OPERATION MANUAL OF

"AKHSHEYA ENTERPRISES"

SEWAGE TREATMENT PLANT

FOR

PROJECT:

CLIENT:

L & W CONSTRUCTION PVT LTD

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1. OBJECTIVE OF THE MANUAL

The standard operating procedure and maintenance of the treatment plants are important for achieving effective performance of the treatment plant. The principal objectives of this manual are to provide the following information:

- Description of the treatment process steps and the functioning of the treatment plant.
- Details regarding civil and mechanical components of the treatment plant.
- Providing detailed instructions for the start-up and shut down of the plant units.
- Guide lines for normal operation.
- Maintenance requirements for the different components to ensure smooth functioning of the plant.

The plant operators should familiarize themselves thoroughly with the content of the manual before handling the plant units.It is also recommended that the operation and maintenance manual may be made readily available in the plant at all the times, in a place i.e., easily accessible by all the concerned staff.

2. WATER QUALITY SPECIFICATIONS

2.1 SEWAGE SPECIFICATION

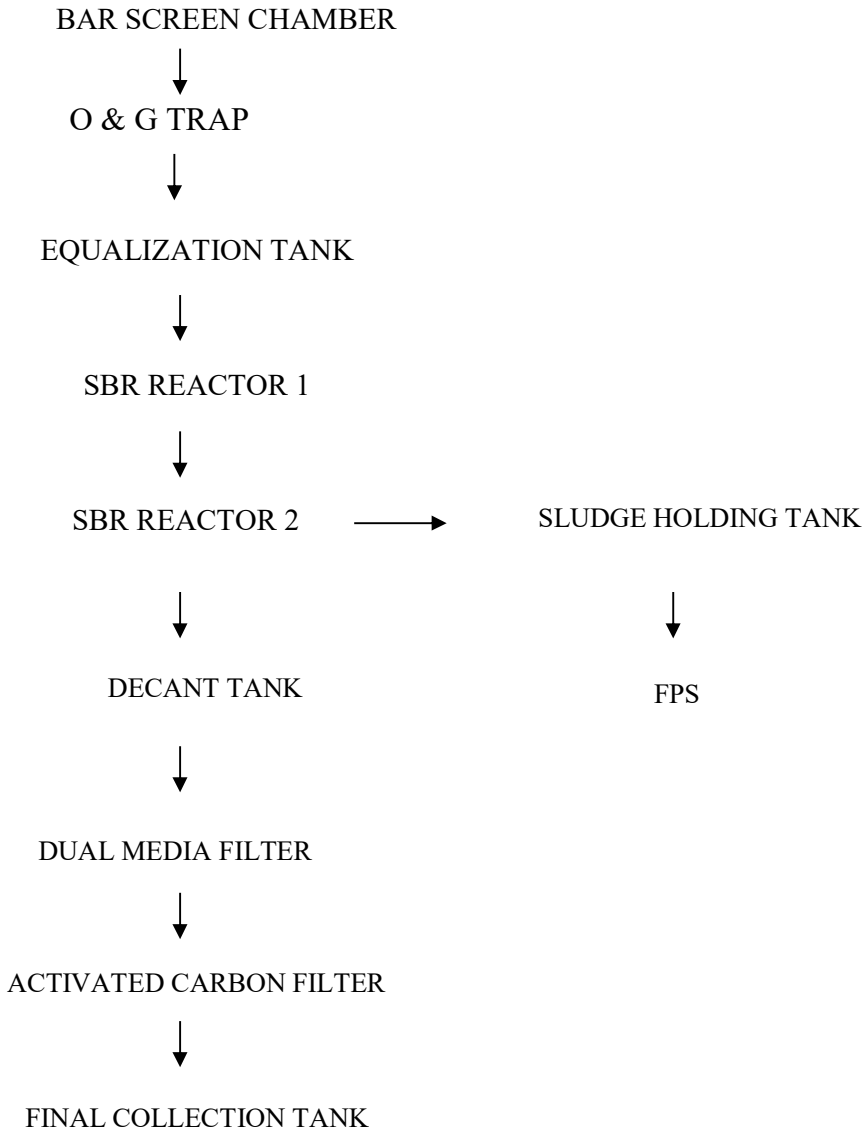
Raw Sewage quantity :	
BOD:	
COD:	
TSS:	
pH:	
O&G:	

2.2 TREATED WATER SPECIFICATIONS

BOD:	
COD:	
TSS:	
pH:	
O&G:	

3. TREATMENT PROCEDURE

(i) BLOCK DIAGRAM



(ii) TREAMENT METHODOLOGY

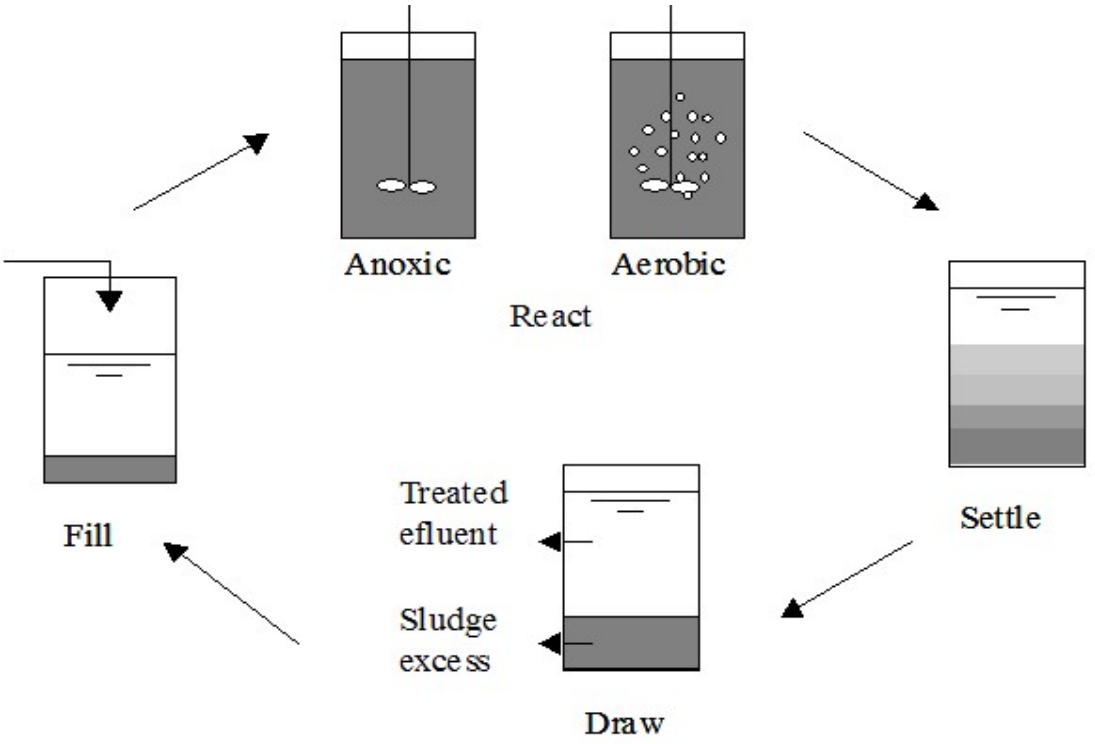
Sequencing Batch Reactor System is a fill and draw Activated Sludge System. SBR process uses high-efficiency oxygen transfer aeration equipment to satisfy the high-rate oxygen consumption requirement at the beginning of the "fill" and "aeration" cycles. SBR is efficient in carbonaceous pollutant removal, and is easily modified to satisfy nutrient removal of nitrogen (N) and phosphorous (P). Because the fill, aeration, settlement and draw take place in the same reaction tank, thus SBR tank itself also serves as the clarifier itself.

Sequencing Batch Reactor (SBR) Technology Advantages/Benefits

- Lower installed cost than "Conventional" methods.
- Less land space required for SBR treatment plants.
- Consistent high-quality, low nutrient level effluent.
- Tolerates wide swings in flow and organic loading.
- No clarifier required.
- Better control over filamentous growth and settling problems.
- Nutrient removal without chemicals - nitrification and de-nitrification, phosphate removal.
- Simple sludge process management.
- Less equipment to service and maintain.
- Existing plants can often be converted to SBR process.
- Less operator attention than "Conventional" processes.

The head works process is similar to that of activated sludge process, influent storage or equalization may not be required since the SBR tank itself can serve as a buffer tank and is able to take some kind of shock loadings. Sludge treatment processes are similar to that of a activated sludge system. However the treated effluent may need to be equalized to ensure the effluent quality is suitable for disposal or for further advanced treatment. The processes inside the Sequencing Batch Reactor system include the following:

- Fill - raw sewage or wastewater is filled into the SBR tank, can be mixed, or aerated
- React - aeration process for the carbonaceous organic pollutant removal
- Settlement - settling of sludge after the react
- Draw - the supernatant is decanted (withdrawn) from the tank for discharge or further treatment



the SBR process

Some major equipment used in Sequencing Batch Reactor System is:

- Pretreatment equipment: bar rakes, coarse and fine screens
- Fine bubble aeration systems: air blowers and diffusers
- Pumps for raw wastewater and treated effluent pumping
- SBR Decanters for drawing of supernatant from the tank after settlement
- Effluent disinfection systems

4. TECHNICAL DETAILS

(i) CIVIL CONSTRUCTIONS

Bar Screen Chamber & O & G trap	
No. of Units	.
MOC	

Equalization Tank	
No. of Units	.
Dimension	
MOC	

SBR Tank-1	
No. of Units	.
Dimension	
MOC	

SBR Tank-2	
No. of Units	
Dimension	
MOC	

Decant Tank	
No. of Units	.
Dimension	
MOC	

Treated Water Tank	
No. of Units	
Dimension	
MOC	

Sludge holding Tank	
No. of Units	.
Dimension	
MOC	

(ii) ELECTRO-MECHANICAL DETAILS

Bar Screen	
No. of Units	.
MOC	
Make	

Raw sewage Pumps	
No. of Units	
Capacity	
Model No:	
Make	

Coarse Air grid	
Quantity	
Type	
Make	

Fine Bubble Diffusers	
Quantity	
Type	
Make	

Air blower	
No. of Units	.
Capacity	
MOC	

Blower Motor	
No. of Units	
Capacity	
Make	

Sludge transfer Pumps	
No. of Units	
Capacity	
Model No:	
Make	

Filter Feed Pumps	
No. of Units	
Capacity	
Model No:	
Make	

Decanting Valve	
No. of Units	
Size	
Model	
Make	

Dosing Pump	
No. of Units	
Capacity	
Model	

Multi Grade Filter	
No. of Units	
Size	
MOC of vessel	
Make	

Activated Carbon Filter	
No. of Units	.
Size	
MOC of vessel	
Make	

Filter Press	
No. of Units	.
Dimensions	

Screw Pump	
No. of Units	.
Capacity	
Make	

5. CHEMICALS REQUIRED FOR STP

Following are the chemicals required for the satisfactory operation of the sewage treatment plant:

- **Nutrient/ Bio-Culture**– It is used for better growth of the microorganisms in the aeration tank and hence helps to maintain MLSS.
- **Disinfectant** – This is added in tertiary treatment step to disinfect treated water and to reduce traces of organic matter present.
- **DWPE** – Solid liquid separation in FPS

6. PLANT START UP & SHUT DOWN PROCEDURE

(i) PLANT START UP PROCEDURE

- The sewage is screened for solid matter in the bar screen chamber.
- The sewage is passed though equalization tank and then pumped to the aeration tank.
- In the initial stage, if the seeding is not sufficient, cow dung solution or bio culture powder has to be added to the aeration tank, to generate sufficient quantity of seeding and to stabilize the plant.
- Start the blower and ensure the flow through aerators.
- To develop MLSS (Mixed Liquor Suspended Solids) in aeration tank, add fresh cow dung slurry about 10% of the volume of aeration tank.
- To develop MLSS in the aeration tank, jaggery & Biocultures used as nutrients.
- Monitor MLSS & DO (Dissolved oxygen) in aeration tank.
- Maintain MLSS value of 3000-4000 mg/l.
- It is recommended not to stop the aerator.
- From the aeration tank, the wastewater is pumped to the settling tank.
- Each blower should run for every 4 hrs and a break of 0.5 hr should be given before starting it again.
- The sludge will settle at the SBR tank and the clear supernatant is passed to decanter tank.
- Open the necessary valves at Dual media filter (DMF) for normal operation of filters and then start the PSF feed pump.
- Each pump should run for every 2 hrs and the entire load should not be taken by one pump.
- while operating the filter unit if the pressures drop from initial pressure to final pressure is of 0-2 Kg/cm^2, this indicates the exhaustion of filters and back washing is recommenced.
- Similarly other filter (activated carbon filter) shall be operated with the same procedure.
- The back –wash of the filters shall be fed to the equalization tank.
- The clear treated water shall be stored in the final collection tank.
- The treated water is disinfected and used for gardening/ road wash etc.
- The sludge from the settling tank is dried with the aid of filter press. The dried sludge

is to be removed periodically.

(ii) BACK WASHING PROCEDURE

Step by step procedure for Filter backwashes:

- Ensure that water is present at the TWT tank.
- Open the Air Vent Valves.
- Position the Multiport Valve (MPV) in back wash position.
- After 15 minutes stop the back wash water pump and position the multiport valve to rinse and start the feed pump.
- After few minutes, position MPV to filter position to get filtered water.
- Please ensure that MPV is not operated when the feed is running.

PLANT SHUT DOWN PROCEDURE

(i) Normal Shutdown Procedure for Sewage Treatment Plant

- Stop the raw sewage.
- Stop aeration tank motor.
- Stop all motors and close delivery valves.
- Stop pumps and close suction valves.
- Stop the DMF and ACF pump and close the delivery valve.
- Stop the disinfectant-dosing pump.
- Allow all sludge to pass to sludge drying bed and close recirculation valve to aeration tank.

(ii) Plant shut down – Emergency

- Stop all the pumps/motor in sequence.
- Close all the inlet valves and collect raw effluent in equalization tank.

7. PLANT OPERATION GUIDE LINES

(i) Log sheet

- A log sheet should be maintained to monitor the plant operation and to document daily events.

(ii) WASTE WATER QUALITY ANALYSIS

- Regular analysis of the treated water from the plant is necessary to assess the process performance.
- The treated water characteristic is to be analyzed as per the PCB Guidelines.
- If the treated water standards are not matching with PCB norms then ensure inlet sewage characteristics and make sure that there is no shock load generated from the process side.

EQUIPMENTS

(iii) Bar Screen

- The collected course solids on the upstream side are manually removed frequently with the mild steel rakes to ensure free flow of sewage.

(iv) Pumps

- Dry running of the pumps should be avoided.
- Ensure that direction of the motor agrees with the arrow of the pump and the pump is rotating freely by hand.
- Ensure that there is sufficient grease / oil in the cup.
- Check the voltage and it should be $\pm$5% of motor rated voltage.
- Pumps should be operated only within the recommended range on the head verses discharge ratio of the pumps.
- Pumps are started with delivery valve closed, otherwise the load on the motor at the time of starting is more.
- Delivery valves should be operated gradually, to avoid surges.
- While stopping the pump. The position of the delivery valve should be as at the time of pump starting.

(v) Motors

- Motors should be kept free from dust, oil and moisture.
- Make sure that rated supply voltage is reaching the motor terminal.
- Make sure that motor is not over loaded.
- See that there is no break in the cables and all the terminals are clean and tight.

- Keep the motor clean and cool.

8. MAINTENANCE OF TREATMENT UNITS

(i) PUMPS

- Check leakages through gland packing daily.
- Check for any under noise or vibration of the pump
- Check the oil/ grease level as per lubrication schedule.
- Recommended lubricants shall be used as directed by the equipment supplier.
- Clear & oiling of the gland bolts to be done once in 2 months.
- Clearing & examination of all bearings and shaft sleeves to be checked once in a six month.
- Impeller herbs and vane pits should be examined for any pitting or erosion once in six month.

(ii) MOTORS

- Motor should be kept free from dust, oil & moisture.
- Make sure that rated supply voltage is reaching the motor terminal.
- Make sure that motor is not over loaded.
- See that there is no breaks in the cables and all the termination are clean & tight
- Keep the motor clean & cool.

(iii) GENERAL MAINTENANCE

- Periodic inspection is recommended during shut down or other occasion and care is taken to service without delay.
- Rectify leaking valves and joints immediately by tightening the loosened bolts, changing sealing joints and replacing gland packing when required.
- Whenever nut & bolts is against rubber, use rectangular plate washer and tightening down does not cause washer to rotate.
- The bearing should be lubricated once a month.
- Use correct grade grease in oils.

(A) MAINTAENANCE TIME TABLE

(i) Monthly Maintenance

Pump and blower noise and its foundations.

All piping connections.

Clean the suction of blower.

Clean the diffusers if clogged.

(ii) Yearly Maintenance

- Replace gland packing if worn out.
- Replace all worn out parts.
- Replace wear plates if worn out.
- Replace gaskets if required.
- Check all electrical cabling and it's earthing.

(B) WARRANTY CERTIFICATE

- **Bar Screen – 1 No.**
- **Raw Effluent Pumps –2 Nos.**
- **Air Blower – 4 Nos.**
- **Blower Motor – 4 Nos.**
- **Sludge transfer Pumps- 2 Nos.**
- **Filter Feed Pumps – 2 Nos.**
- **Dosing pumps – 2 Nos.**
- **Dual media Filter – 1 No.**
- **Activated Carbon Filter – 1 No.**
- **Filter Press – 1 no.**
- **Screw Pump- 1 No.**