



# The Leopold® Clari-DAF® System Design and Optimization

## Designing and Optimizing Your Clari-DAF® System to Improve Clarified Effluent Water Quality, Improve Solids Handling, and Lower Your Total Cost of Operation

Leopold® takes a flange-to-flange approach to designing a Clari-DAF® system installation. We employ a variety of resources in designing a Clari-DAF® system plant.

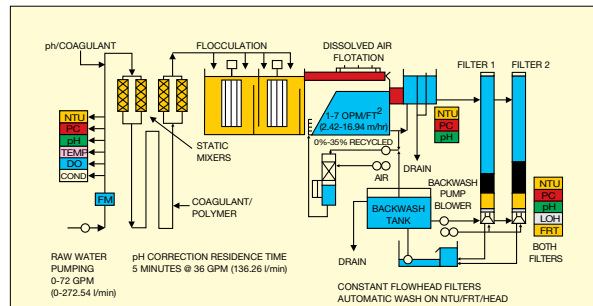
- Point of addition of all chemicals
- Optimization of mixing energy

### Mobile Clari-DAF® System Pilot Plant

Leopold® uses a mobile pilot plant to secure exhaustive, accurate data under actual operating conditions to establish process limits within which Leopold® will guarantee performance. In addition, treatability studies conducted with the Leopold® Clari-DAF® system pilot plant provide filter plant operators with data for obtaining state and environmental regulatory agency approvals.

Designed with Leopold® controls, the pilot plant can run unattended. On-line data logging with automatic filtration backwash sequencing and sludge removal allows the pilot plant to gather data and operate around the clock. It can log data every 5 minutes. A three-week study can yield 2 million results for statistical control. Flocculation volumes, times, and mixing energy can be varied to better target the most appropriate flocculation requirements.

Two chemical feeders using in-line static mixers control the water chemistry. One is used for pH adjustment while the other is used for coagulant dosing. Four-stream particle-counting capability allows flexibility for particle analysis of influent, clarified, and effluent water.



#### Leopold® Clari-DAF® Pilot Plant Process Design Parameters

Design Flow	36 gpm (136.26 l/min)
Design Load	4 gpm/sf (9.68m/hr)
Maximum Flow	80 gpm (302.80 l/min)
Maximum Design Load	9 gpm/sf (21.78 m/hr)
Floc Time	25 minutes @ 4 gpm'sf (9.68 m/hr)
Floc Stages	Up to 4 (2 typical)
Rapid Mixing	Static Mixer
Filters	2
Filter Area	1 ft <sup>2</sup> (0.9 m <sup>2</sup> ) Cross Section
Filter Height	10 ft (3.05 m)



The Leopold® mobile Clari-DAF® system pilot plant gathers data every five minutes around the clock for weeks under actual operating conditions to determine the most appropriate flocculation conditions for designing and engineering a full-scale Clari-DAF® system installation.

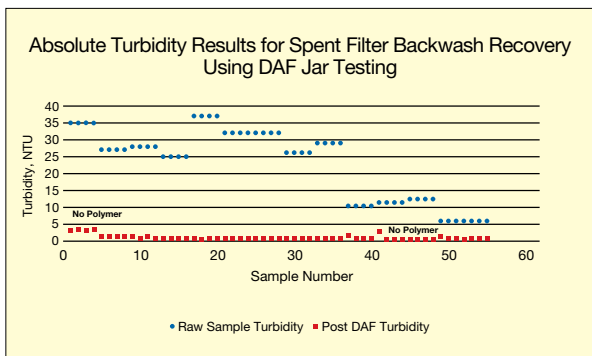
## DAF Jar Testing

Coagulation and flocculation is a complex process. A number of factors affect it: coagulant dosage, pH, turbidity, TOC (Total Organic Carbon), NOM (Natural Organic Material), soluble ions in solution, mixing effects, and temperature. Leopold® employs jar testing to simulate the process of coagulation and flocculation and gather data for optimizing the selection and dosages of coagulants for a specific raw water:

- Coagulant selection and dosage
- Coagulant aid selection and dosage
- Determination of optimum pH



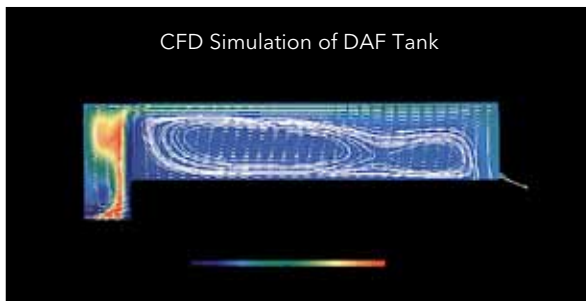
The Leopold® Jar Testing Unit is a stand-alone system designed to test four samples independently and simultaneously, giving flexibility and variable control.



This is an example of data obtained with the Leopold® Jar Testing Unit.

## Computer Modeling

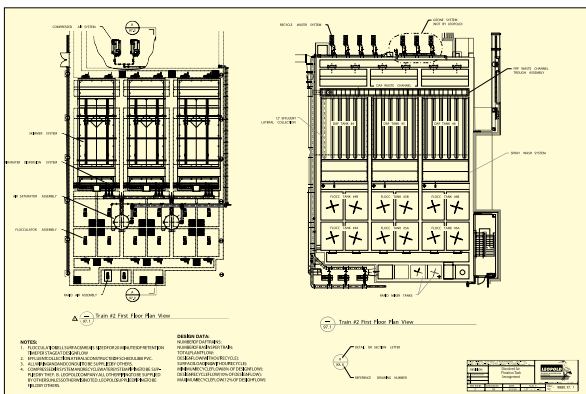
Using the data obtained from treatment studies, Leopold® optimizes Clari-DAF® system installations with sophisticated computer modeling. Leopold® CFD (Computational Fluid Dynamics) simulation allows “operating” the unit before it is built so the installation can be designed with the most efficient flow patterns for the most effective treatment. CFD simulation also allows Leopold® to check existing plant designs and verify the hydraulics of the process units under different operating conditions.



Computer modeling allows Leopold® to optimize each Clari-DAF® system installation to each plant’s particular needs and operating conditions.

## Custom Engineered Plans

Using data obtained from treatability studies, and based on Leopold® experience and knowledge, Leopold® assists engineers in preparing custom-engineered plans. In addition, Leopold® designs the full system controls and integrates them with the filter controls to achieve integrated water treatment plant design and operation.



Leopold® assists engineers in preparing custom plans for each Clari-DAF® system based on treatability study data and Leopold® experience and knowledge.

Call Leopold® to learn more about how the Clari-DAF® system can lower your total cost of operation.

