



The Boat[®]

intra-channel clarifier

Reduce Capital, Energy, and O&M Costs

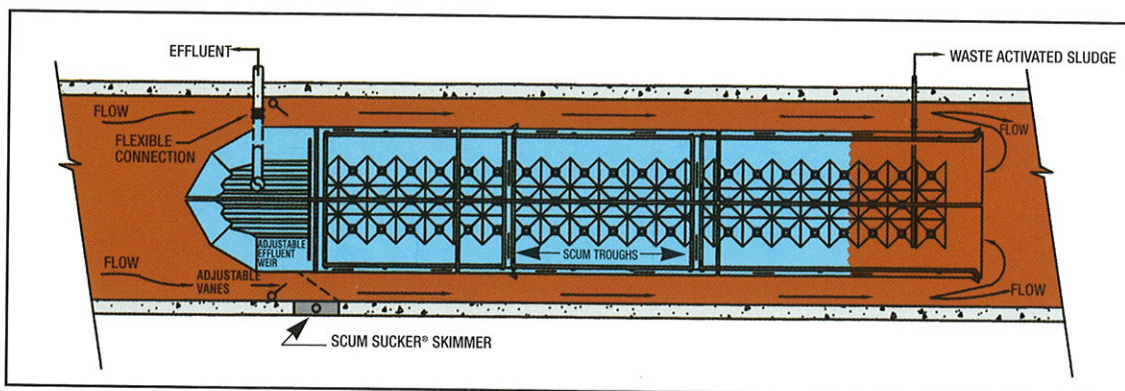


Figure A

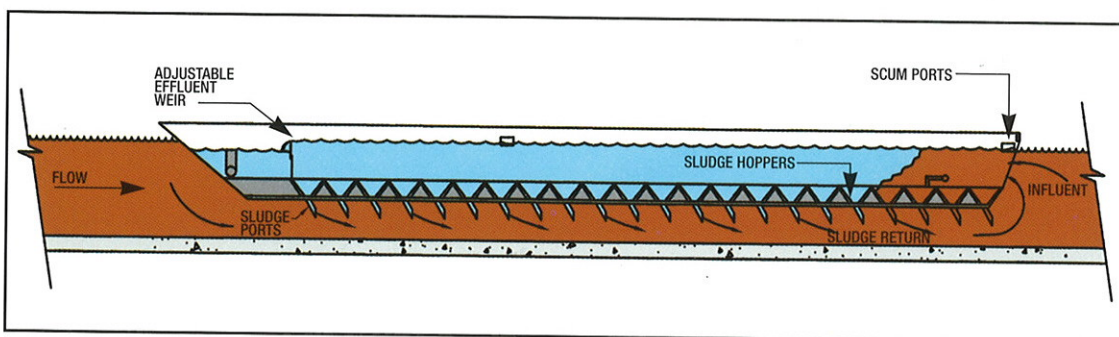


Figure B

This patented system eliminates most of the mechanical equipment associated with external clarifiers, such as scrapers and return sludge pumping systems. In addition, the **BOAT®** intra-channel clarifier does not require any modifications to the conventional structure of an oxidation ditch. Figures A&B illustrate how this unique clarification system functions within an oxidation ditch.

Any conventional aeration/mixing system which produces a horizontal velocity can be utilized with this clarification system. Plants throughout the world have utilized various types of aeration/mixing systems, such as brush rotors, vertical turbine aerators, and propeller/ diffuser systems.

Sludge is returned to the oxidation ditch through ports located on the bottom of the clarifier. The head differential used to remove the sludge is created by the increased velocity of the wastewater flowing in the ditch beneath and

around the clarifier. A semi-thickened sludge can be removed from the stern of the unit by gravity and transported to any dewatering system. Sludge wasting can also be accomplished by using the **SAC™** Sludge Age Controller system. This proprietary device removes the proper amount of mixed liquor on a continuous basis in order to maintain a constant sludge age, even under fluctuating hydraulic and biological loadings. The **SAC™** Sludge Age Controller system also thickens the sludge prior to disposal. This unique device has been effectively utilized in conjunction with the **BOAT®** intra-channel clarifier.

Adjustable vanes are mounted near the bow of the clarifier and are positioned in the flow of the oxidation ditch. These vanes control the amount of liquid which flows under the clarifier and, therefore, the amount of suction from each sludge port. These vanes are pre-adjusted in the field prior to start-up.

Foam, scum, and other floatable debris are continuously removed from the **BOAT®** intra-channel clarifier. This is accomplished through a series of troughs which traps all of the surface materials and transmits the waste to the stern of the clarifier. The debris exits the clarifier through ports located alongside the unit. All of these troughs can be easily cleaned by using the self-contained washdown system that is built into each clarifier. All floating debris in the oxidation ditch can be removed by gravity by using a device called the **SCUM SUCKER™** skimmer. This optional system is non-mechanical and can be mounted in the wall of the oxidation ditch.

The **BOAT®** intra-channel clarifier is fabricated in stainless steel. This eliminates the need for field painting and preventative maintenance in the field, due to the corrosive environment.

Attractive Installations . . . With Proven Effectiveness!

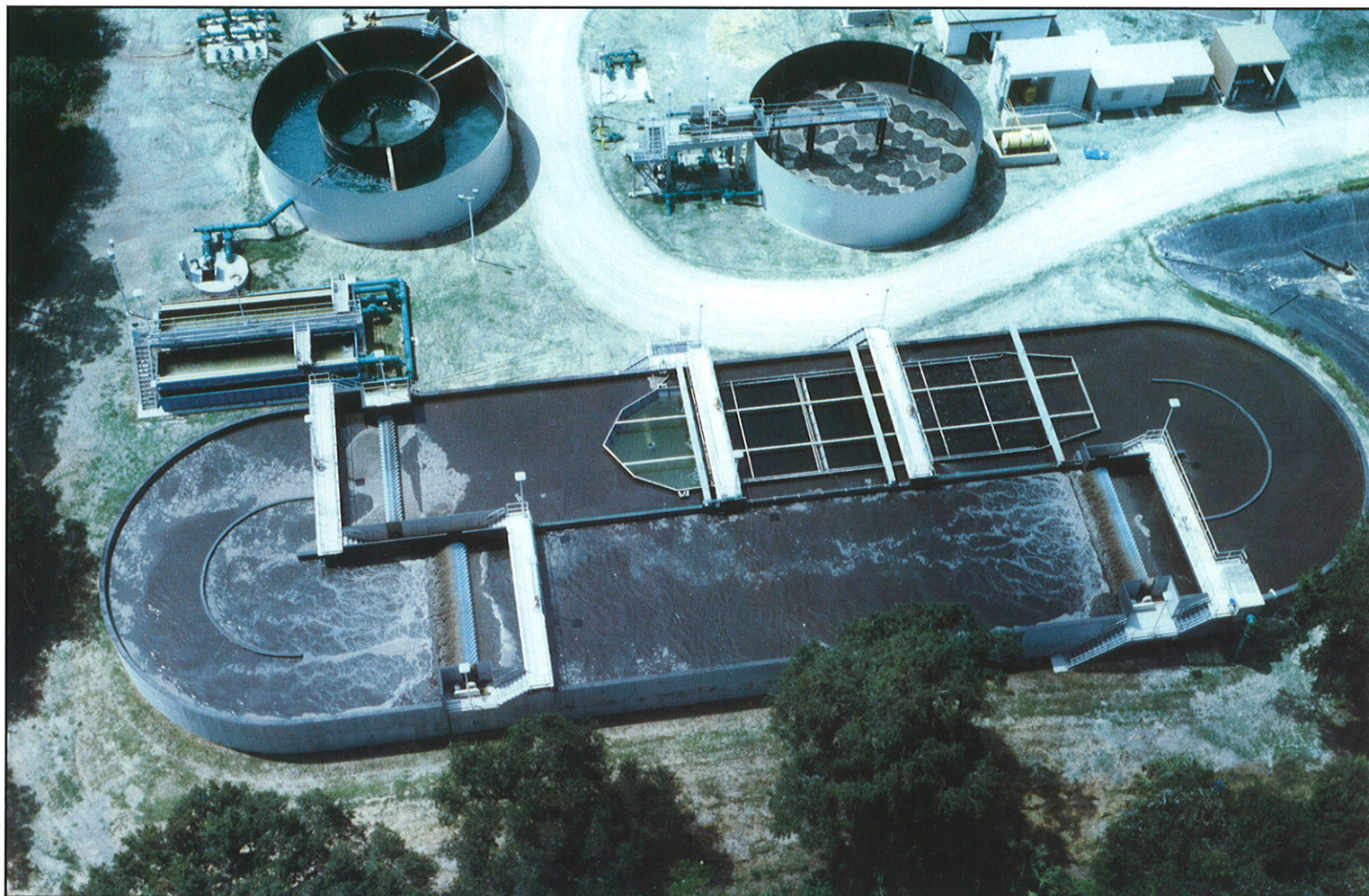


Figure A

A private utility company in Florida owned and operated an old package plant which could not longer meet the stringent effluent requirements. The old system was replaced with an oxidation ditch and the **BOAT**® intra-channel clarifier. Tanks from the existing plant were utilized for sludge digestion and effluent disinfection, thereby reducing the overall plant cost. Chlorine is injected in the bow of the clarifier, thereby resulting in the green color seen in the photograph.

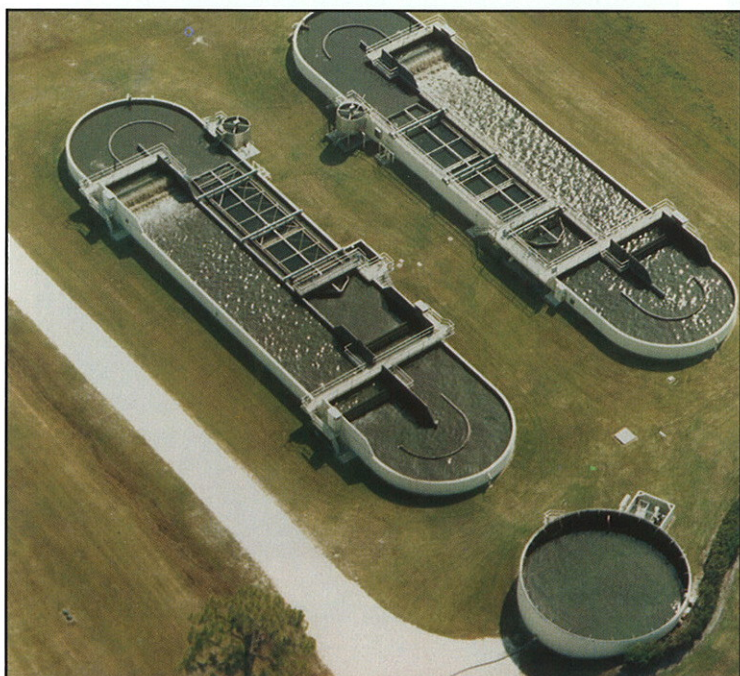


Figure B

This treatment plant in Sarasota Florida was the first treatment plant in the United States to use a **BOAT**® intra-channel clarifier with brush rotor aerators. When the first unit reached design capacity, a second unit was constructed. This facility won the prestigious Phelps Award for the best effluent reuse treatment plant in Florida. This facility also utilized the **SAC**™ Sludge Age Controller system which maintains a constant sludge age, even under fluctuating hydraulic and biological loads. These units are mounted alongside of each ditch and waste the proper amount of mixed liquor on a continual basis, thereby eliminating the manpower requirements normally associated with this function. These stainless steel units also thicken the sludge prior to wasting.

Installation Is A Breeze!



Figure A

The **BOAT®** intra-channel clarifiers are fabricated as complete units in the shops. After fabrication, the larger clarifiers are disassembled into sections for shipment.

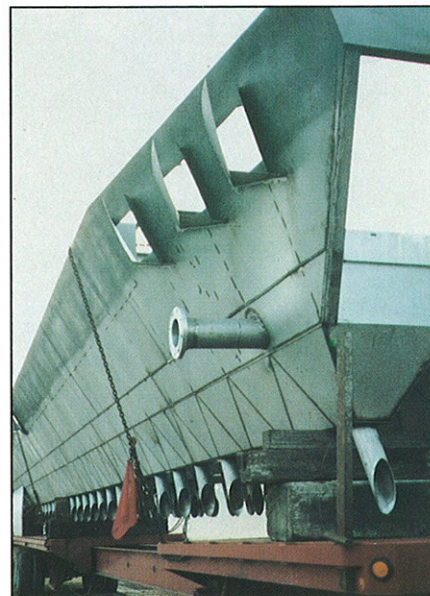


Figure B

Each of these structurally designed sections is lifted onto flatbed trucks and shipped to the jobsite.



Figure C

Once the sections arrive on the jobsite, the contractor lifts each unit of the truck and places it on wooden cribs on the floor of the ditch.

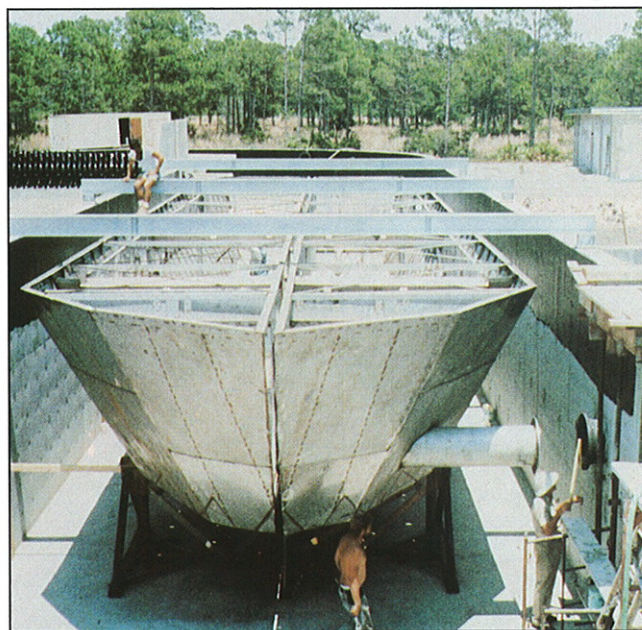


Figure D

The sections are bolted and gasketed together and suspended from the hot-dipped, galvanized support beams. Thus, complete assembly can be accomplished within a few hours. All bolts, gaskets, and silicon required for proper installation are shipped with the clarifier.

Completely Assembled In A Few Hours



Figure E For smaller facilities, the clarifiers are shipped to the jobsite as a single unit. Thus, each unit can be easily lifted off the truck and suspended in the ditch.

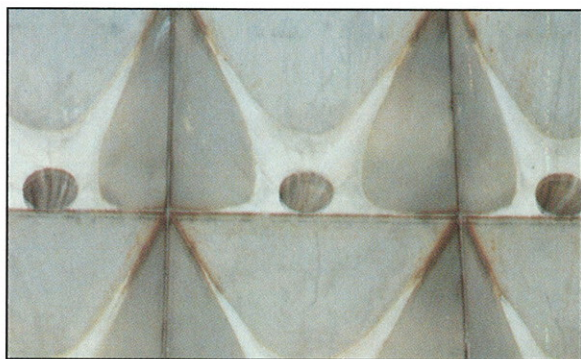


Figure G The contractor places a small amount of grout in the bottom of each hopper, when stainless steel ports are utilized.

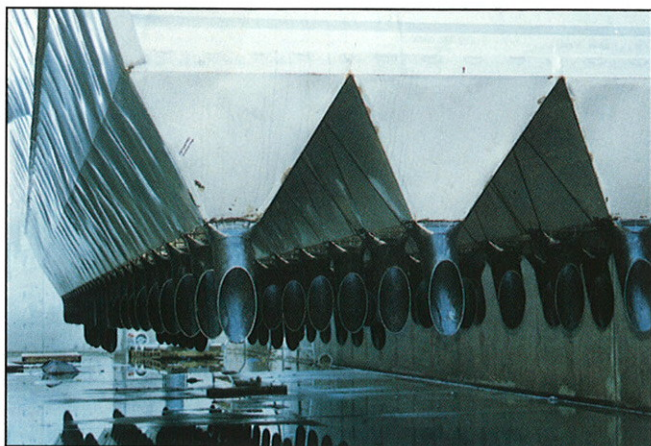


Figure H Some units utilize plastic inserts which include large diameter ports.

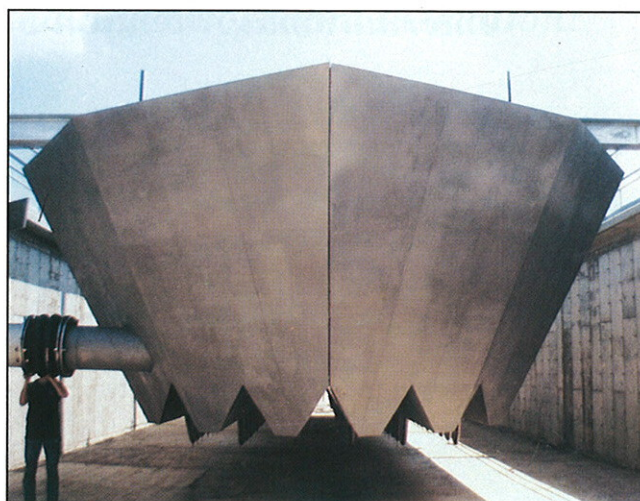


Figure F Once the clarifiers are suspended from the support beams, flexible connections are used to connect effluent and waste-sludge lines to the pipes in the wall of the aeration basin.



Figure I The end of the oxidation ditch can be left open to allow trucks and cranes to drive into the basin for easy installation. The existing treatment plant can be kept in operation while the new facilities are under construction. The oxidation ditch and **BOAT**® clarification system can also be incorporated with a unique odor control system, which is especially important when homes are in close proximity to the plant site.



Ports

International Attention Focuses on Award-Winning Facilities

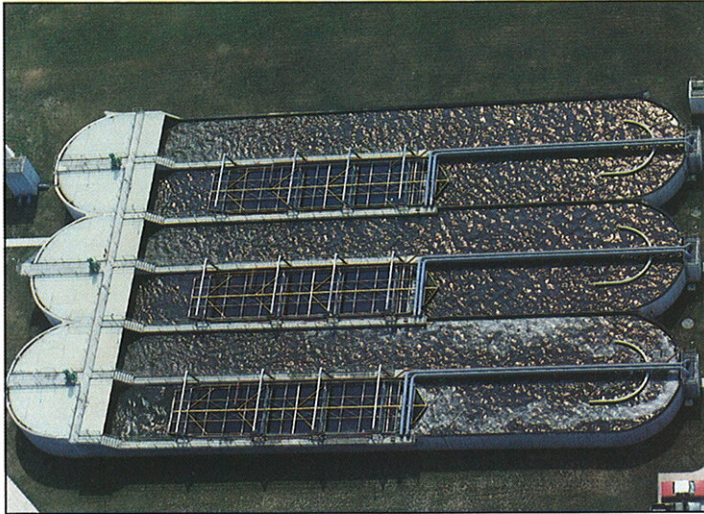


Figure A U.S. Environmental Protection Agency's Award of Excellence, Region 6 – 1989 and 1992

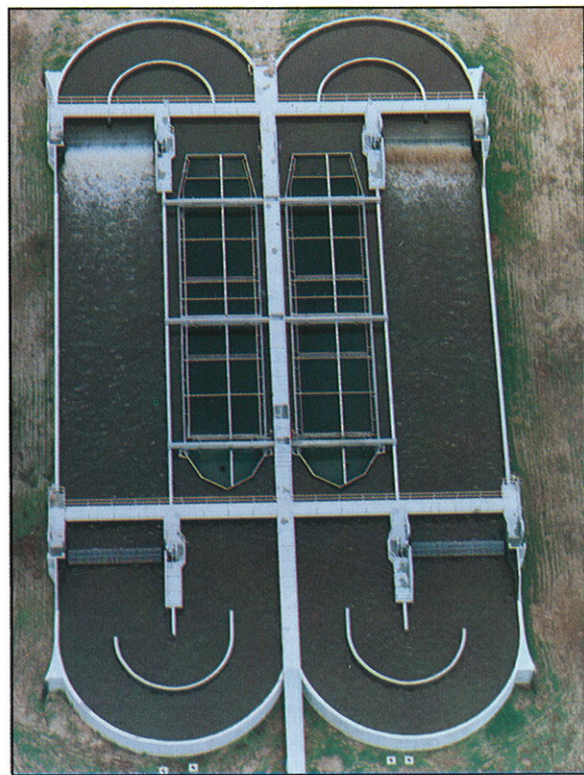


Figure C Water Environment Federation's – National Plant Tour, 1992

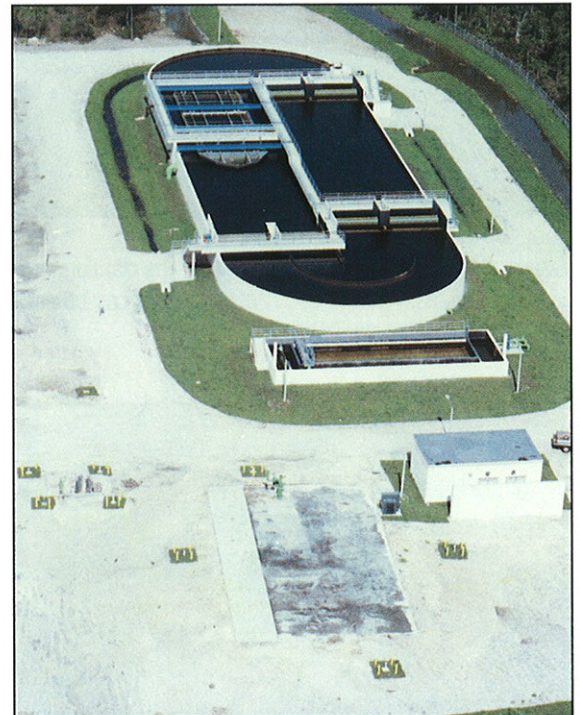


Figure B American Society of Civil Engineers (ASCE) – Outstanding Civil Engineering Regional Design of the Year, 1988

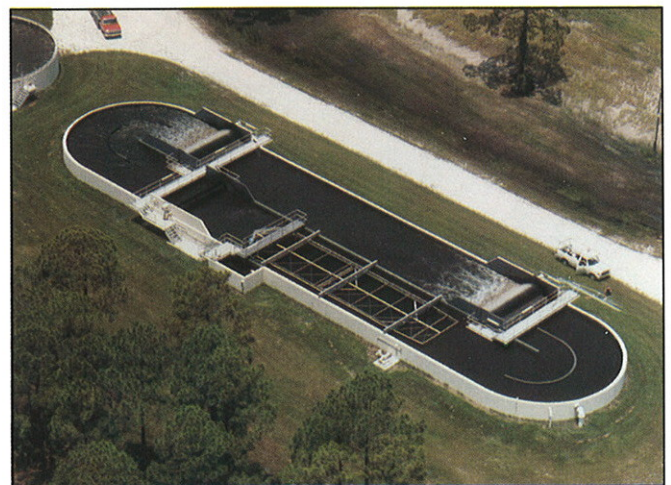


Figure D The Phelps Award, Best Advanced Level/Re-use Treatment Facility – State of Florida, 1989

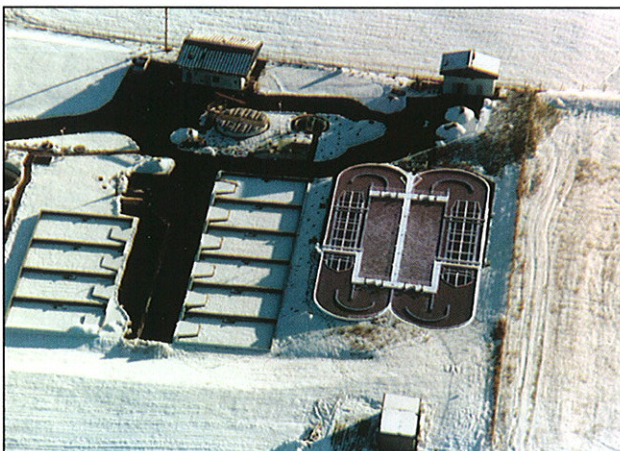
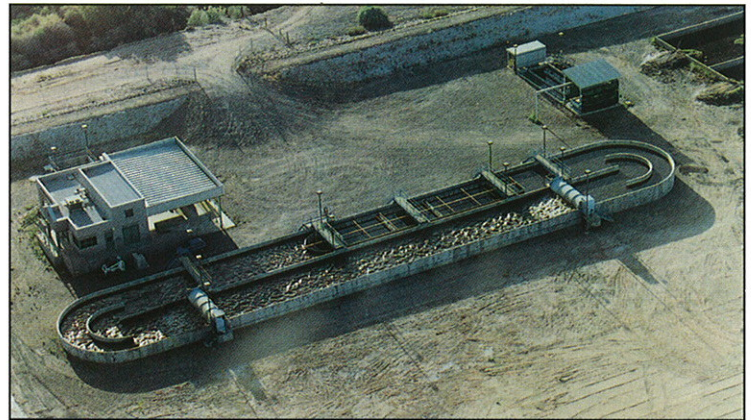
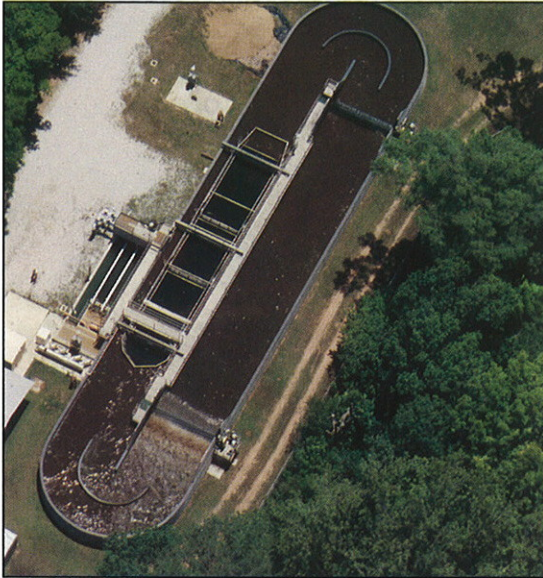
of Call



Peak Performance in Extreme Climates and Any Geographic Location!

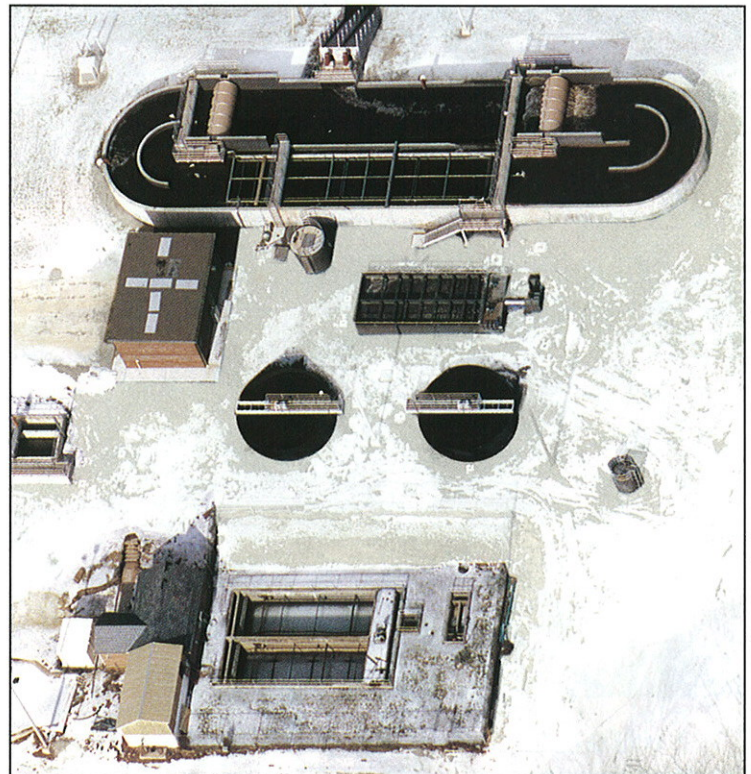
+120°F

From the scorching, sandy deserts to the humid tropical swamps – high-quality effluent can be guaranteed!



SUB-ZERO

Even in the piercing cold of snowy mountains, it's smooth sailing in the warm waters of the oxidation ditch.



Maximum

A Choice of Aeration Systems and Configurations . . .



Figure A Folded-ditch layout



Figure B Dual ditches with propellers and diffusers

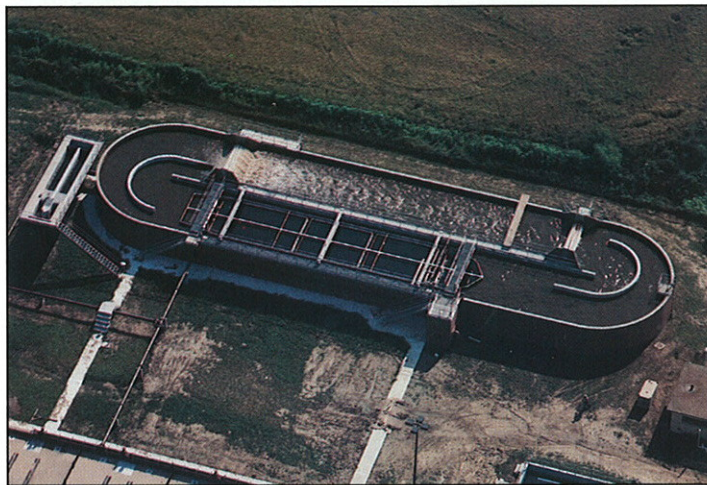


Figure C Plastic-blade brush rotors

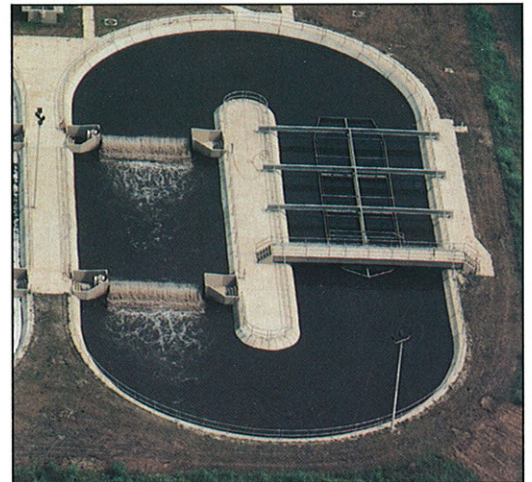


Figure D Trapezoidal ditch



Figure E Conventional brush rotor layout



Figure F Semi-trapezoidal geometry

Versatility

Brush Rotors, Prop & Diffusers, or Vertical Turbine Aerators.

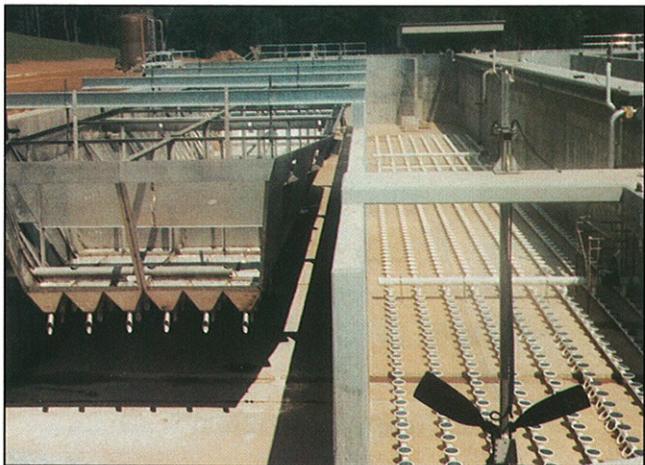


Figure G Dewatered ditch showing placement of clarifier, propellers and diffusers

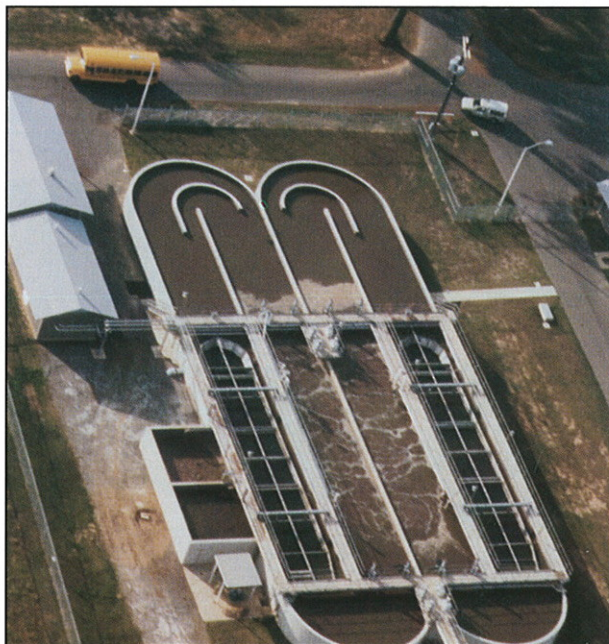


Figure H Propeller & diffusers with dual sludge tanks

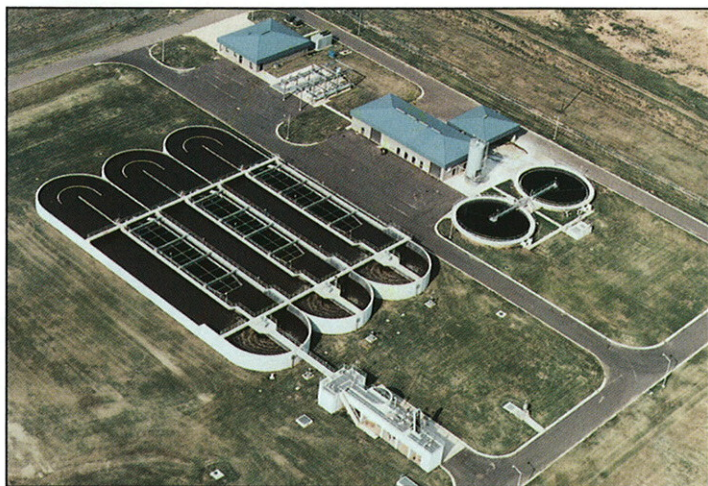


Figure I Multi-ditch layout for domestic and poultry processing wastes using SIMCAR® vertical turbine aerators.

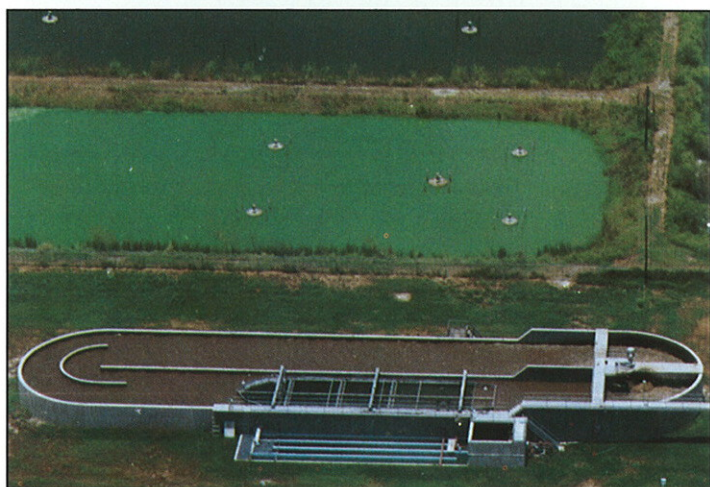


Figure J Replacing high-energy ponds with a single aerator

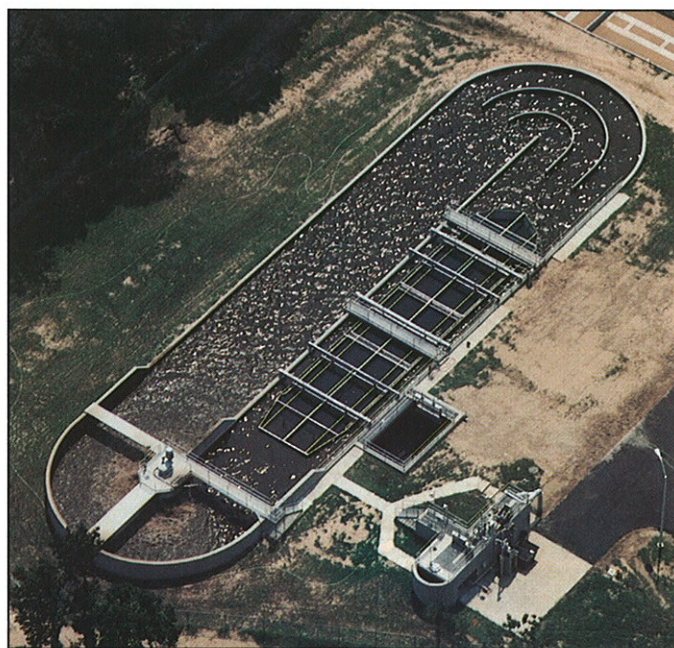


Figure K Single-ditch layout with vertical turbines and sludge holding/thickening tank

Trying to extend the life of a treatment plant? You need a . . .

Life BoatTM intra-channel clarifier

BOAT® intra-channel clarifiers can be installed in existing oxidation ditches . . .
The complete system can be in operation within 7 weeks from the date of equipment order!

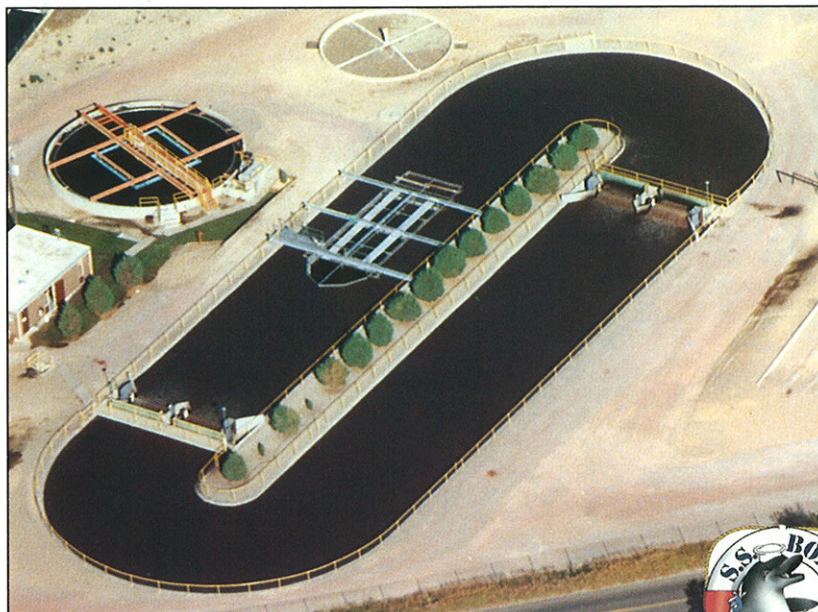


Figure A

This existing clarifier at this treatment plant was hydraulically overloaded and could not handle the peak flows. The city desired to expand the overall capacity without increasing the O&M and energy costs. The **BOAT®** intra-channel clarifier was directly purchased by the city and installed into the existing aeration basin, with minimal downtime. No modifications were required to the existing aeration equipment.



- Retro-fitted into existing basins
- Reduced construction costs
- Lower energy requirements
- Up to 100% increase in plant capacity
- Minimal plant "downtime"



Figure B

When existing treatment plants, such as trickling filters or activated sludge systems, can no longer meet the new discharge permits, the **BOAT®** intra-channel clarifier system can be built alongside while the existing plant is still in operation. This reduces the construction costs, especially when the old facilities are still allowed to treat a reduced amount of flow and the effluent is blended prior to discharge.



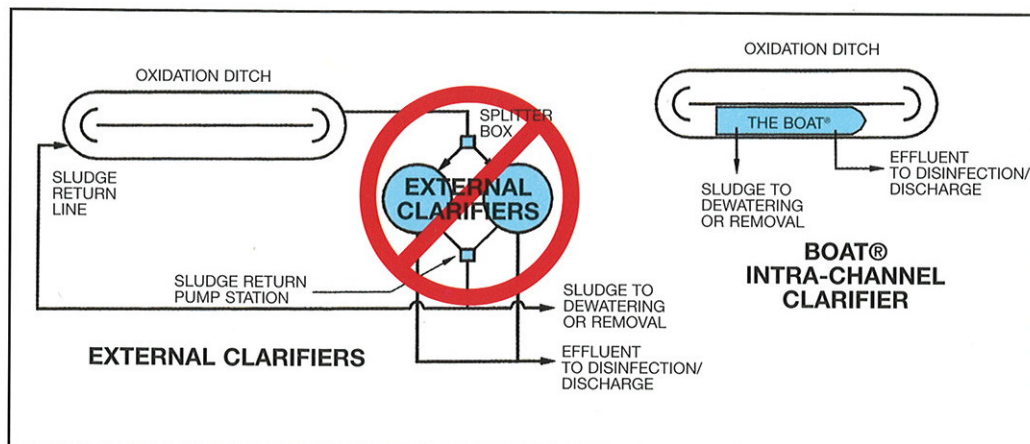
Figure C

Existing lagoon and pond systems cannot meet the more stringent requirements of modern discharge permits. These antiquated systems can be easily upgraded by using the **BOAT®** intra-channel clarifier system. Oxidation ditches with this non-mechanical clarifier can be constructed alongside of the ponds, thereby reducing land and energy costs. The existing ponds can be utilized for sludge holding or flow equalization, if so desired.

United Industries reserves the right to modify and/or improve the products illustrated herein without notification.

The terms **BOAT®** intra-channel clarifier, **BOAT CLARIFIER®**, the **AIRBRUSH™** rotor aerator, **ODOR BUSTER®** aeraspator, **NITROX®** ORP denitrification process, **SAC™** bio-control system, **SCUM SUCKER®** skimmers and **BULLS-EYE™** nutrient removal process are registered trademarks of United Industries, Inc. and Beard International, Inc.

Looking for the best treatment technology? . . . Don't Miss the "Boat"!®



Advantages & Benefits

- Eliminates sludge pumping
- Reduced land area
- Lower energy and O&M costs
- No scraping machinery
- Stainless steel construction
- Reduced capital costs

The Wave of the Future . . . 100% Guarantees for Cost & Performance



Figure A

The 7 mgd first phase of a 28 mgd treatment/reclaimed water facility was constructed for the Chino Basin Municipal Water District in Fontana, California. This treatment plant was designed and constructed utilizing a unique program which provided Chino Basin with 100% guarantees of both construction costs and effluent performance. This facility is required to meet stringent California standards for reclaimed water, which includes nutrient removal. The original design featured the conventional activated sludge process which was estimated to cost approximately \$70 million. The alternate design, shown in Figure A, was bid for \$29.7 million. Chino Basin saved millions of dollars in construction costs and also reduced the O&M and energy requirements.

Unique programs can now be offered which completely eliminate the risks involving wastewater treatment systems . . . 100% guarantees for both total project costs and effluent performance! Attractive financial programs can also be offered which allow for the lease-purchase of equipment, as well as the financing of the entire project. Energy and O&M costs can also be reduced through the combination of unique, patented processes and systems:

NITROX® ORP denitrification process

BOAT® intra-channel clarifiers

SAC™ bio-control system

SIMCAR® vertical turbine aerators

SCUM SUCKER® skimmers

BULLS-EYE™ nutrient removal process

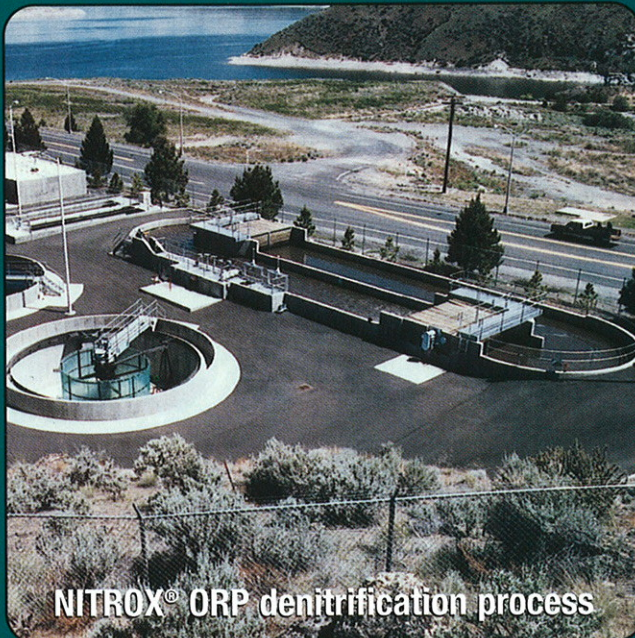
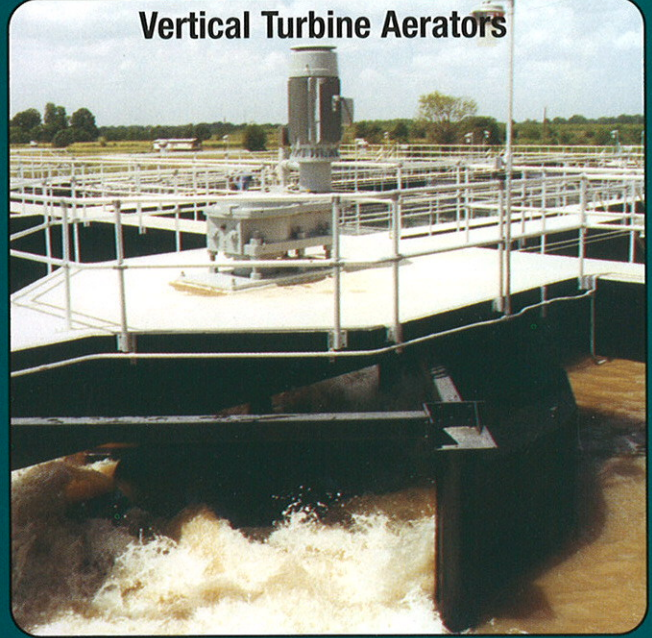
Existing Plant Out of Compliance?

Ditch It!

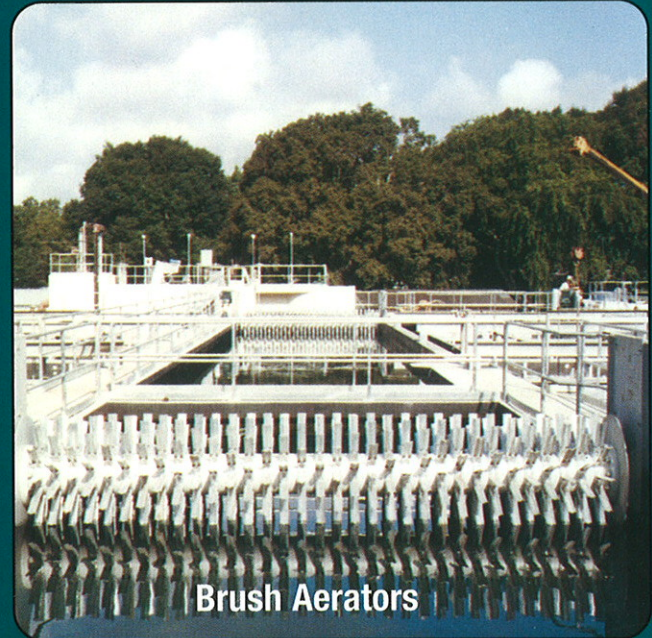
Sludge Age Controller™ Systems



Vertical Turbine Aerators



NITROX® ORP denitrification process



Brush Aerators



UNITED INDUSTRIES