

# DAF Treatment Overview

“A Million Solutions...No Absolute Answers”

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# Then and Now...

- Then
  - Circular DAF (Carborundum; Dorr Oliver Vacuator)
  - Full Flow Pressurization
  - Metal Salts and Anionic Polymer w/o pH Control
  - Reduce BOD, TSS, and Oil and Grease Loadings to Overloaded Biological Treatment Systems (usually municipal)
- Now
  - Equalization
  - Rectangular Units w/ and w/o Plates or Plate Packs
  - Recycle Pressurization; Low Pressure-High Rate Recycle; Foam Generation Systems
  - pH Control
  - Acidulation; Modified Acidulation; Three Polymer; Metal Salts and Anionic and Cationic Polymers
  - Optimize skimmings characteristics
  - Meet Specific Pretreatment Permit Limits; Reduce Municipal Surcharges; Minimize Chemical Costs; Minimize Skimmings Handling Costs

# Many Solutions (survey of 30 facilities)

Item	Survey Results
Number of DAF Manufacturers	9 (FRC; ETS,; GE Water; Stewart Water Solutions; Habersham; Enprotec; Luker; Tennco Hydro; Komline Sanderson; Industrial Services; Homemade)
Number of Different Chemical Programs	6 (No Chemicals; ferric/anionic polymer; alum/anionic polymer; acidulation/anionic polymer; modified acidulation/anionic/cationic polymer; coagulant/anionic/cationic polymer)
Number of Chemical Program Vendors	14 (Bioconversions; Ecolab; ESCO; Fort Bend; GE; H <sub>2</sub> O Tech; Kroft; Nalco; Polysep; Polytec; R Squared; Stewart; Synergy; Water Tec)
Range of Operating pH	4.0 to 6.8
Range of Skimmings Production	3 to 30 gal per 1,000 gal wastewater 0.01 to 0.04 lbs per gal wastewater
Range of Effluent BOD	160 to 500 mg/l
Range of Chemical Costs	\$0.08 to \$2.42 per 1,000 gal wastewater

# Newest Developments

- Rectangular Recycle Pressurization Units
  - Improved White Water Systems
  - Improved Recycle Pressurization Pumps
- Big Box Rectangular Units (GE Water)
  - High Rate/Low Pressure/Low Air Recycle
  - Modified Chemical Injection Points
- Improved White Water Systems
- Improved Process Control (Polytec PICC System)

# DAF Selection Decision Matrix

Item	Permit Compliance	Reduced Surcharges	Minimized Chemical Costs	Reduced Chemical Skimmings	Non-Chemical Skimmings
Rectangular w/ Recycle Pressurization					
Acidulation					
Modified Acidulation					
Metal Salt Plus Polymer					
Two Polymer					
Three Polymer					
Big Box w/ High Rate Recycle					
Acidulation					
Modified Acidulation					
Metal Salt Plus Polymer					
Two Polymer					
Three Polymer					

# Case History – El Dorado, AR

Item	Before (Ferric w/ 2 Polymers)	New System w/ Ferric	New System w/ Acidulation	New System with Modified Acidulation	New System with Acidulation & Coagulant/ Anionic Polymer
Sewer Surcharges, \$/year	\$720,000	\$0	\$240,000	\$180,000	\$120,000
Chemical Costs, \$/year	\$210,000	\$180,000	\$210,000	\$225,000	\$233,000
Skimmings Handling Costs, \$/year	\$624,000	\$750,000	\$78,000	\$156,000	\$78,000
Maintenance Costs, \$/year	\$75,000	\$60,000	\$60,000	\$60,000	\$60,000
Labor Cost, \$/year	\$90,000	\$90,000	\$90,000	\$90,000	\$90,000
Total Costs, \$/year	\$1,719,000	\$1,080,000	\$678,000	\$711,000	\$581,000

# The Future

- DAF Selection Will Include Consideration of:
  - BOD, TSS, and Oil and Grease Removal
  - Nutrient Removal (TKN and TP)
  - Skimmings Renderability
  - Chemical Costs
  - Capital Costs
- Innovations Will Focus on:
  - Reduced Chemical Usage and Costs
  - Improved Process Control
  - Reduced Foot Print
  - Cost Effective Manufacturing Materials

# Maybe the Best Performance

- Simmons Foods, Jay, Oklahoma
- Who Know How Old DORR OLIVER VACUATOR
- Ferric with 2 polymers
- Eff BOD < 150 mg/l
- Eff TSS < 50 mg/l

# The Final Conclusion

IT'S THE CHEMISTRY, STUPID