compliance, reduce waste due to inefficient machinery or leakage, and identify savings opportunities.

Technical Guidance:

All equipment for production and operation should be maintained regularly in order to ensure compliance and reduce environmental impact. Depending on the types of equipment, the frequency and scope of maintenance of equipment will vary. Appropriate maintenance of equipment can be ensured through the following steps:

- Appoint at least one facility engineer or technician to be responsible for managing equipment maintenance.
- Define maintenance scope and schedule for all equipment.
- Establish a regular process to maintain all production and operational equipment.
- Compile and keep maintenance logs.

How This Will Be Verified:

Yes

- **Documentation Required**
    - Equipment maintenance schedule
    - Equipment maintenance log
    - Equipment maintenance procedures, including the following:
        - A list of all equipment used for production and measurement
        - Date Checked
        - Performance Status
        - Problems Identified
        - Action required
        - Action Complete Date
        - Name of personnel and Signature
        - Due date for next check

- **Interview Questions to Ask:**
    - Who is responsible for executing the equipment maintenance procedures?
    - How often are the procedures updated?

- **Inspection - Things to Physically Look For**
    - Verifiers should spot check the equipment seen on the facility work floor and reference the equipment list to ensure equipment is listed and relevant maintenance logs are available.

EMS - Level 2

7. Does your facility review the environmental management strategy with

your facility's managers each calendar year?

Suggested upload: Records from last annual management strategy review

***Answer Yes** only if you have evidence of management reviews conducted in 2021.*

What is the intent of the question?

The intent of this question is to drive management to communicate environmental management strategy and/or opportunities to present environmental progress to facility management team each year.

Holistic environmental management needs leadership support to work - having a long-term sustainability strategy built into your business is an important sign of a mature management approach.

Technical Guidance:

Conducting management review of environmental management systems should be an ongoing process with a focus on driving improvement. Having a set schedule for regular management meeting (such as on quarterly basis) is recommended. At least one full management review is recommended annually. The meeting should review information such as results of verification and legal compliance, environmental performance, status of objective and targets, status of preventive & corrective actions, recommendations for improvements, etc.

ISO 14001 has detailed objectives and processes for management review. There are eight different inputs that are required for successful management review:

1. Results of internal audits, legal compliance and other requirements to which the organization subscribes
2. Communication from external parties
3. Environmental performance
4. Progress of objective and targets
5. Progress of corrective actions
6. Follow-up actions from previous management review
7. Changing circumstances including the update of legal requirements
8. Recommendations for improvement

Further guidance and tips on conducting management review:
https://advisera.com/14001academy/blog/2014/07/30/can-ems-management-review-useful/

https://www.deq.virginia.gov/Portals/0/DEQ/AboutUs/EMS/EMS01%20DEQ%20EMS%20Manual.pdf

Click here for a sample implementation plan for a small/medium size mill

How This Will Be Verified:

Yes

- **Documentation Required**
  - Site EMS management review meeting plan
  - Site EMS management review meeting agenda
  - Meeting memo, action plan & timeline
  - Meeting attendance record
- **Interview Questions to Ask**
  - Management should be able to clearly articulate, in detail, the current long-term sustainability strategy
- **Inspection - Things to Physically Look For**
  - Training materials for most recent training conducted in the last year
  - Training sheets for employees in attendance

8. Do employees at your facility responsible for environmental management have the technical competence required to do their job?

Upload: a) List of individuals that are responsible for environmental related issues; b) Procedure to cross reference the individuals listed have the technical competence required to do their job

***Answer Yes** if you can explain how you ensure environmental employees: a) have technical competence, b) are provided with trainings or certifications as needed, and c) are evaluated for competence on an annual basis.*

***Answer Partial Yes** if you can demonstrate employee competence but do not yet have a process for annual performance review*

What is the intent of the question?

The intention is to demonstrate value in technical training for staff and/or hire staff with technical backgrounds (university degrees, prior work experience, training program certificates) to manage your facility's environmental impacts.

One of the major barriers to progress on sustainability is the lack of technical expertise. Having staff with strong technical expertise in relevant impact areas is what sets apart leaders and beginners in sustainability work.

For example, in order to improve energy and water use on-site, there should be someone who knows what machinery/technologies you use and how much energy/water they use. You need to have someone on-site who can walk through the factory and know how to spot leaks or other inefficiencies.

Technical Guidance:

Hiring someone with a background in engineering or another technical areas is valuable to effectively manage environmental impacts at a facility. If hiring a technical expert is not an option, investing in

technical training for existing employees (e.g. Certificate in ANSI/ ISO 14001: Standard), demonstrating how technical expertise has been cultivated over-time (e.g. staff spent multiple years in the same role with demonstrated environmental improvements), or hiring a consultant/advisor with technical expertise are other solutions.

External trainings for staff to become internal EMS auditors can be offered (e.g. attending internal EMS auditor training courses certified by a reputable professional organization such as the Institute of Environmental Management & Assessment (IEMA), International Registration of Certified Auditors (IRCA), etc.)

How This Will Be Verified:

Yes

- **Documentation Required:**
  - List of individuals that are responsible for environmental related issues
  - Environmental management team organization chart
  - Roles & responsibilities, and their background & qualification in corresponding area
  - Certificates proving their professional qualifications
  - Training records showing the person in charge has received training from time to time to update his/her knowledge in environmental management field

- **Interview Questions to Ask:**
  - Management is able to explain how they ensure they have individuals with technical competence required to do their job effectively
  - Responsible staff can demonstrate their knowledge and expertise related to the areas of environmental management they oversee
  - Management provides training and development opportunities for staff responsible for environmental management

- **Inspection - Things to Physically Look For:**
  - Certifications or trainings provided to the individuals listed who are responsible for environmental related issues
  - Annual review of employee's job performance to ensure they are meeting the technical competence needed to do their job
  - Staff's abilities to communicate their responsibilities and progress against their goals throughout the site visit

Partial Yes

- **Documentation Required:**
  - List of individuals that are responsible for environmental related issues

- Job descriptions for the list of individuals that are responsible for environmental related issues
- Development plans for staff to ensure they have the appropriate level of technical knowledge and resources to successfully manage their areas of responsibility

- **Interview Questions to Ask:**
  - Management is able to explain how they ensure they have individuals responsible for environmental related issues also have the technical competence required to do their job.

- **Inspection - Things to Physically Look For:**
  - Certifications or trainings provided to the individuals listed who are responsible for environmental related issues

EMS - Level 3

9. Does your facility promote awareness of the environmental strategy to employees?

Upload: Plan for promoting awareness of the environmental strategy to workers.

Answer Yes *if you can demonstrate how your environmental strategies have been communicated to workers.*

Answer Partial Yes *if you are in the process of developing a communication plan*

What is the intent of the question?

The intent is for facility management to communicate your environmental strategy and action plan to the facility's workers through trainings, newsletters, posters, or other mechanisms.

Workers play a major role in how much energy and water is used, how much waste is generated, how chemicals are managed, and can also help identify improvements for air and wastewater impacts. By communicating your plans to improve your environmental footprint, you help motivate and mobilize your workforce to support you in these improvements.

Technical Guidance:

As a first step a facility should set up an internal communication plan which identifies different ways of communicating the facility's environmental strategy.

An example of communications includes posters in a visible place that communicate preferred behaviors or strategies (e.g., How to conserve energy and water in dorms/kitchens/toilets, or appropriate waste disposal procedures such as what can be recycled).

More advanced examples of such communication include having formal meetings, reviews and training sessions to inform employees of progress against key performance indicators (KPI's) defined by the environmental policy/strategy. For example, some companies have expanded this education to provide incentives for workers that suggest process improvements that make the facility more efficient.

How This Will Be Verified:

Yes

- **Documentation Required**
  - Plans for promoting awareness of the environmental strategy to workers that includes the schedule and frequency of communications as well as the content to be delivered, attendance records, and employee evaluations on the success of the program.
  - Communications tactics may include: slogan, posters, newsletters, games & competitions, awards, team/division ambassadors, training, best practice sharing, broadcast announcement, etc.
- **Interview Questions to Ask**
  - Management is able to explain how they promote awareness of the environmental strategy to workers at different levels in the organization.
- **Inspection - Things to Physically Look For**
  - Evidences to support management in promoting awareness of the environmental strategy, which may include posters in a visible place, training materials provided to workers, formal meeting minutes and sign in sheets, evaluation reports, etc.
  - Employees can demonstrate their awareness of all or components of the environmental strategy

Partial Yes

- **Documentation Required:**
  - A plan for promoting awareness of the environmental strategy to workers exists and implementation will begin this year

- **Interview Questions to Ask:**
  - Management can articulate the plans and can confirm how and when implementation will commence

- **Inspection - Things to Physically Look For:**
  - Training dates, examples of educational collateral, designated employee trainers, etc.

10. Does your facility monitor, evaluate, and/or engage with your

subcontractors on their environmental performance using the Higg Index?

Upload: List of all subcontractors with proof of Higg Index engagement: e.g., show Higg.org Module shared or other documentation of their Module results such as an emailed export of results.

***Answer Yes** if you engaged any subcontractors in environmental assessment using the Higg Index.*

***Answer Partial Yes** if you have a plan to engage subcontractors using the Higg Index*

***Answer** "**Not Applicable**" if you do not have subcontractors*

The scope of subcontractors for this question only includes subcontractors used for production.

A subcontractor is usually an entity hired by a manufacturer to complete specific tasks which are also considered special tasks or manufacturing process steps. Manufacturers hire subcontractors because they do not have the expertise or resources in-house, and they need the services from subcontractors to complete a portion of the manufacturing process or certain pieces of work to produce finished goods. For example, cut and sew garment manufacturers may need to hire subcontractors for processes, such as, garment dyeing, embroidery and screen-printing tasks.

Subcontractors may or may not have direct ownership connection to the manufacturer. Finished goods facilities that perform the complete manufacturing process, even when they are not privately owned by the manufacturer/ the manufacturer's mother company, should not be considered or termed as a subcontractor in the Higg FEM context.

What is the intent of the question?

The intent is to leverage the Higg FEM and communicate why environmental performance matters to your business with subcontractors, and work with them to evaluate their own performance, monitor impacts, and improve.

The environmental footprint of the products you produce includes your subcontractors' impacts. For example, if you subcontract the final washing step of denim production, it is important that your subcontractor is aware of their water risks and is engaged in reducing water use. Or if you make fabric and you subcontract a screen-printing process, it is important that your subcontractor be engaged in Restricted Substance List compliance.

This is a more advanced practice that environmental leaders should be working on. It's important to start with Level 1 practices to ensure you have your own environmental strategy and action plan, before extending your efforts to your subcontractors.

Technical Guidance:

Ways to engage subcontractors involves leveraging the Higg Index to educate, evaluate performance and identify improvement opportunities. You can invite your subcontractors to complete the Higg FEM and share their results with you. Any engagement and partnership should be continuous so that improvement is monitored and managed over time. Tracking relevant documentation, such as training materials, signed environmental commitment documents, site evaluation reports is recommended.

How This Will Be Verified:

Yes

- **Documentation Required:**
  - List of all subcontractors that your facility conducts business with along with which ones have posted Higg FEM modules
  - Obtain a list from the accounting department and cross reference all subcontractors are listed
  - Proof of Higg Index engagement: e.g., show Higg.org connections and shared modules or other documentation of subcontractor module results such as an emailed export of results.
  - The facility should demonstrate a subcontractor evaluation system and monitoring plan which should include items such as:
    - an EMS training for subcontractors to ensure they understand your facility's requirements and any targets they have to achieve
    - an annual training plan
    - training materials
    - training records, such as an attendance list

- **Interview Questions to Ask:**
  - Management is able to demonstrate the extent to which their sub-contractors are using Higg
  - Management can articulate how they are using suppliers' Higg results to drive environmental improvements up the value chain

- **Inspection - Things to Physically Look For:**
  - Relevant documentation about subcontractor engagement (e.g. agreements, communication documents with subcontractors, Higg Index results for suppliers)

Partial Yes

- **Documentation Required:**
  - List of all subcontractors facility conducts business with and which ones they engage with or plan to engage with using Higg
  - Engagement with subcontractors is in progress or there is a plan in place to engage with them, but no or limited Higg completion or sharing has occurred: e.g., emailed invitations to register, emailed invitation to participate with description of Higg

- **Interview Questions to Ask:**
  - Management is able to explain why and how they plan to engage with their subcontractors on their environmental performance using Higg

- **Inspection - Things to Physically Look For:**
  - Evidence that a plan is in progress and dates have been set for subcontractor engagement to occur

Not Applicable

- **Documentation Required:**
  - Proof that subcontracts are not used for production activities

11. Does your facility engage in environmental improvement in your local context?

Select the ways in which your facility engages in environmental improvement:

- We support (financially or otherwise) conservation or improvement projects for environmental issues (e.g. preserving wetlands).
- We work with other similar businesses to share best practice for environmental management.
- We engage in dialogue with local communities to understand their views on how we as a company should manage our environmental impacts.
- We work within a group of other local stakeholders including government and communities, to understand and address local environmental issues together.
- We engage directly with local or national governance bodies on environmental regulation or management issues.
- We work together in a group with other local stakeholders, to engage with local or national governance bodies on environmental regulation or management issues.
- Other

Suggested Upload: a) Evidence of environmental improvement in your local context (e.g., community, river basin, etc.); b) List of local stakeholders and dates of engagement; c) Pictures, articles or press releases; List of organizations/initiatives you support.

***Answer Yes** if you have engaged in your local context (e.g., your community, your river basin, your region) and can show improvements and lists of stakeholders that you worked with.*

What is the intent of the question?

The intent is to build engagement with people, businesses, and organizations in the community around your facility on environmental practices and improvement.

This practice is important because your facility has a direct impact on the local environment your facility is located in. It is beneficial for your facility to engage with local entities that may include government, NGOs, community members, and environmental impacts in order to more deeply integrate environmental improvement into your local context.

Technical Guidance:

One important way to engage in the community is to partner with local regulatory agencies or centralized wastewater treatment plants to improve environmental performance and investments. For example:

- Organize local trash clean-ups or provide incentives to local families who properly dispose of electronic waste.
- Organize local fundraisers for environmental non-profits.
- Organize educational events for children to start environmental stewardship

References: Answer options adapted from the World Wildlife Federation's water projects questionnaire.

How This Will Be Verified:

Yes

- **Documentation Required:**
  - Evidence of environmental improvement in their local context (e.g., community, river basin, etc.) such as donations to local charities; participation in local environmental initiatives; community service outcomes; newspaper articles, pamphlets, or photo evidence of local community involvement; outcomes of environmental policy work; etc.
  - List of local stakeholders and dates of engagement

- **Interview Questions to Ask:**
  - Management is able to explain how they engage in environmental improvement in their local context

- **Inspection - Things to Physically Look For:**
  - Supporting documentation of engagement with local community:
    - Event photos, or videos
    - Charitable contributions
    - Newspaper articles

12. Does your facility monitor, evaluate, and/or engage with your upstream

suppliers using the Higg Index?

If yes, which type of suppliers?:

- Chemical suppliers
- Raw material suppliers
- Other suppliers, please describe

Suggested Uploads: List of upstream suppliers with proof of Higg Index engagement: e.g., show Higg.org Module shared or other documentation of their Module results such as an emailed export of results.

***Answer** Yes if you engaged any upstream suppliers in environmental assessment using the Higg Index.*

***Answer Partial Yes** if you have a plan to engage upstream suppliers using the Higg Index.*

Upstream suppliers are usually an entity providing raw materials to manufacturers that ultimately process the materials. For example, fabric mills, zipper and buttons manufactories are common upstream suppliers for a cut-sew garment factory.

What is the intent of the question?

The intent is to communicate why environmental performance matters to upstream suppliers, and work with them to evaluate their performance, monitor impacts, and improve using the Higg Index.

The environmental footprint of the products you produce includes your suppliers' impacts. For example, you want to make sure you are purchasing chemicals from a chemicals supplier that gives you all the information you need to confirm proper usage and storage of a chemical. Or you may choose to work with a chemicals supplier that delivers chemicals in tanks instead of drums to reduce waste. Or if you assemble footwear, you may choose to work with component suppliers that understand their own environmental impacts and are taking steps to improve. Or if you make textiles, you want to source from a fabric mill that has an effective wastewater treatment system and doesn't pollute local waterways while dyeing your product's fabric.

An easy way to answer "yes" to this question would be to invite your suppliers to complete the Higg FEM and share their results with you.

This is a more advanced practice that environmental leaders should be working on. It's important to start with Level 1 practices to ensure you have your own environmental strategy and action plan, before extending your efforts to your suppliers.

Technical Guidance:

Ways to engage upstream suppliers involves leveraging the Higg FEM to educate, evaluate performance and identify improvement opportunities. Any engagement and partnership should be continuous so that improvement is monitored and managed over time. Tracking relevant documentation, such as training materials, signed environmental commitment documents, site evaluation reports is recommended. See "How this will be verified" for documentation required.

Tracking a suppliers' environmental performance, a schedule to regularly monitor performance is recommended. Documentation review and factory site visits are recommended. The Higg FEM can be used as a tool to monitor upstream suppliers.

How This Will Be Verified:

Yes

- **Documentation Required:**
  - List of ALL upstream suppliers facility conducts business with
  - Proof of Higg Index engagement: e.g., emailed registration invitations, communications/requests for completion, Higg.org Module share, documentation of their Module results.
  - Communications with upstream suppliers and their feedback on the use of the Higg Index

- **Interview Questions to Ask:**
  - Management is able to provide a description of scope of which upstream supplier are engaged
  - Review the monitoring process of upstream suppliers using the Higg Index

- **Inspection - Things to Physically Look For:**
  - Relevant documentation about upstream supplier engagement (e.g. Contract, agreement, communication documents with upstream suppliers)

Partial Yes

- **Documentation Required:**
  - List of ALL upstream suppliers facility conducts business with
  - Plan in place to engage with suppliers on Higg Index for upcoming adoption cycle

- **Interview Questions to Ask:**
  - Management is able to explain how they plan to engage with their upstream suppliers on their environmental performance

- **Inspection - Things to Physically Look For:**
  - Evidence that a plan is in progress and dates have been set for upstream suppliers engagement to occur.

Other References:

- This question can be used to inform responses to **The Sustainability Consortium's Home and Apparel Textiles Toolkit.** The Greenhouse Gas Emissions - Supply Chain, Water Use - Supply Chain, Wastewater Generation - Supply Chain Key Performance Indicators address environmental impacts from upstream suppliers. The facility data can be aggregated by brands to determine environmental impact management and reduction associated with the final product.

Energy Use & GHG

Energy Use & Greenhouse Gas Introduction

Energy production and energy use are the largest man-made sources of air pollution and greenhouse-gas (GHG) emissions. The operational, environmental, and financial impacts of energy are key issues for facility operations. Driving energy efficiency and use of renewable energy throughout facility operations is an important area of focus for all factories.

As climate change emerges as the most severe human, environmental, and economic risk in the world, more stringent requirements and regulations may be imposed by governments. If your facility reduces your energy consumption and greenhouse gas emissions, it will help to reduce your exposure to regulatory risks or new requirements from brands. This may also create an economic advantage for your company by mitigating risk of fossil fuel and energy cost increase.

By putting in place the necessary organization and action of an energy program facilities can:

- reduce greenhouse gas (GHG) footprint and air emissions
- reduce costs
- improve processes

Energy Use in Your Factory

You can reduce your greenhouse gas emissions by reducing the total amount of energy used at your facility and/or by switching to cleaner fuel sources. To understand how to improve, you first need to start by measuring your energy use and, second, use Higg to understand how your energy sources affect GHG emissions.

Your facility must track the following sources of energy that are owned or controlled by your facility. The scope covers energy sources used in the manufacturing process as well as any other type of energy

sources that are not used in the process (for canteens, dormitories, vehicles, etc.) (source: https://ghgprotocol.org)

Note: Energy consumed by facilities or tenants on-site that are NOT owned or controlled by your facility should be excluded for your energy reporting in the Higg FEM. For example, energy consumed by an onsite canteen/food service provider that is not owned or controlled by your facility should be excluded.

- Coal
- Natural Gas
- Petrol
- Diesel
- Fuel Oil
- Propane
- LPG
- LNG
- Biomass
- Solar Photovoltaic
- Solar Thermal
- Geothermal
- Hydro
- Micro-Hydro
- Wind

Your facility must also track the following sources of energy that are a consequence of your operations, but occur at sources owned or controlled by another entity (source: https://ghgprotocol.org)

- Purchased electricity
- Purchased chilled water
- Purchased steam
- Purchased Renewables

Below is a list of common machines and equipment which use energy (note: this is a very small list of common industrial equipment):

- Boiler
- Compressed Air System
- Motors
- Generator
- HVAC
- Incinerators
- Chiller and burner
- Dryers
- Lighting
- Production Equipment
- Office Equipment

Energy Use in Higg FEM

The Energy section in the Higg FEM serves as a method to evaluate a facility's progress at implementing a successful energy program. While good energy management provides significant benefits, including cost savings and efficiency, it requires adequate organizational focus and resources to correctly implement and be successful while reducing impact on the environment.

The Higg Index Energy section requires you to:

- Track all energy and fuel sources and report quantity used in the last calendar year
- Identify which factors contribute most to energy use on site (e.g., machines, processes, or operations that use the most energy)
- Set a normalized baseline for energy use, such as "80 MJ per unit of production in 2016"
- Set normalized targets for energy reduction, such as "Reduce energy used per unit of production by 70% in 2025."
- Set an action plan with specific actions and strategies to achieve energy reduction targets
- Demonstrate energy reductions against the baseline, such as "Last year we used 60 MJ per unit of production which is a 25% annual reduction."

Tracking and Reporting Energy Use in Higg FEM

Accurately tracking and reporting energy use data over time provides facilities and stakeholders with detailed insight into opportunities for improvement. If data is not accurate, this limits the ability to understand the facility's energy use footprint and identify the specific actions that will help reduce environmental impacts and drive efficiencies.

When establishing an energy tracking and reporting program, the following principles should be applied:

- **Completeness** – The tracking and reporting program should include all relevant sources (as listed in the FEM). Sources should not be excluded from data tracking and reporting should be based on materiality (e.g. small quantity exceptions).
- **Accuracy** - Ensure that the data input into the energy tracking program is accurate and is derived from credible sources (e.g. calibrated meters, established scientific measurement principles or engineering estimates, etc.)
- **Consistency** - Use consistent methodologies to track energy data that allows for comparisons of energy use over time. If there are any changes in the tracking methods, energy sources, or other operations that impact energy use data, this should be documented.
- **Transparency** – All data sources (e.g., energy bills, meter readings, etc.), assumptions used (e.g., estimation techniques), and calculation methodologies should be disclosed in data inventories and be readily verifiable via documented records and supporting evidence.
- **Data Quality Management** – Quality assurance activities (internal or external) should be defined and performed on energy data as well as the processes used to collect and track data to ensure reported data is accurate. For additional guidance on managing data quality, refer to Chapter 7 of the *GHG Protocol A Corporate Accounting and Reporting Standard: Managing Inventory Quality*.

The above principles are adapted from The Greenhouse Gas Protocol - Chapter 1: GHG Accounting and Reporting Principles.

Calculating Greenhouse Gas (GHG) Emissions using Higg FEM

Greenhouse gases (GHGs) are gases in the Earth's atmosphere that absorb/trap some of the Earth's outgoing radiation, causing the atmosphere to warm up (called the 'greenhouse effect'). This process is the main cause of the change in the earth's climate, called 'climate change'. Energy generation and use, transportation, use of refrigeration gases, and other activities produce greenhouse gas emissions that harm the environment. Reference IPCC: www.ipcc.ch.

In addition to environmental improvement, identifying and managing the source and amount of GHG emissions can benefit your factory in the following ways:

- Reduce material cost associated with GHG reductions
- Increase competitive advantage by striving for carbon neutral success
- Get a start on future regulations on carbon and GHG emissions.
- Through tracking and driving strategic reductions the facility is demonstrating environmental stewardship.

Your factory's energy use generates direct and indirect GHG emissions. The GHG Protocol categorizes these emissions into three broad "scopes":

- Scope 1: All direct GHG emissions.
- Scope 2: Indirect GHG emissions from consumption of purchased electricity, heat or steam
- Scope 3: Other indirect emissions, such as the extraction and production of purchased materials and fuels, transport-related activities, electricity-related activities (e.g. T&D losses) not covered in Scope 2, outsourced activities, waste disposal, etc. (Source: https://ghgprotocol.org)

Other References:

HKEx's Reporting Guidance on Environmental KPIs: https://www.hkex.com.hk/-/media/HKEX-Market/Listing/Rules-and-Guidance/Environmental-Social-and-Governance/Exchanges-guidance-materials-on-ESG/app2_envirokpis.pdf?la=en

Once you've entered your factory's energy use in Higg FEM, the tool will provide a GHG calculation for both Scope 1 (direct) and Scope 2 (indirect) emissions ***based on emissions factors taken from the best publicly-available, free sources.***

Energy & GHG - Level 1

1. Select all sources of energy for your facility:

- Energy Source
- Does your facility track its energy use from this source?
- What quantity of energy was used by this source during this reporting year?
- Unit of Measure
- Which method was used to track this energy source?

- What was the frequency of measurement?
- Provide any additional comments

Suggested Upload: a) Optional: an annual summary of the energy consumption for each type of energy source. Uploading utility bills is NOT required, however they should be available for the verifiers to review at the time of verification; b) Picture of the energy meters used to monitor the consumption of the main energy sources if applicable

*You will receive **full points** if you are completely tracking all sources of energy that your facility uses.*

*You will receive **partial points** if you are completely tracking at least one of your energy sources but are not yet tracking all of your energy sources.*

Higg FEM converts energy use data into common units (MJ), % of total use, and co2 equivalent.

What is the intent of the question?

The intent is for you to enter quantitative data that shows how much energy your facility is using. This question also helps you build your facility's energy source list, which provides a clear understanding of what energy is being used, where it is being used in your factory, and how much is being used.

Measurement of energy use from all sources is the foundation of energy management and the overall sustainability program for a company. Measurement of all energy sources allows you to analyze your biggest energy drivers, detect any abnormal consumption, set energy reduction targets, and measure GHG emissions.

The purpose of completing the energy section is to identify opportunities to reduce energy use. The first step to doing that is to understand which are your largest sources of energy use. Once you know that, you will be able to prioritize reductions. For example, this question helps you understand if you should focus on reducing electricity use, or another source of energy.

Technical Guidance:

Please include all energy used within the site's physical boundary and operations under your business control (owned, operated or directly leased). Please exclude any outsourced services or areas such as a contracted canteen or rental shop.

Energy use tracking is considered the first step in managing energy use. When establishing your energy tracking and reporting program, start by doing the following:

- Map out business and operational processes to identify sources of energy use.
    - **Note:** Energy consumed by facilities or tenants on-site that are NOT owned or controlled by your facility should be excluded for your energy reporting in the Higg FEM. For example, energy consumed by an onsite canteen/food service provider that is not owned or controlled by your facility should be excluded.

- Establish procedures to collect and track energy use data:
    - Use utility bills to determine the quantity of purchased electricity, steam and heat used.
    - Track other fuels used for onsite energy generation such as diesel in generators and coal in boilers owned or controlled by the facility.
    - Track fuels used for mobile combustion sources owned or controlled by the facility such as private cars and fork lifts.
    - Install sub-meters to track the amount of renewable energy generated, if renewable energy is generated in-house.
    - If estimation techniques are used, the calculation methodology should be clearly defined and be supported by verifiable data.
- Record tracking data (e.g. daily, weekly, monthly consumption records) in a format that is easy to review [e.g. spreadsheet (e.g. Microsoft Excel) or similar data analytics program that allows export of data in a human readable format (e.g. Excel, csv)] and maintain relevant supporting evidence for review during verification.

Reporting Energy Data in Higg FEM

Before reporting energy data in the FEM, data quality checks should be performed to ensure that the data AND the processes used to collect and record the data are effective at producing accurate energy data.

Do:

- ✔ Review source data (e.g. utility invoices, meter logs, etc) against aggregated totals to ensure it is accurate.
- ✔ Compare the current year with historical data. Any significant changes (e.g. an increase or decrease of over 10%) should be attributable to known changes. If not, further investigation may be warranted.
- ✔ Ensure the most recent and updated versions of data tracking spreadsheets are being used and that all automated calculations/formulas are correct.
- ✔ Ensure the proper units are reported and verify any unit conversions from source data to reported data.
- ✔ Review any assumption or estimation methodology/calculations to ensure accuracy
- ✔ Add notes in the "Provide any additional comments" field to describe any data assumptions, estimation methodology, or other relevant comments on the data for a particular source.

Do Not:

- X Report data that is not accurate (e.g. the data source is unknown or has not been verified).
- X Report estimated data if it is not supported by verifiable and reasonably accurate estimation methodology and data (e.g. engineering calculations).

Energy FAQ

1. **What is the difference between diesel and diesel oil?**
   Diesel refers to diesel used for generator or vehicle while diesel oil refers to oil used for heating/ other engineering devices.
2. **What is the difference between petrol and gasoline?**
   Petrol and gasoline are the same.

3. **What is a solar photovoltaic system (Solar PV)?**
   Solar photovoltaic system is a system to convert sun's radiation into electricity supply. Therefore, solar heating system should not be considered as solar photovoltaic.
4. **What is the correct energy source category for fabric scrap?**
   Fabric scrap is made of cellulose which should be considered as biomass. Since there is no specific category for fabric scrap under biomass, it can be categorized as "Biomass - Specific type not known".
5. **How to convert steam from metric ton to the units we have on the platform?**
   Steam can be reported in megajoule (MJ) according to the following formula.
   Steam (MJ) = Steam (metric ton) x 1000 (kg/ metric ton) x Specific enthalpy of steam (MJ/kg)
   while specific enthalpy of steam depends on the boiler pressure. (Please refer to the steam table: https://www.engineeringtoolbox.com/saturated-steam-properties-d_457.html)
   Example:
   How many megajoule is 200 metric ton of steam in 7 bar boiler equal to?
   Specific enthalpy of steam under boiler pressure of 7 bar = 2.762 MJ/kg
   Steam (MJ) = Steam (metric ton) x 1000 (kg/ metric ton) x Specific enthalpy of steam (MJ/kg)
   = 200 x 1000 x 2.762 = 552,400 MJ

How This Will Be Verified:

When verifying a facility's energy data, Verifiers **must** review all aspects of the facility's energy tracking program that could produce inaccuracies including:

- The initial data collection processes and data sources (e.g., invoices, on-site meters, metering logs, etc.); and
- The process and tools used to aggregate the data (e.g. spreadsheet calculations, unit conversions, etc.)

If any inconsistencies or errors are noted, the reported information must be corrected where possible and detailed comments should be included in the Verification Data field.

Full Points

- **Documentation Required:**
  - Frequency and method of measurement for **all sources** of energy
  - Electricity, fuel, steam and other energy consumption records (e.g. monthly bills and annual consumption records; metering records compiled in a spreadsheet (e.g. Excel) is ok as long as the metering records are available for review as well) whose totals match the reported answers to all questions answered.
  - Meter calibration records where applicable (e.g. as per manufacturer's specifications)
  - Estimation methodology documented where applicable
  - All energy sources at the facility are tracked in full. This means that all sources listed in the Level 1 table have complete answers in all columns that are accurate.

- **Interview Questions to Ask:**
  - Discussion with Management:

        - Management is aware of laws and regulations, where applicable, concerning energy use, transport and GHG emissions?
        - Management provides the appropriate resources to ensure that applicable laws and regulations are maintained?
        - Is the facility meeting local requirements regarding energy consumption and documentation?
    - Key Employees:
        - Key Employees are aware of the facility's energy data tracking program and how data quality is maintained
        - Key Employees are aware of energy use and greenhouse gas emissions permit/license requirements, where applicable?
        - Employees have access to, and understand, energy use, transport and greenhouse gas emissions procedures, where appropriate?

- **Inspection - Things to Physically Look For:**
    - Onsite meters
    - Equipment related to energy (production or energy consuming)
        - Maintenance (appears to be well maintained?)
        - Any leaks (of steam for example?)
    - Take pictures of energy related equipment

Partial Points

- Same requirements as for "**Full Points**" above for at least one energy source at the facility. This must be tracked in full. This means that at least one (but not all) energy sources listed in the Question 1 table have complete answers in all columns and there is evidence to support all of the answers.

This question can be used to inform responses to The Sustainability Consortium's Home and Apparel Textiles Toolkit. The Greenhouse Gas Emissions Intensity - Manufacturing Key Performance Indicator asks respondents for the greenhouse gas emissions intensity of final manufacturing facilities. The facility data can be aggregated by brands to answer TSC's question. The Greenhouse Gas Emissions - Supply Chain Key Performance Indicator asks respondents if Scope 1 and 2 greenhouse gas emissions were reported by fabric manufacturing facilities. The facility data can be aggregated by brands to answer TSC's question.

Energy & GHG - Level 2

2. Has your facility set baselines for energy use?

If yes, select all sources of energy for which your facility has set a baseline.

- Source
- Have you set a baseline for this source?
- Is the baseline absolute or normalized?
- What is the baseline quantity?
- Unit of Measure
- Enter the baseline year
- How was your baseline calculated?
- Was the baseline verified?

Suggested Upload: A description of how the baseline was calculated (uploading annual consumption records is NOT required, however they should be available for the verifier to review at the time of verification).

What is the intent of the question?

In order to demonstrate improvements or energy reductions, it is important to know what your starting point is. Setting a baseline (i.e. the annual performance of a set parameter at a defined base year) enables you to have a clear reference point for ongoing energy performance tracking and target setting.

Technical Guidance:

A "baseline" is a starting point or benchmark that you can use to compare yourself against over time.

In the Higg FEM, baselines can be "absolute" (total consumption for a reporting year. e.g. 1,500,000 kWh per year) or "normalized" to a product or operational metric (e.g. 0.15 kWh per unit of production). Data normalization is recommended to account for operational fluctuations as this provides for better year-over-year comparison of data and therefore more useful, and actionable analytics**.**

When establishing a baseline, be sure to do the following:

- Confirm the energy source data is stable, and sufficient to be used to determine a baseline. In the Higg FEM, a baseline should generally comprise of a full calendar year's data.
    - **Note:** If your factory has undergone major structural or operational changes such as acquisition or changes in product type, in general, you should establish or reset a baseline *after* those changes have been completed.
- Determine if the baseline will be Absolute or Normalized (Normalized baselines are preferred)
- Verify the source data and normalizing metrics data is accurate.
    - Energy and production volume data from previous Higg FEM 3.0 verifications, internal or external audits conducted by qualified personnel are acceptable sources of data verification.
- Apply the appropriate baseline metric (i.e., per year for absolute OR divide by the chosen normalizing metric 1,500,000 kWh per 1,000,000 pieces = 1.5kWh/piece)

- **Note:** For energy consumption that is not related to production, other normalizing metrics should be used where appropriate (e.g. Natural gas consumption in the canteen can be normalized per meal served or per worker)

Note: If the baseline is used to evaluate performance against a target, the baseline should remain unchanged.

Reporting baseline data in Higg FEM:

Do:

- ✔ Review source data and raw normalizing metric data (utility invoices, meter logs, production quantity, etc.) against aggregated totals used to determine the baseline(s) to ensure they are accurate. (e.g. double check monthly electricity consumption records to ensure they match the annual consumption quantities used to calculate the baseline).
- ✔ Select the appropriate baseline type in the FEM - Absolute or Normalized.
- ✔ Ensure the proper units are reported and verify any unit conversions from source data to reported data.
- ✔ Enter the baseline year. This is the year the baseline data represents.
- ✔ Provide sufficient details on how the baseline was calculated (e.g. electricity consumption was normalized per meter of fabric produced).
- ✔ Only select Yes to the question "Was the baseline verified?" if the baseline data was fully verified in a previous Higg FEM 3.0 verifications, or by an internal or external audit conducted by qualified personnel.

Do Not:

- X Report a baseline that is not accurate (e.g. the data source is unknown or has not been verified)
- X Report a baseline that is based on insufficient data (e.g., not a full year's data).
- X Report an estimated baseline if it is not supported by verifiable and accurate estimation methodology and data (e.g. engineering calculations).

How This Will Be Verified:

When verifying a facility's baselines, Verifiers **must** review:

- All source data (utility invoices, metering logs, production quantity) and aggregated data totals for the baseline year; and/or
- Records of baseline data verification where available (e.g., previous Higg Verification, data quality review, internal or external audits, etc.)

If any inconsistencies or errors are noted, the reported information must be corrected where possible and detailed comments should be included in the Verification Data field.

Yes

- **Documentation Required:**
  - Description/Methodology showing how the baseline was calculated.
  - Documentation that shows the baseline matches consumption records for the year the baseline was set.
  - Ability to demonstrate how baseline data was validated (e.g., used Higg FEM 3.0 verified data, used internal/external validation process)

- **Interview Questions to Ask:**
  - Discussion with the team responsible for managing the metrics. The team must clearly explain and demonstrate how baseline data was calculated and validated (e.g., used Higg FEM 3.0 verified data, used internal validation process, external audit, etc.)

3. Does your facility know what facility processes or operations use the most energy?

Upload the methodology for identifying the highest energy use factors

What are the highest energy use factors at your facility?

These can be any factors in production such as machines, processes, or sections

Suggested Uploads: a) Ranking of processes, services, or operations that consume the most energy (with energy consumption values); b) Copy of an energy audit conducted by an internal or external energy management specialist (if available)

It is important to understand what influences energy use the most in your facility. This allows you to strategically target those factors in order to improve energy efficiency and/or greenhouse gas emissions.

***Answer Yes** only if you have documented records and methodology to identify the highest factors of energy use on-site (e.g., processes, machines, operations, etc.).*

What is the intent of the question?

The intent is to have the facility complete an entire-facility analysis to evaluate the amount and sources of energy in all places where the energy is used (i.e. processes, lighting, HVAC, boiler, etc.). The intent of this question is to have the facility demonstrate they strategically prioritize operations or processes with the highest energy consumption for energy efficiency programs or with plans to replace the energy source with renewable energy.

For sustainability efforts to mature, a facility must identify and rank its largest energy consuming operation or processes within the facility boundary. Once a facility has an understanding of what

operations or processes consume the most energy, it can strategically reduce the energy consumption by prioritizing and targeting those operations or processes, or replacing the energy source with renewable energy. A facility must be able to measure uses before they can be effectively managed.

Technical Guidance:

A facility can evaluate the most energy consuming processes and operations based on mapping out its production processes, together with machinery list, associated energy use parameters, energy sources (i.e. fuel oil, natural gas, electricity, etc.) and energy usage data. Below are common operations or processes which influence energy use:

- Boilers and generators
- Compressed air system
- Motors
- Old or inefficient equipment
- Equipment location

Here are some ways to get started:

- Identifying individual machines that consume energy by creating a machinery list
- Analyzing the power ratings of equipment multiplied by the hours of operation to estimate energy use
- Installing electronic devices to track energy usage over time (e.g., data loggers, data recorders, or sub-meters)
- Hiring a certified professional energy engineer to conduct an energy assessment
- Consolidate the energy consumption per manufacturing process/ machine type and sort them from highest consumption to lowest consumption

Any of the options listed above on how to get started in identifying your highest energy consuming operations or processes are acceptable.

How This Will Be Verified:

Yes

- **Documentation Required:**
  (Provide at least one complete and up-to-date document such as)**:**
  - Records of onsite energy influences (e.g. list of machines and energy ratings/consumption)
  - Recent energy audits conducted by a qualified energy auditor (internal or external)
  - Consumption records accurately analyzed, and operations or processes categorized from highest consumption to lowest
  - Capitalization plans to replace old equipment for new energy-efficient equipment

- **Interview Questions to Ask:**
  - Understanding of energy ratings of equipment

- Relevant employees have a general understanding of how they, and their site's activities and operations, can impact energy use and greenhouse gas emissions

- **Inspection - Things to Physically Look For:**
  - Equipment used in the factory
  - Presence of data loggers to track energy use over time
  - Other energy sources not listed in energy record list

4. Has your facility set targets for improving energy use? If yes, select all sources of energy for which your facility has set an energy reduction target.

- Source
- Have you set a target for this source?
- What is your target for change in energy use from this source? **(*Enter a negative percentage for a reduction target, and a positive percentage for an increase target.)***
- Unit of Measure
- Enter the target year
- Is this a normalized or absolute target?
- Describe the measures planned to achieve this target (*how you will achieve the target)*

Suggested upload: consolidated targets for different energy sources

*You will receive **Full Points** if you set targets for energy sources that make up 80% or more of your total energy use.*

*You will receive **Partial Points** if you set targets for energy sources that make up 50-79% of your total energy use. This is to reward you for aiming to improve your most significant sources of energy use which will maximize environmental impact.*

Please Note: Full or Partial points are automatically calculated based on which sources you report having an improvement target for.

Make sure to enter a negative percentage for a reduction target (e.g. -5 for a 5% reduction), and a positive percentage for an increased usage target (e.g. 5 for a 5% increase in usage). If you switch your energy sources from one to another (e.g. replacing electricity with solar PV), please set a positive target for solar PV to indicate you utilize more energy generated from solar PV and set a negative target for electricity to indicate you target to use less of this source.

What is the intent of the question?

For facilities to have established at least one energy reduction target for your facility.

Sustainable companies continually work towards minimizing their environmental impacts. Now that you know how much energy your facility uses (your "baseline"), and your greatest drivers of energy use, you are ready to set targets to reduce your energy use.

Targets can be long-term or short-term (Short-term = less than 3 years, Long-term = more than 3 years). Once set, progress should be reviewed at least quarterly to ensure adjustments are made as needed to stay on track to realize success.

Technical Guidance:

A target can use absolute or normalized metrics to drive quantifiable improvements by a set date compared to the baseline. For Higg FEM, reduction targets may be normalized to the annual volume unit (selected in Site Info section: Annual volume unit) or another appropriate operational metric. A normalized target shows you when progress is real, rather than being a result of business changes such as reductions in production. An example of a normalized target is kWh of energy used for the production of one kilogram of sellable product (kWh/kg).

The FEM requires that formal targets be set in order to be able to answer **Yes** to this question. When establishing formal improvement targets, be sure to do the following:

- Base the target on a formal evaluation of improvement opportunities and actions (e.g. equipment replacement or upgrades) to calculate the amount of energy that can be reduced.
    - For example: Setting a target based on an evaluation of a boiler replacement that is expected to provide 10% reduction in annual energy consumption per piece that was calculated based on a formal review of the boiler manufacturer's specifications and the expected operating load.
- Define the exact target quantity, expressed as a percent (e.g. reduce normalized electricity consumption per piece by 5%). This **must** be based on a formal evaluation as noted above.
- Determine if the target will be Absolute or Normalized to a production or operating metric.
- Define the start date (i.e., "baseline") of the target.
- Define the end date of the target, meaning the intended completion date of the required improvements.
- Define the appropriate measurement units.
- Establish procedures to review the target. This review should include an evaluation of the actions taken and progress on reaching the defined target. Quarterly reviews are recommended.
- Ensure the target is relevant to reducing the site's energy use (e.g. focuses on the most significant energy use areas at the site)

Reporting Targets in Higg FEM:

Do:

- ✔ Review the target to ensure all aspects noted above are covered and that the information is accurate.
- ✔ Enter the targeted reduction or improvement as a percentage. **Make sure to enter a negative percentage for a reduction target (e.g. -5 for a 5% reduction), and a positive percentage for an increased usage target (e.g. 5 for a 5% increase in usage).**

✔ Select the appropriate target type in the FEM - Absolute or Normalized.
✔ Provide sufficient details on how the target will be met in the "Describe the measures planned to achieve this target:" field (e.g. Achieve a 3% reduction in normalized electricity consumption by replacing 500 T8 lights with LED lights).

Do Not:

X Report a target that is not accurate (e.g. the data source is unknown or has not been verified)
X Report a target that is based on insufficient data. (e.g. a reduction target that is not based on a formal evaluation of options such as equipment upgrades to meet the stated target OR actions to meet the target have not been defined.)
X Report an estimated target if it is not supported by verifiable and accurate estimation methodology and data (e.g. engineering calculations).

How This Will Be Verified:

When verifying a facility's targets, Verifiers **must** review:

- All supporting evidence (e.g. calculations, energy use and baselines, new/proposed equipment specifications, etc) to verify target is based on a formal evaluation of improvement opportunities.
- Facility operations in relation to its energy sources and use to ensure targets and opportunities evaluated are relevant to the site's energy use.

If any inconsistencies or errors are noted, the reported information must be corrected where possible and detailed comments should be included in the Verification Data field.

Full Points

- **Documentation Required:**
  - Supporting documentation that demonstrate targets are based on a formal evaluation of reductions/improvement opportunities (e.g. calculations, energy use/GHG data and baselines, new/proposed equipment specifications, etc)
  - Supporting methodology and calculations to show how the target(s) was calculated
  - List of measures/actions to be taken to achieve the target
  - Target communicated to the relevant employees and linked to the major energy usage of the facility identified in Question 1.
    - Communication methods may include: Meeting, bulletin board posting, newsletter release, any other form of written communication to employees which are involved with the tasks as they relate to energy usage in the facility.

- **Interview Questions to Ask:**
  - Discussion with the team responsible for managing the targets. The team must clearly explain and demonstrate how the target was determined (e.g. based on calculated reductions from evaluations of improvement opportunities) and how the target is monitored and reviewed.
  - Management actively promotes or endorses proactive energy conservation.

- Management is driving continuous improvement and reviewing on-site energy reduction targets on an annual basis.
- Energy consumption and greenhouse gas emissions data is made available to relevant internal and/or external stakeholders in order to drive accountability for achieving targets.

Partial Points

- Same requirements as for "Yes" answer but for sources (or one source) totalling 79% or less of energy use (this data is found in the % contribution calculation in Question 1)

Example of how points are awarded for this question:

If a facility's energy sources and use were as follows:

- 80% of energy used is from Purchased Electricity;
- 5% is from diesel fuel for back-up generators; and
- 5% is from LPG used in the Canteen

To achieve **full points**, the facility would need to have targets that (at minimum) address purchased electricity because this source represents 80% of the facility's total energy use.

If targets were set for diesel fuel and/or LPG only, the facility can still select Yes to the main question for setting targets, however **no points** would be awarded as these sources make up **less than 50%** of the facility's total energy use.

Note that the targeted or actual energy reduction amounts (i.e. in kWh) are not used in determining the points awarded.

The goal of this is to reward facilities for aiming to reduce the most significant sources of energy use and GHG emissions onsite which will maximize reductions in environmental impact.

(NEW) Has your facility set targets for reducing your facility overall GHG emissions?

- Enter the base year
- What is your target for reducing your facility's overall GHG emissions? **(*Enter a negative percentage for a reduction target.)***
- Unit of Measure
- Enter the target year
- Is this a normalized or absolute target?
- Describe the measures planned to achieve this target (*how you will achieve the target)*

Suggested upload: consolidated targets of different activities that would reduce GHG emissions

This question is not scored in both 2020 Higg FEM and 2021 Higg FEM reporting year. *Score may be applied in future reporting years.*

Make sure to enter a <u>negative percentage for a reduction target (e.g. -5 for a 5% reduction)</u>.

What is the intent of the question?

Sustainable companies continually work towards minimizing their environmental impacts. Now that you know how much GHG emissions your facility releases (your "baseline"), and your greatest drivers of energy use in Energy Question 1, you are ready to set targets to reduce your overall GHG emissions.

Targets can be long-term or short-term (Short-term = less than 3 years, Long-term = more than 3 years). Once set, progress should be reviewed at least quarterly to ensure adjustments are made as needed to stay on track to realize success.

Technical Guidance:

A target can use absolute or normalized metrics to drive quantifiable improvements by a set date compared to the baseline. For Higg FEM, reduction targets may be normalized to the annual volume unit (selected in Site Info section: Annual volume unit) or another appropriate operational metric. A normalized target shows you when progress is real, rather than being a result of business changes such as reductions in production. An example of a normalized target is kgCO2e released during production of one kilogram of sellable product (kg CO2e/unit).

The FEM requires that formal targets be set in order to be able to answer **Yes** to this question. When establishing formal improvement targets, be sure to do the following:

- Base the target on a formal evaluation of improvement opportunities and actions (e.g. switching to cleaner fuels).
    - For example: Setting a target based on an evaluation of a boiler replacement that is expected to provide 10% reduction in annual GHG emission that was calculated based on a formal review of the boiler manufacturer's specifications and the expected operating load.
- Define the exact target quantity, expressed as a percent (e.g. reduce normalized GHG emissions (kgCO2e/unit) by 4%). This **<u>must</u>** be based on a formal evaluation as noted above.
- Determine if the target will be Absolute or Normalized to a production or operating metric.
- Define the start date (i.e., "baseline") of the target.
- Define the end date of the target, meaning the intended completion date of the required improvements.
- Define the appropriate measurement units.
- Establish procedures to review the target. This review should include an evaluation of the actions taken and progress on reaching the defined target. Quarterly reviews are recommended.
- Ensure the target is relevant to reducing the site's overall GHG emissions (e.g. focuses on the highest GHG emissions areas at the site)

Reporting Targets in Higg FEM:

Do:

- ✔ Review the target to ensure all aspects noted above are covered and that the information is accurate.
- ✔ Enter the targeted reduction or improvement as a percentage. **Make sure to enter a <u>negative percentage for a reduction target (e.g. -5 for a 5% reduction)</u>.**
- ✔ Select the appropriate target type in the FEM - Absolute or Normalized.
- ✔ Provide sufficient details on how the target will be met in the "Describe the measures planned to achieve this target:" field (e.g. Reduce normalized GHG emissions (kgCO2e/unit) by 4% by switching to natural gas-fired boilers).

Do Not:

- X Report a target that is not accurate (e.g. the data source is unknown or has not been verified)
- X Report a target that is based on insufficient data. (e.g. a reduction target that is not based on a formal evaluation of options such as equipment upgrades/switching fuel sources to meet the stated target OR actions to meet the target have not been defined.)
- X Report an estimated target if it is not supported by verifiable and accurate estimation methodology and data (e.g. engineering calculations).

How This Will Be Verified:

When verifying a facility's GHG reduction targets, Verifiers **<u>must</u>** review:

- All supporting evidence (e.g. calculations, GHG inventories and baselines, new/proposed equipment specifications, etc) to verify target is based on a formal evaluation of improvement opportunities.
- Facility operations in relation to its GHG emissions to ensure targets and opportunities evaluated are relevant to the site's GHG emissions.

If any inconsistencies or errors are noted, the reported information must be corrected where possible and detailed comments should be included in the Verification Data field.

Yes

- **Documentation Required:**
  - Supporting documentation that demonstrate targets are based on a formal evaluation of reductions/improvement opportunities (e.g. calculations, energy use/GHG data and baselines, new/proposed equipment specifications, etc)
  - Supporting methodology and calculations to show how the target(s) was calculated
  - List of measures/actions to be taken to achieve the target

- **Interview Questions to Ask:**
  - Discussion with the team responsible for managing the targets. The team must clearly explain and demonstrate how the target was determined (e.g. based on calculated

reductions from evaluations of improvement opportunities) and how the target is monitored and reviewed.
- Management actively promotes or endorses proactive GHG reduction.
- Management is driving continuous improvement and reviewing emission targets on an annual basis.
- Greenhouse Gas emissions data is made available to relevant internal and/or external stakeholders in order to drive accountability for achieving targets.

5. Does your facility have an implementation plan to improve energy use and/or GHG Emissions?

Upload a copy of the plan

Improvements may be made by reducing energy use or improving GHG emissions by replacing existing energy sources with renewable sources.

***Answer Yes** if you have an implementation plan in place that demonstrates you are taking action to achieve your targeted reductions.*

***Answer Partial Yes** if you have a plan but have not started on all action items.*

You may download a [sample implementation plan here]

What is the intent of the question?

The intent is for your facility to create an action plan for reducing energy use and/or GHG emissions prioritizing by the highest energy consuming processes identified in Question 3.

Target-setting is an important step in systematically managing energy use, but your site must *take action* to make reductions. Having an implementation plan demonstrates the action you are taking to achieve your targeted reductions. Some facilities may have an implementation plan without having set targets.

Technical Guidance:

This question is identifying how the facility supports its target with clear actions. This is an opportunity to document all business processes for energy reduction projects planned or happening at the facility.

Steps for action should include:

1. Identify energy saving opportunities through internal assessment by qualified personnel or third-party energy assessment
2. Evaluate energy saving alternatives and calculate return on investment
3. Approve funds/budget for chosen solution

4. Implement the solution and realize reductions
5. Conduct regular review on the action plan to check progress

How to create an implementation plan?

Management commitment and employee awareness and participation are needed to ensure improvement opportunities can be identified, solutions can be proposed, and changes can be made using capital or expense dollars if necessary, to successfully implement proposed solutions. Often this can involve third party consultation, literature and technology research, design firms, and pilot testing among many other potential paths toward installation of solutions. All activity related to meeting targets should be part of an implementation plan to ensure organized and coordinated progress steps take place from the start.

How to report Energy Recovery?

Energy recovery (or reusing waste heat) is a practice or action that reduces the need for energy that you've already consumed. If you practice energy recovery, please list it in your implementation plan to ensure your efficiency efforts are called out.

How to reduce GHG Emissions?

In addition to reporting energy efficiency actions, you can also report actions which contribute to GHG reduction. For example, if your facility has switched to lower carbon energy sources or has taken other measures to reduce GHG emissions besides reducing energy use, you can also report in your action plan.

Where to go for more info:

- Clean by Design Ten Best Practices: https://apparelimpact.org/case_study/best-practices/
- Implementation plan template: https://howtohigg.org/fem-landing/fem-templates/

How This Will Be Verified:

Yes

- **Documentation Required:**
  - Energy reduction plan listing specific projects, target reductions, dates, and progress that covers 80% or more of total energy use and/or
  - Energy audit or assessment done by a qualified energy auditor (internal or external) identifying energy reduction opportunities and implementation dates. A qualified energy auditor should be trained / experienced with the ISO 50002:2014 standard related to Energy auditing.

- **Interview Questions to Ask:**
  - Management can articulate the plan including projects being implemented, their completion status, and their associated benefits

- **Inspection - Things to Physically Look For:**
  - Projects identified in the plan that are completed or in progress

Partial Yes

- Same requirements as for "Yes" answer but for sources (or one source) totalling 50-79% of total energy use

6. Has your facility improved energy consumption compared with its baseline in the last calendar year? If yes, select all sources of energy that have been improved.

- Source
- Has your facility improved energy consumption for this source compared with its baseline?
- Select a baseline year
- Indicate your facility's change in energy use from this source (quantity, unit of measure, Percent Change)
- Is this normalized or absolute?
- Describe the strategies used to achieve this improvement

Suggested Upload: Energy tracking reports showing reductions for energy sources from last calendar year. Uploading utility bills is NOT required, however they should be available for the verifier to review at the time of verification.

*You will receive **full points** if you made reductions in the last calendar year for energy sources that make up 80% or more of your total energy use.*

*You will receive **partial points** if you made reductions in the last calendar year for energy sources that make up 50-79% of your total energy use. This is to reward you for reducing your greatest sources of energy use which will maximize environmental impact.*

*Please **select No** as your answer option for that source if you have no reductions in the last calendar year or are unable to state what your reductions are for a source.*

What is the intent of the question?

Taking action to reduce impacts on site is the primary important goal for this assessment.

Sustainability is a journey of continuous improvement. Success is the result of extensive work involved in tracking, setting targets, and performing to implementation plans to meet targets. This question provides an opportunity to report quantifiable energy conservation success for the reporting year. By tracking success over the reporting year, a facility proves through results the commitment made towards sustainability.

Technical Guidance:

Improvements can be absolute or normalized, however it is recommended that you show normalized reductions such as "electricity used was reduced by 0.015 kWh/unit in the reporting year." This is because normalized metrics show real improvement rather than reductions from business changes such as reduced production.

The FEM requires that year over year improvements be demonstrated in order to be able to answer **Yes** to this question. When evaluating your energy improvements, be sure to do the following:

- Review the energy source data and aggregated total to ensure the data and any automated calculations are accurate.
- Review the actions taken to make improvements and determine if they have resulted in measurable improvements by comparing the data with historical energy use data to determine the improvement quantity. **Note:** Historical data accuracy should also be verified.
    - For example: Optimizing the facility's compressed air system and reducing the operating pressure by 5psi produced a 5.3% year over year reduction in energy consumed by air compressors on-site. This was measured by the sub-meters installed in compressor rooms.

Reporting Improvements in Higg FEM:

Do:

- ✔ Review the improvement data to ensure all aspects noted above are covered and that the information is accurate.
- ✔ Enter the improvement quantity either as an absolute or normalized value. This is the year over year change in energy use for the source. (e.g. previous year's consumption – reporting year consumption = the change in energy use) **Make sure to enter a <u>negative number for a reduction</u> (e.g. -0.05 for a normalized reduction of 0.05 kWh/unit) and a <u>positive number for an increase</u> (e.g. 0.03 for a normalized increase in renewable energy use of 0.03 kWh/unit)**
- ✔ Select the appropriate units for the improvement. (If the appropriate units are not available, list the units in the "Describe the strategies used to achieve this improvement:" field)
- ✔ Input the percent (%) change in the energy use of the source from the previous year. **Make sure to enter a <u>negative percentage for a reduction (e.g. -5 for a 5% reduction)</u>, and a <u>positive percentage for increased usage (e.g. 5 for a 5% increase in usage)</u>.**
- ✔ Provide sufficient details in the "Describe the strategies used to achieve this improvement:" field (e.g. Normalized electricity consumption was reduced by optimizing the facility's compressed air system).

Do Not:

- X Report improvements that are not accurate (e.g. the data source is unknown or has not been verified)
- X Report improvement that were not achieved in the FEM reporting year (e.g. historical improvements achieved more than 1 year ago should not be reported)

X Report an improvement that is absolute and relates to a decrease in production or reduced facility operations. This is why data normalization is important.
X Report an improvement that is based on insufficient data. (e.g. an overall reduction was achieved but this was not related to measurable or defined actions taken to achieve the reduction). This is particularly important when the improvements are marginal (e.g. less that 1-2%) and possibly attributable to measurement/ tracking errors and/or operational variability.

NOTE: This question does NOT provide scoring based on the actual % or quantity of improvement because a facility may be working on the last 5-10% of energy efficiency which is hard to make up. We don't want to falsely reward beginners and give fewer points to leaders

How This Will Be Verified:

When verifying a facility's improvements, Verifiers **must** review:

- All supporting evidence (e.g. energy use data and baselines, etc.) to verify the reported improvement quantity is accurate and attributable to measurable actions taken to improve energy use.
- The implemented changes or actions taken to achieve the improvements.

If any inconsistencies or errors are noted, the reported information must be corrected where possible and detailed comments should be included in the Verification Data field.

Full Points

- **Documentation Required:**
  - Energy tracking reports and consumption records showing reductions for energy sources that make up more than 80% of your total energy use
  - Evidence of new equipment purchases or efficiency improvements that demonstrate that energy reductions weren't made solely from a decline in production, or number of employees, or change in processes.

- **Interview Questions to Ask:**
  - Discussion with the team responsible for managing energy use. The team must clearly explain and demonstrate how the improvement was achieved (e.g. what actions were taken, and how this change was measured and calculated).
  - Management are proactively driving continuous improvement reviewing energy consumption reduction targets on a regular basis?

- **Inspection - Things to Physically Look For:**
  - Progress against the components of the project plan (e.g. lighting or equipment replacement)
  - Rebates received from energy efficiency projects (if applicable)

- Awards or certificates for energy efficiency or renewable energy achievements (e.g. green building certifications, Energy Star certification, etc.)

Partial Points

- Same requirements as for "yes" above but for energy sources (or one source) that make up less than 79% of your total energy use

Energy - Level 3

7. Were your facility's annual Scope 3 greenhouse gas (GHG) emissions calculated during this reporting year?

Report your facility's annual Scope 3 GHG emissions in co2e here

Describe your Scope 3 calculation here

Suggested Upload: documentation on calculation of scope 3 GHG emissions in the reporting year

This question is not scored. *The GHG Protocol categorizes emissions into three broad scopes:*

- *Scope 1: All direct GHG emissions. (this was covered in Level 1 energy tracking)*
- *Scope 2: Indirect GHG emissions from consumption of purchased electricity, heat or steam. (this was covered in Level 1 energy tracking)*
- *Scope 3: Other indirect emissions, such as the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity, electricity-related activities (e.g. T&D losses) not covered in Scope 2, outsourced activities, waste disposal, etc. (Source: https://ghgprotocol.org)*

Calculating Scope 3 emissions for your facility or business is an advanced practice that can be noted in this question. However, this question is unscored because Higg only gives Level 3 points for taking action that improves environmental impact directly. Calculating Scope 3 emissions can provide useful insights and/or support reporting, but it does not guarantee any environmental improvement has occurred.

What is the intent of the question?

Calculating Scope 3 emissions for factory operations is particularly important for the manufacturing industry because it provides insights on the environmental impact associated with the manufacturing and consumption of the product, both upstream and downstream operations. All upstream and downstream business activities (except in-house manufacturing) could be captured to calculate the Scope 3 footprint.

Technical Guidance:

GHG Protocol Corporate Value Chain (Scope 3) Standard allows companies to assess the emission impact of its entire value chain. The Scope 3 standard focuses on the following:

- Upstream emissions which are indirect GHG emissions related to purchased or acquired goods and services.
- Downstream emissions which are indirect GHG emissions related to sold goods and services.

In the Standard, upstream and downstream sources are further subdivided into 15 main categories as follows:

Upstream Scope 3 Emission Sources	1. Purchased goods and services 2. Capital goods 3. Fuel- and energy-related activities (not included in scope 1 or scope 2) 4. Upstream transportation and distribution 5. Waste generated in operations 6. Business travel 7. Employee commuting 8. Upstream leased assets
Downstream Scope 3 Emission Sources	9. Downstream transportation and distribution 10. Processing of sold products 11. Use of sold products 12. End-of-life treatment of sold products 13. Downstream leased assets 14. Franchises 15. Investments

The GHG Protocol Scope 3 Evaluator (http://www.ghgprotocol.org/scope-3-evaluator) is a tool that can be used to help identify and estimate GHG emissions from Scope 3 Sources.

In order to be able to answer **Yes** to this question, Scope 3 GHG must be calculated and reported in accordance with the Corporate Value Chain (Scope 3) Standard. This includes:

- Calculating GHG emissions from all Scope 3 emissions sources (as defined by Chapter 5 & 6 of the Standard)
- Scope 3 emissions are reported in accordance with the requirements defined in Chapter 11 of the Standard including a list of scope 3 activities excluded from the reporting with justification for their exclusion.

How This Will Be Verified:

When verifying a facility's Scope 3 GHG emission reporting, Verifiers **must** review:

- The reporting methodology and scope to ensure that it aligns with the requirements outlined in the Corporate Value Chain (Scope 3) Standard. This includes:
  - The minimum reporting boundaries/requirements for scope 3 sources and categories
  - Required documentation for any excluded scope 3 categories or activities excluded from the inventory that justifies their exclusion.

Yes

- **Documentation Required:**
  - Records of sources for calculating Scope 3 GHG emissions in the last calendar year
  - Supporting evidence to demonstrate GHG emissions from all relevant Scope 3 emissions sources have been calculated (as defined by Chapter 5 of the Standard)
    - **Note:** Basic reporting of only a select number of scope 3 sources without following the reporting requirements outlined in Chapter 11 of the Standard **does not** meet the expectations for a **Yes** Answer (e.g. informal tracking/reporting of emissions from 1 or 2 sources of Scope 3 emissions)

- **Interview Questions to Ask:**
  - Management understands the methodology and requirement for calculating Scope 3 GHG emissions
  - Emissions have been reported through the Carbon Disclosure Project or other external reporting (optional)

8. Has your facility set a Science-Based Target according to the SBTi?

If No, Is your facility preparing to set a Science-Based Target according to the SBTi?

Suggested Upload: documentation to show you have set a Science-Based Target according to the SBTi in the reporting year

This question is not scored in both 2020 Higg FEM and 2021 Higg FEM reporting year. *Score may be applied in future reporting years.*

What is the intent of the question?

The intent of this question is for companies to demonstrate that they have established science-based greenhouse gas (GHG) targets that align with the Science Based Targets Initiative (SBTi). https://sciencebasedtargets.org/

Technical Guidance:

GHG Targets are considered "science-based" if they align with the latest climate science and are designed to meet the goals of the Paris Agreement which seeks to limit GHG emissions and global warming.

To be able to answer Yes to this question, your company's targets must align with the SBTi's requirements which includes:

- Company commitment to setting Science-Based Targets in line with the SBTi. Formal commitment to the SBTi is required (e.g. submitting the commitment letter and paying the applicable fees)
- Setting your company's GHG target and having it validated and approved by the SBTi.

Full details on what is required to set a Science-Based Target can be found here: https://sciencebasedtargets.org/step-by-step-guide/

If your company has committed to the SBTi but has not yet established or submitted a target for approval, or if your target is under review, you should answer **Yes** to the question **"Is your facility preparing to set a Science-Based Target according to the SBTi?"**

Information on companies who have committed and set targets that are validated and approved by the SBTi can be found here: https://sciencebasedtargets.org/companies-taking-action/

How This Will Be Verified:

Yes

- **Documentation Required:**
  - Documentation to show you have set a Science-Based Target according to the SBTi in the reporting year.
  - The company's target is listed on the SBTi website. This must indicate the company's target is set (e.g. company status is listed as "Target Set") https://sciencebasedtargets.org/companies-taking-action/

Note: If the company has submitted a commitment letter and paid the applicable fees (i.e. the company's status on the SBTi website is listed as "Committed"), but has not yet established or submitted a target for approval, or if the target is under review. The answer to the question **"Is your facility preparing to set a Science-Based Target according to the SBTi?"** should be Yes.

- **Interview Questions to Ask:**
  - Discussion with the team responsible for managing the targets. The team must clearly explain and demonstrate how the target was determined and how the target is monitored and reviewed.
  - Management actively promotes or endorses proactive GHG reduction.
  - Management is driving continuous improvement and reviewing emission targets on an annual basis.

Water Use

Water Use Introduction

We know water is critical to life. We also know Earth is becoming hotter, drier, and more crowded. As human population grows and consumers demand more apparel and footwear products, freshwater is also becoming more heavily demanded. There is a finite amount of water on Earth, but we are demanding more and more water to sustain our population and our industry. If your factory uses freshwater as global demand for water increases, your factory is reducing the amount of clean, potable water available to workers, the community, and the environment. This not only creates a risk for your business, but creates a risk for your community and planet on a broader scale.

It is important to understand *h*ow much water you are withdrawing, in order to take action to improve your freshwater across your facility sites' operations.

Water used by companies may come from a number of sources, including the following (definition reference: CDP Water Reporting Guidance):

- **Fresh surface water:** Surface water is naturally occurring water on the Earth's surface in ice sheets, ice caps, glaciers, icebergs, bogs, ponds, lakes, rivers and streams. (Fresh water underground is called groundwater and oceans are not freshwater). Fresh water sources are generally characterized by having low concentrations of dissolved salts (below 1,000 mg/l) and other total dissolved solids.
- **Rainwater:** If a company is managing rainwater, either to harvest and use, or to prevent flooding for example, they should try to estimate and disclose it as withdrawal from the hydrological system. This helps companies better understand their water dependency and risks.
- **Groundwater:** Water in soil beneath the soil surface, usually under conditions where the pressure in the water is greater than the atmospheric pressure, and the soil voids are substantially filled with the water. Non-renewable groundwater is generally located at deeper depths and cannot be replenished easily or is replenished over very long periods of time. They are sometimes referred to as “fossil” groundwater sources.

- **Produced/process water:** Water which, during extraction or processing, comes into direct contact with or results from the production or use of any raw material (e.g. crude oil or a by-product from sugar cane crushing), intermediate product, finished product, by-product, or waste product. Note this also includes reused / recycled water:

According to GRI – G4's explanation of Indicator EN10, **recycled or reused water is defined as** "an act of processing used water/wastewater through another cycle before discharge to final treatment and/or discharge to the environment". It specifies three general types of water recycling/reuse practices:

- Wastewater recycled back in the same process or higher use of recycled water in the process cycle;
- Wastewater recycled/re-used in a different process, but within the same facility; and
- Wastewater re-used at another of the reporting organization's facilities. In accordance with Indicator EN10, this can include water that was treated prior to reuse and water that was not treated prior to reuse. It can also include collected rainwater and wastewater generated by household processes such as washing dishes, laundry, and bathing (grey water).

- **Municipal water:** Water provided by a municipality or other public provider.
- **Wastewater from another organization:** Ceres Aqua gauge defines wastewater as "Water that is of no further immediate value to the purpose for which it was used or in the pursuit of which it was produced because of its quality, quantity or time of occurrence." Cooling water is not considered to be wastewater.
- **Brackish surface water/seawater:** Brackish water is water in which the concentration of salts is relatively high (over 10,000 mg/l). Seawater has a typical concentration of salts above 35,000 mg/l.

Note: You may use the water in the form that it is provided, or you may need to treat the water.

Applicability

At the beginning of this section you will be asked to evaluate your water risk using either the WRI Aqueduct Tool or the WWF Water Risk Filter. Facilities with high water use (more than $35m^3$ daily) and those located in areas of high/very high water risk will be asked to complete the full Water section to ensure appropriate water management. Facilities with low water use that are located in areas of low water risk will only need to answer Level 1 questions.

The WRI Aqueduct Tool and the WWF Water Risk Filter are simple and similar tools to assess water scarcity risks.

If using the WRI Aqueduct Tool go to the home page and select **explore global water risk maps** and select **Enter Address** at the bottom of the screen to search using your facility address. Facility should select default weighing scheme. "Low risk", "Low to medium risk" and "Medium to high risk" are defined as "Low risk" in FEM. "High risk" and "Extremely high risk" are defined as "High risk" in FEM.

If using WWF Water Risk Filter, scroll to your country and location, and look at the color-coding of the map. This link locates the explanation about the WWF method and on page 3 the risk rating and color-coding is explained.

Tracking and Reporting Water Use in Higg FEM

Accurately tracking and reporting water use data overtime provides facility's and stakeholders with detailed insight into opportunities for improvement. If data is not accurate, this limits the ability to understand a facility's water use footprint and identify the specific actions that will help reduce environmental impacts and drive efficiencies.

When establishing a water tracking and reporting program, the following principles should be applied:

- **Completeness** – The tracking and reporting program should include all relevant sources (as listed in the FEM). Sources should not be excluded from data tracking and reporting should be based on materiality (e.g. small quantity exceptions).
- **Accuracy** - Ensure that the data input into the water tracking program is accurate and is derived from credible sources (e.g. calibrated meters, established scientific measurement principles or engineering estimates, etc.)
- **Consistency** - Use consistent methodologies to track water data that allows for comparisons of water use over time. If there are any changes in the tracking methods, water sources, or other operations that impact water use data, this should be documented.
- **Transparency** – All data sources (e.g., water bills, meter readings, etc.), assumptions used (e.g., estimation techniques), and calculation methodologies should be disclosed in data inventories and be readily verifiable via documented records and supporting evidence.
- **Data Quality Management** – Quality assurance activities (internal or external data quality checks) should be defined and performed on water data as well as the processes used to collect and track data to ensure reported data is accurate.

The above principles are adapted from The Greenhouse Gas Protocol - Chapter 1: GHG Accounting and Reporting Principles.

Water Use - Level 1

1. Select all water sources used by your facility

Source

- Does your facility track its water use from this source?
- What quantity of water from this source was used during the reporting year?
- Unit of Measure
- Which method was used to track water use from this source?
- What was the frequency of measurement?

Suggested uploads: Optional: annual summary of the water consumption for each type of water source. Uploading utility bills is NOT required, but these should be available during verification.

If you are unable to report the amount of water used from a source, the method being used to track it, and the frequency of measurement; please select **No or Unknown** as your answer option for the question: Does your facility track its water use from this source?

Please note that if you are unable to identify the sources of water used, please select **"Water – general or unknown origin"** as your answer for this question.

You will receive **Full Points** if you are completely tracking the quantity of water that your facility withdraws from all sources.

You will receive **Partial Points** if you are completely tracking at least one of your sources, but are not yet tracking all of your sources.

The Higg FEM automatically converts water use data into common units (liter) and % of total use.

This information will be used to auto-calculate average daily water use to determine applicability.

- If your facility site uses more than 35 m3/day, you are a **heavy water user**
- If your facility site uses less than or equal to 35 m3/day, you are a **light water user**

What is the intent of the question?

The intent is for you to enter quantitative data that shows how much water your facility is using. This question also helps you build your facility's water source list, which provides a clear understanding of what water is being used, where it is being used in your factory, and how much is being used.

Measurement of all freshwater use from all freshwater sources is the foundation of a water management. Ensuring measurement of all freshwater sources gives facilities the ability to perform a water balance, set freshwater based key performance indicators (KPI), identify water leaks, and establish and measure freshwater footprint. It is recommended that water be measured monthly or more frequently (e.g. onsite meter readings).

The most common freshwater use is potable municipal or city water (drinking water). Other sources can be from ground water wells, surface waters (lakes, rivers, and streams), rain water, recycled process water, and even condensate when collected from steam which is supplied to the business from an external source.

Technical Guidance:

Please include all water sources used within the site's physical boundary and operations under your business control (owned, operated or directly leased). Please exclude any outsourced services or areas such as a contracted canteen or rental shop.

Water use tracking is considered the first step in managing water use. It's recommended to start by:

- Mapping out business and operational processes to identify water sources, areas/processes that consume water.
- Establish procedures to collect and track water use data:
    - Use utility bills to determine the quantity of purchased water

    - Determine methods to track water consumption from other applicable sources, such as rainwater, recycled water, etc.
    - Install sub-meters to track the amount of water used on-site.
    - If estimation techniques are used to determine water use, the calculation methodology should be clearly defined and be supported by verifiable data.
    - Take inventory of how the site obtains water and gathers information on where the water comes from and who or what supplies the water.
- Record tracking data (e.g. daily, weekly, monthly consumption records) in a format that is easy to review [e.g. spreadsheet (e.g. Microsoft Excel) or similar data analytics program that allows export of data in a human readable format (e.g. Excel, csv)] and maintain relevant supporting evidence for review during verification.

Reporting Water Use Data in Higg FEM:

Before reporting water use data in the FEM, data quality checks should be performed to ensure that the data AND the processes used to collect and record the data are effective at producing accurate data.

Do:

- ✔ Review source data (e.g. utility invoices, meter logs, etc) against aggregated totals to ensure it is accurate.
- ✔ Compare the current year with historical data. Any significant changes (e.g. an increase or decrease of over 10%) should be attributable to known changes. If not, further investigation may be warranted.
- ✔ Ensure the most recent and updated versions of data tracking spreadsheets are being used and that all automated calculations/formulas are correct.
- ✔ Ensure the proper units are reported and verify any unit conversions from source data to reported data.
- ✔ Review any assumption or estimation methodology/calculations to ensure accuracy

Do Not:

- X Report data that is not accurate (e.g. the data source is unknown or has not been verified).
- X Report estimated data if it is not supported by verifiable and reasonably accurate estimation methodology and data (e.g. engineering calculations).

How This Will Be Verified:

When verifying a facility's water use data, Verifiers **must** review all aspects of the facility's water tracking program that could produce inaccuracies including:

- The initial data collection processes and data sources (e.g., invoices, on-site meters, metering logs, etc.); and
- The process and tools used to aggregate the data (e.g. spreadsheet calculations, unit conversions, etc.)

If any inconsistencies or errors are noted, the reported information must be corrected where possible and detailed comments should be included in the Verification Data field.

Full Points

- **Documentation Required:**
  - Water consumption records (e.g. monthly bills and annual consumption records; metering records compiled in a spreadsheet (e.g. Excel) is ok as long as the metering records are available for review as well) whose totals match the reported data to all questions answered.
  - Meter calibration records where applicable (e.g. as per manufacturer's specifications).
  - Estimate methodology documented where applicable
  - All water sources at the facility are tracked in full. This means that all water sources listed in the Level 1 table have complete answers in all columns that are accurate.

- **Interview Questions to Ask:**
  - Key Employees are aware of the facility's water data tracking program and how data quality is maintained.

- **Inspection - Things to Physically Look For:**
  - Confirm sources of water intake and/or extraction
  - If a facility has flow meters, see if the flowmeters are in place and working
  - Take a photo of flowmeters (if applicable)

Partial Points

- Same requirements as for "full points" above for at least one water source at the facility. This must be tracked in full. This means that at least one (but not all) water sources listed in the Level 1 table have complete answers in all columns and there is evidence to support all of the answers.

Other References: This question can be used to inform responses to The Sustainability Consortium's Home and Apparel Textiles Toolkit. The Water Use - Supply Chain Key Performance Indicator asks respondents if total annual water use is reported by fabric facilities. The fabric facility data can be aggregated by brands to answer TSC's question.

Water use - Level 2

2. Has your facility set baselines for water use? If yes, select all water sources for which your facility has set a baseline.

Source

- Is the baseline absolute or normalized?
- What is the baseline quantity and unit of measure?
- Enter baseline year
- How was your baseline calculated?
- Was the baseline verified?

Answer No/Unknown *if you are unable to report your baseline year and quantity for a source.*

What is the intent of the question?

In order to demonstrate improvements or reductions, it's important to know what your starting point is. Setting a baseline (i.e. the annual performance of a set parameter of a defined base year) enables you to have clear reference point for ongoing water use tracking and target setting.

Technical Guidance:

A "baseline" is a starting point or benchmark that you can use to compare yourself against over time.

In the FEM, baselines can be "absolute" (total consumption for a reporting year. e.g. 150,000m3 of municipal per year) or "normalized" to a product or operational metric (e.g. 0.15m3 per unit of production). Data normalization is recommended to account for operational fluctuations as this provides for better year-over-year comparison of data and therefore more useful, and actionable analytics**.**

When establishing a baseline, be sure to do the following:

- Confirm the water use data is stable, and sufficient to be used to determine a baseline. In the Higg FEM, a baseline should generally comprise of a full calendar year's data.
    - **Note:** If your factory has undergone major structural or operational changes such as acquisition or changes in product type, in general, you should establish or reset a baseline *after* those changes have been completed.
- Determine if the baseline will be Absolute or Normalized (Normalized baselines are preferred)
- Verify the source data and normalizing metrics data is accurate.
    - Water and production volume data from previous Higg FEM 3.0 verifications, internal or external audits conducted by qualified personnel are acceptable sources of data verification.
- Apply the appropriate baseline metric (i.e., per year for absolute OR divide by the chosen normalizing metric 150,000 m3 per 1,000,000 pieces = 0.15m3/piece)
    - **Note:** For water consumption that is not related to production, other normalizing metrics should be used where appropriate. For example: Domestic only water use can be normalized per person (e.g. 0.005m3 per person per day or month).

Note: If the baseline is used to evaluate performance against a target, the baseline should remain unchanged.

Reporting baseline data in Higg FEM:

Do:

- ✔ Review water use source data and raw normalizing metric data (water invoices, meter logs, production quantity, etc.) against aggregated totals used to determine the baseline(s) to ensure they are accurate. (e.g. double check monthly water source consumption records to ensure they match the annual water consumption quantities used to calculate the baseline).
- ✔ Select the appropriate baseline type in the FEM - Absolute or Normalized.
- ✔ Ensure the proper units are reported and verify any unit conversions from source data to reported data.
- ✔ Enter the baseline year. This is the year the baseline data represents.
- ✔ Provide sufficient details on how the baseline was calculated (e.g. water consumption was normalized per meter of fabric produced).
- ✔ Only select Yes to the question "Was the baseline verified?" if the baseline data was fully verified in a previous Higg FEM 3.0 verifications, or by an internal or external audit conducted by qualified personnel.

Do Not:

- X Report a baseline that is not accurate (e.g. the data source is unknown or has not been verified)
- X Report a baseline that is based on insufficient data (e.g., not a full year's data).
- X Report an estimated baseline if it is not supported by verifiable and accurate estimation methodology and data (e.g. engineering calculations).

How This Will Be Verified:

When verifying a facility's baselines, Verifiers **must** review:

- All source data (water invoices, metering logs, production quantity) and aggregated data totals for the baseline year; and/or
- Records of baseline data verification where available (e.g., previous Higg Verification, data quality review, internal or external audits, etc.)

If any inconsistencies or errors are noted, the reported information must be corrected where possible and detailed comments should be included in the Verification Data field.

Yes

- **Documentation Required:**
  - Description/Methodology showing how the baseline was calculated
  - Documentation that shows the baseline matches consumption records for the year the baseline was set
  - Ability to demonstrate how baseline data was validated (e.g., used Higg FEM 3.0 verified data, used internal/external validation process)

- **Interview Questions to Ask:**

- Discussion with the team responsible for managing the metrics. The team must clearly explain and demonstrate how baseline data was calculated and validated (e.g., used Higg FEM 3.0 verified data, used internal validation process, external audit, etc.)

3. Does your facility know what facility processes or operations use the most water?

Upload the methodology for identifying the highest water use factors OR If you do not have a document to upload, describe your methodology

What are the highest water use factors at your facility?

Suggested uploads: ranking of processes or services, or operations that consume the most water (with water consumption values).

It is important to understand what influences water withdrawal the most in your facility. This allows you to strategically target those factors in order to reduce water withdrawal.

***Answer Yes** only if you have documented incoming water, water loss and outgoing water in a water pipeline drawing/diagram/flowchart that is complete with meter locations. This may also include submetering and proper record keeping to understand the process, machines, or operations that use the most water.*

What is the intent of the question?

The intent is to assess freshwater usage and impacts for the site and to identify which processes, machines or operations use the most water.

For sustainability efforts to continue a facility should identify and rank water impact influences within the facility boundary. Once a facility has an understanding of specific influences on water impact it can strategically reduce the water usage and impact by targeting those factors. A facility must be able to measure uses and context-based water risks before they can be effectively controlled.

Technical Guidance:

If the facility understands what influences water use and impacts it the most, details will be needed to fill out the subsequent questions that will be asked. The facility must be able to demonstrate how the highest water use process/operation is determined and what specifically is causing the high use of water.

To answer this question properly a facility must be able to understand how much water is going into a specific area / tool / process. A site process flow diagram with identification of where usage is metered or can be estimated is a first step to identifying high level water use areas.

One way to start is to create a water audit template. This involves manually listing out all equipment on site that uses water and then identifying through meters, quick tests, or estimates how much water each item on the list uses. Once complete, like items can be combined and totalled to enable comparing bathrooms to dye equipment for instance. This provides a good snapshot of how various areas are performing but requires time and effort to complete. Since a water audit is only a single view in time, it lacks performance over time visibility.

Where to go for more info:

1. **Steps in a Water Audit**

http://www.facilitiesnet.com/green/article/Steps-in-a-Water-Audit-Facilities-Management-Green-Feature--9364

2. **Water Audit Data Collection Sheet**

https://www.brewersassociation.org/attachments/0001/1518/Water_Water_Audit_Data_checklist.pdf

3. **Water calculation tool for the textile wet processing sector**

https://watercalculator.dnvgl.com

Sites may want to invest in portable water meters to allow water measurement readings throughout the facility. Both battery operated digital in-line meters as well as non-invasive mount around the pipe ultrasonic meters are available.

New Guidance for Hardgoods facilities:

Here are examples of manufacturing processes in the Hardgoods industry sector that may consume large volumes of water:

- Casting (cooling water)
- Degreasing (with water-based degreasing agents)
- Machining (cooling water)
- Painting
- Polishing (water may be used for cooling)
- Anodization, electroplating, electroless plating, coating
- Printed Circuit Board manufacture (cooling water)

How This Will Be Verified:

Yes

- **Documentation Required:**
  (Facility can demonstrate they have evaluated and are aware of incoming water, water loss and outgoing water in facility through one or both of the following):

- Documented water assessment (conducted internally or by a third party) of the site identifying the aspects that contribute the most to the water withdrawal
- Facility flowchart including where measurements are made for water use and wastewater effluents.

- **Interview Questions to Ask:**
  - The management and key employees know what aspects of the site contribute the most to the water withdrawal based on the results of a water assessment conducted internally or externally
  - The management and key employees understand local water challenges and how site impacts link to these – for example is the site using high levels of groundwater in a groundwater stressed area

- **Inspection - Things to Physically Look For:**
  - Review water pipeline drawing/diagram/flowchart, check if the factory is knowledgeable regarding their water usage
  - Sub metering and proper record keeping for water consumption

4. Has your facility set targets for reducing water use from any sources? If yes, select all sources of water for which your facility has set a reduction target.

Source

- Has your facility set a target for reducing water use from this source?
- What is your target for change in water use from this source? ***(Enter a negative percentage for a reduction target, and a positive percentage for an increase target.)***
- Enter the target year
- Is this a normalized or absolute target?
- Describe the measures planned to achieve this target

Upload: Documentation describing the targets in place to reduce the water withdrawal

Answer No/Unknown *if you are unable to tell us your target amount, year and whether it is absolute or normalized for a source*

You will receive ***Full Points*** *if you set targets for water sources that make up 80% or more of your total water use.*

*You will receive **Partial Points** if you set targets for water sources that make up 50-79% of your total water use. This is to reward you for aiming to reduce your greatest sources of water withdrawal which will maximize environmental impact.*

Please Note: Full or Partial points are automatically calculated based on which sources you report having an improvement target for.

Make sure to enter a negative percentage for a reduction target (e.g. -5 for a 5% reduction), and a positive percentage for an increased usage target (e.g. 5 for a 5% increase in usage).

What is the intent of the question?

For facilities to have established at least one water use reduction target for your facility.

Sustainable companies continually work towards minimizing their environmental impacts. Now that you know how much water your facility uses (your "baseline"), and your greatest drivers of water use, you are ready to set targets to reduce your water use.

Targets can be long-term or short-term (short term = less than 3 years, long term = more than 3 years). Once set, progress should be reviewed at least quarterly to ensure adjustments are made as needed to stay on track to realize success.

Technical Guidance:

A target can use absolute or normalized metrics to drive quantifiable improvements by a set date compared to the baseline. For Higg FEM, reduction targets may be normalized to the production volume metric (selected in Site Info section: Annual volume unit) or other appropriate operational metric. A normalized target shows you when progress is real, rather than being a result of business changes such as reductions in production. An example of a normalized target is cubic metres of water used for the production of one kilogram of sellable product (m^3/kg).

The FEM requires that formal targets be set in order to be able to answer Yes to this question. When establishing formal improvement targets, be sure to do the following:

- Base the target on a formal evaluation of improvement opportunities and actions (e.g. equipment replacement or upgrades) to calculate the amount of water that can be reduced.
    - For example: Setting a target based on an evaluation of installing a counter current rinsing system is expected to result in a 5% reduction in annual municipal water consumption per square meter of fabric produced that was calculated based on a formal review of the rinse system manufacturer's specifications and the expected production requirements. OR a 10% reduction target that will be achieved by the installation of low flow water taps in all lavatories that was calculated based on the facility's baseline water use data and the reduced flow rate of the taps to be installed.
- Define the exact target quantity, expressed as a percent (e.g. reduce normalized municipal water consumption per square meter of fabric by 5%). This **must** be based on a formal evaluation as noted above.

- Determine if the target will be Absolute or Normalized to a production or operating metric.
- Define the start date (i.e., "baseline") of target
- Define the end date of the target, meaning the intended completion date of the required improvements.
- Define the appropriate measurement unit
- Establish procedures to review the target. This review should include an evaluation of the actions taken and progress on reaching the defined target. Quarterly reviews are recommended.
- Ensure the target is relevant to reducing the site's water use (e.g. focuses on the most significant water uses at the site)

Reporting Targets in Higg FEM:

Do:

- ✔ Review the target to ensure all aspects noted above are covered and that the information is accurate.
- ✔ Enter the targeted reduction or improvement as a percentage. **Make sure to enter a <u>negative percentage for a reduction target (e.g. -5 for a 5% reduction)</u>, and a <u>positive percentage for an increased usage target (e.g. 5 for a 5% increase in usage)</u>.**
- ✔ Select the appropriate target type in the FEM - Absolute or Normalized.
- ✔ Provide sufficient details on how the target will be met in the "Describe the measures planned to achieve this target:" field (e.g. Achieve a 5% reduction in normalized municipal domestic water consumption per person by installing low flow fittings and self-closing taps on all taps in facility lavatories).

Do Not:

- X Report a target that is not accurate (e.g. the data source is unknown or has not been verified)
- X Report a target that is based on insufficient data. (e.g. a reduction target that is not based on a formal evaluation of options such as equipment upgrades to meet the stated target OR actions to meet the target have not been defined.)
- X Report an estimated target if it is not supported by verifiable and accurate estimation methodology and data (e.g. engineering calculations).

How This Will Be Verified:

When verifying a facility's targets, Verifiers **<u>must</u>** review:

- All supporting evidence (e.g. calculations, water use data and baselines, new/proposed equipment specifications, etc) to verify target is based on a formal evaluation of improvement opportunities.
- Facility operations in relation to its water sources and use to ensure targets and opportunities evaluated are relevant to the site's water use.

If any inconsistencies or errors are noted, the reported information must be corrected where possible and detailed comments should be included in the Verification Data field.

Full Points

- **Documentation Required:**
  - Supporting documentation that demonstrate targets are based on a formal evaluation of reductions/improvement opportunities (e.g. calculations, water use data and baselines, new/proposed equipment specifications, etc)
  - Supporting methodology and calculations to show how the target(s) was calculated
  - List of measures/actions to be taken to achieve the target
  - Target communicated to the relevant employees and linked to the major water usage of the facility identified in Question 3.
  - Communication method may include: Meeting, bulletin board posting, newsletter release, any other form of written communication to employees which are involved with the tasks as they relate to energy usage in the facility.
    - Note: If targets are newly established, the review structure and responsibility delegation must already be in place.

- **Interview Questions to Ask:**
  - Discussion with the team responsible for managing the targets. The team must clearly explain and demonstrate how the target was determined (e.g. based on calculated reductions from evaluations of improvement opportunities) and how the target is monitored and reviewed.
  - Management actively promotes or endorses proactive water conservation
  - Management is driving continuous improvement and reviewing water reduction targets on an annual basis
  - Water consumption data is made available to relevant internal and/or external stakeholders in order to drive accountability for achieving targets

Partial Points

- Same requirements as for "Yes" answer but for sources (or one source) totalling 50-79% of water use (this data is found in the % contribution calculation in Question 1).

Example of how points are awarded for this question:

If a facility's water sources were as follows:

- 90% of incoming water used is from the municipality;
- 10% of water used onsite comes from ground water wells

To achieve full points, the facility would need to have targets that address municipal water use because this source represents more than 80% of the facility's total water withdrawal.

If targets were set for ground water only, no points would be awarded as this source makes up less than 50% of the facility's total water withdrawal.

Note that the targeted or actual water reduction amounts (i.e. quantity in m3) are not used in determining the points awarded.

The goal of this is to reward facilities for aiming to reduce the greatest sources of water withdrawal which will maximize reductions in environmental impact.

5. Does your facility have an implementation plan to improve water use?

Please upload a copy of the implementation plan.

Suggested uploads: Please upload the water use reduction plan showing specific actions designed to achieve targeted reductions in water consumption.

***Answer Yes** if you have an implementation plan in place that demonstrates you are taking action to achieve your targeted reductions.*

***Answer Partial Yes** if you have a plan but have not started on all action items.*

What is the intent of the question?

Target-setting is an important step in systematically managing water use, but your site must *take action* to make reductions in order to improve. Having an implementation plan demonstrates the action you are taking to achieve your targeted reductions. Some facilities may have an implementation plan without having set targets. Management commitment, employee awareness, and participation are needed to ensure improvement opportunities can be identified, solutions can be proposed, and changes can be made using capital or expense dollars if necessary to successfully implement proposed solutions. Often this can involve third party consultation, literature and technology research, design firms, and pilot testing among many other potential paths toward installation of solutions. All activity related to meeting targets should be part of an implementation plan to ensure organized and coordinated progress steps take place from the start.

Technical Guidance:

A business process to account for communication and approval paths for water conservation projects should be documented and formalized by the facility.

Steps for action should include:

1. Identification of water saving opportunities
2. Evaluate water saving alternatives, investment and return on investment (ROI)
3. Approve funds for chosen solution
4. Implement the solution and track reductions
5. Conduct regular review on the action plan to check progress

Water savings opportunities can be identified by individual employees, water audits, and water balances to name a few. Some simple saving alternatives are related to maintenance such as fixing leaks. Other

saving alternatives may be more complex requiring changes to process or replacement of equipment/chemicals such as:

- Process and recipe optimization
- Checking the optimum process conditions and fastness requirements
- Achieving higher right-first-time
- Use of chemicals which can improve the wash-off behavior
- Combination of processes: possibility of use of dyes and chemicals in same bath for two stages
- Possibility of use of penultimate rinse or wash water for other processes

Cost is typically of highest concern, so a facility should be able to evaluate return on investment scenarios since improvements may cost capital but will reduce the cost of water use and may also include energy and chemical savings. Once the solution is chosen the facility needs to schedule and support implementation. This can be as simple as changing valves or as complex as having a third party perform design build contracts. Ultimately this question is looking for the framework around how the facility pursues action on sustainable innovations.

Your implementation plan may include any actions that reduce water consumption. Water Saving Measures include:

- Collecting and reusing condensate
- Collecting and reusing cooling water
- Recycling and reusing water by more than 80% by employing Zero Liquid Discharge (ZLD) water treatment technologies.
- Collecting and reusing process or rinsing water (at least 30% recommend)
- Using low liquor dyeing machines
- Showing liquor ratio in each individual process recipe
- Using batch rinsing instead of continuous flow washes
- Automatic dispenser system for dyes and auxiliaries (chemical including salt)

Best Practice recommendations include:

- Dye batch scheduling to reduce equipment cleaning/rinsing (group similar colors on dye machines)
- Dye fixation ratio optimization for fewer rinse cycles less pigment in effluent
- Improved chemicals to reduce water usage
- Modern water saving equipment installed
- Flow meters monitor water use by process
- Employee awareness water conservation
- Fixing leaks (wasteful practices)

Where to go for more info:

- Clean by Design Ten Best Practices: https://apparelimpact.org/case_study/best-practices/
- Green to Wear tool: https://www.wateractionplan.com/documents/177327/558126/Green+to+Wear+2.0.pdf/21e45f62-8e99-1e1a-7c28-901efcf65073
- Stockholm International Water Institute: http://www.siwi.org/

- Implementation plan template: https://howtohigg.org/fem-landing/fem-templates/

How This Will Be Verified:

Yes

- **Documentation Required:**
  - Water reduction plan listing specific projects, target reductions, dates, and progress that covers 80% or more of total water use and/or
  - Water audit or assessment done by external party identifying water reduction opportunities and implementation dates

- **Interview Questions to Ask:**
  - Management can articulate the plan including projects being implemented, their completion status, and their associated benefits
  - Management actively promotes or endorses proactive water conservation

- **Inspection - Things to Physically Look For:**
  - Projects identified in the plan that are completed or in progress
  - Take pictures of any equipment or processes relate to the plan

Partial Yes

- Same requirements as for "Yes" answer but for sources (or one source) totalling 50-79% of total water use

6. Has your facility reduced water withdrawal for any sources, compared with your baseline? Select all water sources that have been reduced.

Source

- Select baseline year
- Indicate your facility's change in water withdrawal from this source (Quantity, Unit of Measure and Percentage change)
- Describe the strategies used to achieve this improvement

Suggested Upload: a) Evidence of normalized or absolute reduction of annual water withdrawal for at least one primary water sources (e.g. fresh surface water, groundwater etc.) that is attributable to actions taken by the site. b) Water tracking reports showing reductions of the normalized water withdrawal in the last calendar year

*You will receive **Full Points** if you made reductions in the last calendar year for water sources that make up 80% or more of your total water withdrawals.*

*You will receive **Partial Points** if you made reductions in the last calendar year for water sources that make up 50-79% of your total water withdrawals. This is to reward you for reducing your greatest sources of water withdrawal which will maximize environmental impact.*

***Select No** if you have no reductions in the last calendar year or are unable to state what your reductions are for a source as your answer option for that source.*

If you have entered a baseline for each of your sources, your reductions will be auto calculated within the tool. If you have not entered a baseline, you have the option to manually enter your reductions below.

What is the intent of the question?

Sustainability is a journey of continuous improvement. Success is the result of extensive work involved in tracking, setting targets, and performing to implementation plans to meet targets. This question provides an opportunity for facilities to demonstrate their quantifiable water conservation success achieved in the reporting year. By tracking improvement over the previous year, a facility proves through results the commitment made towards sustainability.

This is your opportunity to demonstrate impact reduction from your hard work to track, set targets and create an action plan. Use this question to share what you have accomplished in the last calendar year.

Technical Guidance:

Reductions can be absolute or normalized, however it is recommended that you show normalized reductions such as "Groundwater use was reduced by 0.17 m^3 per unit in the reporting year" This is because normalized metrics show real improvement rather than reductions from business changes such as reduced production.

The FEM requires that year over year water use reductions be demonstrated in order to be able to answer Yes to this question. When evaluating your water use improvements, be sure to do the following:

- Review the water source data and aggregated total to ensure the data and any automated calculations are accurate.
- Review the actions taken to make improvements and determine if they have resulted in measurable improvements by comparing the data with historical water use data and baselines to determine the improvement quantity. **Note**: Historical data accuracy should also be verified.
    - For example: Installation of a steam condensate recover system produced a 2% year over year reduction in normalized water consumption per meter of fabric produced. This was measured using sub meters installed in the condensate recovery system and the site's overall municipal water consumption data.

Reporting Improvements in Higg FEM:

Do:

- ✔ Review the reduction data to ensure all aspects noted above are covered and that the information is accurate.
- ✔ Enter the improvement quantity either as an absolute or normalized value. This is the year over year change in water use for the source. (e.g. previous year's consumption – reporting year consumption = the change in water use) **Make sure to enter a <u>negative number for a reduction</u> (e.g. -0.05 for a normalized reduction of 0.05 m3/piece) and a <u>positive number for an increase</u> (e.g. 0.03 for a normalized increase in recycled water use of 0.03 m3/piece)**
- ✔ Select the appropriate units for the reduction. (If the appropriate units are not available, list the units in the "Describe the strategies used to achieve this improvement:" field)
- ✔ Input the percent (%) change in the water use of the source from the previous year. **Make sure to enter a <u>negative percentage for a reduction (e.g. -5 for a 5% reduction)</u>, and a <u>positive percentage for increased usage (e.g. 5 for a 5% increase in usage)</u>.**
- ✔ Provide sufficient details in the "Describe the strategies used to achieve this improvement:" field (e.g. Normalized municipal consumption was reduced by installing a condensate recovery system).

Do Not:

- X Report improvements that are not accurate (e.g. the data source is unknown or has not been verified)
- X Report improvement that were not achieved in the FEM reporting year (e.g. historical reductions achieved more than 1 year ago should not be reported)
- X Report an improvement that is absolute and relates to a decrease in production or reduced facility operations. This is why data normalization is important.
- X Report an improvement that is based on insufficient data. (e.g. an overall reduction was achieved but this was not related to measurable or defined actions taken to achieve the reduction). This is particularly important when the improvements are marginal (e.g. less than 1-2%) and possibly attributable to measurement/ tracking errors and/or operational variability.

NOTE: This is NOT scoring the actual % of improvement because a facility may be working on the last 5-10% of water efficiency which is hard to make up. We don't want to falsely reward beginners and give fewer points to leaders.

How This Will Be Verified:

When verifying a facility's improvements, Verifiers **<u>must</u>** review:

- All supporting evidence (e.g. water use data and baselines, etc.) to verify the reported reduction quantity is accurate and attributable to measurable actions taken to reduce water use.
- The implemented changes or actions taken to achieve the reductions.

If any inconsistencies or errors are noted, the reported information must be corrected where possible and detailed comments should be included in the Verification Data field.

Full Points

- **Documentation Required:**

    - Water tracking reports and consumption records showing reductions from water sources that make up more than 80% of your total water use
    - Evidence of new equipment purchases or efficiency improvements that demonstrate that water reductions weren't made solely from a decline in production, or number of workers, or change of process.

- **Interview Questions to Ask:**
    - Discussion with the team responsible for managing water use. The team must clearly explain and demonstrate how the reduction was achieved (e.g. what actions were taken, and how this change was measured and calculated).
    - Management are proactively driving continuous improvement reviewing water consumption reduction targets on regular basis
    - Management can describe how the actions that were taken by the facility to drive improvement.

- **Inspection - Things to Physically Look For:**
    - Progress against the components of the project plan (e.g. observation of the equipment/processes installed to reduce the water withdrawal)
    - Rebates received from water efficiency projects (if applicable)
    - Awards or certificates for water efficiency achievements

Partial Points

- Same requirements as for "yes" above but for water sources (or one source) that make up 50-79% of total water use

Water use - Level 3

7. Has your facility implemented a water balance or another analysis to evaluate the traceability of water intake vs. usage (i.e. which processes) and output (i.e. to wastewater treatment plant)?

Upload the methodology for analyzing the water balance.

- How was the water balance analysis conducted

Answer Yes if your facility has fully implemented a water balance to fully understand the traceability of water intake vs. usage and outputs in the facility. A complete water balance must include the below information.

Answer Partial Yes if you have completed a partial water balance but have an action plan to complete all requirements.

Includes:

- The incoming water in the facility: amount and water sources
- The quantity of water used during the production process
- The quantity of water recycled/reused in the facility
- The quality of wastewater generated
- The wastewater generated in the facility
- The volume of water discharged after the own treatment
- The frequency which the water balance is updated

What is the intent of the question?

The creation of a full-facility water balance allows facilities to identify unaccounted-for water and provide insight into areas with efficiency improvement opportunities. A water balance, along with historical water use and cost of water, will help build a facility understand the overall water use and cost savings opportunities to the facility.

Technical Guidance:

A method that allows performance over time visibility is a water balance. A water balance allows a facility to identify water use and also potential losses through leaks and evaporation since it also looks at wastewater for a given area / tool / process. Historical water use along with cost can build trends that allow a facility to visualize performance over time from site level down to an individual process step. Limiting factors in creating a water balance are meters/estimates and logs of data, which need to be maintained. Electronic data systems can be implemented to perform this automatically and on demand, which eliminates time and effort otherwise taken by performing a water audit.

Basic water balance takes into account the facility property boundary and identifies all water coming into the facility from external sources (includes on-site wells), and all water leaving the facility from wastewater and sewer discharges. In an ideal environment there are no losses so influent – effluent = 0.

However, in the practical situation, the difference between influent and effluent can hardly be zero. Difference is possibly result from leakage, evaporation (intended or unintended), error of measurement (1-10%), etc. Difference less than 15% of total water use is normal. Nevertheless, a difference greater than 25% of total water use is usually indicative of a larger problem and sources of water loss should be identified through additional investigation. This can often uncover leaks and poor performing equipment as an example.

More advanced water balances move the boundary being looked at from a facility property to a building boundary, manufacturing process boundary, or even a tool/equipment specific boundary. What is going in the tool and coming out of the tool? This more advanced balance is limited only by metering and estimate points available for use but allows greater measurement of water use within a facility, which in turn allows greater control of those uses.

- Identify and analyze how water is used in your entire facility analysis must be carried out in the facility to evaluate/understand the traceability of water intake vs. Usage (i.e. which processes) and output (i.e. to ETP). A good methodology would be creating a water balance. A water balance can be basic or advanced depending on needs.
- The creation of a facility water balance allows facilities to identify unaccounted-for water and provide insight into areas with efficiency improvement opportunities. A water balance, along with historical water use and cost of water, will help build facilities understanding of overall water use and savings opportunities to the facility.
- A basic water balance is an equation used to describe flow of water into and out of the facility. The total metered influent would equal the total of all effluents in an ideal environment (influent = effluent). When they are not equal, there are water losses or consumed: influent – effluent = water losses. Some losses, such as evaporation, are part of normal manufacturing operations.

Here is an example of a basic water balance that demonstrates your inflow vs. outflow of water in your factory:

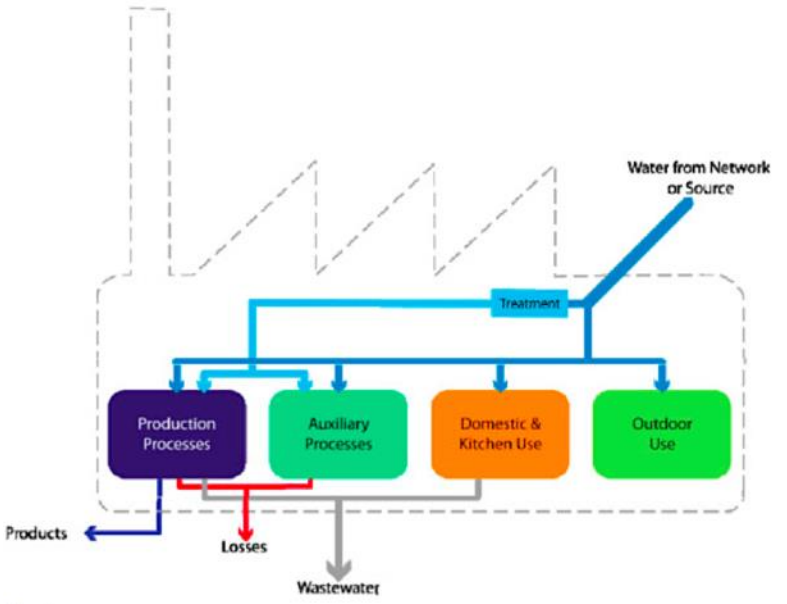


Fig. 4.
Water use in industrial plant.

Source: http://www.sciencedirect.com/science/article/pii/S2212371716300221

- Differences greater than 15% represent discrepancies beyond the error of most meters and calculation and suggest the existence of leak or other potential issue. (typically, a calculated water loss of 15%is a good balance, greater than 15% is poor balance and may need to be redone to confirm accuracy. A water loss balance of 0 or negative is usually an error.)
- A more advanced water balance where each area, building, process, or even equipment has all influents and effluents metered allow a more detailed water balance to be performed. This can show excessive water use in specific areas or buildings etc. For more targeted efficiency improvement.
- The more frequently a water balance is reviewed, the greater understanding one can have on facility water use and variability. A business needs to balance level of effort with potential value gained. Monthly water balance is recommended as it allows understanding of seasonal trends and variability in water use and typically coincides with most water use billing frequency.

Glossary:

- Water Balance: A basic water balance is an equation used to describe flow of water into and out of the facility. The total metered influent would equal to the total of all effluent and water losses.

See website for sample - http://waterplanner.gemi.org/calc-waterbalance.asp

Where to go for more info:

- GEMI "Collecting the Drops: A Water Sustainability Planner" http://waterplanner.gemi.org/index.htm
- Brewer Association " Checklist: Water Audit Data Collection Sheet" https://www.brewersassociation.org/attachments/0001/1518/Water_Water_Audit_Data_checklist.pdf

How This Will Be Verified:

Yes

- **Documentation Required:**
  - The facility has fully implemented a water balance or is able to demonstrate transparently another type of method for conducting analysis to fully understand the traceability of water intake vs. usage and outputs in the facility
  - This report should include the following information:
    - The incoming water in the facility: amount and water sources
    - The quantity of water used during the production process

        - The quantity of water recycled/reused in the facility
        - The quality of wastewater generated
        - The volume of water discharged after the own treatment
        - The frequency which the water balance is updated

- **Interview Questions to Ask:**
    - How frequently is the water balance reviewed?
    - What have you learned from the water balance?
    - Were there losses? How big? How were they explained?

- **Inspection - Things to Physically Look For:**
    - Review water pipeline drawing/diagram/flowchart, check if the factory is knowledgeable regarding their water usage (input through to output)
    - Sub metering and proper record keeping of water use

Wastewater

Wastewater can be a significant contributor of pollution and contamination for surrounding natural systems and communities if not managed, treated and discharged properly. All facilities have some form of wastewater:

- **Domestic use:** toilets, showers, kitchens, cleaning, etc.
- **Industrial use:** production, lubrication, cooling, maintenance, cleaning of production machines, etc.

Before answering assessment questions, you will first be asked to define your facility's approach to wastewater treatment and discharge. The following use and treatment methods will determine which Wastewater questions will need to be submitted for your facility:

- Industrial and/or domestic wastewater?
- Offsite treatment, onsite treatment, both onsite and offsite treatment, or Zero Liquid Discharge?

The Higg Wastewater section requires you to:

- Track quantity of wastewater generated from industrial and/or domestic operations
- Report all wastewater quality parameters that were found to not meet permits or industry standard(s), such as the ZDHC Wastewater Guideline, in the most recent quality test
    - ***New guidance for Hardgoods facilities:*** Whilst the ZDHC Wastewater Guideline are not directly applicable to hardgoods manufacturers, they are encouraged to make reference to it where appropriate or adopt equivalent industry best practice.
- Report name and quality results from the offsite wastewater treatment plant (if applicable)
- Describe backup process if regular treatment fails (if applicable)

- Ensure proper sludge disposal (if applicable)
- Report whether your site reuses and/or recycles process wastewater as process water (if applicable)

Wastewater Introduction

This section refers to water leaving a site that is not intended for reuse within your facility. Wastewater can be a significant cause of environmental pollution if not handled, stored, transferred, treated, and/or disposed of appropriately.

If your facility uses water for any aspect of its operations, there will be some form of industrial wastewater or liquid discharge. This includes all manufacturing and/or commercial activities within your facility site's footprint, such as industrial processing, lubrication, cooling, maintenance, cleaning, and domestic use (e.g., dormitories, bathrooms, showers, kitchens). If any of these exist within a facility then the site has some form of wastewater and associated discharges and effluents.

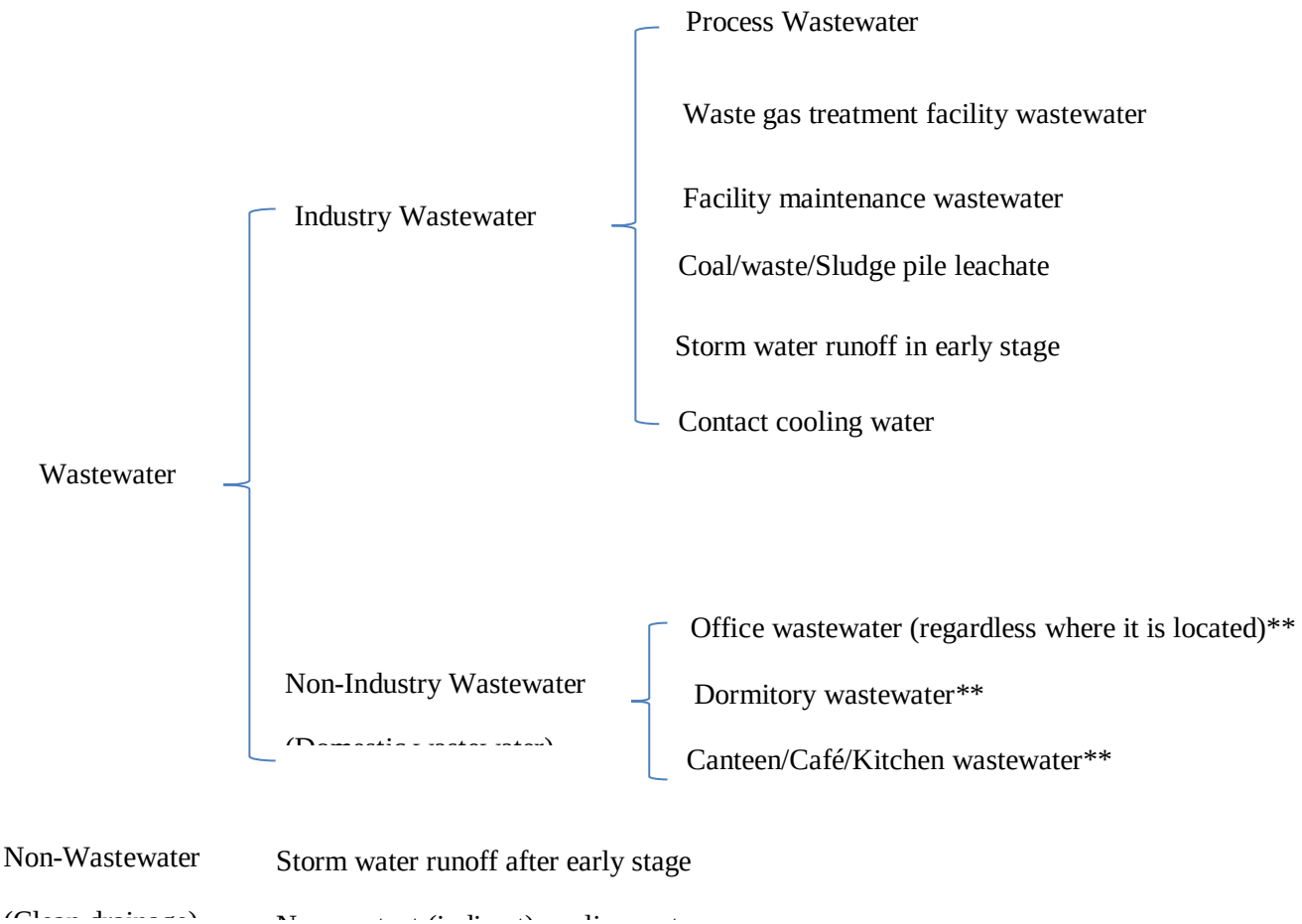
Wastewater discharge can take on many forms:

- process (or "trade") effluents arising from various stages of an industrial, agricultural, or commercial process;
- cooling wastewater or other non-contact wastewater (e.g., flushing chillers);
- blow-down (e.g., from compressors, boilers);
- sanitary / domestic wastewater (e.g., from toilets, sinks etc.).

Other types of liquid discharge include:

- storm water run-off (sometimes referred to as surface water run-off) from roofs, hard standing areas, car parks, etc.);
- firewater (water run-off from fire fighting drills)

A frequently asked question asks "how to categorize my wastewater as either industrial or domestic. Below is a diagram to help you decide, along with some notes for situations where it still may not be clear.



Decisions about the most appropriate or efficient options for managing wastewater (e.g. on-site treatment, off-site treatment options for reuse, etc.) will depend on a number of factors, including:

- Facility location
- External infrastructure availability
- Volume of wastewater generated
- Composition of wastewater
- On-site (or off-site) reuse of treated wastewater
- Cost
- Local regulatory requirements

The quantity and quality of the wastewater to be treated will influence/govern the treatment or disposal options for that wastewater stream. For example, there can be significant differences in:

- Wastewater volume and flow rate
- Total suspended solids (TSS) content
- Biological oxygen demand (BOD)

- Chemical oxygen demand (COD)
- Potential Toxicity (e.g. from chemicals, medicines/antibiotics etc.)
- Heavy metal content (e.g. antimony, arsenic, cadmium, chromium, cobalt, copper, cyanide, lead, mercury, nickel, zinc, etc.)
- pH (acidity / alkalinity)
- Color
- Temperature
- Surfactants
- Nitrogen and phosphorous content
- Oil and grease, amongst other

New Guidance for Hardgoods facilities:

Hardgoods facilities may have several specific contaminants that are covered in the groups mentioned above.

A few examples are:

- Organic solvents (measured by BOD, COD, or specific wastewater parameter)
- Degreasing agents (measured by BOD, COD, or specific wastewater parameter)
- Heavy metals from the metal treatment processes (heavy metals, pH, temperature.)

On-site wastewater treatment is the wastewater treatment plant used and managed by the factory only. After treated by the on-site treatment, the wastewater can meet with relevant limits and be directly discharged into the environment, or into an Off-site 3rd party treatment plant (known as partial onsite treatment).

Off-site wastewater treatment is a third party enterprise or organization who provides wastewater treatment service for more than two pollutant discharging entities by collecting their wastewater, and the wastewater discharged directly to the environment should meet with the relevant limits. The off-site treatment can be public wastewater treatment facility, regional wastewater treatment facility (i.e. industrial park, industry area, etc.)

Zero-liquid discharge (ZLD) is a treatment process that design for no water leaves a facility in liquid form. At a facility with on-site ZLD treatment system, almost all wastewater is treated and recovered such that the only water discharged from the facility exists by evaporation or as moisture in the sludge from treatment plant operations. (Source: https://www.roadmaptozero.com/output - see definitions section of ZDHC Wastewater Guidelines). A facility is not considered to have a ZLD treatment system if there is a liquid discharge.

Reference to Industry Standards

One of our partner organizations, the Zero Discharge of Hazardous Chemicals (ZDHC) group, has developed a Wastewater Guideline for our industry to use as a guideline to manage wastewater and drive

the industry toward the goal of zero discharge of hazardous chemicals. In Higg FEM 3.0 you will find mention of industry standards, and the ZDHC Wastewater Guideline is one of such standards.

New guidance for Hardgoods facilities: Whilst the ZDHC Wastewater Guideline are not directly applicable to hardgoods manufacturers, they are encouraged to make reference to it where appropriate or adopt equivalent industry best practice.

Applicability Questions

Does your facility generate industrial wastewater?

Review the definition of industrial wastewater in the introductory paragraphs above.

Does your facility have Zero Liquid Discharge?

Review the definition of ZLD in the introductory paragraphs above.

Do you treat industrial and domestic wastewater together?

Review the definition for industrial and domestic wastewater in the introductory paragraphs above.

Where is your industrial/domestic/combined wastewater treated?

Review the definitions of on-site and off-site wastewater treatment in the introductory paragraphs above.

Wastewater – Level 1

1. Does your facility track its wastewater volume? (Industrial/Domestic/Combined)

- What was the total quantity of wastewater discharged from your facility during this reporting year?
- Which method was used to track wastewater volume?
- What was the frequency of measurement?
- How many wastewater discharge points do you have?
- Have you labelled all wastewater discharge points?
- Do you monitor all identified wastewater discharge points?
- What was the final discharge point for your facility's wastewater?
- Provide any additional comments

Suggested Upload: Annual wastewater discharge monitoring record (quantity)

Wastewater tracking should include water that is either discharged out from the facility, reclaimed/recycled or reused at your site

Industrial: include all manufacturing and/or commercial activities within your facility site such as industrial processing, lubrication, maintenance etc.

Domestic: include all domestic wastewater generation including wastewater/effluent from dormitories, bathrooms, showers, and kitchens, etc.

What is the intent of the question?

The intent of this question is to ensure that the site knows how much wastewater is being produced and where it is discharged to. This information can be derived from the facility's water balance. By answering this question, facilities can demonstrate how they monitor and manage wastewater volume. Knowing your volume is an important first step to making decisions on appropriate treatment options.

Wastewater tracking allows complete visibility into daily operations of a facility and what operations impact wastewater volumes. Knowing your wastewater volume is directly linked to ecological impact and operational costs.

Technical Guidance:

Wastewater tracking should include both domestic and industrial wastewater where applicable and include water that is either discharged, reclaimed/recycled or reused at your site, that is generated from all manufacturing and/or commercial activities within your facility.

When tracking wastewater, it's recommended to start by:

- Mapping out facility areas and processes to identify where wastewater is generated and discharged.
- Establish procedures to collect and track wastewater data:
    - Install on-site meters or use metered invoices from off-site treatment facilities.
    - If estimation techniques are used to determine the amount of wastewater generated, the calculation methodology should be clearly defined and be supported by verifiable data.
- Record tracking data (e.g. daily, weekly, monthly records) in a format that is easy to review [e.g. spreadsheet (e.g. Microsoft Excel) or similar data analytics program that allows export of data in a human readable format (e.g. Excel, csv)] and maintain relevant supporting evidence for review during verification.

Tracking Wastewater Volume

The most accurate way to track wastewater volume is using a metering system. Mechanical meters and ultrasonic meters are widely used to track wastewater volume. Facility should install meters at all

wastewater discharge points before discharging to the environment. If the facility has its own effluent treatment plant (ETP), the meter should be installed at the outlet of the wastewater treatment facility. Facility needs to gather and record data from the meters regularly in order to track accurate wastewater discharge volume. The method applies to both domestic and industrial wastewater.

If facility does not have meters to track its wastewater discharge volume, an estimation method can be used which may include:

- If the facility has accurate data (meters or invoices) on incoming water volume for production process and domestic use, the facility may estimate wastewater discharge volume using the incoming water volume. The facility may need to account for water use or loss for things like cooling tower evaporation loss or irrigation when estimating wastewater volume.
- Use of any official environmental reports that contain data on wastewater discharge volume (e.g. Environmental Impact Assessment reports, Environmental permit applications, Government's compliance report or offsite wastewater treatment invoices). **Note:** In some cases, wastewater treatment invoices from offsite wastewater treatment facility may not provide the treated wastewater volume. Instead, the invoice would indicate the total treatment fee (e.g. 100 USD) with unit treatment cost ($1 USD/$m^3$). In this case, facility may need to manually calculate and record wastewater volume with the total treatment fee and unit cost (e.g. total treatment fee ÷ unit treatment cost = wastewater volume).
- If the facility has no documentation which indicates the amount of incoming water, then they can estimate industrial wastewater volume based on different production processes and equipment specific consumption. For example, in a dyeing mill, the dyeing recipe may have water needed for each dyeing batch, or the dyeing machine may also have specifications on how much water is required for each batch. Facility would need to collect production volume of each dyeing recipe and production volume of each dyeing machine. Then the facility would be able to manually calculate using production water use of each recipe per machine and water needed of each recipe/machine, multiply by respective production volume. Lastly, sum up all production water use. This estimated production water volume could be considered as an estimation for the amount of industrial wastewater discharged. Facilities may also need to account for any loss due to evaporation during production processes.

A tool available to help calculate water use from different sources can be found here: http://waterplanner.gemi.org/calc-waterbalance.asp

Domestic Wastewater Tracking:

Tracking flow rate and discharge volume of domestic wastewater with on-site meters is not a common practice but it is highly encouraged to track the volume and quantity of the domestic wastewater. The behavior we are looking for with asking this is to show that a facility understands how much water is being wasted/ leaving their facility and they are applying that volume to an assessment of water use in your facility and the impact it creates to the environment if not properly treated.

If domestic wastewater discharge metering data or actual discharge data is not available, factory could consider estimating wastewater discharge based on the sites total water use, the estimated amount used for domestic purposes and then minus an estimated amount due to losses (e.g. evaporation). For example, a

site with domestic only wastewater who used 150m3 of municipal water per month estimates that 10% of the water is lost due to evaporation and leaks would report 135m3 of wastewater discharged (150m3 – 10%).

Water use in a facility can also be estimated by number of persons, number and types of facilities, taps, toilets, shower, irrigation etc based on any available local/regional data or manufacturer's specifications (e.g. rated litres per flush for toilet fixtures).

Note: If an estimation technique is used, this should be fully documented, applied consistently and based on reasonable estimation factors that are derived from relevant sources (e.g. manufacturer's specifications, regional data on sewerage volume per person/day, etc.)

Reporting wastewater data in the FEM:

Before reporting wastewater data in the FEM, data quality checks should be performed to ensure that the data AND the processes used to collect and record the data are effective at producing accurate data.

Do:

- ✔ Review source data (e.g. meter logs, invoices, etc) against aggregated totals to ensure it is accurate.
- ✔ Compare the current year with historical data. Any significant changes (e.g. an increase or decrease of over 10%) should be attributable to known changes. If not, further investigation may be warranted.
- ✔ Ensure the most recent and updated versions of data tracking spreadsheets are being used and that all automated calculations/formulas are correct.
- ✔ Ensure the proper units are reported and verify any unit conversions from source data to reported data. **Note:** The FEM requires that wastewater data be entered in cubic meters (m3).
- ✔ Report the data source (e.g. meters, invoice, estimate) and frequency of measurement (e.g. daily, monthly, etc).
- ✔ Report the final discharge point (e.g. Offsite Wastewater Treatment Plant). **Note:** This should be where the wastewater is discharged to after it leaves the facility.
- ✔ Review any assumption or estimation methodology/calculations to ensure accuracy.
- ✔ Add notes in the "Provide any additional comments" field to describe any data assumptions, estimation methodology, or other relevant comments on the reported quantity.

Do Not:

- X Report data that is not accurate (e.g. the data source is unknown or has not been verified).
- X Report estimated data if it is not supported by verifiable and reasonably accurate estimation methodology and data (e.g. engineering calculations).

How This Will Be Verified:

When verifying a facility's wastewater data, Verifiers **must** review all aspects of the facility's wastewater tracking program that could produce inaccuracies including:

- The initial data collection processes and data sources (e.g., invoices, on-site meters, metering logs, etc.); and
- The process and tools used to aggregate the data (e.g. spreadsheet calculations, unit conversions, etc.)

If any inconsistencies or errors are noted, the reported information must be corrected where possible and detailed comments should be included in the Verification Data field.

Yes

- **Documentation Required:**
  - Wastewater discharge records (e.g. monthly bills and annual discharge records; metering records compiled in a spreadsheet (e.g. Excel) is ok as long as the metering records are available for review as well) whose totals match the reported data to all questions answered.
  - Meter calibration records where applicable (e.g. as per manufacturer's specifications).
  - Estimation methodology documented where applicable
  - All wastewater sources at the facility are tracked in full. This means that all sources listed in the Level 1 table have complete answers in all columns that are accurate.
- **Interview Questions to Ask:**
  - Key Employees are aware of the facility's wastewater data tracking program and how data quality is maintained.
- **Inspection - Things to Physically Look For:**
  - Is wastewater/effluent directed to a wastewater/effluent treatment plant or does it undergo treatment prior to discharge?
  - Are surface water/storm water drains free from contamination and blockages?
  - Are procedures established to manage wastewater/wastewater discharges being followed? (e.g. management of wastewater, activities etc.)
  - Are spills or leaks to the environment observed?
  - Are there boiler blow down and other membrane cleaning activities where water is collected and tracked as well?
  - Are the flowmeters in place working (in case the facility has selected the "meters" method), calibrated and accessible?
  - A picture of flowmeters as evidence has to be taken during the site inspection
  - In the case of estimated data, please verify the water balance is based on available flow meters, equalization tank volumes, flow rate timing, etc.
  - Verify invoices for incoming water and discharge estimation

(NEW) Does your facility have a mechanism to prevent wastewater from mixing with stormwater in the storm drain systems?

Suggested Upload: Process Flow Diagram and Utility Map that show where pipes and sewers and how they are connected.

This question is not scored in both 2020 Higg FEM and 2021 Higg FEM reporting year. *Score may be applied in future reporting years.*

What is the intent of the question?

It is considered good to separate stormwater from wastewater for many reasons including greater control of volume surges and pollutant loading on wastewater treatment systems as well as prevention of overflows that release sewage and/or untreated industrial wastewaters to the environment. Facilities should have separation of these two systems through the facility, but local regulations may stipulate what must be done in terms of treatment prior to discharge, which can include combining stormwater with facility wastewater in a treatment system.

Technical Guidance:

Stormwater (e.g. rain water) and wastewater should be collected, treated and discharged separately, so as to reduce the impact of stormwater on wastewater treatment plant and ensure treatment efficacy. The purpose of having this mechanism is to ensure stormwater and wastewater are collected and discharged accordingly, and to ensure the system is functional.

How to maintain the mechanism –

1) Code and label all the stormwater and wastewater collection points and drainage systems, and assign designated responsible department or person for regular management

2) Develop a stormwater and wastewater drainage map with the information of location, uses, code and responsible person. Post the drainage map in a location where it is accessible for most of the employees. **Note:** The facility's wastewater collection and stormwater drainage system may be included on facility structural engineering/utility drawings.

3) Provide training to all responsible persons on the different uses of each collection system.

4) Regularly check (e.g. daily, monthly, etc) on all stormwater and wastewater collection points and drainage systems to ensure there is no mixing or damage to the systems.

How This Will Be Verified:

Yes

- **Documentation Required:**
  - Stormwater and wastewater drainage map(s) that shows the two collection and drainage systems are separate
  - Documented policies or procedures, and regular monitoring records if available
- **Interview Questions to Ask:**
  - Interview employees who manage various wastewater/stormwater related infrastructure that has potential to cross contaminate or leak including pipes, chemical tanks, and other systems.
  - Determine if employees perform inspections walks, document findings, and resolution of findings.
- **Inspection – Things to Physically Look For:**
  - Obtain the Utility map and Process Flow Diagram, walk a few lines on the map to inspect for accuracy.
  - Review permit or other regulatory information around combined sewers and/or separation of stormwater and any stormwater treatment prior to discharge regulations.
  - Check and observe the stormwater well if there is anything unusual, i.e. if it is not raining but there is wastewater flowing by the well, or water in the rainwater well is with suspicious color (white, black, green, etc.).

2. Do you have the name and contact information of the offsite wastewater treatment plant?

- Name:
- Address:
- Ownership:
- Do you have a copy of the contract with the wastewater treatment plant?
- Please upload documentation if available

Upload: a) Signed contract with the off-site wastewater treatment plant; b) A permit and contractual agreement for your facility to show that they are allowed to discharge into the off-site wastewater treatment plant

This information is important because environmental contamination from improper treatment must be addressed regardless of where the problem originates. This information can help your factory, the community, and local businesses prevent or cleanup accidental environmental contamination in the case of a failure.

*You will receive **Full Points** if you know information of your off-site wastewater treatment plant and are able to upload a contract. Please note that a contract will be required during verification for all factories in China.*

What is the intent of the question?

The intent of this question is for the facility to have a relationship and be able to communicate with the wastewater treatment plant. This also enables troubleshooting and supports continuous improvement.

This information is important because environmental contamination from treatment problems must be addressed regardless of where the problem originates. This information can help the community and businesses prevent or cleanup accidental environmental contamination in the case of a failure.

How This Will Be Verified:

Yes

- **Documentation Required - already checked during permit section:**
  - Signed contract with the off-site wastewater treatment plant
  - A permit for your facility to show that you are allowed to discharge into the off-site wastewater treatment plant
- **Interview Questions to Ask:**
  - Check for basic details of the off-site wastewater treatment plant like layout, treatment type (primary, secondary, tertiary), etc.
  - Does management have a process in place to renew the contract with the 3rd party off site treatment plant?

3. Does your facility have a back-up plan if there is an emergency situation related to wastewater?

Does your facility have a process to contact appropriate government authorities or agencies as legally required in case of accidental discharge?

Does your facility provide training to all relevant employees regarding the backup plan?

- How many employees were trained?
- How frequently do you train your employees?

Select all strategies included in your facility's back-up plan for wastewater

- Emergency Production Shutdown
- Holding Tank
- What is the size of your facility’s holding tank?
- Secondary Treatment (biological and advanced chemical treatment—excluding coagulation, flocculation, neutralization, clarification/sedimentation process)

- Discharge to Offsite Water Treatment Plant
- Other Backup Process

What is your facility's wastewater treatment handling peak / max average capacity?

Upload: Documented emergency backup process that is sufficient to treat the average daily amount of wastewater discharged by the facility site.

It is critical that your facility has a backup plan in the event of a wastewater treatment failure in order to prevent untreated effluent from being discharged to the local environment. If you do not have a backup process that can handle your average daily capacity, you cannot score points or complete Level 1.

What is the intent of the question?

This question promotes a contingency plan in the event the treatment process fails to prevent untreated effluent from being discharged. If you do not have a backup process in place, you cannot complete Level 1 as this is critical to preventing accidental environmental contamination in the case of a failure.

This is critical to prevent accidental environmental contamination in the case of a failure of wastewater treatment plant.

Technical Guidance:

The facility needs to set up and document a contingency plan in response to emergencies. It is important to know the wastewater treatment handling capacity per day and the size of the holding tank (if the facility has a holding tank). This information should be compared with wastewater quantities to determine whether you can hold the wastewater during an emergency. Holding tanks should not be considered as an exclusive backup measure.

The type of responses could be:

1. Facility has an additional holding tank which can hold the quantity of wastewater equal to one day's production as a minimum. (This is the case if the facility is not doing any treatment but directly sending the waste water to CETP as a continuous discharge through a pipeline.)
2. In cases if the facility is doing pre-treatment in-house in order to meet the contractual requirements with the CETP on the quality of the wastewater discharged, then they should have a collection tank followed by homogenization or neutralization etc. In those cases, the facility should have a larger collection tank with capacity to hold more than the volume of the wastewater generated currently, and it should additionally hold at least 1 day's production volume in addition to the existing volume or residence time.

3. The facility will shut down the production until the situation is back to normal. However, this response should be backed up by some kind of documented emergency response process rather than stating simply that they will stop production.

Without having a documented emergency response plan and having this understood across all teams, it is not possible to move past level 1 because the main intention of this practice is that no wastewater should is bypassed or discharged to any body of water without proper treatment.

How This Will Be Verified:

Yes

- **Documentation Required:**
  - Documented backup process that is sufficient to treat the average daily amount of wastewater discharged by the facility site. This should outline either the emergency production shutdown procedures or/and the type of treatment, availability of treatment, procedures for putting back up treatment into operation, responsible person or people for delivering these operations, etc.
  - Any schematics describing the backup treatment options and capacity
- **Interview Questions to Ask:**
  - The key employee responsible for the wastewater treatment can articulate what the back-up plan is and demonstrate how and when it would be put into effect
  - Has this back up system been needed? When and why?
  - If any emergency event happened before, when and why was the back-up system needed? Was the backup plan sufficient to manage the emergency situation?

- **Inspection - Things to Physically Look For:**
  - Request the documented back up plan and verify if the area is preset as per the plan
  - Take a picture of the plan, equipment (if on-site), and/or contract (if off-site)

(NEW) Can you confirm that there is no leaking or bypassing of wastewater?

This question is not scored in both 2020 Higg FEM and 2021 Higg FEM reporting year. *Score may be applied in future reporting years.*

What is the intent of the question?

Factories should be monitoring wastewater discharge and reduce the pollutants of wastewater to levels compliant with applicable laws and regulations.

The intent is to assess a factories knowledge of their process flow diagram in terms of the piping and other conveyance systems used for distributing water and directing wastewater flows to the correct

treatment or discharge locations. A facility should show environmental management systems around inspections to continue to confirm there are no illicit discharges.

Technical Guidance:

Identify and characterize all wastewater streams, and maintain an inventory of process wastewater streams and ensure they are directed to appropriate treatment before being discharged to the environment.

Install and maintain appropriately sized wastewater treatment systems that reduce the pollutant of wastewater to levels compliant with applicable laws and regulations.

In the absence of an on-site wastewater treatment facility, discharge wastewater into the off-site wastewater treatment facility (i.e. industrial park wastewater treatment facility, or municipal wastewater treatment facility) as regulated. Required discharge permits must be updated periodically and filed with the proper regulatory agency.

Prepare for emergencies and implement emergency response actions in case the on-site wastewater treatment plant exceeds its capacity or if it malfunctions.

Provide training for all employees who work directly with wastewater.

How This Will Be Verified:

Yes

- **Documentation Required:**
    - Review documentation to record what inspections are done, where they are done, and the frequency to monitor for leaks and bypasses.
    - Compare operation and monitoring records of wastewater treatment plant.
        - E.g. Influent/Effluent records, online monitoring system records and other system records to check if the difference between amount of wastewater generated and discharged is acceptable.
- **Interview Questions to Ask:**
    - Interview employees who manage various outdoor manufacturing infrastructure that has potential to leak including pipes, chemical tanks, and other systems.
    - Determine if employees perform inspection walks, document findings, and resolution of findings.

    - Interview employees in production workshop to check if they are aware of wastewater collection and treatment.
    - Interview employees in wastewater treatment plant and labs to understand daily operation practice, training and awareness.
- **Inspection – Things to Physically Look For:**
    - Obtain the Utility map and Process Flow Diagram, walk a few lines on the map to inspect for accuracy.
    - Walk the exterior around key systems and buildings to look for illicit discharges.
    - Check the wastewater and rainwater discharge point if there is wastewater leaking or bypassing.
    - Check the wastewater treatment plant if each part is functional and well-maintained.

4. Is hazardous sludge (chemical / industrial) disposed of properly?

Does your facility provide training to all relevant employees regarding the disposal method of hazardous sludge?

- How many employees were trained?
- How frequently do you train your employees?

How is your hazardous sludge disposed of?

- Hazardous Waste Treatment
- Incinerated controlled conditions
- Landfilled
- Open burning
- Fuel Blended
- Composted
- Fertilizer (applied to land)

Upload: a) Sludge analysis or test results from last 12 months (if non-hazardous is selected); b) permits or manifests for proper disposal or land application.

If you have hazardous sludge it must be disposed of through a licensed hazardous waste contractor or through incineration under properly controlled conditions.

What is the intent of the question?

You should know if there are any chemical or industrial hazards present in your operations, and, if there are, you need to make sure you do not dispose of these hazards improperly.

Hazardous sludge needs to be disposed of properly to avoid contaminating the environment. If you put hazardous sludge onto land or burn it openly, you can release serious hazards into the

environment.

Technical Guidance:

Sludge should be properly disposed through authorized agent or facility should be licensed by local pollution board to decompose it in premises. Chemicals should be handled and disposed of in accordance with MSDS section 13. In cases where the local government has classified the sludge under non-hazardous waste then the test report of sludge analysis may not be necessary. However, landfilling and open burning activity in-house may not be appropriate unless it is clearly identified through sludge analysis that the sludge is non-hazardous in nature.

How This Will Be Verified:

Yes

- **Documentation Required:**
  - An inventory of the amounts and types (non-hazardous and hazardous) sludge generated
  - Lab analyses showing the non-hazardous and hazardous (if applicable) components for the various types of sludge
  - Documentation showing methods for disposing each type of sludge
  - For off-site disposal, invoices or delivery records confirming that the types of disposal selected here reflect what's being used in practice
  - If disposal is done via landfilling, open burning, compost, fuel blended, or as fertilizer applied to land, the sludge must be analyzed and documented as non-hazardous and suitable for the particular disposal method
  - Permits, if applicable for a particular disposal method
- **Interview Questions to Ask:**
  - Is there an in-depth and up-to-date knowledge of the sludge components? How is sludge regularly analyzed to ensure it is properly disposed of?
  - Is management and responsible employees aware of proper disposal methods for each type of sludge?
- **Inspection - Things to Physically Look For:**
  - Site or area and process for disposing of sludge if it is one on-site
  - Please take photographs

5. Is non-hazardous sludge disposed of properly? (Domestic wastewater only)

Suggested Upload: Sludge analysis or test results

Non-hazardous sludge can be disposed of through any method though you must provide documented evidence that your facility's sludge is not hazardous.

Does your facility provide training to all relevant employees regarding the disposal method of non-hazardous sludge?

- How many employees were trained?
- How frequently do you train your employees?

How is your non-hazardous sludge disposed of?

- Hazardous Waste Treatment
- Incinerated controlled conditions
- Landfilled
- Open burning
- Fuel Blended
- Composted
- Fertilizer (applied to land)

Suggested Upload: a) Sludge analysis or test results from last 12 months (if non-hazardous is selected); b) permits or manifests for proper disposal or land application.

Non-hazardous sludge can be disposed of through any method though you must provide documented evidence that your facility's sludge is not hazardous.

What is the intent of the question?

You should know if there are any chemical or industrial hazards present in your operations, and, if there are, you need to make sure you do not dispose of these hazards improperly.

Technical Guidance:

Sludge should be properly disposed through authorized agent or facility should be licensed by local pollution board to decompose it in premises.

How This Will Be Verified:

Yes

- **Documentation Required:**
    - An inventory of the amounts and types (non-hazardous and hazardous) sludge generated
    - Lab analyses showing the non-hazardous and hazardous (if applicable) components for the various types of sludge
    - Documentation showing methods for disposing each type of sludge
    - For off-site disposal, invoices or delivery records confirming that the types of disposal selected here reflect what's being used in practice
    - If disposal is done via landfilling, open burning, compost, fuel blended, or as fertilizer applied to land, the sludge must be analyzed and documented as non-hazardous and suitable for the particular disposal method.
    - Permits, if applicable for a particular disposal method
- **Interview Questions to Ask:**
    - Is there an in-depth and up-to-date knowledge of the sludge components? How is sludge regularly analyzed to ensure it is properly disposed of?
    - Is management and responsible employees aware of proper disposal methods for each type of sludge
- **Inspection - Things to Physically Look For:**
    - Site or area and process for disposing of sludge if it is one on-site
    - Please take photographs

6. Does your facility treat wastewater using Septic before it is discharged?

Suggested Upload: a) Documentation that your facility treats septic wastewater before it is discharged; b) Plan to upgrade your septic tank to a more modern wastewater treatment approach.

Does your facility provide training to all relevant employees regarding the disposal method of septic waste?

- How many employees were trained?
- How frequently do you train your employees?

How does your site unload your septic tank once full?

- Describe where it is discharged
- Describe how it is treated after discharge
- Please upload documentation if available

Do you have a plan to upgrade your septic tank to a more modern wastewater treatment approach?

Septic wastewater needs to be treated and disposed of properly to avoid contaminating the environment.

Your facility should begin planning to upgrade your septic system to a more modern form of treatment in order to properly contain pollutants long-term. You will be awarded partial points if you are properly treating and disposing of septic wastewater, but do not yet have a plan to upgrade to a modern treatment system.

What is the intent of the question?

You should know if there are any chemical or industrial hazards present in your operations, and, if there are, you need to make sure you do dispose of these hazards properly.

Septic wastewater needs to be disposed of properly to avoid contaminating the environment.

If you do not treat or discharge your septic wastewater properly, you will release hazards into the environment.

Technical Guidance:

Domestic water uses such as washing detergent, floor cleaning chemicals and spot cleaners, other janitorial chemicals may lead to discharge of few regulated chemicals and high amounts of coliform. A facility should understand, monitor and account for the associated risk of discharging septic wastewater by the following activities:

1. Establish a process to ensure that septic wastewater is treated before it is discharged.
2. Appoint a responsible person to manage and monitor the septic wastewater
3. Contract with approved third party to unload the septic tank contents and keep the disposal record/ invoices

How This Will Be Verified:

Full Points

- **Documentation Required:**
    - Documentation (process, schematics of equipment, procedures, responsible persons, etc.) that site treats septic wastewater before it is discharged
    - Documentation describing how the you unload the septic tank and dispose of the waste once full
    - Any permits if required
    - Disposal records/invoices for septic tank contents removal if applicable
    - A time-bound plan that describes the details and milestones for how you are or will be upgrading your septic tank to a more modern wastewater treatment approach

- **Interview Questions to Ask:**
    - Management and responsible employees can describe what specific waste water gets treated in the septic system
    - Management and responsible employees can describe how the site unloads the septic tank once it is full and can tell you roughly how often this procedure is done.
    - Management and responsible employees can describe where septic tank discharge is treated and/or disposed of once removed from the tank
    - Management can speak to plan to their plans upgrade to a more modern wastewater treatment approach and provide their timeframe for doing this

- **Inspection - Things to Physically Look For:**
    - Take pictures of the septic tank area and sewage pipelines
    - Do the pictures match their plans provided
    - Is there evidence of improper disposal of septic waste or overburdened septic systems? If yes, please make comments and take photos.

Partial Points

- Same as what is required for "yes" except for plans about upgrading from a septic system

Wastewater – Level 2

7. Are you reporting against a wastewater standard?

· **Are you reporting against this standard?**

- ZDHC Wastewater Guideline
- BSR
- IPE
- Customer/Brand
- If other, please describe (excluding local law and regulations)

· **Have you tested and met all parameters specified in the standard?**

· **Are your parameter results available on the standard's platform? (*e.g. ZDHC Gateway or IPE database*)**

If ZDHC Wastewater Guideline was selected:

· **Does your test result also show no detection of parameters in Table 2A-N Chemical Groups?**

Upload test results

Complete parameters tables if detected

What is the intent of the question?

This question is intended to demonstrate a facility's current performance with wastewater quality through wastewater standards tracking and reporting. The standards referred here are industry standards and the intention is to improve beyond compliance against local law and regulations.

The quality of the water discharged by your facility is directly linked to ecological impact and operational costs. It also is directly related to compliance at a facility along with potential disclosure requirements for industry organization transparency.

What is the optional ZDHC Wastewater Guideline?

The Zero Discharge of Hazardous Chemicals (ZDHC) Wastewater Guideline is an OPTIONAL guideline that some brands are requiring of their customers. If you have not heard of ZDHC from your customers, please disregard this reference - you ***will not be penalized*** if you do not answer the last column in the parameters table.

The Zero Discharge of Hazardous Chemicals (ZDHC) Programme is a collaboration of brands, value chain affiliates and associates that releases a ZDHC Wastewater Guideline, which is a unified expectation on wastewater quality for the entire textile and footwear industry. If you would like more information on ZDHC, you may peruse their website and guideline here: https://www.roadmaptozero.com/about

Technical Guidance:

1) Report all parameters for which you have found a detection / are over the limit from the test reports generated from 3rd party approved laboratories during previous year or inhouse monitoring reports. We only are seeking to collect information on wastewater problems in order to prioritize action rather than incentivize data reporting.

- Select standard used
- **Enter results for parameters not met** (type number and select unit).
- **Enter limit required by the permit or standard** (e.g., limits listed in ZDHC Wastewater Guideline at Foundational level)
- If you choose ZDHC Wastewater Standard, you will be asked an additional set of UNSCORED questions about whether test parameters listed in the ZDHC Wastewater Guidelines have been detected in your site's wastewater test report. Note that incoming water testing is also recommended in case of detection of any detox parameter.

How This Will Be Verified:

Yes

- **Documentation Required:**
  - Wastewater test report showing the parameters tracked by the facility (Treated effluent and untreated effluent) should be available. For the ZDHC Wastewater guidance, wastewater testing should be conducted according to the frequency, test parameters, limits, sampling and testing methods. It is recommended to upload the test reports on the ZDHC Gateway – Wastewater Module.
  - Documentation showing that the parameters are recorded and analyzed
  - Sample procedures document
- **Interview Questions to Ask:**
  - Are key employees aware of the wastewater discharge points in the facility?
  - Is there a mechanism for employees to identify to management when wastewater is not properly being discharged?
  - Are key employees who deal with the sample procedures properly trained? How often?

- **Inspection - Things to Physically Look For:**
  - Are sumps/pits receiving wastewater in good condition and of sound integrity?
  - Are surface water/storm water drains free from contamination and blockages?
  - Are procedures established to manage wastewater/wastewater discharges are being followed? (e.g. management of wastewater, activities etc.)
  - Please provide pictures for each treatment step of the ETP

8. Have you requested wastewater quality test results from the offsite wastewater treatment plant?

Upload: a) Documentation of your request to offsite wastewater treatment plant for wastewater quality records; b) Off site wastewater treatment plant quality records (if provided)

It is important to be aware of any wastewater quality violations at the wastewater treatment plant in the event that your facility is contributing to environmental contamination. Although your facility does not have authority over the offsite wastewater treatment plant, please provide evidence of your request for wastewater quality results, even if quality results were not provided. This question is intended to provide you with more information in case you are able to take any action to assist the wastewater treatment plan in proper treatment and discharge to the environment.

What is the intent of the question?

The intent of this question is to create connection and accountability between the facility and the offsite wastewater treatment plant that is contracted to treat wastewater. The goal is for the facility to be as proactive as possible to confirm their wastewater is compliant and are not responsible for any violations towards environment. Regardless of the response outcome from the off-site wastewater treatment plant, the proactive effort from the facility is what is being asked in this question.

This information is useful to help understand your situation and identify risk factors and/or opportunities for improvement.

By requesting the wastewater quality test results from the offsite treatment plant, a facility ensures that treated wastewater often discharged from the offsite facility to the environment is compliant in addition to their own facility discharge compliance related to the permit between the offsite treatment plant and the facility.

Although your facility is not in control of offsite 3rd party treatment, it is important to be aware of any non-compliances and to what extent the facility may be contributing to non-compliances. In addition, if your site is contributing to the non-compliance, the question checks to ensure your facility has a plan to help resolve the issue it is causing. This was included in Level 2 rather than Level 1 as a site may not have direct control over offsite treatment or visibility to it.

Technical Guidance:

Your facility will get credit for this question as long as you can show evidence that you have reached out to the offsite wastewater treatment plant to obtain wastewater quality reports. You will not be penalized if the offsite wastewater party treatment plant refused, as long as you can provide proof of request and denial.

NOTE: If the 3rd party wastewater treatment plant posts their effluent online, the factory can answer "Yes" to this question.

Sometimes the offsite effluent treatment plant may set a standard for facility to discharge wastewater and charge facility more for any exceeding parameters. If this applies to you, please explain the situation and provide examples if relevant to capturing accurate assessment from your facility. A soft limit is not a permit limit if a surcharge is involved. They would still be compliant to their permit.

If you requested results and found that the 3rd party wastewater treatment plant is not in compliance with limits, please describe whether your facility has contributed to the non-compliance. If yes, how has your facility resolved it? If you requested test results, but did not receive them, please describe what happened.

How This Will Be Verified:

Yes

- **Documentation Required:**
  - Recent documentation of your request to receive off-site wastewater treatment plant for wastewater quality records and/or
  - Recent (within the year, but ideally more frequently) off-site wastewater treatment plant quality records (if provided)

- **Interview Questions to Ask:**
  - Key personnel responsible for the wastewater quality explains the results of the wastewater quality test results collected from the common effluent treatment plant
- **Inspection - Things to Physically Look For:**
  - Do the sampling results reflect the facility's operational conditions?

Wastewater – Level 3

9. Does your facility reuse and/or recycle process wastewater as process water (closed loop)?

- Enter the percentage of wastewater treated and recycled back into your production processes

Suggested Upload: a) Records demonstrating closed-loop recycling (process water to process water) and/or b) List of water reduction achievement(s) according to the location where water is captured for recycling OR the location where recycled water is used.

***Answer Yes** if you have wastewater treatment in place to reuse and/or recycle your production wastewater back into production processes. The reused and/or recycled water must be used in production processes - other uses like irrigation, toilets are excluded. The actual treatment technologies may include chemical or biological such as membrane filtration or Zero Liquid Discharge.*

Note on scoring:

- Reuse/Recycle 50% or more = full points
- No or unknown = zero points

What is the intent of the question?

This question is focused on incentivizing the innovative technology needed for reuse/recycling and reducing overall fresh water use footprint.

This technology nearly eliminates freshwater withdrawal for production processes.

Technical Guidance:

When the wastewater from a given process does not meet quality requirements for another process it is often simply treated and discharged. If instead a facility treats this wastewater (either chemically or biologically) to meet quality specifications for another process in the facility it would be considered reusing/recycling water. Outside of process optimization to ensure every process runs as efficiently as possible, recycling and reuse of water is the most common mechanisms for reducing freshwater use. For reuse, the wastewater from one process may still meet quality criteria for use in a second process without additional treatment. This uses the same volume of water multiple times reducing the need for freshwater in the second process.

Recycling 100% of total water use within a facility is closed-loop. This means no significant freshwater use is needed to operate the facility except natural water loss such as evaporation. Zero liquid discharge (ZLD) technologies which involves steps such as pre-treatment, evaporation and crystallization facilitate recovery and reuse of all wastewater.

A facility which is treating the waste water using Reverse Osmosis (RO) and nanofiltration technologies and reusing 80% of the waste water but the rejected water from the membrane are being sent to offsite ETPs are not considered as ZLDs as the TDS of the rejected water from the membrane technologies is considered more hazardous than the usual waste water discharged.

This water has to be reused again as process water. Other uses like irrigation and toilets are not included.

How This Will Be Verified:

- **Documentation Required:**
    - Facility is able to prove through documented record keeping that they reuse and/or recycle process wastewater as process water. Please refer back to documentation in the

Water section to evaluate whether the percentages provided here are correct based on water withdrawal and the water balance (if applicable)
    - List of water reduction achievements according to:
        - the location where water is captured for recycling
        - the location where recycled water is used
        - flow diagram of the recycling process
- **Interview Questions to Ask:**
    - Management and responsible employees can describe/demonstrate how wastewater is reused and/or recycled as process water
- **Inspection - Things to Physically Look For:**
    - Observation of the equipment in place for the reuse / recycling of process water
    - Detailed descriptions of the equipment (function, benefits for the water consumption, age, maintenance, etc.)
    - Please take a picture of the equipment
    - Confirm that all reject wastewater goes through treatment (as recorded in the previous questions above) before discharge

Air Emissions

We have all seen smog clouds over cities and know that pollution is unhealthy for humans and the environment. This visible smog is one result of air emissions from your facility, but Industrial processes and operations also emit other invisible pollutants into the air that impact human health and contribute to climate change.

Air emissions are commonly generated from:

- **Facility operations: boilers, generators, and cooling systems** (typically emit dust/particulates (PM10, PM2.5), various oxides of nitrogen ("NOx"), various oxides of Sulphur ("SOx"), ozone depleting substances ("ODS") and other toxic air pollutants).
- **Production processes: production line equipment and manufacturing processes** (typically emit volatile organic compounds ("VOCs"), ozone depleting substances ("ODS"), dust/particulates (PM10, PM2.5), and other toxic air pollutants).

IMPORTANT NOTE: You will be asked to select which air-emitting operations or processes you have on-site below. These selections will direct you to the questions that are most applicable for your facility. If you don't have any facility air emissions from operations or production, you will not need to complete this section.

The Higg Air Emissions section requires you to:

- Track **quantity** of emissions from facility ***operations and refrigeration,*** if applicable.

- **IMPORTANT NOTE:** If you use refrigerants on-site you will be asked to specify which refrigerants are used. These refrigerants will factor into your GHG emission calculations so please try to accurately report refrigerant tracking.
- Track **quantity** of emissions from ***production processes***, if applicable.
- List control devices / abatement processes and monitoring frequency for ***operating and refrigeration*** *emissions.*
- List control devices / abatement processes and monitoring frequency for ***production*** *emissions.*
- Specify achievements of advanced performance in **Nitrogen Oxides (NOx), Sulfur Oxides (SOx) and Particulate Matter (PM).**
- Specify whether your facility has a process for **modernizing equipment** to improve air emissions.

REMEMBER: Most fugitive releases of air pollution from refrigerants are due to breaks or leaks in equipment. The equipment maintenance question you were asked in the Environmental Management System section is relevant to this section as preventative maintenance is one of the best ways to prevent fugitive emissions.

Air Emissions Introduction

Facility air emissions are commonly generated from:

- Your production processes: production line equipment and manufacturing processes
- Your facility operations: boilers, generators, and cooling systems

Types of emissions include:

- **Point Source Emissions** – air flow which is controlled in some way and released into the atmosphere from a single source such as stack. These emissions can be facilities related, such as emissions from boilers, or process related, such as exhaust systems for volatile chemical use.
- **Non-Point Source or Fugitive Emissions** – for the Higg FEM, these sources of air emissions are those that are released into the general indoor or outdoor environment. These types of emissions are typically process related such as screen printing, spot cleaning, dyeing, etc.).

Anyone of the emissions sources may have several discharge points at a single facility. For example, a facility may have multiple boilers or multiple point-source process emissions stacks.

These are the common pollutants released into the air by these activities:

- Acid fumes
- dust/particulates (PM10, PM2.5) - typically associated with fuel combustion, yarn spinning, synthetic fiber manufacturing, casting
- various oxides of nitrogen ("NOx") – typically associated with fuel combustion
- various oxides of Sulphur ("SOx") – typically associated with fuel combustion
- volatile organic compounds ("VOCs") - typically associated with fabric finishes, solvents, adhesives, fabric printing, tenterframes, degreasing operations
- ozone depleting substances ("ODS") – commonly found in refrigerants, many apparel spot cleaners, and some adhesives and solvents
- hazardous or toxic air pollutants - typically associated with fuel combustion, solvents, adhesives, and some apparel finishes, metal plating
- Regulated cotton dust emission from spinning, slashing, and weaving

- Fumes: Painting and plastic injection molding

For a given source of emissions (e.g. boiler operations, multiple production lines or processes), there may be several emissions or discharge points. Your factory's emissions points are your greatest opportunity for controlling the air pollutants released by your factory. Here are the most common discharge points for air emissions:

- Stacks, chimneys, or vents (from production equipment or dorm services, such as a kitchen)
- Open tanks
- Handling or moving dusty materials
- Solvent applications

Managing air emissions requires a different approach than managing energy, water, and waste. Air emissions are regulated to a set level, while energy, water, and waste can be continuously improved.

Your factory's air performance really depends on the equipment you have. If you have older or poorly maintained equipment, you have a greater risk of air emissions. **The best thing you can do to ensure good air emissions management is to upgrade to modern equipment and have a strict process for maintaining and monitoring existing equipment.**

If CFCs and HCFCs (ozone depleting substances) are used on-site, solutions to phase out these gases should be considered. One solution is to use chemicals with low-GWP such as HFO's in the applications of refrigerants, aerosol propellants and foam blowing agents. Please refer to the following list of refrigerants with reference numbers to determine which of your refrigerants are important to track and phase out: https://www.ashrae.org/standards-research--technology/standards--guidelines/standards-activities/ashrae-refrigerant-designations.

How will Higg assist you in improvement?

To take action on air emissions, there are several important things for you to have in place:

1. You must know your local rules/permit requirements, know how the monitoring/enforcement process works, and have a process in place to demonstrate compliance (Higg FEM Permits section and EMS section)
2. You must know your factory's sources of air emissions (Higg FEM Applicability Test)
3. You must track the air pollutants that your factory emits (Higg FEM Level 1)
4. You must install control devices and/or upgrade to modern equipment (e.g., modern boiler) to ensure compliance/standard is met or exceeded (Higg FEM Level 1)

Air emissions are often dependent on your specific technologies and machines; therefore, it is important to maintain and upgrade equipment. There is not yet a standard to guide you on which technologies are associated with which reduced emissions, but Higg FEM questions prepare you to take the most direct

actions to manage your emissions. Knowing how to maintain equipment is a job best suited for a trained technical expert on-site.

Abatement technologies could be:

- Absorption
- Activated carbon filter
- Cyclone
- Dust bag filter
- Electrostatic precipitator
- Scrubber
- Selective catalytic reaction
- Selective non-catalytic reaction

GHG emissions are not limited to energy use and fuel consumption, but also result from emissions as a result of production processes. The Air section of the Facility Environmental Module measures the GHG emissions that are not linked to fuel combustion. If your factory emits GHG gases from non-combustion sources such as HFCs (e.g. leakage of refrigerants and release of HFs in aerosol propellants and foam blowing agents) and control devices for production emissions, Higg Index will help you calculate GHG emissions as part of the GHG footprint.

Tracking and Reporting Air Emissions in Higg FEM

Accurately tracking and reporting air emissions data over time provides facilities and stakeholders with detailed insight into opportunities for improvement. If data is not accurate, this limits the ability to understand the facility's air emissions and identify the specific actions that will help reduce environmental impacts.

When establishing an air emissions tracking and reporting program, the following principles should be applied:

- **Completeness** – The tracking and reporting program should include all relevant sources (as listed in the FEM).
- **Accuracy** - Ensure that the data input into the air emissions tracking program is accurate and is derived from credible sources (e.g. emissions testing or continuous monitoring systems that are based on established scientific measurement principles or engineering estimates, etc.)
- **Consistency** - Use consistent methodologies to track air emissions data that allows for comparisons of emissions over time. If there are any changes in the tracking methods, sources, or other operations that impact air emissions data, this should be documented.
- **Transparency** – All data sources (e.g., testing reports), assumptions used (e.g., estimation techniques), and calculation methodologies should be disclosed in data inventories and be readily verifiable via documented records and supporting evidence.

- **Data Quality Management** – Quality assurance activities (internal or external) should be defined and performed on air emissions data as well as the processes used to collect and track data to ensure reported data is accurate.

The above principles are adapted from The Greenhouse Gas Protocol - Chapter 1: GHG Accounting and Reporting Principles.

Applicability Test

To determine whether you need to complete the questions in the Air Emissions section, we must evaluate whether your factory has relevant sources of air emissions. Air emissions can be from materials processing equipment AND/OR boilers that generate steam for operations.

You will first be asked to select which operations or processes are present in your factory. These selections will direct you to the Higg questions that are most applicable for your facility

- If you have any air-emitting operations (e.g., boiler), you will answer questions about operating emissions in all levels.
- If you have any air-emitting production processes (e.g., solvents or adhesives), you will answer questions about production emissions in Level 1
- If you don't have any facility operation or production air emissions, you do not need to complete this section.

1. **Does your facility contain any of the following operations equipment?**

- Boiler
    - If selected, tell us size:
        - Small: less than 50 MW
        - Medium: 50 MW - 300 MW
        - Large: more than 300 MW
    - Generators
    - Combustion Engines (e.g. gasoline powered pumps)
    - Industrial Ovens (for heating/drying/curing)
    - Combustion Heating (Furnace) and ventilation
    - Refrigerant containing device (other than air conditioning system)
    - Air conditioning (Cooling)
    - Other sources of known air emissions from facility operations
    - Other sources of volatile organic compounds (VOCs)

2. **Does your facility conduct any of the following processes or use any of the following substances?**

- Yarn spinning or synthetic fiber manufacturing
- Finishes (any mechanical or chemical process that occurs after dying to affect the look, performance, or feel of the product)
- Solvents
- Adhesives/cementing

- Printing
- Dyeing
- Tenterframes or other heating processes
- Spot cleaners (*Spot cleaners are chemicals used to remove contaminated spots from final products such as garments, bed covers, shoes etc. In many cases, acetone-based chemicals are used as spot cleaners. Spot cleaning activity may be done on line during production process, or a facility may have a dedicated room for spot cleaning.)
- Sprayed chemicals or paints
- Other sources of ozone depleting substances (ODSs)

3. **Does your facility monitor air emissions?**

Air Emissions - Level 1

1. Do you track your air emissions from operations?

Select all sources of air emissions relevant to your facility's operations

Please enter data for all air emissions. Please select all pollutants that may be associated with the same emission source. This question excludes emissions from production processes.

- *Source*
- *Are there emissions from this source?*
- *Do you track emissions from this source?*
- *What equipment is this source linked to?*
- *What pollutants are found in this source?*
- *Are pollutants regulated by a government agency?*
- *If the pollutant is regulated by a permit, is it in compliance with the permit?*
- *If your facility is out of compliance, update the action plan for the substance detected*
- *If you cannot upload a copy, please describe the action plan*
- *If applicable, upload emissions test report(s).*
- *Additional comments*

Note: In the future version, Higg FEM will require detailed tracking and reporting of emissions data and the below technical guidance and verification requirements are provided for reference.

What is the intent of the question?

The intent of this question is to have facilities report air emission from on-site operations. This question should drive you to inventory all possible sources of emissions to air from operations on-site.

Technical Guidance

Air emissions are measured and regulated in different ways, which are summarized below. When evaluating whether your emissions are in compliance, the following types of standards may need to be considered:

Air quality standards: These are the quality guidelines, often associated with human health within an airshed. Good examples are the U.S. National Ambient Air Quality Standards (https://www.epa.gov/criteria-air-pollutants/naaqs-table), the Chinese Ambient Air Quality Standards (GB 3095-2012), and the World Health Organization air quality guidelines (https://www.who.int/airpollution/guidelines/en/). Facilities should not have emissions that result in pollutant concentrations that reach or exceed relevant ambient quality guidelines or contribute a significant portion to the attainment of relevant ambient air quality guidelines. That can only be determined by estimating through qualitative or quantitative assessments by the use of baseline air quality assessments and atmospheric dispersion models to assess potential ground level concentrations. Some countries utilize ground level concentration measurements for regulatory assessment (permitting).

Emission standards (concentration): Air pollution limits are sometimes concentration limits (e.g. ppm, mg/m^3). Regulatory authorities may set maximum emissions concentrations based upon overall goals to reduce air pollution. For example, for automobiles, governments may regulate concentration limits measured at the exhaust. The same is true for most small combustion facilities (e.g. boiler), which have emissions standards in concentrations (e.g. gas boiler is limited to NOx concentration of 320 ppm measured in stack). Permits for these small facilities may also be based on concentrations measured in the stack. *These are not quantities, but may be useful in calculations or estimations of quantity, especially when flow rates are known.*

Emissions standards (quantity): Air pollution limits may also be measured by the actual quantity of emissions from a source. Some regulatory authorities limit the annual quantity of emissions from a whole facility, however, others apply to point source emissions that are specifically defined or identified by regulation or other requirements. Quantity is the total quantity of emissions that ultimately have the impact on the environment.

Regulatory requirements for monitoring of emissions varies depending on local regulatory requirements. Data about emissions and ambient air quality generated through your monitoring program should be representative of the emissions discharged by the facility and process over time. For example, data should account for time-dependent variations in the manufacturing process such as batch process manufacturing and seasonal process variations. Emissions from highly variable processes may need to be sampled more frequently or through composite methods. Emissions monitoring frequency and duration may also range from continuous for some combustion process operating parameters or inputs (e.g. the quality of fuel) to less frequent, monthly, quarterly or yearly stack tests. Annual quantities of emissions from variable sources may also need to be determined using engineering estimates or modelling based on the process inputs (e.g. the amount and types of chemicals used in the process).

Creating an Air Emissions Inventory:

An air inventory is needed for the facility to track and manage emissions and their sources. To prepare a facilities inventory, emissions from all ancillary activities and equipment should be included. Regular review should be carried out to make sure the inventory is up-to-date. This inventory should include emissions sources regulated by permit as well as those not currently regulated.

The following elements are suggested to be included in the inventory (*source: GSCP*):

- Pollutants known or likely to be present
- Quantity of each pollutant emitted
- Emissions/discharge points
- Control devices and their operating parameters
- Frequency of monitoring
- Compliance with legal regulations

An example inventory can be downloaded here: https://www.sumerra.com/wp-content/uploads/Air-Emissions-Inventory.xlsx

Emission testing (concentration): Emissions testing is sometimes regulated by concentration, which requires certain test locations to fall below a given emissions per time. Testing shall be done during representative operating scenarios, and non-standard testing or calculations can be considered separately. Each test method and/or equipment used to determine emissions likely has a minimum time and/or repeat test requirement, and these statistical variations shall be considered.

Emissions testing may be used to calculate the quantity of emissions through continuous monitoring, or through discrete testing during representative operating scenarios and extrapolating over the course of one-year or standard operation through calculations. Each test method and/or equipment used to determine emissions likely has a minimum time and/or repeat test requirement, and these statistical variations shall be considered.

Emissions estimation (quantity): For each source of emissions, a quantity for each relevant pollutant should be calculated. Facilities can estimate their emissions quantities using one of the emission estimation techniques available.

Multiple discharge points from a type of emissions source (e.g. boilers or multiple solvent application processes) can be considered a single emissions source for the purposes of reporting, or may be separated by each location. The appropriate methodology should be applied by qualified individuals such as a

process or environmental engineer.

Reporting Air Emissions from Operations in the FEM:

Before reporting air emissions data in the FEM from facility operations sources, data quality checks should be performed to ensure that the data AND the processes used to calculate, and track emissions data are effective at producing accurate air emissions data.

Note: The methodology used to determine emissions from each source should be selected and applied by qualified individuals such as a process or environmental engineer.

- ✔ For each source, pollutant emission quantities should be calculated. This can be done using emissions testing data and/or engineering estimates.
  - Facilities can estimate their emissions quantities using one of the emission estimation techniques available. A good reference for this is National Pollutant Inventory (NPI) Emission Estimation Techniques Manual for Textile and Clothing Industry (http://www.npi.gov.au/system/files/resources/1889355c-bdcc-f7d4-853f-203ddf3652bd/files/ftextile.pdf).
  - Published emission factors can also be used to estimate emissions such as the USEPA AP42 Compilation of Air Emissions Factors: https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors
- ✔ If the source is not regulated by a permit or not in compliance with its required permit, the emission data from the source should be included in the Question 1 data table.
- ✔ List the equipment that the emissions are linked to. **Note**: If there is more than one source, list all sources (e.g., Boiler 1 and Boiler 2)
- ✔ Select the pollutants that are not regulated by a permit or are out of compliance from the dropdown list. **Note:** If other is selected, please provide a description in the "Additional Comments" field.
- ✔ List the quantity of pollutants emitted from the source(s). The quantities of each pollutant should be added together and entered in the Higg FEM.. Multiple discharge points from a type of emission source (e.g. boilers, generators, etc.) can be considered a single emissions source for the purposes of reporting in the FEM.
  - **Note:** If the emission quantity is listed as a concentration (e.g. PPM or mg/m3), exhaust flow data for the source(s) should be entered in the table.
- ✔ If applicable, report the testing method or equipment used to test the source (e.g. USEPA method 5 for Particulate Matter or Real-Time Continuous Emission Monitoring System for NOx, etc.)

Add notes in the "Additional Comments" field to describe any data assumptions, estimation methodology, or other relevant comments on the quantities of pollutants emitted for the source(s).

How This Will Be Verified:

When verifying a facility's air emissions data, Verifiers **must** review all aspects of the facility's emissions tracking and reporting program that could produce inaccuracies including:

- Emissions data sources (e.g., testing reports, emissions modelling or other engineering estimates); and
- The process and tools used to aggregate the data (e.g. spreadsheet calculations, unit conversions, etc.)

If any inconsistencies or errors are noted, the reported information must be corrected where possible and detailed comments should be included in the Verification Data field.

Full Points

Documentation Required:

- An inventory of emissions to air for ALL sources related to facility operations.
- Emission testing/monitoring reports. Testing data compiled in a spreadsheet (e.g. Excel) is ok as long as the testing reports are available for review as well as the data matches the reported information to all questions answered.
- Emission estimation methodology/calculations documented where applicable.
- Information entered into Higg for each emission source can be verified with appropriate evidence such as equipment sources and quantity of emissions.

Interview Questions to Ask:

- Management is able to explain the list of sources for emissions to air and how they inventory each source including the methodology for any emissions estimates.

Inspection - Things to Physically Look For:

- Onsite evaluation of air emission sources listed.
- Ensure all applicable equipment is listed on sources list.

Partial Points

Documentation Required:

- Compliance issue documentation from permitting office shows that the issue(s) is less than three months old.
- An action plan is completed for any emissions source found out of compliance.

Interview Questions to Ask:

- Management can explain the source of non-compliance and their plans for coming back into compliance.

Inspection - Things to Physically Look For:

- Any improvements made, or work done to address any non-compliances. Please take pictures.

2. Do you track your air emissions from productions?

Select all sources of air emissions that result from production processes

- *Processes Selected*
- *Are there emissions from this source?*
- *Emissions source title*
- *Do you track emissions from this source?*
- *What pollutants are found in this source?*
- *Are pollutants regulated by a government agency?*
- *If the pollutant is regulated by a permit, is it in compliance with the permit?*
- *If your facility is out of compliance, update the action plan for the substance detected*
- *If you cannot upload a copy, please describe the action plan*
- *If applicable, upload emissions test report(s).*
- *Additional comments*

This question tracks the presence of indoor air quality emissions from production processes. This includes fugitive sources from production processes (sources without a chimney that emit into the building outside through windows, doors, etc.).

Note: In the future version, Higg FEM will require detailed tracking and reporting of emissions data and the below technical guidance and verification requirements are provided for reference.

What is the intent of the question?

The intention of this question is for your facility to know the sources of process air emissions to put necessary action and abatement in place to monitor and control them.

Technical Guidance:

All process emissions should be tracked, regardless of if they are captured and discharged in a stack/chimney. These may include non-point sources such as drying rooms, or fugitive emissions such as outdoor dust.

The following elements are suggested to be included in the inventory (GSCP):

- The pollutants known or likely to be present
- The estimated quantity emitted
- Emissions/discharge points or locations, if applicable
- Any control devices, if applicable
- Monitoring conducted
- Compliance with legal regulations, if applicable

Non-point source emissions may require a different methodology to determine the amount of pollutants emitted. Note that specific regulatory calculation or reporting methodology may be applicable for fugitive sources. Additional explanation and examples of how air emission can be determined are listed below:

1. Inventory-based (Potential to Emit, PTE)
    - A Potential To Emit looks at inventories for all air emissions including energy generation and process chemistry to establish the maximum amount that could be emitted from that facility. For example, if 1 ton of IPA was purchased, 1 ton of IPA could potentially be emitted to the air. This is generally a very conservative assumption and gives the maximum potential of emissions from a site.
    - To provide a conservative estimate when calculating or reporting air emissions quantities, it is often estimated that 100% of the volatile pollutants will be emitted to the environment. If a percent composition range is provided (i.e. on and SDS) the upper part of the range can be used
2. Inventory-based (Potential to Emit + Mass Balance and/or Abatement)
    - Once a PTE analysis is completed, mass balance and/or abatement assumptions may be added. For example, if 1 Ton of IPA was purchased, yet 0.25 tons went to solvent recovery, we could assume a maximum of 0.75 tons would be emitted to air. However, if a thermal oxidizer was used to abate the 0.75 tons at a 90% efficiency, we would calculate that only 0.075 tons would be emitted to air. This same technique can be applied for many different uses of mass balance including re-use, wastewater, and other waste types.
3. Emissions Factor-based (Factory or Offsite Testing)
    - Emissions factors represent standard rates of emissions given a certain process. For example, a process using a recipe of 1kg of chemical may be tested to show that only 0.05kg is released to air each time that recipe is run. If that's the case, then for every 1kg of chemical used on that process step and on that specific tool, 0.05kg can be multiplied to get the total emissions. These types of testing may be done onsite or offsite by a 3rd party. Please note that the general recipe and tool must be the same or similar enough to generate the same emissions for this factor to be used. Sometimes, for a given facility, hundreds or even thousands of emissions factors are needed to represent their operations. All testing and documentation must be available to utilize this method. Where recipes and tool designs do not change frequently, or when similar recipes are used over a long time, this may be a very cost effective way to estimate emissions to prevent repetitive emissions testing.

The chosen emission estimation method must be applicable to the source type (e.g. for intermittent activities or high change over with different chemistries the quantity could be estimated based on consumption of solvents annually for that process).

Mass Balance Example: Emissions may be estimated based on the chemical composition of materials used (i.e. percentage of VOC content or individual pollutant) and how much of the chemical is used annually (i.e. liters/year).

As an example, A total of 100 L of acetone is used for spot cleaning on an annual basis. The density of acetone is 784 kg/m^3. If we assume 50% is collected as waste and 50% is emitted to the environment, we could calculate that 50 L X (784 kg/m^3/1000 L/m^3) = 39.2 kg of acetone is emitted to air annually.

Another example: If the VOC content in a chemical was 5g/L and the facility used 1,000L annually, yet abatement was applied at 90% efficiency, the annual emissions would be 5,000g*(10%) = 500g emitted.

In some cases, emissions factors can be used. For example, if known quantities of a nitrogen containing chemical are mixed with another non-nitrogen containing chemical and tests detect nitrogen oxide emissions, an emissions factor may be used if the recipe is repeated without change. If 1kg of the original chemical always causes 0.3kg of NOx, then the emissions factory for NOx in this recipe is 0.3. These calculations may be complex, so please utilize chemical and environmental expertise if this method is chosen.

References:

National Pollutant Inventory (NPI) Emission Estimation Techniques Manual for Textile and Clothing Industry (http://www.npi.gov.au/system/files/resources/1889355c-bdcc-f7d4-853f-203ddf3652bd/files/ftextile.pdf

US EPA Compilation of Air Pollutant Emissions Factors (AP-42): https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors

All of the examples above are basic examples demonstrating the principles of estimating emissions. The appropriate methodology should be applied by qualified individuals such as a process or environmental engineer.

Reporting Air Emissions from Production in the FEM:

Before reporting air emissions data in the FEM from production sources, data quality checks should be performed to ensure that the data AND the processes used to calculate, and track emissions data are effective at producing accurate air emissions data. The guidance provided on reporting emissions in Question 1 above should also be used for reporting emissions from production sources in this question.

Note: The methodology used to determine emissions from each source should be selected and applied by qualified individuals such as a process or environmental engineer.

How This Will Be Verified:

When verifying a facility's air emissions data, Verifiers **must** review all aspects of the facility's emissions tracking and reporting program that could produce inaccuracies including:

- Emissions data sources (e.g., testing reports, emissions modelling or other engineering estimates); and
- The process and tools used to aggregate the data (e.g. spreadsheet calculations, unit conversions, etc.)

If any inconsistencies or errors are noted, the reported information must be corrected where possible and detailed comments should be included in the Verification Data field.

Yes

Full Points

Documentation Required:

- An inventory of emissions to air for ALL sources of emissions from production processes.
- Emission testing/monitoring reports. Testing data compiled in a spreadsheet (e.g. Excel) is ok as long as the testing reports are available for review as well and the data matches the reported information to all questions answered.
- Emission estimation methodology/calculations documented where applicable.
- Information entered into Higg for each emission source can be verified with appropriate evidence such as equipment sources and quantity of emissions.

Interview Questions to Ask:

- Management is able to explain the list of sources for emissions to air and how they inventory each source

Inspection - Things to Physically Look For:

- Onsite evaluation of air emission sources matches what is listed
- Ensure all applicable equipment is listed on sources list
- Supporting documentation for test results for all sources of emissions (equipment) for those regulated by a governmental/ accredited agency

Partial Points

Documentation Required:

- Compliance issue documentation from permitting office shows that the issue(s) is less than three months old.
- An action plan is completed for any emissions source found out of compliance.

Interview Questions to Ask:

- Management can explain the source of non-compliance and their plans for coming back into compliance.

Inspection - Things to Physically Look For:

- Any improvements made, or work done to address any non-compliances. Please take pictures.

3. Did your facility add additional refrigerants to any existing equipment during this reporting year?

Do you track refrigerant use/emissions?

If yes, select all refrigerants added to existing equipment

- *Refrigerant*
- *Quantity of refrigerant added to existing equipment in this reporting year*
- *Unit of measure*
- *What method was used to track emissions from this source?*
- *What is your plan for fixing this leak?*

This question will contribute to your GHG-emissions calculation so it's important for you to enter accurate data about leak quantities. Please note that your GHG result is intended to provide directional insight into your opportunities to improve, but is not a formal GHG calculation to be used for public reporting.

Having to add refrigerants to existing equipment indicates the system has a leak. If CFC-based refrigerants are maintained in the building, you must reduce annual leakage to 5% or less and reduce the total leakage over the remaining life of the equipment to less than 30% of its refrigerant charge.

***ONLY answer NO** if you **did not** add additional refrigerants to any existing equipment in the reporting year. **Full Point** will be granted.*

*If you do not know whether refrigerants were added to any existing equipment in the reporting year, you should answer **Unknown**.*

*If you know that refrigerants were added, however you do not know the quantity, You should select **Yes** to the question "Did your facility add additional refrigerants to any existing equipment in the reporting year?", and select **No** to the Question "Do you track refrigerant use/emissions?"*

What is the intent of the question?

The intent is for you to enter quantitative data that shows how much refrigerant(s) your facility emitted in the reporting year. This question also helps you identify what refrigerants are being used, where they are being used in your factory, and how much is potentially being emitted to the atmosphere.

Technical Guidance:

Refrigerants are ozone depleting substances that can be harmful contributors to GHG emissions and climate change due to the relatively high global warming potentials (GWPs) common refrigerants have. Refrigerants are often emitted through equipment leaks, servicing and disposal.

Although most modern equipment is designed to minimize leaks, it is important to identify leaks if they do occur. Leaks are typically identified by having to add additional refrigerant to equipment. It is also important to have an action plan to fix the leaks and/or upgrade equipment to eliminate refrigerant leakage.

If refrigerants are used on-site, solutions to phase out these gases should be considered. One other solution is to use refrigerants with lower global warming potentials (GWP) such as HFO's in the applications of refrigerants, aerosol propellants and foam blowing agents. Please refer to the following list of refrigerants with reference numbers to determine which of your refrigerants are important to track and phase out: https://www.ashrae.org/standards-research--technology/standards--guidelines/standards-activities/ashrae-refrigerant-designations.

CFCs and HCFCs are being phased out under an international agreement called the Montreal Protocol, in favor of HFCs which are potent greenhouse gases with high GWPs, and they are released into the atmosphere during manufacturing processes and through leaks, servicing, and disposal of equipment in which they are used. Newly developed Hydrofluoroolefins (HFOs) are a subset of HFCs and are characterized by short atmospheric lifetimes and low GWPs. HFOs are currently being introduced as refrigerants, aerosol propellants and foam blowing agents.

For more information on phasing out Ozone Depleting Substances: https://www.epa.gov/ods-phaseout

- Substances NOT in scope include:
    - The production and consumption of mineral products such as cement, the production of metals such as iron and steel, and the production of chemicals. (CO2)
    - The production of adipic acid, which is used to make fibers, like nylon, and other synthetic products. (N2O)
    - Production, processing, storage, transmission, and distribution of natural gas and crude oil; and extraction of coal. (CH4)
    - Industrial livestock operations, landfills, and anaerobic treatment of wastewater. (CH4)

- Agricultural soil management, production and application of synthetic fertilizers, and livestock manure management. (N2O)
- Forestry Practices and Land Use. (CO2)
- Perfluorocarbons are compounds produced as a byproduct of various industrial processes associated with aluminium production and the manufacturing of semiconductors. (PFC)
- HFC-23 is produced as a byproduct of HCFC-22 production. (HFC)
- Sulfur hexafluoride (SF6) is used in magnesium processing and semiconductor manufacturing, as well as a tracer gas for leak detection, and is used in electrical transmission equipment including circuit breakers.

For additional resources please visit:

- https://www.epa.gov/sites/production/files/2015-07/documents/fugitiveemissions.pdf
- https://ww2.arb.ca.gov/our-work/programs/refrigerant-management-program

Tracking Refrigerant Use:

Identifying and tracking refrigerant use is the first step in managing refrigerants use onsite. When establishing your tracking and reporting program, start by doing the following:

- Map out all facility equipment (production and operational equipment) to identify equipment that contain refrigerants.
  - This should include identifying the specific refrigerant type that is used in the equipment (e.g. R-22).
- Establish procedures determine how much refrigerant is released (e.g. through leaks, disposal, etc) from each piece of equipment.
  - In general, the amount of refrigerant released is equal to the amount of Refrigerant that is added to the equipment (see Calculating Leak Rate below)
  - Refrigerant purchase invoices, or service records may also be helpful in determining quantities released.
  - If estimation techniques are used, the calculation methodology should be clearly defined and be supported by verifiable data.
- Record tracking data (e.g. monthly, annual leakage or top-up records) in a format that is easy to review [e.g. spreadsheet (e.g. Microsoft Excel) or similar data analytics program that allows export of data in a human readable format (e.g. Excel, csv)] and maintain relevant supporting evidence for review during verification.

Calculating a Leakage Rate

When determining the quantity of refrigerants emitted from a piece of equipment, it is generally considered that the amount of refrigerant emitted is equal to the amount that was added to the equipment after a period of time to return the equipment back to a full charge.

- For example, if you recharge the refrigerant in a Chiller unit to a full charge, then after one year of operation you need to add 0.5kg to fully recharge the unit, then is it assumed that the 0.5kg was emitted due to leaks or servicing throughout the year.

When tracking refrigerant emissions, a facility can directly measure and record the amount of refrigerant added to a piece of equipment in the reporting year or a leakage rate can be determined used to estimate emissions.

The leakage rate is typically expressed as the percentage of a full charge that would be lost in a 12-month period. The example below is one way to calculate a leak rate.

1. Take the kilograms (kg) of refrigerant you added to recharge the system to a full charge and divide it by the kg of refrigerant in the normal full charge for the system.
2. Determine the number of days that have passed between charges (e.g. how many days between the last time refrigerant was added and this time refrigerant was added), then divide by 365 (the number of days in a year).
3. Take the kg of refrigerant determined in step 1 and divide it by the number of days determined in step 2.
4. Lastly, multiply by 100% (to determine a percentage).

For example:

Chiller #1

- Refrigerant Added = 1kg
- Full charge = 5kg
- Days between charges = 275

Leakage rate = (1kg ÷ 5kg) ÷ (275 ÷ 365) x 100% = 26.5%

Therefore, this Chiller unit loses/emits 1.33kg (26.5% of a full charge) of refrigerant in a year.

Note: Leakage rates may also be used to determine when equipment may need additional service or replacement.

Reporting Refrigerant Data in the FEM:

Before reporting refrigerant data in the FEM, data quality checks should be performed to ensure that the data AND the processes used to collect and record the data are effective at producing accurate energy data.

Do:

- ✔ Review source data (e.g. equipment maintenance records, servicing logs, refrigerant purchase invoices, etc.) against aggregated totals to ensure it is accurate.
- ✔ Ensure the most recent and updated versions of data tracking spreadsheets are being used and that all automated calculations/formulas are correct.
- ✔ Ensure the proper units are reported and verify any unit conversions from source data to reported data.
- ✔ Review any assumption or estimation methodology/calculations to ensure accuracy.
- ✔ Report the proper tracking method in the FEM (e.g. measured, leakage rate, estimate)

Do Not:

X Report data that is not accurate (e.g. the data source is unknown or has not been verified).
X Report estimated data if it is not supported by verifiable and reasonably accurate estimation methodology and data (e.g. leakage rate or other engineering calculations).

How This Will Be Verified:

When verifying a facility's refrigerant data, Verifiers **must** review all aspects of the facility's tracking program that could produce inaccuracies including:

- The initial data collection processes and data sources (e.g., equipment maintenance records, servicing logs, refrigerant purchase invoices, etc.); and
- The process and tools used to aggregate the data (e.g. spreadsheet calculations, leakage rate calculations, etc.)

If any inconsistencies or errors are noted, the reported information must be corrected where possible and detailed comments should be included in the Verification Data field.

Full Points

Documentation Required:

- All refrigerant equipment has a log of equipment servicing including refrigerant replacement that is kept up to date
- These records must show that no refrigerants were added in 2021

Interview Questions to Ask:

- Can the employee(s) responsible for maintaining the refrigeration equipment describe the process and frequency with which they evaluate the equipment for leaks?

Inspection - Things to Physically Look For:

- Well-kept records of equipment maintenance
- Potential refrigerant leaks

Partial Points

Documentation Required:

- All refrigerant equipment has a log of equipment servicing including refrigerant replacement that is kept up to date
- Equipment logs show the date, specific type and amount of refrigeration added

- The source of the leak(s) was identified
- An action plan and responsible employee are in place to make sure the leak gets repaired rapidly

Interview Questions to Ask:

- Can the employee(s) responsible for maintaining the refrigeration equipment describe the process and frequency with which they evaluate the equipment for leaks?
- Can the employee responsible for fixing any leaks describe what work he/she is doing to resolve the issue(s)?

Inspection - Things to Physically Look For:

- Well-kept records of equipment maintenance
- Any evidence that leaks are being addressed by staff responsible for maintaining the equipment

4. Does your facility have control devices or abatement processes for on-site point source air emissions? If yes, select all point sources of air emissions that have control devices or abatement processes.

- *Source*
- *Do you have control devices/abatement process for this source?*
- *What control device, abatement process, or safety equipment was used for this source of air emissions?*
- *What was the frequency of monitoring?*

Suggested Upload: Emission testing records from control devices or abatement processes.

***Answer Yes** only if you have control device(s) installed and in operation for all sources of emissions from operations.*

***Answer Partial Yes** if you have control device(s) installed and in operation for some sources of emissions from operations. This question does not include controls for indoor air quality emissions from production processes.*

Definition of Point Source Emissions – air flow which is controlled in some way and released into the atmosphere from a single source such as stack. These emissions can be facilities related, such as emissions from boilers, or process related, such as exhaust systems for volatile chemical use.

What is the intent of the question?

The intent of this question is to understand if the facility has effective controls in place to manage and limit its emissions to air from all point sources.

Air pollution control or abatement devices are the techniques used to reduce or eliminate the operational emission into the atmosphere of substances that can harm the environment or human health. Abatement process can range from a simple process or a sophisticated device and control equipment depending on the source of air emission and necessity. If facility meets the required standard for air emission, it is most likely that an abatement process is already in place or the control device is already part of the existing equipment. Example of the devices include dust collection and extract units (DCE), scrubbers and incinerator.

Technical Guidance:

This question primarily applies to point source/stack emissions. For example, this may include boilers from facilities, or other stacks from process exhausts. Controls on these emissions may include dust collectors, scrubbers, incinerators, etc.

Monitoring and maintenance of control and abatement devices should be included in your factory's preventative maintenance program and in the checklists for ongoing visual inspections so that any problems can be identified promptly.

The effectiveness and efficiency of your control devices is typically evidenced through monitoring/testing data. Therefore in the case that no regular monitoring is conducted, facilities should answer No to this question.

Scoring: **Full Point** will be given based on the extent that the facility has abatement processes or controls processes (when technically applicable) for all identified or potential point source/stack emissions to air that result in lesser quantities of emissions that would otherwise be found if no controls were in place. This obviously requires confirmation and therefore monitoring/testing data as noted above.

How This Will Be Verified:

Yes

Documentation Required:

- Schematics, descriptions or procedures for control devices or abatement processes

- Records of calibration and maintenance for control devices listed

Interview Questions to Ask:

- Management and responsible employees are able to describe the control devices or abatement processes are in place at the facility and how they reduce emissions

Inspection - Things to Physically Look For:

- Review the list of the control devices in the facility are in fact where they should be and are in operation and good working condition (per regular maintenance and observation by responsible staff) for all sources of emissions from operations

Partial Yes

- Same as "yes" but control devices installed for some but not all sources of emissions from operations.

Reference: This question can be used to inform responses to The Sustainability Consortium's Home and Apparel Textiles Toolkit. The Air Quality - Manufacturing Key Performance Indicator asks respondents if annual air emissions are tracked and reported by final manufacturing facilities. The facility data can be aggregated by brands to answer TSC's question.

5. Does your facility have control devices or abatement processes for on-site fugitive/non-point source air emissions? If yes, select all fugitive/non-point sources of air emissions that have control devices or abatement processes.

- *Source*
- *Do you have control devices/abatement process for this source?*
- *What control device, abatement process, or safety equipment was used for this source of air emissions?*
- *What was the frequency of monitoring?*

Suggested Upload: Emission testing records from control devices or abatement processes.

***Answer Yes** only if you have control devices installed and in operation for all sources of emissions from production processes.*

***Answer Partial Yes** if you have control devices installed and in operation for some sources of emissions from production processes.*

Definition of Non-Point Source or Fugitive Emissions – for the Higg FEM, these sources of air emissions are those that are released into the general indoor or outdoor environment. These types of emissions are typically process related such as screen printing, spot cleaning, dyeing, etc.).

What is the intent of the question?

The intent of this question is to understand if the facility has effective controls in place to manage and limit its emissions from non-point or fugitive sources of air emissions.

Air pollution control or abatement devices are the techniques used to reduce or eliminate the emission into the atmosphere of substances that can harm the environment or human health. Abatement process can range from a simple process or a sophisticated device and control equipment depending on the source of air emission and necessity. For example, this may include exhaust which is treated for VOC from a drying room.

Technical Guidance:

This question primarily applies to any non-point sources that generate emissions, and may impact both indoor air quality and the environment. Some examples of production processes that produce emissions include:

- Digital printing units which are producing their own colorants / inks by dissolving the solid colorants (acid, reactive and disperse dyes usually) using solvent systems which includes, glycols, dioxanes among others in house.
- Coating / lamination units which use solvents
- Embroidery yarn dyeing units which typically use viscose filament yarn using vat dyes in powder form
- Footwear assembly units which use spraying systems to color the soles
- Leather coating / spraying units which use liquid dispensing chambers
- Transfer printing units which use solvents
- Dry cleaning processes using halogenated solvents
- Potassium permanganate (PP) spraying units
- Molding units which use lamination or fusing processes etc.
- Curing the fabric/ apparel after dyeing
- Other solvent or adhesive applications (e.g. gluing or priming)

Controls for these emissions may include fume hoods or local exhaust ventilation with additional control devices or abatement processes, solvent recovery systems, adsorption devices, or filters/bag houses capturing the dust / flock etc.

Monitoring and maintenance of control and abatement devices shall be included in your factory's preventative maintenance program and also in the checklists for ongoing visual inspections and other required testing so that any problems could be identified promptly.

Scoring: **Full Point** will be given based on the extent that the facility has abatement processes or controls (when technically applicable) for all identified or potential fugitive emissions to air that result in lesser quantities of emissions that would otherwise be found if no controls were in place.

How This Will Be Verified:

Yes

Documentation Required:

- Schematics, descriptions or procedures for control devices or abatement processes
- Records of calibration and maintenance for control devices listed

Interview Questions to Ask:

- Management and responsible employees are able to describe the control devices or abatement processes are in place at the facility and how they reduce emissions

Inspection - Things to Physically Look For:

- Review the list of the control devices in the facility are in fact where they should be and are in operation and good working condition (per regular maintenance and observation by responsible staff) for all sources of emissions from production processes.

Partial Yes

- Same as "yes" but control devices installed for some but not all sources of emissions from production processes.

Air Emissions - Level 2

6. Has your facility gone beyond permit requirements to achieve a higher level of air performance in Nitrogen Oxides (NOx), Sulfur Oxides (SOx), and Particulate Matter (PM)?

- *If yes, specify the level.*

Upload emissions testing results for PM, SO2, and NOx

Higg FEM encourages air emissions performance that goes beyond compliance. However, there is not currently an air standard that exists for the apparel, footwear, and textiles industry. If an industry air standard becomes available, we will update the tools accordingly.

What is the intent of the question?

The intent of this question is to demonstrate whether your facility has improved air emissions from combustion devices beyond compliance.

Technical guidance:

Meeting an Air Standard: Air emissions are typically managed to a specified limit as set by local regulations. However in sustainability, it is important to improve *beyond compliance* to the most aspirational level of air performance possible. Currently, there is no existing air standard for the industry, so The Higg FEM Air section leverages a collaboratively-developed set of limits that are aligned with the best available air pollutant guidance.

The Higg FEM Air section encourages you to reduce pollutant limits as far as possible by setting three levels of limits for combustion devices (e.g., boilers and generator) emitting Nitrogen Oxides (NOx), Sulfur Oxides (SOx) and Particulate Matter (PM). These limits were identified by leveraging IFC's Small Combustion Facilities Emissions Guidelines (link: https://www.ifc.org/wps/wcm/connect/532ff4804886583ab4d6f66a6515bb18/1-1%2BAir%2BEmissions%2Band%2BAmbient%2BAir%2BQuality.pdf?MOD=AJPERES) and standards from Sri Lanka, Belgium, Australia, Germany (more than 50 MW), Japan, and India. SAC or another industry organization will refine these limits over time or replace with another standard if such a standard emerges for the apparel industry.

You can assess different opportunities in reducing emissions at source against these levels of emission limits. Examples include boiler retrofit to use cleaner fuel, improving control device to reduce emissions, etc.

Draft Air Standard for Boilers and Generators (Unit of measure: mg/Nm^3):

Small (less than 50 MW)		**Level 1** **Foundational**	**Level 2** **Strategic**	**Level 3** **Aspirational**
	PM	150	100	50

	SO2	2000	1000	400
	NOx	650	300	200
Medium (50 MW - 300 MW)		**Level 1**	**Level 2**	**Level 3**
	PM	150	80	50
	SO2	1500	1000	200
	NOx	600	300	150
Large (greater than 300 MW)		**Level 1**	**Level 2**	**Level 3**
	PM	100	50	30
	SO2	850	600	150
	NOx	510	200	150

How This Will Be Verified:

Yes

Documentation Required:

- Emission testing results which show facility has gone beyond permit requirements to achieve a higher level of air performance in Nitrogen Oxides (NOx), Sulfur Oxides (SOx), and Particulate Matter (PM).
- A plan in place or project description of what was done to achieve it. This should include a list of equipment and/or process changes along with records for the change in emissions resulting from improvements made.

Interview Questions to Ask:

- Management is able to explain the actions resulting in the facility going above and beyond permit requirements

Inspection - Things to Physically Look For:

- Reference items listed in plan including equipment or processes used for achieving higher level of air performance.

Air Emissions - Level 3

7. Do you have a process for implementing modernized equipment to reduce or eliminate air emissions and indoor air quality issues at your facility?

Upload: Documentation of plans/process for equipment upgrades or documentation of recent upgrades

***Select Yes** if you have a documented plan to upgrade machinery or if all machinery has been upgraded to the most modern version as this is one of the best ways to control pollutants and minimize air emissions.*

What is the intent of the question?

The intent is for a facility to be able to share or demonstrate advanced practices to control air pollutants.

Modernizing equipment is an effective way to reduce or eliminate air emissions and indoor air quality issues. Feasibility studies are helpful to identify and assess the possibility to upgrade equipment (e.g. replacing equipment, modifying existing equipment, further optimizing abatement equipment, etc.) to reduce emissions (GSCP).

Technical Guidance:

Antiquated or ineffectively operating equipment often does not utilize the best available technology (BAT) or best available control technology (BACT) for air emissions controls. Therefore, current equipment may result in greater air emissions than newer, more modern, equipment. Modernizing machinery means retrofitting existing machinery with newer technologies or purchasing new equipment with more advanced technologies for controlling air emissions.

One example of modernizing machinery is to upgrade refrigeration and/or air conditioning systems so that they may use refrigerants with lower GWP or substituting ODS with more environmental friendly refrigerants.

Another example is the procurement of a new boiler or generator powered by cleaner fuels and thus results in less air emissions.

How This Will Be Verified:

Yes

Documentation Required:

- Documentation of plans/process for equipment upgrades or documentation of recent upgrades
- List of recent equipment upgrades (if applicable)

Interview Questions to Ask:

- Management is able to describe plan/process for equipment upgrades or documentation of recent upgrades.

Inspection - Things to Physically Look For:

- Verify equipment upgrades in facility against plan in place

Waste

Waste Introduction

Waste is any material or substance that is discarded from a factory site, which can pollute and contaminate the environment and surrounding communities.

Example of waste can include, but not limited to:

- **Non-hazardous waste** is discarded materials from the consumption of goods and services and the manufacture of goods. Non-hazardous waste usually includes non-hazardous production waste and domestic waste. Non-hazardous production waste is generated from manufacturing process directly, e.g., cloth, leather, plastic, paper, metal or packaging waste. Domestic waste includes food waste and sanitary waste. Food waste is typically generated from facility canteens and kitchens. Sanitary waste is the household waste from office and dormitory areas, e.g., toilet paper, yard/garden waste, glass, and food packaging.
- **Hazardous waste** is waste that could cause harm to public health and/or the environment because of its chemical, physical, or biological characteristics (e.g., it is flammable, explosive, toxic, radioactive, or infectious). The U.S. Environmental Protection Agency defines hazardous waste as "waste that is dangerous or potentially harmful to our health or the environment. Hazardous wastes can be liquids, solids, or gases, or sludge. The requirements for managing hazardous waste are stricter than for non-hazardous waste." (http://www.epa.gov/osw/hazard/)

However, the classification into hazardous and non-hazardous waste may differ from one country legislation to another, defining which types of waste are categorized as hazardous differently. A facility should at minimum follow the legal waste requirements. If legal requirements are not available, it is recommended to select more stringent industry guidelines.

New Guidance for Hardgoods facilities:

For all companies manufacturing or distributing in or to the European Union, the WEEE (Waste from Electrical and Electronic Equipment) directive is an important directive to follow. The WEEE directive governs the reduction and separation of electronic waste.

The Higg Index Waste section requires you to:

- Understand and track all hazardous and non-hazardous waste streams
- Record and Report the volume generated and disposal method for all hazardous and non-hazardous waste streams
- Segregate, properly store, and train workers to handle all hazardous and non-hazardous waste streams
- Forbid open burning and dumping of waste on-site and properly control any onsite incineration
- Set normalized baselines for waste generated (e.g., generated 20 Kgs of domestic waste per production unit in 2016) and percentage of waste to disposal methods (e.g., landfilled 80% of domestic waste in 2016)
- Set normalized targets for waste reductions and improvements to preferred disposal methods
- Set an action plan with specific actions and strategies to achieve waste reduction targets
- Demonstrate waste reductions against the baseline such as "Last year we generated 16 Kgs of domestic waste per unit of production which is a 20% annual reduction since 2016."
- Leading practice: Divert at least 90 percent of all discarded materials from landfills, incinerators without energy recovery, and the environment
- Leading practice: Upcycle waste by transforming waste materials into new materials or products of better quality or for better environmental value.

Waste performance can be improved in two ways:

1. By **reducing the total amount of waste generated** for your facility. This is the most preferred method because it will reduce waste amount from the original source.
2. By **switching to preferred methods of disposal** such as recycling, reuse, recycling, or appropriately controlled incineration with energy recovery.

Tracking and Reporting Waste Data in Higg FEM

Accurately tracking and reporting waste data overtime provides facilities and stakeholders with detailed insight into opportunities for improvement. If data is not accurate, this limits the ability to understand a facility's wastes and identify the specific actions that will help reduce environmental impacts and drive efficiencies.

When establishing a waste tracking and reporting program, the following principles should be applied:

- **Completeness** – The tracking and reporting program should include all relevant sources (as listed in the FEM). Sources should not be excluded from data tracking and reporting should be based on materiality (e.g. small quantity exceptions).

- **Accuracy** - Ensure that the data input into the waste tracking program is accurate and is derived from credible sources (e.g. calibrated scales, invoices, established scientific measurement principles or engineering estimates, etc.)
- **Consistency** - Use consistent methodologies to track waste data that allows for comparisons of waste quantities over time. If there are any changes in the tracking methods, waste sources, or other operations that impact waste data, this should be documented.
- **Transparency** – All data sources (e.g., invoices, weighing records, etc.), assumptions used (e.g., estimation techniques), and calculation methodologies should be disclosed in data inventories and be readily verifiable via documented records and supporting evidence.
- **Data Quality Management** – Quality assurance activities (internal or external data quality checks) should be defined and performed on waste data as well as the processes used to collect and track data to ensure reported data is accurate.

The above principles are adapted from The Greenhouse Gas Protocol - Chapter 1: GHG Accounting and Reporting Principles.

Waste - Level 1

1. Which non-hazardous waste streams does your site produce? Select all that apply:

- Materials
- Metal
- Plastic
- Paper
- Cans
- Food
- Glass
- Cartons
- Wastewater Treatment Sludge (Non-Hazardous)
- Other (please specify)
- All domestic waste combined

Suggested Upload: Waste Manifest

Do you track your non-hazardous waste streams?

Includes non-hazardous production waste and domestic waste.

*You will receive **Full Points** if you are completely tracking all waste streams that your facility generates, the quantity of each waste stream and the disposal method of each waste stream.*

*You will receive **Partial Points** if you are completely tracking at least one of your waste streams, but are not yet tracking all of your sources or the disposal method of each waste stream.*

What is the intent of the question?

The intent is to build awareness of all non-hazardous waste types (both production and domestic waste) at your facility and to start tracking the volume each waste type generates. You must know your sources of waste before you can make strategic decisions on how to reduce and divert waste. It's important to understand your current waste management practices and to prioritize improvements for the waste sources that you produce the most. By doing this you can find more effective alternatives to reduce and divert waste.

Technical Guidance:

Developing a waste inventory is considered the first step in waste management. When establishing your waste tracking and reporting program, start by doing the following, which applies to non-hazardous wastes covered in this question and hazardous waste tracking covered in Question 2:

- Map out business and operational processes to identify where waste is being generated and all the types of wastes that are generated.
- Establish procedures to collect and track waste data:
    - Use on-site scales, waste invoices/manifests, receipts for waste materials that are sold, etc. to determine the amount of waste generated.
    - If estimation techniques are used, the calculation methodology should be clearly defined and be supported by verifiable data (see examples below)
- Record tracking data (e.g. daily, weekly, monthly waste quantities) in a format that is easy to review [e.g. spreadsheet (e.g. Microsoft Excel) or similar data analytics program that allows export of data in a human readable format (e.g. Excel, csv)] and maintain relevant supporting evidence for review during verification.

Reporting Waste data in the Higg FEM:

Before reporting waste data in the FEM, data quality checks should be performed to ensure that the data AND the processes used to collect and record the data are effective at producing accurate data.

Do:

- ✔ Review source data (e.g. weighing records, invoices/manifests, etc) against aggregated totals to ensure it is accurate.

- ✔ Compare the current year with historical data. Any significant changes (e.g. an increase or decrease of over 10%) should be attributable to known changes. If not, further investigation may be warranted.
- ✔ Ensure the most recent and updated versions of data tracking spreadsheets are being used and that all automated calculations/formulas are correct.
- ✔ Ensure the proper units are reported and verify any unit conversions from source data to reported data.
- ✔ Review any assumption or estimation methodology/calculations to ensure accuracy
- ✔ Verify the how the specific waste is disposed and report the disposal method (e.g. landfill, recycle, incineration)
- ✔ Ensure waste vendors have the appropriate licensed to handle each specific waste type.
- ✔ Add notes in the "Describe your waste management and disposal processes for this source" field to describe how the waste is managed and any data assumptions, estimation methodology, or other relevant comments on the data for a particular source.

Do Not:

- X Report data that is not accurate (e.g. the data source is unknown or has not been verified).
- X Report estimated data if it is not supported by verifiable and reasonable accurate estimation methodology and data (e.g. engineering calculations).

The following terminology will help you understand how to complete this question:

- **All waste streams** mean all the waste produced on-site including waste generated from manufacturing product, office use, waste produced by workers at the canteen, dormitory, shops, and waste produced by contractors coming on-site to perform a service.
- **Final disposal** means the final step to manage or remove your waste. If a contractor is collecting your waste and selling it to another company, the final disposal will be the last company to handle your waste by recycling, incinerating, treating (physical or chemical treatment), or landfilling your waste. This can be controlled in the factory by checking the waste collection area or waste contractor's site and confirming that sorting is well-managed
- **Non-hazardous waste:** please refer to the definition listed in the waste introduction section at the top of this section.
- **Hazardous waste**: please refer to the definition mentioned in the waste introduction section at the top of this section. To identify the hazardous waste, you can check its characteristic, environmental impact, usage, corrosivity, ignitability and reactivity, if it doesn't belong to hazardous waste, it will be non-hazardous waste.
- **Reuse:** Materials that are used in a function or application as a substitute for a new commercial material. Typically, this material is designed to be reused multiple times for the same purpose. This could also include checking, cleaning or repairing materials/components, so that they can be re-used without any other preprocessing whether for the original or other purposes. For example:
    - Chemical supplier can reuse the chemical container for filling them up with the same chemical (external reuse).
    - Fabric leftover can be reused in another factory (external reuse).
    - Rechargeable batteries can be reused many times (internal reuse). Wood pallet or cardboard can be reused for holding materials within the factory (internal reuse).
- **Recycle:** Materials that are reprocessed from recovered material and made into a final product or into a component of a product. It does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operation.

Differences between recycled material and reused material:

- **Recycled material** undergoes processing, or change in physical form, to be made into another component or product.
- **Reused material** is used in its current form, multiple times, typically for the same purpose. For example:
    - Plastic recycling is the process of recovering scrap or waste plastic and reprocessing the material into useful products, sometimes completely different in form from their original state. For instance, this could mean melting down soft drink bottles and then casting them as plastic chairs and tables.
    - Plastic used for playground surfaces or traffic cones
    - Fabric scraps being reprocessed for padding/stuffing used for furniture, mattresses, blankets, toys
- **Incinerated with energy recovery:** The process of generating energy in the form of electricity or heat from the incineration of waste. Thermal technologies include incineration, gas plasma, pyrolysis or any other process in excess of 150 °C (please refer to UL2799 standard: https://standardscatalog.ul.com/standards/en/standard_2799_3). This operation is only accepted by an approved and permitted incineration plant by the local government or by a permitted incineration plant.
- **Biological treatment**: usually used for food waste disposal. The common treatments are Anaerobic digestion, biofuel and composting. **Anaerobic digestion** is a biological process where bacteria decompose organic matter in the absence of oxygen. The bacteria produce biogas that can be used to generate energy. The effluent remaining after controlled anaerobic decomposition is low in odor and rich in nutrients. **Biofuel** is derived from biological materials and can be used as an alternative fuel or as an additive to reduce vehicle emissions. **Composting** is the biological process of breaking organic waste into a useful substance by various microorganisms in the presence of oxygen. Composting also includes converting organic waste into industrial and manufactured products such as fertilizer, tallow and industrial chemicals.
- **Incineration:** materials that are collected and managed through an incineration process that meets local and international standards.
- **Landfill:** materials that are collected and managed through a landfilling process that meets local and international standards.
- **Upcycle:** Upcycling is the process of transforming by-products, waste materials, useless and/or unwanted products into new materials or products of better quality or for better environmental value. Recycling used garments and fabrics to manufacture new clothing, making fabric from used plastic bottles, and processing coal ash from the boiler room to make bricks are some examples of upcycling. A facility can engage its material suppliers, buyers and waste management contractors to find creative solutions to upcycle wastes
- Mandated waste material should *not* be included in the non-hazardous waste stream, as these types of waste are not generated from a "business as usual" situation**,** such as**:**
    - Medical waste
    - Polychlorinated biphenyls (PCBs)
    - Lead Paint
    - Asbestos
    - Other waste mandated by local regulation
    - Major construction and demolition projects waste (C & D waste)
    - Waste from nature disaster such as flood, fire, tornado, hurricane.

Accepted estimation for non-hazardous waste quantity calculation: In some cases, calculating waste quantity requires estimation. Estimation requires a documented methodology that includes:

- Calculations and methodology
- Date used you calculate the estimate
- Frequency of updates to calculations and methodology

Example: Your facility generates waste in barrels which are sealed when full and sent weekly for disposal. Weighing every barrel may not be possible. Therefore, the average weight of a full barrel can be determined by weighing a representative sample of barrels and then multiplying this average weight by the number of barrels disposed each week or month as shown below:

- Average weight of a barrel = 25kg (based on representative weights of barrels from different days, months, production scenarios, etc.)
- Number of barrels disposed of in 1 month = 65
- Total waste for this source in 1 month = 1,625kg (25kg x 65 barrels)

Note: The above method can be used for any waste type (e.g. production or domestic waste). The estimation methodology and calculations should be documented and applied consistency for each waste type.

Method For food waste or sanitary waste:

Weigh a random bucket or bag 3 times a month and calculate the average weight per bucket or bag. Then accumulate the total weight based on the number of buckets or bags at the end of each month. **Please note** that the waste volume for each bucket or bag should be representative of the typical amount of waste generated.

Note: If an estimation technique is used, this should be fully documented, applied consistently and based on reasonable estimation factors that are derived from relevant data (e.g. actual weights of a representative sample of the waste).

How This Will Be Verified:

When verifying a facility's waste data, Verifiers **must** review all aspects of the facility's waste tracking program that could produce inaccuracies including:

- The initial data collection processes and data sources (e.g., weighing records, manifest/invoices/receipts, etc.); and
- The process and tools used to aggregate the data (e.g. spreadsheet calculations, unit conversions, etc.)

If any inconsistencies or errors are noted, the reported information must be corrected where possible and detailed comments should be included in the Verification Data field.

Full Points

- **Documentation Required:**
  - List of ALL non-hazardous waste produced by the facility
    - Production Waste
    - Packaging waste
    - Domestic Waste
  - Records for tracking both the quantity and type of disposal (including disposal destination) of ALL non-hazardous waste (e.g. invoices from waste contractors, weighing records compiled in a spreadsheet (e.g. Excel) is ok as long as supporting evidence is available for review as well). Records must match the reported answers to all questions answered.
  - Method of tracking the quantity and measurement method for ALL non-hazardous waste
  - Scale calibration records where applicable (e.g. as per manufacturer's specifications)
  - Estimation methodology documented where applicable
  - All non-hazardous waste sources at the facility are tracked in full. This means that all sources listed in the Level 1 table have complete answers in all columns that are accurate
- **Interview Questions to Ask:**
  - Management can describe the major sources of non-hazardous waste and describe their fate (where they are disposed of)
  - Key Employees are aware of:
    - The procedures in place for tracking non-hazardous waste, including tracking the waste collection process, quantity measurement and type of disposal
    - The waste data tracking program and how data quality is maintained
- **Inspection - Things to Physically Look For:**
  - Sources of non-hazardous waste production
  - Equipment for waste quantity measurement
  - Collection sites for waste disposal
  - Waste handling contractors site for waste disposal

Partial Points

- Same requirements as for "yes" above for at least one non-hazardous waste source at the facility. This must be tracked in full. This means that at least one (but not all) of the sources listed in the Level 1 table have complete answers in all columns and there is evidence to support all of the answers.

2. Which <u>hazardous</u> waste streams does your site produce? Select all that apply:

Production Waste:

- Empty chemical drums and containers
- Film and Printing Frame
- Wastewater treatment sludge (Hazardous)
- Expired / unused / used chemicals (waste oil, solvents, reactants, etc.…)
- Compressed Gas Cylinders (refrigerants, etc.)
- Contaminated materials (please specify)
- Other (please specify)
- *New Guidance for Hardgoods facilities*: enter (e.g. Metal sludge, Waste oil and grease (from operations and manufacturing), Disposal of coolant, etc.)

Domestic Waste:

- Batteries
- Fluorescent light bulb
- Ink cartridges
- Waste oil and grease (from cooking)
- Empty containers (cleaning, sanitizing, pesticides, etc...)
- Electronic Waste
- Coal combustion residuals (fly ash and bottom ash/coal slag)
- Wastewater treatment sludge (household)
- Other (please specify)

Suggested Upload: Hazardous waste manifests and/or copies of permits for handling hazardous waste

Do you track your hazardous waste streams?

*You will receive **Full Points** if you are completely tracking all hazardous waste sources AND are disposing of hazardous wastes through a licensed and permitted hazardous waste contractor. Please refer to the guidance below for information on reporting on drums or barrels.*

*You will receive **Partial Points** if you are completely tracking at least one of your hazardous waste sources, but are not yet tracking all of your sources.*

What is the intent of the question?

The intent is to build awareness of all **hazardous** waste types produced onsite and to track the volume of each waste type generated and the method of disposal. You must know your sources of waste before you can make strategic decisions on how to reduce, divert or improve waste management.

Technical Guidance:

Because of its hazardous characteristics, all hazardous waste must be well tracked and controlled to meet the local laws & regulations. To identify your hazardous waste, each country has its own National Hazardous Waste Inventory and National Hazardous Waste Identification Standard. Please refer to these standards and inventory.

Note: The data tracking and reporting principles and guidance provided in the Technical Guidance of Question 1 for non-hazardous wastes should be applied to hazardous waste tracking and reporting.

Hazardous waste poses a greater risk to the environment and human health than non-hazardous waste, and thus requires a stricter *management process*. You must know your sources of waste before you can make strategic decisions on how to reduce, divert or improve waste management. It's important to prioritize improvements for the waste sources that you produce the most of.

It is important to also specify how each waste stream is being disposed of in order to meet the local laws and regulations regarding hazardous waste and identify opportunities to improve the disposal methods (e.g., reduce, recycle and incinerate with energy recovery).

It is advisable for your factory to regularly check that hazardous wastes are being properly handled and are treated/ disposed of at the approved intended facility.

An example of contaminated materials can be a piece of cotton or nylon used to clean machines. The fabric is contaminated by hydraulic oil or lubricant oil or ink or chemicals and may be classified as hazardous waste.

Note: The classification into hazardous and non-hazardous waste may differ from one country legislation to another that may define which 'waste' are categorized as hazardous differently. The facility should follow the legal waste requirements. If legal requirements are not available, select more stringent industry guidelines.

Note on Drums / Barrels: If you have disposed of empty drums, please enter the *total weight* of all drums in kilograms or metric tons. For example, if you disposed of 25 empty steel drums that weighed 20

kilograms each, please choose “Empty containers” and enter 500 kilograms (25 drums x 20 kgs = 500 kgs total).

If you have disposed of full drums that contain liquid waste, please enter the volume of the drum (cubic feet, cubic yard, gallons, meters) or the total weight (kg or metric tons).

How This Will Be Verified:

When verifying a facility’s waste data, Verifiers **must** review all aspects of the facility’s waste tracking program that could produce inaccuracies including:

- The initial data collection processes and data sources (e.g., weighing records, manifest/invoices/receipts, etc.); and
- The process and tools used to aggregate the data (e.g. spreadsheet calculations, unit conversions, etc.)

If any inconsistencies or errors are noted, the reported information must be corrected where possible and detailed comments should be included in the Verification Data field.

Yes

- **Documentation Required:**
    - List of ALL hazardous waste produced by the facility
        - Production Waste
        - Packaging waste (e.g. chemical drums and containers)
        - Domestic Waste
    - Records for tracking both the quantity and type of disposal (including disposal destination) of ALL hazardous waste (e.g. invoices from waste contractors, weighing records compiled in a spreadsheet (e.g. Excel) is ok as long as supporting evidence is available for review as well). Records must match the reported answers to all questions answered.
    - Method of tracking the quantity and measurement method for ALL hazardous waste.
    - Permits for hazardous waste handling (if applicable)
    - Scale calibration records where applicable (e.g. as per manufacturer’s specifications).
    - Estimation methodology documented where applicable
    - All hazardous waste sources at the facility are tracked in full. This means that all sources listed in the Level 1 table have complete answers in all columns that are accurate
- **Interview Questions to Ask:**
    - Management can describe the major sources of hazardous waste and describe their fate (where they are disposed of).
    - Key Employees are aware of:
        - The procedures in place for tracking hazardous waste include tracking the waste collection process, quantity measurement, and type of disposal.
        - The waste data tracking program and how data quality is maintained.

- **Inspection - Things to Physically Look For:**
    - Sources of hazardous waste production
    - Equipment for waste quantity measurement
    - Collection sites for waste disposal
    - Waste handling contractor's site used for waste disposal

3. Does your facility segregate all waste streams into non-hazardous and hazardous waste, and store them separately?

Suggested Upload: Photos of segregated storage sites

***Answer Yes** if you segregate hazardous and non-hazardous waste for appropriate management.*

What is the intent of the question?

The intent is for your facility to segregate hazardous and non-hazardous waste for appropriate management.

This question is important because your facility needs to manage and dispose of hazardous and non-hazardous waste differently. Segregating hazardous and non-hazardous waste can prevent unwanted reactions between the waste streams, reduce pollution and harm to environment and people, help reduce cost (mixing waste can increase the volume of waste classified as hazardous which is more expensive to dispose of), and prevent unwanted exposure for personnel (source: GSCP).

Technical Guidance:

The first step is to make sure that legal requirements in relation to waste generation, collection and segregation, storage, transportation, treatment and disposal are met. There should be procedures for the management (including collection, segregation, storage and transportation) of hazardous and non-hazardous waste. The facility should provide sufficient working instruction or standard operating procedures and signs for handling and segregating non-hazardous waste. This can be a training, awareness campaigns, posters, working instructions, signs directing where to put which waste, etc. Personal protective equipment (PPE) should be provided to employees when handling waste. Instruction should be provided to:

- Personnel responsible of handling and segregating non-hazardous waste
- To anyone that can produce non-hazardous waste and has to collect and segregate in the right garbage bin (e.g., all workers at the canteen, production floor, dorm, etc.)

How This Will Be Verified:

Yes

- **Documentation Required:**
  - Documentation for the working instructions or operating procedures of collecting generated waste, segregating waste streams (hazardous waste and non-hazardous waste), storing and transporting hazardous waste and non-hazardous waste.
  - Training materials and record for waste management and handling training
- **Interview Questions to Ask:**
  - Key Employees discussion:
    - Key Employees are trained to collect, segregate and store wastes

- **Inspection - Things to Physically Look For:**
  - Location of segregated waste area as collection points around the factory and clear instruction or signs at the collection point to physically segregate both hazardous and non-hazardous waste
  - On-site evidence to support an established procedure for separating waste, e.g., the related standard procedures are posted in the workshops.
  - Collection sites for waste disposal -- are they clearly segregated, marked, and controlled as required by the danger imposed by the contents?

4. Does your facility have well-marked, designated hazardous waste storage areas and containers?

Suggested Upload: Photos of segregated storage sites

Hazardous waste storage area requirements:

- **The hazardous waste storage area is ventilated, dry and protected from the weather and fire risk.**
- **The hazardous waste storage area is protected from unauthorized employees (i.e. locked).**
- **Eating, smoking and drinking are not permitted in these areas.**
- **The hazardous waste storage area is clearly marked.**
- **Where liquid wastes are stored, the floor is solid and non-porous, containers have lids, there are no water drains that the liquid could spill into, and there is no evidence of spilled liquid.**
- **Flammable substances are kept away from sources of heat or ignition, including the use of grounding and explosion-proof lighting.**
- **Incompatible waste must be segregated.**
- **Spill response equipment including necessary personal protective equipment (PPE) must be located near storage areas including accessible emergency eyewash and/or shower stations.**
- **Employees must use appropriate personal protective equipment (PPE) when in these areas.**

Hazardous waste storage container requirements:

- **Storage containers are in good condition, appropriate for their contents, closed and clearly labeled with their contents.**
- **Containers must have lids**
- **Containers must be secured to prevent falling and safely stacked**
- **Adequate aisle space must be maintained between containers**

What is the intent of the question?

The intent is to ensure proper storage of hazardous waste containers in all parts of your facility.

Hazardous waste poses a greater risk to the environment and human health than non-hazardous waste, and thus require stricter management process. It's important to segregate hazardous waste and secure storage areas and containers to eliminate risk to workers and the environment.

Technical Guidance:

The facility should have a dedicated location for the hazardous waste storage. The storage area should have the following features:

- The location should be further from people, fire source and high traffic flow area.
- Store corrosives, flammables and explosives in dry, cool areas, out of direct sunlight and away from steam pipes, boilers or other sources of heat. Follow the chemical manufacturer's or supplier's recommendations for storage temperature.
- Proper roofing and flooring to prevent rainwater from seeping through waste and to prevent any leakage to infiltrate to the ground and ground-water.
- Spill containment available and workers trained to use it in case of leakage.
- Firefighting equipment if oxidizers, explosives, flammable or gasses under pressure wastes are stored in the area.
- Sufficient ventilation. Well-designed and well-maintained ventilation systems remove corrosive, flammable and toxic vapors, fumes, mists or airborne dusts from the workplace and reduce their hazards. Some places may need a complete system of hoods and ducts to provide acceptable ventilation. Others may require a single, well-placed exhaust fan. Use corrosion-resistant construction in ventilation systems for corrosive materials. No special ventilation system may be needed when working with small amounts of corrosives which do not give off airborne contaminants.
- Locked and secured at all times. Only authorized people are allowed to enter.
- Provide appropriate warning signage at the entrance.
- Display the personal protective equipment (PPE) list that is needed for entering the area.
- Provide the PPE needed for entering the area.
- Display the simplified Safety Data Sheet.
- Segregate according to the chemical compatibility matrix.
- Wrong segregation may lead to incompatible wastes reacting together to create fires, explosions or to release toxic gas.

- Hazardous waste is stored in containers compatible to their contents, such as discarded chemicals. The choice of materials such as steel, aluminium, fiber, plastic, etc.… need to be linked to the product it will contain. Make sure the waste is not going to react with the container itself. Some waste is highly corrosive, which may cause a reaction with a metal container, possibly causing the container to fail. Plastic or plastic-lined containers are good solutions for corrosive wastes. Steel containers are a good choice for non-corrosive and flammable liquids.
- Waste containers should be closed or made secure when not in use; open-topped skips should be covered securely.
- All containers and receptacles should be clearly labelled with their contents and hazard characteristics.
- Waste containers are in good condition.
- Good housekeeping to be maintained for preventing the area from becoming breeding ground for rodents and insects.
- Regular inspections of on-site waste storage areas should be undertaken at a frequency in proportion to the risk and maintain the above requirement at all time.
- The status of all hazardous waste in the storage area must be well recorded with the name of each hazardous waste, source, quantity, characteristic, waste container type, waste-in date, storage location, waste-out date, and waste received department.

How This Will Be Verified:

Yes

- **Documentation Required:**
  - Procedures for ensuring hazardous waste storage and status in the storage area records are always kept compliant with the above technical guidance.

- **Interview Questions to Ask:**
  - Management understands the dangers of hazardous waste and the importance of preventing contamination
  - Key employees are trained on how to prevent contamination in hazardous storage area
- **Inspection - Things to Physically Look For:**
  - Wastes are being stored in a specific location and all the above requirements are fulfilled. (refer to **Technical Guidance)**

5. Does your facility have well-marked, designated non-hazardous waste storage areas and containers?

Suggested Upload: Photos of segregated storage sites

Non-Hazardous waste storage area requirements:

- **The non-hazardous waste storage area is ventilated, dry and protected from the weather and fire risk, and must be stored on impervious surfaces.**
- **The non-hazardous waste storage area is clearly marked.**
- **Flammable substances are kept away from sources of heat or ignition, including the use of grounding and explosion-proof lighting.**
- **Employees must use appropriate personal protective equipment (PPE) when in these**

areas.

Non-Hazardous waste storage container requirements:

- **Storage containers are in good condition, appropriate for their contents, closed and clearly labeled with their contents.**
- **Containers must be secured to prevent falling and safely stacked.**

What is the intent of the question?

This intent is to ensure proper storage of non-hazardous waste in all parts of your facility.

Non-hazardous wastes can pose contamination risks (e.g., pollution, waste being dispersed by the wind, food waste leachate) and risks to workers (e.g., fire, sharp objects).

Waste shouldn't be kept too long and in too much quantity as leachate can happen (especially for food waste or coating on metals or other type of materials that contain hazardous substances). Any site where waste is concentrated and stored even for a short period of time may be a potential point source of ground and groundwater contamination.

Technical Guidance:

A storage area should be available to contain the sorted waste while waiting for the contractor to collect for disposal. General requirement of a non-hazardous waste storage area should include:

- **Location:** Further from people, fire source.
- **Proper roofing and flooring and walls:** Prevent rainwater from seeping through waste and generate leachate to the ground and ground-water. Protect the floor with impervious (meaning that the material used to cover the floor will not allow any liquid to infiltrate / get through) surfaces to avoid any contamination of the ground from waste leachate or coating substances on non-hazardous waste (printing materials, paintings, etc.…) and avoid spreading
- **Housekeeping:** Good housekeeping to be maintained for preventing the area from becoming breeding ground for rodents and insects.
- **Firefighting equipment** if flammable wastes are stored in the area (e.g., paper, cardboard, etc.…)
- Provide appropriate **warning signage** at the entrance and inside the storage area such as "no smoking" signs, "no food", name and location of where to store the different types of recyclables. All signs should be in a visible location and in a language(s) that can be understood by workers handling waste.
- Display and provide the **PPE list** that is needed for entering the area if any risks (gloves for sharp waste, mask for dusty waste…).

- Regular inspections of on-site waste storage areas should be undertaken by the waste engineer at a frequency in proportion to the risk and inspections record should be kept.
- The status of non-hazardous waste in the storage area must be well recorded with the name of each non-hazardous waste, source, quantity, waste-in date, storage location, waste-out date, and waste received department.

Leachate is the liquid (e.g., rain) that drains or 'leaches' (e.g., water contained in food waste) from waste when water percolates through any waste. It varies widely in composition regarding the age of the waste and the type of waste. It usually contains both dissolved and suspended material.

How This Will Be Verified:

Yes

- **Documentation Required:**
  - Procedures for ensuring non-hazardous waste storage does not become contaminated.
  - Records for the non-hazardous waste status in the storage area.
- **Interview Questions to Ask:**
  - Management understands the dangers of non-hazardous waste and the importance of preventing contamination
  - Key employees are trained on how to prevent contamination in non-hazardous storage area
- **Inspection - Things to Physically Look For:**
  - Wastes are being stored in a specific location and all the above requirements are fulfilled. (refer to **Technical Guidance)**

6. Does your facility forbid all irresponsible waste disposal actions including open burning, open dumping, burying and storage tank leaks?

Open burning is forbidden

- If open burning is not forbidden, please describe the technology used and how you control air emissions

Open dumping is forbidden

- If open dumping is not forbidden, please describe the technology used and how you control pollution

Burying of wastes and Storage tank leaks is forbidden

- If burying of wastes and storage tank leaks is not forbidden, please indicate how you have dispose of waste onsite

What is the intent of the question?

Irresponsible waste disposal actions including on-site open burning, landfilling, burying of waste and storage tank leaks can cause contamination in the soil and groundwater, air pollution from smoke emissions and gas generation, and health hazards (GSCP). The intent is to drive you to eliminate all irresponsible waste disposal actions.

How does this question help a facility drive improvement?

Any unauthorized burning and dumping of waste as well as burying wastes and storage tank leaks in the premise of your factory site should be forbidden as relevant environment hazards, such as air emissions, wastewater discharge will not be controlled, collected and treated. All waste gasses should be released through a chimney, stack, or vent so emissions can be controlled and a filter can be applied to capture pollution in some cases.

Technical Guidance:

Burning and dumping waste on facility premises (inside or outside) with no air emissions control equipment and without special authorization from your environmental legal agency should be forbidden. If you do incinerate on-site, please explain the technology, the approval process, and how you control air emissions in the comment field provided. Any uncontrolled waste landfilling (i.e. landfilling without the appropriate license/ permit) should be forbidden. All your hazardous waste should be passed on to a licensed and permitted handler (Certified legal contractor) and solid waste should be managed by a qualified third-party vendor that will treat the waste minimizing and controlling all health and environmental impact. Final disposal and treatment shouldn't be handled on-site (in the factory premise) by the factory employees.

How This Will Be Verified:

Yes

- **Documentation Required:**
  - Policy for forbidding irresponsible waste disposal actions
  - Policy on how waste will be handled and disposed of
  - Contract of waste handling contractor
- **Interview Questions to Ask:**
  - Management and Key employees are made aware of any irresponsible waste disposal actions
- **Inspection - Things to Physically Look For:**
  - Uncontrolled burying, burning or uncontrolled landfilling activities on-site
  - Leaks of waste storage tank

7. Does your facility provide training to all employees whose work involves

hazardous waste handling (such as maintenance and custodial staff)?

If yes, please select all topics included in your training:

- Proper handling
- Storage and disposal techniques and procedures
- Specific operational procedures for waste minimization
- Use of personal protective equipment
- Other, please specify

How many employees were trained?

How frequently do you train your employees?

Suggested Upload: List of trained individuals, training materials (including calendar), certifications

*You will be awarded **Full Points** if all topics were included in your training.*

*If some, but not all, topics were included you will be awarded **Partial Points***

What is the intent of the question?

The intent is for you to educate all necessary workers on appropriate waste handling procedures.

Technical Guidance:

Factory is advised to include the following important elements in the training:

- Proper handling
- An overview of legal requirements and the environmental consequences of poor waste handling and management.
- How to identify, segregate, collect and transport hazardous waste
- How to track and weigh the quantity of hazardous waste
- Awareness on hazardous waste accident prevention policy, emergency preparedness and response procedure management
- Storage and disposal techniques and procedures
- An overview of positive environmental benefits of waste segregation including quality control and ensuring highest value recycling options.
- Personal protective equipment distribution and usage management.

- Introduction on the use of proper tools and protective equipment when handling waste.

In addition to training, facilities should provide sufficient working instruction and signs for handling, segregating and transporting non-hazardous waste.

How This Will Be Verified:

Yes

- **Documentation Required:**
  - Training documentation including ALL of the below:
    - Proper handling
    - The procedures for identifying, segregating, collecting and transporting hazardous waste
    - The procedures of tracking and weighing the quantity of hazardous waste
    - Storage and disposal techniques and procedures
    - Specific operational procedures for waste minimization
    - Personal protective equipment distribution and usage management
  - **Interview Questions to Ask:**
    - Key employees have undergone hazardous waste handling training
    - Employees understand the risks of not following the safety procedures
  - **Inspection - Things to Physically Look For:**
    - Training documents
    - Training sign in sheets
    - Training testing results documents
    - Pictures of Training event

Partial Yes: Partial credit if all the preventive measure to fully control any contamination (air, soil and underground…) are not fully in place and controlled yet

- **Documentation Required:**
  - Training documentation including some of the below:
    - Proper handling
    - The procedures for identifying, segregating, collecting and transporting hazardous waste
    - The procedures of tracking and weighing the quantity of hazardous waste
    - Storage and disposal techniques and procedures
    - Specific operational procedures for waste minimization
    - Personal protective equipment distribution and usage management

- **Interview Questions to Ask:**
  - Key employees have undergone hazardous waste handling training

- **Inspection - things to physically look for:**
  - Training documents
  - Training sign in sheets
  - Training result testing documents
  - Pictures of Training event

Waste - Level 2

8. Has your facility set a baseline for solid waste?

If yes, select all sources of waste for which your facility has set a baseline

- Source of Waste
- Is the baseline absolute or normalized?
- What is the baseline quantity?
- Unit of Measure
- Enter the baseline year
- How was your baseline calculated?
- Was the baseline verified?

What is the intent of the question?

In order to demonstrate improvements or reductions of waste sources, it's important to know what your starting point is. Setting a baseline (i.e. the annual performance of a set parameter at a defined base year) enables you to have clear reference point for ongoing waste performance tracking and target setting.

Technical Guidance:

A "baseline" is a starting point or benchmark that you can use to compare yourself against over time.

In the FEM, baselines can be "absolute" (total waste quantity for a reporting period e.g. 1,500 tons per year) or "normalized" to a product or operational metric (e.g. 0.15 kg per unit of production). Data normalization is recommended to account for operational fluctuations as this provides for better year-over-year comparison of data and therefore more useful, and actionable analytics.

When establishing a baseline, be sure to do the following:

- Confirm the waste source data is stable, and sufficient to be used to determine a baseline. In the Higg FEM, a baseline should generally comprise of a full calendar year's data.
    - **Note:** If your factory has undergone major structural or operational changes such as acquisition or changes in product type, in general, you should establish or reset a baseline *after* those changes have been completed.
- Determine if the baseline will be Absolute or Normalized (Normalized baselines are preferred)
- Verify the source data and normalizing metric data is accurate.
    - Waste quantities and production volume data from previous Higg FEM 3.0 verifications, internal or external audits conducted by qualified personnel are acceptable sources of data verification.
- Apply the appropriate baseline metric (i.e., per year for absolute OR divide by the chosen normalizing metric 1,500,000 kg per 1,000,000 pieces = 1.5kg/piece)

- **Note:** For waste sources that is not related to production, other normalizing metrics should be used where appropriate (e.g. food or other domestic wastes can be normalized per meal served or per worker)

Note: If the baseline is used to evaluate performance against a target, the baseline should remain unchanged.

Reporting baseline data in the Higg FEM:

Do:

- ✔ Review source data and raw normalizing metric data (manifests/invoices, weighing records, production quantity, etc.) against aggregated totals to ensure they are accurate. (e.g. double check monthly waste source records to ensure they match the annual waste quantities used to calculate the baseline).
- ✔ Select the appropriate baseline type in the FEM - Absolute or Normalized.
- ✔ Ensure the proper units are reported and verify any unit conversions from source data to reported data.
- ✔ Enter the baseline year. This is the year the baseline data represents.
- ✔ Provide sufficient details on how the baseline was calculated (e.g. waste quantity was normalized per meter of fabric produced).
- ✔ Only select Yes to the question "Was the baseline verified?" if the baseline data was fully verified in a previous Higg FEM 3.0 verifications, or by an internal or external audit conducted by qualified personnel.

Do Not:

- X Report a baseline that is not accurate (e.g. the data source is unknown or has not been verified)
- X Report a baseline that is based on insufficient data (e.g., not a full year's data).
- X Report an estimated baseline if it is not supported by verifiable and accurate estimation methodology and data (e.g. engineering calculations).

How This Will Be Verified:

When verifying a facility's baselines, Verifiers **must** review:

- All source data (manifests/invoices, weighing records, production quantity, etc.) and aggregated data totals for the baseline year; and/or
- Records of baseline data verification where available (e.g., previous Higg Verification, data quality review, internal or external audits, etc.)

If any inconsistencies or errors are noted, the reported information must be corrected where possible and detailed comments should be included in the Verification Data field.

Yes

- **Documentation Required:**

    - Documentation of each waste source's baseline and baseline setting process as well as the related data tracking regarding baseline setting
    - Ability to demonstrate how baseline data was validated (e.g., used Higg FEM 3.0 verified data, used internal validation process)
- **Interview Questions to Ask:**
    - Discussion with the team responsible for managing the metrics. The team must clearly explain and demonstrate how baseline data was calculated and validated (e.g., used Higg FEM 3.0 verified data, used internal validation process, external audit, etc.)
- **Inspection – Things to Physically Look For:**
    - Waste generation points
    - Waste storage areas
    - Waste weighing area

9. Did you set a baseline for waste disposal methods for your facility's overall waste?

If yes, indicate which methods:

- Disposal method
- What is the baseline quantity? (Enter a Percentage %)
- Enter the baseline year
- How was your baseline calculated?
- Was the baseline verified?

What is the intent of the question?

In order to demonstrate improvements in waste disposal methods, it's important to know what your starting point is. Setting a baseline (i.e. the annual performance of a set parameter at a defined base year) enables you to have clear reference point for ongoing improvements in waste disposal method tracking and target setting.

Technical Guidance:

Waste disposal method baseline are different from the waste source baseline in Question 8. Disposal methods baselines focus on the percentage of total facility wastes being disposed of by a specific method (e.g. 60% of all waste generated at the facility in a year is disposed of by landfilling).

When establishing a waste disposal method baseline, be sure to do the following:

- Confirm the waste quantity data is accurate, includes all sources and is sufficient to be used to determine a baseline. In the Higg FEM, a baseline should generally comprise of a full calendar year's data.
    - **Note:** If your factory has undergone major structural or operational changes such as acquisition or changes in product type, in general, you should establish or reset a baseline *after* those changes have been completed.
- Calculate the total amount of waste generated at the facility (from all sources) including hazardous and non-hazardous sources.

- Calculate the total amount of wastes being disposed of using a particular disposal method (e.g. landfill, recycling. Incineration)
- Divide the total amount of waste disposed of using the same method by the total amount of waste generated. For example:
    - Total waste generated from all sources: 460,555 kg per year
    - Total amount of waste recycled (all relevant sources): 255,000kg/year
    - Baseline for recycled waste: 55.3% (255,000kg/460,555kg)

Note: If the baseline is used to evaluate performance against a target, the baseline should remain unchanged.

Reporting baseline data in the Higg FEM:

Do:

- ✔ Review source data (manifests/invoices, weighing records, etc.) against aggregated totals to ensure they are accurate. (e.g. double check monthly waste source records to ensure they match the annual waste quantities used to calculate the baseline).
- ✔ Ensure all waste sources (hazardous and non-hazardous) are included in the facility's total waste quantities and quantities for each disposal method.
- ✔ Enter the baseline year. This is the year the baseline data represents.
- ✔ Provide sufficient details on how the baseline was calculated (e.g. total quantity of all recycled waste was divided by total quantity of waste generated at the facility).
- ✔ Only select Yes to the question "Was the baseline verified?" if the baseline data was fully verified in a previous Higg FEM 3.0 verifications, or by an internal or external audit conducted by qualified personnel.

Do Not:

- X Report a baseline that is not accurate (e.g. the data source is unknown or has not been verified)
- X Report a baseline that is based on insufficient data (e.g., not a full year's data).
- X Report an estimated baseline if it is not supported by verifiable and accurate estimation methodology and data (e.g. engineering calculations).

How This Will Be Verified:

When verifying a facility's baselines, Verifiers **must** review:

- All source data (manifests/invoices, weighing records, production quantity, etc.) and aggregated data totals for the baseline year; and/or
- Records of baseline data verification where available (e.g., previous Higg Verification, data quality review, internal or external audits, etc.)

If any inconsistencies or errors are noted, the reported information must be corrected where possible and detailed comments should be included in the Verification Data field.

Yes:

- **Documentation Required:**
    - Documentation of each the waste disposal method's baseline setting process as well as the related data tracking regarding baseline setting
    - Ability to demonstrate how baseline data was validated (e.g., used Higg FEM 3.0 verified data, used internal validation process)
    - Waste handlers' contract. The records of waste disposal data and process explanation.
- **Interview Questions to Ask:**
    - Discussion with the team responsible for managing the metrics. The team must clearly explain and demonstrate how baseline data was calculated and validated (e.g., used Higg FEM 3.0 verified data, used internal validation process, external audit, etc.)
- **Inspection – Things to Physically Look For:**
    - Waste disposal methods at the facility and waste handling contractor's site.

10. Does your facility set formal targets to reduce waste quantity?

Select all sources of waste for which your facility has set a quantity or improvement target.

- What is your target change for waste generated from this source? ***Make sure to enter a negative percentage (%) for a reduction target***
- What is the target year?
- Describe the measures planned to achieve this target

Y*ou will receive **Full Points** if you set targets for waste quantity that make up 80% or more of your total waste generated.*

*You will receive **Partial Points** if you set targets for waste quantities that make up 50-79% of your total waste generated. This is to reward you for aiming to reduce your greatest sources of waste generation which will maximize environmental impact.*

Please Note: Full or Partial Points are automatically calculated based on which sources you select and report having an improvement target for.

What is the intent of the question?

The intent is for you to set up at least one waste reduction target for your facility.

Sustainable companies continually work towards minimizing their environmental impacts. Now that you know how much waste your facility generates (your "baseline"), you are ready to set targets to reduce the amount of waste generated.

Note: Facilities can separate targets for waste quantities and disposal methods. This Question focuses on waste quantities for specific sources of waste.

Targets can be long-term or short-term (short term=less than 3 years, long term=more than 3 years). Once set, progress should be reviewed at least quarterly to ensure adjustments are made as needed to stay on track to realize success.

Technical Guidance:

A target can use absolute or normalized metrics to drive quantifiable improvements by a set date compared to the baseline. For Higg FEM, reduction targets may be normalized to the production volume unit (selected in Site Info section: Annual volume unit) or another appropriate operational metric. A normalized target shows you when progress is real, rather than being a result of business changes such as reductions in production. An example of a normalized target is kilograms (kg) of a waste generated for the production of one unit of sellable product (kg/unit).

The Higg FEM requires that formal targets be set in order to be able to answer Yes to this question. When establishing formal improvement targets, be sure to do the following:

- Base the target on a formal evaluation of improvement opportunities and actions (e.g. change of raw materials/packaging, process modifications or equipment replacement) to calculate the amount of waste that can be reduced.
    - For example: Setting a target based on an evaluation of the purchase of laser cutting machines that is expected to reduce fabric waste by 15% per meter of fabric that was calculated based on a formal review of equipment specifications and planned operations.
- Define the exact target quantity, expressed as a percent (e.g. reduce normalized fabric waste per piece by 5%). This **must** be based on a formal evaluation as noted above.
- Determine if the target will be Absolute or Normalized to a production or operating metric.
- Define the start date (i.e., "baseline") of the target.
- Define the end date of the target, meaning the intended completion date of the required improvements.
- Define the appropriate measurement units.
- Establish procedures to review the target. This review should include an evaluation of the actions taken and progress on reaching the defined target. Quarterly reviews are recommended.
- Ensure the target is relevant to reducing the site's waste (e.g. focuses on the most significant waste sources at the site)

Reporting Targets in the Higg FEM:

Do:

- ✔ Review the target to ensure all aspects noted above are covered and that the information is accurate.
- ✔ Enter the targeted reduction as a percentage. **Make sure to enter a negative percentage for a reduction target (e.g. -5 for a 5% reduction)**
- ✔ Select the appropriate target type in the FEM - Absolute or Normalized.
- ✔ Provide sufficient details on how the target will be met in the "Describe the measures planned to achieve this target:" field (e.g. Achieve a 3% reduction in normalized cardboard waste generated by switching to reusable cartons for raw material deliveries).

Do Not:

X Report a target that is not accurate (e.g. the data source is unknown or has not been verified)
X Report a target that is based on insufficient data. (e.g. a reduction target that is not based on a formal evaluation of options such as process/equipment modifications or change of materials used to meet the stated target OR actions to meet the target have not been defined.)
X Report an estimated target if it is not supported by verifiable and accurate estimation methodology and data (e.g. engineering calculations).

How This Will Be Verified:

When verifying a facility's targets, Verifiers **must** review:

- All supporting evidence (e.g. calculations, waste quantity data and baselines, new/proposed equipment specifications, etc) to verify target is based on a formal evaluation of improvement opportunities.
- Facility operations in relation to its waste sources to ensure targets and opportunities evaluated are relevant to the site's wastes.

If any inconsistencies or errors are noted, the reported information must be corrected where possible and detailed comments should be included in the Verification Data field.

Full Points

- **Documentation Required:**
  - Supporting documentation that demonstrate targets are based on a formal evaluation of reductions/improvement opportunities (e.g. calculations, waste quantity data and baselines, new/proposed equipment specifications, etc)
  - Supporting methodology and calculations to show how the target(s) was calculated
  - List of measures/actions to be taken to achieve the target
- **Interview Questions to Ask:**
  - Discussion with the team responsible for managing the targets. The team must clearly explain and demonstrate how the target was determined (e.g. based on calculated reductions from evaluations of improvement opportunities) and how the target is monitored and reviewed

- **Inspection - Things to Physically Look For:**
  - Evidences supporting waste reduction target strategies

Partial Yes

- Same requirements as for "Yes" answer but for sources (or one source) totalling 50-79% of total wastes (this data is found in the % contribution calculation in Question 1).

11. Did you set a target for improving waste disposal methods for your facility's overall waste?

If yes, indicate which methods.

- Waste disposal method
- What is your target change for this method of disposal?
- What is the target year?
- Describe the measures planned to achieve this target

Please note that you need to set separate targets for total amount of waste generated and disposal method. These targets are focused on disposal methods.

What is the intent of the question?

The intent is for you to set up at least one target to improve the waste disposal methods at your facility.

Sustainable companies continually work towards minimizing their environmental impacts. Now that you know the percentage of wastes that are disposed of using a specific method (e.g. landfill, recycling, etc.) (your "baseline"), you are ready to set targets to improve the disposal methods of your waste to reduce environmental impacts.

Targets can be long-term or short-term (short term=less than 3 years, long term=more than 3 years). Once set, progress should be reviewed at least quarterly to ensure adjustments are made as needed to stay on track to realize success.

Technical Guidance:

Minimizing the environmental impact of your waste can be achieved by reducing the quantity of waste generated or by using a disposal method results in less environmental impact. Examples of improvements to disposal methods can include:

- Increase quantity of waste sent to external recycling contractors and biological treatment (such as non-hazardous production waste recycling and food waste biological treatment) to divert waste from landfill or incineration without energy recovery.
- Switch to a disposal/treatment method that recovers usable aspects of the waste (e.g., using incineration with energy recovery as opposed to landfilling)

Note: Improving waste disposal methods will often require collaboration with waste treatment vendors to evaluate which preferred disposal methods are available.

When evaluating improvements to waste disposal or treatment methods the following hierarchy can be used (1 being the most preferred option).

1. Waste Source Reduction & Reuse/Upcycle
2. Recycle
3. Energy/Material Recovery (e.g. Incineration with energy recovery)
4. Other Treatment (e.g. Biological treatment, Incinerated without energy recovery)
5. Landfill

The Higg FEM requires that formal targets be set in order to be able to answer **Yes** to this question. When establishing formal improvement targets, be sure to do the following:

- Base the target on a formal evaluation of improvement opportunities and actions (e.g. a review of the available disposal alternatives with waste treatment vendors) to calculate the amount and types of wastes that can be treated by the preferred method.
    - For example: Setting a target based on an evaluation of sending all fabric and plastic packaging to a recycling vender as opposed to sending it to landfill is expected to result in a 25% increase in waste sent for recycling. **Note**: It should be confirmed that the vendor is able to recycle the materials and has applicable technology and operating permits to do so.
- Define the exact target quantity, expressed as a percent (e.g. Increase waste treated by incineration with energy recovery by 15%). This **must** be based on a formal evaluation as noted above.
- Define the start date (i.e., "baseline") of the target.
- Define the end date of the target, meaning the intended completion date of the required improvements.
- Establish procedures to review the target. This review should include an evaluation of the actions taken and progress on reaching the defined target. Quarterly reviews are recommended.
- Ensure the target is relevant to improving the facility's waste disposal methods (e.g. new disposal methods result in less environmental impact)

Reporting Targets in the Higg FEM:

Do:

✔ Review the target to ensure all aspects noted above are covered and that the information is accurate.
✔ Enter the targeted reduction as a percentage. **Make sure to enter a negative percentage for a reduction target (e.g. -5 for a 5% decrease in disposal method), and a positive percentage for an increased target (e.g. 5 for a 5% increase in disposal method).**
✔ Provide sufficient details on how the target will be met in the "Describe the measures planned to achieve this target:" field (e.g. Achieve a 10% increase in waste being recycled by sending fabric scrap to a verified fibre recycling vendor).

Do Not:

X Report a target that is not accurate (e.g. the data source is unknown or has not been verified)

X Report a target that is based on insufficient data. (e.g. a reduction target that is not based on a formal evaluation of options such as new waste treatment vendors OR actions to meet the target have not been defined.)
X Report an estimated target if it is not supported by verifiable and accurate estimation methodology and data (e.g. engineering calculations).

How This Will Be Verified:

When verifying a facility's targets, Verifiers **must** review:

- All supporting evidence (e.g. calculations, waste quantity data and baselines, new/proposed waste treatment methods, etc) to verify target is based on a formal evaluation of improvement opportunities.
- Facility operations in relation to its waste sources to ensure targets and opportunities evaluated are relevant to the site's wastes.

If any inconsistencies or errors are noted, the reported information must be corrected where possible and detailed comments should be included in the Verification Data field.

Yes

- **Documentation Required:**
  - Waste diversion improvement strategies/Waste management plan.
  - Supporting documentation that demonstrate targets are based on a formal evaluation of reductions/improvement opportunities (e.g. waste quantity data and baselines, new/proposed disposal methods, etc).
  - Supporting methodology and calculations to show how the target(s) was calculated.
  - List of measures/actions to be taken to achieve the target.
- **Interview Questions to Ask:**
  - Discussion with the team responsible for managing the targets. The team must clearly explain and demonstrate how the target was determined (e.g. based on formal evaluations of improvement opportunities) and how the target is monitored and reviewed.

- **Inspection - Things to Physically Look For:**
  - Evidences supporting waste diversion improvement target strategies

12. Does your facility have an implementation plan to reduce waste quantity or improve type of treatment?

Upload a copy of the plan.

- *This should be a waste reduction plan showing specific actions designed to achieve targeted reductions in waste consumption*

***Answer Yes** if you have an implementation plan in place that demonstrates you are taking action to achieve your targeted reductions or improvements.*

Answer Partial Yes *if you have a plan but have not started on all action items.*

You may download a sample implementation plan here

NOTE: This is NOT scoring the actual % of improvement because a facility may be working on the last 5-10% of waste management opportunities which is hard to make up. We don't want to falsely reward beginners and give fewer points to leaders.

What is the intent of the question?

The intent is for your facility to create an action plan for improving waste management (amount or final disposal).

Target-setting is an important step in systematically managing waste, but your site must *take action* to make reductions. Having an implementation plan demonstrates the action you are taking to achieve your targeted reductions and waste diversions. Some facilities may have an implementation plan without having set targets.

Technical Guidance:

This is your opportunity to document all business processes for waste management projects happening at your facility.

Steps for action should include:

1. Identification of waste improvement opportunities
2. Evaluate waste management alternatives
3. Prioritize the improvement items and with the progressive timelines
4. Approve funds for chosen solution
5. Implement the solution and document reductions
6. Assign a team/staffs to track and monitor the progress
7. Conduct regular review to check progress of improvement projects

How to create an implementation plan?

You will need management and waste handling contractor's commitment, employee awareness, and participation to ensure improvement opportunities can be identified, solutions can be proposed, and changes can be made using capital or expense dollars if necessary to successfully implement proposed solutions. To effectively identify waste management opportunities, a waste minimization audit can be conducted. The audit typically provides a systematic assessment of waste generated on-site and identifies opportunities to reduce the environmental and cost impacts of the waste. Often this can involve third party consultation, literature and technology research, design firms, and pilot testing among many other potential paths toward implementation of solutions.

All activity related to meeting targets should be part of an implementation plan to ensure organized and coordinated progress steps take place from the start and prioritize the improvement items with the progressive timelines. After creating this plan, an implementation team is suggested to be created to ensure effective implementation. The assigned staff in this team should have clear roles & responsibilities. The implementation plan should be reviewed at least annually and should at minimum include improvement project details, appropriate implementation timeline and responsible parties.

How This Will Be Verified:

Yes

- **Documentation Required:**
  - Plan is in place for managing and implementing environmental performance improvements of waste management.
- **Interview Questions to Ask:**
  - Management has communicated plan for managing and implementing environmental performance improvements of waste management to key employees.
  - Key employees understand the plan for managing and implementing environmental performance improvement of waste management.
  - Waste handling contractors have received communication on the plan for managing and implementing environmental performance improvements of waste management.
- **Inspection - Things to Physically Look For:**
  - Plan for managing and implementing environmental performance improvements of waste management is readily available to employees.
  - Evidences to support plan is being followed in facility and waste handling contractor site.

Partial Yes

- **Documentation Required:**
  - Facility is in the process of creating a plan for managing and implementing environmental performance improvements of waste management.
- **Interview Questions to Ask:**
  - Management understand how to create and finalize their plan for managing and implementing environmental performance improvements of waste management.
- **Inspection - Things to Physically Look For:**

- Evidence to support the facility is in the progress of creating a plan for managing and implementing environmental performance improvements of waste management.
- There are clear next steps outlined for completing the plan.

13. Has your facility reduced waste quantity or improve type of treatment in this reporting year, compared with the established baseline?

- Select all sources of waste for which your facility made improvements
- Select baseline year
- Quantity
- Unit of Measure
- Percent Change
- Describe the strategies used to achieve this improvement

*You will receive **Full Points** if you made reductions for waste sources that make up 80% or more of your total waste generated.*

*You will receive **Partial Points** if you made reductions for waste sources that make up 50-79% of your total waste generated. This is to reward you for reducing your greatest sources of waste which will maximize environmental impact.*

We recommend that you show normalized reductions such as "kg of hazardous waste per product was reduced by 50% in 2019." This is because normalized metrics show real improvement rather than reductions from business changes such as reduced production.

What is the intent of the question?

Sustainability is a journey of continuous improvement. Success is the result of extensive work involved in tracking, setting targets, and performing to implementation plans to meet targets. This question provides an opportunity to report quantifiable waste management display improvements made in the Higg FEM reporting year. By tracking success over the previous year, a facility proves through results the commitment made towards sustainability.

This is your opportunity to demonstrate impact reduction from your hard work to track, set targets and create an action plan. Use this question to share what you have accomplished.

Technical Guidance:

Improvements can be absolute or normalized, however it is recommended that you show normalized reductions such as "carton waste used was reduced by 0.015kg/unit the reporting year." This is because normalized metrics show real improvement rather than reductions from business changes such as reduced production.

The FEM requires that year over year improvements be demonstrated in order to be able to answer Yes to this question. When evaluating your waste reductions, be sure to do the following:

- Review the waste source data and aggregated total to ensure the data and any automated calculations are accurate.
- Review the actions taken to make improvements and determine if they have resulted in measurable improvements by comparing the data with historical waste data to determine the improvement quantity. **Note:** Historical data accuracy should also be verified.
    - For example: The installation of 5 laser cutting machines produced a reduction of 0.02kg of fabric waste per unit made, which is a 8% reduction from the previous year's normalized waste data.

Note: Facility construction and demolition (C&D) waste should not be included in the baseline and reduction performance. Also, the reductions are attributable to measures taken by the site.

Reporting Improvements in the Higg FEM:

Do:

- ✔ Review the improvement data to ensure all aspects noted above are covered and that the information is accurate.
- ✔ Enter the improvement quantity either as an absolute or normalized value. This is the year over year change in energy use for the source. (e.g. previous year's consumption – reporting year consumption = the change in energy use) **Make sure to enter a <u>negative number for a reduction</u> (e.g. -0.05 for a normalized reduction of 0.05 kg/piece) and a <u>positive number for an increase</u> (e.g. 0.03 for a normalized increase in renewable energy use of 0.03 kg/piece)**
- ✔ Select the appropriate units for the improvement. (If the appropriate units are not available, list the units in the "Describe the strategies used to achieve this improvement:" field)
- ✔ Input the percent (%) change in the waste quantity from the previous year. **Make sure to enter a <u>negative percentage for a reduction (e.g. -5 for a 5% reduction)</u>, and a <u>positive percentage for increased (e.g. 5 for a 5% increase)</u>.**
- ✔ Provide sufficient details in the "Describe the strategies used to achieve this improvement:" field (e.g. Normalized waste generation was reduced by switching to reusable packaging containers for raw materials).

Do Not:

- X Report improvements that are not accurate (e.g. the data source is unknown or has not been verified)
- X Report improvement that were not achieved in the FEM reporting year (e.g. historical improvements achieved more than 1 year ago should not be reported)

X Report an improvement that is absolute and relates to a decrease in production or reduced facility operations. This is why data normalization is important.
X Report an improvement that is based on insufficient data. (e.g. an overall reduction was achieved but this was not related to measurable or defined actions taken to achieve the reduction). This is particularly important when the improvements are marginal (e.g. less than 1-2%) and possibly attributable to measurement/ tracking errors and/or operational variability.

How This Will Be Verified:

When verifying a facility's improvements, Verifiers **must** review:

- All supporting evidence (e.g. waste quantity data and baselines, etc.) to verify the reported improvement quantity is accurate and attributable to measurable actions taken to reduce waste.
- The implemented changes or actions taken to achieve the improvements.

If any inconsistencies or errors are noted, the reported information must be corrected where possible and detailed comments should be included in the Verification Data field.

Full Points

- **Documentation Required:**
  - Waste tracking reports and quantity records showing reductions of waste sources that make up more than 80% of your site's total waste.
  - Evidence of waste reduction initiatives that demonstrate that waste reductions weren't made solely from a decline in production, or number of workers.
- **Interview Questions to Ask:**
  - Discussion with the team responsible for waste management. The team must clearly explain and demonstrate how the improvement was achieved (e.g. what actions were taken, and how this change was measured and calculated).
  - Management is actively promoting site implementation of leading practices in relation to reducing waste.
  - Management understand what recognized international standard practice is in relation to waste reduction for their sector/geography.
- **Inspection - Things to Physically Look For:**
  - Process in the facility which have contributed to improvements made listed in strategies.

Partial Points

- Same requirements as for "yes" above but for waste sources (or one source) that make up 50-79% of the site's total waste.

14. Has your facility improved waste disposal methods for overall waste in this reporting year, compared with the baseline?

If yes, indicate which methods.

- Select baseline year
- What was the percentage change?
- Describe the strategies used to achieve this improvement

What is the intent of the question?

Sustainability is a journey of continuous improvement. Success is the result of extensive work involved in tracking, setting targets, and performing to implementation plans to meet targets. This question provides an opportunity to report quantifiable improvements made in waste disposal methods in this FEM reporting year. By tracking success over the previous year, a facility proves through results the commitment made towards sustainability.

This is your opportunity to demonstrate impact improvement from your hard work to track, set targets and create an action plan. Use this question to share what you have accomplished.

Technical Guidance:

Improvements in waste disposal methods can be demonstrated by diverting wastes to a preferred disposal/treatment method that results in less impacts to the environment. For example, sending waste to be treated through incineration with energy recovery instead of being sent to a landfill or increasing the amount of waste that is for recycling.

Note: Waste disposal methods should be attributable to measures taken by the facility (e.g. collaboration with waste disposal vendors).

The Higg FEM requires that year over year improvements be demonstrated in order to be able to answer Yes to this question. When evaluating your improvements, be sure to do the following:

- Review the waste data and aggregated totals to ensure the data and any automated calculations are accurate.
- Review the actions taken to make improvements and determine if they have resulted in measurable improvements by comparing the data with historical waste data to determine the improvement quantity. **Note:** Historical data accuracy should also be verified.
    - For example: By sourcing a new material recycling vendor using advanced technology, the facility was able to increase the amount of total waste recycled by 25%.

Reporting Improvements in the Higg FEM:

Do:

- ✔ Review the improvement data to ensure all aspects noted above are covered and that the information is accurate.
- ✔ Input the percent (%) change in the waste disposal methods from the previous year. **Make sure to enter a negative percentage for a reduction (e.g. -5 for a 5% reduction), and a positive percentage for increased (e.g. 5 for a 5% increase).**
- ✔ Provide sufficient details in the "Describe the strategies used to achieve this improvement:" field (e.g. both fabric and leather waste are now being sent to material recycler instead of landfill).

Do Not:

- X Report improvements that are not accurate (e.g. the data source is unknown or has not been verified)
- X Report improvement that were not achieved in the FEM reporting year (e.g. historical improvements achieved more than 1 year ago should not be reported)
- X Report an improvement that only relates to a decrease in production or reduced facility operations.
- X Report an improvement that is based on insufficient data. (e.g. an overall reduction was achieved but this was not related to measurable or defined actions taken to achieve the reduction). This is particularly important when the improvements are marginal (e.g. less than 1-2%) and possibly attributable to measurement/ tracking errors and/or operational variability.

How This Will Be Verified:

When verifying a facility's improvements, Verifiers **must** review:

- All supporting evidence (e.g. waste quantity data, waste disposal records and baselines, etc.) to verify the reported improvement in disposal methods are accurate and attributable to actions taken by the facility.
- The implemented changes or actions taken to achieve the improvements.

If any inconsistencies or errors are noted, the reported information must be corrected where possible and detailed comments should be included in the Verification Data field.

Yes

- **Documentation Required:**
  - Waste quantity and disposal records showing that the reported quantities (as a percentage of total wastes) were diverted to disposal methods which result in reduced environmental impacts.
  - Documented methodology that shows how the improvement was calculated (as a percentage of total wastes).
  - Evidence that the improvements are attributable to measures taken by the facility (e.g. collaboration with waste disposal vendors) and weren't made solely from a decline in production, or number of employees.
  - A description of the plan/strategies used to achieve these improvements.
- **Interview Questions to Ask:**

    - Discussion with the team responsible for managing energy use. The team must clearly explain and demonstrate how the improvement was achieved (e.g. what actions were taken, and how this change was measured and calculated).
    - Management understands the concept of improving waste disposal methods and whether the site waste diversion rate to preferred disposal alternatives is increasing.
    - Management is actively promoting or endorsing site implementation of leading practices in relation to increasing the percentage of waste materials that are diverted to preferred disposal alternatives such as reuse or recycling, incineration with energy recovery.
    - Management understand what recognized international standard practice is in relation to waste disposal alternatives for their sector/geography.
- **Inspection - Things to Physically Look For:**
    - Process in the facility or waste handling contractors which have contributed to waste diversion improvements made listed in strategies

Waste - Level 3

15. Does your facility validate the final disposal and treatment of all hazardous wastes?

- If yes, please upload the supporting documentation.
- Describe how you work with your facility's waste contractors to ensure appropriate disposal during the waste treatment.

What is the intent of the question?

The intent is to validate the final disposal and treatment of all hazardous waste. You should be able to describe how you engage with your waste contractors, including your workflow and process to ensure their environmental performance.

Technical Guidance:

Hazardous waste poses serious risk to the environment when improperly treated and disposed of. It is considered leading practice for a facility to take extra steps to confirm that their waste contractors are properly transporting, storing, treating and disposing of hazardous wastes from your facility site. Facilities should screen, validate and check contractors every three years.

A facility should evaluate its waste contractors during the contractor selection process and conduct regular assessments of the waste contractors to ensure that they are operating in legal compliance and with the terms of the contract.

When evaluating waste management contractor, consider:

- Waste contractor qualifications (such as business license, environment permits, reports) of the contractor.
- Waste contractor due diligence and legal environment performance (any historic violations)
- Their overall environmental performance
- Cost viability of using the contractor's services (GSCP)

Conduct regular assessments after the contract is placed. Things to look for in your waste contractor:

- Implement practices to transport waste in a way that is traceable, secure, and waste must remain segregated and properly labeled at all times
- Have a facility with impermeable surfaces, proper security, and fire/flood protection
- Not engage in illegal dumping or burning either on or off-site
- Implement human health and safety practices such as providing employee access to personal protective equipment, training, and machine safety
- If they use optimized waste disposal methods (such as recycling hazardous waste or incinerate hazardous waste with energy recovery) to reduce the impacts to the environment.

How This Will Be Verified:

Yes

- **Documentation Required:**
  - Records of validating final disposal of ALL hazardous waste
  - Records for validating with contractors every 3 years
- **Interview Questions to Ask:**
  - Management is able to explain how they work with contractors to ensure their environmental performance during the waste treatment
- **Inspection - Things to Physically Look For:**
  - Evidences to support facility has validated their waste contractors waste treatment in the past 3 years.

16. Has your factory diverted at least 90 percent of all discarded materials from landfills, incinerators and the environment?

- If yes, please upload the supporting documentation.
- Please describe how this is implemented.

Suggested Upload: Waste inventory and waste manifests showing >90% diversion from landfills/incinerators

Zero waste to landfill is defined as diverting 90% or more of all discarded materials away from landfills, incinerators and the environment (UL 2799 Zero Waste to Landfill)

***Answer Yes** If you can demonstrate that you divert 90% or more of all waste.*

What is the intent of the question?

The intent is for your facility to divert all waste from landfill or incineration without energy recovery. Waste disposal is considered as the least economically favorable and environmentally beneficial waste management option. In order to qualify for this point the facility must divert at least 90% of all waste from landfill or incineration without energy recovery through optimized alternatives (reduction, reuse, recycling, biological treatment), closed loop material take-back program, or incineration with controlled % energy recovery.

Technical Guidance:

It is recognized that a mature industrial economy could not reach literal zero waste and there are different thresholds guiding zero waste. This question aspires the facility to attain leading practices in waste reduction by diverting 90 percent of all discarded materials from landfills, incinerators without energy recovery and the environment: a condition defined by Zero Waste International Alliance (ZWIA) as "Zero Waste" (http://zwia.org/standards/zero-is-zero/)

A useful hierarchy for how to move closer to Zero Waste can be found here: http://zwia.org/standards/zero-waste-hierarchy/

UL 2799 standard (Zero Waste to Landfill) can be found here:

https://standardscatalog.ul.com/standards/en/standard_2799_3

Achieving true "zero" waste is extremely difficult, if not impossible. Given that reality, the two most important aspect to demonstrate are:

1. All viable and optimized waste diversion options are considered
2. You have a process to examine remaining materials and use this information to refine your systems to rethink, redesign, reduce, reuse, and recycle in order to prevent further discards. If you can demonstrate proactive thought on remaining materials, this is satisfactory for "zero waste" at this point

How This Will Be Verified:

Yes

- **Documentation Required:**
  - Documentation of all waste streams and waste disposal paths.

    - Documentation of process to examine and prepare to divert any remaining wastes.
- **Interview Questions to Ask:**
    - Management is aware and able to explain how to implement all optimized waste diversion options and how the remaining wastes are being considered for future diversion.
- **Inspection - Things to Physically Look For:**
    - Evidences to support this plan.
    - Waste contractor site inspection
    - Remaining materials diversion equipment or site inspection

17. Does your facility upcycle some of its waste or insert its waste into a circular economy system?

- If yes, please describe how.

Suggested Upload: Pictures or process flows, showing type and amounts of waste that are recycled into products of the same or higher value

What is the intent of the question?

The intent is to encourage the facility to upcycle or establish closed-loop systems, where previously discarded products circle back into the value chain in order to reduce, reuse and recycle waste generated at the facility.

Technical Guidance:

Upcycling is the process of transforming by-products, waste materials, useless and/or unwanted products into new materials or products of better quality or for better environmental value.

Recycling used garments and fabrics to manufacture new clothing, making fabric from used plastic bottles, and upcycling coal ash from the boiler room to make bricks are some examples of upcycling. A facility can engage its material suppliers, buyers and waste management contractors to find creative solutions to upcycle wastes.

A circular economy is a regenerative system in which resource input and waste, emissions, and energy leakages are minimized by slowing, closing, and narrowing energy and material loops; this can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, recycling, and upcycling. This is in contrast to a linear economy which is a 'take, make, dispose' model of production.

The four aspects of a closed-loop supply chain:

- Source: Use recycled or renewable materials that are responsibly sourced.
- Make efficiently: Design and manufacture products to minimize the use of materials.
- Use for a long time: Design products to be durable, so they can have long lives.
- Contribute: Replenish market supply with an amount of recycled, reclaimed, or renewable material at least equal to the amount used to make the product.

How This Will Be Verified:

Yes

- **Documentation Required:**
  - Records to indicate the facility upcycles some of its waste or inserts it back into circular economy
- **Interview Questions to Ask:**
  - Management is able to explain how facility upcycles some of its waste or inserts it back into circular economy
- **Inspection - Things to Physically Look For:**
  - Evidences to support facility upcycles some of its waste or inserts it back into circular economy

Chemical Management

The goal of this section is to drive responsible chemical management programs at manufacturing facilities. The use of chemicals in a facility's production processes and operations can be extremely toxic and hazardous to the environment and human health if not managed systematically and appropriately. Unlike other sections in Higg, chemical management will touch all parts of your business - from inventory and purchasing, to the production floor, to storage and waste locations. A robust chemical management program should contain basic and advanced practices in the following areas:

- Chemical management policies, compliance procedures, and commitments
- Employee training and communication
- Chemical and raw materials procurement and purchasing practices
- Chemical inventory management
- Chemical storage, transportation, handling and use practices
- Emergency Response Plan (ERP), accidents, incidents and spills remediation plan
- Product traceability, quality and integrity
- Chemicals and process innovation
- Continuous Improvement

The Higg FEM Chemical Management section guides you from basic to advanced practices in each of these categories. Please keep in mind that it may take a few years to fully complete all the necessary requirements in order to launch a robust chemicals management system. One can refer to the ZDHC CMS framework Version 1.0 document for more information,
https://www.roadmaptozero.com/process#Guidance

Before answering assessment questions, you will first be asked to define whether your factory has production processes that require chemicals. These selections will direct you to the questions that are most applicable for your facility. Examples of chemicals used in production include dyes, silicone finishes, screen printing, solvents, inks, labels, durable water repellent chemical formulation, adhesives, tanning chemicals, chemicals for metal plating, and other chemical enhancements. Other examples include chemical plasticizers added to a plastic product/component, screen printing ink that has pigments and resins, or a solvent used as the carrier for other ingredients that will evaporate from the garment after the printing process is complete. We expect that all Tier 2 and Tier 3 facilities (material suppliers, dyeing and printing facilities, leather tanneries, chemical suppliers, and trim suppliers) will answer "Yes" to using chemicals in production.

Note: The Higg FEM Chemical Management section is the result of a collaboration between Sustainable Apparel Coalition, Outdoor Industry Association, and Zero Discharge of Hazardous Chemicals.

Chemicals Introduction

Every question in this section is written to drive facilities to excel in each of these categories:

- **Chemical Management Policies, Compliance Procedures, and Commitments:** it is important for facilities to have strong policies and procedures in place as a first step to proper chemicals management. This documentation demonstrates management support and comprehensive planning for chemicals management. While this documentation does not *guarantee* responsible behavior, it is an important *precursor* to responsible, systematic chemical management.
- **Employee training & communication:** in order for chemicals to be managed responsibly, all workers that come into contact with chemicals must be aware of responsible management practices and guidelines.
- **Chemical selection, procurement, & purchasing practices:** in order to meet basic chemical requirements, a critical first step is to *understand* what chemicals are coming into the facility. Once you know what is coming in the door, you are better equipped to make responsible decisions about what is purchased and how those purchased chemicals are managed.
- **Chemical inventory management:** maintaining a chemicals inventory is an important part of good record-keeping to confirm a facility's understanding of which products are used on-site and whether they meet criteria. Inventories are also important to identify the source of a product failure in the case of a non-compliance.
- **Chemical storage, transportation, handling and use, practices:** once chemicals are brought onto the premises, workers must be prepared to properly store, transport / dispense, handle and use them responsibly to prevent environmental contamination and/or worker exposure.
- **Emergency Response Plan (ERP), accidents & spills remediation plan:** in order to protect workers and/or responders from inadvertent exposure, it is critical to have a plan for managing an emergency chemical incident that all workers are prepared to implement.
- **Product traceability, quality / integrity:** to ensure product quality, it is important for your facility site to confirm the quality of a chemical ordered matches the quality of the chemical received, especially related to environmental criteria and document full traceability. This

enables a facility to prevent an unintentional non-compliance or worker/environmental chemical exposure.

- **Chemicals & Process Innovation**: chemicals management is a complex area where we currently have more environmental challenges than solutions. It is critical that value chain partners work together to innovate in order to shift away from properly *managing* contaminants towards *replacing* contaminants with better alternatives and innovations to reduce environmental impacts.
- **Continuous Improvement**: CMS implementation is a continuous process. As changes happen in organisations, regulations, requirements, Policies, SOPs and processes need continuous review and updates. It is important that the organisation has a process in place to do so. This process may be done internally and/or by external parties.

The above KPI's were also mapped against the original OIA Chemicals Management Module Primary Objectives 1-7, ensuring all concepts were captured within this newly organized, converged Facility Environment Module 3.0 and allowing the Chemical Management Module (CMM) Primary Objectives to continue to be used as another way to think about and reference the key high-level chemicals management best practices we seek to drive within the industry.

IMPORTANT -- HOW TO USE TECHNICAL GUIDANCE LINKS:

One of our partner organizations, the Zero Discharge of Hazardous Chemicals (ZDHC) group, has developed an excellent guide for managing chemicals that is referenced throughout the Higg FEM questions. For example, if a question references "ZDHC Chemical Management System Framework – Version 1.0 (May 2020) – Chapter 5" for more information on the recommended good management practices, you may open this document and find section 5 and get more detail on the corresponding topic.

ZDHC Chemical Management System Framework:

https://uploads-ssl.webflow.com/5c4065f2d6b53e08a1b03de7/5ec4fce8cc2b044b520491d5_ZDHC%20CMS%20Framework_MAY2020.pdf

Select all of the processes performed at your facility:

- Dyeing or other wet processing
- Printing
- Laundry or washing
- Cementing or gluing
- Fiber extrusion or yarn spinning
- Slashing during weaving

- Leather tanning
- Lamination
- Extrusion, assembly, finishing of plastic parts
- Metal Finishing (with Chemical use)
- Welding
- Casting (with Chemical use)
- Degreasing with organic solvents
- Painting
- Powder Coating (for non-metal use)
- Soldering
- Printed Circuit Board electronic automation (with Chemical use)
- Other production processes that require chemicals

If any are selected, you are a facility that **uses chemicals in production processes.**

- This refers to facility processes that use chemicals in processes to make a product (e.g., dyeing or other wet processing, printing, laundry or washing, cementing or gluing, slashing during weaving, fiber extrusion, yard spinning, leather tanning, electroplating, welding or other production process). We expect that all Tier 2 and Tier 3 factories (material suppliers, dyeing and printing facilities, leather tanneries, chemical suppliers, and trim suppliers) will fall into this applicability category.
- Examples of chemicals used in production include dyes, silicone finishes, screen printing, solvents, inks, labels, a durable water repellent chemical formulation, cements, adhesives, tanning chemicals, metal plating solutions, degreasing agents, and other chemical enhancements. Another example is a chemical plasticizer added to a plastic product or component. Some chemical mixtures used to make product don't stay with the finished product but are included here, such as a screen-printing ink that has pigments and resins, plus a solvent used as the carrier for the other ingredients of the ink and will evaporate (or be driven off) from the garment after the printing process is complete. For hardgoods facilities examples may be organic solvents for degreasing, metal plating chemicals, etc. *Facilities that use chemicals in production processes are also required to report on their tooling and operational chemicals as applicable.*

If none are selected, you are a facility that **uses chemicals in facility tooling and/or operations only**

- This refers to factories that do not use chemicals in production processes, but uses chemicals in other parts of facility operations, including wastewater treatment. We expect Tier 1 cut and sew factories, that are not vertically integrated, will fall into this applicability category. You will still be asked a subset of Chemicals Management questions because your facility still uses some chemicals for daily operation such as cleaning products, machine lubricants, **spot cleaners**, paint, and chemicals for wastewater treatment (ETP) where applicable.

Chemical Management - Level 1

1. Does your facility keep an inventory of chemicals used and the suppliers of each chemical product?

Check all types of chemicals included in the inventory

- All chemicals used in manufacturing processes (including chemicals in production, reactants and additives, and wastewater treatment plant chemicals where applicable)
- All chemicals used in tooling/equipment (spot cleaners, lubricants and grease)
- All chemicals used to operate and maintain the facility (aside from WWT which is captured above)

Suggested upload: a) Chemical Inventory List; b) Permits where applicable for certain sensitive chemicals to be stored or used (e.g. explosive materials, acetic anhydride, urea, ethanol, etc., in some countries are regulated and need special permission to use)

1b. Does your facility's chemical inventory include chemical identification data? Check all that apply:

Not all information needs to be in one single document, but it needs to be easily accessible in relevant documents (e.g., first in first out documentation)

- Chemical name and type
    - Type examples: dye, cleaning agent, coating material, detergent, softener, etc.
- Supplier/vendor name and type
    - Type examples: original manufacturer/formulator, reformulator, agent, distributor, broker, other, unknown.
- Presence of Safety Data Sheet (SDS or MSDS) – should include availability and date of issuance
    - Global Harmonization System (GHS) compliant or equivalent
    - GHS or its equivalent SDS must include chemical product information and composition, hazard classification and symbols, supplier (manufacturer) information, intended use/specific end use, health and safety potential hazards and risks, personal precautions, protective equipment and emergency procedures, first aid measures, symptoms and medical treatment required, methods and material for containment and cleaning up, safe usage and handling methods, spill handling methods, conditions for safe storage including any incompatibilities, chemical toxicity, stability, reactivity, any potential hazardous reaction or decomposition, disposal and waste treatment methods, transport hazard classes and risks.
- Function
- Hazard classification
    - Must include P and H hazard phrases (or S and R phrases)
- Where the chemical is used
    - For example, which building/process/machine
- Storage conditions and location
- Quantities of chemicals used

- For example: gallons, grams, kilograms, tons, litre

1c. Does your facility's chemical inventory include the following data? Select all that apply:

- CAS number or numbers (when in a mixture)
- Lot numbers
- MRSL compliance
- Purchase date
- Chemical expiration dates (if applicable)

For data not included in your facility's chemical inventory, is there an action plan for obtaining this data?

Upload your action plan for obtaining this data.

Not all information needs to be in one single document, but it needs to be easily accessible in relevant documents (e.g., first in first out documentation)

A complete chemical inventory includes: chemical name and type, supplier/vendor name and type, Safety Data Sheet (SDS or MSDS) available and date of issuance, function, hazard classification, where used, storage conditions and location, quantities of chemicals used, CAS number(s) as mentioned in the GHS / equivalent SDS for hazardous chemical substances, lot numbers (may be recorded at any location which can be easily tracked or traced back), MRSL compliance, purchase date, and expiration dates (if applicable).

It is also recommended to indicate whether chemicals in your inventory list is included in a Positive List or Negative List of any industry standard, if applicable.

*You will be awarded **Full Points** if you have a complete inventory for all applicable chemicals in your facility.*

*If you track all chemicals in a partial inventory, you will be awarded **Partial Points.** Similarly, if you have a detailed inventory but do not yet track all applicable chemicals, you will be awarded partial points.*

Please note: *You do not need to upload all SDS documentation to higg.org since this may include a high volume of files; this file upload is optional. You should be able to clearly locate where you store SDS information however, you will be asked for this information during verification.*

Additional documentation will be requested during verification: b) Permits where applicable for certain sensitive chemicals to be stored or used e.g. explosive materials, d) Purchase records.

Facilities that <u>do not</u> use chemicals in production should inventory all chemicals that are related to tooling/equipment category, including spot cleaners, machine grease/lubricants, and effluent treatment plant chemicals.

Facilities with only tooling/operations chemicals

If you **do not have any chemicals that touch products** (e.g. cleaning products) and/or do not use chemicals to maintain or lubricate machines, you may select "**not applicable**".

Facilities with only tooling/operations chemicals

Should have an inventory of all chemicals that are related to the manufacturing processes and tooling/equipment category, including spot cleaners, machine grease/lubricants, and ETP chemicals. If you do not have any chemicals that may touch products e.g. cleaning products, and/or do not use chemicals to maintain or lubricate machines, you may select "not applicable".

Facilities with chemicals in production:

- All chemicals in manufacturing, tooling/equipment, operation and maintenance must be inventoried, with all required information is included, to enable full score
- All chemicals in manufacturing must be inventoried to unlock Level 2.
- All chemicals used in tooling/equipment, operation and maintenance also need to be inventoried, however, the facility can move on to next levels in case these are currently not in place or incomplete.
- All chemicals in manufacturing and tooling/equipment must be inventoried to enable **Partial Yes** score.

Operational Key Performance Indicator: Chemical Inventory Management

What is the intent of the question?

This question ensures a facility understands which chemicals are present on-site. This is a necessary first step to determine which chemicals are hazardous, how to manage them safely, and to establish a chemical management system.

All of this information doesn't have to be in one Excel doc but may be easily found in multiple documents. For example, quantities and purchase dates may be in separate docs, each chemical may have hundreds of different purchase dates which can be tracked in separate warehouse documentation.

Chemical management begins with a complete understanding of the chemicals which are stored and utilized within the facility. Most chemicals in the textile and footwear industry fall into several categories such as oxidizers, corrosives, gases under pressure, flammable, toxic and irritant.

Typically, we would find most of these around the workplace. Many chemicals come and go as various recipes use them in each individual work order. A written inventory of all different chemicals at the facility is necessary for monitoring hazard communication, and should be readily available to all employees. The inventory is a living documentation and must be kept up to date at all times.

Some of this data is more advanced to track and will take time to compile, but once compiled this will be valuable to your company as new regulations or more advanced chemical management needs are introduced.

Technical Guidance:

It is necessary to understand the implementation methodology of First In, First Out (FIFO) as a system in the facility to be able to efficiently track the chemical consumption data. There could be two different approaches a facility can adopt. One option is that the facility could maintain the chemical inventory which gets updated monthly. Alternatively, it could maintain stock data to capture the lot numbers of all incoming chemicals and another sheet for chemical information log capturing the hazardous information. In the case where there is a possibility of frequent purchase of chemicals, the second option is required.

While preparing an inventory, create a list including chemicals used in production processes, chemicals used to support production processes, such as chemicals used for cleaning equipment between run

changeovers (i.e. chemicals that the organization re-uses, sells or discards), chemicals used for wastewater treatment, chemicals used in laboratory, chemicals used for boilers, chillers, janitorial chemicals, spot removers, solvents to remove paints, table gum, chemicals used to clean screens, screen making and exposing chemicals, etc.

Intermediate chemicals created during production do not have to be captured. Written instructions for the proper use of a chemical should be available where chemicals are used. Instructions can be in the form of recipe cards, process adjustment instructions or formulation sheets and should describe major operation, the chemicals and quantities that may be required for those processes. The instruction document for chemical use should include process control parameters and check points. Typically, Technical Data Sheets (TDS) will provide information regarding process and usage. It also may be of benefit to work with chemical supplier(s) to optimize recipes, instructions and processes. Inventories should be updated annually or when a process change occurs.

REF: ZDHC Chemical Management System Framework – Version 1.0 (May 2020) – Chapter 5

Items to include in your inventory:

<u>Chemical identification data as listed in Question 1b:</u>

- Chemical name and type
    - Type examples: dye, cleaning agent, coating material, detergent, softener, etc.
- Supplier/vendor name and type
    - Type examples: original manufacturer/formulator, reformulator, agent, distributor, broker, other, unknown.
- Presence of Safety Data Sheet (SDS or MSDS) – should include availability and date of issuance
    - Global Harmonization System (GHS) compliant or equivalent
    - GHS or its equivalent SDS must include chemical product information and composition, hazard classification and symbols, supplier (manufacturer) information, intended use/specific end use, health and safety potential hazards and risks, personal precautions, protective equipment and emergency procedures, first aid measures, symptoms and medical treatment required, methods and material for containment and cleaning up, safe usage and handling methods, spill handling methods, conditions for safe storage including any incompatibilities, chemical toxicity, stability, reactivity, any potential hazardous reaction or decomposition, disposal and waste treatment methods, transport hazard classes and risks.
- Function
- Hazard classification
    - Must include P and H hazard phrases (or S and R phrases)
- Where the chemical is used
    - For example, which building/process/machine
- Storage conditions and location
- Quantities of chemicals used

- For example: gallons, grams, kilograms, tons, litre

Additional data listed in Question 1c:

- CAS number or numbers (when in a mixture)
- Lot numbers
- MRSL compliance
- Purchase date
- Chemical expiration dates (if applicable)

Additional data recommended to be included in Chemical Inventory List:

- Indication of Positive List
- Indication of Negative List

Where to go for more info:

For Globally Harmonized System of Classification and Labelling of Chemicals:
https://www.unece.org/trans/danger/publi/ghs/ghs_rev08/08files_e.html

ZDHC CIL Template: https://www.roadmaptozero.com/documents

How This Will Be Verified:

Facilities that use **chemicals in production processes:**

Full Points:

- Chemical Inventory covers **all** chemicals used for manufacturing, tooling/equipment, operation and maintenance (including chemicals in production, spot cleaners, ETP chemicals, grease and lubricants, where applicable). Please refer to Applicability Guidance
- Facility can provide a full year's list of purchased chemicals and all chemicals purchased are inventoried.
- A chemical inventory exists with the minimum information that include Chemical identification data and Additional data:
  - Chemical identification data – refer to the list listed in **Question 1b,** and
  - Additional data – refer to the list listed in **Question 1c**
- Chemical inventory needs to record the usage quantity information and the quantity needs to be updated at least monthly
- A real time tracking system (electronic or manual) needs to be in place at the storage/warehouse, production, and temporary storage areas to track usage quantity and amount (in/out log) of chemical

- Facility-wide balance check of chemicals (purchased, used) should be monitored at least every 6 months
- The chemical inventory is updated whenever a new chemical is purchased. A new chemical addition initiates a worker training, PPE, review of any hazard and storage requirements including secondary containment, emergency planning, and disposal requirements.
- New chemicals are not moved into stock or storage until verification takes place: matched to P.O, added into chemical inventory list, CAS no. screened against MRSL, acceptable for use, assigned to proper storage as per its hazard class and compatibility, and properly labeled.

Partial Points:

- Chemical Inventory covers **some, but not all** chemicals used for manufacturing or tooling/equipment (including chemicals in production, spot cleaners, ETP chemicals, grease and lubricants, where applicable). Please refer to Applicability Guidance.
- Facility can provide a full year's list of purchased chemicals and all chemicals purchased at least for manufacturing and tooling/equipment are inventoried.
- A chemical inventory exists with the minimum information on Chemical identification data:
    - Chemical identification data – refer to the list listed in **Question 1b**
- Chemical inventory needs to record the usage quantity information and the quantity needs to be updated no longer than 2 months at a time.

Facilities that use **chemicals in facility operations only:**

Full Points

- Chemical Inventory covers **all** chemicals used for manufacturing, tooling/equipment, operation and maintenance (including chemicals in production, spot cleaners, ETP chemicals, grease and lubricants, where applicable). Please refer to Applicability Guidance.
- Facility can provide a full year's list of purchased chemicals and all chemicals purchased are inventoried.
- A chemical inventory exists with the minimum information:
    - Refer to Chemical identification data listed in **Question 1b** and,
    - Refer to Additional data listed in **Question 1c**
- The chemical inventory is updated whenever a new chemical is purchased. A new chemical addition initiates a worker training, PPE, review of any hazard and storage requirements including secondary containment, emergency planning, and disposal requirements.
- New receipt(s) of a chemical are not moved into storage until some verification takes place: correct to P.O, added into chemical inventory list, CAS no. screened against MRSL, acceptable for use, assigned to proper storage as per its hazard class and compatibility, and properly labeled.

Partial Points

- Chemical Inventory covers **some, but not all** chemicals used for manufacturing or tooling/equipment (including chemicals in production, spot cleaners, ETP chemicals, grease and lubricants, where applicable). Please refer to Applicability Guidance.

- Facility can provide a full year's list of purchased chemicals and all chemicals purchased at least for manufacturing and tooling/equipment are inventoried.
- A chemical inventory exists with the minimum information:
    - Refer to Chemical identification data listed in **Question 1b**
- NA (for non-tooling) Facilities

Documentation Required: <u>(These are not required to be uploaded but will be checked during verification):</u>

- Chemical Inventory List
- Safety Data Sheet (SDS or MSDS) – should include availability and date of issuance
    - Global Harmonization System (GHS) compliant or equivalent
    - GHS or its equivalent SDS must include chemical product information and composition, hazard classification and symbols, supplier (manufacturer) information, intended use/specific end use, health and safety potential hazards and risks, personal precautions, protective equipment and emergency procedures, first aid measures, symptoms and medical treatment required, methods and material for containment and cleaning up, safe usage and handling methods, spill handling methods, conditions for safe storage including any incompatibilities, chemical toxicity, stability, reactivity, any potential hazardous reaction or decomposition, disposal and waste treatment methods, transport hazard classes and risks.
- Permits where applicable for certain sensitive chemicals to be stored or used e.g. explosive materials (ethanol, acetic anhydride, urea etc., as applicable in some countries)
- List of purchased chemicals and corresponding purchase records for the past full year

Interview Questions to Ask:

- Discuss the process for maintaining an accurate, up to date, and complete chemical inventory.

Inspection - Things to Physically Look For:

- Check the list/record of purchased chemicals for any gap with the chemical inventory
- Check chemical inventory, FIFO records, or other relevant documents that capture required data. Check traceability of the data that may be recorded in other places back to the chemical inventory.
- Walk through the facility with a random check of chemical inventory, permit, and worker compliance with PPE.
- Random check at least 10 chemicals on-site (depending on the total number of chemicals used on-site), covering chemicals for manufacturing, tooling/equipment, operation and maintenance to see whether:
- The chemical was recorded in the chemical inventory; and
- Information in the chemical inventory is consistent with the original labeling and MSDS/SDS.

2. Does your facility make Safety Data Sheets (SDS) available to employees for all chemicals used?

Are Safety Data Sheets posted where hazardous chemicals are stored?

Are Safety Data Sheets available in languages workers understand (at least sections directly related to operational worker safety and storage requirements, such as first aid, hazard, and flammability information)?

Suggested upload: a) photo images showing that the SDS are available at the workplace and accessible to the employees; b) OPTIONAL Safety Data Sheet (SDS), Global Harmonization System (GHS) compliant or equivalent (skip if previously uploaded. They need not be uploaded but need to be available for review during verification); c) CLP compliant Label in cases where the SDS is not available

Additional documentation will be requested during verification: d) Chemical Inventory List, 3) Emergency Response Plans, f) Documentation of Spill Control/Containment equipment, g) Documentation of Appropriate PPE being utilized by the workforce, h) Training documentation

Safety Data Sheets must be Global Harmonization System (GHS) compliant or equivalent.

***Select Partial Yes** if not all chemicals used for production / manufacturing processes, tooling, effluent treatment chemicals have GHS or equivalent directives.*

***Please note:** You do not need to upload all SDS documentation to higg.org since this may include a high volume of files; this file upload is optional. You should be able to clearly locate where you store SDS information however, and you will be asked for this information during verification.*

For facilities that do not use chemicals in production:** Safety Data Sheets are required for all chemicals that are related to the manufacturing processes and tooling/equipment category, including spot cleaners, machine grease/lubricants, and effluent treatment plant chemicals. If you do not have any chemicals that may touch product (e.g. cleaning products) and/or do not use chemicals to maintain or lubricate machines, select "**not applicable".

Operational Key Performance Indicator: Chemical Handling, Use, & Storage Practices AND Employee Training & Communication

What is the intent of the question?

The facility is expected to have complete Safety Data Sheets (SDS) available for all chemical product used in the facility. Global Harmonization System (GHS) compliant or equivalent Safety Data Sheets (SDS) are widely recognized as a fundamental source of chemical information to identify and control the health and safety impacts from chemicals stored, used and discarded. If facility is located in a region where GHS has not yet been adopted, an equivalent standard needs to be adhered to. Safety Data Sheet (SDS) should be collected, reviewed by the facility before chemical is used, to ensure that all the necessary information contained in the SDS is complete and clear. SDS is a document that contains information on the potential hazards (health, fire, reactivity and environmental) and how to work safely with the chemical product. Having Safety Data Sheets (SDS) is a precursor to forthcoming training and management behaviors in this section.

Safety Data Sheets (SDS) are an essential starting point for the development of a complete chemical hazard, health, and safety program. They are a go-to document for anyone needing to know some information about a chemical product they will be in contact with. Chemicals can be very dangerous, especially if you are repeatedly handling them or if they are improperly stored, transported, or used.

Technical Guidance:

It is important to understand all the necessary information available in SDS and to understand the accuracy and adequacy of the information provided in the SDS for a chemical management responsible person. All information provided in all the sections should be evaluated and checked for the hazard identification and chemical composition information details appropriately. Labelling on chemicals boxes and the information declared in the SDS should be correlated and verified. The labels for all incoming chemicals should be verified and they should be original and compliant to GHS CLP or country specific regulations.

In cases where certain tooling / cleaning chemicals do not have appropriate GHS compliant / equivalent SDS, look for the label on the product which should provide details of ingredients and hazard symbols on the label. In cases, where appropriate label or SDS is not available, facility should try to obtain as much information about the chemical as possible. The original labels should be compliant to GHS CLP or country specific regulations.

For further understanding:

- ZDHC MSDS Training Module.
- ZDHC Academy: https://academy.roadmaptozero.com/
- ZDHC Chemical Management System Framework – Version 1.0 (May 2020) – Chapter 5 and Chapter 6
- GHS: https://www.unece.org/fileadmin/DAM/trans/danger/publi/ghs/ghs_rev08/ST-SG-AC10-30-Rev8e.pdf

How This Will Be Verified:

Facilities that use **chemicals in production processes:**

Yes

- Complete and updated MSDS/SDS (request updates to chemical supplier at least every 3 years) is available for **all** chemicals.
- MSDS/Safety Data Sheets (SDS) are in language workers understand (at least sections directly related to operational worker safety and storage requirements such as first aid, hazard, and flammability information).
- Key hazard and safety information according to the MSDS/SDS are clearly/visibly displayed at each location designated to each specific chemical
- MSDS/SDS are Global Harmonization System (GHS) compliant (or equivalent).
- MSDS/SDS are shared with emergency response team internally and externally so adequate preparation for emergencies are planned.
- Workers (including but not limited to: chemical operations and hazardous waste handling) are trained in how to read and understand MSDS/SDS for personal safety, hygiene, and proper handling of chemicals to which they are exposed and how to properly dispose when necessary.
- Chemical storage areas are properly segregated by physical barriers, by hazard class, and/or CLP label, with appropriate signage at the entrance and with storage and workplace and these spaces have appropriate restricted access.

Partial Yes

- MSDS/SDS are *not* in GHS format, however it has all necessary information, including but not limited to: chemical product information and composition, hazard classification and symbols, supplier (manufacturer) information, intended use/specific end use, health and safety potential hazards and risks, personal precautions, protective equipment and emergency procedures, first aid measures, symptoms and medical treatment required, methods and material for containment and cleaning up, safe usage and handling methods, spill handling methods, conditions for safe storage including any incompatibilities, chemical toxicity, stability, reactivity, any potential hazardous reaction or decomposition, disposal and waste treatment methods, transport hazard classes and risks.
- Complete and updated MSDS/SDS (at least every 3 years) is available for **all** chemicals.

- MSDS/SDS are in language workers understand (at least sections directly related to operational worker safety and storage requirements such as first aid, hazard, and flammability information).
- Key hazard and safety information according to the MSDS/SDS are clearly/visibly displayed at each location designated to each specific chemical
- MSDS/SDS are shared with emergency response team internally and externally so adequate preparation for emergencies are planned.
- Workers are trained in how to read and understand MSDS/SDS for personal safety, hygiene, and proper handling of chemicals to which they are exposed and how to properly dispose when necessary.

Facilities that use **chemicals in facility operations only:**

Yes

- Complete and updated MSDS/SDS (at least every 3 years) needs to be available for **all** chemicals.
- MSDS/SDS are in language workers understand (at least sections directly related to operational worker safety and storage requirements such as first aid, hazard, and flammability information).
- Key hazard and safety information according to the MSDS/SDS are clearly/visibly displayed at each location designated to each specific chemical
- MSDS/SDS are Global Harmonization System (GHS) compliant (or equivalent), where applicable i.e. bulk chemicals: oil and lubricants, ETP chemicals, etc. MSDS/SDS in other formats (*non* GHS format e.g. product instruction manual) may be acceptable for chemicals in small quantities i.e. spot cleaners, spray grease, etc., as long as it has all necessary information, such as: chemical product information and composition, hazard classification and symbols, supplier (manufacturer) information, intended use/specific end use, health and safety potential hazards and risks, personal precautions, protective equipment and emergency procedures, first aid measures, symptoms and medical treatment required, safe usage and handling methods, conditions for safe storage including any incompatibilities, disposal and waste treatment methods.
- MSDS/SDS are shared with emergency response team inside and externally for adequate preparation for emergencies are planned.
- Workers are trained in how to read and understand MSDS/SDS for personal safety, hygiene, and handling of chemicals to which they are exposed and proper disposal.

Partial Yes

- Complete and updated MSDS/SDS (at least every 3 years) needs to be available for **all** chemicals.
- MSDS/SDS are in language workers understand (at least sections directly related to operational worker safety and storage requirements such as first aid, hazard, and flammability information).
- Key hazard and safety information according to the MSDS/SDS are clearly/visibly displayed at each location designated to each specific chemical
- MSDS/SDS are *not* in GHS format, however it has all necessary information, such as: chemical product information and composition, hazard classification and symbols, supplier (manufacturer) information, intended use/specific end use, health and safety potential hazards and risks, personal precautions, protective equipment and emergency procedures, first aid measures, symptoms and medical treatment required, safe usage and handling methods,

conditions for safe storage including any incompatibilities, disposal and waste treatment methods.
- MSDS/SDS are shared with emergency response team inside and externally for adequate preparation for emergencies are planned.
- Workers are trained in how to read and understand MSDS/SDS for personal safety, hygiene, and handling of chemicals to which they are exposed and proper disposal.
- NA (for non-tooling) Facilities

Documentation Required: <u>(These are not required to be uploaded but will be checked during verification):</u>

- Chemical Inventory List (CIL)
- Safety Data Sheet (SDS or MSDS), Global Harmonization System (GHS) compliant or equivalent [skip if uploaded in previous question]
- Globally Harmonized System - Classification, Labelling and Packaging (GHS CLP)
- Emergency Response Plans
- Documentation of Spill Control/Containment equipment
- Documentation of Appropriate PPE being utilized by the workforce
- Training documentation
- Accuracies of the above content should be validated

Interview Questions to Ask:

- Check understanding of the supervisor in charge, and workers for familiarity with MSDS/SDS, CLP.
- Can they explain the classification hazards for several chemicals in their work area?
- Check their understanding of compatibility e.g. corrosive and flammable chemicals, etc. How does the facility organize storage for chemicals with different hazard classification?
- Check their understanding of several hazard symbols. Ask when they were last trained on chemical hazards in their job and the appropriate application of PPEs needed when handling chemicals.

Inspection - Things to Physically Look For:

- Check if all chemical containers (in use and in storage) have appropriate labeling: name of chemical, hazard classification matching with the SDS, batch/lot number, date of manufacture.
- Sample/random check at least 5 dyestuffs (if apply) and 5 auxiliaries, or 10 different chemicals found on-site to see whether the MSDS/SDS are complete (including all detailed information and sections) and available on site.
- Review a sample of procedures like chemical storage, separation, and disposal, are they matching with the requirements in MSDS/SDS?
- Are there any special storage conditions required (e.g. compatibility, humidity controlled, temperature sensitive, water reactive, etc.) in the MSDS/SDS? Are these requirements understood by the supervisor/manager and met?
- Check if workers are using appropriate PPE matching the requirement listed in SDS for the chemical types that they are handling
- Spill control/containment equipment is in place as appropriate

- Chemical Storage areas have appropriate signage

Where to go for more info:

- ZDHC Training Academy (http://www.roadmaptozero.com/academy/)

3. Does your facility train all employees who use chemicals on chemical hazards, risk, proper handling, and what to do in case of emergency or spill?

If yes, select all topics included in your training

How many employees were trained?

How frequently do you train your employees?

Suggested uploads: a) Sample training, content covered during training; b) Training calendar; c) Employee training attendee list

Trainings must be documented and cover chemical hazards and identification; MSDS/SDS; signage; compatibility and risk; proper storage and handling; personal protective equipment (PPE) and procedure in case of emergency, accidents, or spill; access restriction to chemical storage areas; potential environmental impact of the chemicals in tanks; the physical protection provided to employees in the area(s) where the factory uses, stores and transports these containers; and their individual duties associated with monitoring and maintaining this protection.

Reference: ZDHC Chemical Management System Framework Version 1.0 (May 2020) – Chapter 4

Select *Partial Yes* if you do not have documentation or you have not covered all topics listed.

Operational Key Performance Indicator: Chemical Handling, Use, & Storage Practices AND Employee Training & Communication

What is the intent of the question?

The intent is for the facility to do chemicals training on handling/safety prior for workers handling chemicals.

Training materials should have a list of in-house hazardous and non-hazard chemicals, their handling procedures, control measures and emergency plans.

How This Will Be Verified:

Yes

- Trainings held regularly (at least quarterly or in a frequency that allows training all new employees according to the turnover rate) delivered by competent personnel and are documented.
- Training covers topics including: chemical hazards and identification, MSDS/SDS, signage, compatibility and risk, proper storage and handling, PPEs, and procedure in case of emergency, accidents, or spill, access restriction to chemical storage areas, potential environmental impact of the chemicals in tanks, the physical protection provided to employees in the area(s) where the factory uses, stores and transports these containers, and their individual duties associated with monitoring and maintaining this protection
- All workers responsible for *chemical related operations have attended the training.*

Partial Yes

- Scenario 1: Trainings were held but not documented, or do not cover all relevant workers, or not regularly (annually).
- Scenario 2: Trainings were held and documented but does not cover all necessary topics i.e. chemical hazards and identification, MSDS/SDS, signage, compatibility and risk, proper storage and handling, PPEs, and procedure in case of emergency, accidents, or spill.

Documentation Required:

- Documented training covering all required aspects (for full yes response)
- Partial documentation OR documented trainings covering only partial topics (for partial yes)

Interview Questions to Ask:

- Interview workers who handle chemical related operations during the site walkthrough to gain insight on whether they are aware of chemical hazards, risks, proper handling, PPEs, and what to do in case of an emergency or spill.

Inspection - Things to Physically Look For:

- Review training material
- Key employees are able to walk through the training material covered and can follow the procedures outlined in the training.

4. Does your facility have a chemical spill and emergency response plan that is practiced periodically?

How many employees were trained on this topic?

How frequently do you train your employees on this topic?

Does your facility keep records of all employee and environmental incidents related to chemical spills and emergency response?

Upload: Emergency response plan/procedure

Chemical spill and emergency response plans must meet detailed requirements as specified in guidance, and all workers must participate in a practice drill twice a year.

Reference: ZDHC Chemical Management System Framework Version 1.0 (May 2020) – Chapter 4.3

Select Partial Yes *if you have a chemical spill and emergency response plan, but that does not yet meet all requirements or you do not have practice drills.*

For facilities that <u>do not use chemicals in production:</u>

Answer Yes *if you meet requirements for chemicals and spill response plans, however twice-annual practice drills are not required.*

Operational Key Performance Indicator: Emergency Response Plan (ERP), Accidents & Spills Remediation Plan

What is the intent of the question?

The expectation is that the facility can clearly demonstrate that workers will know how to respond in the case of a chemical emergency. All employees must know process to respond in case of incident - simply having safety equipment isn't enough. Response needs to happen immediately without stopping to review a document or ask someone - which is why periodic practice is important (like fire drills in school).

Having a plan can help prevent workers and community casualties as well as possible financial collapse of the organization in the case of a chemical emergency. Time and circumstances in an emergency mean that normal channels of authority and communication cannot be relied upon to function routinely. The stress of the situation can lead to poor judgment resulting in severe losses. The periodic review of chemical emergency planning can help your facility resolve lack of resources (equipment, trained personnel, supplies) or awareness before an emergency occurs. In addition, an emergency plan promotes safety awareness and shows the organization's commitment to the safety of workers. Appropriate municipal officials should also be consulted since control may be exercised by the local government in major emergencies and additional resources may be available. Communication, training and periodic drills will ensure adequate performance if the plan must be carried out.

Technical Guidance:

- A written, up-to-date Emergency Response Plan for the facility (covering all workplaces) is essential. It should include detailed instructions on how to evacuate the building, contact names/information for individuals in charge of the evacuation procedure.
- Primary and secondary escape routes with simple instructions should be posted at significant spots, at entrances and near elevators and telephones etc.
- Emergency Response Leaders should be assigned specific duties, such as verifying that all workers have been evacuated.
- Disabled workers and those with a history of certain medical conditions should be assigned an Emergency Response Leader to guide them to safety.
- Stairways should be kept free of materials that could block or hinder an evacuation process.
- Regular fire drills should be conducted to identify problems before an actual fire occurs and based on these identified problematic areas, work a corrective and preventive action and implement them. Drills should be treated as if they were an actual emergency.

- Important telephone numbers such as emergency, fire department and internal Emergency Response Leaders should be posted close to every telephone.

In addition to the Emergency Response Plan:

- Maintain an emergency shower and eye wash station for removing chemicals that may contact the skin or eyes.
- Keep a first aid kit that is clearly marked, easily accessible and protected against dust and water. The kit should include:
    - An inspection tag to document monthly checks
    - Written first aid instructions in the local language and a list of all items present with their expiry dates

Reference:

- ZDHC Chemical Management System Framework Version 1.0 (May 2020) – Chapter 4.3

How This Will Be Verified:

Facilities that use **chemicals in production processes:**

Yes

- Emergency response plan/procedure exists on paper containing the minimum guidance provided by referencing the ZDHC Chemical Management System Framework Version 1.0 (May 2020) – Chapter 4.3 and the steps to be taken to protect the environment if there is an accidental release of these substances.
- Practice/drill is conducted periodically (at least twice a year) and well documented
- All workers are included in the practice/drill

Partial Yes

- Emergency response plan/procedure exists but does not include the minimum guidance provided by referencing the ZDHC Chemical Management System Framework Version 1.0 (May 2020) – Chapter 4.3
- Practice/drill is documented and conducted periodically but less than twice a year

Facilities that use **chemicals in facility operations only:**

Yes

- Emergency response plan/procedure exists on paper containing the minimum guidance provided by referencing the ZDHC Chemical Management System Framework Version 1.0 (May 2020) – Chapter 4.3

Partial Yes

- Emergency response plan/procedure exists but does not include the minimum guidance provided by the referencing the ZDHC Chemical Management System Framework Version 1.0 (May 2020) – Chapter 4.3
- NA (for non-tooling) Facilities

Documentation Required:

- Emergency response plan/procedure containing the minimum guidance provided by referencing the ZDHC Chemical Management System Framework Version 1.0 (May 2020) – Chapter 4.3 **(For Full Yes points)**
- Emergency response plan/procedure exists but does not include the minimum guidance provided by referencing the ZDHC Chemical Management System Framework Version 1.0 (May 2020) – Chapter 4.3 **(For Partial Yes points)**

Interview Questions to Ask:

- Senior Manager responsible for Emergency Response Plan
- Managers/workers training and drills knowledge

Inspection - Things to Physically Look For:

- Emergency Response Plan written and practiced
- Emergency Exits clearly marked, unobstructed and unlocked
- Emergency response equipment e.g. spill kits, showers, eyewash stations, fire extinguishers, are available on-site and strategically located to be easily accessible to workers at relevant areas
- Emergency response practice/drill records
- MSDS/SDS

5. Does your facility have appropriate and operable protective and safety equipment, as recommended by the Global Harmonization System compliant (or equivalent) Safety Data Sheet, in all areas where chemicals are stored and used?

Suggested upload: a) Schedule for internal checks/audit for chemical safety that covers relevant chemical exposure risks and safety equipment, with clear designation of responsibilities and outcome of the checks/audits; b) Inventory list of PPEs and safety equipment with schedules of stock replenishments, equipment maintenance or replacements, where applicable (skip if previously uploaded).

Protective and safety equipment may include spill response kits (size, type and location appropriately adapted for the chemical), showers and eyewash tested regularly, fire extinguishers maintained regularly, adapted Personal Protective Equipment (PPE) appropriate for the chemical (based on MSDS/SDS) such as appropriate gloves, protective masks, long handle scoops, etc.

Equipment should follow specifications in the GHS-compliant or equivalent Safety Data Sheet, be clearly visible for all relevant workers (e.g., not stored in a storage cupboard with locks; and in close proximity to the relevant area), well-maintained, and checked regularly for functionality by relevant staff.

For facilities that do not use chemicals in production: This applies to all chemicals that are related to the manufacturing processes, tooling/equipment category, and operating chemicals that do not touch product.

Operational Key Performance Indicator: Chemical Handling, Use, & Storage Practices

What is the intent of the question?

The expectation is that the facility uses the Safety Data Sheet (SDS) to define exposure risks and install preventative/emergency equipment and signage in all areas where necessary.

The main purpose should be to protect workers and/or responders from inadvertent exposure whether it is during normal usage or from an accident or incident despite appropriate management systems and operational procedures. Clear signage is important, so facility workers and emergency responders can know immediately whether the stored substance and/or one they handle could expose them to a hazardous property.

Technical Guidance:

PPE details are given in Section 8 of MSDS/SDS and the details need to be understood and followed appropriately. In case the facility has a very high number of chemicals and the selection of suitable PPE needs to be considered, it is advisable to select the suitable PPE based on severity and adequacy of the PPE for all the chemicals. Study the types of PPE's needed in the facility and select the PPE types which can cover all the possible chemicals appropriately and ensure that the chemicals are also segregated based on the type of PPE required to handle to make the workers understand the use of appropriate PPE to be used for the chemical. It is also important that the PPEs are reviewed periodically and replaced

when necessary. This evaluation is based on the calculation of the time interval where the PPE is being exposed.

- ZDHC Chemical Management System Framework Version 1.0 (May 2020) – Chapter 4.6
- MSDS/SDS
- http://www.labour.gov.hk/eng/public/os/C/equipment.pdf
- http://ehsdailyadvisor.blr.com/2012/04/11-rules-for-safe-handling-of-hazardous-materials/

Other Info:

GIZ Facility Plan

Definitions:

'appropriate' - meaning as specified in the Global Harmonization System (GHS) compliant (or equivalent) SDS;

'functional' - meaning

1. easily accessible for all relevant workers (clearly visible - not stored in a storage cupboard with locks; and in close proximity to the relevant area),
2. well maintained,
3. checked regularly for its functionality, by relevant staff e.g. area supervisors, EHS personnel.

How This Will Be Verified:

Verified by on-site facility review of work/storage areas for appropriate signage and safe-handling equipment.

Please note that there is no **Partial Yes** for this question.

Facilities that **use chemicals in production processes:**

Yes

- A facility plan should detail the physical areas of the facility's property involved in chemical storage and usage. The pictorial plan includes a quick overview of the most critical areas.
- Receiving and delivery
- Chemical storage areas (centralized warehouse and temporary storage areas)
- Chemical process areas
- Manufacturing/production areas
- Waste chemicals storage (including chemical residues and expired chemicals)
- Laboratories, tool shop, maintenance, etc.

- Protective and safety equipment are available on-site at all times and are strategically located to be easily accessible to workers at relevant areas
- Protective and safety equipment are appropriate and in accordance with the Global Harmonization System (GHS) compliant (or equivalent) MSDS/SDS for each chemical stored/used
- Protective and safety equipment are well maintained and checked regularly for its functionality

Facilities that **use chemicals in facility tooling and/or operations only:**

Yes

- A facility plan should detail the physical areas of the facility's property involved in chemical storage and usage. The pictorial plan includes a quick overview of the most critical areas.
- Receiving and delivery
- Chemical storage areas (centralized warehouse and temporary storage areas)
- Chemical process areas
- Manufacturing/production areas
- Waste chemicals storage (including chemical residues and expired chemicals)
- Laboratories, tool shop, maintenance, etc.
- Protective and safety equipment are available on-site at all times and are strategically located to be easily accessible to workers at relevant areas
- Protective and safety equipment are appropriate and in accordance with the Global Harmonization System (GHS) compliant (or equivalent) MSDS/SDS for each chemical stored/used
- Protective and safety equipment are well maintained and checked regularly for its functionality

Documentation Required: (these are not required to be uploaded but will be checked during verification):

- Schedule for internal checks/audit for chemical safety that covers relevant chemical exposure risks and safety equipment, with clear designation of responsibilities and outcome of the checks/audits
- Inventory list of PPEs and safety equipment with schedules of stock replenishments, equipment maintenance or replacements, where applicable

Interview Questions to Ask:

- Senior Management on facility plan/emergency response
- Management/Supervisor walk through of their areas of responsibility
- Employee(s) in charge of checks and maintenance of protective and safety equipment

Inspection - Things to Physically Look For:

- Use facility plan during walk through to verify accuracy/completeness
- General walk through of the facility with review of the availability and appropriate usage of PPEs for workers, and accessibility of safety equipment at relevant areas, matching with hazard classification based on the MSDS/SDS

- Whenever possible, check whether the equipment is functioning e.g. eyewash stations, safety showers

6. Does your facility have chemical hazard signage and safe handling equipment in the areas of the facility where chemicals are used?

Suggested upload: Schedule for internal checks/audit for chemical safety that covers relevant chemical exposure risks and communication (signage placement and updates), with clear designation of responsibilities and outcome of the checks/audits (skip if previously uploaded)

Your facility should post signage at all areas where chemicals are stored or used. Signage should depict the hazard classification(s) of chemicals. The most critical areas for signage include: receiving and delivery, chemical storage areas (centralized warehouse and temporary storage areas), chemical process areas, manufacturing/production areas, waste chemicals storage (including chemical residues and expired chemicals), and laboratories, tool shop, maintenance areas. Handling equipment should be available at relevant locations and correspond with the safety requirement and hazard communication/signage for each particular chemical.

For facilities that do not use chemicals in production: This applies to all tooling and operations chemicals in your factory.

Operational Key Performance Indicator: Chemical Handling, Use, & Storage Practices

What is the intent of the question?

Employees should know immediately whether a substance / chemical is hazardous. The expectation is that the facility uses the Safety Data Sheet to define exposure risks and install preventative/emergency equipment and signage in all areas where necessary and CLP compliant label in case of tooling chemicals.

The main purpose should be to protect workers and/or responders from inadvertent exposure whether it is during normal usage or from an accident or incident despite appropriate management systems and operational procedures. Clear signage is important so facility workers and emergency responders can know immediately whether the stored substance and/or one they handle could expose them to a hazardous property.

Technical Guidance:

- Chemical hazard signage should be displayed appropriately with respect to the chemicals placed and as per the information given in MSDS/SDS Section 2 or Section 3. The safe handling equipment such as, trolleys, containers must be maintained in proper condition without any worn-out wheels, ungreased wheels or leakages. Conduct thorough walk through and inspect the real scenario on shop floor.
- ZDHC Chemical Management System Framework – Version 1.0 (May 2020) – Chapter 6
- MSDS/SDS
- Facility Plan
- https://www.osha.gov/dsg/hazcom/pictograms/index.html
- http://www.nfpa.org/Assets/files/AboutTheCodes/704/NFPA704_HC2012_QCard.pdf
- http://www.hse.gov.uk/chemical-classification/labelling-packaging/hazard-symbols-hazard-pictograms.htm
- http://www.safework.sa.gov.au/uploaded_files/CoPManagingRisksHazardousChemicals.pdf
- http://www.baua.de/en/Topics-from-A-to-Z/Hazardous-Substances/EMKG/EMKG.html
- GIZ Practical Chemical Management Toolkit

How This Will Be Verified:

Verified by on-site facility review of work/storage areas for appropriate signage and safe-handling equipment.

Please note that there is no **Partial Yes** for this question.

Facilities that **use chemicals in production processes:**

Yes

- A facility plan should detail the physical areas of the facility's property involved in chemical storage and usage. The pictorial plan includes a quick overview of the most critical areas.
- Receiving and delivery
- Chemical storage areas (centralized warehouse and temporary storage areas)
- Chemical process areas
- Manufacturing/production areas
- Waste chemicals storage (including chemical residues and expired chemicals)
- Laboratories, tool shop, maintenance, etc.
- Signage posted at the storage and chemical operations area depicts the hazard(s) classification of chemicals stored
- Signage are clearly visible and understood by relevant employees/workers that are responsible for chemical operations
- Handling equipment is available at relevant locations and corresponds with the safety requirement and hazard communication/signage for each particular chemical

Facilities that **use chemicals in facility tooling and/or operations only:**

Yes

- A facility plan should detail the physical areas of the facility's property involved in chemical storage and usage. The pictorial plan includes a quick overview of the most critical areas.
- Receiving and delivery
- Chemical storage areas (centralized warehouse and temporary storage areas)
- Chemical process areas
- Manufacturing/production areas
- Waste chemicals storage (including chemical residues and expired chemicals)
- Laboratories, tool shop, maintenance, etc.
- Signage posted at the storage and chemical operations area depicts the hazard(s) classification of chemicals stored
- Signage are clearly visible and understood by relevant employees/workers that are responsible for chemical usage

Documentation Required:

- Schedule for internal checks/audit for chemical safety that covers relevant chemical exposure risks and communication (signage placement and updates), with clear designation of responsibilities and outcome of the checks/audits

Interview Questions to Ask:

- Senior Management on facility plan/emergency response
- Management/Supervisor walk through of their areas of responsibility
- Employee(s) at relevant areas on their understanding regarding the signage and hazard communications

Inspection - Things to Physically Look For:

- Use facility plan during walk through to verify accuracy/completeness
- General walk through of the facility with review of chemical signage and hazard communication
- Check if signage matches with MSDS/SDS of chemicals stored/used at each area

7. Does your facility select and purchase chemicals based on their hazards and MRSL / RSL requirements?

If yes, do all chemicals purchased and used in production meet the facility's chemical purchasing policy?

If no, do you have a process or plan for eliminating chemicals that do not meet the facility's chemical purchasing policy?

(Note: Not all are required to upload, but need to be available for review during verification) Suggested upload could include some of the following to demonstrate practice: a) MRSL(s) applicable to the facility e.g. customer's MRSL, ZDHC MRSL, facility-own MRSL (combined hazard-based and MRSL from all customers); b) Chemical purchasing procedures and standard operating procedures; c) Chemical supplier/vendor criteria; d) Positive lists; e) Chemical Safety Data Sheet and TDS (skip if previously uploaded); f) Certificate of analysis of chemical composition (the test results of the chemical to evaluate the hazardous chemicals presence along with impurity profiles); g) Certificate of MRSL conformance (chemcheck reports from gateway conforming to the ZDHC gateway level) and declaration letters (with proper evidence of conformance towards the MRSL in case if the chemical is not present in ZDHC gateway) stating date of issuance, name of chemical in concern, the MRSL it is declaring compliance against, and chemical test report confirming the conformance; h) MRSL conformance test reports, where applicable

MRSL is a Manufacturing Restricted Substance List. Facilities typically are aware of Restricted Substance Lists (RSL); however, the industry has recently evolved to focus on Manufacturing Restricted Substance Lists (MRSL) to further environmentally-friendly chemical use in addition to Restricted Substance Lists. MRSL is important because a facility that uses compliant chemicals, in accordance with technical specification directions, has better environmental outcomes for the various facility discharges as well as more consistent RSL material compliance.

***Answer Yes** only if all chemicals purchased meet RSL/MRSL purchasing requirements and you have documentation to support this.*

***Answer Partial Yes** if you purchased chemical(s) that do not have sufficient documentary evidence to prove compliance to MRSL / RSL. and you have clear plan for obtaining the documents from chemical supplier within 6 months or change the chemical supplier who can meet the requirements in order to increase the % of compliant chemicals meeting MRSL/RSLs.*

***For facilities that do not use chemicals in production**: All purchased chemicals must meet these requirements with documentation available that includes certificates of analysis for the composition and MSDS / SDS and technical data sheets where applicable. MRSL should be included in your facility's purchasing policies to prevent non-conforming chemicals enter the facility and RSL compliance through proper production control and avoid violations to occur accidentally, thus demonstrate a full RSL-compliance program in Higg FEM. For chemicals such as cleaners etc., look for the label for the ingredient information and try to check COA to avoid any non-compliance towards MRSL.*

Operational Key Performance Indicator: Chemical Selection, Procurement, & Purchasing Practices

What is the intent of the question?

The intent is to drive the purchase of the compliant chemical / chemical formulation with the least hazard risk for workers, workplace, environment and customer.

This question will be asked of all facilities to ensure purchases do not violate RSL and MRSL. We need to ask non-production facilities if MRSL is included in their purchasing to prevent violations from accidentally occurring, and it relieves this group from having to have a full RSL-compliance program in the upcoming RSL question.

Technical Guidance:

It is important to discuss with chemical suppliers for ZDHC Gateway Level 1-3 compliant and products which are acceptable for RSL/MRSL usage. However, it is important that the facility should not just rely on the declarations or assurances from suppliers alone but ensure to put some validation processes in place to ensure compliance such as test reports from competent ISO 17025 certified laboratories approved for conducting these tests. It is important to discuss with the chemical / material suppliers about their product details with respect the facility's operating conditions and its limitations on recipe concentrations etc.

ZDHC Gateway – Chemical Module, BLUESIGN®, OEKO-TEX®, ecopassport, certificates of conformance, certificates of analysis

New Guidance for Hardgoods facilities:

In the hardgoods sector MRSL (Manufacturing Restricted Substances List) and RSL (Restricted Substances List) requirements may not be available. However, there is a significant impact from the use of chemicals and therefore Restricted Lists should be used.

All textile components in the hardgoods sector (for example, products such as rucksacks, tents, etc.) should apply the MRSL and RSL requirements as outlined in the Higg FEM.

All other components should be governed *at least* by a Restricted List regarding their use during manufacturing. The restrictions on the final product, as applied through an RSL, may especially be relevant for the metal processing and electronics industry, and yet again for other sectors not be relevant. With RSLs the management of residual chemicals on the final product is secured, however this may depend on the product and materials used.

For manufacturing, black, grey and white lists are often used. Black lists contain chemicals that are prohibited in manufacturing, grey lists contain chemicals that should be phased out from manufacturing and white lists contain chemicals that may be used. As a summary term we have chosen "Restricted Lists".

Three examples of "Restricted Lists" are:

1. The RoHS directive of the EU, the European Union. The RoHS directive restricts residual chemicals on electronic products and is strongly linked to the EU WEEE directive mentioned in the waste section guidance. Electronic Products that may be relevant for the hardgoods section includes Consumer equipment, Lighting equipment (including light bulbs, Electronic and electrical tools, Toys, Leisure an Sports equipment, Monitoring and Control instruments). The chemicals that are restricted are:
    a. Lead (Pb)
    b. Mercury (Hg)
    c. Cadmium (Cd)
    d. Hexavalent chromium (Cr6+)
    e. Polybrominated biphenyls (PBB)
    f. Polybrominated diphenyl ether (PBDE)
    g. Bis(2-ethylhexyl) phthalate (DEHP)
    h. Butyl benzyl phthalate (BBP)
    i. Dibutyl phthalate (DBP)
    j. Diisobutyl phthalate (DIBP)
        i. Maximum Permitted Concentration: 0.1%[5]
        ii. Maximum for Cadmium: 0.01%[5]
2. The GADSL (Global Automotive Declarable Substance list).
3. The ABB List of Prohibited and Restricted Substances.

It is expected that facilities may use either a sector-wide list, a brand-specific restricted list or create their own list.

Beyond the fact that different lists are used in the hardgoods sector, the question about selection and purchasing is also valid for hardgoods facilities.

How This Will Be Verified:

Facilities that use **chemicals in production processes:**

Yes:

- All chemicals meet requirements of MRSL/RSL, and documentation is available to demonstrate this. The ZDHC MRSL conformance levels (1, 2 and 3) from ZDHC Gateway Chemical module should be used for the determination of the conformity of the chemicals and for the development of approved chemicals lists. For more information about the ZDHC MRSL conformance, refer to the ZDHC MRSL Conformance Guidance.
- Facility strategically set up their own chemical MRSL based on their hazards and covering all MRSL and RSL requirements from various brands which they are working with, or alternatively implement a strategy to use compliant chemicals from an active list that covers all MRSL e.g. the bluesign® system.
- The facility strategically purchases chemicals that are certified to meet the MRSL and RSL when used appropriately such as bluesign® approved chemistry, Ecopassport by OekoTex. These certifications are checked for validity and updated at least annually.
- If above certifications are not available, the facility should purchase chemicals that are declared to meet the MRSL and RSL by the chemical provider, accompanied with analytical/test report to substantiate the declaration conducted at an approved 3rd party laboratory. The declaration and analytical report are checked for validity and updated at least annually.
- The facility has internal purchasing policy that is implemented and includes reference to criteria for the selection and use of dye and chemical suppliers. The purchasing procedures should include (but not limited to): process of communicating MRSL / RSL with the chemical suppliers, process to obtain suppliers' confirmation/declaration of MRSL / RSL compliance, collection of up-to-date Positive Lists from chemical suppliers, preference to purchase chemicals in Positive Lists, purchase orders with a remark stating that MRSL compliance is mandatory against appropriate version, chemicals technical specifications and acceptance criteria, actions to be taken in case of defects or deviation from requirements are found.
- Purchasing department and management are aware about MRSL and purchasing procedures to ensure requirements are met
- The facility has a certificate of analysis (wherever applicable) from chemical supplier who got the test report from an approved laboratory for MRSL test for the composition including low level contaminants along with an MSDS / SDS and technical data sheet. These certificates of analysis are updated at least annually and retained for a year. Technical Data Sheets (TDS) are the documents where the chemical supplier provides the information on how to use the chemical, dosage requirements, conditions required for application process among other information. So it is important that all facilities request the TDS and refer to the information before going for application.
- A tracking / dashboard system to indicate the general level of compliance to the process requirements for the purchasing standard is available to senior executives.
- For chemicals not used in the manufacturing process (example, lubricants, cleaning chemicals...) it might not be feasible to collect certificates of MRSL compliance or certificates of analysis. For those types of chemicals the facility have a process in place to review the list of ingredients

against the MRSL / RSL to check if those chemicals are in conformance with those substance lists.

Partial Yes

- Facility may have non-compliant chemicals, but demonstrate a process for elimination.
- Purchasing department and management are aware about MRSL and purchasing procedures to ensure requirements are met
- The facility generally purchases the chemicals based on the MRSL requirements, which is evidenced by upstream suppliers' agreement on MRSL, or certificate of conformance, or declaration letters.
- Certificate of MRSL conformance and declaration letters issued by chemical suppliers need to clearly state: date of issuance, name of chemical in concern, the MRSL it is declaring compliance against (attached), and internal chemical test report confirming the conformance.

Facilities that use **chemicals in facility tooling and/or operations only**:

Yes

- All chemicals meet requirements MRSL and RSL requirements, and documentation is available to demonstrate this.
- The facility has a process that details the necessary criteria for selection of a chemical / chemical formulation through the use of technical specifications and hazards associated with the purchase.
- Purchasing department and management are aware about MRSL / RSL and purchasing procedures to ensure requirements are met
- For chemicals used in the manufacturing process (example, lubricants, cleaning chemicals...) it might not be feasible to collect certificates of MRSL compliance or certificates of analysis. For these types of chemicals the facility has a process in place to review the list of ingredients against the MRSL / RSL to check if those chemicals are in conformance with those substance lists.

Partial Yes

- Facility has a process to ensure the compliance of the chemicals against an MRSL / RSL but it is not applied to 100% of the chemicals in the inventory. In such cases the facility must demonstrate a process for obtaining the necessary documentary evidence for MRSL compliance from chemical supplier within a stipulated time frame, or a plan to change to a chemical supplier who comply to the requirement and can submit the necessary documentation/certification.
- Purchasing department and management are aware about MRSL / RSL and purchasing procedures to ensure requirements are met
- The facility generally purchases the chemicals based on the MRSL / RSL requirements, which is evidenced by upstream suppliers' agreement on MRSL / RSL, or certificate of conformance, or declaration letters where available.
- Certificate of MRSL / RSL conformance and declaration letters issued by chemical suppliers where available need to clearly state: date of issuance, name of chemical in concern, the MRSL /

RSL it is declaring compliance against (attached), and internal chemical test report confirming the conformance.

Documentation Required:

- Reference requirements for Yes and Partial yes above.
- MRSL(s) applicable to the facility e.g. customer's MRSL, ZDHC MRSL, facility-own MRSL (either create a combined hazard-based and MRSL from all customers or follow the MRSL which is created to cover all requirements of Brands and Retailers.)
- RSL
- Chemical purchasing procedures and SOPs
- Chemical supplier/vendor criteria
- ZDHC Gateway Chemical module compliance Levels for 1 - 3
- Chemical SDS and TDS
- Certificate of analysis test reports of chemical formulation to check any impurities present in chemical composition
- Certificate of MRSL conformance and declaration letters stating date of issuance, name of chemical in concern, the MRSL it is declaring compliance against (attached), and chemical test report confirming the conformance
- MRSL conformance test reports, where applicable

Interview Questions to Ask:

- Purchasing Manager on knowledge about MRSL and chemical hazards, and purchasing policy and procedures related to MRSL

Inspection - Things to Physically Look For:

- Documents review, e.g. certificates, purchasing policy and procedures, list of chemical suppliers, relevant communications regarding MRSL requirement, purchase agreement with chemical suppliers, vendor criteria, etc.

Where to go for more info (e.g., links or websites):

- https://www.my-aip.com/ZDHCGateway/Login.aspx
- https://uploads-ssl.webflow.com/5c4065f2d6b53e08a1b03de7/5e8de0a3c5077cd5d6846799_Conformance_Guidance_V1_1.pdf
- https://www.roadmaptozero.com/landingpage/chemcheck
- http://www.bluesign.com/
- https://www.oeko-tex.com/de/business/business_home/business_home.xhtml better change into English page as below
- https://www.oeko-tex.com/en/business/business_home/business_home.xhtml
- https://www.osha.gov/Publications/HazComm_QuickCard_SafetyData.html

8. Does your facility have an environmental and occupational health and safety program specific to chemicals management?

(Note: Not all are required to upload, but need to be available for review during verification) Suggested upload could include some of the following to demonstrate practice: a) Letter of appointment, job description, organization chart of the EHS responsible; b) Curriculum Vitae of responsible person/team, experience / training records demonstrating relevant content in chemical management; c) Environmental Health and Safety procedures related to chemical storage, handling, usage, and disposal); d) Chemical Inventory with identified hazards with SDS/ MSDS, technical sheets available to and used by Environmental Health and Safety personnel (skip if previously uploaded); e) Permits with operating limits and relevant laws governing health and safety requirement for chemical storage, operations, and disposal (skip if previously uploaded); f) Chemical incident / accident and spill records (skip if previously uploaded); g) Health and Safety Log (First Aid and health station)

Chemicals health and safety programs must have a designated person or team, meet legal health and safety requirements, and have written procedures for chemical storage, handling, usage, disposal, and environmental controls for waste or discharge to the environment.

*Please select **Partial Yes** if your chemicals health and safety program is complete, but not yet documented in writing.*

Operational Key Performance Indicator: Chemical Handling, Use, & Storage Practices

What is the intent of the question?

This program is intended to protect humans and the environment from exposures. The facility should have a process for identifying and controlling the potential health and safety impact from chemicals stored, used and discarded.

Chemical exposure can occur via many routes. A facility must identify health and safety roles and responsibilities, and appropriate control mechanisms to protect health and safety, and a mechanism to reduce the potential for health and safety impacts. Knowledge of the hazards and routes of exposure from the MSDS/SDS is the starting point for an EHS program.

Technical Guidance:

ZDHC Chemical Management System Framework – Version 1.0 (May 2020) – Chapter 1 and Chapter 2

Additional Training:

- ZDHC CMS Training
- Chemical management training records with the training content. Chemical management training requirements should be facility specific and cannot be just limited to only few important section elaborations**.**

How This Will Be Verified:

Facilities that use **chemicals in production processes:**

Yes:

- The facility has a designated person or team dedicated to chemical management with appropriate qualifications to understand and enact appropriate occupational safety and health measures indicated in the MSDS/SDS and/or Technical Data Sheets (TDS) to protect workers, the community and the environment.
- Basic chemical risk assessment has been conducted which involves the identification of the risk and the potential hazard or harm resulting from a specific activity at the facility related to the use of a chemical. For example, using certain chemical in a proposed amount and manner, taking into account the chemical's possible routes of exposure. The assessment also needs to identify different types of chemical and hazardous waste in production processes that are relevant to the facility that could affect wastewater quality. The chemical risk assessment may be conducted as standalone or as part of environmental assessment report.
- The facility is operating within all permit/law requirements on health and safety related to chemicals with routine monitoring and reporting to senior management.
- There are written procedures for safety and health related to chemical storage, handling, usage, disposal, and basic environmental controls for identified potential environmental impacts from the chemical inventory due to waste or discharge: air, soil, groundwater, noise, waste and sludge, wastewater. The procedures also need to consider the most likely natural disaster in the region, for example, areas prone to heavy rain and flooding, earthquake, typhoon, etc.
- Basic health/wellness process is available on site or through a third party when hazardous chemicals are handled, or exposure occurs.

Partial Yes:

- The facility has a designated person or team dedicated to chemical management with appropriate qualifications to understand and enact appropriate occupational safety and health measures indicated in the MSDS/SDS and/or Technical Data Sheets (SDS) to protect workers, the community and the environment.
- The facility is operating within all permit/law requirements on health and safety related to chemicals with routine monitoring and reporting to senior management.

- The facility has identified potential environmental, health and safety hazards related to its chemical storage, handling, usage, and disposal at *some parts* of its chemical operation, and the potential hazards are identified *correctly* based on MSDS and TDS. However, a facility-wide chemical risk assessment has **not** been conducted.
- There are procedures and followed practices for safety and health related to chemical storage, handling, usage, disposal, and basic environmental controls for the identified potential environmental impacts for chemicals, however it is **not** written and documented.

Facilities that use **chemicals in facility tooling and/or operations only**:

Yes

- The facility has a designated person or team dedicated to chemical management with appropriate qualifications to understand and enact appropriate occupational safety and health measures indicated in the MSDS/SDS and/or Technical Data Sheets (TDS) to protect workers, the community and the environment.
- The facility is operating within all permit/law requirements on health and safety related to chemicals with routine monitoring and reporting to senior management.
- There are written procedures for safety and health related to chemical storage, handling, usage, disposal, and basic environmental controls for identified potential environmental impacts from the chemical inventory due to waste or discharge: air, soil, groundwater, noise, waste and sludge, wastewater. The procedures also need to consider the most likely natural disaster in the region, for example, areas prone to heavy rain and flooding, earthquake, typhoon, etc.
- Basic health/wellness process is available on site or through a third party when hazardous chemicals are handled or exposure occurs.

Partial Yes

- The facility has a designated person or team dedicated to chemical management with appropriate qualifications to understand and enact appropriate occupational safety and health measures indicated in the MSDS/SDS and/or Technical Data Sheets (TDS) to protect workers, the community and the environment.
- The facility is operating within all permit/law requirements on health and safety related to chemicals with routine monitoring and reporting to senior management.
- There are procedures and followed practices for safety and health related to chemical storage, handling, usage, disposal, and basic environmental controls for identified potential environmental impacts for chemicals, however it is not written and documented.

Documentation Required:

- Letter of appointment, job description, organization chart
- Curriculum Vitae of responsible person/team
- EHS procedures related to chemical storage, handling, usage, and disposal
- Chemical Inventory with identified hazards with MSDS, technical sheets available to and used by EHS personnel
- Permits with operating limits and relevant laws governing health and safety requirement for chemical storage, operations, and disposal

- Chemical accident and spill records
- Health and Safety Log (First Aid and health station)

Interview Questions to Ask:

- EHS, Chemical Responsible person/team on their understanding of health and safety related to chemical storage, operations, and disposal, and their relevant responsibilities including facility-wide EHS checks/audits, PPEs placements and availability, safety equipment maintenance, emergency response plan, etc. The responsible person also needs to be aware of the most likely natural disaster in the region where the facility is located, for example, areas prone to heavy rain and flooding, earthquake, typhoon, etc., and how these considerations are included in the EHS planning related to chemicals exposure due to natural disasters.
- Health/medical Station, emergency response team (if available)
- Doctor, nurse, health practitioner if available on site

Inspection - Things to Physically Look For:

- Verify responsible person/team is in place and appropriately qualified to manage the EHS program related to chemicals management
- Chemical Inventory with identified hazards with MSDS/SDS, technical sheets are available to the EHS personnel and used as basis of the EHS program e.g. chemical accidents and emergency response plan, safety equipment and PPE placements, workers training, regular check and maintenance of EHS utilities
- Explosion Proof Electrical lights and receptacles available in flammable usage and storage areas

9. Does your facility have well marked, designated chemical storage and temporary storage areas?

If yes, select all that apply

- The chemical storage area is ventilated, dry and protected from the weather and fire risk.
- The storage area is protected from unauthorized employees (i.e. locked).
- The chemical storage area is clearly marked.
- The chemical storage area has easy entry and exit in case of any emergencies.
- Storage containers are in good condition, appropriate for their contents, closed and clearly labelled with their contents.
- Floor in storage area is solid and non-porous, there are no water drains that the liquid could spill into, and there is no evidence of spilled liquid.
- Secondary containment is available for solid and liquid chemicals in tanks, drums, and temporary containers (where applicable) to ensure no unintended releases occur.
- Incompatible substances (such as strong acids and strong bases) are stored separately.
- Flammable substances are kept away from sources of heat or ignition, including the use of grounding and explosion-proof lighting.
- Temporary storage containers are closed and labelled with contents, lot, and hazard class.

(Note: Not all are required to upload, but need to be available for review during verification) Suggested upload could include some of the following to demonstrate practice: a) Facility drawing or emergency response plan with local authorities where applicable (skip if previously uploaded); b) Storage/usage permit with restrictions (if applicable); c) Local fire codes; d) MSDS/SDS and technical sheets in local language (skip if previously uploaded); e) Chemical labeling on chemical containers (original labeling, no handwritten labels); f) Floor plan of chemical storage areas, specifying categorization and placements of different types of chemicals; g) Storage in/out log, FIFO records, for each chemical specifying date of arrival at storage, lot number, chemical expiration dates, date of dispatch to production, etc. (skip if previously uploaded); h) Management audits/inspections checklists of chemical storage areas; i) Standard operating procedures for proper chemical storage.

Proper chemical storage is as important to safety as proper chemical handling. Often, seemingly logical storage ideas, such as placing chemicals in alphabetical order, may cause incompatible chemicals to be stored together. Facilities must demonstrate that all storage areas are well-marked and properly managed to prevent contamination and safety risks. Temporary storage happens at the point of work where chemicals are applied, such as a screen-printing station. Temporary storage questions only apply to factories that use chemicals in production processes.

*You will be awarded **Full Points** if you meet all storage criteria.*

*You will be awarded **Partial Points** if you meet half of all storage criteria.*

Operational Key Performance Indicator: Chemical Handling, Use, & Storage Practices

What is the intent of the question?

The expectation is that a facility can clearly demonstrate that all storage areas are well-marked and properly managed to prevent contamination and safety risks.

Proper chemical storage is as important to safety as proper chemical handling. A facility is home to a considerable range of chemicals requiring safe storage. Chemical storage in a building needs appropriate design to store various hazardous materials in a safe segregated and secure area(s). Often, seemingly logical storage ideas, such as placing chemicals in alphabetical order, may cause incompatible chemicals

to be stored together. Storage and quantities must be known to emergency responders, fire brigades, etc. for proper response.

Technical Guidance:

ZDHC Chemical Management System Framework – Version 1.0 (May 2020) – Chapter 3

Templates to Create:

- Emergency Response Plan (template) - available in ZDHC CMS as hyperlink

Where to go for more info (e.g., links or websites):

- ZDHC CMS https://www.roadmaptozero.com/process
- OKOPOL
- German Technical Rules for Hazardous Substances
- GHS
- https://www.unece.org/fileadmin/DAM/trans/danger/publi/ghs/ghs_rev08/ST-SG-AC10-30-Rev8e.pdf

How This Will Be Verified:

Facilities that use **chemicals in production processes:**

Full Points

- Chemical storage area (warehouse and temporary storage including underground storage) is ventilated, dry, and protected from the direct exposure of weather (with roof and walls), fire risk, and unauthorized employees i.e. locked. Access permission is clearly defined.
- The chemical storage area has easy entry and exit in case of any emergencies.
- The floor is solid and non-porous, there are no water drains that the chemicals could spill into, and there is no evidence of spilled liquid
- Chemicals are stored to avoid direct contact with floors and walls
- All chemicals at warehouse and temporary storage areas are clearly marked, with each chemical properly identified by visible signage with at least the chemical product name and appropriate hazard warning (Global Harmonization System (GHS) compliant signs, or equivalent) according to the MSDS/SDS
- All chemicals containers in warehouse and temporary storage are in good condition, identified by its original labeling, lot number, product name, supplier/manufacturer name, and hazard class

- Temporary/sub-containers are properly labeled with accurate information consistent with the label on original container
- Different chemicals are properly segregated with appropriate partitions
- Solid and liquid chemicals are properly segregated
- Chemicals are stored in organized manner, categorized by their hazard classifications as shown on its original labels and MSDS/SDS
- Incompatible substances e.g. strong acids, strong bases, corrosives, flammables, etc. are identified and stored separately.
- Flammable substances are kept away from sources of heat or ignition, including the use of grounding and explosion-proof lighting. All combustible or flammable materials are situated at least ~15 meters (50 feet) from any smoking area
- Expired chemicals are tracked regularly, visibly marked, stored separately, and properly labeled
- MSDS/SDS in language workers understand are readily available at warehouse and temporary storage areas
- Storage conditions such as temperature, moisture, explosion proof fixtures are met according to the MSDS/SDS
- Appropriate PPE and spillage kits are available and easily accessible
- All dyes and chemicals containers in warehouse and temporary storage are properly closed with a lid and are not over stacked
- Secondary containment is available for solid and liquid chemicals in tanks, drums, and temporary containers (where applicable) to ensure no unintended releases occur. The secondary containment is in good condition without cracks or gaps. At a minimum, the capacity of secondary containment should either be at least 110% of the original (primary) container of the chemical, or able to contain at least 10% of the total volume of the original (primary) container.
- Each chemical and dyestuff has individual scoop (or jar, bucket, spoon, etc.) properly labeled specifically for that chemical product.
- Scoops and temporary containers e.g. buckets are made of stable material to avoid corrosion/chemical reaction with the chemical products. It is suggested to avoid containers carrying chemicals which react or leach hazardous chemical residues, i.e. materials consisting of PVC and iron are to be avoided.
- Weighing equipment/tools are placed in a clean, dry, smooth and flat surface
- Facility drawing or emergency response plan is up to date and shared with local authorities where applicable
- There is grounding used where necessary and bonding as needed (fire risk)
- Periodical inspection is in place (weekly recommended)

Partial Points: (*meets at least half of the criteria listed below*)

- Chemical storage area (warehouse and temporary storage including underground storage) is ventilated, dry, and protected from the direct exposure of weather (with roof and walls), fire risk, and unauthorized employees i.e. locked. Access permission is clearly defined.
- The chemical storage area has easy entry and exit in case of any emergencies.
- The floor is solid and non-porous, there are no water drains that the chemicals could spill into, and there is no evidence of spilled liquid
- Chemicals are stored to avoid direct contact with floors and walls
- All chemicals at warehouse and temporary storage areas are clearly marked, with each chemical properly identified by visible signage with at least the chemical product name and appropriate

hazard warning (Global Harmonization System (GHS) compliant signs, or equivalent) according to the MSDS/SDS

- All chemicals containers in warehouse and temporary storage are in good condition, identified by its original labeling, lot number, product name, supplier/manufacturer name, and hazard class
- Temporary/sub-containers are properly labeled with accurate information consistent with the label on original container
- Different chemicals are properly segregated with appropriate partitions
- Solid and liquid chemicals are properly segregated
- Chemicals are stored in organized manner, categorized by their hazard classifications as shown on its original labels and MSDS/SDS
- Incompatible substances e.g. strong acids, strong bases, corrosives, flammables, etc. are identified and stored separately.
- Flammable substances are kept away from sources of heat or ignition, including the use of grounding and explosion-proof lighting. All combustible or flammable materials are situated at least ~15 meters (50 feet) from any smoking area
- Expired chemicals are tracked regularly, visibly marked, stored separately, and properly labeled
- MSDS/SDS in language workers understand are readily available at warehouse and temporary storage areas
- Storage conditions such as temperature, moisture, explosion proof fixtures are met according to the MSDS/SDS
- Appropriate PPE and spillage kits are available and easily accessible
- All dyes and chemicals containers in warehouse and temporary storage are properly closed with a lid and are not over stacked
- Secondary containment is available for solid and liquid chemicals in tanks, drums, and temporary containers (where applicable) to ensure no unintended releases occur. The secondary containment is in good condition without cracks or gaps. At a minimum, the capacity of secondary containment should either be at least 110% of the original (primary) container of the chemical, or able to contain at least 10% of the total volume of the original (primary) container.
- Each chemical and dyestuff has individual scoop (or jar, bucket, spoon, etc.) properly labeled specifically for that chemical product.
- Scoops and temporary containers e.g. buckets are made of stable material to avoid corrosion/chemical reaction with the chemical products. It is suggested to avoid containers carrying chemicals which react or leach hazardous chemical residues, i.e. materials consisting of PVC and iron are to be avoided.
- Weighing equipment/tools are placed in a clean, dry, smooth and flat surface
- Facility drawing or emergency response plan is up to date and shared with local authorities where applicable
- There is grounding used where necessary and bonding as needed (fire risk)
- Periodical inspection is in place (weekly recommended)

Facilities that use **chemicals in facility tooling and/or operations only**:

Full Points

- Chemicals are stored to avoid direct contact with floors and walls

- Chemicals are stored in ventilated, dry condition, and protected from the direct exposure of weather
- Solid and liquid chemicals (where applicable) are properly segregated
- Chemical containers are in good condition, identified by its original labeling and hazard class
- Flammable substances (where applicable) are kept away from sources of heat or ignition. All combustible or flammable materials are situated at least ~15 meters (50 feet) from any smoking area
- Secondary containment is available (where applicable) to ensure no unintended releases occur. The secondary containment is in good condition without cracks or gaps. At a minimum, the capacity of secondary containment should either be at least 110% of the original (primary) container of the chemical, or able to contain at least 10% of the total volume of the original (primary) container.
- MSDS/SDS (where applicable) or other hazard communication in language workers understand are readily available/visible
- Appropriate PPE are available and easily accessible (where applicable)
- Facility drawing or emergency response plan is up to date and shared with local authorities where applicable
- Facility has a monitoring program for their subcontractors' chemical storage management.

Partial Points: *(meets at least half of the criteria listed below)*

- Chemicals are stored to avoid direct contact with floors and walls
- Chemicals are stored in ventilated, dry condition, and protected from the direct exposure of weather
- Solid and liquid chemicals (where applicable) are properly segregated
- Chemical containers are in good condition, identified by its original labeling and hazard class
- Flammable substances (where applicable) are kept away from sources of heat or ignition. All combustible or flammable materials are situated at least ~15 meters (50 feet) from any smoking area
- Secondary containment is available (where applicable) to ensure no unintended releases occur. The secondary containment is in good condition without cracks or gaps. At a minimum, the capacity of secondary containment should either be at least 110% of the original (primary) container of the chemical, or able to contain at least 10% of the total volume of the original (primary) container.
- MSDS/SDS (where applicable) or other hazard communication in language workers understand are readily available/visible
- Appropriate PPE are available and easily accessible (where applicable)
- Facility drawing or emergency response plan is up to date and shared with local authorities where applicable

Documentation Required:

- Facility drawing or emergency response plan with local authorities where applicable
- Storage/usage permit with restrictions (if apply)
- Local fire codes
- MSDS/SDS and technical sheets in local language
- Chemical labeling on chemical containers (original labeling, no handwritten labels)

- Floor plan of chemical storage areas, specifying categorization and placements of different types of chemicals
- Storage in/out log, FIFO records, for each chemical specifying date of arrival at storage, lot number, chemical expiration dates, date of dispatch to production, etc.
- Management audits/inspections checklists of chemical storage areas
- Standard Operating procedures for proper chemical storage

Interview Questions to Ask:

- Check understanding of the supervisor in charge, and workers for familiarity with MSDS/SDS, CLP.
- Can they explain the hazard classification for several chemicals in their work area?
- Check their understanding of several hazard symbols and storage compatibility.

Inspection - Things to Physically Look For:

- Facility drawing or emergency response plan is up to date and shared with local authorities where applicable
- Check all relevant areas where chemicals are used and stored, including: warehouse, temporary storage areas, in-house laboratory, chemical recipe mixing areas, workshop/production floor, ETP.
- Chemicals are properly labeled (original labeling, no handwritten labels) and appropriately segregated, stored off floor, etc.
- Storage condition meets requirement (roof, walls, floors, segregation criteria met based on hazard class, risk, compatibility, forms (solid vs. liquid), storage conditions e.g. special storage conditions such as temperature, moisture, explosion proof fixtures, etc.)
- Access permission and hazard warning signage
- MSDS/SDS in language workers understand are readily available, up-to-date, and accurately translated; check if signage is clearly visible and matching with chemicals stored and its MSDS/SDS - check at least 5 at each location
- Secondary containment is available and appropriate
- Check hazardous waste and sludge storage and containment areas
- Check general housekeeping and organization/categorization of chemicals, chemical containers integrity e.g. tank or drum, etc, expiration dates on chemicals
- Containers are not modified to facilitate chemicals dispense
- Containers are appropriately closed with a lid
- All weighing equipment and accessory (is dust being created during handling and weighing procedures?)
- Check scoops and buckets i.e. does it include the name of the product they are used for
- Check PPE usage and availability and maintenance record where applicable
- Ask for a demo of at least 3 different chemicals and check if each chemical has its own handling and weighing accessory labeled with the name of the product they are used for. During that demo, verifier should check if they weigh the different chemicals of a mixture independently.
- Take pictures of storage areas
- Periodical inspection record

10. Does your facility train employees responsible for the chemical

management system on Restricted Substance Lists (RSLs) and Manufacturing Restricted Substance Lists (MRSLs)?

Please select all topics included in your training: MRSL ; RSL

Please describe the RSL and MRSL trainings conducted in the last calendar year

How many employees were trained?

How frequently do you train your employees?

Suggested upload: MRSL/RSL training record(s) with names, date, topic of training, brief description of what was trained

MRSL and RSL trainings must be conducted by a knowledgeable employee and come with documentation showing who, when, where, and how they were trained on MRSL and RSL.

Additional documentation will be requested during verification: Job Descriptions.

***Select Partial Yes** if training has been provided but is not yet well-documented.*

Operational Key Performance Indicator: Employee Training & Communication

What is the intent of the question?

Before we jump to requiring compliance with RSL, MRSL, we must first introduce the topic and reasoning to workers so a program can be effectively implemented. The facility should hold trainings to ensure that the personnel responsible for MRSL/RSL compliance are competent through appropriate education, training and/or experience.

All facilities should ban non-compliant hazardous chemicals used in the facility due to legislations, regulations, or customers' requirements (such as Manufacturing RSL (MRSL) from the ZDHC). However, before we jump to requiring compliance with banned operating chemicals, we must first educate by introducing the topic and reasoning to workers so a program can be effectively implemented.

Chemicals and chemical handling are key essentials of chemical management and workplace safety. MRSL/RSL is just one aspect in a full chemical management process when dealing with chemicals, their proper application for function, and their potential hazardous properties to the worker and in the workplace.

Technical Guidance:

Training of MRSL/RSL in Chemical management should cover the possible source(s) of hazardous chemicals in the facility with complete analysis of risks from the full chemical inventory and available stock. The facility should be in the position to carry out a ROOT Cause analysis in case of any non-compliance detected.

Where to go for more info:

https://mrsl.roadmaptozero.com/MRSL2_0

http://afirm-group.com/afirm-rsl/

https://www.aafaglobal.org/AAFA/Solutions_Pages/Restricted_Substance_List

How This Will Be Verified:

Facilities that **use chemicals in production processes:**

Yes

- There is a designated person(s) responsible for chemical management, MRSL and RSL compliance, identified by formal job description, including but not limited to: purchasing, production line and technical managers.
- There is a formal system of training that documents who, when, where, and how they were trained on MRSL and RSL.
- Designated person(s) responsible for chemical management are knowledgeable regarding MRSL and RSL (through interview)

Partial Yes

- Scenario 1:
    - There is a designated person(s) responsible for chemical management, MRSL and RSL compliance, identified by formal job description, including but not limited to: purchasing, production line and technical managers.
    - MRSL and RSL training has been provided but not well documented.

- Scenario 2:
    - There is a designated person(s) responsible for chemical management identified by formal job description, including but not limited to: purchasing, production line and technical managers.
    - Training has been provided and well documented but designated person(s) is still not knowledgeable regarding MRSL and RSL.

Documentation Required:

- Job Descriptions
- Training record(s) with names, date, topic of training, brief description of what was trained
- Interview / dialogue with management or key employees (including but not limited to purchasing, production line and technical managers):
    - Check the understanding of the responsible person
    - Difference between MRSL and RSL
    - Examples of few (minimum of 5) MRSL parameters
    - Different MRSL limits for certain parameter (random pick) - what it means and how to manage it
    - Which is the main restricted substance derived from dyestuff. (only for printing/dyeing facilities)
    - Where would they find information regarding MRSL or RSL compliant information
    - Can they provide one example of a recipe card linked to technical sheet for proper usage
    - Knowledge of MRSL document, how it works and they understand the consequences of using product included in the list

Inspection - Things to Physically Look For:

- Review Training Material and Logs
- Job description review.
- Conduct interviews with all designated person(s).
- Ensure purchasing, production line and technical managers are trained.

11. Does your facility have a documented process to systematically identify, monitor and verify compliance with all product Restricted Substance Lists (RSLs), and segregate chemical formulations materials and products which

are non-compliant with RSL?

Does your facility have a failure resolution process that is followed in the event of an RSL test failure?

(Note: Not all are required to upload, but need to be available for review during verification) Suggested upload could include some of the following to demonstrate practice: a) Technical Data/Specification sheets (TDS) for all chemicals; b) Recipes for processes where chemicals are used; c) Purchased materials list with Letter of Compliance to RSL for all chemicals and guidance from chemical suppliers on safe limits to use; d) documented procedure to systematically identify, monitor and verify compliance with all product Restricted Substance Lists (RSLs)

Facilities must incorporate an industry standard such as an AFIRM, AAFA, or major customer RSL(s) into their business practices. Please answer Yes if you can verify RSL compliance by providing evidence of your RSL review process and technical data sheets, inventories that meet RSL requirements, and by providing Letters of RSL Conformance, and/or product test results.

***Answer Partial Yes** if you can prove RSL conformance but do not yet have an internal review process to systematically monitor RSL*

Operational Key Performance Indicator: Chemical Management Policies, Compliance Procedures, and Commitments

What is the intent of the question?

The expectation is for facilities to incorporate an industry standard such as an AFIRM, AAFA, or major customer RSL(s) into their business practices. When chemicals are used in a process they should comply to Technical Data Sheet (TDS) requirement(s) that are necessary to achieve the desired RSL outcome. The RSL process should be formally documented in some written form and updated on an annual basis.

RSL compliance is important to ensure that the product being created will protect and consumer's health and safety as well as comply with relevant chemical regulations in every jurisdiction where products are created or sold. MRSL compliant chemicals must be used in accordance with technical specification directions to meet RSL material compliance outcomes.

Technical Guidance:

A complete document containing the Risk Assessment for RSL and MRSL should be present in the facility and can be prepared on basis of the chemical inventory and the SDS/MSDS information along with the documents provided by the chemical suppliers such as Technical Data Sheets, Certificate of Analysis, Certificate of Conformance, Test reports etc., The risk assessment document should identify the components present in the composition of the chemical formulation and its concentration levels, any unintentional component present due to the process route or source of chemical and also evaluate the possible risks from the process route of production or during the wastewater treatment etc.

Reference lists for RSL and/MRSL include:

- REACH SVHC Level 1
- RoHS
- Prop 65
- ZDHC priority 11
- AFIRM
- AAFA
- BLUESIGN® System Substance List
- Oeko Tex 100
- ZDHC MRSL (most updated version)

Other References:

- ZDHC Chemical Management System Framework – Version 1;0 (May 2020) – Chapter 3, 5 & 8
- Product technical guidance documents from the chemical supplier

How This Will Be Verified:

Facilities that use **chemicals in production processes:**

Yes

- The facility or its parent/corporate group can provide a written document specifying a review process that monitors, updates and show compliance to a RSL.
- Process recipes should consider the usage of chemicals according to each Technical Data Sheet (TDS) to ensure compliance to RSL i.e. chemicals in process recipe should not exceed the concentrations as suggested by the chemical manufacturer.
- All chemicals in the Chemical Inventory are checked against RSL compliance at least on annual basis.
- The facility or its parent/corporate group can provide Letters of RSL Conformance supported with test/analysis results for all relevant chemicals.
- RSL has been formally communicated to upstream suppliers i.e. chemical suppliers, raw material suppliers, process subcontractors (e.g. washing, finishing, printing)
- Procedure or process to verify the products complies with RSLs such as testing according to customer's requirement, or having a program to test the products based on factories' own risk assessment (the focus should be the procedure and process)

- The facility or its parent/corporate group should ensure that all the raw materials (yarn, fabric etc.,) are in compliance with the MRSL / RSL.

Partial Yes

- Process recipes should consider the usage of chemicals according to each Technical Data Sheet (TDS) to ensure compliance to RSL i.e. chemicals in process recipe should not exceed the concentrations as suggested by the chemical manufacturer.
- The facility or its parent/corporate group can provide Letters of RSL Conformance supported with test/analysis result for all relevant chemicals.
- The facility or its parent/corporate group has procedures related to the use of customers RSL in its chemical purchasing and operations, however it does not have a written document specifying a full review process that monitors, updates and show compliance to a RSL.

Documentation Required:

- Technical Data/Specification sheets (TDS) for all chemicals.
- Recipes for processes where chemicals are used.
- Purchased materials list with Letter of Compliance to RSL for all chemicals.
- Chemical inventory - verify all chemicals are covered and checked for RSL compliance at least on annual basis, check the dates of previous check.

Interview Questions to Ask:

- Interviewees demonstrate basic knowledge of RSL and how to perform a compliance check to ensure usage against a Technical Data Sheet (TDS) with linkage to recipe cards.
- Ask relevant employees (e.g. lab manager, production manager, EHS manager, purchasing, etc.) about how the facility is keeping track of RSLs of different customers and the RSL updates, how RSL is communicated and internalized. Check alignment of understanding amongst internal stakeholders across functions.

Inspection - Things to Physically Look For:

- Check RSL(s) the facility is working with, how the facility is keeping track of RSLs and RSL updates, how RSL is communicated and internalized.
- Availability of Technical Data Sheets (TDS) for all relevant chemicals at appropriate areas e.g. lab, chemical mixing.
- Formal communication trail with upstream suppliers regarding RSL i.e. chemical suppliers, raw material suppliers, process subcontractors (e.g. washing, finishing, printing)
- Availability of letter of RSL conformance supported with test/analysis result for relevant chemicals
- Visual observation of work processes for determining chemical composition in recipe cards and / or materials, the process should incorporate the reference of TDS to ensure conformance against RSL. Chemicals e.g. dyestuffs and pigments recipes should not exceed the concentrations suggested by chemical manufacturers with reference to the intended usage/processes and any specific combinations to avoid.

- Check process of at least an annual update for RSL conformance check against all chemicals in Chemical Inventory.

Where to go for more info:

- AFIRM RSL http://afirm-group.com/afirm-rsl/
- AAFA RSL https://www.aafaglobal.org/AAFA/Solutions_Pages/Restricted_Substance_List

12. Does your facility have a documented process to systematically monitor, update and demonstrate compliance with Manufacturing Restricted Substance Lists (MRSLs), and segregate chemical formulations materials and products which are non-compliant with MRSL?

Does your facility require its chemicals suppliers to do the same?

Does your facility require its washing and printing subcontractors to do the same?

Please describe these processes

(Note: Not all are required to upload, but need to be available for review during verification) Suggested upload could include some of the following to demonstrate practice: a) Chemical Inventory (skip if previously uploaded); b) Chemical review policy and process flow; c) List of chemicals which do not have full documentation conforming MRSL compliance; d) Plan for obtaining appropriate documentation for chemicals which currently do not contain documentation e) MRSLs applicable to the facility e.g. own MRSL, customers' MRSL, or ZDHC MRSL; f) Positive lists from chemical suppliers (skip if previously uploaded); g) Email communication or communication trail between facility and its chemical suppliers and subcontractors (if any) regarding MRSL compliance; h) Letter of compliance to MRSL with chemical name, date of issuance, and test reports; i) Documented periodical screening process against ZDHC Gateway – Chemical Module (where applicable, ZDHC Performance InCheck) and the Level of Conformance of each chemical screened. Dated records of previous screenings and schedule of future screening.

Facilities must incorporate an MRSL into their business practices. Establishing an effective MRSL program is complicated and may take several years to fully implement in your factory.

Operational Key Performance Indicator: Chemical Management Policies, Compliance Procedures, and Commitments

What is the intent of the question?

The intended behavior for this question is for facilities to understand MRSLs, which should be used to enable compliant chemical purchases and chemical inventory within the facility, its contractors and subcontractors. The process should be formally documented in some written form and updated on an annual basis. One example of an MRSL with strong industry support is the ZDHC MRSL, which you can find more information about here: https://mrsl.roadmaptozero.com/MRSL2_0

Facilities typically are aware of Restricted Substance Lists (RSL); however, the industry has recently evolved to focus on Manufacturing Restricted Substance Lists (MRSL) to further environmentally friendly chemical use in addition to Restricted Substance Lists. MRSL is important because a facility that uses compliant chemicals, in accordance with technical specification directions, has better environmental outcomes for the various facility discharges and more consistent RSL material compliance. The objective is important for the full facility supply value chain (contractors, subcontractors, upstream suppliers, etc.).

Technical Guidance:

The ZDHC MRSL (latest version) is the global apparel, footwear, and textile industry recognized chemical MRSL standard for the chemical supply industry and major retail brands. The MRSL must be communicated up and down the supply value chain.

For all products which are considered to be MRSL compliant, there must be an appropriate process for validating the MRSL present in the facility.

The process of engaging the subcontractors should involve subcontractor selection, evaluation and management which essentially includes the same processes that the facility is following in order to meet all MRSL compliances and chemical management practices. Hence, communication, evaluation of the performance towards chemical management practices is the responsibility of the facility towards subcontractors.

ZDHC CMS Framework:

https://uploads-ssl.webflow.com/5c4065f2d6b53e08a1b03de7/5ec4fce8cc2b044b520491d5_ZDHC%20CMS%20Framework_MAY2020.pdf

Glossary:

ZDHC MRSL: The ZDHC MRSL is a list of chemical substances subject to a usage ban (see Usage Ban, page 2). The MRSL applies to chemicals used in facilities that process materials and trim parts for use in apparel and footwear. Chemicals in the ZDHC MRSL include solvents, cleaners, adhesives, paints, inks, detergents, dyes, colorants, auxiliaries, coatings and finishing agents used during raw material production, wet-processing, maintenance, wastewater treatment, sanitation and pest control. Source: https://www.roadmaptozero.com/

How This Will Be Verified:

Facilities that use **chemicals in production processes:**

Yes

- The facility or its parent/corporate group can demonstrate a well-documented (written) chemical review process that monitors, updates and shows compliance to legislations, customer MRSL requirements, or the ZDHC MRSL as a standard for the facility, subcontractors and contractors.
- The chemical review process against MRSL is aligned and managed properly across functions in the facility (management, purchasing, lab, production teams) and external parties (subcontractors, suppliers, testing agency, etc.) and responsibilities are assigned properly
- The process should also demonstrate how chemicals are reviewed / checked against the MRSL prior to purchase.
- Chemical review process/methods are robust, i.e. periodical screening through the ZDHC Gateway – Chemical Module (with ZDHC Performance InCheck when possible), certification/Letter of Compliance to MRSL specific to each chemical product with test data/report to support the claim, or adoption of systems that ensures MRSL conformance e.g. Bluesign, etc. When non-conforming chemicals are found, a phase out plan is developed accordingly. When ZDHC Gateway - Chemical Module is used for screening, the facility tracks and monitors the Level of Conformance of each chemical screened.
- The facility or its parent/corporate group actively communicates the expectations to their dye and chemical suppliers that formulations supplied to the facility need to be compliant with MRSL.
- The facility or its parent/corporate group can demonstrate that the expectation of MRSL compliance is actively communicated to the upstream supply base and monitored on at least an annual basis, including subcontracted processing units i.e. washing, printing (if applicable).
- The facility or its parent/corporate group actively asks and monitors MRSL compliance of its suppliers and screen it against Chemical Inventory List (CIL).

Partial Yes

- The facility or its parent/corporate group monitors policies regarding banned chemicals based on legislation, regulation, or customers' requirements applicable to the facility.
- The facility or its parent/corporate group is able to provide a Letters of Compliance to MRSL with test data/report to support the claim, for each manufacturing and tooling/equipment chemicals which is updated on an annual basis, but does not have a formal (documented/written) chemical review process.
- The facility or its parent/corporate group has a formal chemical review process, but it is not well implemented and not aligned/managed properly across functions in the facility
- The facility or its parent/corporate group has a formal chemical review process, but it is not robust e.g. Letters of Compliance only containing a statement/declaration letter without any test report/data to support the claims, or ZDHC Gateway - Chemical Module is used to screen chemicals but level of conformance are not tracked or there is no phase out plan for the non-conforming chemicals found.
- The facility or its parent/corporate group communicates the MRSL compliance expectations to dye and chemical suppliers but not to subcontracted processing units (if applicable)
- The facility or its parent/corporate group can demonstrate that the expectation of MRSL compliance is communicated to the upstream supply base including subcontracted processing units i.e. washing, printing, but not monitored on at least an annual basis (if applicable).

Documentation Required:

Please reference applicability with sections for yes and partial yes for requirements.

- Chemical Inventory List (CIL)
- Chemical review policy and process flow
- List of non-conforming chemicals
- Phase out plan for non-conforming chemicals, if any
- MRSLs applicable to the facility e.g. own MRSL, customers' MRSL, or ZDHC MRSL
- ZDHC tools for MRSL checks (InCheck Reports, ChemCheck)
- Positive lists from chemical suppliers
- Email communication or communication trail between facility and its chemical suppliers and subcontractors (if any) regarding MRSL compliance
- Letter of compliance to MRSL with chemical name, date of issuance, and test reports
- Documented periodical screening process against ZDHC Gateway - Chemical Module (where applicable) and the Level of Conformance of each chemical screened. Dated records of previous screenings and schedule of future screening.

Interview Questions to Ask:

- Interviewees demonstrate basic knowledge of MRSL and how to perform a compliance check or obtain Letters of Compliance as appropriate.
- Do they understand the consequences of using products not included in the MRSL?

Inspection - Things to Physically Look For:

- A visual verification of several work processes for use of chemicals or materials against the supplied inventory list.
- Check the chemical review process to determine whether the MRSL review and/or Letter of Compliance is robust and performed periodically (at least annual), and is consistent with chemical purchase list and inventory.

13. Can all of your production chemicals be traced from the manufacturing process back to chemical inventory?

Suggested uploads: a) Recipe cards, chemical formulation sheets, and process instructions (where applicable), containing all traceable information (i.e. chemical name and available quantity); b) Chemical Inventory (skip if previously uploaded); c) Chemical mixing process log, lab records (e.g. color lab, washing lab, etc.)

Chemicals traceability is necessary so that a facility can trace the source of a RSL and/or MRSL failure and take action.

Reference: ZDHC Chemical Management System Framework – Version 1 (May 2020) – Chapter 1, 5 & 8

*Answer **Yes** only if your facility can trace all chemicals in production recipes back to the chemical inventory.*

*Answer **Partial Yes** if only some of the chemicals in production recipes can be traced back to the chemical inventory*

Operational Key Performance Indicator: Product Quality / Integrity

What is the intent of the question?

The purpose of traceability is determining whether the chemical components involved in the production can be traced “backward” (Pick out a finished product, whether it is possible to trace the chemical components that are used to produce that particular finished product), and “forward” (Pick out a chemical, whether it is possible to identify all the particular finished products that are produced by using that particular chemical).

Ability to do so, would help support root cause investigations in case any quality or compliance issue occurred due to any particular chemical.

If a recall of a product is needed, it is possible to recall the particular chemical that are involved.

In Level 1, the facility should have a traceability of chemicals used in each manufacturing processes up to the chemical inventory. In other words, the facility should track: (1) the chemicals available on-site (inventoried); (2) the production recipe sheets, where each chemical used in every production step that involve chemicals is listed. These will demonstrate that you know how and where chemicals are used in your facility operations (which processes), and these chemicals are properly documented and monitored facility-wide.

Chemicals traceability is necessary to track what chemicals are used and when, so that a facility can assess the source of a RSL (for Product) and/or MRSL (for process input chemicals) failure and take action. Your facility's ability to track the chemicals used and to trace chemicals through all processes within the facility can start simply with a good coordination of the existing documentation currently used for production, and eventually progress to a more advanced, detailed tracking over time.

The focus of this question is on having documented records of the manufacturing processes, production recipes, the chemical formulations, and amounts (quantity) used to make a product. These records should demonstrate linkage between the information contained in facility's chemical inventory (i.e. chemical / formulation trade name, lot number, MRSL and RSL compliance) and each chemical that are actually used in every processing step through to a final product.

Technical Guidance:

A **recipe** is: a record of the chemical formulations used to make the product or material and its quantities/composition (e.g., all formulations used in the making of a blue t-shirt)

A **formulation** is: a chemical product you purchase from a chemicals supplier (e.g., one colorant for a blue t-shirt).

A **substance** is: the individual chemicals that makeup that formulation (e.g., the one dye and 3 binding agents in that colorant).

Chemical formulations or "chemicals": the individual chemical product or 'ingredients' listed in Production Recipes and used in manufacturing processes to make a final product/material at the Facility. These chemicals also need to be included in the facility Chemical Inventory. They may be complex formulations, dyestuffs, auxiliaries, finishing chemicals, etc. provided by chemical suppliers that are made up of one or more chemical substances. This is important to clarify as textile mills procure "chemical formulations" which may not have details of what the individual chemical substances are.

Production Recipe or "recipe": the recipe sheet that documents the chemicals and the process conditions to be used to make Product/Material. A record of the actual chemicals used and process conditions should be kept for all processes and the Product/Material manufactured. Details of "chemical formulation needs" and processing steps/parameters to meet the material/product specification should be tracked. Documented production recipe is needed for consistent reproducibility from batch to batch.

Chemical Inventory: a chemical "formulation" inventory needs to be maintained on-hand and replenished to "match" the recipe needs. Any alteration to the recipe must be noted and reconciled with an update to the inventory requirements. Likewise, any substitution in the inventory must be approved for use to meet the recipe requirements. Any changes to recipe and/or inventory should be noted and communicated to Production and QA Teams to ensure the final commercial product specifications will still be met.

Process Instructions – every process in the facility must have documentation that describes the operating conditions and controls required to successfully make Product/Material – a record of the actual process conditions should be kept for all Product/Material manufactured in the facility.

How This Will Be Verified:

Facilities that use **chemicals in production processes:**

Yes

- All processes that a product went through that involves usage of chemical are identified and the corresponding recipe and batch cards at each process are available and retained.
- Wherever chemicals are used there are written instructions for their proper use including recipe cards, process instructions (where applicable), formulation sheets, containing all traceable information i.e. chemical name, lot number, and quantity, which can be linked back to the facility-wide chemical inventory.
- Major production processes and each chemical used and its respective quantities are covered, and the process instruction including control parameters and checkpoints are in place.
- Where internal blending / mixing of chemicals take place the process has been documented.
- Chemicals listed in each production recipe at each manufacturing step can be traced consistently to relevant records, including chemical mixing process log, lab records (e.g. color lab, washing lab) where applicable, and the chemical information is also recorded in the chemical inventory i.e. chemical / formulation name, lot number, MRSL and RSL compliance etc. (please refer to ZDHC CIL and ZDHC CMS Framework version 1.0 – Chapter 5 for expectations related to chemical inventory).

Partial Yes

- All processes that a product went through that involves usage of chemical are identified and the corresponding recipe and batch cards at each process are available and retained.
- Scenario 1: Wherever chemicals are used there are written instructions for their proper use including recipe cards, process instructions (where applicable), formulation sheets, containing all traceable information i.e. chemical name, lot number, and quantity, which can be linked back to the chemical inventory. The information contained in chemical inventory is incomplete or the chemical inventory is not up-to-date (please refer to ZDHC CIL and ZDHC CMS Framework version 1.0 – Chapter 5 for expectations related to chemical inventory).
- Scenario 2: *Only some part* (not all) of the manufacturing processes/steps where chemicals are used have written instructions for their proper use including recipe cards, process adjustment instructions (where applicable), formulation sheets, containing all traceable information i.e. chemical name, lot number, and quantity, which can be linked back to the chemical inventory.

Documentation Required:

- Recipe cards, chemical formulation sheets, process instructions (where applicable), containing all traceable information i.e. chemical name, available quantity, and lot number
- Chemical Inventory (please refer to ZDHC CIL and ZDHC CMS Framework version 1.0 – Chapter 5 for expectations related to chemical inventory)
- Chemical mixing process log, lab records (e.g. color lab, washing lab, etc.)

Interview Questions to Ask:

- Managers/workers can demonstrate a documented traceable and trackable system back to an MRSL compliant inventory
- Workers understand the content and know the important content for a process recipe, especially for washing, printing, or finishing where applicable

Inspection - Things to Physically Look For:

- Perform a random check of 1-2 products currently in manufacturing line on-site, and find out which processes that the product undergoes that involves usage of chemicals e.g. dyeing, printing, washing, finishing, etc. Check the corresponding recipe and batch cards at each process identified.
- Random pick 3-4 chemicals in the recipe/batch cards identified in each process to trace up to the chemical mixing area (“kitchen”), chemical lab (where applicable), and chemical storage areas (temporary/warehouse), then up to the chemical inventory.
- Check whether the linkage between the chemicals used in the processes and chemical inventory can be established and are properly documented.
- Review of records: process/production records i.e. recipe cards, chemical formulation sheets, process instructions (where applicable), containing all traceable information i.e. chemical name, quantity, and lot number. Check chemical mixing process log, lab records (e.g. color lab, washing lab, etc.) where applicable, for consistent information. Cross check information with chemical Inventory (please refer to ZDHC CIL and ZDHC CMS Framework version 1.0 – Chapter 5 for expectations related to chemical inventory).

Chemicals Management - Level 2

14. Does your facility have an implementation plan to improve your chemicals management program?

Suggested upload: Documented plan for achieving full completion of Level 1 requirements. This plan should include: a) Which questions were not fully achieved why; b) People responsible and a targeted date for achieving requirements for those questions which were not met.

It may take many facilities years to fully complete all Level 1 requirements for a robust chemicals management program. If you have a plan for achieving full completion of Level 1 requirements, please upload it here.

Operational Key Performance Indicator: all

What is the intent of the question?

Considering that relatively few facilities are expected to meet all level 1 chemical management criteria, the most important behavior that level 2 questions are intended to drive is the development and the implementation of a plan to improve the existing chemical management practices intended to progressively reach the minimum regulatory and industry expectations (Level 1).

This question aims at capturing the ability for facilities to develop an action plan in order to improve the existing chemical management system in place.

Technical Guidance:

The foundation of an effective chemicals management program depends on the establishment of policies and procedures to appropriately manage chemicals throughout their life cycle. For each stage in the life cycle, policies and procedures that define legal and other requirements, responsible persons, and appropriate work practices and controls need to be developed. Chemical management program consistent with the commitment to continual improvement. And in order to sustain continual improvements in overall chemical management performance, it is utmost important to work on the corrective actions /findings by internal /external chemical management assessment.

How This Will Be Verified:

Yes:

Documentation Required:

- Documented plan in place to complete all requirements for every question in level 1
- Documented should include which questions were not achieved with a full yes and why
- Documented plan should include persons responsible and a targeted date for achieving full yes responses for those questions which were not met

Interview Questions to Ask:

- Management and key employees are familiar with the plan and can speak to the various steps for achieving a full yes response to level 1 questions in the chemicals management section

Inspection - Things to Physically Look For:

- Have the facility walk you through the plan to ensure they are implementing the said actions in plan 2-3 items.
- Take photos of any equipment /logs that support the action plan

15. Does your facility have an implementation plan to reduce the use of hazardous chemicals beyond chemicals specified by regulations and/or Restricted Substance Lists / Manufacturing Restricted Substance Lists?

Suggested upload: a) A hazardous chemical(s) list with an action plan with assigned responsibilities and a timeframe for action; b) Alternative chemical trials in laboratory or pilot facility documents with conclusions to proceed or decline.

Having hazardous chemicals does not mean that you have violated RSL or MRSL; your facility may have hazardous chemicals that are permitted on-site but that must be handled appropriately and eventually phased out.

Operational Key Performance Indicator: Chemicals & Process Innovation

What is the intent of the question?

Removal of hazardous chemicals through the intentional setting of an action plan with targets, assigned responsibilities and a timeframe for action.

This question encourages facilities to be proactive in identifying hazards and working to reduce beyond what is already restricted by MRSL or RSL. This question does not require facilities to have in-house expertise to do detailed hazard assessments. Factories can have hazard implementation plans by relying on lists via guidance. This excludes implementation plans for addressing non-compliances against RSL/MRSL/regulatory - those are captured in Level 1.

For example, if a facility is currently following an industry or brand's specific MRSL/RSL, this facility may also proactively search to phase out other substances which are listed in candidate list of ZDHC MRSL or SIN LIST etc., that are not included in the list they are following. They can find these substances in other industry list's and start working on phasing out these substances from production before it is restricted by the MRSL/RSL that they follow. As alternatives to these phased out substances, the facility may look into chemicals products that are identified in available industry databases, such as ZDHC Gateway – Chemical Module or any other brand specific sources.

In scope: All production chemicals, focus on on-product chemicals for a cut and sew operation (the most important behavior is impact on product - should move toward using lists of pre-screened chemicals)

Out of scope: Chemicals which are not focused on the product such as, cleaners, chemicals in cooling tower/boiler excluded.

Technical Guidance:

The facility should identify the hazardous chemicals which are not considered in RSL or MRSL but also consider chemical substances which go beyond these lists. The reference lists and tools that identify hazardous substances and/or chemicals of concern beyond MRSL and RSL include the following but are not limited to:

- ZDHC MRSL Candidate List - https://mrsl.roadmaptozero.com/MRSL2_0
- Stockholm Convention on Persistent Organic Pollutants
- ChemSec SIN list
- Washington State Reporting List of Chemicals of High Concern to Children (CHCC)
- Subsport European platform (http://Subsport.eu)
- SVHC (Substance of very high concern) (https://echa.europa.eu/candidate-list-table)
- Other relevant list for the activity of the facility, such as Bluesign BSSL, GOTS

How This Will Be Verified:

Facilities that use **chemicals in production processes:**

Yes

- Implementation plan includes goals, targets, action plan, and actions taken.
- The facility has identified the list of chemicals currently in use that contains or may contain hazardous chemicals or MRSL substances
- A hazardous chemical(s) list with an action plan with assigned responsibilities and a timeframe for action. The action plan should contain:
    - name of the chemical;
    - hazardous substance contained;
    - exposure assessment involving estimating the intensity, frequency, duration, and route of exposure to a substance;
    - action items to phase out usage of such chemical and respective timelines;
    - list of alternative/substitute chemicals to be used;
    - timeline for phase-out completion;
    - monitoring procedure for the alternatives and its performance.

Partial Yes

- Implementation plan with action checklists but not backed up by strategy (goals, targets, plan, etc.)
- No active list; laboratory / pilot production records exist for alternative trials.

Facility that **uses chemicals in facility tooling and/or operations only:**

Yes

- Implementation plan includes goals, targets, action plan, and actions taken.
- A hazardous chemical(s) list with an action plan with assigned responsibilities and a timeframe for action.

Partial Yes

- Implementation plan with action checklists but not backed up by strategy (goals, targets, plan, etc.)
- No active list; laboratory / pilot production records exist for alternative trials.

Documentation Required:

- A hazardous chemical(s) list with an action plan with assigned responsibilities and a timeframe for action.
- Alternative chemical trials in laboratory or pilot facility documents with conclusions to proceed or decline.

Interview Questions to Ask:

- Senior Management, EHS Manager, Chemical Manager and/or responsible individual(s)

Inspection - Things to Physically Look For:

- Review of active plan or alternative chemical evaluation process i.e. laboratory, pilot facility documents

16. Does your facility source already-approved or preferred chemicals from a positives list beyond chemicals specified by regulations and/or Restricted Substance Lists / Manufacturing Restricted Substance Lists?

(Note: Not all are required to upload, but need to be available for review during verification) Suggested upload could include some of the following to demonstrate practice: a) Demonstrate access to a positive list (example: BLUESIGN® bluefinder license); b) Chemical inventory listing the chemical formulations and the corresponding chemical supplier - chemicals sourced from a positive list should be identified in the chemical inventory (skip if previously uploaded); c) Purchasing support documents; d) Purchasing contract language to support sourcing chemicals from positive lists; e) Process documentation to identify internal and external responsibilities

*For facilities that **use chemicals in production:***

***Answer Yes** only if more than 50% of the chemical formulations in the chemical inventory (% based on the number of chemicals, not the volume) are sourced from a positive list such as ZDHC Chemical Gateway, BLUESIGN®, GOTS, and/or OEKO-TEX® Eco Passport.*

***Answer Partial Yes** if you have chemicals from a positives list that make up less than 50% of your inventory*

*For facilities that **do not use chemicals in production:***

***Answer Yes** only if more than 10% of the chemical formulations in the chemical inventory (% based on the number of chemicals, not the volume) are sourced from a positive list such as ZDHC MRSL Level 3, BLUESIGN®, GOTS, and/or OEKO-TEX® C2C certified, Chem iQ screen allowed chemicals, etc.*

***Answer Partial Yes** if you have chemicals from a positives list that make up less than 10% of your inventory.*

Operational Key Performance Indicator: Chemical Selection, Procurement, & Purchasing Practices

What is the intent of the question?

This question is intended to reward manufacturers who proactively seek chemicals with fewer hazards and risks to replace chemistry that poses greater danger to humans and our environment. These programs typically go above and beyond MRSLs and RSLs which are focused around regulatory risk.

Substitution of hazardous chemicals is a fundamental measure to reduce risks to environment, workers, consumers and public health. Several brand-driven and third-party programs exist to identify positive substitutes. Purchasing chemical formulations from reliable positive lists is a cost-effective approach to ensure that chemicals purchased do not contain hazardous substances. Driving demand for these substitutes, and green chemistry innovation as a whole, is an important driver for the overall improvement of the sustainability performance of the textile and footwear industry.

Technical Guidance:

It is important to note that positive lists are developed by screening the composition of specific formulation to identify hazardous substances. Positive lists should consider the assessment of the composition of the chemicals used in the formulation as well as an evaluation of the quality process in place in the facilities that manufacture these chemicals. This second aspect is key to ensure that the composition of the chemical formulation is consistent over time and that the risk of finding unwanted impurities is limited. Information related to the composition of the chemical mixture available in Safety Data Sheets should not be used (only) for the development of positive lists as the level of detail available in SDSs usually do not identify impurities or substances non intentionally added that can often be the source of the non-compliance with an RSL or an MRSL.

Some positive lists to consider are:

References:

- BLUESIGN® bluefinder (*Any chemistry that is bluesign® approved may be considered part of a positive list – this includes both blue or grey rated chemistry.)*
- ZDHC MRSL Level 3 (with production stewardship)
- Full material disclosure with Tox assessment
- Customer supplier MRSL / positive list for chemicals with ChemiQ screening.
- Other to be documented by the facility

Note: This question can be used to inform responses to The Sustainability Consortium's Home and Apparel Textiles Toolkit. The Priority Chemicals Management Key Performance Indicator asks respondents for priority chemicals information. The facility data can be aggregated by brands to answer TSC's question.

Where to go for more info:

- ZDHC Gateway – Chemical Module - http://gateway.roadmaptozero.com/
- BLUESIGN® bluefinder - https://www.bluesign.com/industry/bluesign-system/web-applications/bluesign-bluefinder

How This Will Be Verified:

Facilities that use **chemicals in production processes:**

Yes:

- Demonstrated evidence that more than 50% of the chemical formulations in the chemical inventory (% based on the number of chemicals, not the volume) is sourced from a positive list
- Sourcing preferred chemical list such as ZDHC Gateway – Chemical Module, bluesign®, GOTS, OekoTex, etc.

Partial Yes

- The chemical formulations in the chemical inventory sourced from a positive list represent less than 50% of the chemical inventory (% based on the number of chemicals, not the volume)

Facilities that **use chemicals in facility tooling and/or operations only:**

Yes

- Demonstrated evidence that more than 10% of the chemical formulations in the chemical inventory (% based on the number of chemicals, not the volume) is sourced from a positive list

Partial Yes

- The chemical formulations in the chemical inventory sourced from a positive list represent less than 10% of the chemical inventory (% based on the number of chemicals, not the volume)

Documentation Required:

- Demonstrate the access to a positive list (example: bluesign® bluefinder license)
- Chemical inventory listing the chemical formulations and the corresponding chemical supplier. Chemicals sources from a positive list should be identified in the chemical inventory
- Purchasing support documents
- Purchasing contract language to support sourcing chemicals from positive lists

- Process documentation to identify internal and external responsibilities

Interview Questions to Ask:

- Senior Management, Chemical Manager, Purchasing Manager

Inspection - Things to Physically Look For:

- Review actual list and practice
- Verify random purchase and receipts against positive list of a selection of chemicals (at least 2)

Chemical Management - Level 3

17. Does your facility collaborate with brands and/or chemical suppliers to select chemicals for alternatives assessment?

Select what applies:

- All chemicals used in manufacturing processes
- All chemicals used in tooling/equipment (lubricants and grease)
- All chemicals used to operate and maintain the facility

Upload: a) Prioritized list of alternatives for chemicals; b) MRSL/RSL, substances of concern list/candidate list, REACH SVHC List (skip if previously uploaded); c) Minutes from collaborative meeting between facility, customers, and chemical suppliers regarding alternatives.

It's critical that value chain partners work together on alternatives in order to prevent a regrettable substitution that results in a product failure or non-compliance.

*You will be awarded **Full Points** if you are collaborating on alternatives for all categories of chemicals.*

*You will be awarded **Partial Points** if you are only prioritizing alternatives for some categories of chemicals.*

Operational Key Performance Indicator: Chemical Selection, Procurement, & Purchasing Practices

What is the intent of the question?

Collaborate to prioritize a list of alternatives. This question is intended to reward facilities that are engaging with brands and chemical suppliers to identify alternatives for substances of concern or restricted substances. It's critical that value chain partners work *together* on alternatives in order to prevent a regrettable substitution that results that results in a product failure or non-compliance.

To prioritize, important analysis to run are: a) toxicity criteria and b) life cycle assessment - forthcoming questions. The behavior to drive here is a commitment to prioritizing collaboratively.

Chemical management of hazardous substances is a complex and demanding process. The more collaboration on substances of concern enables better prioritization, customer satisfaction, and industry improvement.

Technical Guidance:

Collaboration to develop alternatives to the use of chemicals including hazardous substances can take various forms. This criteria measures the ability for facilities to take the ownership of the substitution of hazardous substances by leveraging collaboration.

Reference: ZDHC Chemical Management System Framework – Version 1 (May 2020) – Chapter 3

- This question can be used to inform responses to The Sustainability Consortium's Home and Apparel Textiles Toolkit. The Priority Chemicals Management Key Performance Indicator asks respondents for priority chemicals information. The facility data can be aggregated by brands to answer TSC's question

The idea can be strongly fortified if facilities engage themselves in collaboration with suppliers, brands and research institutes to come out with possible solutions for new product development or substitution of toxic chemicals through application development, thereby benefiting the society and industry (e.g. DWR finish application with plasma techniques and energy efficient chemicals etc.)

How This Will Be Verified:

Expectation is to produce the prioritized list of alternatives for a chemical.

Facilities that use **chemicals in production processes:**

Yes

- Facility has a process for collaboration regarding chemical alternatives, substances of concern, and/or restricted substance lists. It is transparent and documented and it includes the following:
    - All chemicals used in manufacturing processes
    - All chemicals used in tooling/equipment (lubricants and grease)
    - All chemicals used to operate and maintain the facility.
- Facility has a prioritized list of alternatives for a chemical through a transparent, science-based, simple and reasonable system that evaluates chemicals and/or chemical products.

Partial Yes

- Facility has a process for collaboration regarding chemical alternatives, substances of concern, and/or restricted substance lists. It is transparent and documented but do not cover all the chemicals used in manufacturing, tooling and maintenance chemicals.

Documentation Required:

- Prioritized list of alternatives for chemicals
- MRSL/RSL, substances of concern list/candidate list, REACH SVHC List
- Minutes from collaborative meeting between facility, customers, and chemical suppliers regarding alternatives

Interview Questions to Ask:

- Senior Management can explain process for collaborating with customers and chemical suppliers regarding regional/global chemical requirements
- Ensure management and key employees are aware of updating the prioritized list of alternatives for chemicals

Inspection - Things to Physically Look For:

- Review prioritized list of alternatives for chemicals
- Review MRSL/RSL, substances of concern list/candidate list, REACH SVHC List
- Review minutes from collaborative meeting between facility, customers, and chemical suppliers regarding alternatives

18. Does your facility contribute a chemical analysis against human and environmental hazard criteria (e.g., persistent, bio-accumulative, and toxic) to this alternatives process?

Suggested Upload: a) Hazardous Chemicals assessment report, such as Screened Chemistry or Cradle2Cradle assessment; b) Evidence the facility has evaluated the alternatives against hazard

criteria.

Answer Yes *if a hazardous chemicals assessment has been conducted in the facility and you are using this information to prioritize action and encourage chemical use towards safer alternatives. The assessment must include an evaluation of the hazard associated with a hazardous substance and an assessment of the exposure.*

Answer Partial Yes *if you have conducted an assessment but have not prioritized further action.*

Operational Key Performance Indicator: Product Quality / Integrity

What is the intent of the question?

The alternative process referred in this question is a process done by the facility to identify the chemical products they are using based on its hazards, and then use this knowledge to make a selective decision to reduce, substitute or ultimately phase out this hazardous chemical. It takes technical knowledge to be able to identify hazards outside of lists like in Level 2. If this is done, it is done with the intent to replace existing or proposed chemicals. Facilities should be rewarded for this behavior within the context of alternatives assessment. The choice for banning or substituting the use of identified hazardous substances should be made by combining the hazard associated with an estimation of the potential exposure to this substance. Ignoring exposure can lead to very inaccurate estimates of product risk, resulting in misdirected product stewardship efforts. We will discuss the estimation of exposures via the evaluation of scenarios, where scenarios are dependent upon the use of the substance.

This helps determine exposure risk categorization (i.e. BLUESIGN® levels 1, 2, 3) which relate to end-use (i.e. children's product, next to skin, outer layer with no skin exposure, etc.). This helps a supplier choose which formulation may best support the end use functional requirements plus the chemical exposure risk.

Technical Guidance:

Chemical hazard assessment is used to identify and prioritize chemical substances for possible replacement with safer alternatives is increasingly required by retailers, brands, and material suppliers in response to both consumer pressure and regulatory requirements.

Hazardous chemicals are those that show intrinsically hazardous properties—persistent, bio-accumulative, and toxic (PBT); very persistent and very bio-accumulative (vPvB); carcinogenic,

mutagenic, and toxic for reproduction (CMR); endocrine disruptors (ED); or chemicals of equivalent concern—not just those that have been regulated or restricted in other jurisdictions.

Reference: ZDHC Chemical Management System Framework – Version 1 (May 2020) – Chapter 3

The benefits of conducting a hazard assessment are as follows:

- The approach can be used to assess and compare alternatives to an incumbent chemical substance. The goal is to identify alternative chemicals that are inherently less hazardous, thereby preventing substitutions that may increase risk to human health and the environment.
- The approach is adaptable to information technology tools, making it capable of screening a large number of chemicals in a relatively short period of time, and providing guidance for more comprehensive profiling of chemicals and materials.
- The approach is readily adaptable to multiple industry sectors and provides a science-based approach to evaluating chemical hazards so that less hazardous alternatives may be identified.

Reference: This question can be used to inform responses to The Sustainability Consortium's Home and Apparel Textiles Toolkit. The Priority Chemicals Management Key Performance Indicator asks respondents for priority chemicals information. The facility data can be aggregated by brands to answer TSC's question.

Glossary:

Hazardous chemicals: Hazardous chemicals are those that show intrinsically hazardous properties—persistent, bio-accumulative, and toxic (PBT); very persistent and very bio-accumulative (vPvB); carcinogenic, mutagenic, and toxic for reproduction (CMR); endocrine disruptors (ED); or chemicals of equivalent concern—not just those that have been regulated or restricted in other jurisdictions.

To get started with chemical hazard assessment please download this guide: https://outdoorindustry.org/wp-content/uploads/2015/05/Haz_Assessment-2.pdf

How This Will Be Verified:

Guidance: Expectation is evidence that you have evaluated the alternatives against hazard criteria.

Facilities that **uses chemicals in production processes:**

Yes

- A hazardous chemicals assessment has been conducted in the facility and the facility is using this information to prioritize and create an action plan with clear implementation towards safer alternatives. The assessment shall include an evaluation of the hazard associated with a hazardous substance together with an assessment of the exposure.

Partial Yes

- A hazardous chemicals assessment has been conducted in the facility however no further actions have been taken to prioritize further action.

Facilities that use **chemicals in facility tooling and/or operations only:**

Yes

- A hazardous chemicals assessment has been conducted in the facility and the facility is using this information to prioritize and action and encourage chemical use towards safer alternatives. The assessment shall include an evaluation of the hazard associated with a hazardous substance together with an assessment of the exposure.

Partial Yes

- A hazardous chemicals assessment has been conducted in the facility however no further actions have been taken to prioritize further action.

Documentation Required:

- Hazardous Chemicals assessment report
- Evidence the facility has evaluated the alternatives against hazard criteria.

Interview Questions to Ask:

- Do key employees understand how to use this information to prioritize and action and encourage chemical use towards safer alternatives?

Inspection - Things to Physically Look For:

- Review the Hazardous Chemicals report.
- Review evidences that the facility has evaluated alternatives against hazard criteria

19. Does your facility contribute an analysis of lifecycle impacts to this alternatives process?

Suggested Upload (if applicable): a) BLUESIGN® BlueXpert assessment; b) Lifecycle Assessment studies; c) Documented metrics for water, energy, waste, etc.; d) Third party assessments; e) MFCA (Material Flow Cost Accounting)

Your facility should optimize chemicals used, manufacturing processes, and machinery to reduce energy and water consumption associated with a production step. An example would be choosing a different dyestuff in order to reduce water consumption during a dyeing process.

This question focuses on the other resource consumption or production (such as water, energy and waste), as opposed to chemical assessment based on the hazardous properties as referred in Question 18.

Answer Yes if you have evaluated the environmental impacts (e.g., impacts on water usage, energy usage, waste, wastewater, and disposal) of replacing chemicals in your factory.

Operational Key Performance Indicator: Chemicals & Process Innovation

What is the intent of the question?

This action is beyond just chemical management and a more encompassing approach of sustainability which looks at a product life-cycle within and beyond the facility e.g. water usage, energy usage, waste, wastewater, disposal, etc.

The objective of product and chemical life-cycle reviews are to support the product's and chemical's environmental footprint. There are frameworks to establish life cycle metrics which can assist in the development and measurement. The efficiency of the manufacturing process is highly dependent on the optimization of the use of the chemicals together with the manufacturing process and the machineries. The optimization of these three elements can generate significant savings by reducing the amount of chemicals used, reducing the energy and water consumption associated with the process and therefore significantly reduce the life cycle impacts of the system.

Technical Guidance:

- http://www.lcacenter.org/

Where to go for more info:

- http://wbcsdservers.org/wbcsdpublications/cd_files/datas/business-solutions/reaching-full-potential/pdf/Chemical%20Sector%20Life%20Cycle%20Metrics%20Guidance.pdf

- http://www.ecoinvent.org/

How This Will Be Verified:

Facilities that use **chemicals in production processes:**

Yes

- Evaluation using the BLUESIGN® BlueXpert: https://www.bluesign.com/sites/bluexpert/about
- PLCA/LCA studies.
- Documented metrics for water, energy, waste, etc.
- 3rd Party assessments

Documentation Required:

- BLUESIGN® BlueXpert assessment
- PLCA/LCA studies
- Documented metrics for water, energy, waste, etc.
- MFCA (Material Flow Cost Accounting)
- 3rd Party assessments

Interview Questions to Ask:

- Senior Management, Environmental Steward

Inspection - Things to Physically Look For:

- Review facility for implementation of strategies.

20. Can your manufacturing process chemicals be traced from product lot number back to chemical lot number?

Suggested Uploads: a) Product batch card including batch number, dates and production quantity; b) Recipe cards, formulation sheets, process instructions (where applicable), containing all traceable information i.e. chemical name, lot number, and quantity; c) Chemical mixing/blending process log, lab records (e.g. color lab, washing lab, etc.), including relevant information e.g. chemical name and quantity used in mixtures; d) Chemical storage log, including temporary/working storage and main warehouse with consistent records i.e. storage in/out log with chemical lot number, quantity, and dates (stored and dispatched for usage).

Answer Yes *only if ALL chemicals used in processes or in mixtures can be traced to the temporary/working storage and main warehouse where consistent records are available and maintained to the lot number.*

Answer Partial Yes *if you can trace some but not all chemicals back to the lot number*

Operational Key Performance Indicator: Chemicals & Process Innovation

What is the intent of the question?

The purpose of traceability is determining whether the chemical components involved in the production can be traced "backward" (Pick out a finished product, whether it is possible to trace the chemical components that are used to produce that particular finished product), and "forward" (Pick out a chemical, whether it is possible to identify all the particular finished products that are produced by using that particular chemical).

Ability to do so, would help support root cause investigations in case any quality or compliance issue occurred due to any particular chemical.

If a recall of a product is needed, it is possible to recall the particular chemical products that are involved.

In Level 3, the facility should have a traceability of chemicals used in each manufacturing process of each batch number of finished product, up to the lot number of the chemical. In other words, the facility should maintain consistent linkage of information as follows: (1) the product batch number (2) the production processes that the particular product underwent (3) the recipe sheets in relation with each process that involves chemical use (4) the corresponding records of the chemicals used in these recipes at the chemical mixing or lab, e.g. name and quantity (5) consistent record of these particular chemicals at the storage (temporary and warehouse/bulk storage) e.g. storage log, in/out records (6) the corresponding chemical lot number (7) consistent information in the facility-wide chemical inventory. These will demonstrate that you know how and where chemicals are used in your facility operations, are stored in the facility, and all information are consistently documented and monitored facility-wide.

Technical Guidance:

This level of traceability is only possible when we ask chemical suppliers to provide the lot number of chemicals with every delivery and facilities to track against PO upon receipt of these chemicals. Facilities

should record this information in their inventory or chemical log by product name and lot number, date of receipt and subsequently when the product is opened to use in the recipe and the date of use to ensure full traceability of the chemical product being used.

How This Will Be Verified:

Facilities that use **chemicals in production processes:**

Yes

All requirements below are met:

- Batch cards are available for all product specifying batch number and other relevant information e.g. dates and production quantity
- All processes that the product has gone through that involves usage of chemical are identified and the corresponding recipes and batch cards at each process are available and maintained. Process instructions and checkpoints are established and documented.
- All chemicals listed in recipes can be traced to the chemical mixing/blending or lab (where applicable), including relevant information e.g. chemical name and quantity used in mixtures
- All chemicals used in processes or in mixtures can be traced to the temporary/working storage and main warehouse where consistent records are available and maintained, e.g. storage in/out log with chemical lot number, quantity, and dates (stored and dispatched for usage).
- Linkage between the lot number of chemicals used and the product batch number is established for any given product manufactured at the facility

Partial Yes

- Batch cards are available for all product specifying batch number and other relevant information e.g. dates and production quantity
- All processes that the product has gone through that involves usage of chemical are identified and the corresponding recipes and batch cards at each process are available and maintained. Process instructions and checkpoints are established and documented.
- Some of the chemicals (not all) listed in recipes can be traced to the chemical mixing/blending or lab (where applicable), including relevant information e.g. chemical name and quantity used in mixtures
- Some of the chemicals (not all) used in processes or in mixtures can be traced to the temporary/working storage and main warehouse where consistent records are available and maintained, e.g. storage in/out log with chemical lot number, quantity, and dates (stored and dispatched for usage).
- Linkage between the lot number of chemicals used and the product batch number is established for some of the product (not all) manufactured at the facility

Documentation Required:

- Product batch card including batch number, dates and production quantity

- Recipe cards, formulation sheets, process instructions (where applicable), containing all traceable information i.e. chemical name, lot number, and quantity
- Chemical mixing/blending process log, lab records (e.g. color lab, washing lab, etc.), including relevant information e.g. chemical name and quantity used in mixtures
- Chemical storage log, including temporary/working storage and main warehouse with consistent records i.e. storage in/out log with chemical lot number, quantity, and dates (stored and dispatched for usage)

Interview Questions to Ask:

- Managers/workers can demonstrate a documented traceable and trackable system back from each product batch to each chemical lot
- Workers understand the content and know the importance of product batch records, process instructions, recipe, usage records, storage records, especially for processes that involves chemical use e.g. dyeing, washing, printing, or finishing where applicable

Inspection - Things to Physically Look For:

- Review of records (refer to above requirements)
- Perform a random check of 1-2 products currently in manufacturing line on-site, and trace back to the processes that the product went through and the corresponding recipe and batch cards at each process
- Random check 3-4 chemicals in the recipe/batch cards identified in each process to trace up documentation from final product to mixing area and storage warehouse. Check if linkage between product batch number and chemical lot number can be established and whether documentation is available and maintained.

21. Does your facility have a documented Quality Assurance (QA) Program that includes performance of chemicals?

(Note: Not all are required to upload, but need to be available for review during verification) Suggested upload could include some of the following to demonstrate practice: a) SOP for purchasing chemicals from qualified suppliers (skip if previously uploaded); b) Quality department with associated records such as customer test reports, analytical laboratory test reports by chemical by lot; c) Chemical supplier analytical test report; d) Quality reports to senior management; e) In-house records of the analysis performed during last season; f) Test reports records from external ZDHC MRSL accepted labs of the analysis performed during last season and check that they are in accordance with MRSL requirements; g) Analysis results traceable to their corresponding internal orders and finished good batch

Answer Yes *only if you have a process in place to randomly select and verify a chemical's compliance to a known standard such as an MRSL or RSL via an organoleptic and chemical analysis on at least an annual*

basis. This QA program should include: 1) the evaluation of the quality and performance efficacy of each chemical formulation used, 2) ensuring the process recipes of how each chemical formulation are to be used are strictly followed, 3) process controls are strictly followed, and 4) ongoing assessment of production quality with supporting records.

***Answer Partial Yes** if your facility utilizes customer testing reports traceable to work orders and recipes to verify chemical supplier conformance.*

Operational Key Performance Indicator: Product Quality / Integrity

What is the intent of the question?

The focus should be on whether the chemical being purchased is performing according to its technical data sheet. It is very leading practice for a facility that purchases chemicals to setup a process to really verify the chemical compliance on its own (e.g., screening laboratory test).

The expectation is that the facility will have a quality management program that ensures chemicals are evaluated against and meet standards for achieving MRSL and RSL requirements.

Why is this question important? The chemical supply chain is a many tiered value-added process, including traders, distributors, etc. Understanding the quality of a chemical ordered versus the chemical received is crucial to ensure the upstream creation and distribution of chemicals delivers chemicals that will meet RSL and/or your own (or your customers') responsible input chemistry requirements. Factual data collected should be used in a process to add/remove chemical suppliers for future purchases.

Technical Guidance:

Reference: ZDHC Chemical Management System Framework – Version 1 (May 2020) – Chapter 1 and Chapter 3

How This Will Be Verified:

Facilities that use **chemicals in production processes:**

Yes

- Facility has a process in place to randomly select and verify a chemical's compliance to a known standard such as an MRSL or RSL via an organoleptic and chemical analysis on at least an annual basis.
- QA program should include: 1) the evaluation of the quality and performance efficacy of each chemical formulation used, 2) ensuring the process recipes of how each chemical formulation are to be used are strictly followed, 3) process controls are strictly followed, and 4) ongoing assessment of production quality with supporting records.

Partial Yes

- Facility utilizes customer testing reports traceable to work orders and recipes to verify chemical supplier conformance.
- Chemical supplier analytical test report.

Documentation Required:

- Quality department with associated records such as customer test reports, analytical laboratory test reports by chemical by lot.
- Chemical supplier analytical test report.
- SOP for purchasing chemicals from qualified suppliers
- Quality reports to senior management
- In-house records of the analysis performed during last season
- Test reports records from external labs of the analysis performed during last season and check that they are in accordance with MRSL requirements
- Analysis results traceable to their corresponding internal orders and finished good batch
- Does the facility send internal results to external lab for accuracy checking?
- All records kept for one year

Interview Questions to Ask:

- QA Manager, Lab Manager, do they know what the parameters are, and whether they know which ones have to be performed in-house and which are outsourced.
- Is the facility aware of which labs can perform which tests.
- Laboratories should have certifications or accreditations for the tests to be carried out.
- Laboratories should inform their customers in case one of the tests is being outsourced to any other laboratory.
- Laboratories should regularly participate in correlation studies ("round robin" or blind samples) for the tests they are performing for their customers
- Laboratories should be able to offer reasonable analysis times

Inspection - Things to Physically Look For:

- Minimum parameters that have to be considered for production control are the following:
- Analysis to be performed in-house:
    - pH (except for tanneries where this test is excluded).

    - Color fastness:
        - To perspiration
        - To water
        - To rubbing (dry and wet).
        - To saliva (only for baby garments).
- Analysis to be outsourced:
    - Arylamines
    - Formaldehyde
    - Composition
    - APEO´s and PFC´s
- Take pictures as evidence if the facility has a PH meter with temperature control, an adequate shaker for PH analysis, an appropriate crockmeter to perform rubbing fastness analysis, Monofiber species for color fastness analysis (if apply), Balance, Oven (if applies), A grey scale to provide the result of color fastness analysis (if applies), Light box –not applicable for positional printing mills and laundries where not dyeing processes are carried out, Performing pH analysis according to legislation: ask for a demo
- Check if the in-house lab has all the necessary equipment to perform a good quality chemical performance
- Review process for sample/testing of a chemical receipt
- Review process for chemical supplier analytical test report
- Review process for add/remove of a chemical supplier based on quality

22. Do your contractors/subcontractors source already-approved or preferred chemicals from a positives list to replace chemicals not already included in RSL/MRSL?

Suggested Upload: a) Description of the procedures; b) Communications with the contractors and subcontractors showing confirming the practice of sourcing chemicals from positive lists; c) Higg verification report from contractors / subcontractors showing that they meet the criteria.

*Answer **Yes** if your facility has a system in place that requires all contractors and subcontractors to have a preferred chemicals list and verify its use.*

*Answer **Partial Yes** if you have an action plan to engage contractors and subcontractors by requesting the selection of chemicals from a positive list.*

Note: Contractors/Subcontractors include all production material or chemical suppliers and/or other contracted business partners that support the manufacturing process of final products(e.g. screen printing, washing/dyeing, or other product embellishments).

Operational Key Performance Indicator: Chemical Selection, Procurement, & Purchasing Practices

What is the intent of the question?

Facilities should proactively seek chemicals with fewer hazards and risks to replace chemistry that poses greater danger to humans and our environment (beyond MRSLs and RSLs). This question is intended to reward facilities that have gone above and beyond to also require their contractors and subcontractors to use preferred chemicals lists.

Substitution of hazardous chemicals is a fundamental measure to reduce risks to environment, workers, consumers and public health. Several brand-driven and third-party programs exist to identify positive substitutes. Driving demand for these substitutes, and green chemistry innovation as a whole, will improve the sustainability of the textile and footwear industry.

Technical Guidance:

It is important to note that positive lists are developed by screening the composition of specific formulation to identify hazardous substances. Positive lists should consider the assessment of the composition of the chemicals used in the formulation as well as an evaluation of the quality process in place in the facilities that manufacture these chemicals. This second aspect is key to ensure that the composition of the chemical formulation is consistent over time and that the risk of finding unwanted impurities is limited. Information related to the composition of the chemical mixture available in Safety Data Sheets should not be used (only) for the development of positive lists as the level of detail available in SDSs usually do not identify impurities or substances non-intentionally added that can often be the source of the noncompliance with an RSL or an MRSL.

- ZDHC Chemical Management System Framework – Version 1 (May 2020) – Chapter 2
- BLUESIGN® bluefinder
- Customer supplier MRSL / positive list for chemicals.
- ZDHC MRSL Level 3, BLUESIGN®, GOTS, OEKO-TEX®, others.

Where to go for more info:

- https://www.osha.gov/dte/library/industrial_hygiene/industrial_hygiene.pdf
- http://www.hse.gov.uk/opsunit/perfmeas.pdf
- http://www.whss.ca/default/assets/File/ohsa_guide.pdf
- http://www.kznhealth.gov.za/occhealth/policyocc.pdf
- National, local, regional regulations on workplace safety and health

How This Will Be Verified:

Facilities that use **chemicals in production processes:**

Yes

- A system in place that requires all contractors and subcontractors to have a preferred chemicals list and verify their use.

Partial Yes

- Action plan to engage contractors and subcontractors by requesting the selection of chemicals from a positive list

Documentation Required:

- Description of the procedures.
- Communications with the contractors and subcontractors showing confirming the practice of sourcing chemicals from positive lists
- If available, Higg verification report from contractors / subcontractors showing that they meet the criteria on Higg FEM Chemicals Question 16.

Interview Questions to Ask:

- Do key employees understand these procedures?

Inspection - Things to Physically Look For:

- An observation of how these procedures are put into practice

23. Does your facility have documented business goals, processes and actions showing commitment (e.g., equipment, process, choice of substitute chemicals) to new sustainable chemistry innovation?

Does your facility communicate its goals, processes and actions to Brands and Suppliers?

Suggested Upload: a) Description or examples of current chemistry R&D projects/investments; b) Examples of how you have incorporated responsible chemistry into your own business agreements.

*Answer **Yes** only if you can demonstrate that business decisions take responsible chemical management and innovation into consideration by incorporating responsible chemicals into its own business agreements and documented business goals.*

*Answer **Partial Yes** if you can otherwise demonstrate that business decisions take responsible chemical management and innovation into consideration.*

Operational Key Performance Indicator: Chemicals & Process Innovation

What is the intent of the question?

In this question, we expect that your facility can demonstrate that business decisions take responsible chemical management and innovation into consideration. This means you aren't just writing policies, but you are actively incorporating responsible chemicals into your own business agreements. Behavior will really change once there are business incentives incorporated. Facilities with documented business goals supporting chemicals management should also be communicating your intention to supply chain partners.

Real sustainability improvement will only occur when sustainability is incorporated into business decisions.

Technical Guidance:

Innovation in process changes such as salt free dyeing, solvent free processing, water less dyeing, use of plasma technology for finishing or electrochemical dyeing process, recovery/reusing of various chemicals like Potassium permanganate, Alkali etc. machine modification to improve water and energy conservations or develop new process route to establish radical change and improvement in overall environmental impact.

Glossary:

- SMART is a best practice framework for setting goals. A SMART goal should be specific, measurable, achievable, realistic and time-bound

Templates to Create: SMART Template

Where to go for more info:

- http://www.smart-goals-guide.com/smart-goal.html

- http://www.hr.virginia.edu/uploads/documents/media/Writing_SMART_Goals.pdf

How This Will Be Verified:

Facilities that use **chemicals in production processes:**

Yes

- Facility can demonstrate that business decisions take responsible chemical management and innovation into consideration.
- Facility is actively incorporating responsible chemicals into its own business agreements.
- Facility has a plan on finding new sustainable chemicals.
- Facilities with documented business goals supporting chemicals management should also be communicating their intention to supply chain partners.

Partial Yes

- Facility can demonstrate that business decisions take responsible chemical management and innovation into consideration.

Documentation Required:

- Description or examples of current chemistry R&D projects/investments
- Examples of how the facility has incorporated responsible chemistry into your own business agreements.

Interview Questions to Ask:

- Senior Management, Responsible Manager regarding business decisions made that take responsible chemicals management and innovation into consideration.

Inspection - Things to Physically Look For:

- Review of documented plans and actions regarding business decisions made that take responsible chemicals management and innovation into consideration.