

WASTEWATER AND SLUDGE

November 2017

LEARNING OUTCOMES & RESOURCES

Learning Outcomes

- Understand requirements on Wastewater Management and testing.
- Knowledge on how to identify the output load of effluent.
- Manage the effluent load by understanding and managing the production planning.

Resources

- REMC Company Handbook.
- www.rewe-group.com.
- www.tchibo.com.
- ZDHC Wastewater Guideline.

Workbook

Refer to complimentary excercises in your workbook.

ZDHC REQUIREMENTS

ZDHC Wastewater Guidelines

- Testing according to ZDHC requirements outlined in ZDHC Wastewater Guidelines

References: ZDHC Wastewater Guidelines

THE PROBLEM

What problems can occur if you do not follow wastewater testing requirements?

Brainstorm as a group and make notes in your workbook, exercise (14-1).

SLUDGE

QUIZ

What is sludge?

SLUDGE

A residual semi-solid material formed as a **by-product from industrial and municipal wastewater treatment**.

A residue of effluent treatment plants (ETP) independent of applied treatment:

- Physio-chemical.
- Biological.
- Chemical.

SLUDGE HANDLING

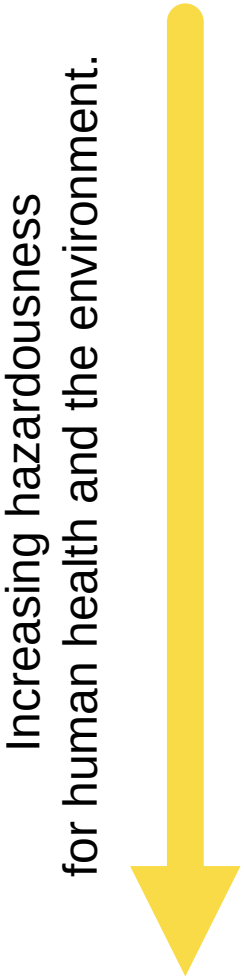
Sludge / solid waste from the effluent stream could potentially **contain high levels of chemicals**, and requires proper handling and disposal:

- Disposal must meet all local requirements.
- Safety protocol need to be followed when handling sludge.
- Sludge must be disposed of through a qualified disposal company.

Disposal
- Landfill.
- Incineration.
- Upcycling.

Removal of Moisture
- Thickening.
- Dewatering.

SLUDGE CATEGORIES – BANGLADESH



Category A: Municipal sludge from domestic or urban waste waters only.

Category B: Sludge from industry, including sludge from CETP*.

Category C: Sludge from industry belonging to a hazardous waste category including sludge from CETP.

Exhibits one or more hazardous characteristics such as high flammability, explosive property, oxidizing property, poisonous, infectious etc.

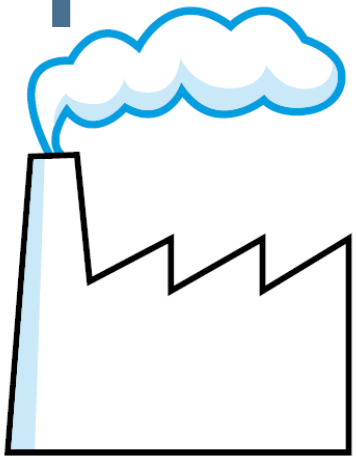
**Central Effluent Treatment Plant*

SLUDGE CATEGORIES – BANGLADESH

Treatment and disposal options Option	Sludge category		
	A	B	C
Anaerobic Digestion (Co-Fermentation)	X[1]	X[1]	**
Aerobic Digestion (Composting)	X[1]		
Agricultural Use	X		
Controlled Landfill*	X	X	X
Thermal incineration	X[1]	X[1]	X[1]
Land application (filling material, e.g. for flood prevention)	X	X[2]	**
Recycling in brick, cement or asphalt manuf.	X	X[3]	**

[1]Residues will remain that have to be disposed of, fulfilling the requirements applicable to the category, on an alternative route e.g. by landfill.
[2]Inert material (low organic matter required)
[3]Availability and capacity limited by local conditions. Accepted sludge volume limited due to a loss of compressibility of the product
* Requirements for the landfill class (Chapter 3.3.4) vary depending on category of the sludge.
**As described in Chapter 2, the producer may provide evidence that sludge categorized as category C sludge according to Annex 1A or 1B does not possess any hazardous characteristics; in this case it may be categorized as category B sludge and the management options of anaerobic digestion (co-fermentation), land application (filling material e.g. for flood prevention), recycling in brick, cement or asphalt making are permissible.

TREATMENT OF WASTEWATER AND SLUDGE



Waste air

Waste water

Waste air cleaner / scrubbers

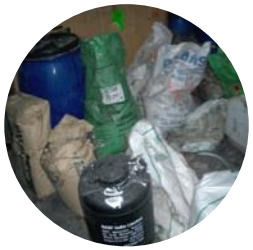
Filtered air

Filters with contaminants

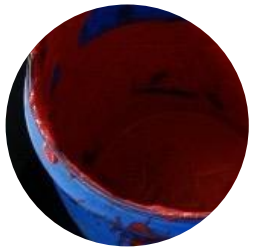
Effluent treatment plant (ETP)

Treated water

Treatment sludge containing chemicals



Empty chemical containers



Solid chemical residuals

LINKING RESOURCE EFFICIENCY AND WASTEWATER MANAGEMENT

Good Practice:

- There is evidence that **recipe review can achieve chemical reduction**.
- **Recovery of caustic** after the mercerising process.
- **Replacing hazardous chemicals** with less hazardous chemicals e.g.
  - **Bi-reactive dyes** in place of mono-reactive dyes.
  - Switch from APEO containing detergents to **Biodegradable non-APEO based products**.
  - Starch-based sizes with **synthetic sizes**.

WASTEWATER BENCHMARKS FOR TEXTILES AND LEATHER

Wastewater Quantity Benchmarks	L/kg
Wool scouring	2 - 6
Yarn finishing (wool)	35 - 45
Yarn finishing (cotton)	100 - 120
Yarn finishing (synthetic fibres)	65 - 85
Finishing of knitted fabrics (wool)	60 - 70
Finishing of knitted fabrics (cotton)	60 - 136
Finishing of knitted fabrics (synthetic fibres)	35 - 80
Finishing of woven fabric (wool)	70 - 140
Finishing of woven fabric (cotton)	50 - 70
Finishing of woven fabric (synthetic fibres)	100 – 180
Bovine leather (from raw to finished)	12 -30
Pig skin leather (from raw to finished)	32 - 69
Sheep/goat skin leather (from raw to finished)	110 – 265 per skin

Source: BREF BAT/Textile, 2003, Source: BREF BAT/Leather, 2013

WASTEWATER TESTING REQUIREMENTS

APPROACHES

- All parties have a strong interest to work towards achieving zero discharge of hazardous chemicals.
- The requirements on a strong chemical management system are equal for REWE Group, Tchibo and ZDHC.
- REWE Group and Tchibo have defined their specific requirements on wastewater testing to be able to work towards their Detox commitments.
- ZDHC wastewater testing requirements are an recommended industry approach and mandatory for their members.

WASTEWATER TESTING REQUIREMENTS

	REWE Group	Tchibo
What is to be tested?	Waste water after treatment	Waste water before treatment
When it is to be tested?	For every order a valid and acceptable test report including coversheet needs to be provided.	For every textile order the supplier is asked to fill out a Wet Processing Form and attach the latest waste water test, if not available or valid Tchibo will assign a test.
Which chemicals are to be tested?	The test report needs to include the eleven priority chemical groups according to the REWE Group MRSL.	ZDHC waste water test + 107 Tchibo MRSL-specific substances covered, for Key Suppliers we also test general waste water parameters to verify a proper ETP function: • Temperature °C • TSS • COD • Total N • Phenathrene • Colour m-1 • BOD5 • Ammonium-N • Total -P • AOX • Oil and Grease • Phenol • Coliform (cacterial/100 ml) • Foam • Cyanide • Sulfide • Sulfite • Conductivity
Which test reports are accepted?	**Scope**: At least Greenpeace 11 substance groups covered **Sample point:** Wastewater after treatment or waste water before treatment **Test report date:** Not older than 1 year **Acceptability:** No findings for banned chemicals, cover sheet **Preferred Laboratories:** Intertek, Bureau Veritas, SGS	**Scope**: At least ZDHC waste water scope/ Greenpeace 11 substance groups covered **Sample point:** Wastewater before treatment and/or wastewater after treatment and/or sludge **Sampling date:** Not older than 1 year **Laboratories:** Intertek, Bureau Veritas, SGS, UL
Further information	Waste water testing brochure https://www.rewe-group.com/en/nachhaltigkeit/gruene-produkte/informationsmaterial-f-r-lieferanten-und-fabriken	https://www.tchibo.com/servlet/content/1119122/-/starteseite-deutsch_en/tchibo-unternehmen_en/verantwortung_en/gebrauchsartikel_en/detox_en.html

ACTIVITY

REFLECTION

Take notes.
Workbook, exercise (14-2)

Discuss your experience with wastewater testing.

What were your challenges?

What solutions have you found to positive test results?

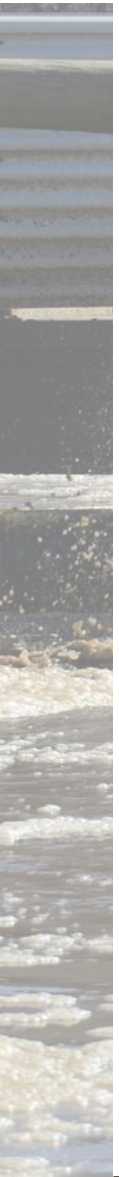
Requirements From The ZDHC Wastewater Guidelines

OBJECTIVES AND BENEFITS

- Safeguard the environment by preventing the discharge of harmful wastewater.
- Unified monitoring and testing programme - reducing supplier operating costs and increase efficiency.
- Defines pass/fail reporting limits.
- Helps to estimate and control chemical concentration loads and loads discharged for treatment.
- Better understand the root cause of any hazardous chemicals or residue that poses a risk to WWTP.

Reference: ZDHC Wastewater Guidelines

SCOPE



The guidelines apply to wet processing facilities, including but not limited to:

- Textile dyeing and finishing.
- Fabric mills.
- Washing/laundry facilities.
- Printing operations.
- Vertical finished goods manufacturing and fibre production.
- Wastewater and sludge processed.

Out of scope:

- Wastewater management beyond the property boundaries of facility.
- Wastewater treatment or pre-treatment systems that are not owned & operated by facilities.
- Centralised or common wastewater treatment plant.
- Cotton field, cattle range, slaughter house, chemical synthesis industry, and polymer industry.

Reference: ZDHC Wastewater Guidelines

THREE LEVEL APPROACH TO WASTEWATER LIMITS

The guidelines provide a three-level approach for wastewater discharge limits, with the intent that suppliers actively execute a continuous improvement plan to reach the next level.

The three levels are:

Foundational: At a minimum, meets legal discharge requirements and ensures effective control of ZDHC MRSL chemicals.

Progressive: Demonstrates increasing knowledge of chemical management and applies advanced wastewater treatment processes.

Aspirational: Demonstrates best-in-class performance and strives for continuous improvement in both chemicals and wastewater treatment process knowledge; creates industry best practices.

Reference: ZDHC Wastewater Guidelines

WASTEWATER PARAMETERS - TWO CATEGORIES

Conventional Parameters: Their limits are defined on the next slide and for standard methods for analysis refer to 2016 Wastewater Guidelines.

ZDHC MRSL Parameters: These parameters, their reporting limits, and standard methods for analysis are defined for wastewater Tables 2A - 2N in 2016 Wastewater Guidelines.

The list includes:

- Alkylphenol (AP) and Alkylphenol Ethoxylates (APEOs): Including All Isomers.
- Chlorobenzenes and Chlorotoluenes.
- Chlorophenols.
- Dyes – Azo (Forming Restricted Amines).
- Dyes – Carcinogenic or Equivalent Concern.
- Dyes – Disperse (Sensitising).
- Flame Retardants.
- Glycols.
- Halogenated Solvents.
- Organotin Compounds.
- Perfluorinated and Polyfluorinated Chemicals (PFCs).
- Phthalates – Including all other esters of phthalic acid.
- Polycyclic Aromatic Hydrocarbons (PAHs).
- Volatile Organic Compounds (VOC).

Reference: ZDHC Wastewater Gudielines

ZDHC WASTEWATER PARAMETERS

Download the 2016 Wastewater Guidelines:
http://www.roadmaptozero.com/fileadmin/content_2016/Files_2016/ZDHC_Wastewater_Guidelines.pdf

Reference: ZDHC Wastewater Gudielines

CONVENTIONAL PARAMETERS

Zero discharge cannot be applied to conventional parameters, such as pH, COD. Hence foundational, progressive and aspirational limits are applied.
Where local legislation and/or permits do not cover one or more conventional parameters listed in these guidelines, the foundational level stated in these guidelines shall apply.

Conventional Parameters + sum anions + metals (mg/L unless otherwise noted)	Limits		
	Foundational	Progressive	Aspirational
Temperature [°C]	Δ15 or 35	Δ10 or 30	Δ5 or 25
TSS	50	15	5
COD	150	80	40
Total-N	30	10	5
pH	6-9		
Colour [Pt-Co]	150	50	10
BOD_5	30	15	5
Ammonium-N	10	1	0.5
Total-P	3	0.5	0.1
AOX	5	1	0.1
Oil and Grease	10	2	0.5
Phenol	0.5	0.01	0.001
Coliform [bacteria/100 ml]	400	100	25
Persistent Foam	Not visible		

Reference: ZDHC Wastewater Gudielines

ZDHC GUIDELINE DOCUMENT DRAFT VERSION

Conventional parameters showing foundational, progressive and aspirational limits.

Conventional Parameters + sum anions + metals (mg/L unless otherwise noted)	Limits		
	Foundational	Progressive	Aspirational
Anions			
Sulfide	0.5	0.05	0.01
Sulfite	2	0.5	0.2
Metals			
Antimony	0.1	0.05	0.005
Chromium, total	0.2	0.05	0.005
Cobalt	0.05	0.01	0.005
Copper	2	0.1	0.05
Nickel	0.2	0.02	0.005
Silver	0.1	0.01	0.001
Zinc	5	1	0.1
Arsenic	0.05	0.01	0.005
Cadmium	0.1	0.005	0.001
Chromium (VI)	0.05	0.005	0.001
Lead	0.1	0.01	0.005
Mercury	0.01	0.001	0.0005

Reference: ZDHC Wastewater Gudielines

SAMPLING (1/5)

Sampling, testing and reporting requirements are the same for direct or indirect discharge of wastewater (refer to later slides).

- Facilities are required to submit a copy of their discharge permits to ZDHC.
- For conventional parameters indirect dischargers will be accountable to their wastewater discharge permit instead of to the foundational, progressive, and aspirational limits defined by ZDHC.
- Facilities discharging indirectly are required to provide:
  - Name and location of receiving centralised / common wastewater treatment plant (WWTP).
  - Parameters and limit values agreed with receiving centralised/ common WWTP.
  - Test results for the wastewater parameters that are included in the wastewater permit that are in addition to the Table 1 parameters of these guidelines.

Reference: ZDHC Wastewater Guidelines

SAMPLING (2/5)

Each facility is expected to develop written procedures that clearly identify and document the sampling point/s, sampling methodologies and reporting frequency, for the following sampling types:

Discharged Wastewater:

- Sampling occurs at point closest to where wastewater leaves the property.
- For multiple permitted discharge locations, each shall have an independent sampling, (including testing), conducted in accordance with these guideline.
- Sample taken shall be of the same quality that is discharged beyond the facility.
- Wastewater quality should not be altered after the testing point.

Reference: ZDHC Wastewater Guidelines

SAMPLING (3/5)

Raw Wastewater:

Has not undergone treatment prior to direct or indirect discharge from the facility, or prior to water recycling efforts.

Raw Wastewater Sampling:

- An alternative requirement for ZDHC MRSL parameters.
- Provides insights into the usage of ZDHC MRSL chemicals which may be diverted into the sludge during wastewater treatment.

Reference: ZDHC Wastewater Guidelines

SAMPLING (4/5)

Incoming Water:

Supplied to a manufacturing process, usually withdrawn from surface water bodies, groundwater, or collected from rainfall. This includes water supplied by municipalities, and condensate obtained from external sources of process steam.

Incoming Water Sampling:

- At point water enters the facility, and prior to any on-site treatment.
- Assists with point source identification of hazardous chemicals above the reporting limits.
- In the event that a wastewater or sludge sample analysis does not result in any hazardous chemicals above the reporting limits, the sample may be discarded without testing.

Reference: ZDHC Wastewater Guidelines

SAMPLING (5/5)

Sludge:

Sludge analysis from wastewater treatment is considered another factor in the verification of MRSL compliance.

Testing of sludge is expected and appropriate limits will be developed by ZDHC going forward.

Reference: ZDHC Wastewater Guidelines

SAMPLING METHODOLOGY (1/2)

- Wastewater and sludge samples shall be collected as composite samples following: ISO 5667- 13:2011 (Part 1,3, 10, 13 and 15): Water Quality Sampling Guidance for the preservation and handling of water samples.
- To ensure representative samples, composite sampling performed for no less than six (6) hours , with no more than one hour between discrete samples.
- Each discrete sample of equal volume.
- Use of calibrated autosamplers is preferred or must meet the requirements of national sampling standards.

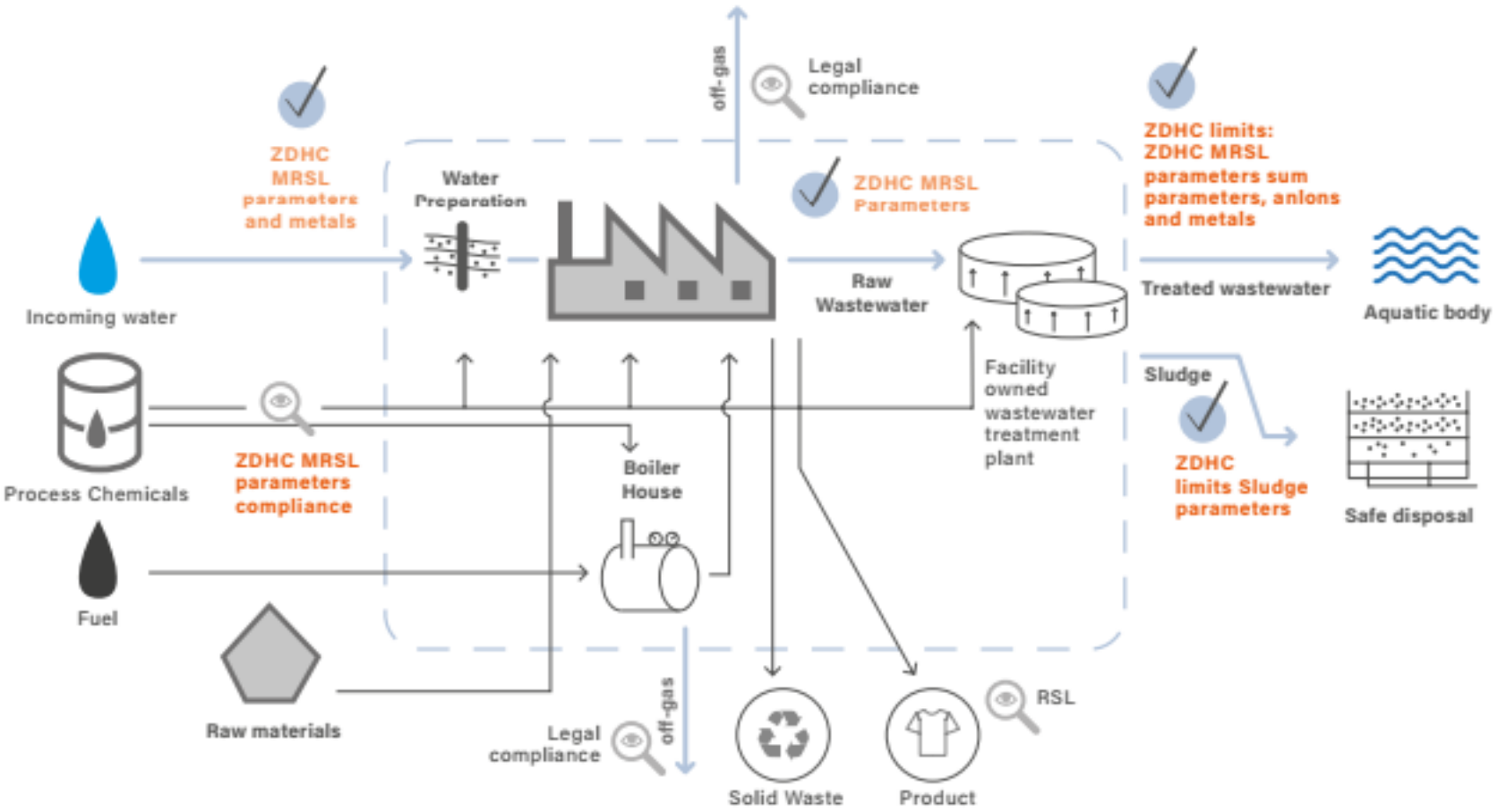
Reference: ZDHC Wastewater Guidelines

SAMPLING METHODOLOGY (2/2)

- Samples taken by qualified laboratory personnel and must maintain a chain-of-custody log to ensure integrity.
- Samples must be taken during production process.
- Samples not to be taken during heavy rainfall (dilute sample).
- Allow for unannounced sampling by ZDHC-accepted laboratories.
- Incoming water may be a single grab sample. For facilities with multiple incoming water sources, a single grab sample from a common blend tank is acceptable. If no blend tank, one grab sample shall be collected from each incoming source.

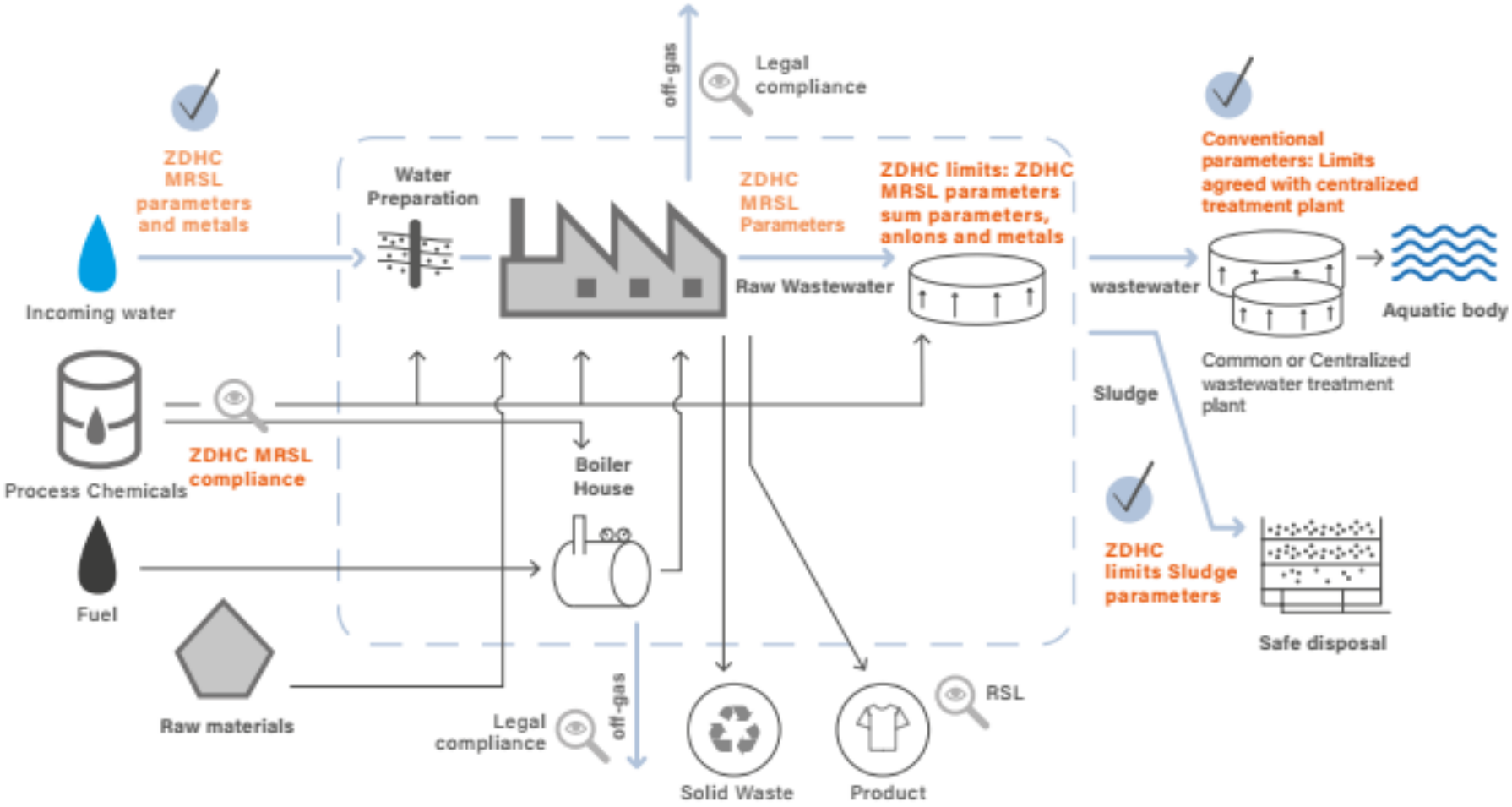
Reference: ZDHC Wastewater Guidelines

SAMPLING POINTS FOR FACILITY WITH OWN WWTP AND DIRECT DISCHARGE



Reference: ZDHC Wastewater Guidelines

SAMPLING POINTS FACILITY WITH INDIRECT DISCHARGE



Reference: ZDHC Wastewater Guidelines

DATA REPORTING AND FREQUENCY BASED ON ZDHC REQUIREMENTS

Data Reporting:

- Through ZDHC Data & Disclosure Platform (on website). Any additional testing outside guidelines, is recommended to be submitted to the platform.
- If direct discharge tests reports exceeds stated limits - notify authorities, ZDHC, brand/s and/or customers. In addition:
    - Submit a corrective action plan, with defined completion date for resolution.
    - Within 30 days of excursion, establish root cause and corrective action plan (CAP) and upload to platform.
    - Validate CAP and re-sample the sludge and wastewater, upload to platform.

Frequency:

Same for Conventional Parameters and ZDHC MRSL. Twice per year (April 30 and October 21), with no less than three months between testing and reporting.

Note: More frequent sampling and reporting may be required by through permits or regulatory compliance, independent of these guidelines.

Reference: ZDHC Wastewater Guidelines

SCHEDULING

- Facilities excepted to meet foundational limits within one year from publishing date of these guidelines (where local legal/permitted limits are lower than foundational limits.)

- **Progressive limits for conventional wastewater parameters** (slide 42) **expected to be met/exceeded by**:
  - Facilities that start production after January 1, 2018.
  - Facilities with new onsite wastewater treatment system operational after January 1, 2018.
  - Current production facility that undergoes enhancement and/or at least a 50% expansion of capacity that is operational after January 1, 2018.

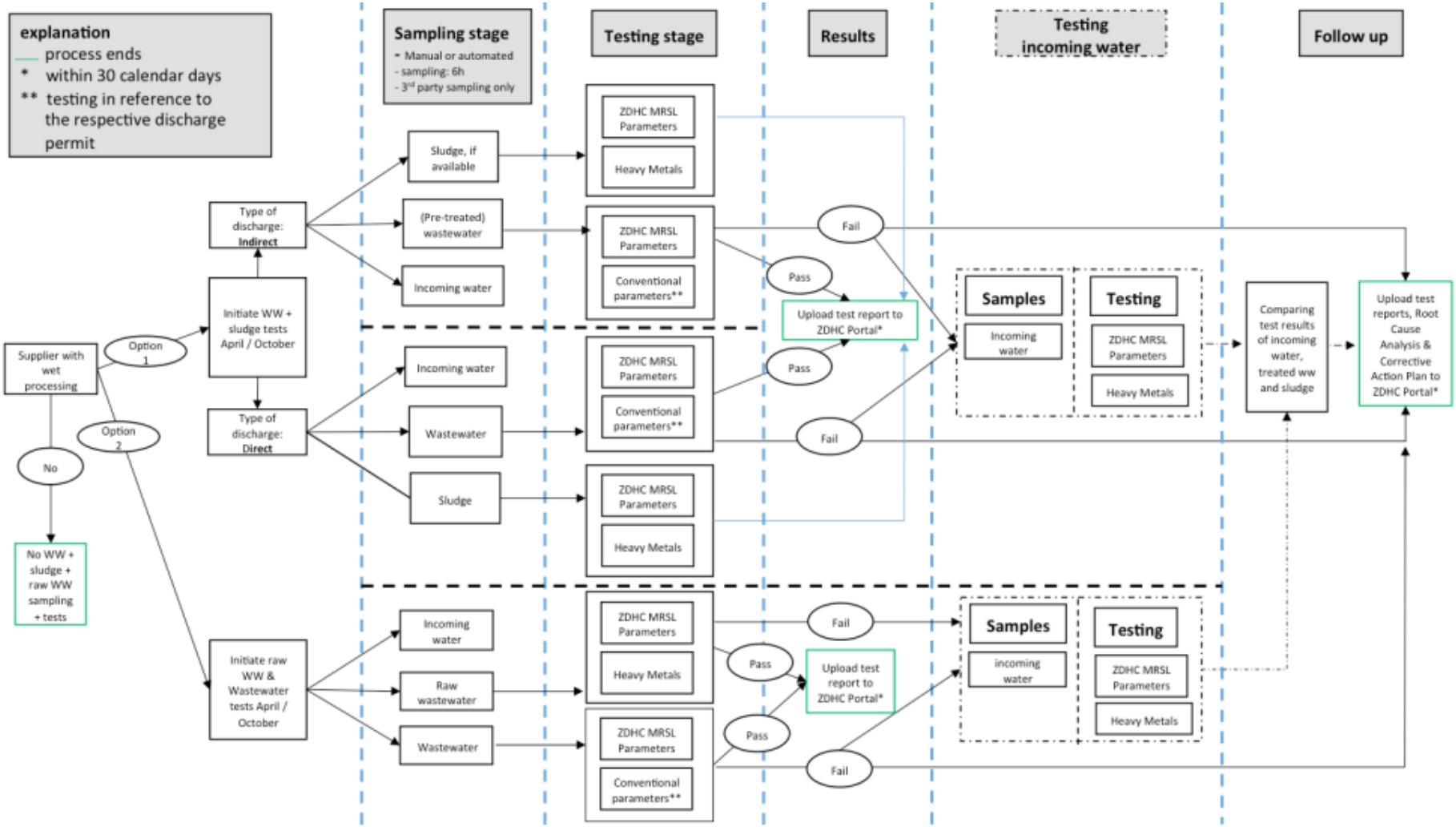
- **Aspirational limits for conventional wastewater parameters** (slide 43) are **expected to be met by January 1, 2020 and facilities are e**ncouraged to continuously improve to achieve one of the following:
  - Attain and demonstrate performance that meets or exceeds aspirational performance or,
  - In absence of aspirational performance, attain and demonstrate progressive performance, and have a plan with milestones in place to achieve continuous improvement.

- All facilities expected to meet aspirational or progressive limits as early as possible and share best practices.

Reporting limits for ZDHC MRSL parameters are expected to be fully met by January 1, 2020. From January 2018, ZDHC expects suppliers to be able to provide evidence of a progressive schedule to phase out hazardous chemicals by 2020.

Reference: ZDHC Wastewater Guideline Draft v.3

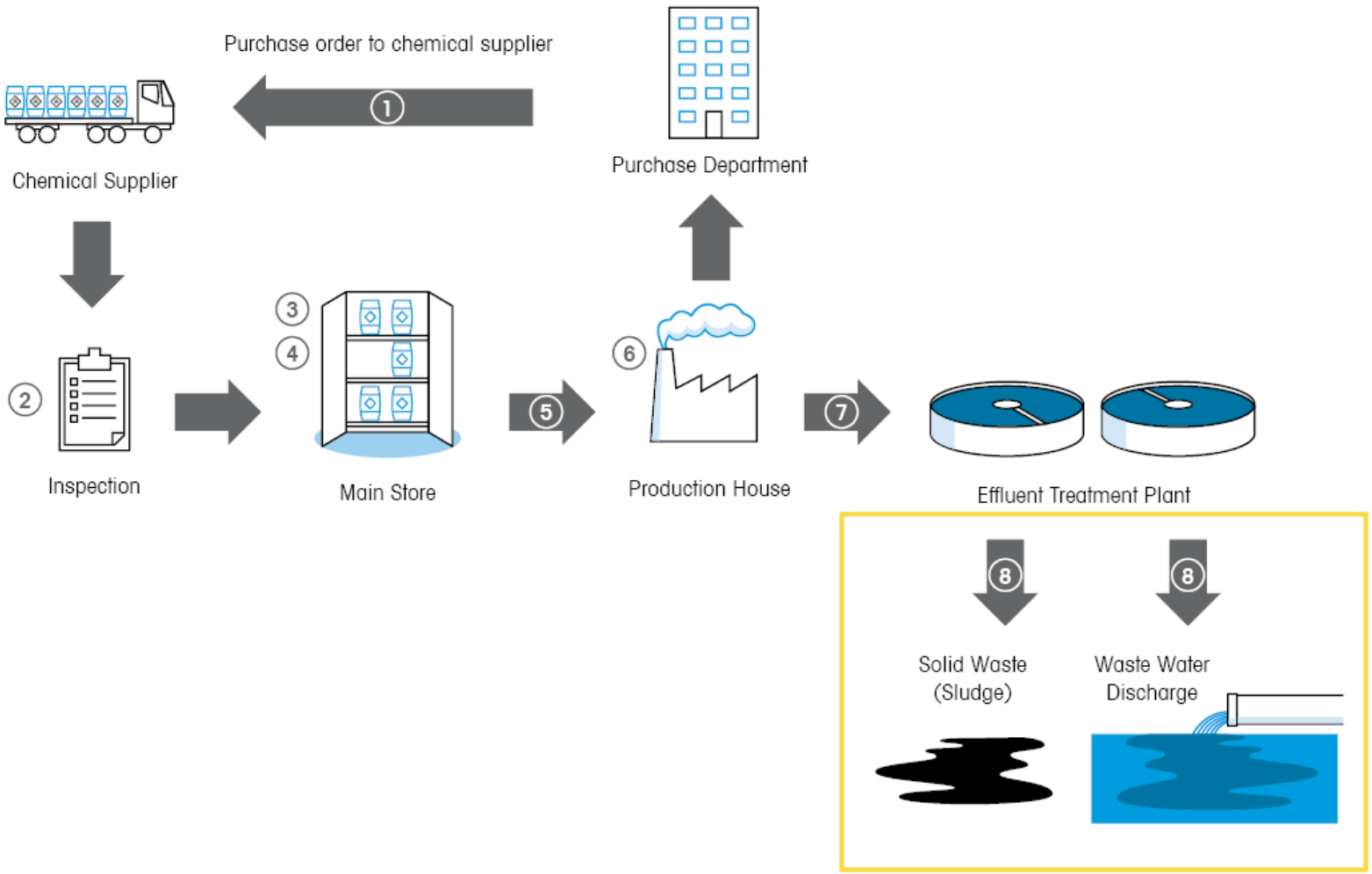
PROCESS FLOWCHART FOR TESTING



Reference: ZDHC Wastewater Guidelines

IDENTIFICATION OF OUTPUT LOAD OF EFFLUENT

OUTPUT LOAD AND EFFLUENT



LEGAL DISCHARGE STANDARDS FOR THE TEXTILE INDUSTRY CHINA

GB 8978-1996 Integrated Wastewater Discharge Standard (China Ministry of Environmental Protection, 1996):

- Tables 1 and 4 apply to wastewater discharge to water bodies.
- Table 4 applies to enterprises built after 1 January 1998.
- This document also includes parameters such as chlorobenzene, oxybenzene and total organic carbon that are not listed in Appendix A.

Consequences for Your Facility if You do not adhere to the requirements:

- It may include "daily penalty", restricting operations", "suspending operations to make improvements", and "shutting down enterprises" to tackle environmental offence....
- http://english.mep.gov.cn/News_service/infocus/201501/t20150114_294171.shtml
- It can depend as well if the factory is doing illegal discharge on purpose, if the discharge is in sensitive area like lake or river....

LEGAL DISCHARGE STANDARDS FOR THE TEXTILE INDUSTRY CHINA

GB 4287-2012 +XG1-2015 Discharge Standards of Water Pollutants for Dyeing and Finishing of Textile Industry (China Ministry of Environmental Protection, 2015)

- Table 2 applies to an existing facility as of 1 January 1 2015 and new facility as of 1 January 2013.
- Table 3 for special discharge t applies to areas in which the ecological environment is vulnerable.
- This standard applies to discharge to the environment and to the public wastewater treatment system.

Consequences for Your Facility if You do not adhere to the requirements:

- It may include "daily penalty", restricting operations", "suspending operations to make improvements", and "shutting down enterprises" to tackle environmental offence....
- http://english.mep.gov.cn/News_service/infocus/201501/t20150114_294171.shtml
- It can depend as well if the factory is doing illegal discharge on purpose, if the discharge is in sensitive area like lake or river....

EFFLUENT LOAD CALCULATIONS

EFFLUENT LOAD CALCULATION

Item	Mon. Qty.	COD Kgs/Kg	COD Kgs/Mon.	COD%
Acetic ACID	307	1.04	319.28	10.14
KEROSENE	1,100	0.75	825	26.20
Printing Dyes	550.7	0.8	440.56	13.99
Dispersing ag.	303	0.65	196.95	6.26
Sodium Sulfide	222	0.82	182.04	5.78
Detergent	157	1	157	4.99
Levelling ag.	144	0.75	108	3.43
Na Alginate	100	0.8	80	2.54
Hydro	236	0.33	77.88	2.47
Anticrease	275	0.25	68.75	2.18
Desizing ag.	136	0.5	68	2.16
Resist Salt	73	0.82	59.86	1.90
Dyeing Dyes	550.7	0.8	440.56	13.99
Sequestrant	46	0.52	23.92	0.76
Emulsifier	35	0.6	21	0.67
Citric acid	25	0.686	17.15	0.54
Stain Remover	32	0.5	16	0.51
CMC	75	0.2	15	0.48
Wetting agents	26	0.5	13	0.41
Prestogen K	22	0.4	8.8	0.28
Antifoamer	21	0.25	5.25	0.17
Oxalic acid	25	0.178	4.45	0.14
Total	**4461.4**	**13.144**	**3148.45**	**100.0%**

Monthly Consumption Quantity in KG * COD of the chemical Kgs/kg = COD Load of that chemical Kgs/month
e.g. Acetic Acid = 307 *1.04 = 319.28 kg/month COD load for month
Where our Total load of COD is 3148.45 kg/month COD

Hence, Acetic acid contribution to ETP from total monthly COD load is 10.14%

EFFLUENT LOAD CALCULATION

12. ECOLOGICAL INFORMATION

Ecotoxicity

Bacterial toxicity

	BST	> 300 mg/l		
Fish toxicity	**LC0**	> 1000 mg/l	48 hour Rainbow trout	OECD 203
	LC50	> 1000 mg/l		
Daphnia toxicity	**EC50**	> 100 mg/l	48 h	OECD 202
Summary		Not toxic or harmful to aquatic organisms		

Persistance and degradability

Bioelimination	30-40%, DOC Analysis,	OECD 302B
Summary	Partially eliminated by adsorption on effluent treatment sludge	
Behaviour in treatment plants	No inhibition. No nitrification inhibition known	

Additional Ecology Data

BOD5	0 mgO2/g
COD	465 mgO2/g
TOC	17.2 %
Nitrogen content	2.3 %
Phosphorus content	0 %
Organohalogen content	0 %

Approximate COD contribution Daily in ETP = $\frac{C \times M}{v} \times R$

Daily consumption of chemical: *M in kg*

Factor for amount of chemical entered in ETP: *R*

COD value: *C in mg/litres*

Volume of equalization tank: *V in litres*

TEMPLATE FOR EFFLUENT LOAD CALCULATION

Chemical	Kgs / Month	COD Kg/Kg	COD Kg/Month	% COD Contribution	BOD Kg/Kg	Total BOD	% BOD Contribution
e.g. Acetic Acid	*300*	*1.04*	*312*				

ACTIVITY

GROUP ACTIVITY

Take notes.
Workbook,
exercise (14-3)

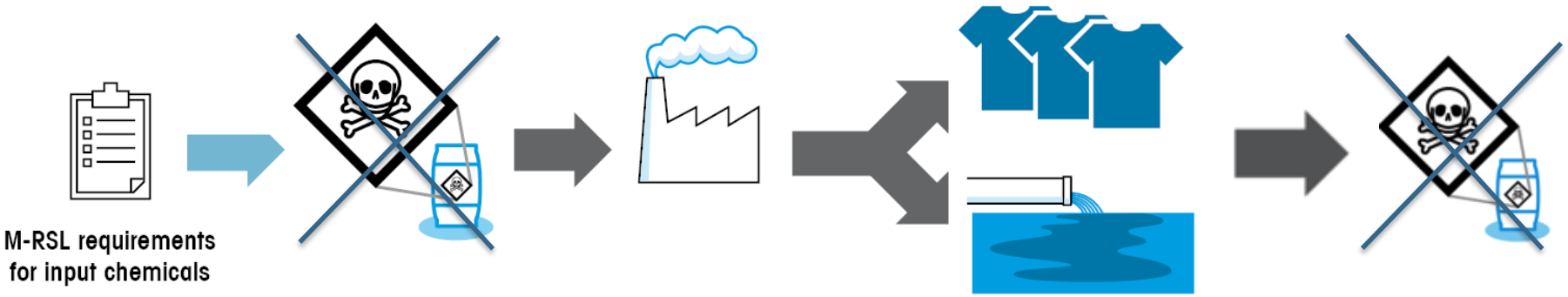
Review the production recipe and the SDS provided.
Go through the SDS information and create the chemical inventory.
Calculate the approximate COD values of the water discharged to the equalisation tank (input of ETP).
Compare your calculations to the ETPs input and discharge information for COD and BOD. What does the information tell you?

IMPACT ON PRODUCTION PLANNING

CLEAN FACTORY APPROACH

To achieve zero discharge of hazardous chemicals the factory shall not only improve chemicals for selected products but for all production taking place in the facility.

This is called the “Clean Factory Approach”.



LINKING EFFLUENT TREATMENT TO PRODUCTION PLANNING

The input values for ETP parameters for COD, BOD, TSS, pH etc., are the values which define the output parameters based on the treatment technologies installed:

- Understand your ETP design and plan all activities to meet the design parameters (input to output ratio).
- Do not conduct only pre-treatment at all machines at one time.
- Ensure your production planning never exceeds the input parameters at all times.
- Never use a chemical load which can not be handled by the ETP.
- Control the efficiency of ETP functioning through choice of product selection and proper production planning.

LINKING EFFLUENT TREATMENT TO PRODUCTION PLANNING – EXAMPLE I

Challenge:

The effluent loads of pre-treatment are higher than the effluent loads of washing:

- Ensure homogeneous effluent load at all times.
- Plan a way that allows you to balance dyeing and washing processes.

Example:

- Input COD load = 1500
- Discharge COD is designed to be 250

→ Ensure to not exceed the input COD value of 1500 through production planning.

LINKING EFFLUENT TREATMENT TO PRODUCTION PLANNING – EXAMPLE II (1/2)

Challenge:

Mill uses a chemical with bacterial toxicity. What is the maximum discharge of the same chemical allowed to sustain the bacterial activity?

Facts:

- EC_{50} - 10 mg/l (Section 12 of SDS) and having only biological effluent treatment plan.
- ETP capacity = 100,000 lit
- Chemical dose = 0.5 %
- Exhaustion = 85 %

Example:

- 1 kg chemical product will be responsible for bacteria to dead for 100,000 lit ETP capacity.
- 6.67 kg of product used in one day results in to 1 kg of product to go in ETP
- 100 kg fabric required 0.5% chemical hence 6.67 kg of chemical required for 1334 kg of production.

Mill should not use more than 6.67 kg of the above chemical. Or production should not be more than 1334 kg to sustain the bacteria in ETP.

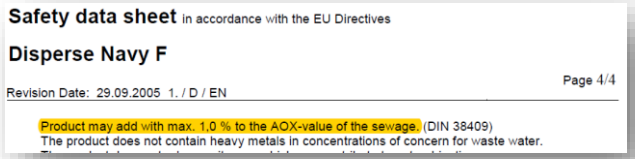
LINKING EFFLUENT TREATMENT TO PRODUCTION PLANNING – EXAMPLE II (2/2)

Challenge:

How much use of dye will cross the foundational limit in ETP?

Facts:

- Mill using dyestuff which adds 1% to the AOX value of the sewage.
- ETP capacity = 100,000 lit
- AOX ZDHC foundational limit = 5 ppm


Safety data sheet in accordance with the EU Directives

Disperse Navy F

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Product may add with max. 1,0 % to the AOX-value of the sewage. (DIN 38409)
The product does not contain heavy metals in concentrations of concern for waste water.

Example:

- 5mg/lit is requirement hence 100,000 lit ETP capacity 500 gm AOX.
- Now if dyestuff gives 1% AOX.

Hence dyestuff required is 50 kg to give the 5 ppm AOX load on to 100,000 lit capacity of ETP

ACTIVITY

DISCUSSION

Take notes.
Workbook,
exercise (14-4)

What is your experience on reduction of waste through improved production planning?

ANY QUESTIONS?

SUMMARY

Each participant to feedback with one key learning from this session.

Take notes in your workbook, exercise (14-5)