



**INFILTRATOR**  
water technologies



**Achieving Secondary Wastewater Treatment Standards using  
Zero-Energy Combined Treatment and Dispersal Technology**

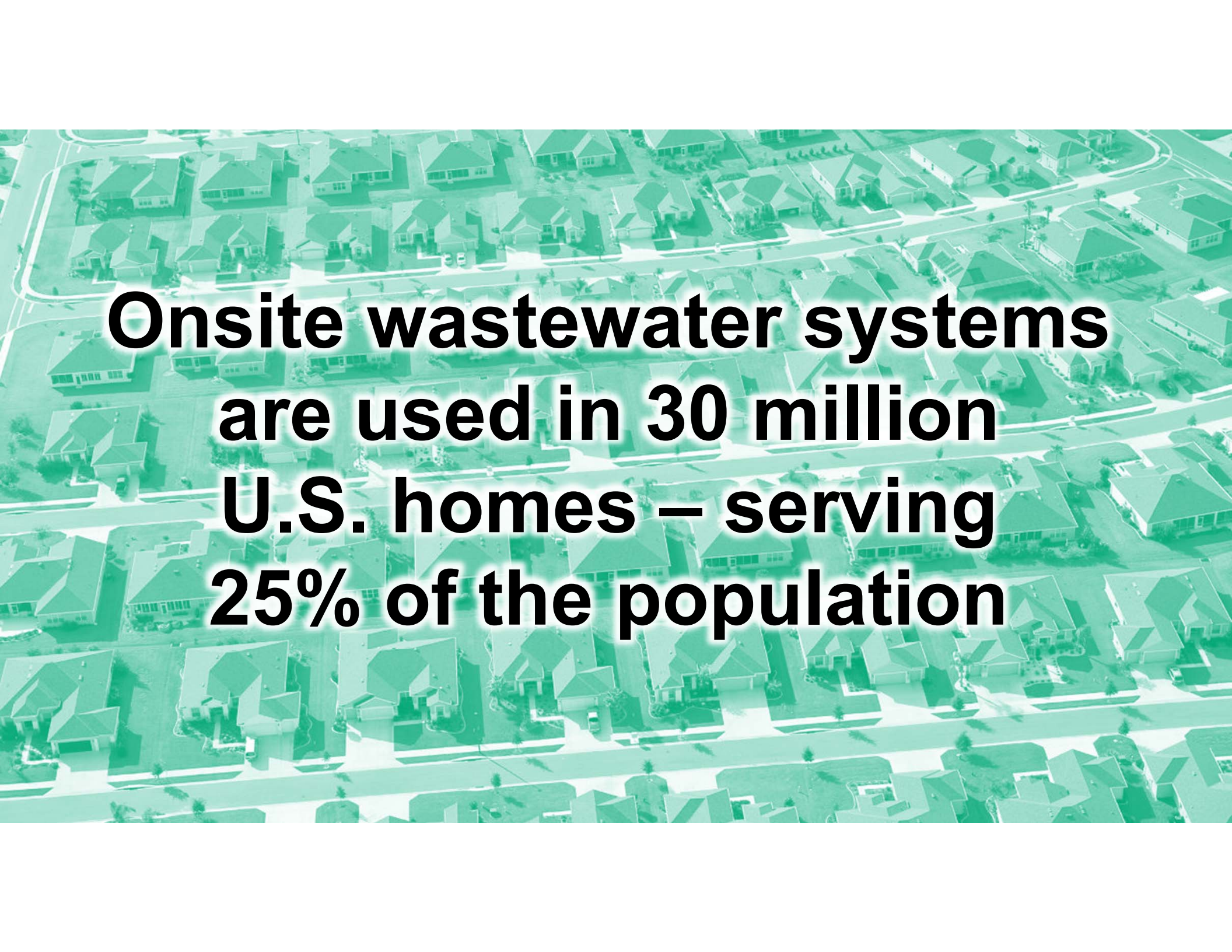
David Lentz, P.E.

# Content Limitation

There are many combined treatment and dispersal systems approved by regulatory agencies. These products are produced by multiple manufacturers. Since showing all designs and performance results is not practical, this presentation depicts designs from one manufacturer.

The audience can search for "combined treatment and dispersal systems" to find additional information on the topic and information on other products within the technology group.



An aerial photograph of a residential neighborhood, showing numerous houses with gabled roofs and driveways, arranged in a grid-like pattern. The entire image is overlaid with a semi-transparent green filter. Centered over the image is a large, bold, black text block with a white outline, providing statistics on onsite wastewater systems.

**Onsite wastewater systems  
are used in 30 million  
U.S. homes – serving  
25% of the population**



“...4 billion gallons of sewage is treated by onsite/ decentralized systems in the USA every day.”

USEPA





**One-third of new homes  
built in the U.S.  
use onsite  
wastewater  
treatment  
systems**







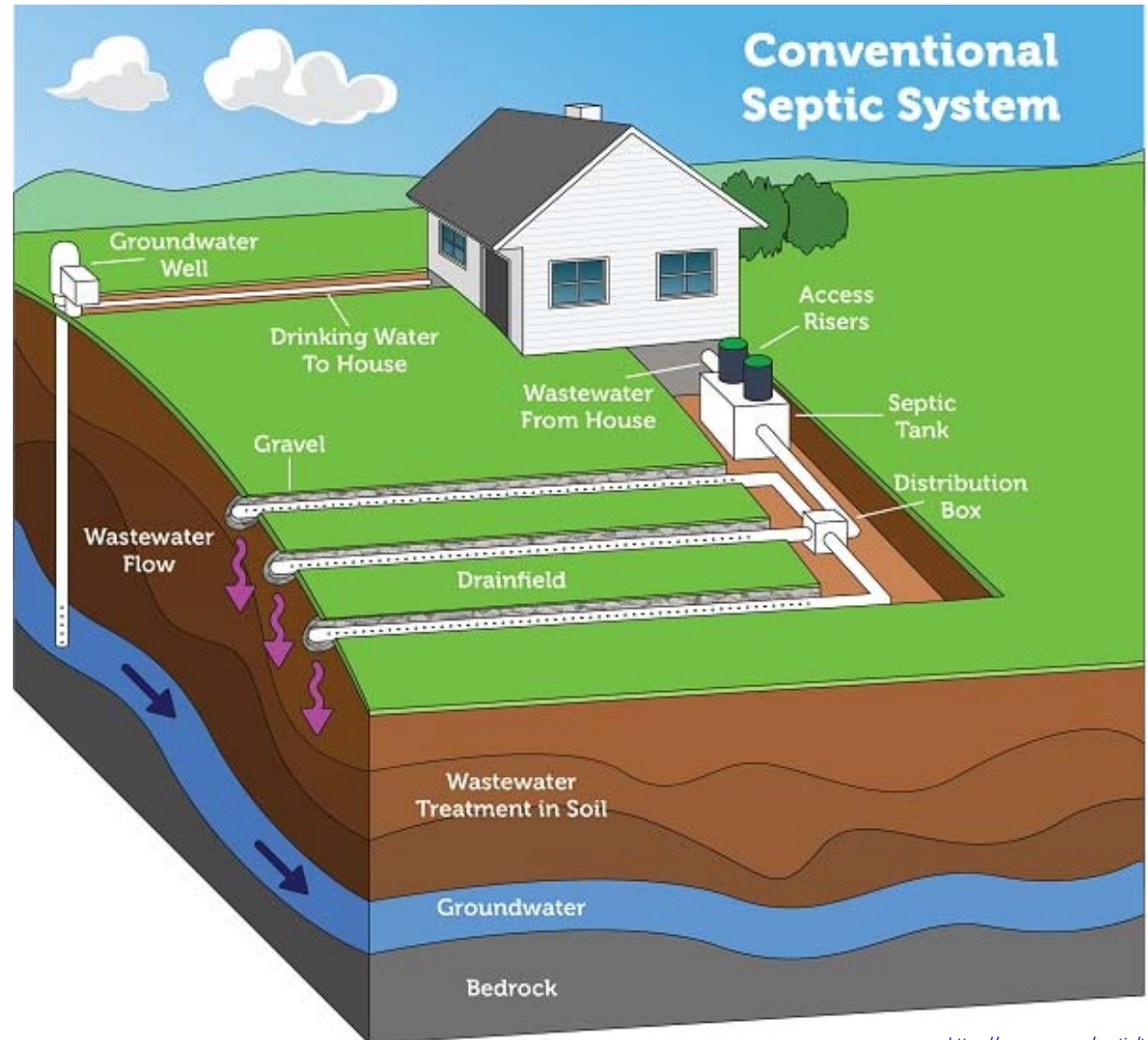
<https://www.yorkdispatch.com/story/news/local/2021/07/27/municipalities-launch-protests-against-york-city-wastewater-treatment-system-sale/8092813067/>



# Conventional Septic System



United States  
Environmental Protection  
Agency



Please note: Septic systems vary. Diagram is not to scale.

<https://www.epa.gov/septic/types-septic-systems>



# Conventional Drainfield Distributes Wastewater





# What if Wastewater Treatment is Needed?



Electromechanical systems treat wastewater to secondary standards requiring:

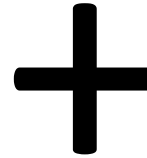
- Electricity
- Maintenance
- Blower
- Separate drainfield



# Separate Treatment and Dispersal Systems



<https://www.yolocounty.org/government/general-government-departments/community-services/environmental-health-division/land-use-programs/onsite-wastewater-treatment-system-program/types-of-owts-septic-systems>



<http://www.newhudsonvalley.com/category/building-a-passive-house/passive-house-site-development/septic-system>



# Combined Treatment and Dispersal System





# Why Combined Treatment and Dispersal?

- Two functions in one footprint
- Zero-electric passive operation
- Resilient naturally occurring microbes
- Stable, reliable performance
- High wastewater purification levels
- Design versatility for nutrient removal
- No moving parts or special maintenance
- Smaller footprint vs. legacy systems



# No Special Maintenance

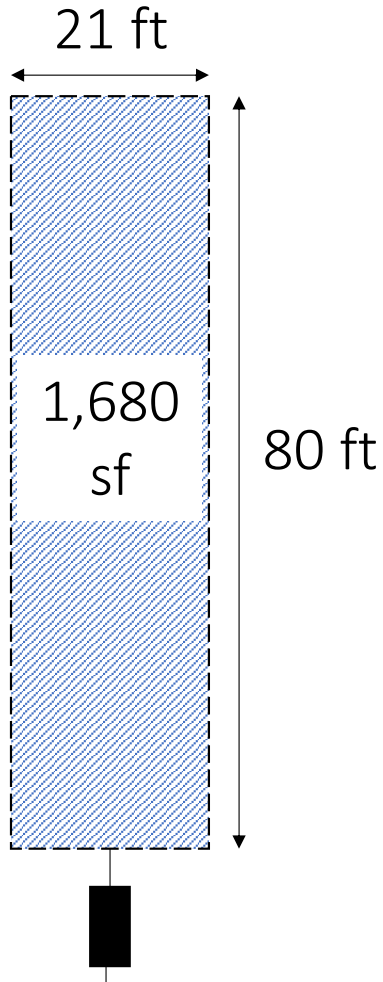
- Pump septic tank as needed
- If installed, clean effluent filter
- If installed, check observation ports
- Maintain vegetated system cover





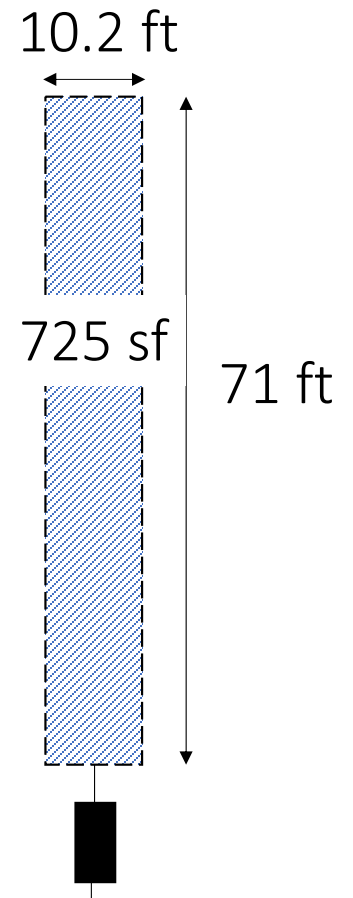
# Smaller Footprint vs. Legacy Systems

**Conventional  
gravel and  
pipe drainfield**



Septic tank

**Combined  
treatment  
and dispersal  
system**



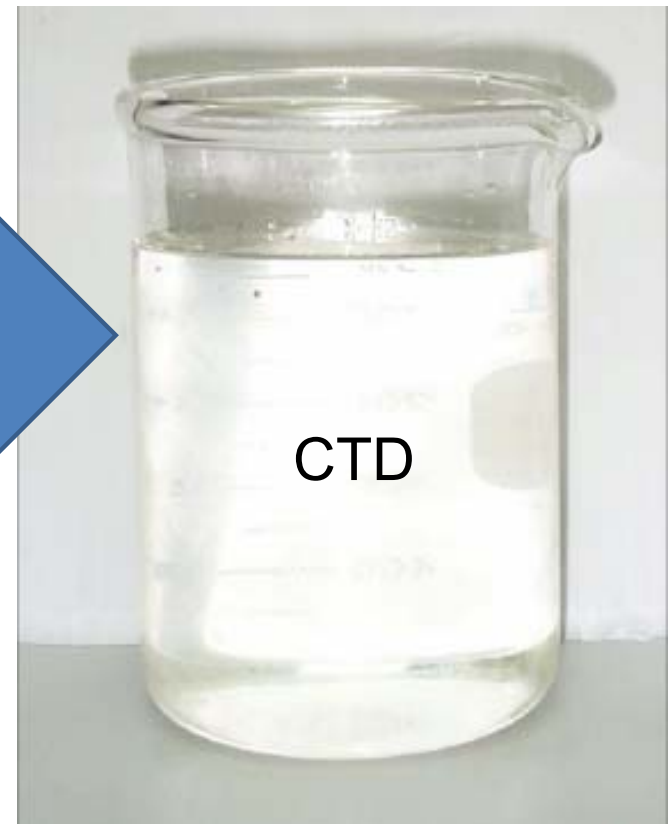
Septic tank



# CTD Provides Another Tool in the Toolbox



# Zero-Energy Secondary Treatment





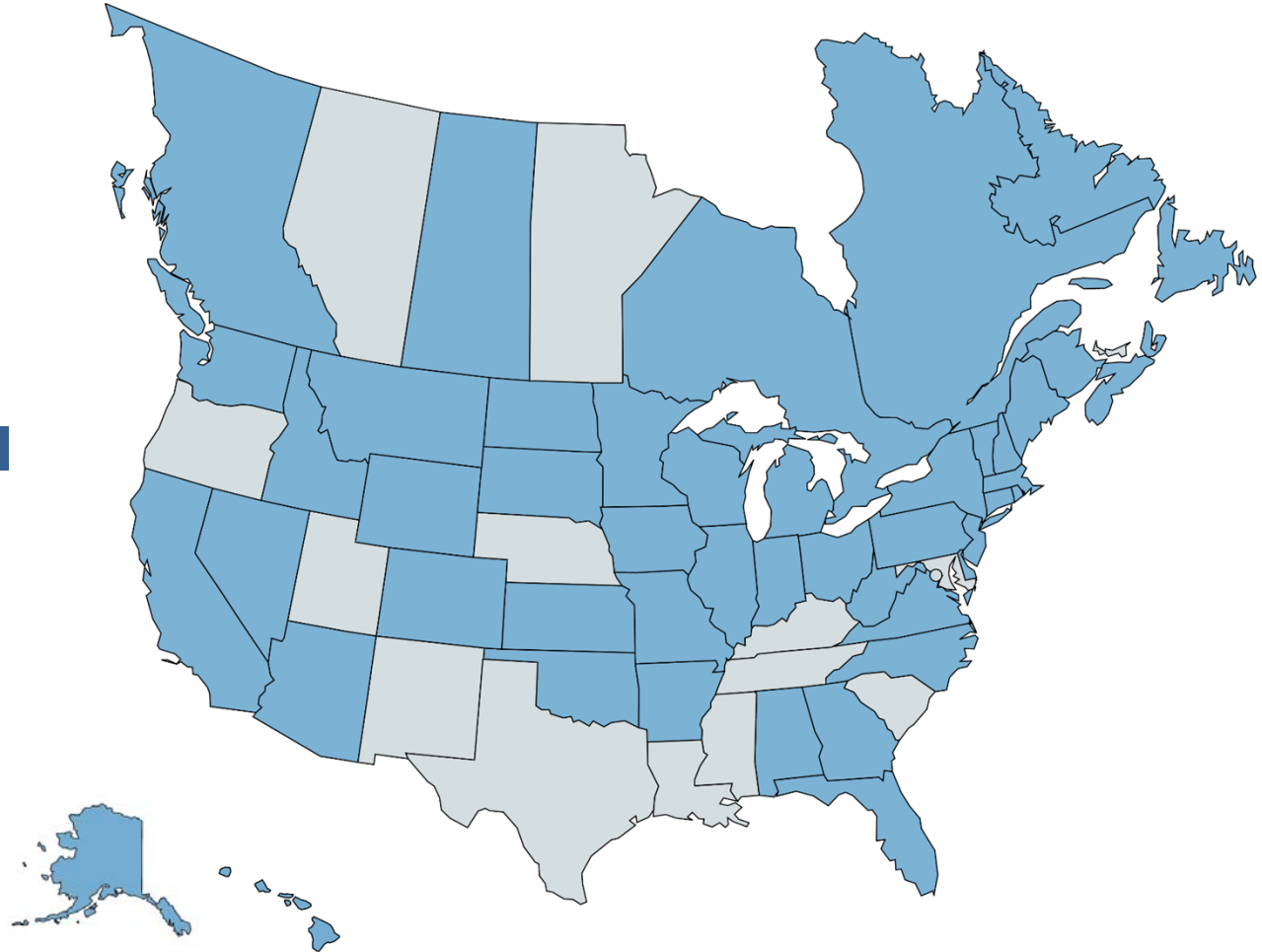
# Why is CTD an Emerging Technology?

- Increasing wastewater reclamation needs
- Increasing treatment system demand
- National performance standard certification availability
- Increasing energy conservation awareness
- Improved design and manufacturing methods
- Broadening regulatory recognition

# Evolving North American Regulatory Acceptance

## Key

- Accepted jurisdiction
- No regulatory approval



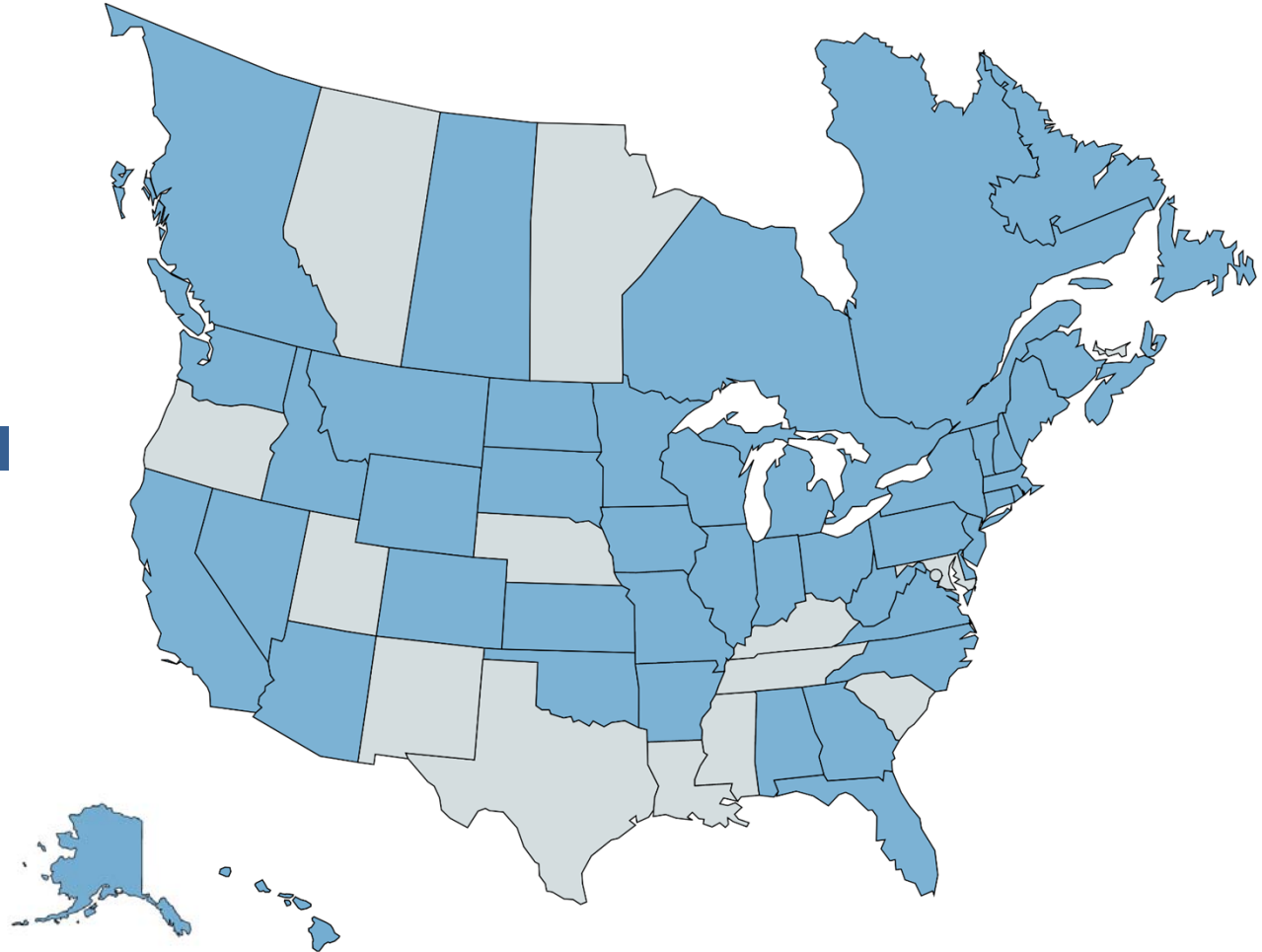


# Evolving North American Regulatory Acceptance

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*Number of individual installations exceeds 500,000*





**What's inside a  
field-installed  
combined treatment  
and dispersal system?**



# Integrated Technology

**Manufactured CTD Product**

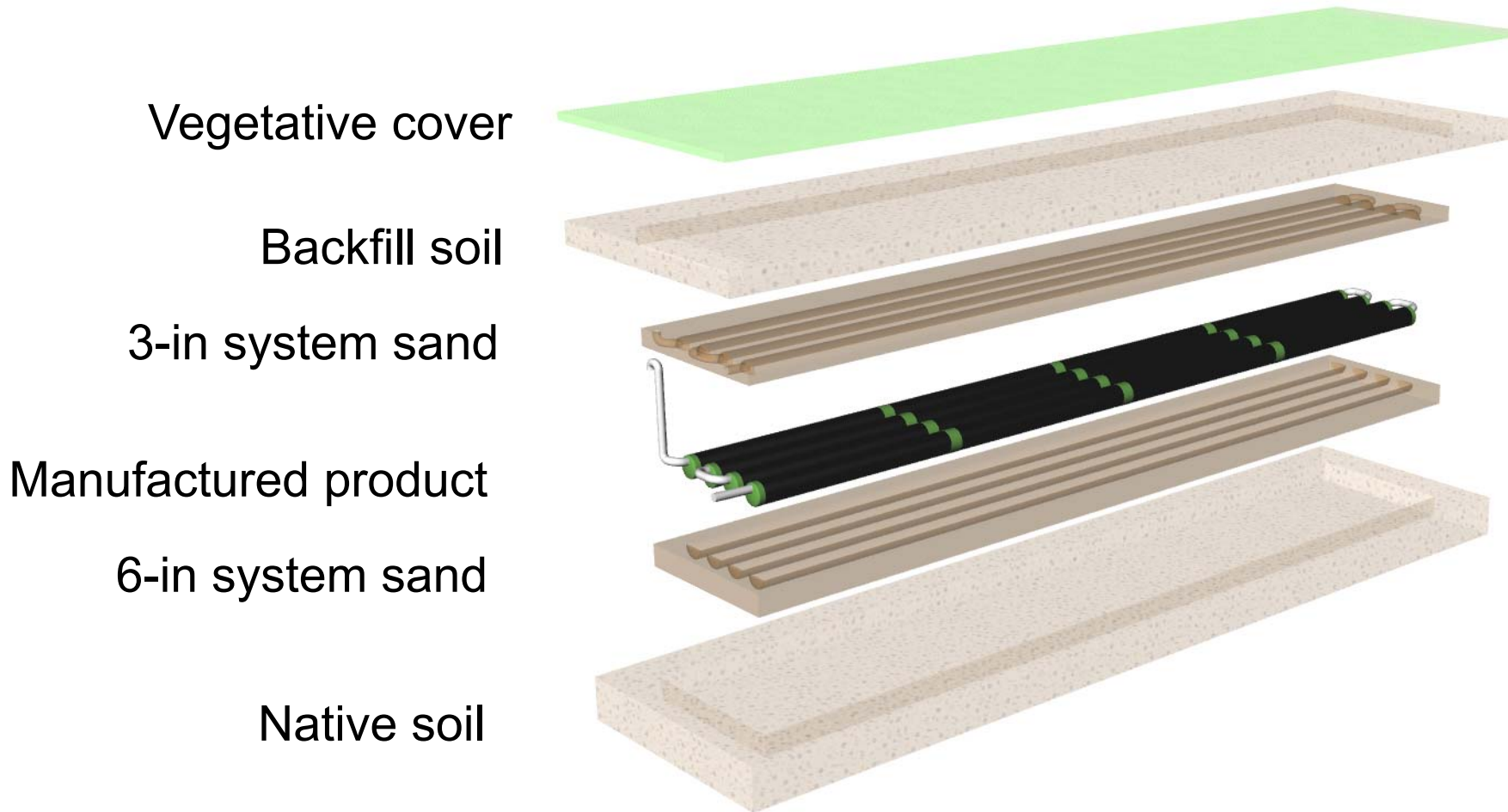


+

**System Sand**



# Typical Expanded View













# California 100,000 gpd Installation



- FEMA worker base camp
- Over 1,500 workers
- Kitchens and laundry facilities
- Largest CTD system to date
- 100,000 gallons per day
- Adapted for nutrient reduction





# Typical Residential Installation





# Compact Residential Installation





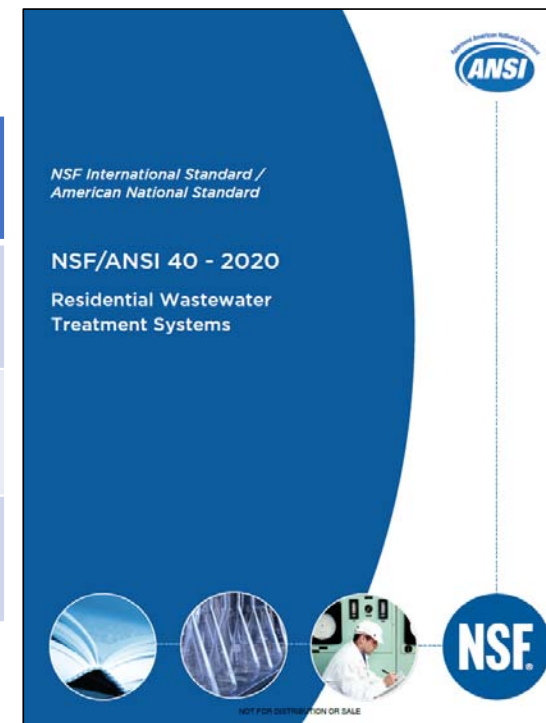
# What is Secondary Treatment?



*EPA establishes secondary treatment standards for publicly owned treatment works (POTWs), which are minimum, technology-based requirements for municipal wastewater treatment plants. These standards are reflected in terms of five-day biochemical oxygen demand (BOD5), total suspended solids (TSS) removal, and pH.*

# NSF/ANSI 40 Secondary Treatment Standards

NSF/ANSI 40 Parameter	Requirement
5-day carbonaceous oxygen demand	<25 mg/l
Total suspended solids	<30 mg/l
pH	6 to 9





# NSF/ANSI 40 Certification



# NSF/ANSI 40 Testing



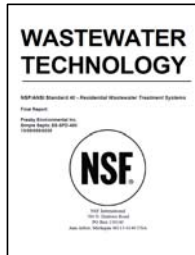
- **Consistently reduced CBOD<sub>5</sub> and TSS concentrations:**
  - **From day 1**
  - **Throughout 26-week test**





**TABLE I. SUMMARY OF ANALYTICAL RESULTS**

	<u>Average</u>	<u>Std. Dev.</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Median</u>	<u>Interquartile Range</u>
<b>Biochemical Oxygen Demand (mg/L)</b>						
<i>Influent (BOD<sub>5</sub>)</i>	180	52	100	430	160	140 - 200
<i>Effluent (CBOD<sub>5</sub>)</i>	11	9	2	50	8	6- 14
<b>Total Suspended Solids (mg/L)</b>						
<i>Influent</i>	210	71	45	650	190	170- 230
<i>Effluent</i>	7	3	2	18	6	5 -9
<b>pH</b>						
<i>Influent</i>	-	-	6.0	7.5	6.9	6.8 – 7.2
<i>Effluent</i>	-	-	6.0	7.4	6.5	6.3 – 6.7
<b>Temperature (°C)</b>						
<i>Influent</i>	17	5	8	23	19	13 – 21
<i>Effluent</i>	16	7	2	32	18	10 - 23
<b>Dissolved Oxygen (mg/L)</b>						
<i>Influent</i>	0.4	0.4	0.1	2.5	0.2	0.1 – 0.5
<i>Effluent</i>	3.5	1.7	1.0	8.5	3.4	2.0 –4.4



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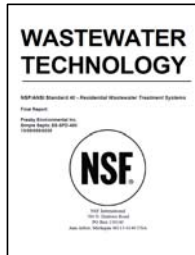
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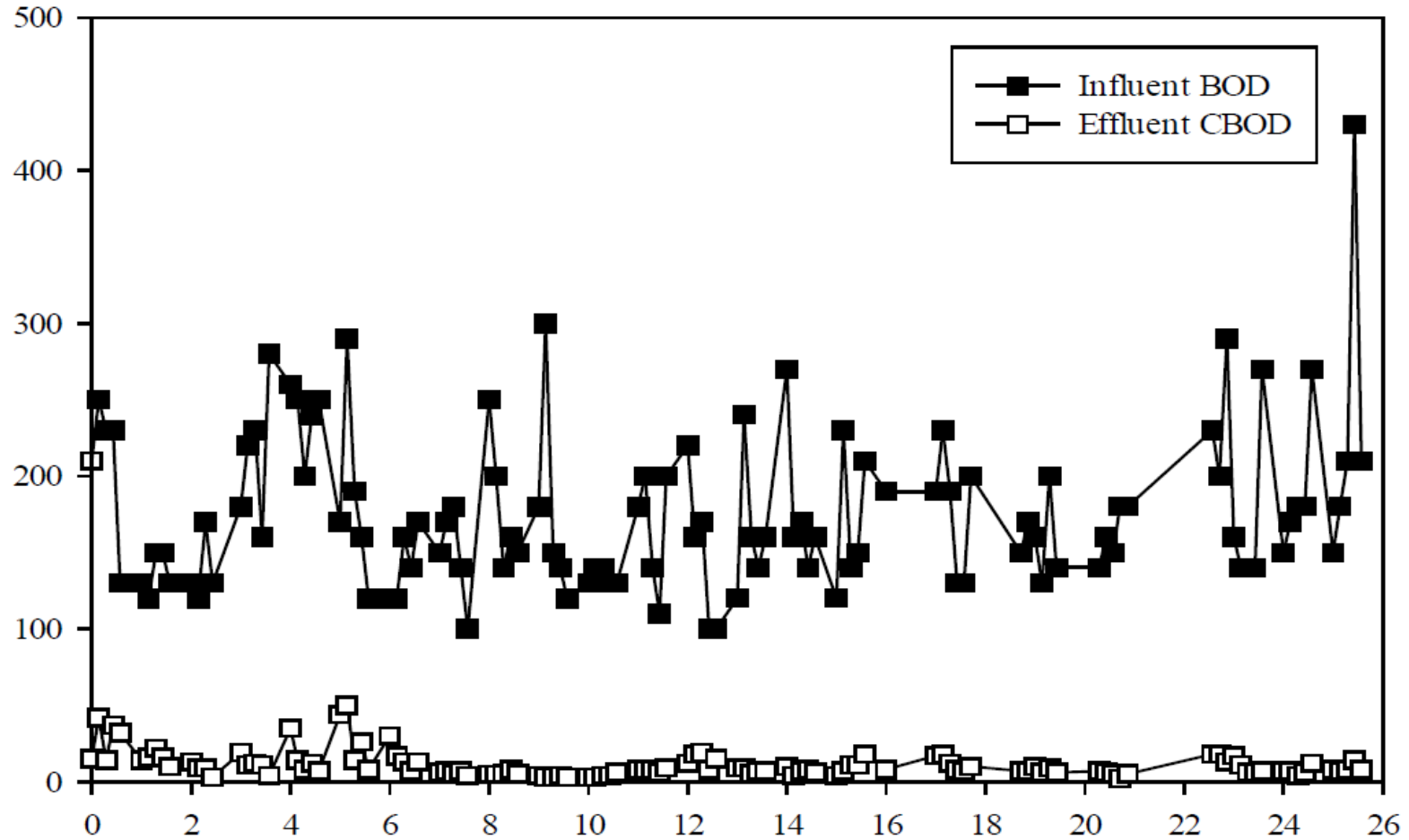


# NSF/ANSI 40 Testing



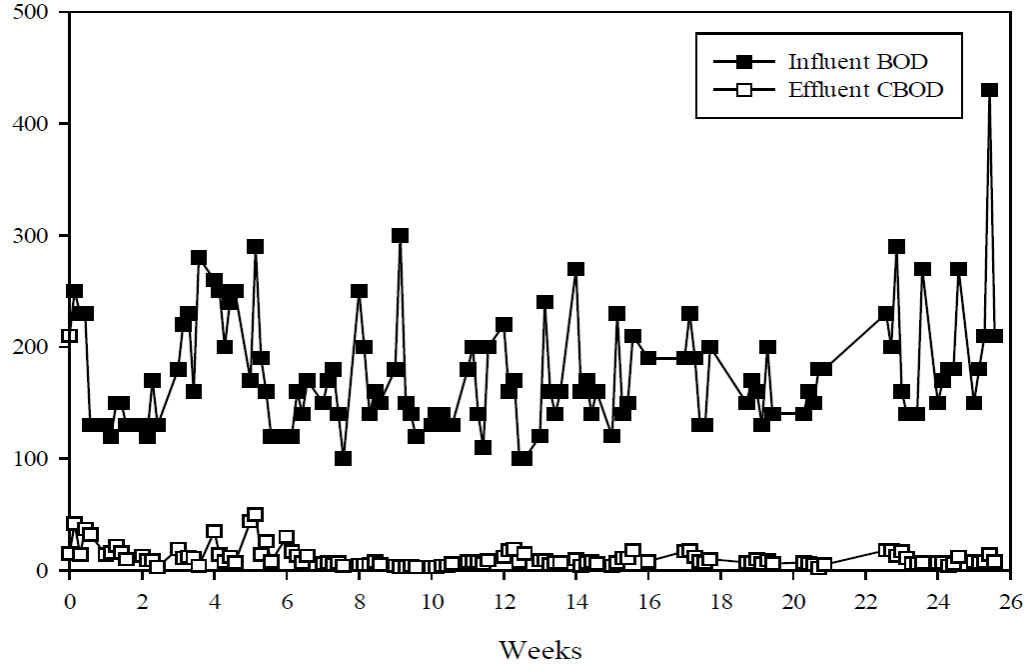
- **Fluctuating influent concentrations**
- **Consistent effluent concentrations**

# CBOD<sub>5</sub> Treatment Performance

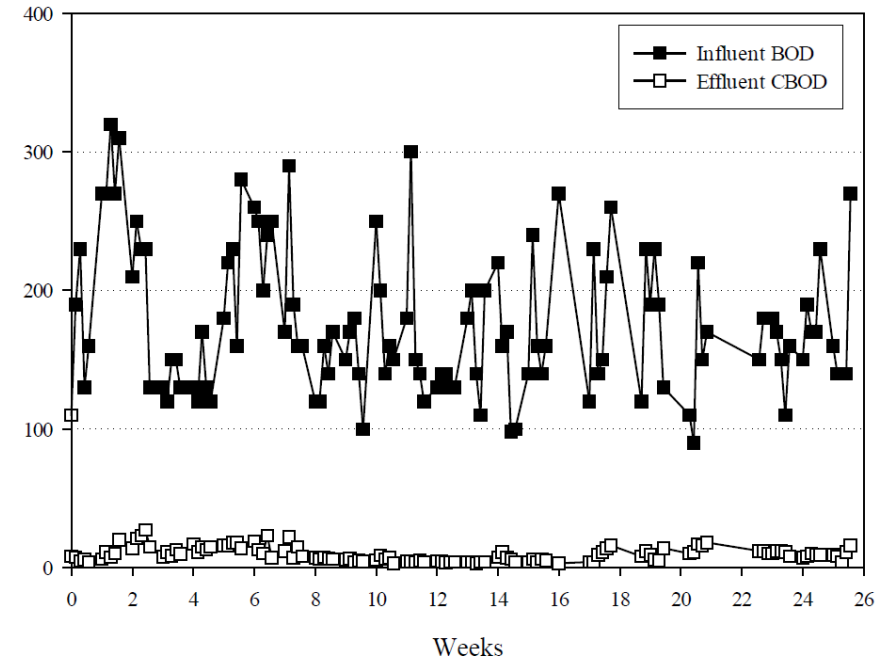


# CBOD5 Treatment Comparison

## Product A



## Product B

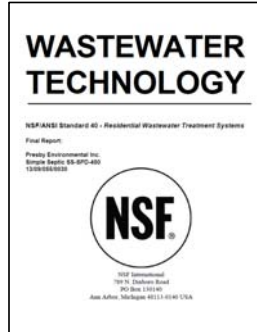




# NSF/ANSI 40 Testing



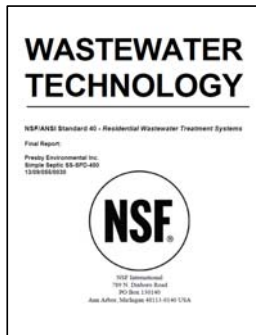
- **No start-up period required**
- **Effectiveness is immediate**



**Table II. 7- and 30-day Average Effluent CBOD<sub>5</sub> and 30-day Average Influent BOD<sub>5</sub>**

Month	Week	7-day Average Effluent CBOD <sub>5</sub> (mg/L)	30-day Average Effluent CBOD <sub>5</sub> (mg/L)	30-day Average Influent BOD <sub>5</sub> (mg/L)
1	1	28	17	180
	2	16		
	3	8		
	4	11		
2	5	15	14	170
	6	28		
	7	16		
	8	6		
	9	6		
3	10	3	7	160
	11	4		
	12	8		
	13	14		
4	14	7	9	170
	15	7		
	16	7		
	17	12		
5	18	14	8	160
	19	8		
	20	8		
	21	6		
	22	4		
6	23	16	10	200
	24	9		
	25	7		
	26	9		

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	15	7		
	16	7		



**WASTEWATER  
TECHNOLOGY**

NSF/ANSI Standard 41 - Residential Wastewater Treatment Systems

Final Report

Procter Environmental Inc.  
Simple Report: NS-SPC-40  
12/20/2012

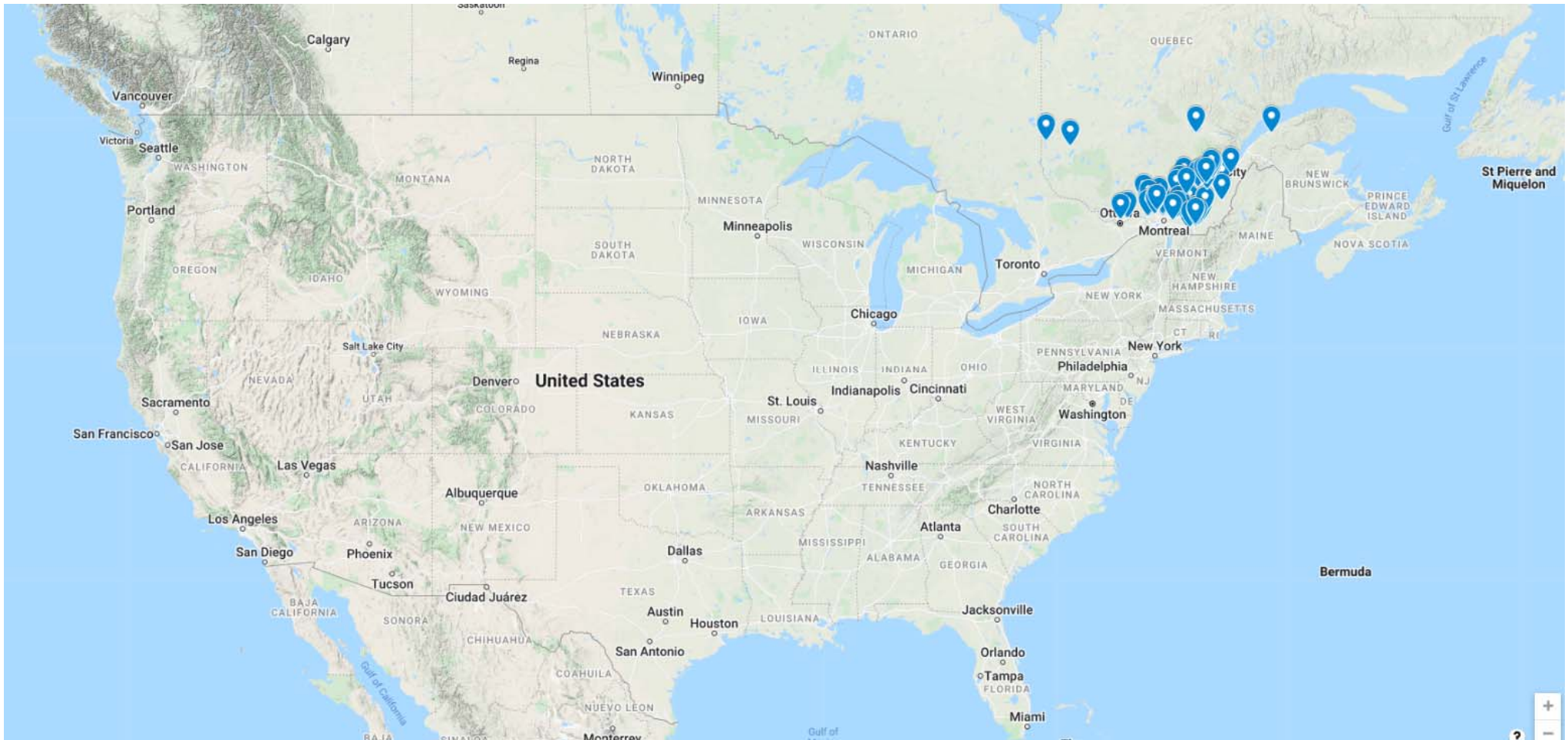


510 International  
791 N. Dublin Road  
PO Box 12044  
Ann Arbor, Michigan 48111-0144 USA

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# Resilience – Cold Climate Performance in Quebec



# Quebec Residential Performance Data

## Tableau des résultats BNQ 2018

Référence installation	ville	Date d'installation	MES	DBO5	Coliformes Fécaux
3863	Lac Beauport	28/11/2011	<1	<3	<10
5725	Rouyn-Noranda	02/09/2013	<1	<3	<10
1905	Québec	02/09/2009	<1	<3	<10
2166	St. Lazare-de-Bellechasse	23/11/2009	2	<3	<10
2170	Ascot Corner	17/04/2009	3	3	18
2567	L'Ange-Gardien	15/07/2010	<1	6	700
4356	Mascouche	20/08/2012	4	<3	5700
6643	Laval	17/12/2014	3	<3	<10
2583	Saint-Tite	03/06/2010	2	<3	<10
2318	Saint-Hippolyte	03/05/2010	12	58	60000





# International Certification Reach



SPD & CTD Models  
Certified to NSF/ANSI  
Standard 40, Class I



# Thank You for Attending!

## CTD Technology Summary

- Promotes wastewater reclamation
- Reduces energy demand
- Performs reliably and consistently
- Proven longevity
- Functions in all climates
- Smaller footprint vs. legacy systems





# INFILTRATOR

water technologies



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