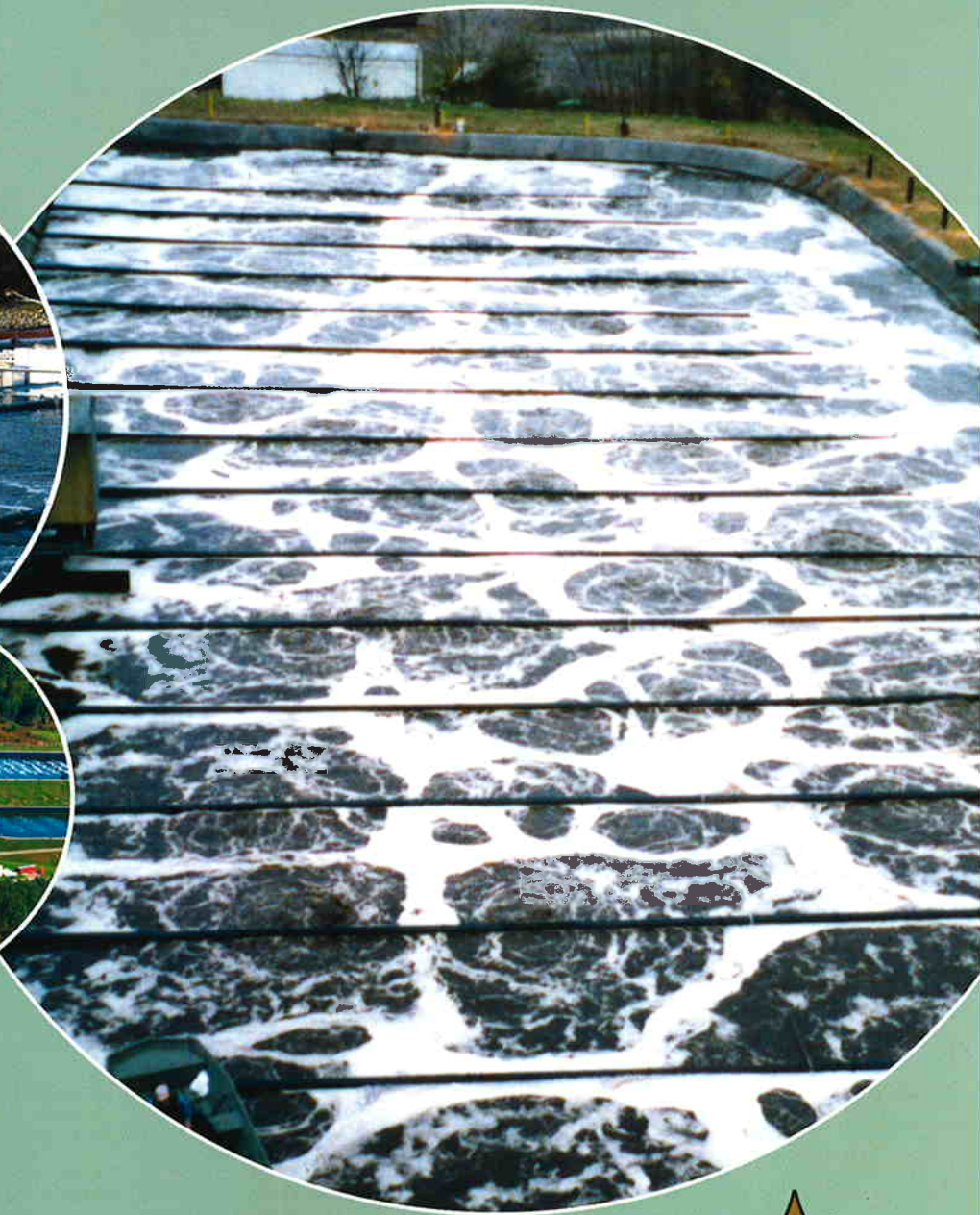


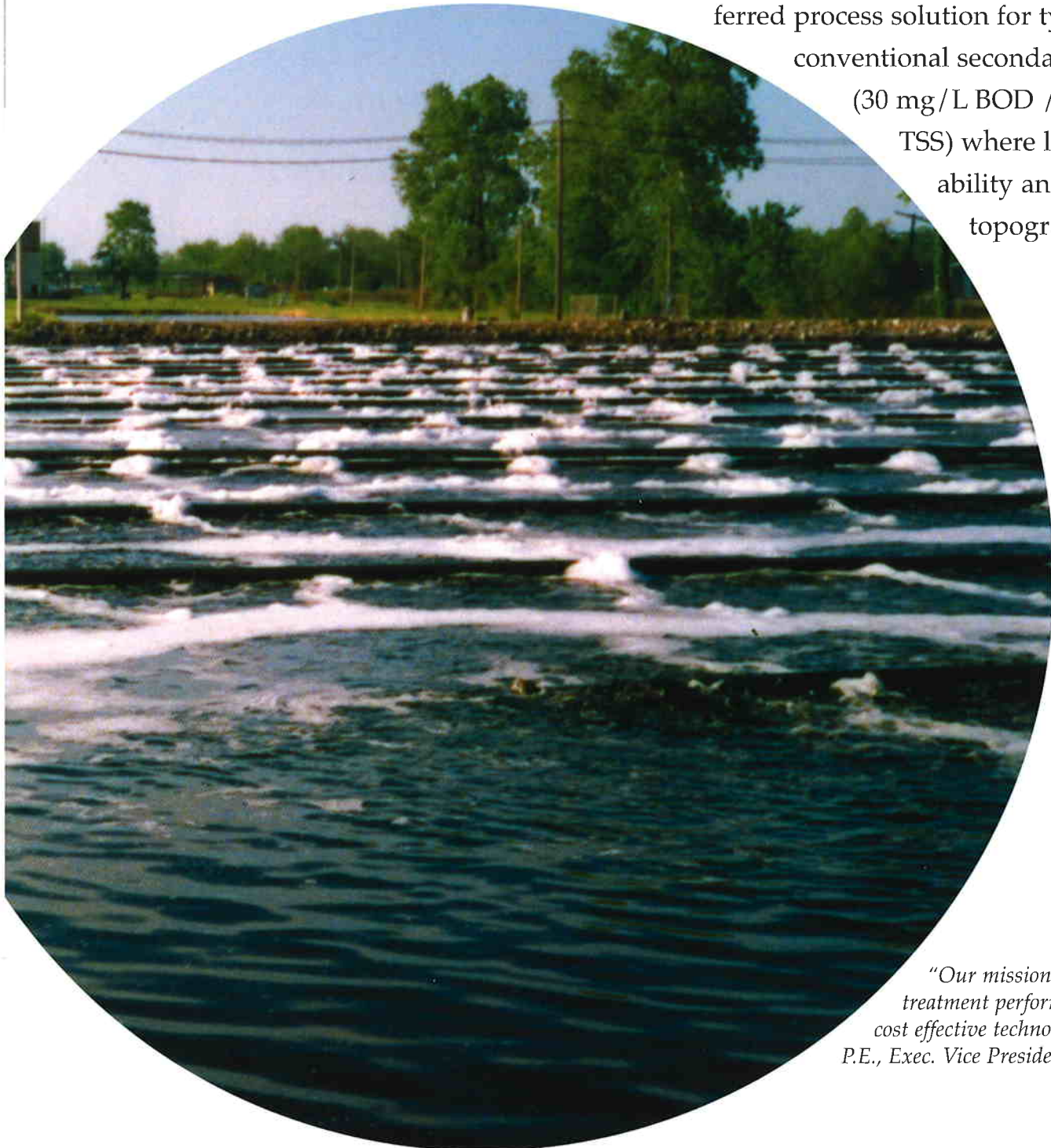
Environmental Dynamics Inc.

Lagoon Technology



LAGOON TECHNOLOGY

Lagoon systems have been recognized throughout the world as an economical solution for wastewater treatment. Low operating cost and minimal operator attention have made lagoon systems the preferred process solution for typical or conventional secondary treatment (30 mg/L BOD / 30 mg/L TSS) where land availability and proper topography permit.



"Our mission is to deliver advanced treatment performance using simple, cost effective technologies" - R. C. Chann, P.E., Exec. Vice President EDI



Environmental Dynamics Inc. A Leader in Aerated Lagoon Technology

Since 1978 EDI has provided aerated lagoon solutions for secondary treatment. EDI aerated lagoon solutions include the following innovations of equipment and process configurations that are now considered industry standard:

- Pioneered the use of membrane diffusers in aerated lagoons
- Applied high efficiency diffused aeration products in lagoons with energy savings of 30-70% over mechanical aerators and static tubes.
- Patented retrieval methods which allow access and service of high efficiency diffusers, with no need to dewater or shut down lagoons.
- Applied both floating aeration systems and submerged lateral systems
- Patented BioMizer™ technology for increased mixing efficiency in complete mix lagoons
- Developed the FlexAir™ Magnum tube diffuser for outstanding economy in large scale applications
- Complete mix and partial mix processes for increased capacity

EDI innovations are now considered industry standard

EDI's innovative process design and hardware solutions have proven successful in more than 1,000 lagoon applications. These solutions provide cost effective options for secondary treatment, and typically deliver BOD and suspended solids levels less than 30 mg/L. EDI's fully retrievable fine bubble diffuser systems continue to deliver the lowest operating cost of any secondary wastewater treatment option available.

Limitations to Conventional Aerated Lagoon Technologies

With all the benefits of the conventional aerated lagoon processes, there are also substantial process limitations. Conventional lagoon technologies cannot meet stringent effluent criteria imposed by water quality based effluent standards. Other limitations include:

- Limited operator process control
- Large land area requirements
- Limited cold weather performance
- Limited or no ammonia removal
- Large volumes which limit control of algae and suspended solids levels in warm weather operations



New Advanced Lagoon Technologies!

EDI continues to move forward with advanced lagoon process and hardware innovations. The Advanced Treatment Lagoon Activated Sludge (ATLAS™) technologies from EDI headline those efforts. EDI ATLAS systems deliver the process performance of an activated sludge process, along with the following unique process and operational benefits:

- Upgrade existing lagoons or use with new lagoon construction
- Economical installed cost to achieve full advanced treatment levels for BOD and TSS with ammonia and nutrient control
- Low operating cost using high efficiency field-proven EDI FlexAir™ aeration systems with more than 20 years of successful operating history
- Multiple process choices within the ATLAS framework
- Staged treatment options for long-term facility viability
- Reduced space requirements
- Year round performance in warm or cold climates
- Minimal increase in operator attention, monitoring, or maintenance requirements over conventional aerated lagoons
- Simple and economical long-term sludge management using lagoon-based stabilization and storage



Basic ATLAS Framework

The basic ATLAS framework uses conventional low-rate activated sludge processes with multiple process configuration choices. Each process configuration uses an effective liquid/solids separation technology to increase and maintain the desired mixed-liquor concentration in the biological reactor. The ATLAS framework offers a high degree of design flexibility, to meet the demands of a wide range of process and facility applications.

ATLAS – EC (External Clarifier)—The ATLAS – EC system uses EDI’s field-proven floating or fixed-grid aeration systems in a lagoon (earth, lined, or concrete) structure with conventional clarifier components plus return and waste-activated sludge pumping. The ATLAS – EC system is ideal for large flow, direct discharge applications with independent solids management facilities.

ATLAS – IC (Internal Clarifier)—The ATLAS – IC system uses EDI’s field-proven aeration systems in conjunction with an internal clarifier that is constructed in the lagoon biological reactor basin. EDI field-proven flocculating and effluent withdrawal components with efficient

New ATLAS innovations employ unique EDI “equilibrium” solids management design technologies to deliver advanced biological treatment. . .

RAS and WAS management systems deliver reliable, extended aeration process performance. The ATLAS – IC system is ideal for small to medium sized, new construction applications with independent solids management facilities.

Innovative ATLAS Configurations

New ATLAS innovations employ unique EDI “equilibrium” solids management design technologies to deliver economical advanced biological treatment performance which includes minimized solids management costs and reduced operator attention requirements.

EDI’s “equilibrium” self-balancing systems combine the best features of activated sludge and conventional lagoon systems with unique or patented liquid/solids separation technologies. EDI’s ATLAS – IS and ATLAS – SBR systems provide advanced treatment performance with no added operational or solids management requirements beyond those of conventional aerated lagoons.

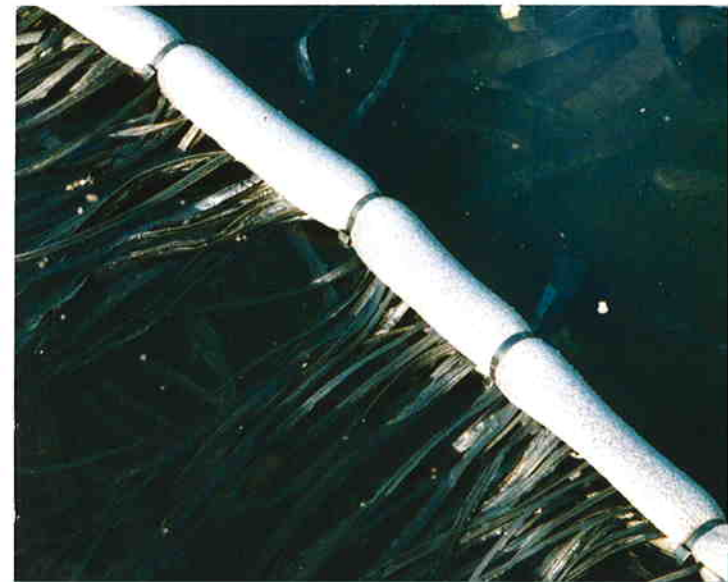
ATLAS – IS (Internal Separator) — The EDI ATLAS – IS system uses the core biological treatment and aeration technologies of the basic ATLAS framework. The system employs an equilibrium Internal Separation Module for control of liquid / solids separation. Using fixed or floating separation modules inside



the primary biological lagoon reactor, biological solids are maintained, separated, returned and wasted with no mechanical components. The solids separation mechanism is self-regulating, which results in an “equilibrium” biological solids management program. Excess solids from the primary biological reactor are handled in downstream partial mix and quiescent lagoon reactors.

A key performance feature of the ATLAS – IS system is its elimination of clarification with return and waste solids pumping requirements and management. ATLAS – IS is particularly suited for upgrades to existing lagoon applications in order to deliver full carbonaceous oxidation plus nitrification -- even in cold climates.

ATLAS – SBR (Sequencing Batch Reactor) — The ATLAS – SBR system takes advantage of the lagoon biological reactor to establish a sequencing activated sludge process. The EDI “equilibrium” decanter and process cycling maintain the appropriate biomass inventory. The process allows limited operator attention by eliminating return or waste solids pumping. The ATLAS – SBR allows extended treatment levels of full carbonaceous oxidation plus total nitrogen control. ATLAS – SBR is best suited for large flows where multiple basins are available. The system is typically used in series with partial mix lagoons for simplified and economical solids management.



ATLAS Performance Enhancement Technologies

BioReef™ System — The BioReef system uses submerged attached growth technology to increase treatment performance for BOD, TSS, ammonia, and nitrogen removal. BioReef is ideally suited to improve the performance of conventional aerated lagoons and for effluent polishing when used in combination with an ATLAS system.

BioReef is a flexible fixed-film product typically mounted on cables that span the reactor. BioReef is easily deployed without interruption in service. BioReef presents a high surface area-to-volume ratio and unlike other high surface-area products, the flexible BioReef system is self-

cleansing, will not foul, and requires no maintenance for long-term performance.

BioInsulate™ Floating Cover System — The BioInsulate floating cover system improves the performance of all biological processes in extreme cold environments. By covering the lagoon with an insulating air blanket, thermal energy in the waste is retained maintaining higher operating temperature, increased biological reaction rates are sustained.

BioShade™ Floating Cover System — The BioShade floating cover system provides control of effluent suspended solids. The system may be used with conventional aerated stabilization lagoons and all ATLAS systems that use polishing

BioReef is ideally suited to improve the performance of conventional aerated lagoons. . .

lagoons for solids management. The BioShade system is effective in reducing the presence of both algae and biological solids in the effluent stream. Proper application of the BioShade system can reduce effluent suspended solids concentration to well below 30 mg/L.

Both the EDI BioInsulate and BioShade cover systems are designed to be self-deployed with no need for external cabling or anchoring systems. Installation is simple and no adjustment is required with varying water levels.



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