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## F.B. Leopold Co., Inc.

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#### CT2 Submerged Sludge Collector

The advanced features and performance of the CT2 evolved from the Leopold Clari-Trac™ sludge system. For over ten years, these units have quietly done their job, delivering reliable operation, maintenance costs and good sludge production to hundreds of facilities. By simplifying the waste process, the CT2 increases plant efficiency, reduces maintenance time, and total system operating costs. The CT2 submerged sludge collector operates on the simple principle, but powerful force, of gravity. Pressure in the main tank forces the sludge through the header collector into the outlet piping and into the sludge removal trough. Careful selection of smooth bore piping for the suction header keeps head loss to a minimum for the most efficient sludge removal and low driving head requirements. The CT2 system is the optimum choice for flat bottomed or sloped floor tanks. As the suction head glides through the sludge, it removes the settled sludge without gross disturbance and with minimal dilution. The CT2 system is ideal for high-rate sedimentation applications, has multi-pass control options, and a double header can handle heavy sludge production. Engineered simplicity is integral to the design of the CT2 system. Using a cable drive to push sludge from the basin eliminates pumping costs. Cable drives require far less power compared to other submerged sludge collectors, the CT2 is far simpler to maintain because it has a much smaller number of moving parts. CT2 has a Fit and Forget quality that not only simplifies the water treatment process but also reduces total system operation costs. The header, locked onto the guide rail, goes where you want it. The cable drive pulls the header through the sludge with a positive motion and minimizes disturbance, removing the sludge without dilution. For the most efficient and cost-effective sludge removal system, the CT2 is the best choice.

**Brand:** CT2 Submerged Sludge Collector

**Date of introduction:** August 6, 2002

#### Main categories

[Sludge](#)

#### Subcategories

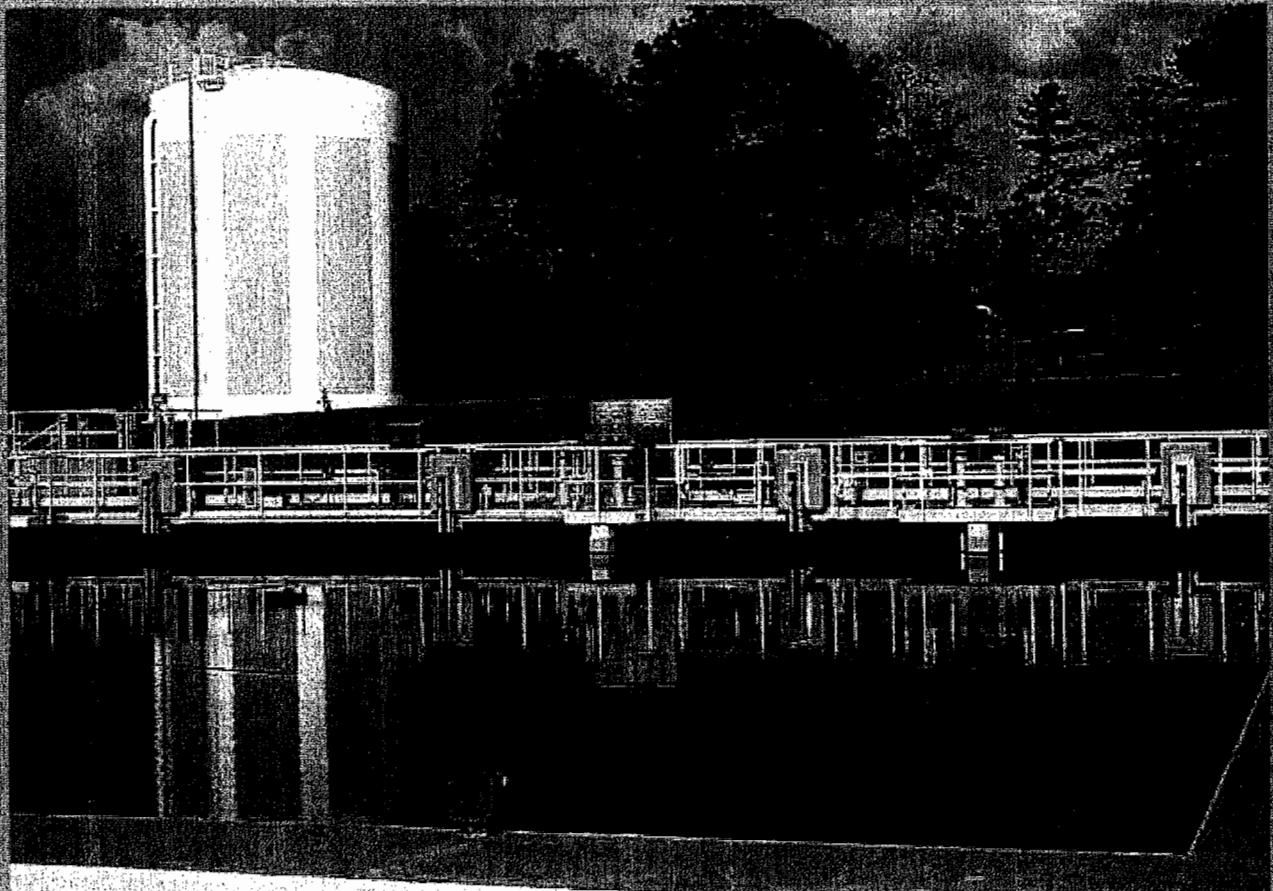
[Sludge collectors](#)



*The Leopold CT2 Submerged Sludge Collector*



**Sludge Sucker™**



## **Sludge Removal Systems**

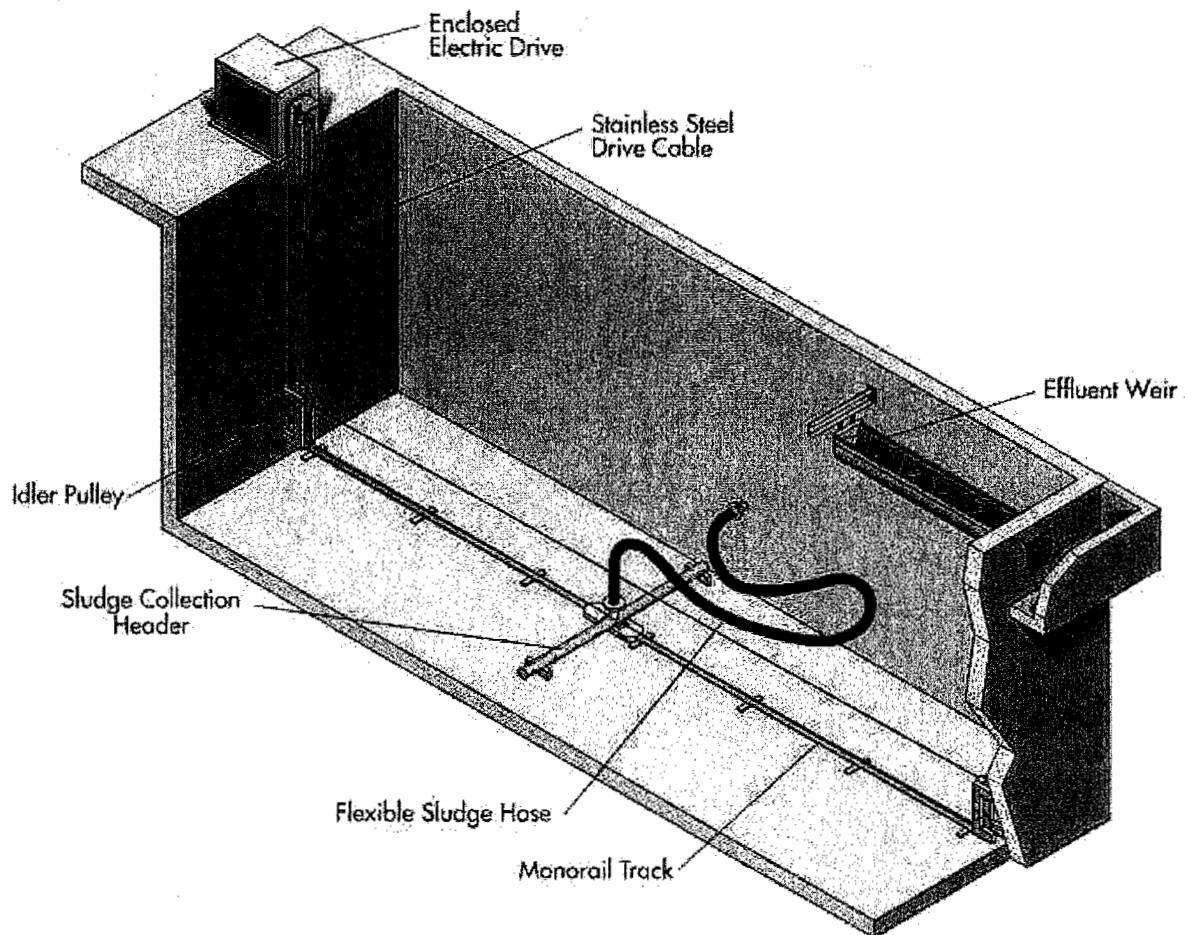
**General Filter Company**

# Sludge Sucker

General Filter Company's Sludge Sucker™ is a gravity driven sludge collecting mechanism for cost effective and efficient removal of lightweight sludges from rectangular settling basins. It is available in two configurations to best fit either your retrofit needs into existing basins or a new installation. Where obstructions exist at the surface of the basin, the totally submerged version is preferred. The floating type is much easier to monitor and has no moving parts below the water surface. Corrosion resistant materials throughout and a positive cable drive system generate very low maintenance cost. Simplicity is the key and when combined with the following key features and advantages, Sludge Sucker is your economical and efficient sludge removal unit of choice.

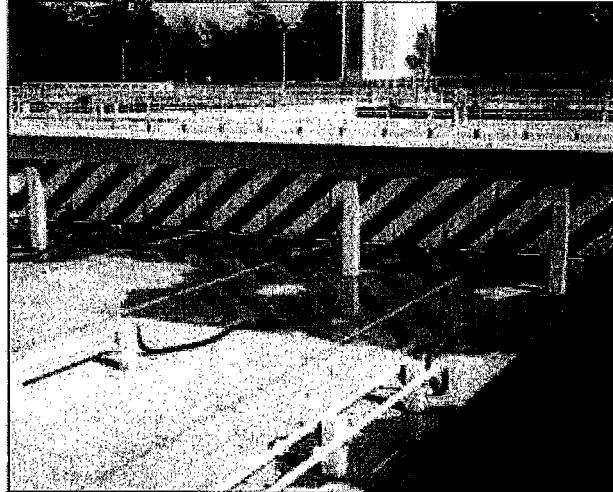
## Key Features and Advantages

- Positive Cable Drive Assembly
- Corrosion-Resistant Submerged Parts
- Collector Arm Movement Visible from Drive Cable
- Wheeled Track Design is Standard for Positive Tracking
- Rapid Sludge Removal with Variable Speed Collection Header
- Solid State Control Panel for Programmable Operation
- Readily Accessible Service Panels for Easy Drive Maintenance
- Low Capital, Operating and Maintenance Costs
- Modular Lightweight Construction Results in Easy Installation



## Operation

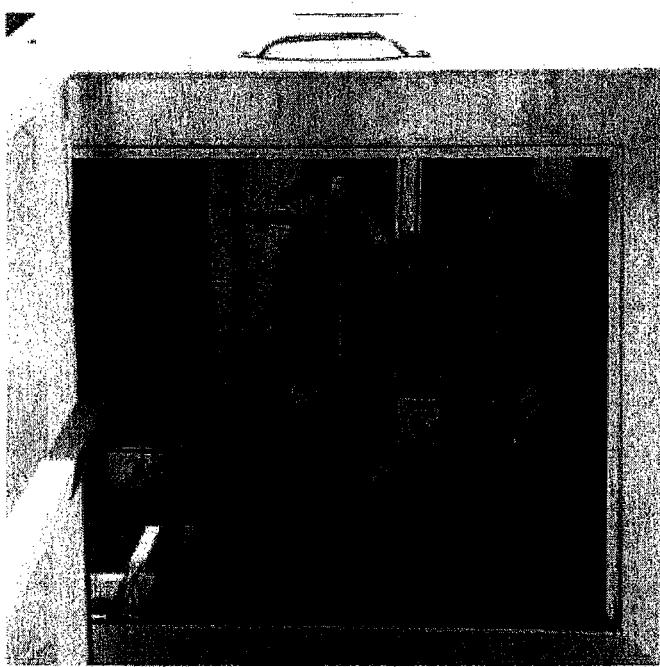
Operational simplicity is accomplished by hydraulic pressure between the water surface and sludge discharge pipe elevation which forces sludge collecting in the bottom of the basin through orifices located in a header pipe. The sludge then migrates through a durable flexible hose which, in turn, is connected to the sludge discharge pipe. A truck assembly, with header pipe attached, is pulled smoothly across the basin by a cable system connected to a drive assembly conveniently mounted above water. For versatile sludge removal, a programmable controller lets you easily adjust the speed of travel at various locations in the basin. Single units are used for basins typically up to 30 ft. wide while multiple units can be provided for wider basins.



20 Sludge Sucker units installed in a 25 MGD facility.

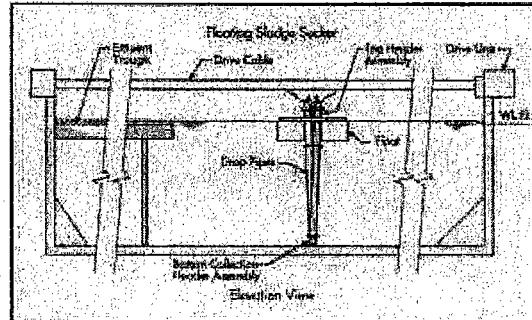
## Floating Sludge Sucker

Optional features and advantages can be realized with the unique Floating Sludge Sucker. As opposed to the submerged, rail type Sludge Sucker, the floating unit has the added benefit of being drawn across the basin on an easily accessible "pontoon-like" float system. This allows the Sludge Sucker to be pulled continuously and effortlessly across an open type basin with minimal loading on the drive system and allows you to see the unit in motion. Other notable features include a separate priming valve and sight glass for each collection header.



Electric drive unit with aluminum enclosure

For added convenience when multiple units are used, each header also has its own sludge valve which allows the rate of sludge removal to be adjusted separately. As with the submerged type mechanism, reliability and simplicity are synonymous with the Floating Sludge Sucker.



Floating Sludge Sucker

# Applications

The primary application for Sludge Sucker sludge collecting systems is in surface water treatment plants for effective removal of light sludges such as alum or ferric hydroxide, or light iron and manganese precipitates in potable water supplies. The Sludge Sucker is ideally suited in light sludge applications when lower capital cost and long-term reliability is essential to the proper operation of your treatment facility.

Sludge Sucker can be easily retrofitted into most any existing rectangular settling basin that has no sludge collecting mechanism. It is especially

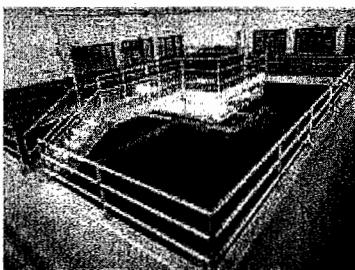
effective for retrofitting basins that are cluttered with overhead obstructions such as crosswalks, skimmers, troughs, tube settlers, or anything that projects from the walls above the bottom of the basin. Accumulated sludge can be readily removed from beneath these obstacles.

The cost-effective Sludge Sucker can also be used in certain industrial and municipal wastewater applications with either the floating or submerged type designs. For your next sludge removal system design, specify Sludge Sucker as the design of choice.

## Other General Filter Products

If it's in the water, General Filter's engineered processes and equipment can take it out, economically and dependably. Our comprehensive line includes solutions to simple and complex water treatment and conditioning needs, all backed by working installations and years of experience. Our line includes:

- Floc-clarifiers
- CONTRAFLO® solids contact clarifiers
- SPIRAZONE® sludge blanket clarifiers
- Sludge thickeners
- SURF® for surface water treatment
- Vertical and horizontal pressure filters
- Aerators
- CenTROL® gravity filters
- AERALATER® packaged treatment
- MULTIWASH® Filtration Process
- Gravity filtration equipment
- MULTICRETE II™ monolithic underdrain system
- Surface washers
- ESSD™ filter washtroughs and launder systems
- Control consoles



Clockwise from upper left:  
Concrete CenTROL Filter;  
CONTRAFLO Clarifiers;  
MULTIWASH Filtration Process.



For more information, contact your local General Filter sales representative, or:



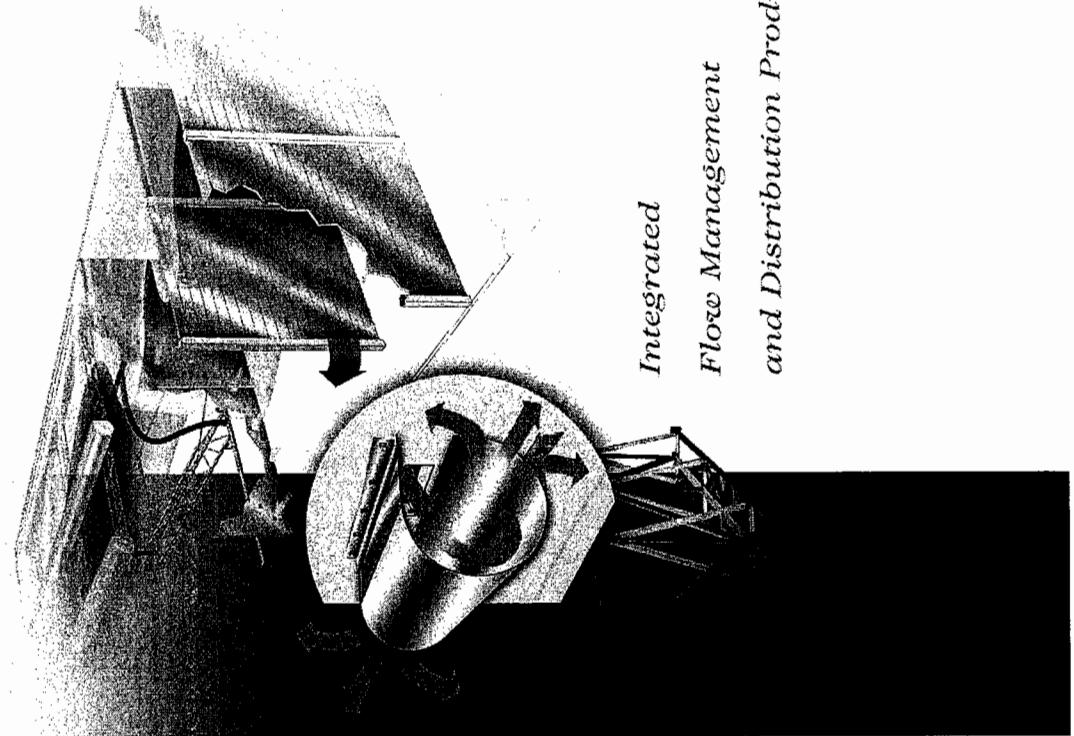
600 Arrasmith Trail, Ames, IA 50010-9021  
Phone: 515/232-4121 Fax: 515/232-2571

General Filter's products and processes for water and wastewater treatment are protected by patents issued and pending in the United States and other countries.

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Bulletin No.  
0505-596-50

*Integrated*  
*Flow Management*  
*and Distribution Products*



MURRAY RESEARCH INC.  
LOW MANAGEMENT



MURRAY RESEARCH INC.  
15411 W. 67th Ave., Suite 100  
Golden, CO 80401  
(303) 729-8572 FAX (303) 729-8129  
E-mail: [info@murrayresearch.com](mailto:info@murrayresearch.com)  
[www.murrayresearch.com](http://www.murrayresearch.com)

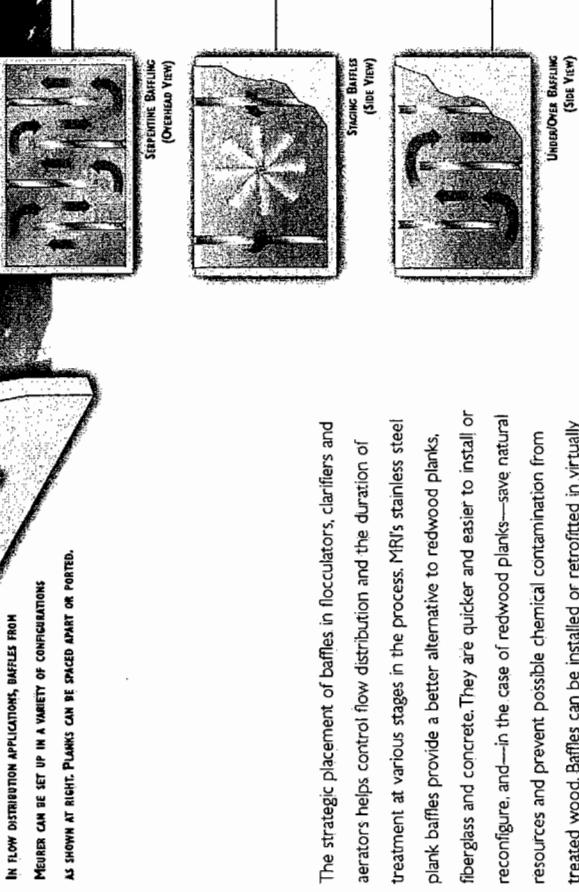
## *RJ baffles: The key to efficient flow management.*

For more than 25 years, Meurer Research, Inc. (MRI) has been developing innovative sedimentation technology such as its patented inclined plate and tube settler systems, as well as the Cable-Vac™ sludge collector system. To achieve maximum performance in water and waste water clarifiers, MRI's considerable experience in settleable solids removal processes has led to the development of a complete family of flow management devices. These all-stainless steel products include

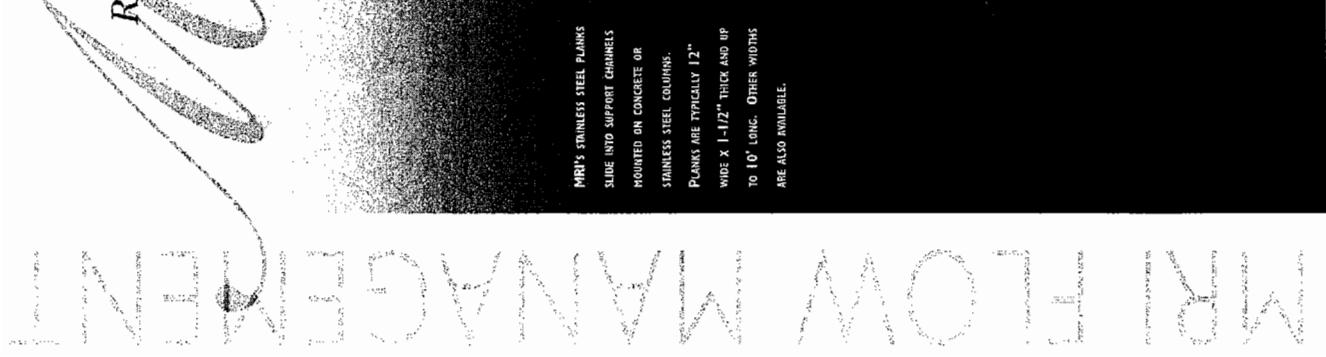
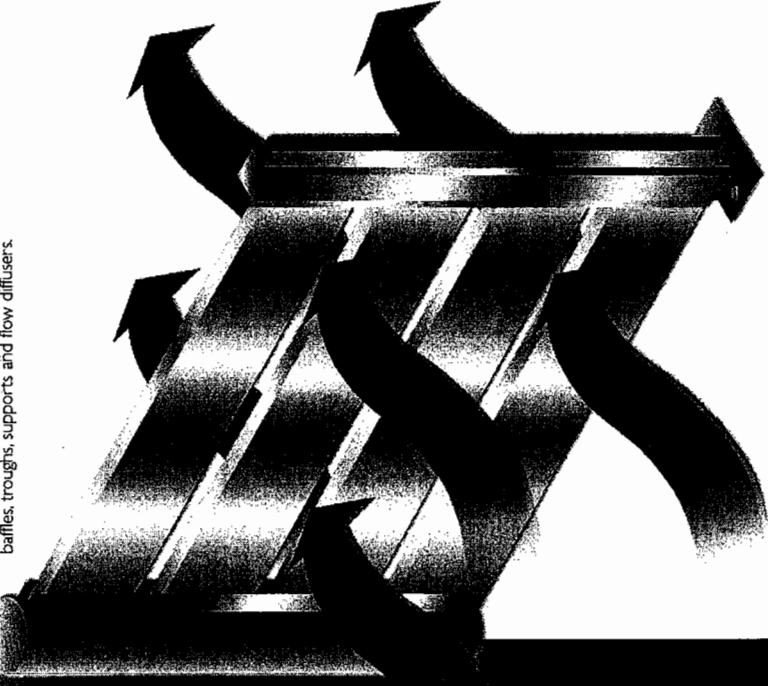
baffles, troughs, supports and flow diffusers.

baffles, troughs, supports and flow diffusers.

MRI's STAINLESS STEEL PLANKS  
SLIDE INTO SUPPORT CHANNELS  
MOUNTED ON CONCRETE OR  
STAINLESS STEEL COUPLINGS.  
PLANKS ARE TYPICALLY 12"  
WIDE X 1-1/2" THICK AND UP  
TO 10' LONG. OTHER WIDTHS  
ARE ALSO AVAILABLE.



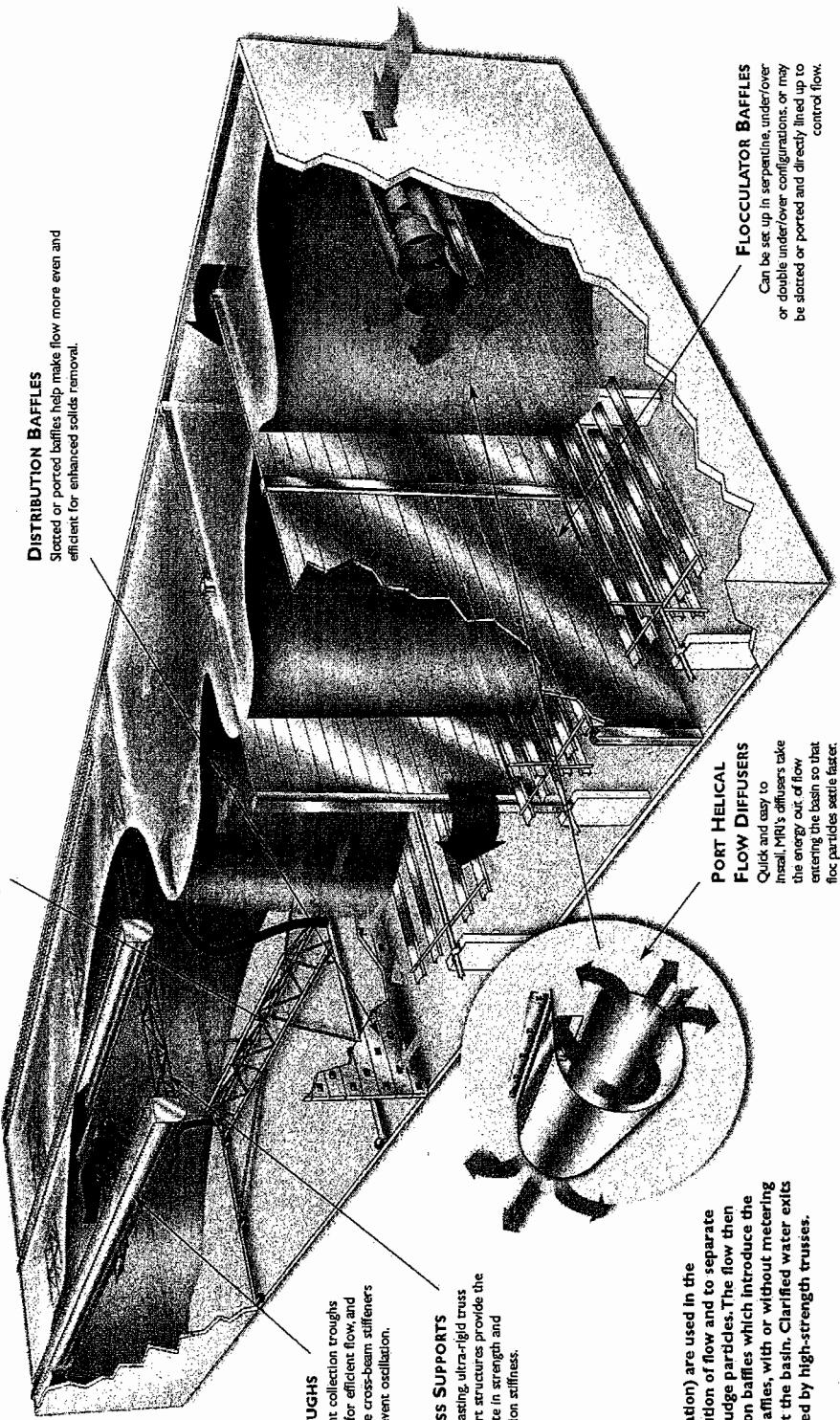
The strategic placement of baffles in flocculators, clarifiers and aerators helps control flow distribution and the duration of treatment at various stages in the process. MRI's stainless steel plank baffles provide a better alternative to redwood planks, fiberglass and concrete. They are quicker and easier to install or reconfigure, and—in the case of redwood planks—save natural resources and prevent possible chemical contamination from treated wood. Baffles can be installed or retrofitted in virtually any basin to improve efficiency and may be slotted, ported or solid depending on the application.



*high-quality products for every part of the treatment process.*

**CABLE-VAC™ SLUDGE COLLECTOR**  
MRI's state-of-the-art sludge collector system provides  
optimal solids removal.

Meurer Research Inc. brings together all the components necessary for improved flow management and distribution to boost settling efficiency in clarifiers. Manufactured at MRI's facility in Colorado, the company's flocculation, distribution and aeration baffles can be retrofit to replace redwood plants. MRI baffles, \*helical flow diffusers, \*troughs\* and trusses\* are NSF-61 approved and manufactured of T304/316 stainless steel.



**MRI FLOW MANAGEMENT AND DISTRIBUTION APPLICATIONS IN USE**

Baffles (pictured here in a serpentine configuration) are used in the flocculation chamber(s) for controlling distribution of flow and to separate each stage to facilitate the agglomeration of sludge particles. The flow then enters the sedimentation basin through diffusion baffles which introduce the flow evenly across the full width of the basin. Baffles, with or without metering orifices, are also used to direct flow throughout the basin. Clarified water exits the system via MRI collection troughs supported by high-strength trusses.

\*Patented

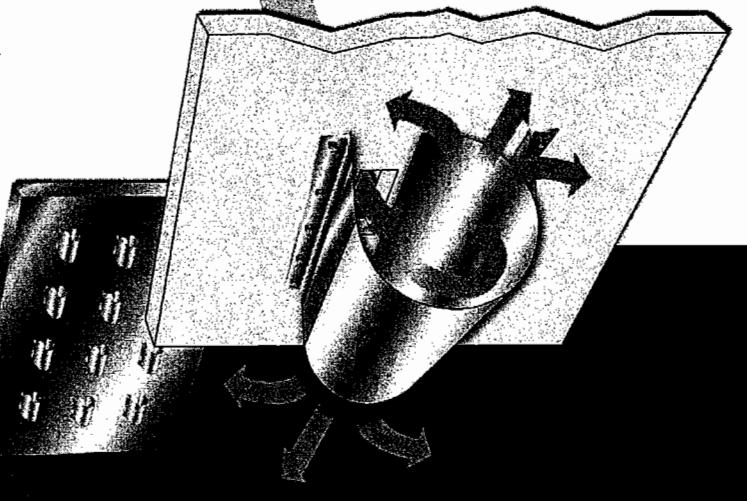
**FLOCCULATOR BAFFLES**  
Can be set up in serpentine, under/over or double under/over configurations, or may be slotted or ported and directly lined up to control flow.

## *Port diffusers for more effective control of flow velocity.*

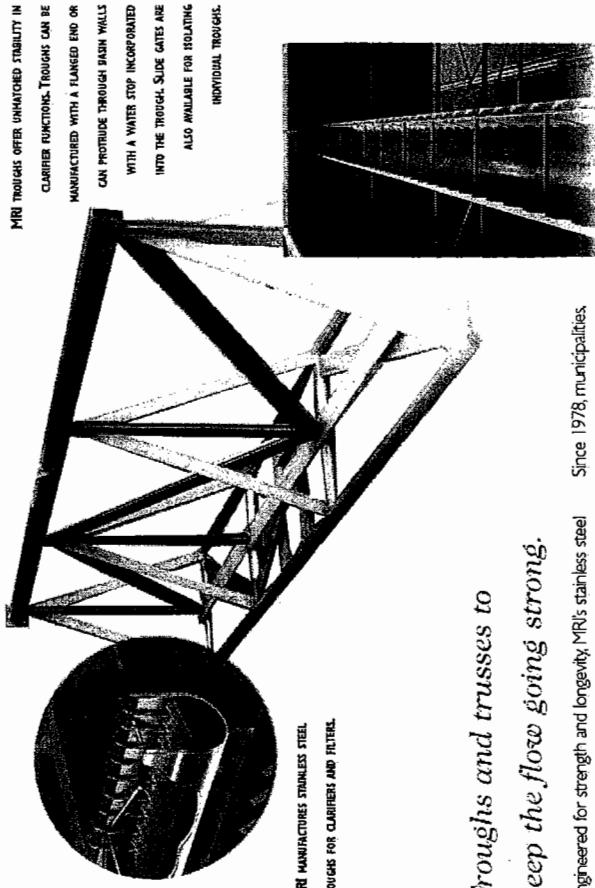
Over time, higher treatment demand creates higher flows and velocities through inlet ports, which can prevent floc particles from settling in the sedimentation basin. MRI's patented port helical flow diffuser is designed as an inexpensive means of eliminating high flow rates entering the basin from the flocculators through the diffusion wall. Port diffusers are installed over each port on the wall. Each diffuser splits the flow in half—thereby reducing the velocity—and spirals it out each end. The exiting flow then homogenizes with the flow from adjacent diffusers to create a slow, even flow throughout the basin.

### *Flow diffuser as venturi*

The flow diffuser is venturi-shaped, creating a low-pressure zone at its narrowest point. This causes the water to accelerate as it passes through the diffuser, creating a vortex that spirals out at both ends.



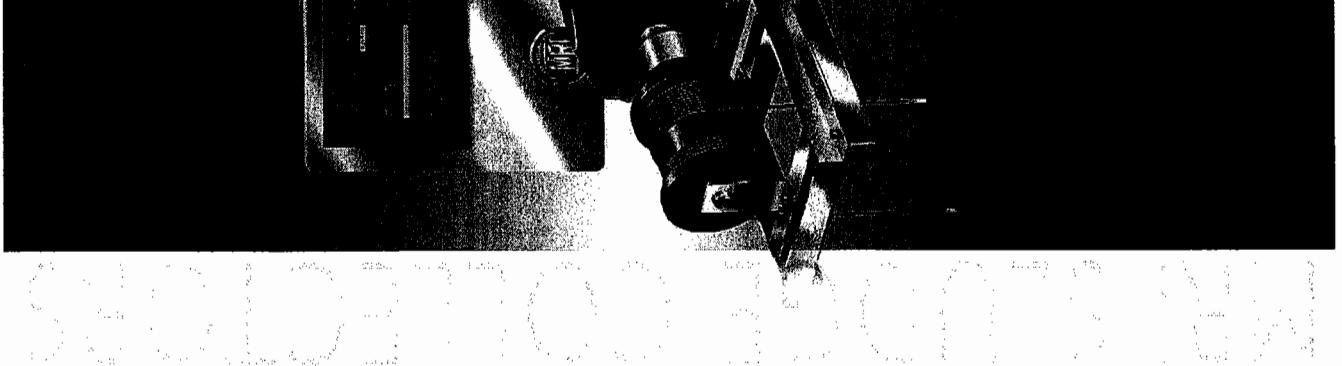
**THE PATENTED DESIGN OF THE PORT HELICAL FLOW DIFFUSER FROM MRI AVOIDS DIFFUSION INLET VELOCITIES IN THE CLARIFIER TO PREVENT DISRUPTION OF THE FLOC FLOW ENTREING THE DIFFUSER IS CRITICAL SINCE IT HALFS AND DIVIDES THE ENDS IN A SPREADING MOTION AT LESS THAN .5' PFS AS IT EXITS, THE FLOW COVERS A 180° LABEL, WHICH FURTHER CUTS DOWN THE VELOCITY, ASSURING EVEN DISTRIBUTED FLOW IN THE REST OF THE BASIN.**



### *Troughs and trusses to keep the flow going strong.*

Engineered for strength and longevity, MRI's stainless steel effluent collection troughs and filter troughs are designed with a special "tulip" round-bottom shape. Built-in cross-beam stiffeners guarantee stability with no oscillation during system operation. In addition, they come equipped with micro-adjustable weirs allowing for precise control and distribution components represent one more way in which MRI provides efficient, cost-effective water and waste water treatment solutions.

Maurer's truss systems provide a "backbone" of stable support for troughs and baffles, as well as plate settlers and tube settlers. The structures utilize high-strength stainless steel tubing designed into three-dimensional trusses resulting in stronger yet lighter-weight alternatives to conventional steel beams. MRI truss support systems are also quicker and easier to install.



*The Fully  
Engineered*  
**Cable-Vac™ Sludge  
Collector System**



Muenster Research Inc.  
15611 Wauwatosa Avenue  
Cudahy, California 90201  
(310) 779-8373  
FAX (310) 779-4449

*Sludge collection products built on experience.*

## Sludge collection products built on experience.

Meurer Research, Inc. began developing high-quality equipment in 1978 to supply water and waste water treatment facilities with an effective, reliable and economical method of removing sludge from clarifiers. Over the years, the company has built upon those standards by incorporating new ideas and technology into the design and manufacture of its products, many of which have been patented. The latest result is a fully engineered, all-electric system that represents a breakthrough approach to sludge collection.

The **Cable-Vac™** sludge collector consists of three main components, each of which features a quality that today's plants count on to operate at peak levels. The uniquely designed tandem collector offers more efficient removal of solids. The reel-to-reel drive provides dependability and the simple control system ensures ease of operation. Coupled with its installation flexibility and corrosion-resistant longevity, the **Cable-Vac™** system is the ultimate choice for low-maintenance, cost-effective sludge collection in both new and existing basins.

The key to the **Cable-Vac™** ability to deliver proven increased solids removal is the innovative design of its tandem collector.\* Unlike conventional equipment, it has two collectors instead of one, with sludge collection orifices facing forward on the side, rather than the bottom, of each collector. This allows for enhanced two-way directional sludge extraction as the assembly moves back and forth across the basin floor. Moreover, the orifices in the

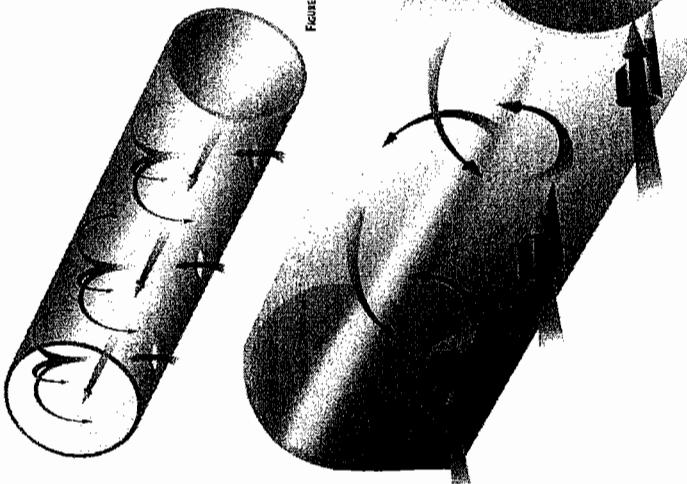
## A tandem collector designed for maximum efficiency.

In conventional sludge collectors (Figure A), the incoming flow entering the bottom and lateral flow moving toward the center outlet travel tangentially to each other and collide at the orifices, resulting in a disrupted flow pattern and decreased sludge removal.

FIGURE A

With MRI's unique tandem collector design (Figure B), the flow enters tangentially to the bottom of each collector, causing the lateral flow to travel in a spiral toward the center outlet. As it passes each orifice, the lateral flow is reenergized by the incoming flow to create a uniform, organized flow pattern that greatly enhances sludge removal.

FIGURE B

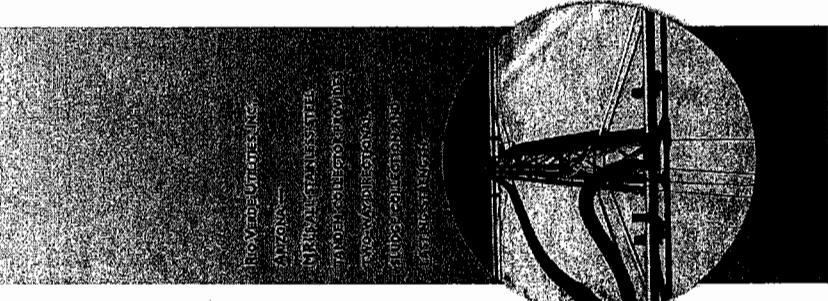


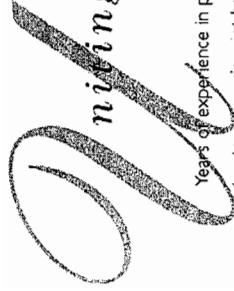
collectors are angled to let sludge enter tangentially, which organizes the flow (see illustration above) to pick up a greater amount of solids, as well as prevent clogs from occurring.\*

MRI's **Cable-Vac™** operates without the use of guide rails or tracks on the basin floor; so installation is quick and easy. It can be retro-fitted

\* Patented

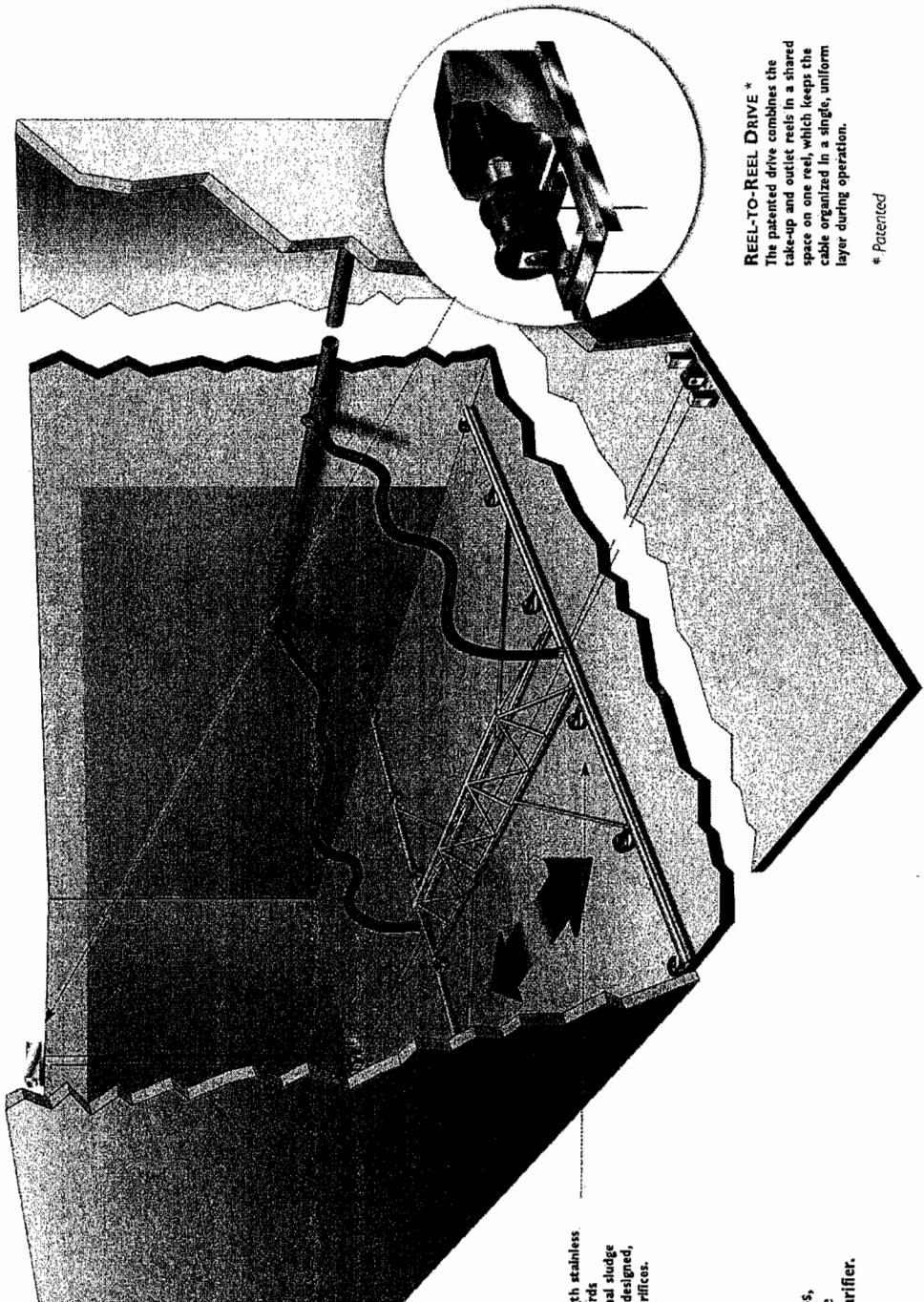
to most existing clarifier basins with flat, sloping or slanted floors. Plus, the collector's all-stainless steel construction, long-life wheel bearings and low rolling resistance provide lasting, virtually maintenance-free operation—even in continuous waste water applications.





## Optimizing technology and simplicity of design.

Years of experience in producing water treatment equipment have made MRI's state-of-the-art **Cable-Vac™** collector system\* the most reliable sludge collector on the market. Completely engineered to provide optimal solids removal, the system can be customized for new or retro-fit installations. In addition, all components are manufactured and tested in-house at MRI's facility before being shipped to the job site.



**CABLE-VAC™**  
Constructed of high-strength stainless steel, the **Cable-Vac™** affords effective two-way directional sludge removal through specially designed, forward-facing collection orifices.

### THE RTR SYSTEM AT WORK

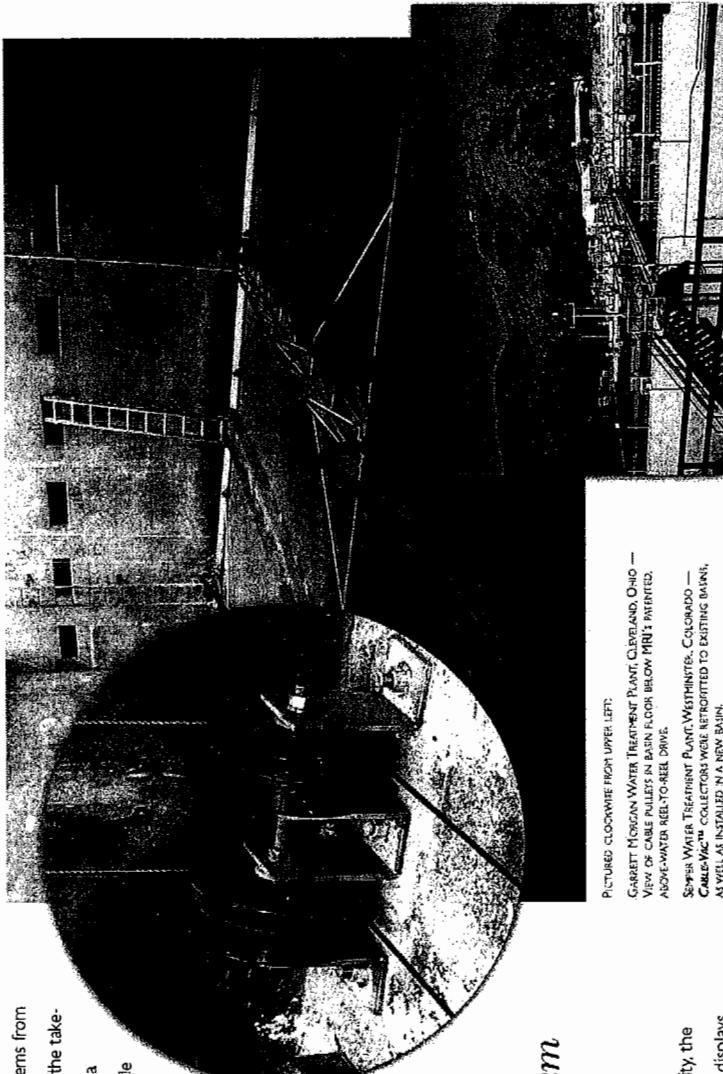
Powered by the reel-to-reel drive (RTR), the **Cable-Vac™** travels back and forth across the sedimentation basin floor to extract settled solids, which are then discharged through flexible sludge hoses connected to fixed piping that exits the clarifier.

**REEL-TO-REEL DRIVE \***  
The patented drive combines the take-up and outlet reels in a shared space on one reel, which keeps the cable organized in a single, uniform layer during operation.

\* Patented

*Reliably powered by the reel-to-reel drive.*

The reel-to-reel drive is what makes **Cable-Vac™** systems from MRI so dependable. Its simple, patented design allows the take-up and outter reels to utilize the same space, affording a compact drum length that maintains the cable in a single layer with no tensioning necessary. Capable of continuous, energy-efficient operation using DC power, the drive can withstand an indefinite stall without failing or sustaining damage. The assembly is housed in a durable safety enclosure that offers visual monitoring of the cable to indicate the tandem collector's working position in the clarifier. And because it has a minimum of moving parts and needs no lubrication, the above-water drive is easy to maintain and service.

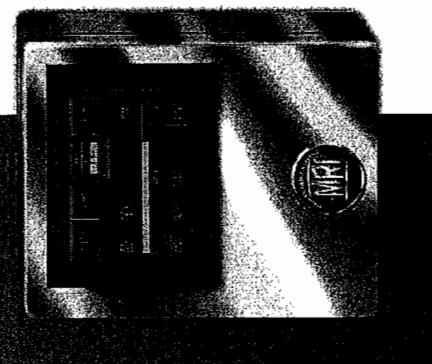


EASTON REEL-TO-REEL SYSTEM  
MURRAY MUNICIPAL WASTEWATER  
TREATMENT PLANT, MARYLAND  
SOUTHERN CALIFORNIA WATER DISTRICT  
WATER RECLAMATION FACILITY  
WATER RECLAMATION FACILITY

### Adaptable control system provides simplified operation.

Combining state-of-the-art technology with versatility, the simple-to-use control system automatically displays and handles all of the sludge collector's functions. It can be programmed easily through a menu-driven, LCD touch screen to control drive variables such as

duration, speed and frequency of operation to fully meet a plant's specific needs. The UL-listed system operates on 120 VAC power and is housed in an anodized aluminum enclosure. In addition, security coding is an option, and conventional button and switch controls are also available.



and support, Meurer Research, Inc. is the supplier that utility operators, contractors and engineers can rely on for the very latest in sludge collection equipment.

For effectiveness, reliability and simplicity, the fully engineered systems from MRI deliver outstanding performance—especially when used in conjunction with the company's plate and tube settler systems. From design and manufacturing through service

## **THE HOSELESS CABLE-VAC™ SLUDGE COLLECTOR**

The "Hoseless" Cable-Vac™ sludge collector was developed to operate in the restricted area below plate settlers where vertical space is limited and many overhead obstructions exist.

The "Hoseless" design eliminates the only problem with operation of a suction sludge collector under plates; the flexible hose which by design must float and can, therefore, become entangled in the plates.

The beauty of the hoseless device is that it utilizes components from the traditional Cable-VAC™ sludge collectors which have been in service in varied applications for many years.

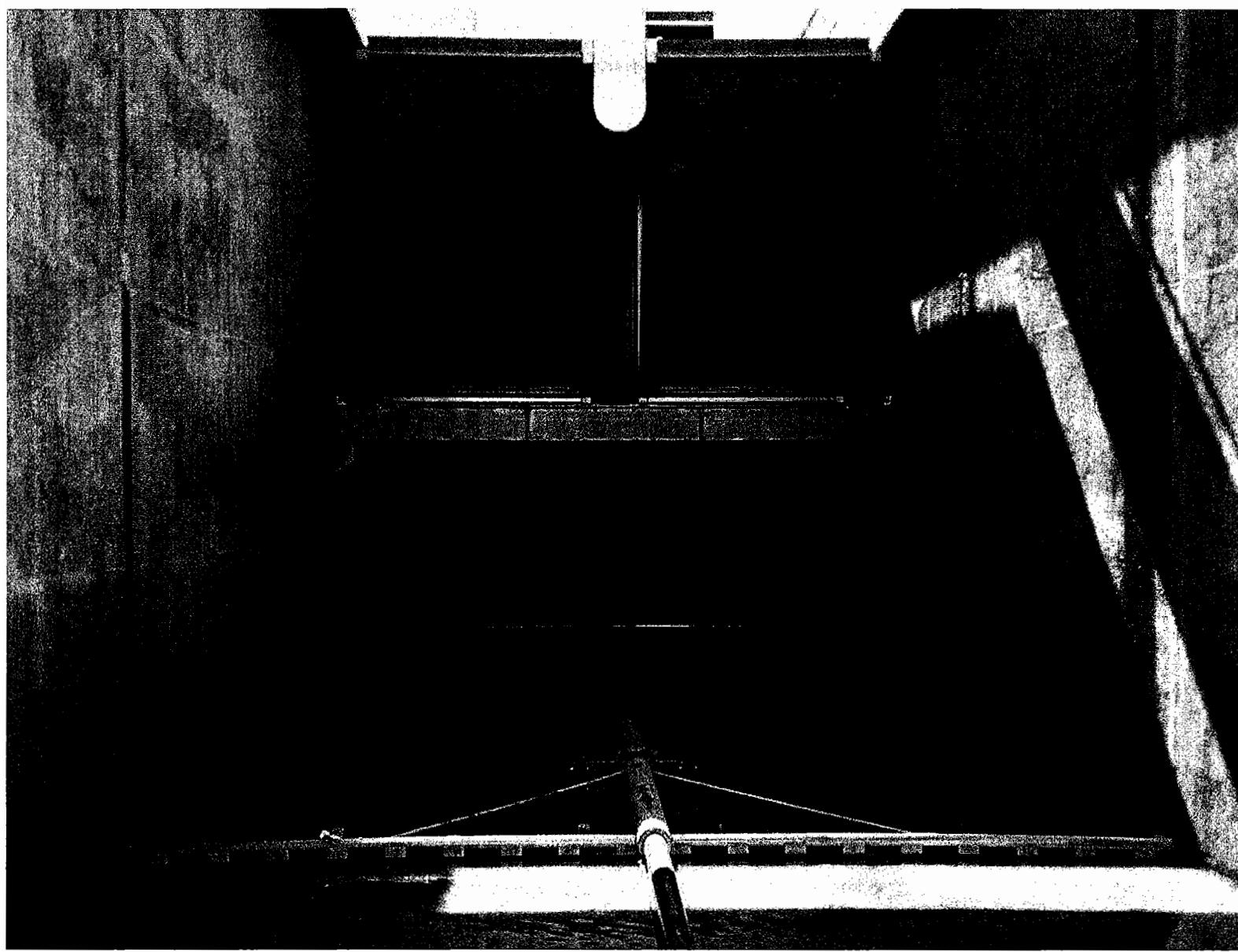
In the hoseless Cable-Vac™, the floating hose has been replaced by a horizontal telescoping pipe sludge conduit.

### **OPERATION OF THE HOSELESS CABLE-VAC™:**

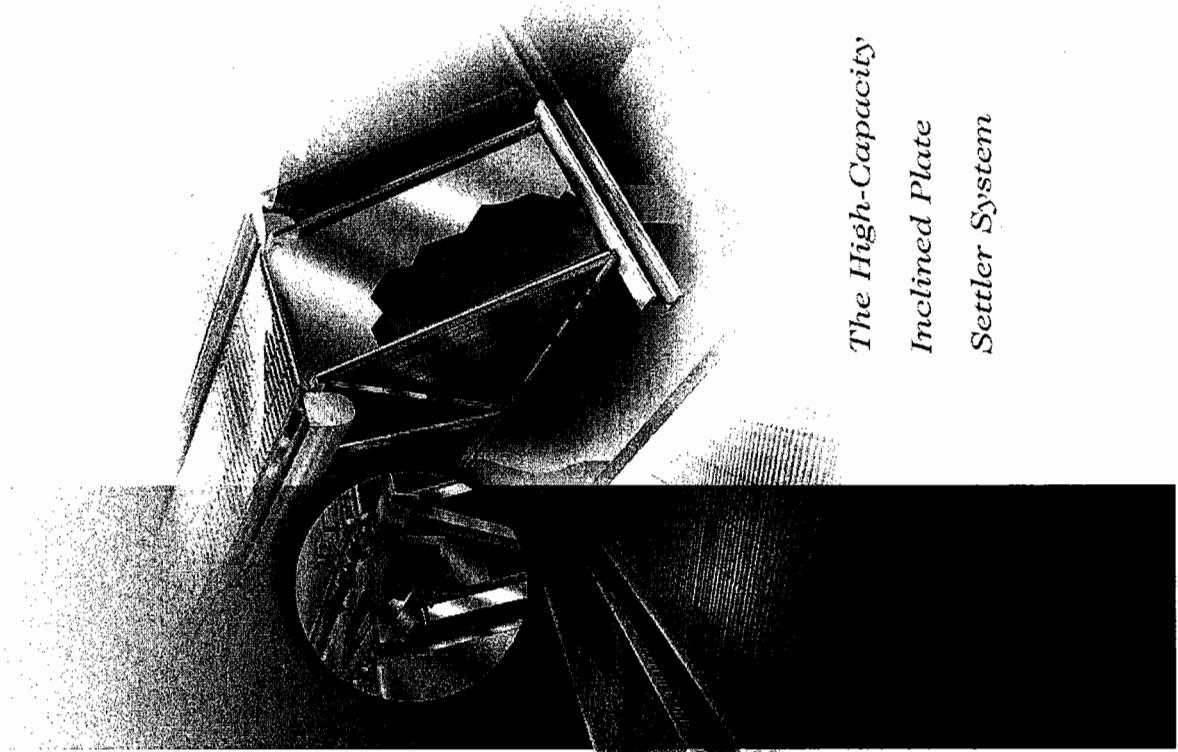
Sludge which has settled on the bottom of the sedimentation basin is collected by the traveling sludge collector which consists of two collection header pipes connected to a large center telescoping pipe. Patented directional orifices along the bottom of the collector pipes extract sludge from across the floor of the sedimentation basin and send it in a spiral pattern to the large center pipe. The flow then passes through the outer telescoping pipe to the inner telescoping pipe and to the end of the sedimentation basin and out through the wall. A sludge valve at the end of the outlet pipe controls the flow.

The unit is half of the total length of the basin; each header pipe covers half of the basin.

The low profile of our "Hoseless" Cable-Vac™ can also be used to extend under baffles to allow for cleaning areas in the flocculators or behind distribution walls. (Baffles must be the plank stainless steel baffles provided by MRI which have the rotating bottom plank designed specifically for this purpose.



# MRI PLATE SETTLERS



*The High-Capacity  
Inclined Plate  
Settler System*



MRI RESEARCH INC.  
1561 N.W. 13th Avenue  
Gainesville, Florida 32601  
(305) 279-8273  
FAX (305) 279-8472

# Patented solutions 25 years in the making.

Today's water and waste water treatment facilities are always looking

for ways to improve clarifier system performance with an eye to practicality, efficiency and economics. The solution? An inclined plate settler system from Meurer Research, Inc. These plates deliver the highest flow rate and solids capture available for the ultimate in clarifier function. What's more, the all-stainless steel self-cleaning system provides long-lasting strength, is extremely cost effective and can be configured for virtually any new or existing basin.

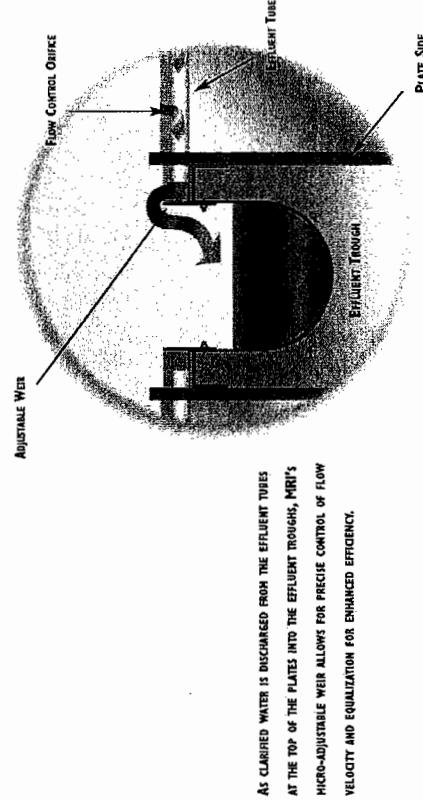
Since 1978, utility companies, municipalities and consulting engineers have relied on MRI for the latest shallow-depth sedimentation technology. With more than 50 patents and hundreds of installations, Meurer Research continues to lead the way with innovative, high quality equipment. Furthermore, MRI is the only 100% employee-owned company in the industry that designs and manufactures all its products in-house in the U.S.

**THE GOLDEN WATER TREATMENT PLANT, COLORADO—THIS FACILITY IN SCENIC GOLDEN VALLEY**

SEVERAL MILLION GALLONS MORE PER DAY WITHOUT ANY INCREASE IN BATH SIZE OR LAND AREA, THANKS TO MRI PLATE SETTLERS.

CLEAR WATER PRODUCTION RATES ARE GREATLY INCREASED BECAUSE MRI INCLINED PLATE SETTLERS DRAMATICALLY SHORTEN THE DISTANCE PARTICLES MUST TRAVEL (A FEW INCHES COMPARED TO SEVERAL FEET IN CONVENTIONAL CLARIFIERS).

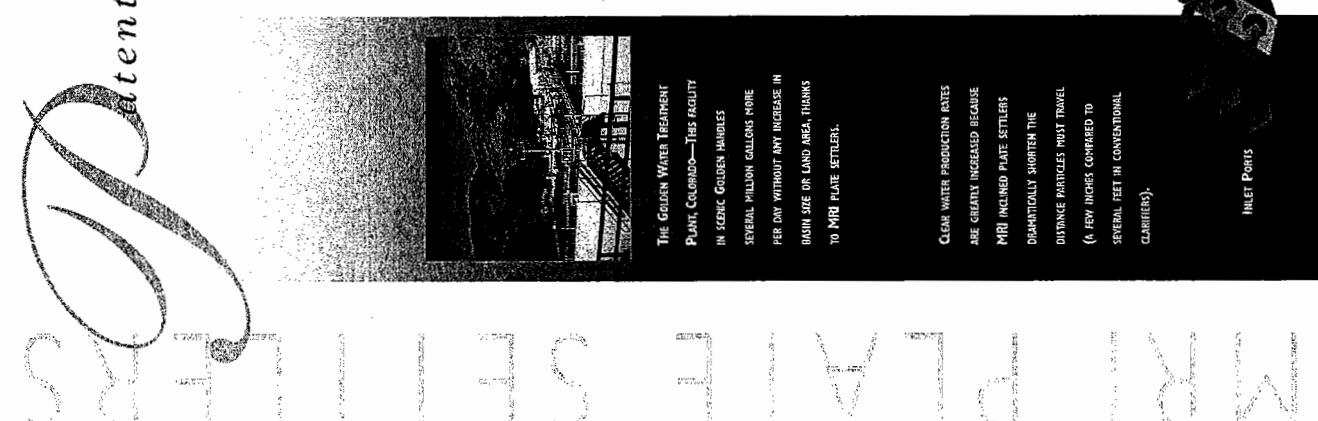
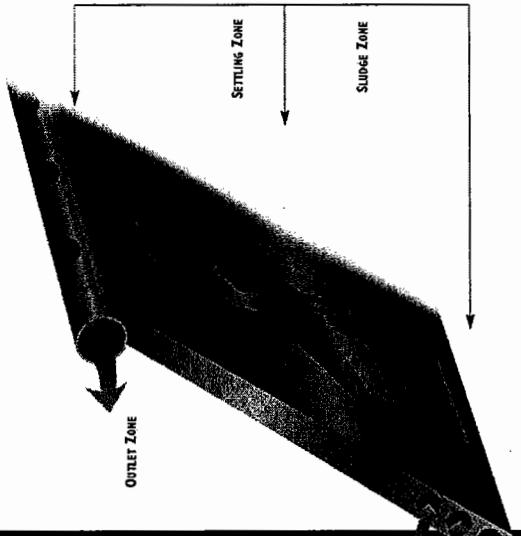
INLET Points



## A process proven to increase solids removal.

Designed around the principle that inclined plates in a basin increase the capacity of water production, the patented MRI plate settling system consists of a set of plates with a combination outlet support tube at the top of each plate edge. Supported by the tubes, the plates are installed at a 55° to 60° angle between two effluent troughs. The sides of the plates fit together to form a wall with inlet ports at the lower end of each side. A stainless steel truss structure supports the system to position the top of the system at the water line.

In the meantime, clear water is conducted upward between the plates and into six orifices in the outlet (or effluent) tubes, where it flows to the side of the plates and across a weir (which is adjustable to maintain equal flow for greater efficiency) into the effluent trough. The troughs then take the flow to the end of the basin and out.



## *Uniquely designed for efficiency and convenience.*

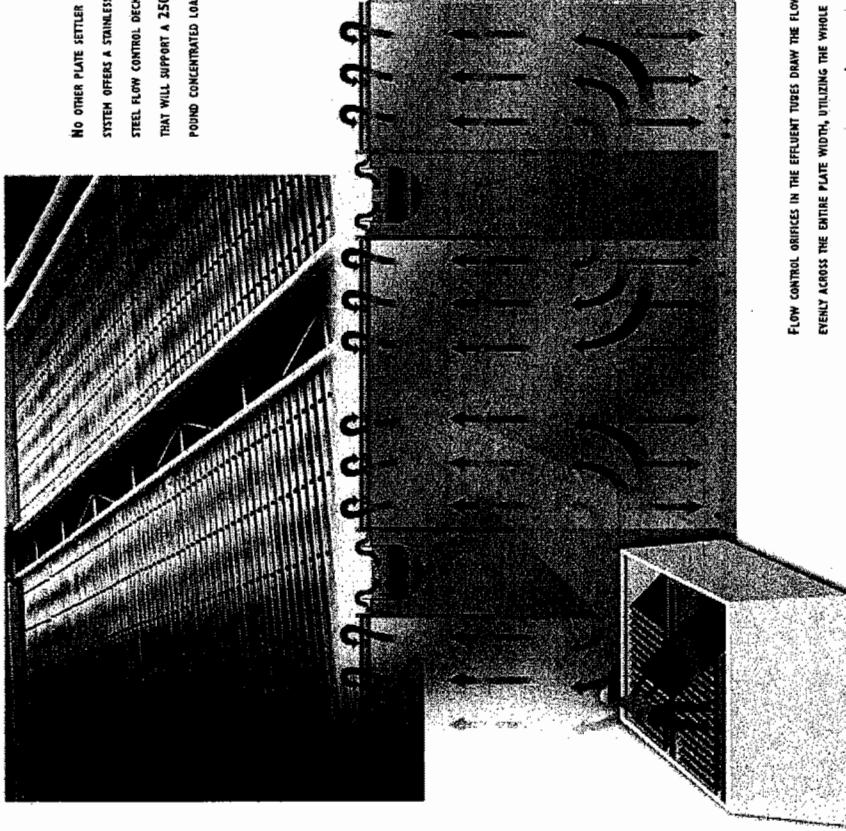
The all-stainless steel construction of MRI's plate settler system provides superior strength and durability. However, what truly sets our plates apart from other plate settling systems is the patented hydraulic flow control deck.

Meurer's flow control deck is made up of a set of stainless steel tubes which are actually the top edge of each plate settler. Each tube has a series of metering orifices that extract flow evenly from across the width of each plate for the most uniform flow distribution available. Coupled with the adjustable weir, MRI's system offers more flow control, capacity and efficiency than any other system.

Moreover; since the plates are mounted in rows at water level in an array that forms an extremely solid deck, it is strong enough to be walked on during installation, inspection or repairs. Whereas other systems have plates that are trapped under effluent troughs or permanently attached to the structure, MRI plates are easily viewed and removed from above without disassembling other components.

BROOKFIELD WATER TREATMENT PLANT, COLORADO—THIS CITY NEEDED TO EXPAND PLANT OPERATIONS BY 100% ON A PROPERTY THAT WAS ALMOST FULLY UTILIZED, SO ANY MODIFICATIONS HAD TO BE VERY COMPACT. INCLINED PLATE SETTLERS WERE INSTALLED IN THE FILTER BACKWASH RECLAIM SYSTEM IN AN UNDERGROUND VAULT, AND TODAY ARE TREATING 6,000 GALLONS PER MINUTE—WITHOUT CHEMICAL FEED.

PLATES CAN BE EASILY INSPECTED AND REMOVED INDIVIDUALLY FOR CLEANING, MAINTENANCE OR REPAIR—  
ALL WITHOUT DRAWDOWN THE BASIN TO GAIN ACCESS.



NO OTHER PLATE SETTLE SYSTEM OFFERS A STAINLESS STEEL FLOW CONTROL DECK THAT WILL SUPPORT A 250-POUND CONCENTRATED LOAD.

FLOW CONTROL ORIFICES IN THE EFFLUENT TUBES DRAW THE FLOW UP EVENLY ACROSS THE ENTIRE PLATE WIDTH, UTILIZING THE WHOLE SURFACE AREA FOR MAXIMUM SETTLING EFFICIENCY. IN ADDITION, THE INFLOW IS INTRODUCED ACROSS THE PLATE FROM THE LOWER SIDE, RATHER THAN STRAIGHT UP FROM THE BOTTOM, ENSURING MINIMUM INTERFERENCE WITH DOWN-FLOWING SLUDGE.

*For ultimate performance, the choice is clear.*

Engineered for simple precision, MRI's state-of-the-art plate settler system\* allows for more water flow and settling area to greatly enhance clarification effectiveness and productivity. NSF-61 approved plates, troughs and support structures are manufactured using solid stainless steel for longevity.

**RTR SLUDGE COLLECTOR DRIVE**  
Compact, powerful, reliable drive for underwater sludge collector.

**FLOW CONTROL DECK**  
Composed of top support tubes, MRI's unique flow control deck extracts clarified water evenly across the plates and distributes it evenly into the effluent troughs.

**SELF-SEALING SIDE BAFFLES**

Plates are installed so that they stack and interlock to form a solid wall, which causes influent to enter the side ports.

**LEVELING FLOW WEIR**  
Combined with MRI's patented flow control deck, the adjustable weir easily manages irregular flow velocities.

**PUTTING THE PLATE SETTLER SYSTEM INTO OPERATION.**

The influent enters the clarifier basin through the helical flow diffuser (not shown), which creates a quiet zone beneath the plate settlers. The flow enters the plates through feed ports in the lower sides of each plate and rises up between the plates as solids are settled out of the flow stream. Clarified water emerges through the outlet pipes at the top of each plate and is discharged into the collection troughs.

\*Patented

**EFFLUENT TROUGHS**

Side-mounted troughs work with the flow control deck to provide even flow distribution off the tops of the plates.

**FLOW CONTROL ORIFICES**

Only MRI plates provide metered flow distribution across the entire plate width for even flow as water rises up through the plates and into the effluent tubes.

**CABLE-VAC™**

**SLUDGE COLLECTOR**

The settling system comes with a computer controlled floor-traveling sludge removal suction system designed specifically for plates and manufactured by MRI.

**INCLINED PLATES**

Available in 5' to 10' lengths, the 100% stainless steel plates are the smoothest, flattest and strongest plates in the industry.

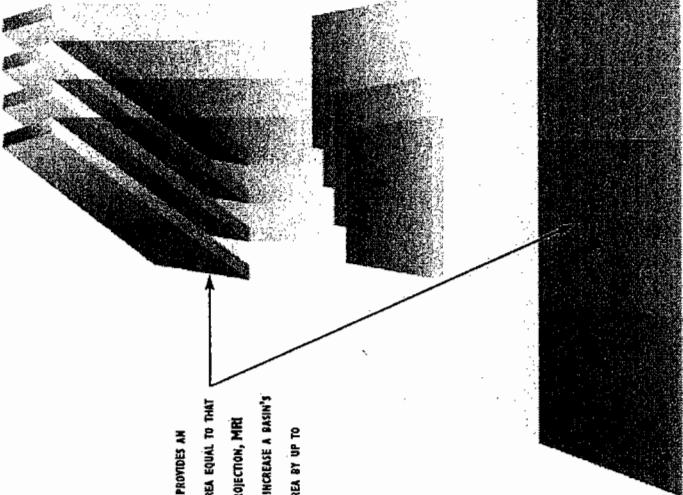


## *Improved clarifier capacity. Improved cost savings.*

In the sedimentation process, a clarifier's capacity is proportional to the surface area of the basin. Using the MRI plate settling system, surface area for solids settling is provided by rows of inclined plates installed at 55° to 60°, in effect compressing the capacity of a large conventional clarifier into a significantly smaller footprint. As more plates are utilized, productivity increases proportionally along with the cost-effectiveness of clarifying operations.

In fact, MRI systems are far more economical compared to the costs of a medium or large clarifier with no sedimentation enhancement. Whether building a new facility or expanding an existing one, plate settlers provide maximum flow using minimum space—which adds up to dramatic savings in land and construction costs. Additionally, plate settlers produce a consistently higher quality effluent, resulting in typical chemical cost savings of 30%. Further costs can be saved by using plate settlers in reclaiming filter backwash waste water and in treating membrane reject water.

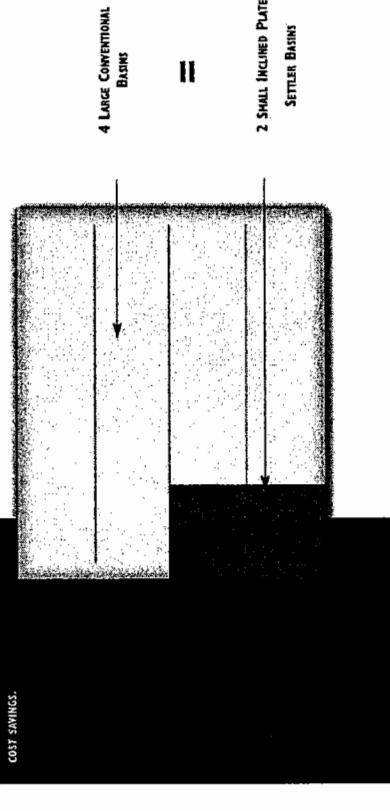
By installing MRI plates at a 55° to 60° angle, more settling surface area can be accommodated in less space, providing for increased efficiency and cost savings.



### *Adaptable to meet specific requirements.*

The Meurer Research plate settling system effectively depending on a facility's unique installation and design needs or limitations. The cartridge form combines the plates, effluent troughs, truss frame and flow control deck in a preassembled module, or "plate pack" that can be placed in the basin by a crane, minimizing field labor. The component form is shipped as individual elements that are placed in the basin item by item, allowing the system to be installed inside or beneath a facility.

In addition, MRI ships equipment in two different forms



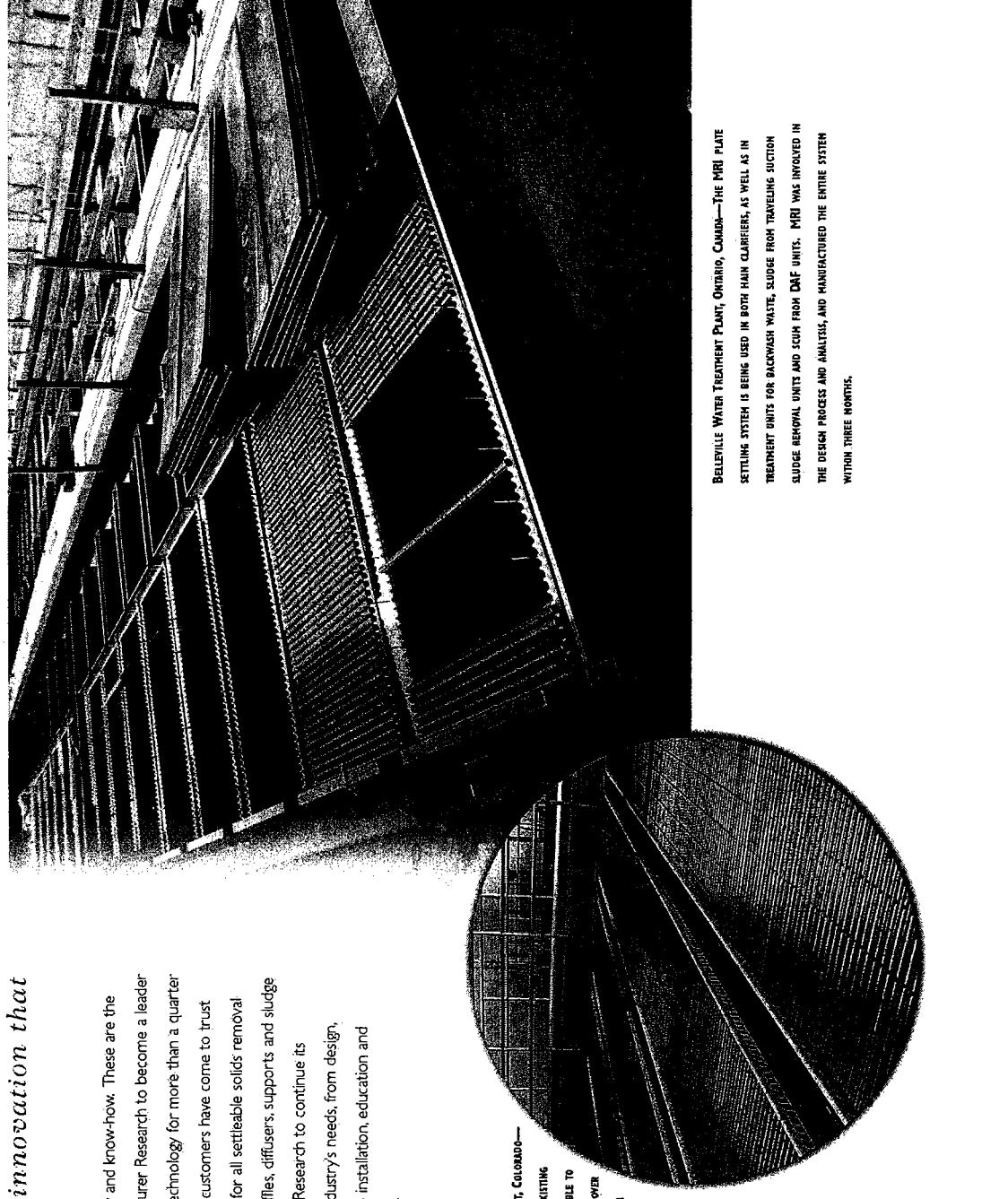
© 1992 Meurer Research Inc.  
MRI™ is a registered trademark of Meurer Research Inc.

*Meurer Research*

## On-site success: The inclined plate settler system in action.

### *Trust MRI for innovation that sets the trend.*

Experience, reliability, creativity and know-how. These are the qualities that have allowed Meurer Research to become a leader in the field of sedimentation technology for more than a quarter of a century. That is also why customers have come to trust MRI as their complete source for all settleable solids removal products, including troughs, baffles, diffusers, supports and sludge collectors. Count on Meurer Research to continue its commitment to serving the industry's needs, from design, engineering and production to installation, education and after-market customer service.



#### CITY OF AURORA WATER TREATMENT PLANT, COLORADO—

By adding MRI plate settlers to its existing direct filtration plant, the City was able to decrease basin size by a factor of 10 over hor-p-plate designs, allowing the system to be housed in a new building. The project was completed in less than a year, including the new building.

BELLEVILLE WATER TREATMENT PLANT, ONTARIO, CANADA—The MRI plate settling system is being used in both main clarifiers, as well as in treatment units for backwash waste, sludge from traveling suction sludge removal units and scum from DAF units. MRI was involved in the design process and analysis, and manufactured the entire system within three months.

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## Plate Settlers

 [Photo Gallery](#) [Illustration Gallery](#)

### Plate Settlers

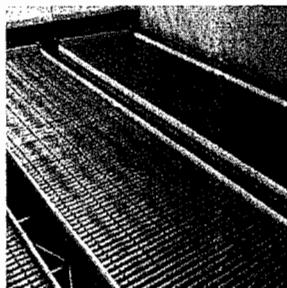
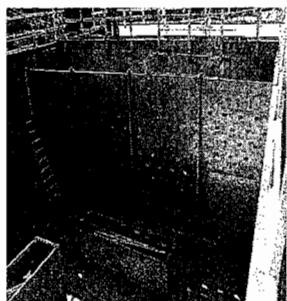


Plate settlers have been in existence since the turn of the century. Only recently has the technology advanced to the point that allows plate settlers to be cost effective. As more engineers and plant personal realize the cost savings associated with plate settlers they are becoming more and more popular. Plate settlers can decrease the footprint of the settling basin by as much as 90% over an open basin or as much as 50% over a basin with tube settlers which results in real estate and concrete cost savings. There are design issues that must be considered for plate settlers to function properly. Since settling enhancement has been our expertise for over 25 years and we design, patent, and manufacture our own plate settlers, all of these issues have been addressed and we offer the most efficient and easy to maintain plate settler on the market today.

### Baffles

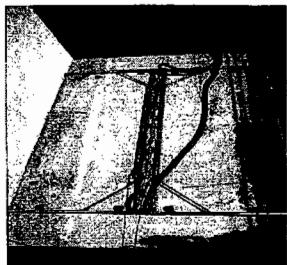


The advantages of MRI plate settlers are:

■ **INFLUENT DISTRIBUTION** – MRI's Helical Flow Inlet Diffuser\* is a compact way to introduce flow into the basin evenly. introduces the flow evenly into the basin to blend , which maintains floc structure, and allows flow to travel evenly down the side channels without short circuiting.

### Sludge Collectors

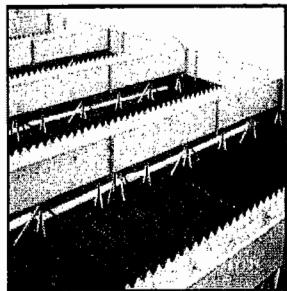
■ **SMOOTH PLATE SURFACE** – The surface of MRI plates are completely smooth. They have nothing that would interfere with the



distribution across the plate or the movement of solids down the plate, i.e. textures, ribs, corrugations or stampings either vertical or horizontal.

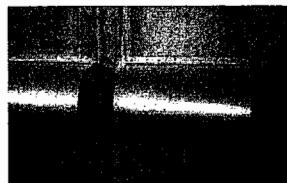
- **EFFLUENT DISTRIBUTION** – MRI has incorporated two very important features which guarantee even distribution through each plate and over the entire basin.

### Tube Settlers



**Top Tube\*** - As the flow reaches the top of the MRI plate settler it is distributed evenly across the entire width of the plate by the orifices spaced across the top tube. This functions as the effluent weir and assures use of the entire plate.

### Inlet Diffusers

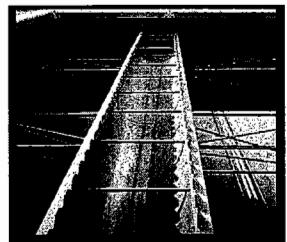


**Effluent Weir** - The water then flows over the adjustable effluent weir which establishes equal distribution between each plate pack.

\* Indicates items either patented or patent pending

### Flow Description

#### Troughs



Flow is introduced to the basin through the helical flow diffuser (not shown) which blends the incoming water with the water already in the basin without shearing floc particles. The flow is then channeled between the plate packs and enters the plates via the openings located in the sides of the plates at the bottom. (See the green arrows in Fig. 1, in the illustration gallery) The flow then travels up the plate while the settled solids travel downward (see the red arrows in Fig. 1, in the illustration gallery) and drop to the basin floor where they are removed by the sludge collector.

As the flow travels upward over the plate, (green arrow Fig. 2, in the illustration gallery) it spreads out over the entire width of the plate due to the orifices spaced evenly across the top tube. This even distribution eliminates short circuiting and allows for even settling. As the solids settle onto the plate settler (see red arrow Fig 2, in the illustration gallery) they are allowed to slide down the  $55^{\circ}$  angle and off of the bottom of the plate to the basin floor. It is very important that there are no ribs, textures, corrugations or indentations (sometimes used for strength) to interfere with the settled solids. Any slight obstruction will accumulate solids and block off the plate.

The flow enters the top tube via the orifices and travels through the tube and

over the weir into the effluent trough. (See the green arrows in Fig. 2, in the illustration gallery).

## Manufacturing:

MRI has designed, patented and manufactured its own products since our inception in 1975.

Our 25,000 square foot production facility is located in Colorado, which is centrally located for shipping to the east coast or the west coast. Our production techniques have been years in the making and are custom designed to fit our requirements. MRI's plate production utilizes the most modern, up to date machinery available today. Our employees are trained in the manufacturing of plate settlers. Stringent quality control measures are implemented to insure a quality product. When the plate settler module is completed and checked it is loaded onto a truck and delivered directly to the jobsite.

Another important advantage to making our own plates is that should the contractor have any questions he can talk directly to the person in charge of manufacturing. This has been extremely important should the contractor have special requests i.e. last minute changes due to unforeseen situations.

## Installation:

The plates are shipped in a "module or plate pack" which consists of a row of plates installed into a truss type structure. This module is assembled at the MRI manufacturing facility in Colorado. They are then loaded onto a flat bed trailer and shipped to the jobsite. Usually 2 modules are loaded onto a truck. Once at the jobsite, the modules can be lifted off by a crane directly into the basin or placed in a safe place for later installation.

This reduces the installation time by a considerable amount compared to installing the individual components.

Inside the basin the modules are supported at each end by a support beam. This beam can be provided by MRI in stainless steel or the contractor can pour them out of concrete. After the modules are set in place the troughs are installed. The modules are spaced the right distance apart to allow the troughs to be dropped into place and bolted. The installation is now complete. The effluent weirs are leveled to insure even distribution. This task is made simple as the plates can be walked on for easy access to the weirs.

For further information on the Meurer Research plate settler line of products, contact us at:



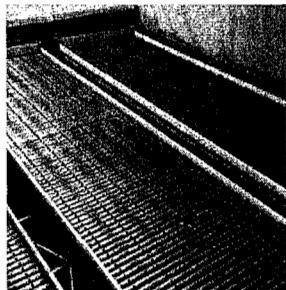
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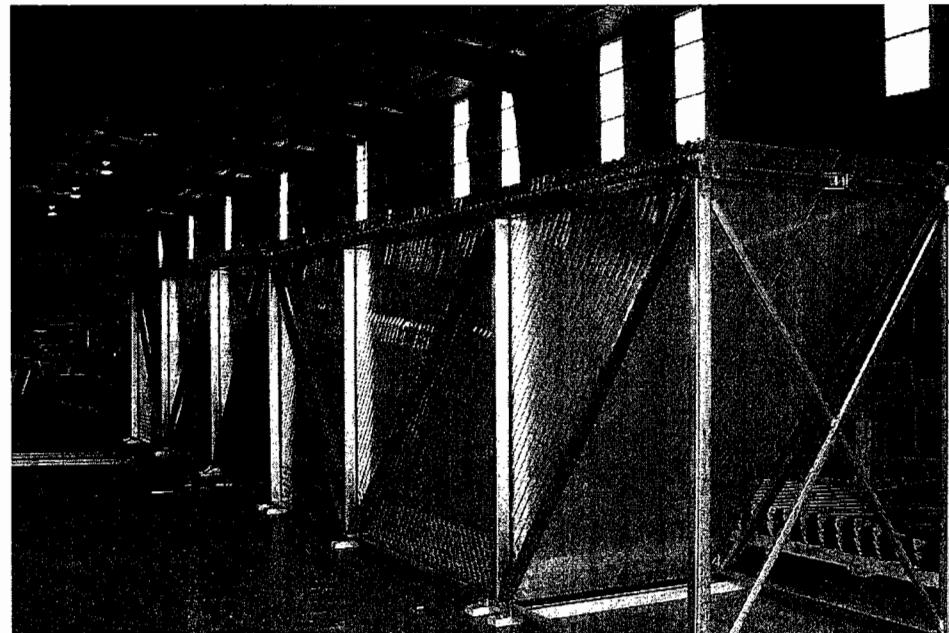


## Photo Gallery

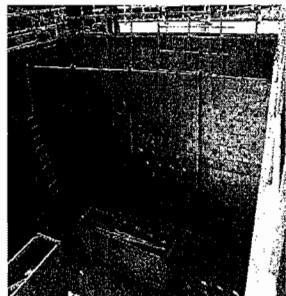
Plate Settlers



Manufacturing

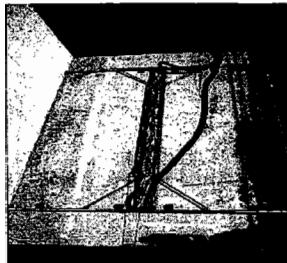


Baffles

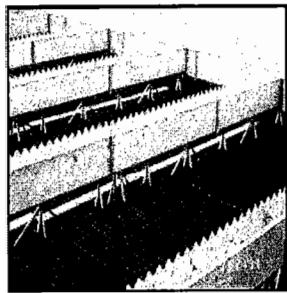


Shipping

Sludge Collectors



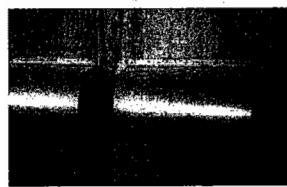
Tube Settlers



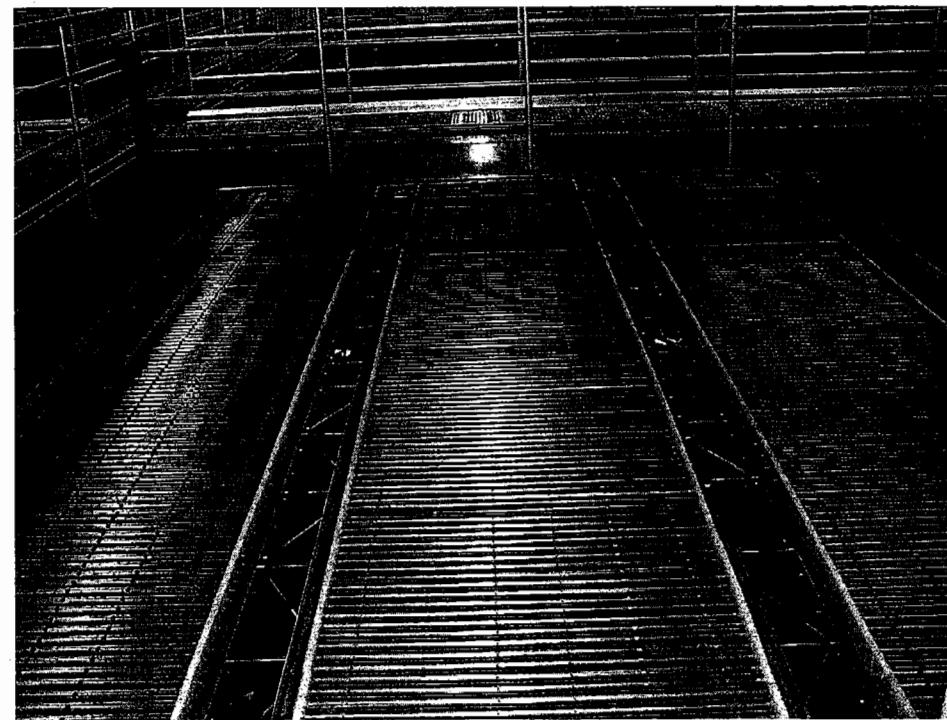
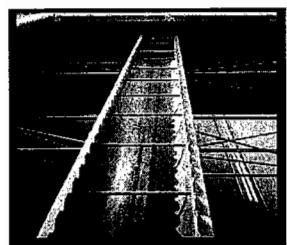
Inlet Diffusers



Finished Product

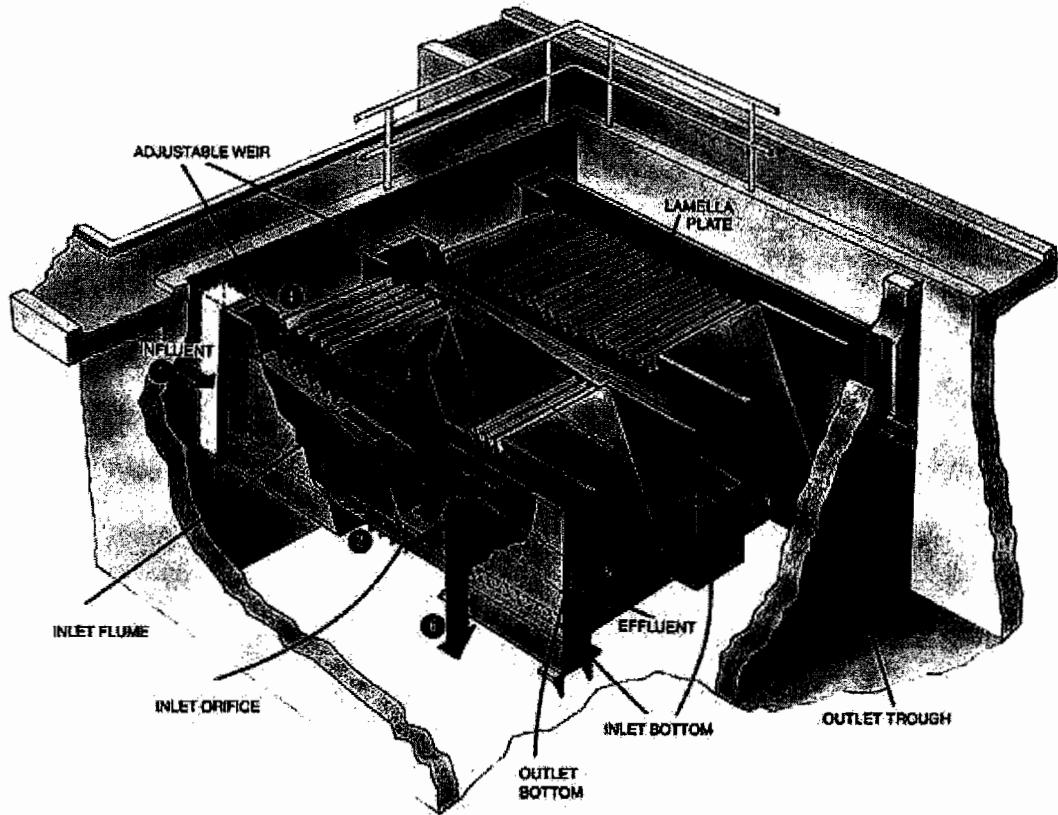


Troughs





Photograph of Parallel Plate Packs inside a Clarifier.



Schematic Diagram for Inclined Plate Settlers

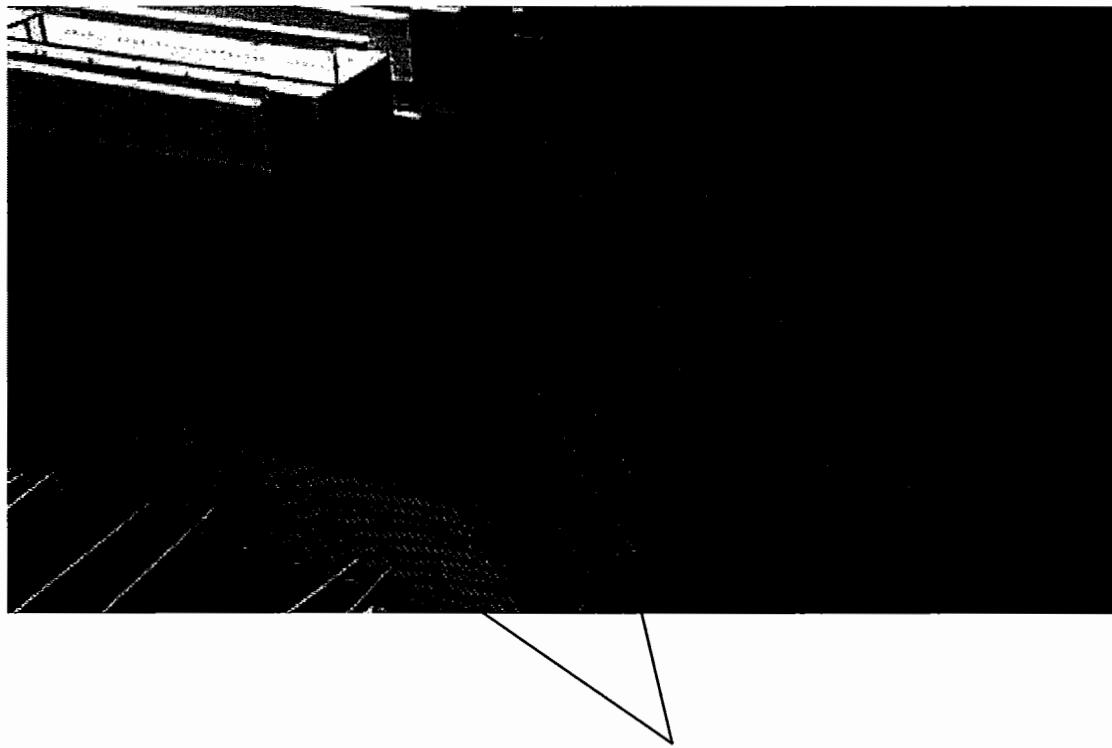
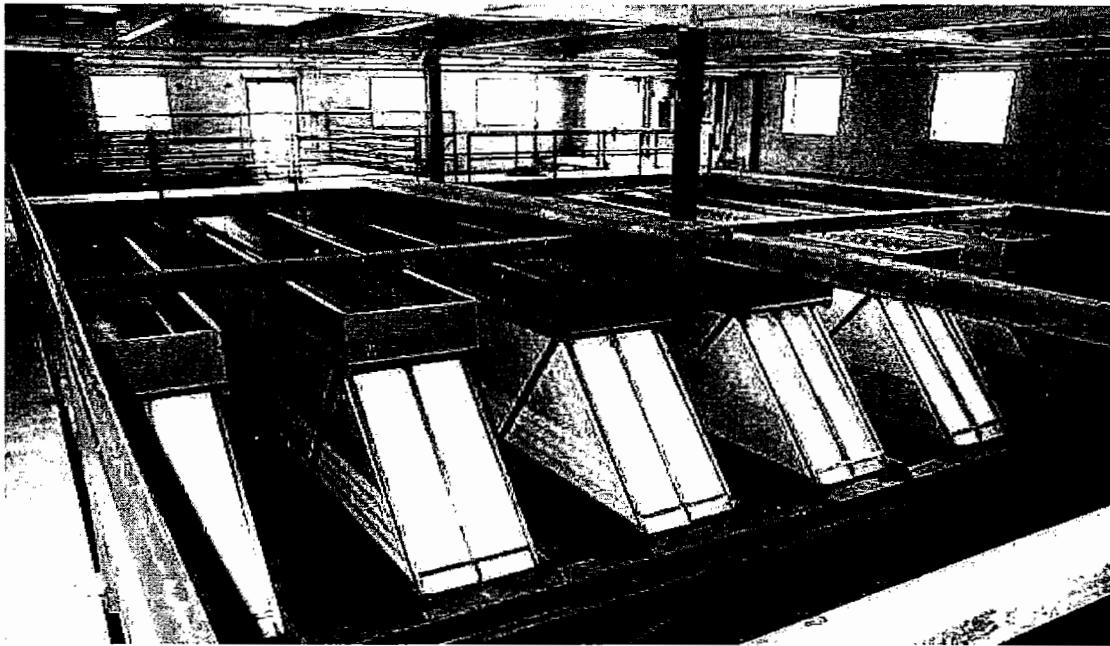
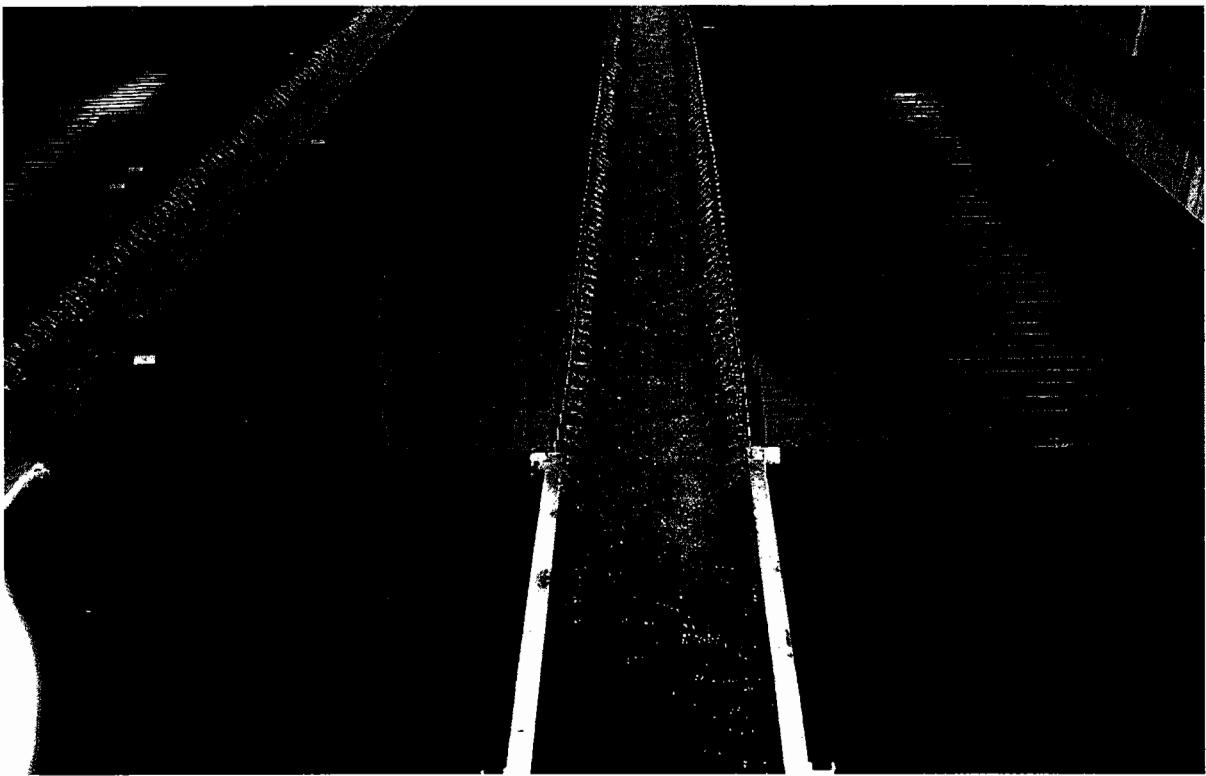


Plate Assembly  
Inlet Openings

Photograph of Plate Assembly showing the Inlet Openings.



Photograph of Plate Packs with a V-notch Effluent Collection Channels.



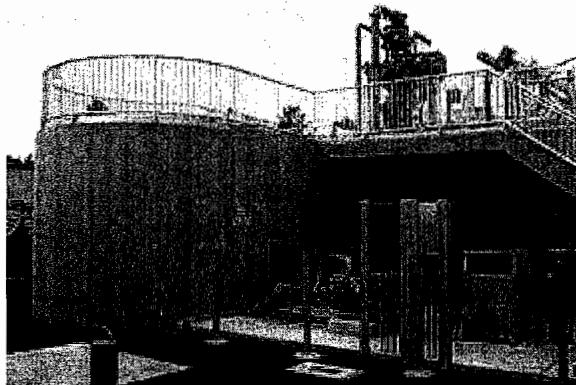
Photograph of GEWE Inclined Plate System with Collection Channels between Plate Raws.



## APPLICATION PARAMETERS

- 1 – 46 mgd per HEADCELL™
- 75 to 200 micron standard designs are available.
- Custom designs available at request.
- Headloss less than 12 inches at peak flow.
- Screening prior to the HEADCELL™ is required in wastewater applications.

## Application Bulletin: HEADCELL™ Headworks



### Headworks Application

The flexible HEADCELL™ design provides optimum grit capture with a space-efficient configuration that uses no moving parts.

The primary application of the HEADCELL™ is to remove grit as small as 50 microns (S.G. 2.65) from screened sewage in the headworks of wastewater treatment plants. Historically, grit removal has usually been installed in the headworks of the plant. It is an important part of design to prevent grit deposits in pipelines, channels, and in anaerobic digesters, thickening tanks, digestion tanks, and aeration basins. Headworks grit removal protects primary sludge pumps, centrifuges, digestion systems, solids handling equipment, high-pressure progressing cavity and diaphragm pumps, and other mechanical equipment by reducing abrasive wear.

Vital design and application considerations for choosing grit removal equipment include: headloss requirements, space requirements, removal efficiency, organic content, life-cycle costs, and characteristics of the native grit. Plant grit load should be investigated to quantify the impacts of sugar sand or light

grit. When all of these are considered, the HEADCELL™ is often the most cost effective grit removal solution.

### HEADCELL™ Description

The HEADCELL™ offers a low headloss option to removing fine grit and abrasives as small as 50 microns (S.G. 2.65). The HEADCELL™ is a non-mechanical, forced vortex grit removal unit using stacked tray clarification. Grit is removed by utilizing large amounts of surface area, short settling distances, and the boundary layer effect. When combined, these allow the HEADCELL™ to remove grit as small as 50 microns.

### Application benefits:

- Small Footprint.
- Low headloss.
- No moving parts to wear out.
- High efficiency fine grit removal.
- High added value to plant through reduced O&M costs.
- All Hydraulic design.
- Simple maintenance.

## **HEADCELL™ Selection Criteria**

The HEADCELL™ is typically sized for 95% removal of 75 to 200 micron material (S.G. 2.65), and larger, with headloss of 12 inches at its peak design flow. Capacity of a single unit can be as high as 46 mgd. Multiple units can be used for higher flows. Flow to the unit can be pumped or flow by gravity. Flow is introduced to the HEADCELL™ via an inlet channel and exits over a weir. The HEADCELL™ offers design flexibility by allowing multiple inlet and outlet orientations. These varied configurations allow the HEADCELL™ to be integrated into virtually any hydraulic profile and plant layout.

The HEADCELL™ is a non-mechanical forced vortex grit removal unit. Therefore, removal efficiency increases with decreasing flow. Because the greatest quantity of grit enters the plant during the highest flow, the HEADCELL™ is sized for peak day flows. At

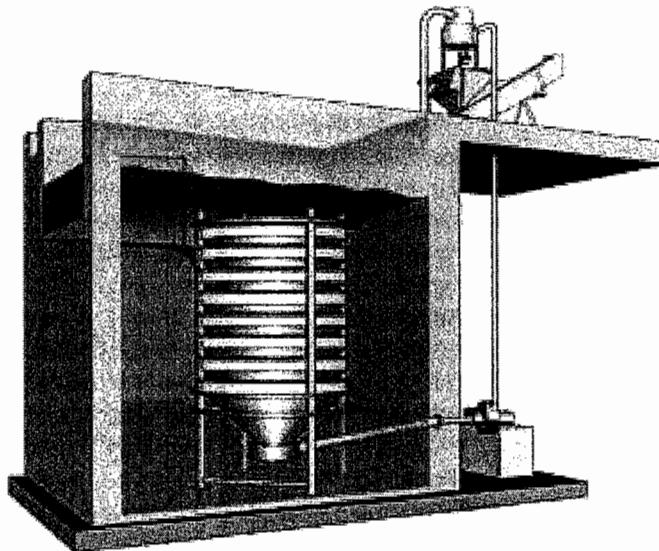
peak day flow, the HEADCELL™ will remove 95% of the specified particle. At lower flows, removal efficiency is increased.

When combined with SLURRYCUP™ and GRIT SNAIL™ grit washing system the HEADCELL™ can remove up to 95% of the total grit load and discharges clean, dry grit with less than 20% organic solids and at least 60% total solids.

## **HEADCELL™ Requirements**

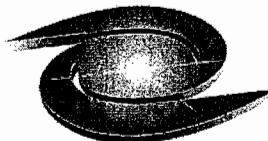
The HEADCELL™ can be operated in a start-stop scheme or continuous flow as necessary. Screening is required prior to the HEADCELL™ in the process stream. Acceptable screen opening is  $\frac{3}{4}$ ".  $\frac{1}{2}$ " or finer is recommended.

Refer to EUTEK® SYSTEMS™, INC. TEACUP™ and SLURRYCUP™ bulletins for other grit removal options.



EUTEK® SYSTEMS™, INC.  
1055 NE 25th Avenue, Suite N, Hillsboro, OR 97124  
Tel: (503) 615-8130 , Fax: (503) 615-2906  
E-mail: sales@eutek.com

HEADCELL™ is a proprietary design - patent pending.  
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**EUTEK<sup>®</sup>**  
**SYSTEMS™**

## Grit Facts

### Why should grit be removed from water and wastewater?

First, grit is abrasive and wears out equipment. The extent of this wear depends on the type of process used at the wastewater treatment plant. Equipment with moving parts will have higher maintenance costs resulting from this abrasive wear.

Secondly, grit accumulates in the bottom of channels, tanks and pipes. When the liquid velocity in a channel, tank or pipe falls below the transport velocity required to move grit forward, the grit settles to the bottom. Re-suspending this settled grit requires a higher energy input, so it often collects until physically removed during periodic cleaning. Prior to cleaning, the performance of the treatment process deteriorates, increasing maintenance costs and potentially jeopardizing compliance permits. This cleaning more often involves expensive "Confined Space" procedures, increasing the cost of clean-up.

Effective grit removal means comparing the capital cost of an effective grit removal system with the long-term operating costs resulting from abrasive wear, periodic cleaning and reduced process performance.

### Why Remove Grit?

#### Abrasive Issues - Wears out Equipment

- Collector Chains, Flights and Buckets
- Clarifier Rakes
- Pumps
- Pipes
- Centrifuges

#### What is Grit? (Conventional Definition)

- $>300\mu$  (50 mesh)
- 1 to 5 ppm Load

Traditionally, grit is defined as high density, inorganic solids greater than 300 microns (50 mesh) in size. These solids will consist of not only sand and gravel, but also seeds, ash, cigarette filters, corn kernels, melon rinds and other inorganic solids. Traditionally, most specifications require removing 50 mesh, 300 micron sand that has a specific gravity of 2.65.

The common misconception is that abrasives, referred to as grit, are predominantly larger than 200 micron (70 mesh) sand. Through multiple pilot studies and grit analysis performed within North America by EUTEK® SYSTEMS™, a more accurate definition for grit has been developed.

Grit is more accurately defined as high density inorganic solids or abrasives as small as 50 micron (270 mesh) with specific gravity 2.65. Regardless of geographic location, to remove 99% of the abrasives, it is necessary to remove all sand larger than 40-45 microns (325 mesh) in size.

As much as 95% of the grit entering a wastewater treatment plant is smaller than 300 microns (50 mesh) in size. Thus, conventional grit control systems designed to remove 100% of sand larger than 300 microns can at best remove as little as 5 to 10% of the total abrasives load during peak flow events, when grit loads are at their highest.

Grit or abrasives are rarely well defined materials in water and wastewater treatment plants. They are most usually found with attached greases and oils which modify their settling and transport characteristics significantly from that of the inorganic grit "kernel". Attached greases and oils can reduce the specific gravity of the fine abrasives to less than that of water, often making them floatable. The condition can remain until subsequent processes remove the grease layer. Then the inorganic grit "kernels" settle rapidly in downstream processes accounting for nuisance solids deposits.

Another misconception is the amount or concentration of abrasives entering wastewater treatment plants. The average is about five parts per million during dry weather conditions and up to 40 times that amount during peak wet weather events.

### **Grit More Accurately Defined**

- $>50\mu$  (270 mesh)
- 2.65 Specific Gravity
- 5 to 240 ppm Load

Looking at a treatment plant with a 4:1 peaking factor and a combined storm/sewer system (Table 2), 50 pounds of fixed solids per million gallons enter the treatment plant during the average daily 95 MGD flow, 359 days per year, for a total annual load of 1.7 million pounds. In contrast, during the 6 peak wet weather days experienced each year, the 380 MGD flow carries 2000 pounds of fixed solids per million gallons for a total annual load for 4.6 million pounds deposited each year of the total load of 6.3 million pounds. Almost 3/4 of the total annual load enters the treatment plant during six (6) days per year. During these six days, higher performance grit removal is essential to prevent subsequent problems.

A plant with a more typical 3:1 peaking factor will result in 10 to 20 peak events per year with less grit entering during each event. However, the total annual load ratio does not significantly change, with 2/3 of the annual grit load entering under these smaller but more numerous peak events.

Grit size distribution varies significantly depending on native soil characteristics and plant location (Table 1).

Larger treatment plants should invest in a grit study to determine actual grit size distribution. Knowledge of the grit size distribution will help determine actual grit removal system performance requirements.

**Table 1: Grit Size Distribution**

Mesh	Micron	Coastal Areas	Inland Areas
50	300	3 - 5%	5 - 40%
70	210	5 - 10%	10 - 60%
100	150	10 - 40%	10 - 75%
150	100	10 - 75%	10 - 95%
200	75	10 - 85%	10 - 98%

**Table 2: Grit Load Example**

Flow (MGD)	Grit Load (lbs. fixed solids per million gallons)	Days Per Year	Annual Load (lbs. fixed solids)	% of Total Annual Grit Load
95 MGD, ADWF	50	359	1,705,000 #FS	27.20%
380 MGD, PWWF	2000	6	4,560,000 #FS	72.80%
	<b>TOTAL</b>	<b>365</b>	<b>6,265,000 #FS</b>	<b>100.00%</b>

\* For additional application information, please view our [application datasheets](#).

MGD = Million Gallons per Day (1 MGD = 3785 M<sup>3</sup> per Day)

FS = Fixed Solids

ADWF = Average Dry Weather Flow

PWWF = Peak Wet Weather Flow

Grit can be removed at various process locations. Most commonly, it is removed at the headworks, thus removing the grit before it enters the treatment processes. Another common practice is to remove the grit from dilute sludge (0.5 to 1%) prior to thickening. Grit removal at other stages in the treatment process is common and may be better for some treatment plants.

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