



USBF™ (UPFLOW SLUDGE BLANKET FILTRATION)

PROCESS SUMMARY

THE PROCESS

With a proven 30-year, award winning track record and over 100 installations within North America alone, operation of a USBF™ plant is both simple and self-regulating. Wastewater enters the anoxic compartment of the bioreactor where it mixes with activated sludge recycled from the bottom of the sludge blanket filter. Agitated and moved in a plug flow manner, the mixed liquor flows into the bioreactor's aerobic compartment. After aeration, a stream of the mixed liquor enters the bottom of the sludge blanket filter where the sludge flocs and water are separated by upflow sludge blanket filtration. After separation, filtered effluent overflows into a collection trough and is discharged from the system. To complete the internal gravity circulation loop, activated sludge collecting at the bottom of the sludge blanket filter is recycled back into the bioreactor anoxic compartment.

THREE FEATURES THAT INCREASE EFFICIENCY AND REDUCE COSTS

1. Sludge Blanket Filter

The upflow sludge blanket filter introduces a substantially higher specific rate of separation than other commonly used separation techniques. Unlike conventional clarifiers, influent enters at the bottom and flows upwards. As the cross sectional area increases, the upflow velocity decreases until the activated sludge flocs become stationary and thus form a filtering media for activated sludge flowing through. High filtration efficiency is achieved and even particles with settling velocities too low to be removed by settling alone are filtered out.

2. High Sludge Concentration

Most traditional plants operate at low or medium sludge concentrations, typically 2,500 – 3,500 mg/l. USBF™ process by contrast operates at higher sludge concentrations, typically 4,000 – 6,000 mg/l resulting in longer sludge age and increased biological efficiency.

3. All Processes Integrated into One Bioreactor

Most conventional technologies carry out processes of nitrification, denitrification, clarification and sludge stabilization in a number of dedicated vessels. By contrast, USBF™ process incorporates these processes inside a compact bioreactor, reducing equipment size and liquid handling requirements.

BENEFITS

High Treatment Efficiency Including Biological Nutrient Removal (BNR)

The USBF™ process features an internal anoxic compartment for biological reduction of nitrogen and phosphorus by nitrification, denitrification and 'luxury uptake' processes respectively.

Alkalinity Recovery & Filamentous Bacteria Control

The integral denitrification process facilitates partial recovery of alkalinity during nitrification. As well, the anoxic selector is used to control filamentous bacteria growth within the system.

No Primary Clarification

USBF™ process does not require primary clarification prior to biological treatment. A proper screening facility and for larger plants, grit removal system is all that is required upstream of the bioreactors.

Hydraulic Flexibility

The sludge blanket filter prism or cone shape not only allows other treatment processes to take place around it, but it also facilitates superior hydraulic flexibility. The process easily accommodates high peak flows and flow swings in a self-regulating manner; the higher the flow, the higher the sludge blanket rises and the larger the filtration area becomes.

Small Footprint with Modular and Flexible Design

Modularity of design allows owners to stage plant development and ensures that plants can be quickly expanded if and when growth demands. Plant designs can range from 5,000 gpd to over 6 MGD. The overall small footprint is ideal for retrofitting on existing sites and provides extreme flexibility for clients with land constraints.

Reduced Operating and Maintenance Requirements

The compact design, minimal amount of moving parts and self-regulating hydraulics result in reduced supervision requirements, contributing to lower operating and maintenance costs.

Reduced Site Requirements

USBF™ process incorporates nitrification, denitrification, clarification and sludge stabilization into a compact bioreactor which reduces equipment size and liquid handling requirements and ultimately leads to a smaller plant footprint.

No Odor

Aerobic conditions throughout the bioreactor and extended sludge age eliminate or dramatically reduce odor. USBF™ plants can be located within populated areas without odor concerns.

Improved Sludge Characteristics

Low microbial loading (extended sludge age of 25-35 days) produces less excess sludge, which is aerobically stabilized, and which is characterized by improved structure and better dewatering capability.

Installation Timeline

Once permitted, an "inside the fence" turnkey facility with flows of 1 MGD and lower can be operational within 120-150 days. Allow 60-90 days more for larger (2-6 MGD) plants.

APPLICATIONS

Municipal and Domestic Wastewater

Literally, thousands of site constructed and packaged USBF™ treatment plants serving municipalities, military installations, communities, subdivisions, ski resorts, shopping centers, summer resorts, golf courses, hotels, restaurants etc. are in operation worldwide.

Water Reclamation

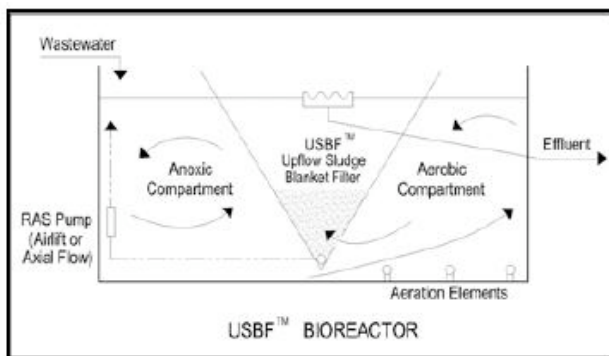
The USBF™ process is capable of removing BOD₅ and TSS to less than 5 mg/l without post-filtration, Total Nitrogen reduction to less than 6 mg/l and Total Phosphorus removal to about .4 mg/l. (The reduction of total phosphorus to less than requires additional chemical precipitation). This high efficiency of the continuous flow USBF™ process paves the way to economical 'tertiary' post-treatment. Using the USBF™ process followed by membrane, sand or microscreen filtration, and UV disinfection, FOP-ECOfluid designs, builds and operates treatment plants producing Class A (Chesapeake Basin or California's Title 22 standards), for reclaimed water quality effluent at economical capital and operating costs.

Existing Plant Retrofits

The self-contained nature of the internal circulation loop and structural independence of the sludge blanket filter insert make it possible that virtually any tank can be converted to a wastewater treatment plant. Many existing RBC's, oxidation ditches and other plants have been retrofitted with USBF™ filters to increase treatment efficiency and/or plant capacity.

Industrial Wastewater

Many plants treating high strength industrial wastewater including food processing plants, slaughterhouses and rendering plants, dairy plants and pulp mills have been designed and are in successful operation worldwide.



CONTACT INFORMATION

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