

TRAINING PROGRAMME FOR ETP OPERATORS IN TEXTILE INDUSTRY

Promotion of Sustainability in the Textile and Garment Industry in Asia - FABRIC

General requirements for ETPs

GIZ FABRIC – ETP Operator Course



Contents

- Defining a good effluent treatment plant
- ETP personnel required
- Using standard operating procedures

Defining a good effluent treatment plant

Defining a good effluent treatment plant

A good ETP...

- Designed according to **standard performance criteria**.
- Constructed according to internationally accepted quality standards
- Equipped with **good quality equipment** and **controls**.
- **Operated well**, meeting all standards stipulated by DoE.
- **Monitored and certified** by stakeholders, buyer and government authorities.
- **Maintained well**, ensuring long life, trouble free operation and with minimum down time.



Defining a good effluent treatment plant

A good ETP...

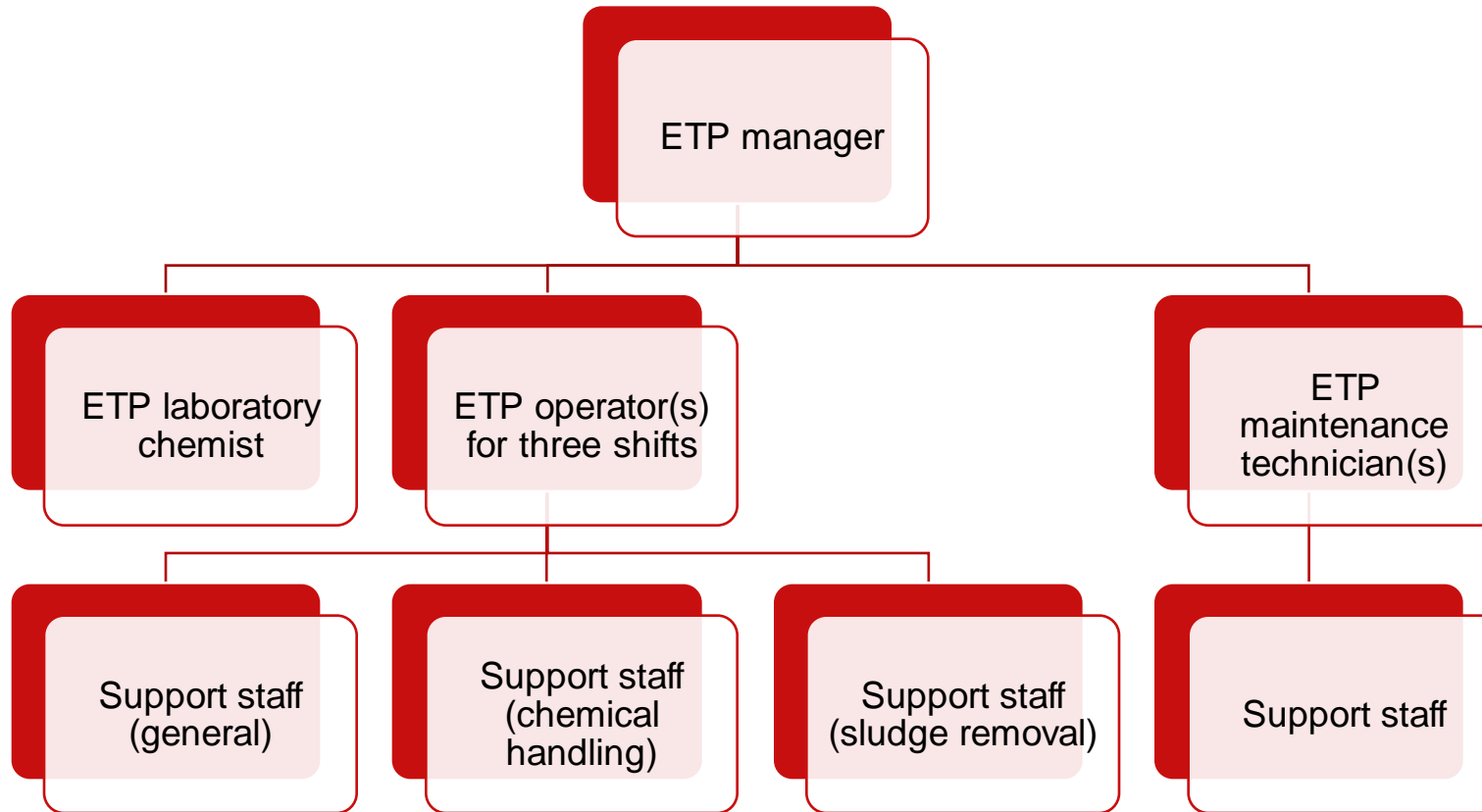
- product of good practices from concept to operation
- Not more expensive in long-run because of better reliability and lower maintenance costs during operation



Personnel required for ETP operation

Personnel required for ETP operation

Typical categories of ETP personnel



Personnel required for ETP operation

ETP manager

Like captain of a ship,

- responsible to ensure overall optimum performance by ETP
- supported by good crew (ETP operator key member)

Usual qualification of ETP managers:

- Engineer (in mechanical/chemical/environmental engineering) or a science graduate/post graduate (chemistry/environmental science)
- In small ETPs, also having to act as chemist as well (ideally to be two separate positions in ETP).



Personnel required for ETP operation

ETP manager

Roles and responsibilities

- Act as front line contact for any visitor, DoE official or buyers/brands → Knowledge and professional appearance calling card for ETP and factory
- Be “jack of all trades”, with (at least) basic knowledge ranging from electrical maintenance to laboratory analysis.
- Have thorough understanding of unit operations and application of microbiology and environmental chemistry in ETP
- Have working knowledge in
 - laboratory operations
 - test methods to validate result given by ETP laboratory chemist



Personnel required for ETP operation

ETP manager

Performance and indicators of good ETP plant manager

- Being able to handle jar tests and bio-sludge settling studies and interpret results
- Preparing weekly duty roster of duties for each ETP members of personnel,
- Specifying duties and responsibilities of each category of staff and keeping staff well informed
- Able to take decisions and lead in critical situations
- Well versed in deciding on dosage of chemicals and nutrients based on analysis of raw effluent quality and
- Well versed making adjustments changes based on interim treatment results



Personnel required for ETP operation

ETP manager

Performance and indicators of good ETP plant manager (contnd.)

- Conducting weekly reviews with team to discuss general operational parameters, issues faced and steps to be taken to ensure smooth operation in future.
- Ensuring staff rotation for various shifts during each month.
- Being ready to learn new technologies and innovations in field of environmental engineering and effluent treatment (including new tools)
- Participating in opportunities to share experiences with other plant managers



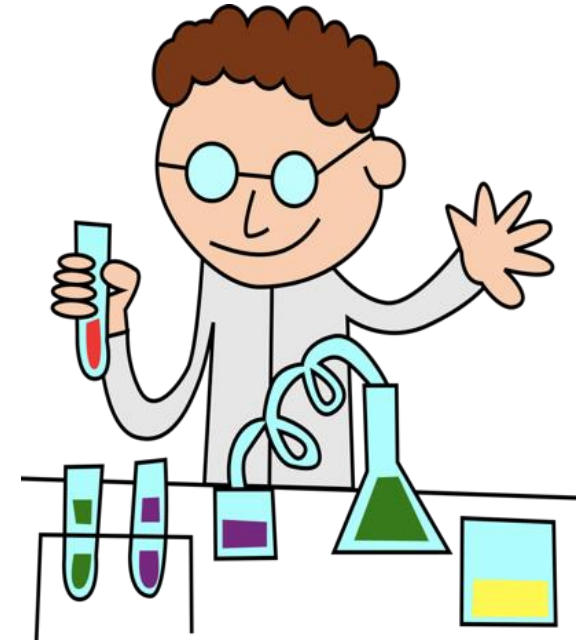
Personnel required for ETP operation

ETP laboratory chemist

Responsible for providing valuable data to ETP manager to enable control of ETP and adjustment of processes (dosage, aeration,...).

Usual qualifications

- Qualified chemist or chemical analyst.
- Graduate/ post graduate in chemistry/environmental science
- Previous experience in an environmental laboratory
- Special knowledge of water and wastewater chemistry

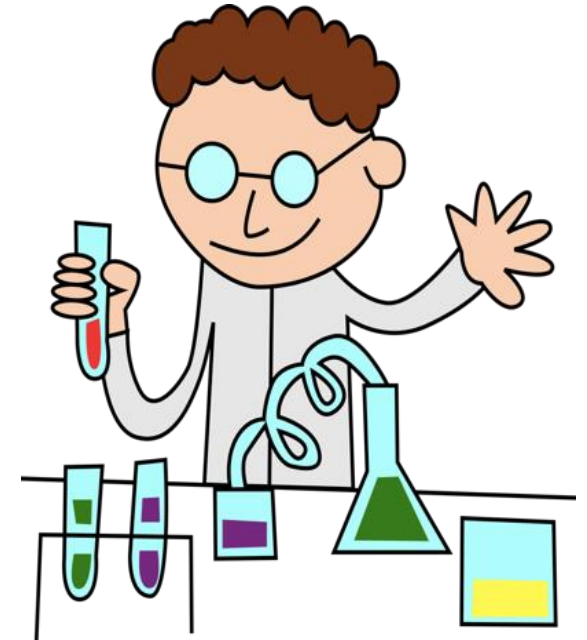


Personnel required for ETP operation

ETP laboratory chemist

Roles and responsibilities

- Sample wastewater (in smaller ETP, if not done by ETP operator)
- Preserve water or wastewater samples
- Prepare laboratory chemicals and use of laboratory instruments
- Apply standard analytical procedures for testing various environmental parameters such as pH, SS, BOD, COD, TDS etc.
- Test quality of treatment chemicals used in ETP.
- Maintain ETP quality monitoring register and compile performance analysis to ETP manager



Personnel required for ETP operation

ETP operator

Responsible for day-to-day hands-on operation of ETP; in absence of ETP manager, one ETP operator usually in charge of ETP.

Usual qualification of ETP operator

- Technically qualified (mechanic/ electrician/ chemist), but non-technical person of good experience also suitable
- Basic knowledge of unit operations and wastewater treatment



Personnel required for ETP operation

ETP operator

Roles and responsibilities

- Operate ETP units as per directions of ETP manager,
- Adjust operations and take corrective action in absence of ETP manager
- Handle basic (preventive) maintenance and service important units like chemical mixing, dosing, sampling, sludge evacuation (e.g. oiling & greasing)
- Assist electrical/mechanical maintenance technician(s) in carrying out preventive and breakdown maintenance tasks.



Personnel required for ETP operation

ETP operator – Expectations as per ZDHC

- Hands-on experience in operation and maintenance of ETP
- Trained and able to demonstrate knowledge levels to qualify as operator for the ETP based on its complexity in line specific qualification scores
- Different grades of operators (based specific qualification scores):
 - Chief operator
 - Senior shift operator
 - Maintenance technician



Personnel required for ETP operation

ETP maintenance technician

Responsible for technical maintenance works in ETP (repairs and other maintenance activity)

- Usually dedicated maintenance technicians part of ETP staff in large ETPs
- Commonly part of factory maintenance team.

Usual qualification of ETP maintenance technician (depending on focal areas usually fitter and electrician):

- Electricians: ITI engineers, diploma holders or degree holders as per size and type of factory.
- Fitters: Mechanical engineers with ITI certificate /diploma/ engineers.



Personnel required for ETP operation

ETP maintenance technician

Roles and responsibilities

- Carry out **routine checks** of electrical readings like amperage are the responsibility of operator,
- Carry out **electrical repairs** (e.g. for which qualified electricians required)
- Remove, replace and **repair of equipment** used in operations (e.g. aerators, pumps, valves, pipes) → works involving welding, lathe work usually done by local workshops specialized in these jobs.
- Identify causes and reasons for faults and ultimate failure.



Personnel required for ETP operation

ETP maintenance technician

Common good practices for consideration

- In ETPs where maintenance technicians obtained from factory pool → Good idea to assign maintenance personnel already **familiar with issues in ETP.**
- ETP managers and operators to **keep good contacts** to maintenance supervisor all the time to obtain services at short notice.
- Make **monthly routine checks-ups** of equipment and motors by qualified maintenance technicians standard procedure
- Develop and strictly follow servicing and/or preventive **maintenance plan** of the equipment or unit.



Personnel required for ETP operation

ETP support staff (casual laborers/helpers)

Backbone for all supportive activities common in ETPs e.g. cleaning sediments in any tanks, preparing sites of maintenance, helping hand to ETP operators and maintenance technicians

- Usually, 2 - 3 permanent helpers assigned to ETP; additional helpers hired based on need basis

Important:

- Helpers in ETP to be well-trained on safety aspects
- Provided with and using safety gadgets (e.g. PPE) depending on work.
- Consider additional training on basic operation of ETP to carryout certain duties of ETP operators in case of emergency.



Personnel required for ETP operation

ETP support staff (casual laborers/helpers)

Roles and responsibilities

- Assist ETP operator in up-keep and maintenance of the various treatment units
- Clean and maintain ETP structures, areas, floors, rooms, equipment, tanks, vessels, beds etc.
- Carry out removal, loading, haulage/carriage of wastes, screenings, stores and other such material as needed.
- Move treatment chemicals from chemical store to chemical preparation tanks or dosing units.



Personnel required for ETP operation

Be aware of ETP operator's important role!

- While ETP manager controlling ETP operation, efficiency of operation entirely depending on efficiency of ETP operator
- If ETP operators not understanding ETP operation, high risk of ETP failure.



Personnel required for ETP operation

Be aware of ETP operator's important role!

ETP operators **maintain 24-hour ETP operation** by

- handling actual ETP operation, turning valves, push switches, collecting samples, lubricating equipment, reading gauges and recording data.
- operating and maintaining screens, grit removal devices, pumps, aerators, valves, etc. in directing effluent and settled sludge to various units for / after treatment.
- checking plant performance by carrying out settleability studies of primary & secondary sludge
- doing spot-checks involving pH, DO and temperature at points where required
- carrying out preventive and breakdown maintenance tasks
- inspecting records and observing treatment condition



Personnel required for ETP operation

Be aware of ETP operator's important role! (contd.)

ETP operators **maintain 24-hour ETP operation** by

- collecting samples from different sampling locations covering all unit operations, preserving these without contamination and submitting for laboratory analysis.
- being involved in proper start up, operation, shut down, and maintaining treatment process such as bar screens, oil catches, equalization tanks, aeration tanks, settling tanks, collection tanks, pressure sand filter etc.
- maintaining clean appearance of ETP and helping make a good i
- Taking responsibility own and others' safety



Personnel required for ETP operation

Training and career prospects

Regardless of current position in ETP, training and continuous education important, with focus on knowledge and skills (Know what and know how)

- Training for the job (formal training courses outside ETP)
- Training on the job (through guidance by supervisors, hands-on work)

Common approach in ETP (e.g. operator and technician level):

- Starting as attendant or operator-in-training and learning skills on the job under direction of experienced operators.
- Learning by observing and doing routine tasks such as recording meter readings, taking samples, simple maintenance and repair work on pumps, electric motors, valves, and other plant equipment.



Using standard operating procedures

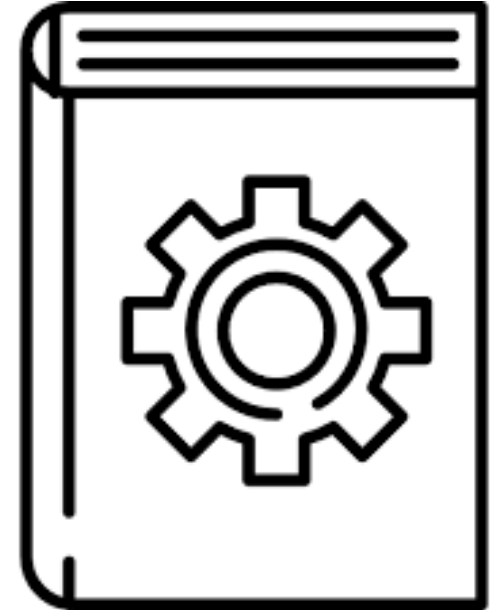
Using standard operating procedures

Purpose

- To provide guidance and reference for
 - all ETP operations (start-up, regular, emergency, shut-down)
 - planning and implementing ETP maintenance work
- To serve as basis for
 - development of work instructions and
 - conducting training of ETP staff

Important:

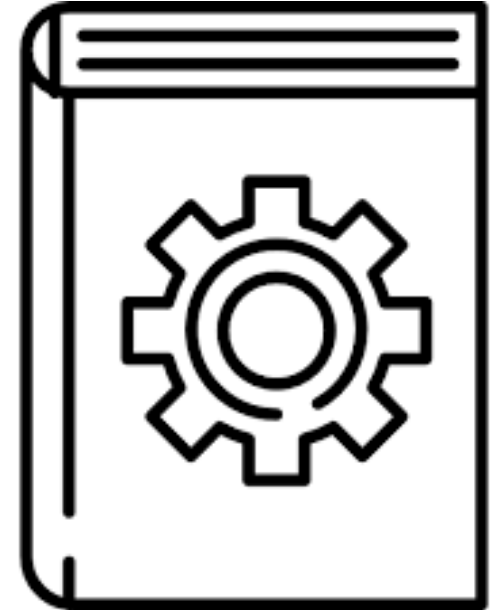
- To be specific to treatment operations and units as installed



Using standard operating procedures

Common challenges

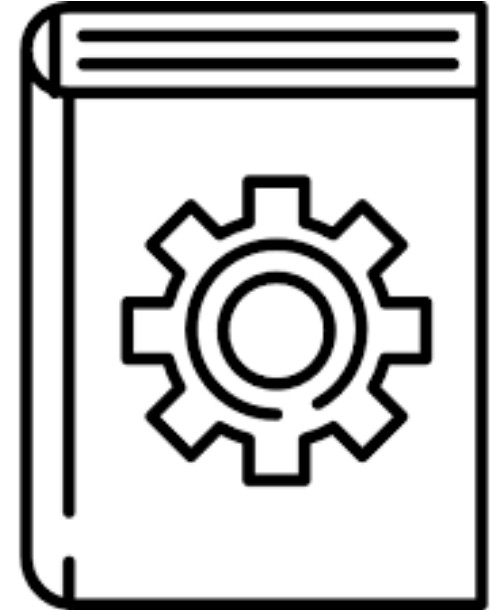
- Often provided consultant/ contractor installing/upgrading ETP
- Very comprehensive and long
- Often technical details cut and pasted from literature or including general leaflets/performance curves of pumps, blowers etc. as well standard maintenance information.
- Commonly in English and not in local language understood by all ETP staff.
- If available, often not used by ETP managers or operators; instead ETP operations on rule of thumb and trial & error basis.



Using standard operating procedures

Good practices – Standard Operating Procedure (SOP) manual

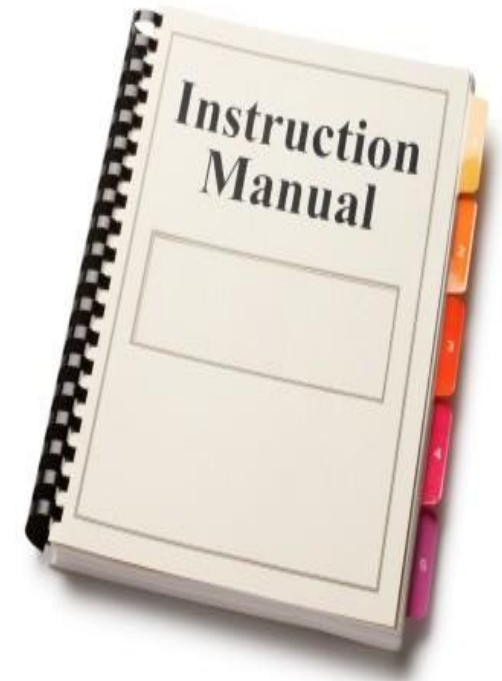
- Specific for ETP at hand, based on their own treatment scheme and units therein.
- Whole manual or relevant parts translated in local language (e.g. Bangla) and readily accessible for whole ETP team
- Relevant pages printed out, laminated and pasted at different treatment units in ETP for ready reference.
- Reviewed and revised, when ETP set-up changed or up-graded
- Referred to for operations as well as for instructions and training



Using standard operating procedures

Suggested minimum content of manual

- Short description of treatment units (including drawings and schematics) starting from inlet to discharge point, their purpose as well as expected performance
- Simple step-by-step instructions for their operation
- General and unit specific Do's & Don't's
- Safety precautions while operating units.
- Description and instructions of standard maintenance requirements (e.g. oiling & greasing, checking electricals)
- Instructions regarding monitoring and record keeping.
- List of spares needed and inventory to be maintained.
- Common problems and trouble shooting instructions.
- Contact numbers of service agents, spare part suppliers.



Using standard operating procedures

EXERCISE

What specific information to find in SOP manual

You have just heard about the suggested minimum content in an ETP operating manual.

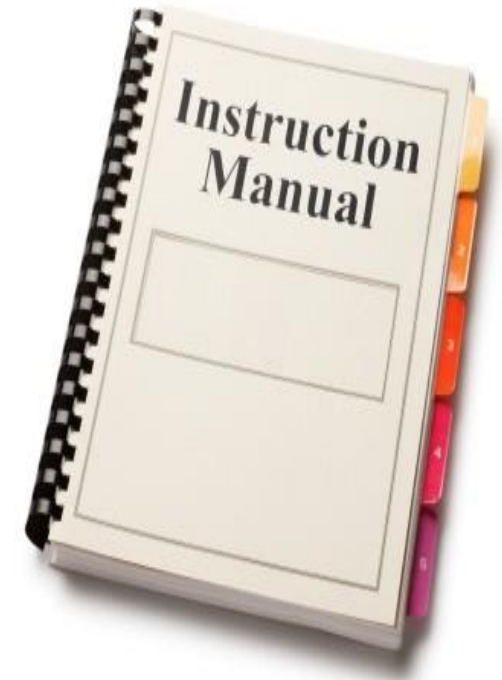
- In your assigned group, quickly discuss (for the next 10 minutes) what more specific information you can/would like to find in the operating manual. Share your ideas or experiences.
- Nominate one person in your group to quickly present the findings of your group.



Using standard operating procedures

What specific information to find in manual (examples)

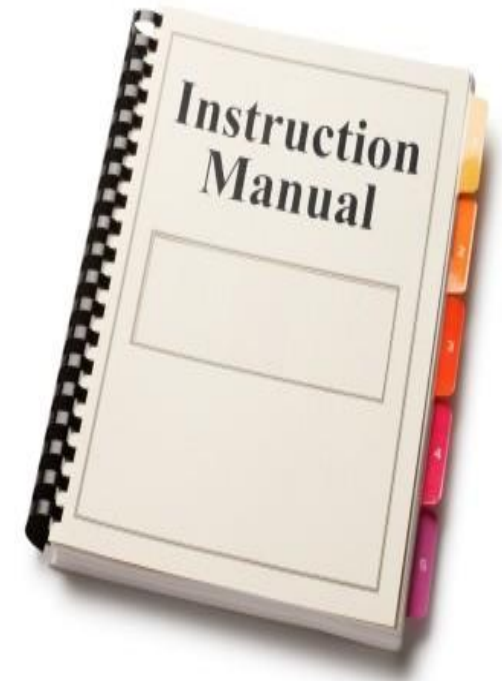
- Frequency for cleaning of manually cleaned screen, removal of screenings and maintenance schedule of the mechanical screen.
- Specifications for pH adjustment and targeted value to be maintained at the inlet of the aeration tank; indication of dilution needed for acid and dosage ranges required
- Specifications of temperature to be achieved at outlet of cooling tower and maintenance of cooling system.
- Guidance on chemical dilution, chemical dosage etc. for all chemicals to be used in ETP.
- Frequency for removal of sludge from bottom of sedimentation tank to be strictly maintained



Using standard operating procedures

What specific information to find in manual (examples, contd.)

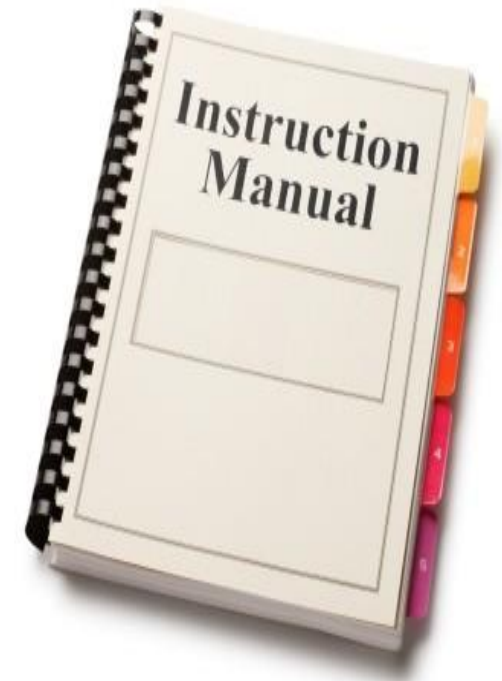
- Guidance on frequency of settling studies using jar tests and adjustment of chemical dosages
- Information on standard operating parameters for specific biological treatment (e.g. feed rate, rate of sludge recycle and rate of waste sludge extraction)
- Specification of minimum level of dissolved oxygen (DO) to be maintained in aeration system and how to control the same.
- Guidance on calculation of standard dosage of nutrients for maintaining proper microbial growth in aeration system (e.g. calculation of BOD: N : P ratio).
- Recommended remedial measure for dealing with foaming (e.g. by colour and type of foam)



Using standard operating procedures

What specific information to find in manual (examples, contd.)

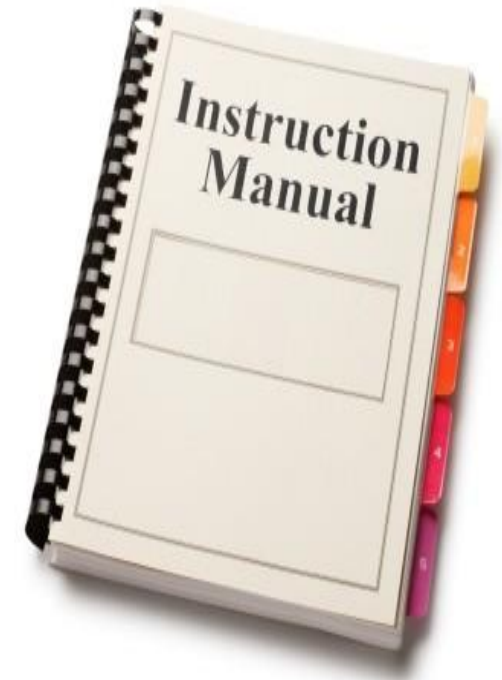
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Using standard operating procedures

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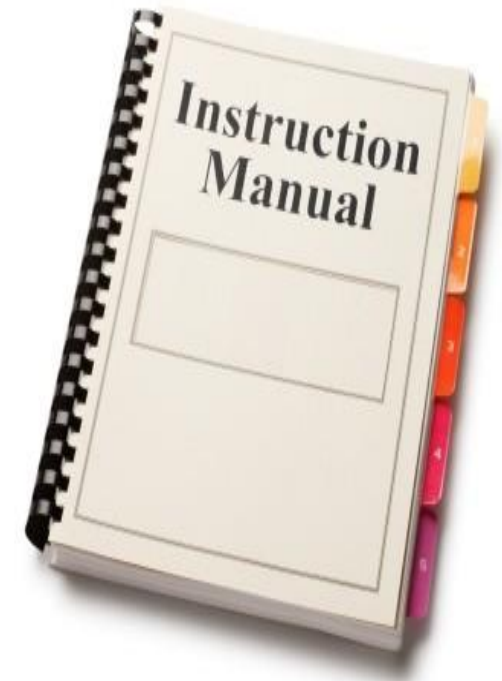
- Guidance on conditioning of sludge, if needed, including dosage, application and handling of conditioning chemicals.
- Instructions on how to check DO and calculate aeration requirement for returned sludge
- Instructions for monitoring and dealing with problems in sludge settling in secondary clarifier (e.g. sludge bulking, pin point floc, ashing of sludge)
- Specifications for management of excess sludge (e.g. concentration of sludge to be withdrawn from primary and excess sludge wasted from secondary treatment)
- Recommendations for maturation (e.g. days) and final disposal of sludge



Using standard operating procedures

What specific information to find in manual (examples, contd.)

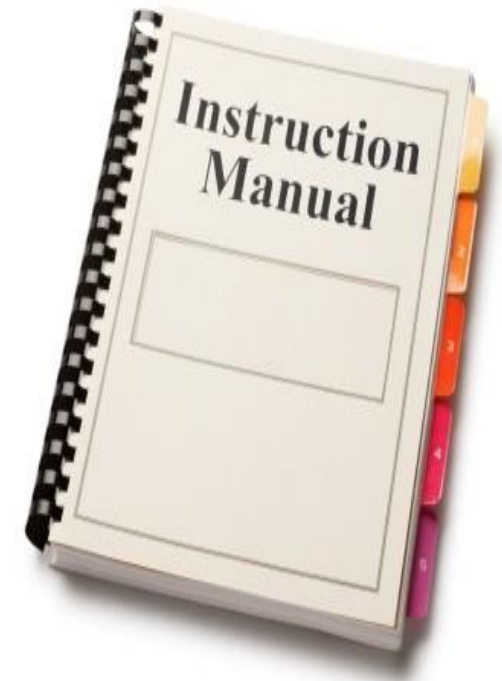
- Specification of laboratory monitoring and analysis protocols as well as testing methods for all specified parameters
- Instructions on safety precautions to be taken inside ETP (i.e. for cleaning of any tank containing effluent/sludge should be followed strictly) and personal protective equipment (PPEs) to be used at specified times.
- Instructions on laboratory safety precautions, including safe practices for handling of reagents and chemicals
- Preventive maintenance instructions (e.g. frequency of oiling & greasing for all the machinery; schedules for periodic maintenance, maintenance of specific records) .



Using standard operating procedures

Additional information in manual

- List of equipment suppliers and service representatives along with telephone number of service person
- Storeroom and spare parts inventory
- List of critical replacement parts for all equipment and their storage locations
- Contract information of suppliers for emergency sourcing
- Additional information from the manufacturer's O&M Literature, O & M manual, brochures, performance curves and other manufacturer's literature



To remember



- Good design and construction prerequisites for good ETP
- Good operation and performance of ETP depending on qualification and motivation of its staff
- ETP operator pivotal for 24-hour functioning of ETP
- ETP specific standard operating procedures providing guidance for all regular and extraordinary operational situations
- ETP standard operating procedures manual key reference for all ETP staff

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