

# Orbal® Aeration System McMinnville, OR

## Removal Efficiency

BOD – 98.8%  
Nitrogen – 74.2%  
Phosphorus – 99.2%

## Design Criteria

Average Flow – 6.2 MGD  
Peak Flow - 30 MGD  
BOD Load – 9,928 lb/day  
TKN Load – 1,293 lb/day  
P Load - 341 lb/day

The Orbal® process was selected for this municipal wastewater treatment plant expansion in 1992 because of its energy efficient biological nutrient removal capabilities. The Orbal® is a series of concentric channels, with wastewater passing through the channels in series. The treatment process includes fine screens, grit removal, the Orbal® process, Tow-Bro® clarifiers, tertiary clarifiers, and tertiary filtration.

Different combinations of aerator speed, disc immersion, and disc location were tested at McMinnville to determine the optimum system configuration. Once these initial adjustments were made, the system maintains the conditions necessary for biological nutrient removal with little operator attention other than an occasional speed adjustment of one of their four (4) aerators. The disc aerators in the outer channel are operated at 29 rpm to keep the channel contents mixed while adding very little oxygen. Passing through the severe oxygen deficit in the outer channel results in absorption of phosphorus into the biological solids when the mixed liquor passes to the aerobic inner channel. About 59% of the system AOR is satisfied in the middle channel, but the organic load on the system is high enough that the dissolved oxygen concentration in the middle channel remains anoxic, resulting in simultaneous nitrification and denitrification with significant power savings.



Typical Operating Data - July/August 1998

Parameter	Influent	Effluent
Flow, MGD	3.1	3.1
BOD mg/l	160	2.0
TSS, mg/l	205	1.1
NH <sub>3</sub> , mg/l	15	0.03
TKN, mg/l	24	0.7
NO <sub>3</sub> , mg/l	--	5.5
TP, mg/l	5	0.04 - *

\*Final clarifier effluent is typically <0.1 mg/l. Alum is added in the tertiary clarifiers to further reduce phosphorus concentrations.

Siemens  
Water Technologies  
1901 South Prairie Avenue  
Waukesha, WI 53189  
800.524.6324 toll-free  
262.547.0141 phone  
262.547.4120 fax  
[www.siemens.com/water](http://www.siemens.com/water)

Orbal is a trademark of Siemens, its subsidiaries or affiliates.

The information provided in this literature contains merely general descriptions or characteristics of performance which in actual case of use do not always apply as described or which may change as a result of further development of the products. An obligation to provide the respective characteristics shall only exist if expressly agreed in the terms of the contract.

©2008 Siemens Water Technologies Corp.  
EN-MCMINNVILLE-DS-0908  
Subject to change without prior notice.