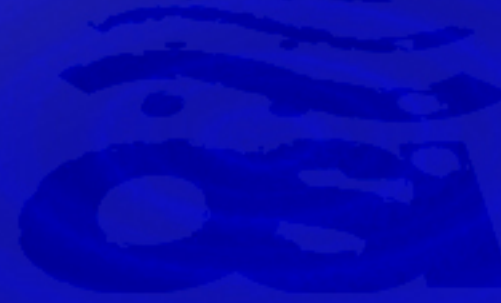




Introduction to Orenco Effluent Sewer and AdvanTex® Treatment Systems

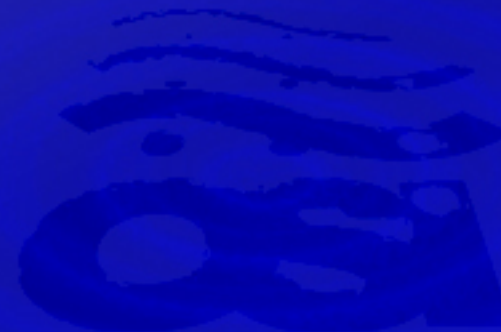
A Manageable Option for Your Community





Discussion Topics

- **Introduction to effluent sewer systems**
- Advantages of an Orenco effluent sewer system
- Introduction to AdvanTex® treatment systems
- Advantages of STEP to AdvanTex system
- Case studies

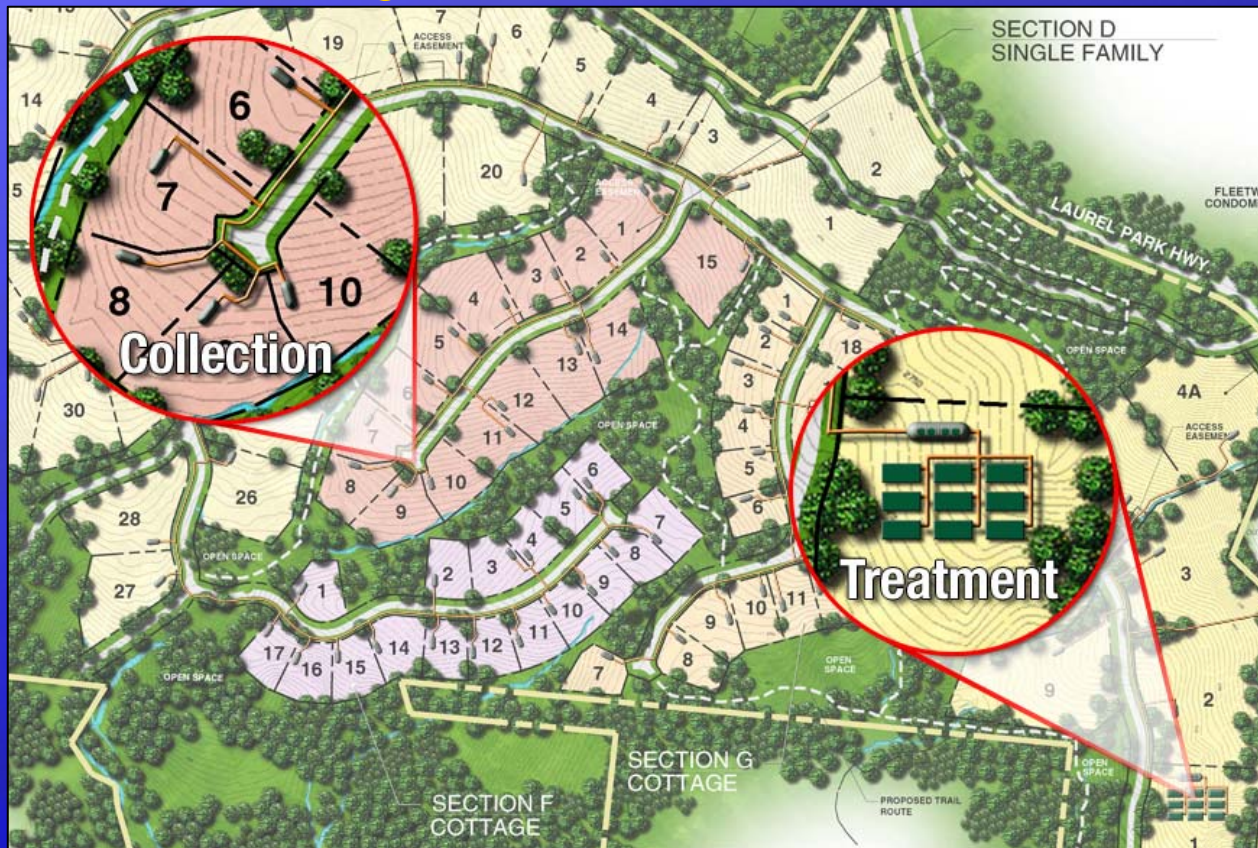




Alternative Wastewater Systems

Orenco Effluent Sewer & AdvanTex Systems ...

Focus Today





Oreco Effluent Sewer Systems

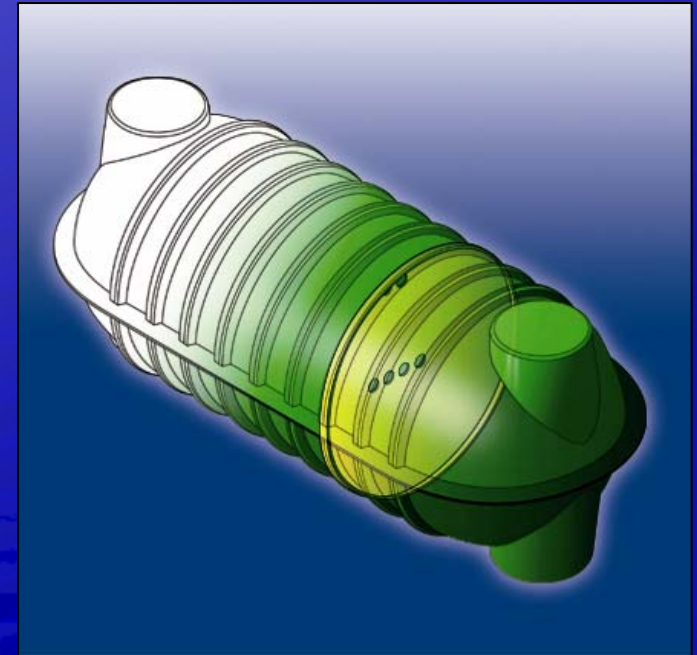
- Hundreds of communities use Oreco effluent sewers
 - ~ 25 years of documented system performance
 - Oregon: Glide, 900+ connections
- Regional examples and number of connections
 - ~ Alberta: Strathcona, 300
 - ~ Northern: Southwest Barry County, MI, 1000+
 - ~ Mountain: Missoula, MT, 2000
 - ~ Central: Bucyrus, KS, 80
 - ~ Northwest: Camas, WA, 2900
 - ~ Southwest: Penn Valley, CA, 240
 - ~ Southeast: Ariton, AL, 340
 - ~ International: Aotea Harbour, NZ, 90



Orencia Effluent Sewer Components

Fiberglass-Reinforced Tanks

- Primary treatment in interceptor tanks
- 1000- or 1500-gallon tank per residence
- 70% removal of fats, oils, and greases
- 24-hour emergency storage
- 12-year pumpout with 95% confidence
- Abuses stay in interceptor tank
- Chemical sources easier to identify





Orencia Effluent Sewer Components

ProSTEP™ Pumping Package

- Get component compatibility with an engineered package containing
 - ~ Pump vault
 - ~ High-head effluent pump
 - ~ Biotube® filter cartridge
 - ~ Float assembly
 - ~ Discharge assembly
 - ~ Splice box





Advantages of an Effluent Sewer

- Flexible in design
 - ~ Adaptable to varying site conditions
 - ~ Allows for phased buildout
 - ~ Can be integrated into existing sewer infrastructure
- Design includes storage/reserve in the event of power outages or need to repair mainline break
- Low-impact construction
 - ~ Minimal disruption to community





Advantages of an Effluent Sewer

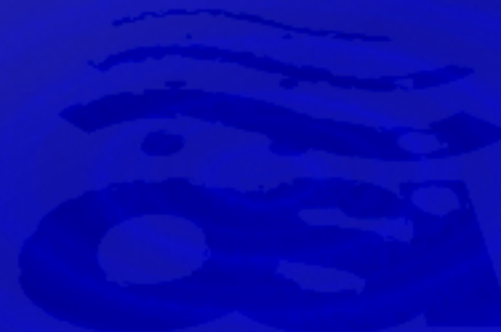
- Cost-effectiveness
 - ~ Low initial costs
 - ~ Deferred capital costs
 - ~ No manholes
 - ~ No lift stations
 - ~ Low operating costs
 - ~ Low maintenance costs
 - ~ Low and gradual repair/replacement costs





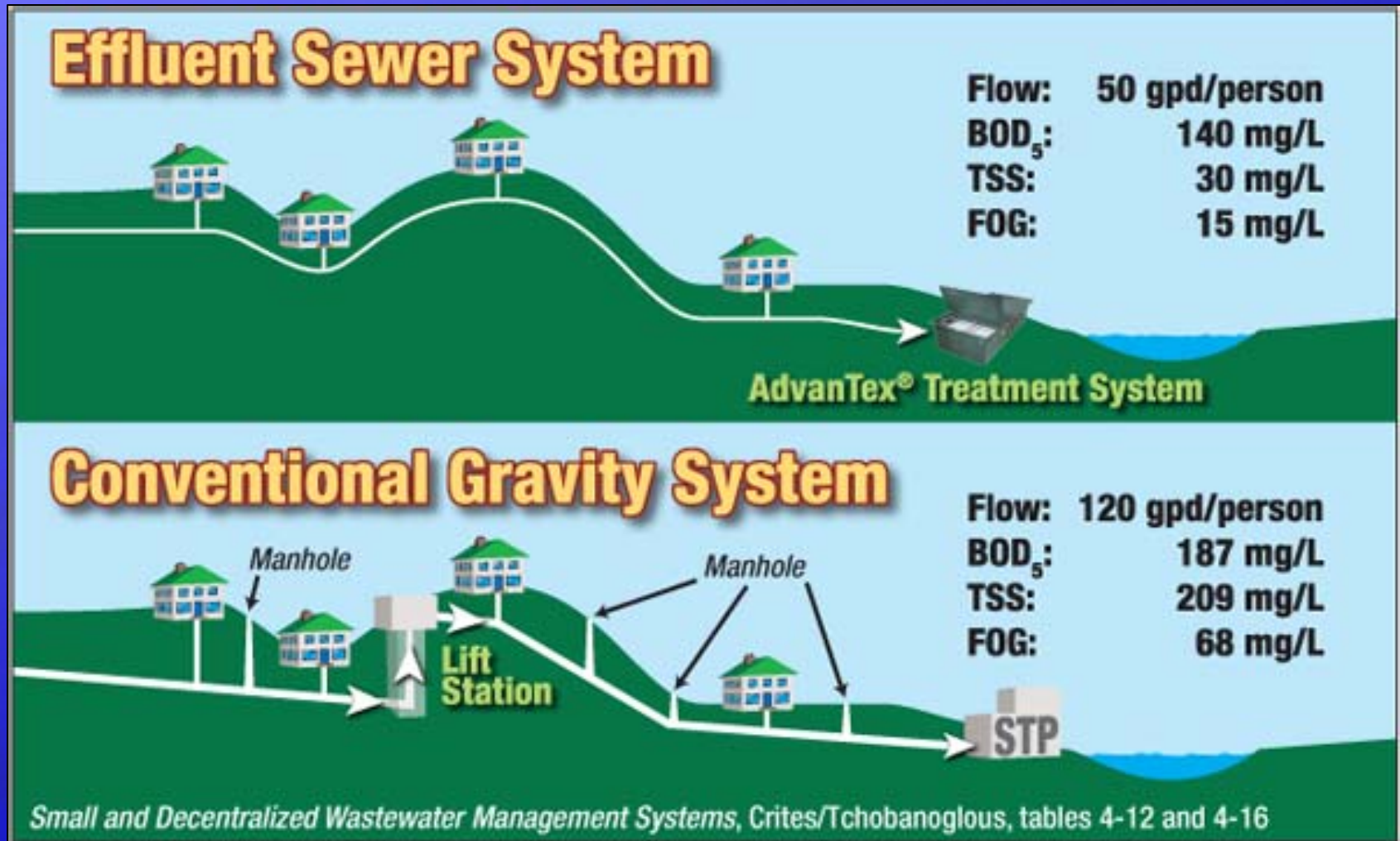
Quality of Treatment

- The ONLY collection technology that provides treatment
 - ~ 70 to 90% reduction in waste strength
- Collection and treatment technology integration
 - ~ Reduced hydraulic and biological loading to treatment facility





System Comparison





Quality of Treatment

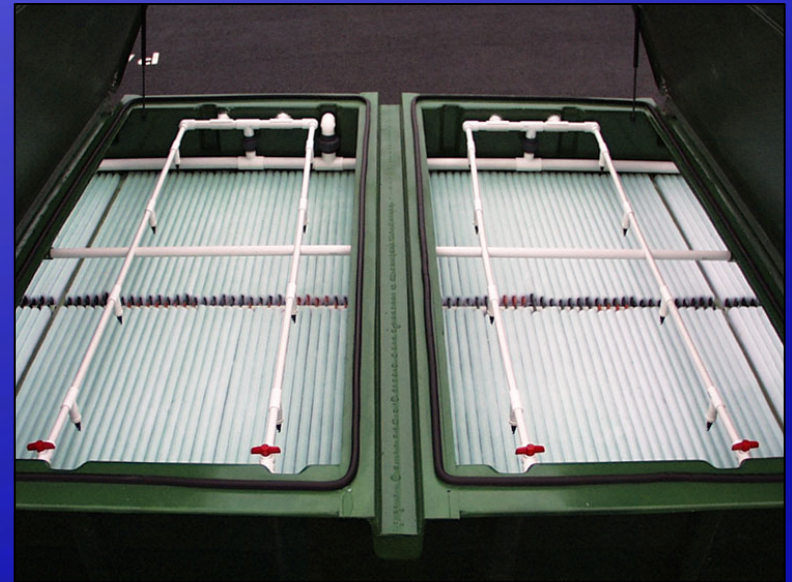
Characteristics	Orenco Effluent Sewer	Conventional Gravity Sewer	Grinder / Vacuum Sewer
	low strength <i>(liquids only)</i>	full strength <i>(liquids & solids)</i>	full strength <i>(slurry)</i>
BOD ₅	100 - 150 mg/L	200 - 450 mg/L	300 - 450 mg/L
TSS	20 - 40 mg/L	200 - 450 mg/L	300 - 450 mg/L
Fat, Oil, & Grease	10 - 20 mg/L	50 - 150 mg/L	60 - 160 mg/L

Small and Decentralized Wastewater Management Systems, *Crites & Tchobanoglous, 1998.*



What is AdvanTex®?

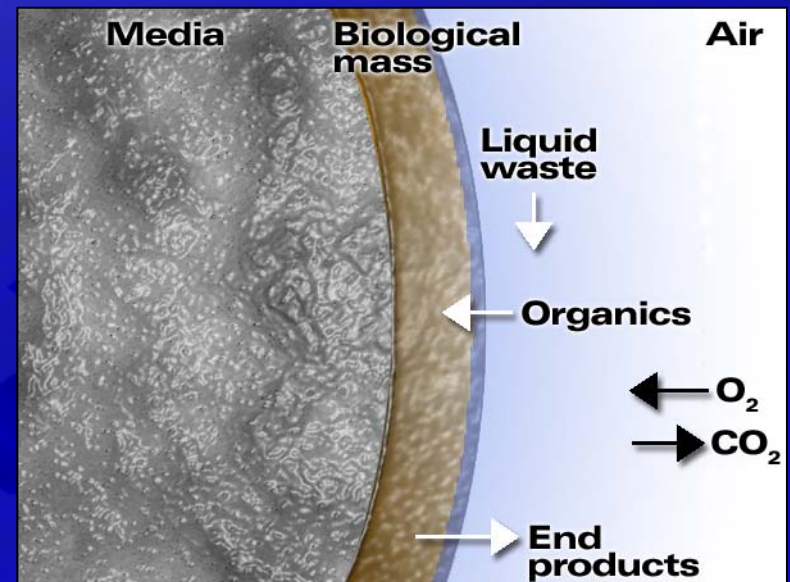
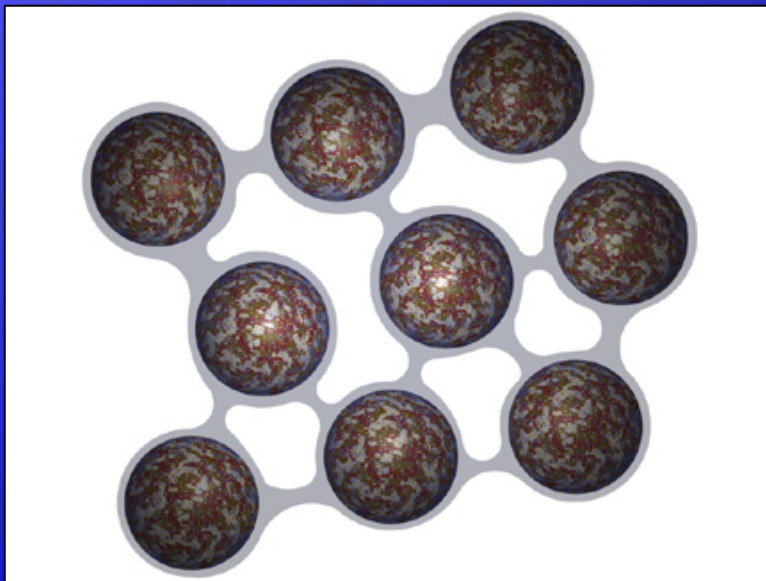
- Packed bed filter
- Engineered textile material
- Appropriate tankage and timed dosing
- Complete, premanufactured package





Attached Growth

- Aerobic microbes attach and grow on media
- Wastewater flows across a zoogeleal film created by microbes
- Microbes extract and digest soluble organic matter from the wastewater





Packed Bed Filter Treatment Technology

Attached Growth Process

- Highly stable, reliable
- Uses fixed film media
- Operates in an unsaturated condition (not submerged)
- Employs intermittent dosing
- Uses filtration and biological/chemical reduction
- Produces a net reduction in cellular mass due to endogenous respiration
 - ~ Little or no sloughing
 - ~ Minimal solids accumulation





Versatile Technology

- AdvanTex® treatment systems can be configured for the application
 - ~ Standard configuration is used when BOD₅ and TSS are the primary concern
 - ~ Modified configuration is used when nitrogen reduction is the primary concern
- AdvanTex treatment systems allow for modular construction
- The loading rate can be varied on the pods to accommodate various waste strengths





Possible Benefits

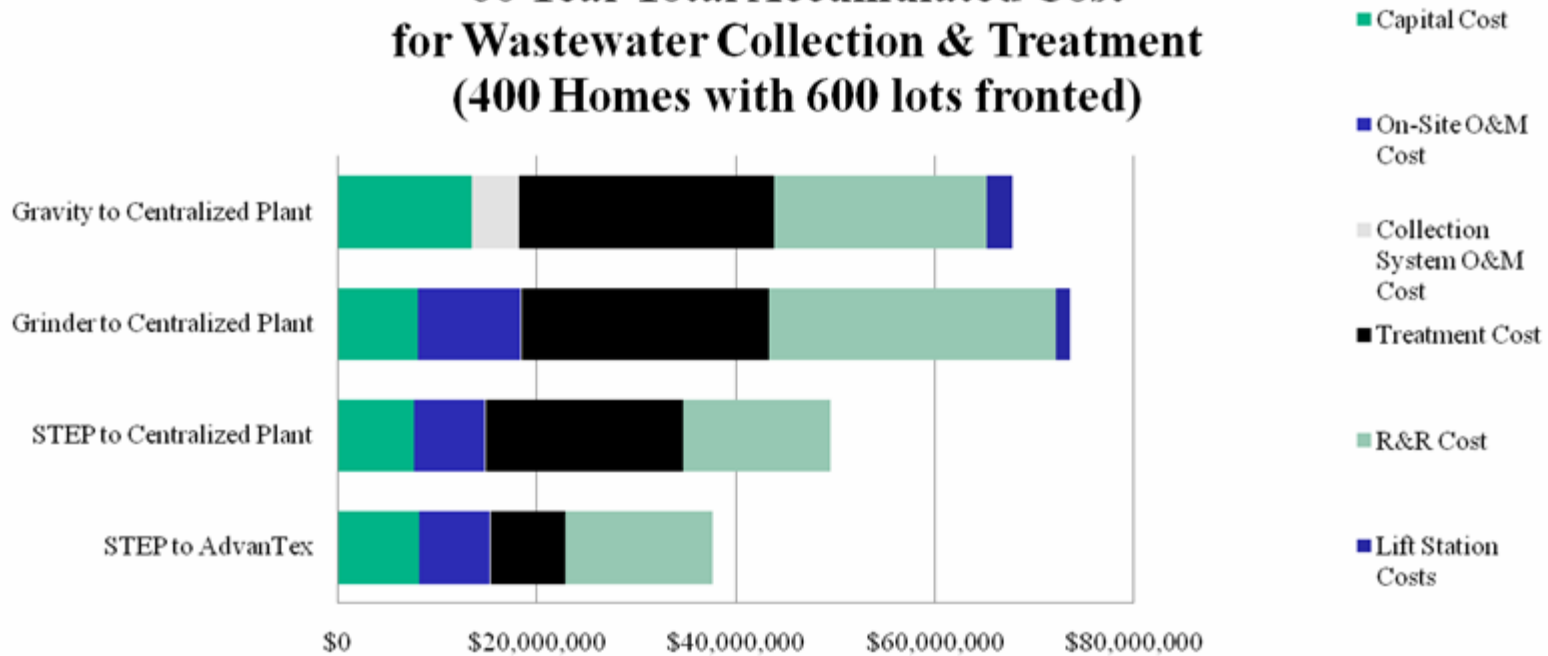
- Reduced initial capital cost
 - ~ No lift stations
 - ~ No onsite infrastructure for vacant properties
 - ~ Build treatment incrementally to match service needs
 - ~ Distribute treatment to multiple locations to avoid bridge crossings and conveyance costs
- Focus on failed septic systems
 - ~ Prioritize substandard systems if possible
- Less environmental impact
 - ~ Trenchless or shallow trench construction
 - ~ Low energy consumption





60 Year Accumulated Cost Comparison

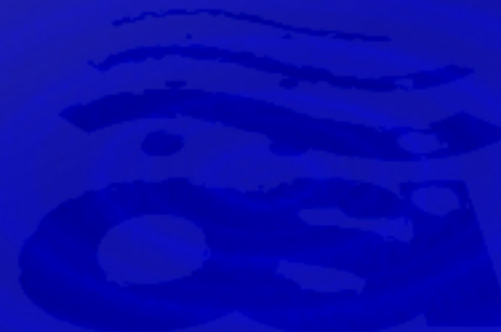
**60 Year Total Accumulated Cost
for Wastewater Collection & Treatment
(400 Homes with 600 lots fronted)**





Preliminary Conclusions - Life Cycle Cost

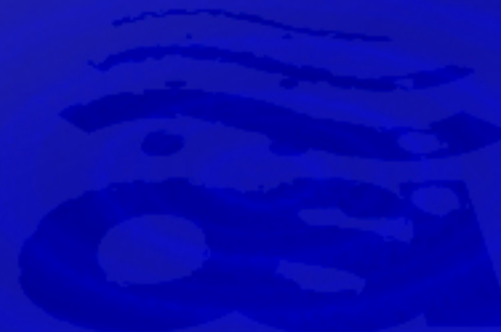
- Gravity Sewer to Grinder Stations has a higher capital cost than effluent sewer pumping directly to treatment
- 8 small grinder pump stations would have a comparable O&M cost to 400 effluent pumps
- AdvanTex would provide a lower treatment cost than SBR
- Long term renewal and replacement cost for STEP will be less than gravity/grinder pump stations





Orenco System Bid Tabulations

- Maple River Junction, Iowa
~ \$12,959 / connection
- Ewing, Virginia
~ \$12,203 / connection
- Village of Clifton, Illinois
~ \$10,283 / connection
- Village of Alma, Illinois
~ \$12,640 / connection





Small Communities

Bethel Heights, Arkansas

- 135,000 gpd design
- STEP collection
- 27 AX100 pods
- Subsurface drip dispersal
- Start-up: 12/2003
- Average effluent characteristics
 - ~ BOD₅: 2.4 mg/L
 - ~ TSS: 5 mg/L





Bethel Heights, Arkansas

Total Project Costs

- Orenco STEP
 - ~ \$5,000 per EDU
- Low Pressure Sewer
 - ~ \$920 per EDU
- AdvanTex® Treatment
 - ~ \$2,380 per EDU
- Subsurface Drip
 - ~ \$1740 per EDU
- Total Costs
 - ~ \$10,040 per EDU





Long-Term Cost Forecasting

- What are the operating costs?
 - ~ Make sure that all costs are identified
- What are the repair and replacement costs?
 - ~ Identify life cycles and rehabilitation costs
 - Can infrastructure be rehabbed?
 - How critical will rehab be?
- Is the system adaptable to technological advancements?
- Is the system adaptable to other technology?
- What is the cost to the environment?



Solutions for Decentralized Wastewater Treatment

Orenco Systems® , Inc.

www.orencosystems.com

