2030
FOP DEVELOPMENT GROUP

MX-30™ WWT Plant Description

Society of
SAME
American Military Engineers

1 Packaged Plant

Each self-contained unit is fabricated from ¼" thick structural steel plate, it is sandblasted and coated with epoxy paint for long lasting life as demonstrated by over thirty such plants installed in the seaside humid Florida environment.

The plant design allows for easy transportation, delivery and installation. Typically, each unit will be installed above ground on a concrete pad or compacted, level sand. Below ground installation are very common. Because each self-contained unit operates independently and the process is completely modular, units can be added or removed to increase or decrease capacity if and when required. Ideal for fluxuating troop deployment and training.

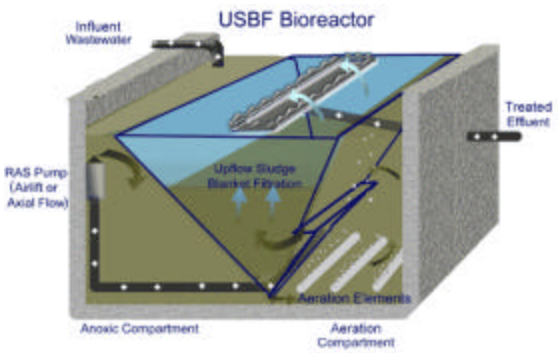
Three 30,000 gpd modular units (treatment for approximately 1,800 troops)

2 Headworks

The plant headworks consist of an equalization tank, which is an integral part of the package plant, provided with a removable basket screen and with duplex type influent pumps. Controlled by float switches and a timer override, the influent is pumped from the equalization tank into the anoxic compartment of the bioreactor.

3 Biological Treatment

Biological treatment takes place in the USBF™ bioreactor. Raw sewage enters the anoxic compartment where it is mixed with activated sludge recycled from the bottom of the sludge blanket filter by an airlift pump. A submersible mixer ensures adequate mixing and keeps the solids in suspension. From the anoxic compartment the mixed liquor flows to the aerobic compartment, which is equipped with fine bubble aeration diffusers. Aerated and moved in a plug flow manner, it eventually enters the bottom of the upflow sludge blanket filters.



The mixture of microbial cells and water enters the filter at the bottom and, as it rises, upward velocity decreases until the flocs of cells become stationary and thus form a filtering media. A high degree of filtration efficiency is achieved as colloid and very fine particles are filtered out. As the flocs become large and heavy, they descend to the bottom and subsequently are recycled back into the anoxic zone. Upflow sludge blanket filtration has a substantially higher specific rate of separation than sedimentation. In addition, the technology accommodates high peak flows and flow swings in a self-regulating manner – the higher the flow, the higher the sludge flocs rise and the larger the filtration area becomes.

USBF™ eliminates the most commonly encountered problem of the conventional biological package plant – gravity separation. Clarified treated effluent is collected in a trough on top of the sludge blanket filter and flows by gravity to disposal.

4 Nutrient Reduction

Nitrogen is removed by nitrification and denitrification processes. Nitrification is autotrophic and all USBF™ integrated bioreactors are designed for complete nitrification of ammonia to NO_3. Denitrification however, is heterotrophic and requires carbon source. Conventional plants' "separate-sludge denitrification" requires that carbon is added, typically in the form of methanol. This adds to operating costs, and if used in excess, it increases effluent BOD_5 content. USBF™ technology's "single-sludge denitrification" approach uses an endogenous carbon source to maintain the denitrifiers. Influent is combined with nitrified mixed liquor in the anoxic compartment providing the carbon source needed for denitrification. Relatively high nitrified mixed liquor recycle rates are employed and sufficient denitrification retention times provided. Total nitrogen reduction to below 10 mg/l is readily achieved.

The USBF™ technology delivers not only high efficiency of organic matter reduction, but also increased efficiency of phosphorus removal by biological phosphorus uptake. The mechanics of biological phosphorus uptake, known as "luxury uptake", is due to exposure of activated sludge to alternating oxide and anoxic conditions. Under the conditions, the cells store more energy in the form of phosphorus than needed for their survival. If strictly oxide conditions are maintained during subsequent clarification, phosphorus will be retained by the cells and it will be removed with excess sludge. Unlike most other methods of clarification, the sludge blanket filtration process maintains oxide conditions in the clarifiers, and phosphorus reduction by biological uptake to 2-3 mg/l is achievable.

5 Waste Sludge Management

Since the age of activated sludge in the bioreactors is in excess of 25 days, less excess sludge is generated, it is stabilized and its dewatering characteristics significantly improve. Waste sludge is thickened in the sludge pre-thickeners to approximately 1.5-2% d.s., and then periodically pumped by pre-thickener pumps to the sludge holding tank. The tank is provided with coarse air spargers for aerobic post-stabilization should it be required.

6 Air Management

Air is required for the biology (in the fine bubble aeration diffusers), the equalization tank, the sludge holding tank, and for the RAS air-lift pumps. It is supplied by two positive displacement blowers (one duty, one standby). The blower/motor assembly is factory mounted on a steel base plate within a weatherproof and sound attenuating enclosure.

7 Operation and Maintenance

One of the inherent advantages of the USBF™ treatment process technology is its design and operational simplicity. The design incorporates a minimal amount of motorized equipment and moving mechanical components which minimizes power consumption and maintenance. For a plant this size, an experienced operator would typically visit the plant a few times a week (total of approximately 10-12 hours per week), to perform routine O&M tasks such as sampling wastewater and recording data, logging equipment hours, wasting sludge, general plant clean-up and periodic equipment maintenance.

8 Plant Visual Impact, Odor and Noise

Wastewater treatment plants are often located in the close proximity of base housing and frequented areas. Plant visual impact, odor and noise issues are therefore of importance. Aerobic conditions throughout the bioreactor and the extended sludge age eliminate or dramatically reduce odor. USBF™ plants have been located within populated areas without any odor issues including on a residential lot between houses. Installations can be above or below ground.

9 Delivery

Subject to equipment availability and fabrication shop space at the time of order, the equipment and components can be delivered within approximately 8-12 weeks from the date of the Purchase Order.

10 Shipping

The design of the self-contained packaged plant allows for easy transportation and delivery by truck, trailer and crane method. All additional equipment and components are shipped in place or loose within the tank. They can easily be removed by hand, forklift or crane upon delivery/installation.