Management of sludge from textile and leather industry

Session III

Classification of sludge

DD MM YYYY

Location, Country

Trainer

Training Content – Mind Map

Session I: Why should sludge management be planned?

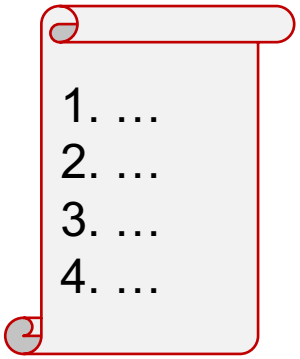
Session II:
What should a sludge management contain?

- **Session III:** Classification of Sludge
- **Session IV:** Sludge temporary storage and pre-treatment
- **Session V:** Sampling and analysis of sludge
- **Session VI:** Sludge treatment options

Session VII: Summary on the sludge management plan

Agenda Session III

1. General information on sludge classification
2. Sludge categories
3. Classification of sludge
4. Group exercise on classification



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General information

- Sludge classification is based on its
  - **origin**
  - **composition**

- Correct classification of the sludge lies in the **responsibility of the producer**

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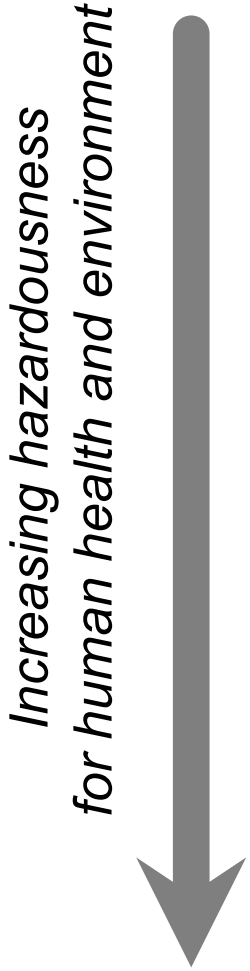
Sludge categories



Category A: **Municipal sludge**

including comparable sludge

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

Category C: **Sludge from industry** including sludge from CETP belonging to the category of **hazardous waste**

**Central Effluent Treatment Plant*

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- Category A -

Category A

Sludge produced in a sewage treatment plant treating

- **only domestic or urban** waste waters
- wastewater **comparable to domestic or urban** waste waters

may be counted as municipal or comparable sludge and classified as Category A.

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Category A

- **Comparable to sludge from domestic or urban wastewater** may be sludges from on-site effluent treatment stemming from:

• the preparation and processing of meat, fish and other foods of animal origin
• fruit, vegetables, cereals, edible oils, cocoa, coffee, tea and tobacco preparation and processing; conserve production; yeast and yeast extract production, molasses preparation and fermentation
• sugar processing
• the dairy products industry
• the baking and confectionery industry
• the production of alcoholic and non-alcoholic beverages (except coffee, tea and cocoa)

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- Category B -

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Category B

- If the sludge **cannot** be classified as Category A or Category C sludge it is automatically classified as Category

$$A , C \rightarrow B$$

- Usually sludge from non-hazardous labelled industries is considered to be Category B

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- Category C -

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Category C

- Sludge from industry including sludge from CETP belonging to the **category of hazardous waste**
- If the sludge or the wastewater are
  - from **hazardous labelled industry** or
  - contain any **chemical recognized as hazardous**

  it must be counted as hazardous waste and classified as Category C.
- These wastes exhibit one or more **hazardous characteristics** such as high flammability, explosive property, oxidizing property, poisonous, infectious etc.

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Category C

How do I know whether the industry generating the sludge is considered as hazardous?

- Industry origin
  - Annex 1a of Standards & Guidelines ('Basel* Y-Codes')
  - → Hazardous waste is marked with a Y-Code
  - Annex 2b of S&G ('EU List of Waste** Codes')
  - → Hazardous industry/processes are marked with an asterisk (*)

Is the textile and leather industry considered as hazardous labelled industry?

→ Usually YES as textile wastes are marked with an asterisk (*)!

* http://www.basel.int/TheConvention/Overview/TextoftheConvention/tabid/1275/Default.aspx
** http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1468849643268&uri=CELEX:02000D0532-20150601

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Category C

Annex 2B of Bangladesh Standards and Guidelines shows the following waste generating processes of the textile industry:

04 02 09	wastes from composite materials (impregnated textile, elastomer, plastomer)	
04 02 10	organic matter from natural products (for example grease, wax)	
04 02 14*	wastes from finishing containing organic solvents	X
04 02 15	wastes from finishing other than those mentioned in 04 02 14	
04 02 16*	dyestuffs and pigments containing hazardous substances	X
04 02 17	dyestuffs and pigments other than those mentioned in 04 02 16	
04 02 19*	sludges from on-site effluent treatment containing hazardous substances	X
04 02 20	sludges from on-site effluent treatment other than those mentioned in 04 02 19	
04 02 21	wastes from unprocessed textile fibres	
04 02 22	wastes from processed textile fibres	
04 02 99	wastes not otherwise specified	

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Category C

How do I know whether the sludge contains hazardous components?

- Hazardous constituents or hazardous properties
  - Annex 1b of S&G ('Basel Y-Codes')
  - Annex 2a of S&G ('Basel Hazardous Properties')

→ The sludge contains hazardous components if it displays one or more of the hazardous properties

Code	List of Hazardous Properties
H1	Explosive
H3	Flammable liquids
H4	Flammable Solids
H5	Oxidising/Organic peroxide
H6	Poisonous (acute)/Infectious substances
H7	Carcinogenic
H8	Corrosive
H10	Liberation of toxic gases in contact with air and water
H11	Toxic (delayed or chronic)
H12	Ecotoxic

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Category C

- Information sources on hazardous constituents and their labelling can be found here:

Source:
http://www.unece.org/trans/danger/publi/ghs/pictograms.html

- Globally Harmonised System of Classification and Labelling of Chemicals (GHS) (http://www.unece.org/trans/danger/publi/ghs/ghs_rev06/06files_e.html#c38156)
- Roadmap to Zero Discharge of Hazardous Chemicals (ZDHC) (http://www.roadmaptozero.com/)

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- General Remarks -

Mixing of sludge

- **Sludge mixtures** (e.g. from CETP) with more than one category of sludge are to be classified as **most hazardous category**:

Category A + Category B	= Category B
Category A + Category C	= *Category C**
Category B + Category C	= Category C
Category A + Category B + Category C	= Category C

- ***Ban on mixing** of Category A sludge with Category C sludge

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Classification of sludge from textile industry

- Wastewater generated from mentioned textile processes are often **treated in the same ETP**
- Sludge **accumulates** in different stages from different processes in the ETP and is usually handled together
- Sludge generate from ETP needs to be further treated and **disposed safely**
- Production of sludge indirectly indicates ETP performance and its operation mode

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- Classification of sludge from textile industry -

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Classification of sludge from textile industry

- Usage of multiple chemical products in the textile industry such as detergents and other surface active agents

➢ Because of the nature of the chemicals used in the textile industry and the usual accumulation of different sludges in the ETP, sludge are most likely

➢ **Category B and C**

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Thresholds for heavy metal concentration in sludges per category

- To simplify and facilitate the classification of sludge, thresholds for heavy metal concentrations per category **are used** based on the German Sewage Sludge Ordinance and US EPA recommendations

Parameter	Unit (DM)	Category A*	Category B#	Category C
As	mg/kg	≤ 40	41-75	> 75
Cd	mg/kg	≤ 10	11-85	> 85
Cr	mg/kg	<600**	<600	> 600
Cu	mg/kg	≤ 800	801- 4,300	> 4,300
Pb	mg/kg	<840**	<840	> 840
Ni	mg/kg	≤ 200	201-420	> 420
Zn	mg/kg	≤ 2500	2,501-7,500	> 7,500
Hg	mg/kg	≤ 8	9- 57	> 57

*According to the limits imposed in Bangladesh standard and guidelines for sludge managements of sludge for use as compost/fertilizer

#US EPA Standards for the Use or Disposal of Sewage Sludge (40 CFR Part 503)

**As the present limits for these parameters are slightly higher than the US EPA values considered for *Category B* and *C*, US EPA limits are considered for consistency.

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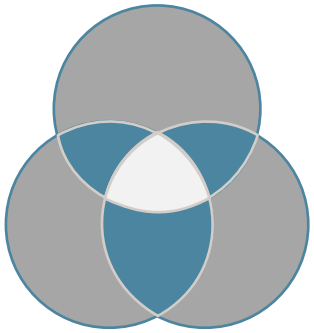
Group exercise



Classification of sludges

1. Form # groups of # people
2. Check the available information on your exemplary sludge samples
3. Decide how to classify the sludges
4. Discuss the chosen sludge classification
5. Present your classifications to all