# TRAINING PROGRAMME FOR ETP OPERATORS IN TEXTILE INDUSTRY

Promoting Sustainability in the Textile and Garment Industry in Asia (GIZ-FABRIC)

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

FABRIC Asia

# General ETP Operation  - Part 2

GIZ FABRIC – ETP Operator Course

## Content

- Organizing daily operational tasks
- Organizing handing over

# Organizing daily operational tasks

# Organizing daily operational tasks

## Second ETP round

(16) Check secondary **clarifier operation**

- Check **inlet feed** and observe if bio-sludge clearly visible
  - If not, indication of over-aeration
- Check **uniformity of overflow** at periphery of tank
  - V Notches even?
  - If not, arrange for adjustment
- **Clean launder** of overflow with broom

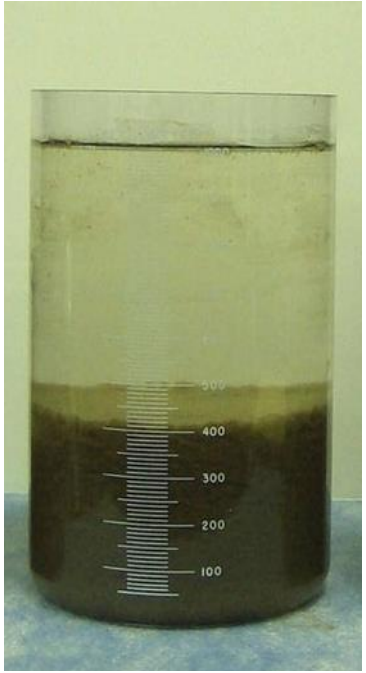
# Organizing daily operational tasks

## Second ETP round

(16) Check secondary clarifier operation

Color removal agent dosing

- **Slurry prepared in correct dilution** as recommended by the manufacturer?
  - **Test different dosages** of chemical in simple jar test **once every two weeks**
  - Select best dosage
  - **Observe effluent color** throughout day and adjust dosage
  - Ensure chemical dosing not resulting in too rapid settling



# Organizing daily operational tasks

## Second ETP round

(16) Check secondary clarifier operation

- Look out for potential problems
  - **Sludge bulking?**
  - **Pinpoint floc?**
  - **Frothing and bubbles** in clarifier?
  - Unusual heating, jerks or noise during operation of the motor and gear box

Refer to presentations on trouble shooting for possible solutions!

# Organizing daily operational tasks

## Second ETP round

(16) Check secondary clarifier operation

- Check **skimmer operations**
  - **Mechanism moving smoothly** over scum box?
  - **Squeeges scooping** out scum into box?
- Remove collected scum once in two days
  - Transfer sum to disposal area or sludge dewatering section

# Organizing daily operational tasks

## Second ETP round

(16) Check secondary clarifier operation

- Check **sludge withdrawal** from clarifier underflow
- Check and **adjust pumping rate**
  - solids content in underflow to be **twice of MLSS value** in aeration tank
- Check **returned sludge settling** once a week
  - MLSS in aeration tank in range of 3000-4000 mg/l?
  - If less than 1500 mg/l of MLSS, pump RAS at 80-90% of inflow quantity

# Organizing daily operational tasks

## Second ETP round

(16) Check secondary clarifier operation

**Decide on action** for returned sludge settling

With 30 minutes settling time…

- if **more than 700 ml** per litre => **increase RAS**
- If **less than 500 ml** per litre => **reduce RAS**

# Organizing daily operational tasks

## Second ETP round

(16) Check secondary clarifier operation

- Check **DO of clarifier overflow/underflow**
  - once a week
  - Ideal DO value: > 0.2 mg/; DO in overflow > 0.5 mg/l
- Adjust if needed!

# Organizing daily operational tasks

## Second ETP round

(17) Check **secondary sludge wastage**

- **Maintain table** for sludge wasting (WAS) recordings
- **Dispose sludge** daily or twice/three times a week
  - Irrespective of periodicity, sludge to be wasted around 10 - 15% of total sludge flow
- Organize **daily sludge removal**
  - Leave return sludge pump on for 2-3 h/d and divert to WAS line
  - Use rest of time (21-22 h/d) for returning sludge to aeration tank

# Organizing daily operational tasks

## Second ETP round

(17) Check **secondary sludge wastage**

For ETP with **muffle furnace**

- **Check Volatile Suspended Solids** (VSS) in returned sludge once a week
  - Value to be between 60-70%

For ETP with **thickener**

- Withdraw sludge for wasting on **daily basis**

# Organizing daily operational tasks

## Second ETP round

(18) Check **sludge thickener operation**

- Observing **supernatant overflow in sludge thickener** (if available)
  - Purpose separating as much water as possible from sludge!
  - Efficiency based on solids load per square meter of thickener surface
  - Ideally collect sludge in collection tank and pump to thickener slowly for around 12-16 h/d

# Organizing daily operational tasks

## Second ETP round

(18) Check **sludge thickener** operation

For **batch operated thickener** (i.e. hopper bottom type)

1. Withdraw sludge till appears diluted
2. Fill up tank with fresh sludge and leave overnight for slow settling

# Organizing daily operational tasks

## Second ETP round

(18) Check **sludge thickener operation**

**Stage 1** - Overflow clear, sludge not coming to surface

- Thickener working normally
- **Keep operating**!

**Stage 2** - Sludge starting to rising to top, but overflow clear?

- **Keep operating**, but **watch overflow** continuously!

Stage 1

Stage 2

# Organizing daily operational tasks

## Second ETP round

(18) Check **sludge thickener operation**

**Stage 3** - Sludge rising to top and starting to overflow, supernatant becoming cloudy

- **Observe closely** and **reduce flow rate** if possible!

**Stage 4:** Sludge fully overflowing supernatant turbid and containing with sludge

- **Stop feed** or reduce drastically!

Stage 3

Stage 4

# Organizing daily operational tasks

## Second ETP round

(19) Check **sludge drying beds**

- Any unpleasant smell indicating inefficient filtration and putrefaction?
- Arrange for washing of filter media before next cycle
- Check condition of sludge getting dried

# Organizing daily operational tasks

## Second ETP round

(19) Check **sludge drying beds**

- Sludge sufficiently dried and cracked into small pieces?
  - Remove sludge
- Top sand lost along with dried sludge, while cleaning dried sludge?
  - Top up bed with fresh sand

# Organizing daily operational tasks

## Second ETP round

(19) Check **sludge drying beds**

- Prepare empty bed for next round of filling
- Ensure continuous admission of sludge
- Check filling not exceeding recommended depth (0.35 – 0.4 m)

# Organizing daily operational tasks

## Second ETP round

(19) Check **sludge drying beds**

- Check for leaks in sludge pipelines and valves
- Note observation and arrange for rectification!
- Check tightness of shutters when admitting sludge through channel

# Organizing daily operational tasks

## Second ETP round

(19) Check **sludge drying beds**

- Check filtrate line
  - Not blocked?
  - Filtrate flowing smoothly to receiving sump?
- Arrange for flushing and cleaning of blocked filtrate lines

# Organizing daily operational tasks

## Second ETP round

**(20)** Check **sludge filter press** operation

If already operating

- Check **running time** since last start
- Check **pump pressure** (indicating level of filtration)

Before starting check **sludge collection tank**

- Agitator working?
- Sludge to be pumped smooth slurry?

# Organizing daily operational tasks

## Second ETP round

**(20)** Check **sludge filter press** operation

At beginning of cycle, filtrate flow even and high

At end of filtration, flow slowing down to trickle, indicating filtration cycle getting completed

# Organizing daily operational tasks

## Second ETP round

**(20)** Check **sludge filter press** operation

Before starting (Contd.)

- Before closing plates look at **alignment of cloths and plates**
- **Close press** with hydraulic closing or by turning manual handle in case of small presses

After starting

- Watch pump filling
- **Check clarity** of filtrate

# Organizing daily operational tasks

## Second ETP round

**(20)** Check **sludge filter press** operation

After pumping cycle

- **Allow** few minutes for further **draining**
- If available, **switch on blower air** or stream for complete drying
- Withdraw hydraulic closure

# Organizing daily operational tasks

## Second ETP round

**(20)** Check **sludge filter press** operation

After pumping cycle

- Open up plates one by one to release cake
- Even with automatic plate shifter, push down sludge cake using spatula.
  - While pushing down sludge cake do not damage the cloths!

# Organizing daily operational tasks

## Second ETP round

(21) Check **sludge maturation** area

- Foul odor?
- **Turn sludge** occasionally to release inherent moisture

Disposal phase

- Arrange for transport and disposal to ultimate disposal facility (TSDF or co-processing)
  - When sludge stored for required time (e.g. 6 months)
- Maintain and retain **statutory records** for disposal including quantity disposed, transport facility details including vehicle number, ultimate point of delivery, etc.

# Organizing daily operational tasks

## Second ETP round

(22) Control room & MCC

- All bolting aligned, leveled and tight?
- Check doors
  - Tightly closed (except for any repair)?
  - Gaskets in order?
  - Proper isolation?
  - Door alignment of individual starter units and door interlock operation in order?

!

ETP´s **corrosive atmosphere** and electronic components in the panel easily affected by **open doors** and/or **insufficient isolation**!

# Organizing daily operational tasks

## Second ETP round

(22) Control room & MCC

- Checks **cleanliness**
  - **MCC bus bar supports** for clean and tight?
  - **Ground connections** to ground bus in order?
  - **Contactor-insulating parts** clean and dry?
  - Remove **any rust** or apply rust preventative
- Inspect **lubrication** of contractor moving part
- Verify overload protective device rating and settings

# Organizing daily operational tasks

## Second ETP round

(22) Control room & MCC

- Disconnect completely drawout contacts when drawout handle operated
- Check **CPT and PT fuses** for size, type and circuit location
- Check **voltage rating** of contactor coil
- Check fuses and wiring to **power factor correction capacitors** for size and rating
- Ensure **tagging of all components** according to drawings and specifications

# Organizing daily operational tasks

## Second ETP round

(22) Control room & MCC

- Check **proper earthing** of MCC
- Check **proper tagging** and **identification of MCC cables**
- Verify **overload relays** selected and set as per actual connected load
- Check proper working of **emergency stop** switches

# Organizing daily operational tasks

## Second ETP round

(22) Control room & MCC

- Check manually breakers of all cubicles in MCC and ensure their functioning
- Check electrical and mechanical interlock between star and delta starters
- Check all meters:
  - Verify functioning of all indicators
  - Verify readings proper
  - Check whether glass sufficiently transparent

# Organizing daily operational tasks

## Second ETP round

(22) Control room & MCC

### Once in two weeks

- Test **insulation resistance** of **MCC bus**/instrument transformers with a 1-minute test (phase to phase and phase to ground).
- Test **insulation resistance of contactor** (closed position) with a 1-minute test (phase to phase and phase to ground).
- Test **contactor contact resistance** with micro-ohmmeter, if available. Calibrate and test each protective relay with settings on devices vis-à-vis approved relay

# Organizing daily operational tasks

## Second ETP round – Follow-up action

- Review observations in pocket handbook
- Transfer all values recorded into log sheets
  - Entries to be legible and clear
  - Enter values into computer
- Keep eye on mimic panel or SCADA panel if available
- Prepare notes for operator of next shift (e.g. in special register)

# Organizing handing over

# Organizing handing over

## Final ETP round and handing over

- Final check **before completion of shift**
- Check of all units in **proper operation** (e.g. no jerks, vibrations noise or burning smell)
- Ensure **sufficient chemicals available** to continue dosing for at least one hour during next shift (until checks during first round by next operator)
- Verify **completion of all activities** planned for shift
  - For example, evacuation of sludge from clarifier, adding defoamers, adding nutrients to aeration tank done?

# Organizing handing over

## Final ETP round and handing over

- **Initiate immediate action** if needed
  - Do not wait for operator in the next shift to do that!
  - For example: Equalization tank level nearing minimum operating level, switch off equalized effluent transfer pump
- **Never leave plant until next operator come in and taken charge**
  - If not turning up, need to continue shift

# Organizing handing over

## Final ETP round and handing over

- Take time to **brief next operator** about
  - ongoing operations
  - task to be done in next shift
  - any shutdowns or break downs occurred during shift
- **Hand over logsheets** and records
- Before leaving, **brief ETP manager** about any unusual occurrence or abnormal behavior of ETP units

# To remember

- Doing **multiple rounds through ETP** and completing actions during the shift important responsibility of ETP operator
  - Use recommendations in this presentations to draw **daily workplan checklist** for yourself
- Location specific operators (e.g. filter press operators) to remain next to their treatment unit throughout shift.
- For general ETP operators, visit to all sections important
  - Unusual appearances, noise or smell important **indicators about ETP health**
  - Do **simple checks and spot tests** to confirm the normal operation

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