

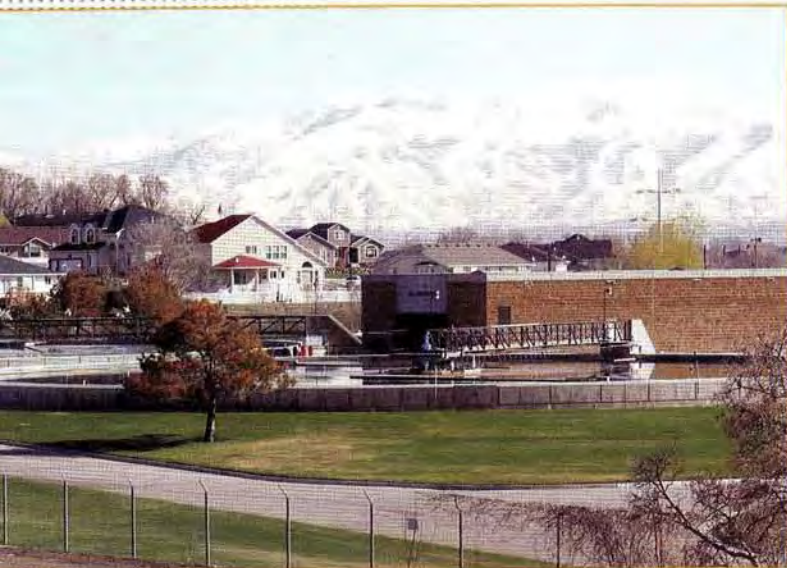
Clarifier Optimization Package

Advanced Clarifier Technology



WESTECH

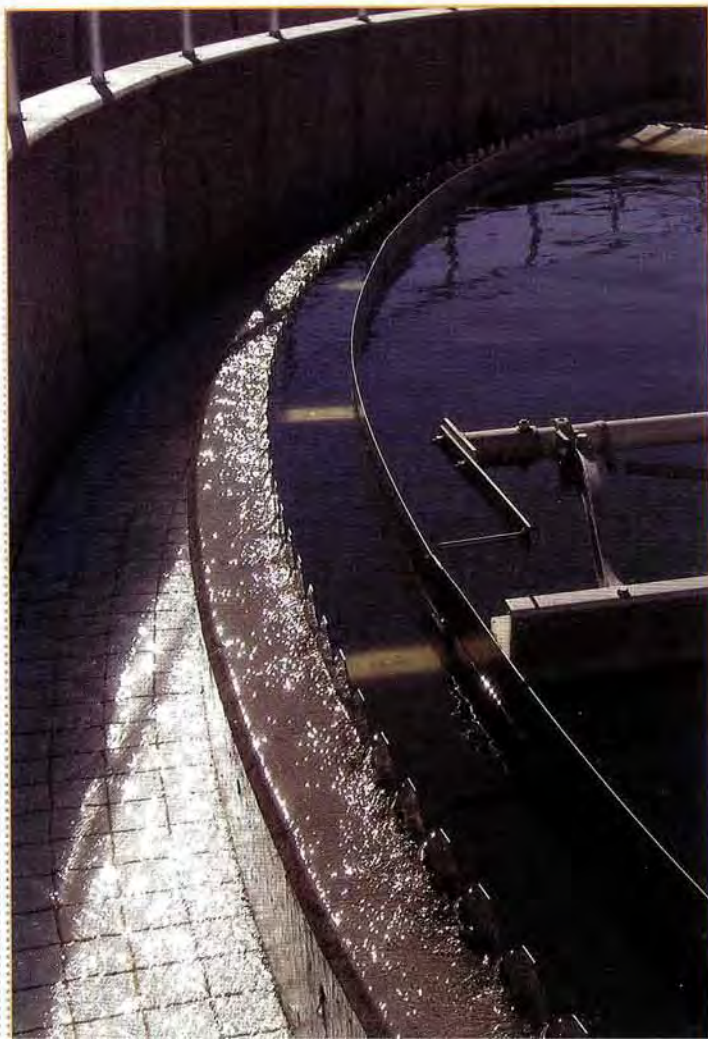
A Delicate Balance



Long-standing rules of thumb, based on manufacturing economics rather than process optimization, have clouded our understanding of clarification design. There are three basic, but interrelated, objectives of clarification:

- **to maximize the flow rate through the clarifier**
- **to produce the cleanest possible effluent**
- **to maximize underflow concentration (or minimize return sludge flow rates)**

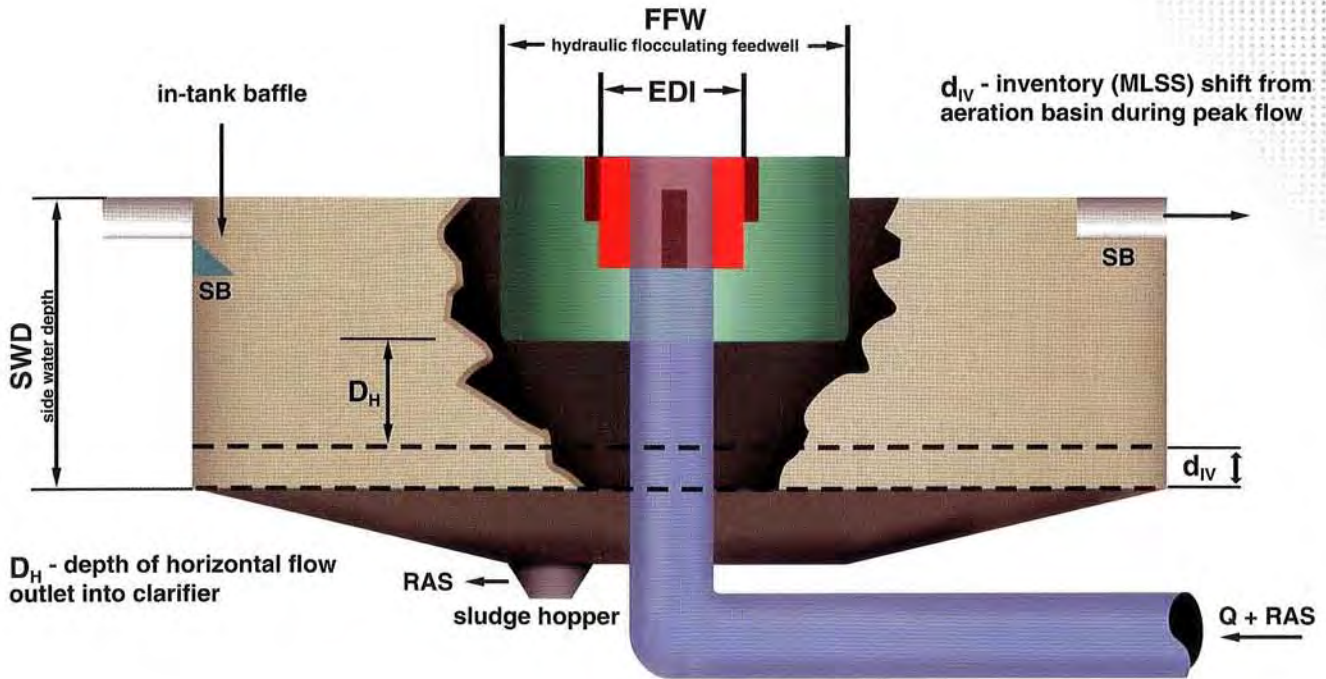
Because of the interaction of clarification process variables, optimal clarifier performance relies on a delicate balance of these interrelated priorities. The trick is how to design and size each component to generate the optimum package.



For more than fifteen years, with 450 installations and 800 individual clarifiers, WesTech has been improving the performance of both primary and secondary clarifiers with our Clarifier Optimization Package (COP™). Our experience has extended to all regions of the United States and foreign countries, in both municipal and industrial applications. This considerable experience has allowed us to constantly improve the original Clarifier Optimization Package.

The clarifier design produced by our mass balancing and sizing programs today can deliver better results than yesterday, and the COP™ Clarifier designed in the future will be better still. This unique approach to clarifier design has been adopted by several of the consulting engineering firms in the United States, and will serve the municipal and industrial markets in the future. WesTech looks forward to partnering with you to improve the effluent quality and capacity of both your primary and secondary clarifiers.

Understanding the Critical Zones of the Clarifier

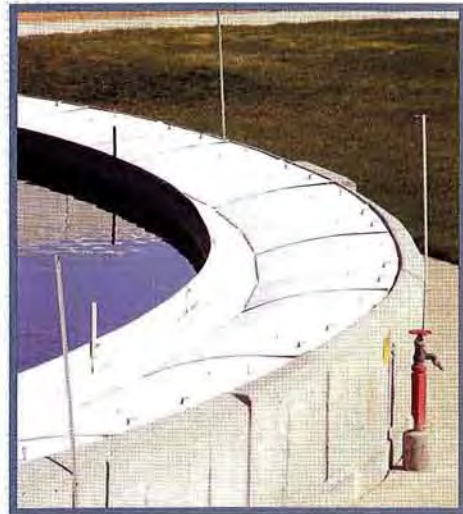


Zone	Problem	The WestTech COP Solution
Center Column	Floc shear	Size column diameter and port openings to reduce energy
Energy Dissipating Inlet (EDI)	Not installed or outdated design	Include new impinged-flow design Dual-Gate™ EDI. Introduce flow into feedwell without destructive currents
Flocculating Feedwell (FFW)	Poor flocculation, blanket scour at higher flow, eddy current created	Optimize EDI-FFW diameter and depth to promote flocculation, eliminate sludge blanket scour, and remove eddy currents
Effluent Baffling	Wall (density) currents short-circuiting, TSS carryover	Supply Crosby/Stamford baffling to control density currents at peak flow
Sludge Blanket	Excessive depth, denitrification, TSS carryover, sludge inventory near periphery	Provide spiral scrapers with properly designed depth for sludge transport capacity. Additional spiral scrapers are included when required.
Sludge Withdrawal	Rat-holing (ineffective removal due to high RAS rate / low RAS concentration) results in deep sludge blanket	Replace or modify sludge hopper or suction removal mechanism with spiral scrapers and sludge withdrawal ring
Scum Removal	Insufficient removal	Employ additional skimmer arm(s), feedwell skimmers, anti-rotation baffles, and automatic scum box flushing

Nine COP™ Design Features

1 Scum Removal

Removes scum build-up from within the feedwell and from clarifier surface.



9 Effluent Launder Covers

Eliminate algae growth and minimize maintenance time.

8 Sludge Withdrawal Ring

Reduces sludge inventory and blanket depth while maintaining high concentration. Provides rapid solids removal in conjunction with spiral rake blades.

2 Basin Configuration

Uses deeper side water depth (SWD) and proper floor slope design for maximum capacity and highest effluent quality for the least cost.

3 Density Current Baffle

Eliminates wall currents and prevents short-circuiting. The wall-mounted baffle is low in cost and requires no maintenance.

4 Flocculating Feedwell (FWW)

Promotes hydraulic flocculation in the inlet area and is designed to eliminate scouring of the sludge blanket.

5 Energy Dissipating Inlet (EDI)

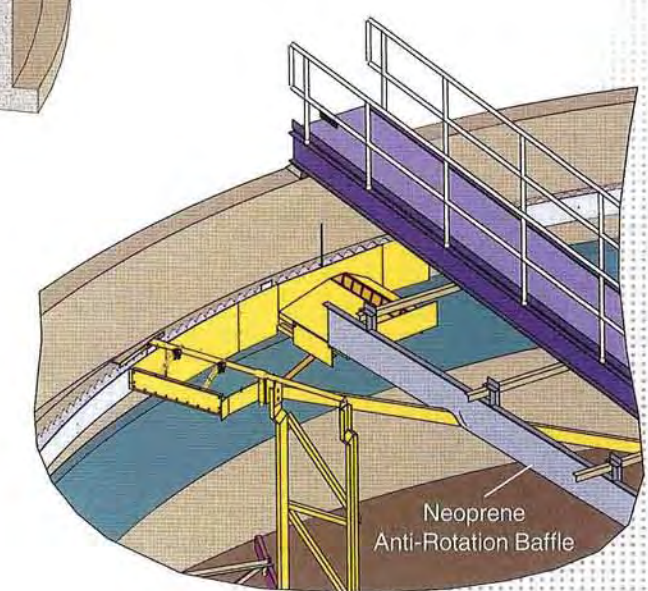
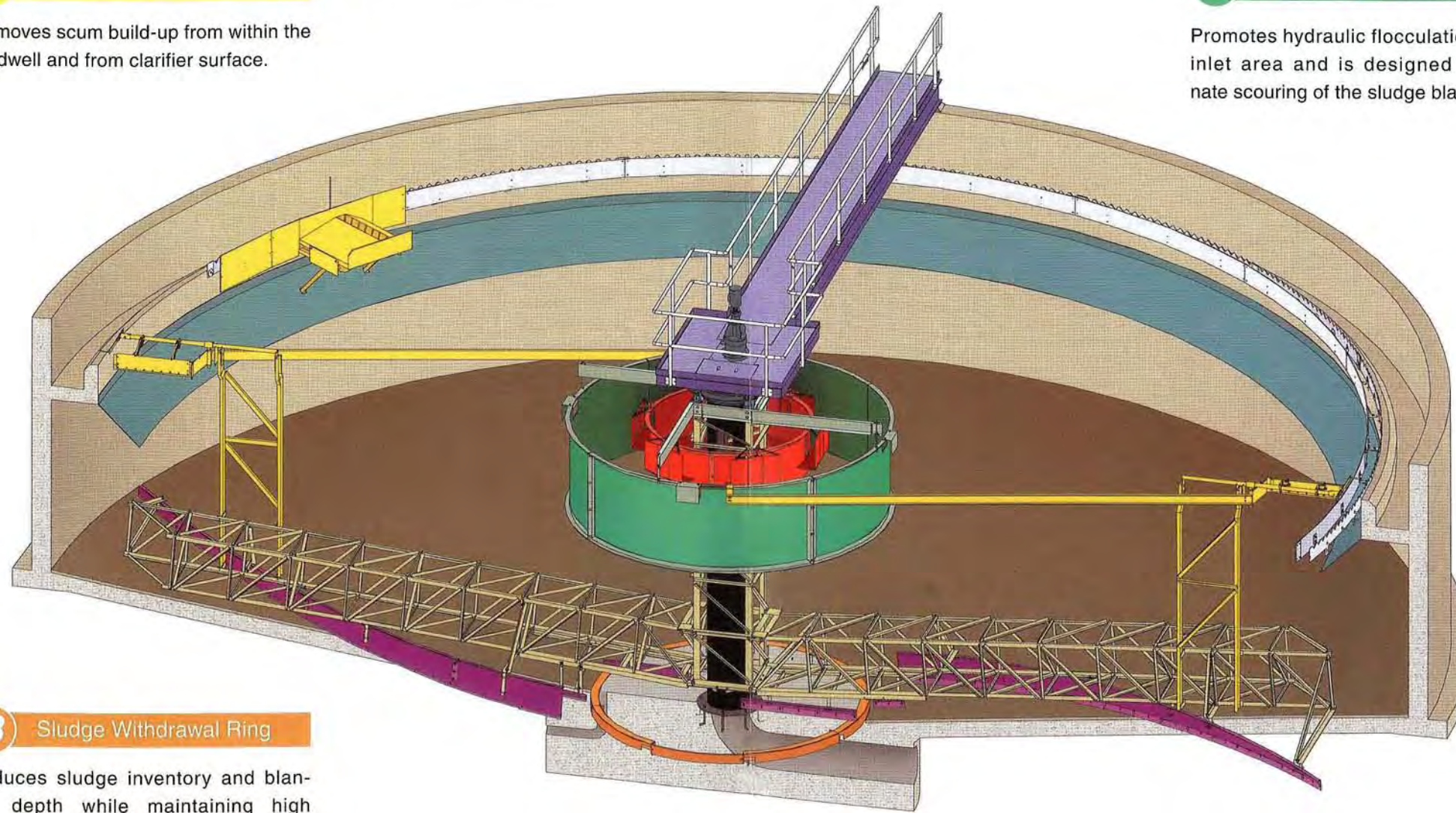
Converts the high energy feed from the center column into a lower velocity flow that is gently mixed in an impinged or tangential flow into the flocculating feedwell to maximize flocculation.

7 Center Column

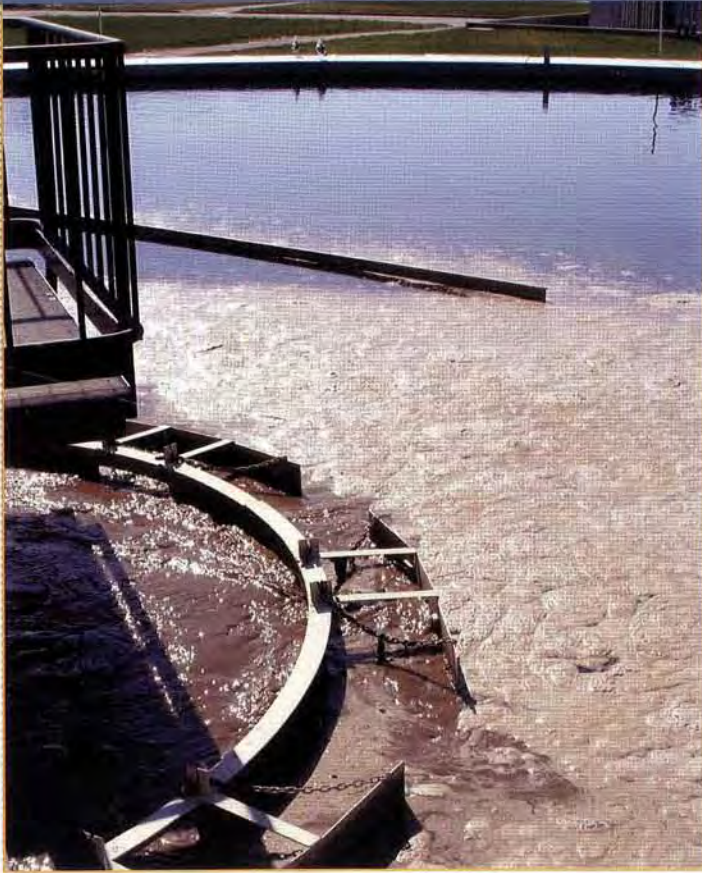
Minimizes floc shearing and reduces influent energy.

6 Spiral Rake Blades

Increase sludge transport capacity, providing rapid solids removal, and lower sludge blankets. Eliminate septicity and denitrification.



Research and Design



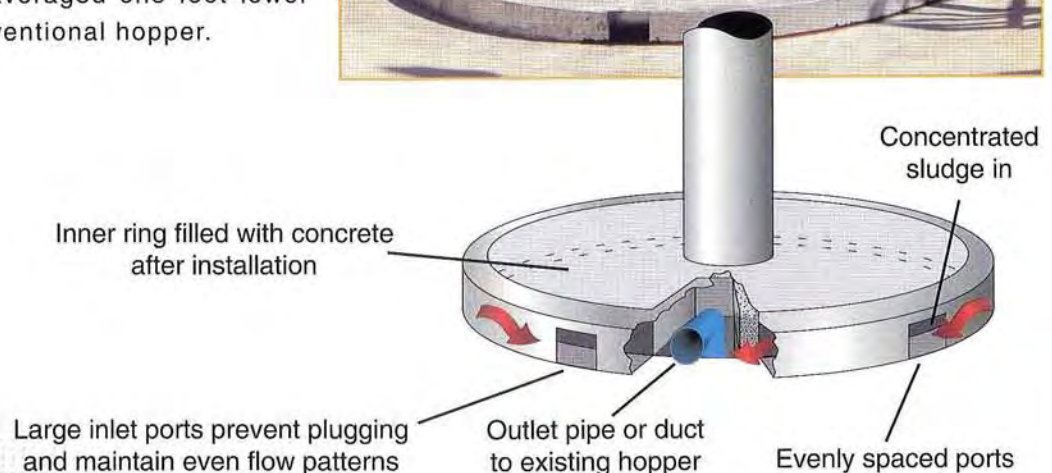
Dual Gate EDI

WesTech has developed a new Energy Dissipating Inlet (EDI) design which uses impinging flows to both promote flocculation and dissipate incoming energy. Flow enters at the water surface, ensuring that the full volume of the flocculation well is used for gentle mixing and flocculation of the biological solids. Opposing adjustable gates are arranged so that incoming flow impinges on itself, effectively dissipating incoming energy and eliminating focused flow streams that could carry into the clarification zone. The result is a well-flocculated mixed liquor that spreads gently and evenly into the clarifier without disturbing settled solids on the basin floor.

Side-by-side studies at the Central Weber Wastewater Treatment Plant in Ogden, Utah showed a 27% reduction in effluent suspended solids when using the new Dual-Gate™ EDI versus a conventional EDI in shallow secondary clarifiers.

Sludge Withdrawal Ring Produces Lower Sludge Blankets

Side-by-side studies at the Central Davis Wastewater Reclamation Facility in Kaysville, Utah compared the performance of a WesTech Sludge Withdrawal Ring to a standard sludge hopper in identical clarifiers. The research showed conclusively that a Sludge Withdrawal Ring can reduce the depth of the sludge blanket in a secondary clarifier. Sludge blankets in the clarifier with the Sludge Withdrawal Ring averaged one foot lower than in the basin with the conventional hopper.



Retrofits

Retrofit Your Clarifier

In addition to new installations, WesTech has upgraded scores of existing clarifiers to the COP™ design, resulting in performance improvements, reduced maintenance headaches, and overall cost savings. No more seal failures or plugging to deal with in suction clarifiers. No more deep sludge blankets and associated process problems in standard scraper clarifiers. No more drive unit main bearing failures to cause shutdowns.

In Memphis, Tennessee, WesTech upgraded three (3) 180 ft. dia. primary clarifiers and seven (7) 140 ft. dia. secondary clarifiers to the COP™ design. Performance improvements included an increase in suspended solids removal in the primary clarifiers from 30% to 60%, and a reduction in secondary clarifier effluent suspended solids of as much as 30%.

Fact

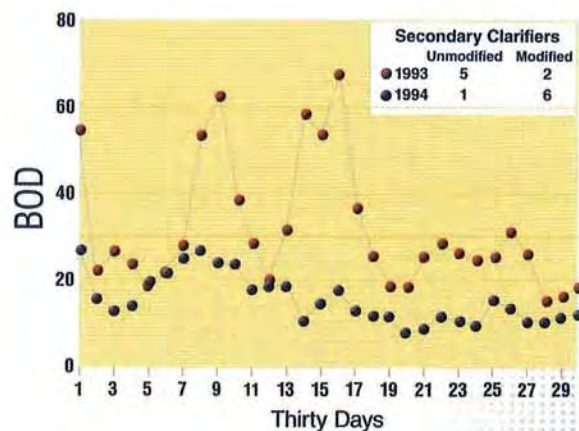
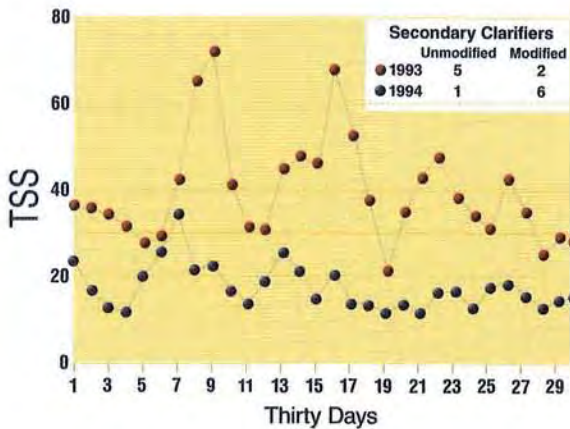
Conversion of primary conventional multi-blade scrapers to spiral scrapers has eliminated 75-90% of the sludge inventory, increased underflow concentration and eliminated septicity, which was evidenced by a SBOD₅ increase and gas evolution.



Fact

Conversion of secondary multi-bladed scrapers to spiral scrapers has reduced sludge blankets and increased underflow concentration by 75% at a 25-35% higher solids loading on the clarifiers.

Retrofit Improvement Results



WesTech has retrofitted and upgraded virtually every type and model of clarifier. WesTech COP™ clarifier upgrades will increase performance and capacity.

Advanced Clarifier Technology

Component designs are being continually refined through field experience and the application of emerging technologies. Such continual refinement provides our customers with demonstrated trouble-free, highly efficient, proven equipment. Available as new equipment or as retrofit to existing installations, WesTech design programs will optimize the performance of all types of clarifiers. Because we design to the specific process and existing dimensional requirements of each plant, WesTech is the clear choice in all clarifiers.

WesTech Clarifier Designs

- COP™ Optimization Package
- Cage and Shaft Drive
- Spiral Rake Blade
- Segmented Rake Blade
- Gravity Thickeners
- Suction Header
- Suction Pipe
- Peripheral Feed
- Rim Drive



Founded in 1973, WesTech designs, engineers, and supplies water, wastewater, and process equipment for municipal and industrial customers around the world. From headworks to tertiary treatment, from petrochemical process to water reclamation and drinking water,

from small communities to large cities and factories, WesTech offers a wide array of custom process solutions for any application. Call today or visit us online to learn how our process equipment and experience can benefit your plant.

...Call today to discuss your process equipment needs.

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