

Water Reuse Onsite Applications

Southwest Onsite Conference 2014



NSF Standards Development Process

Industry Representatives



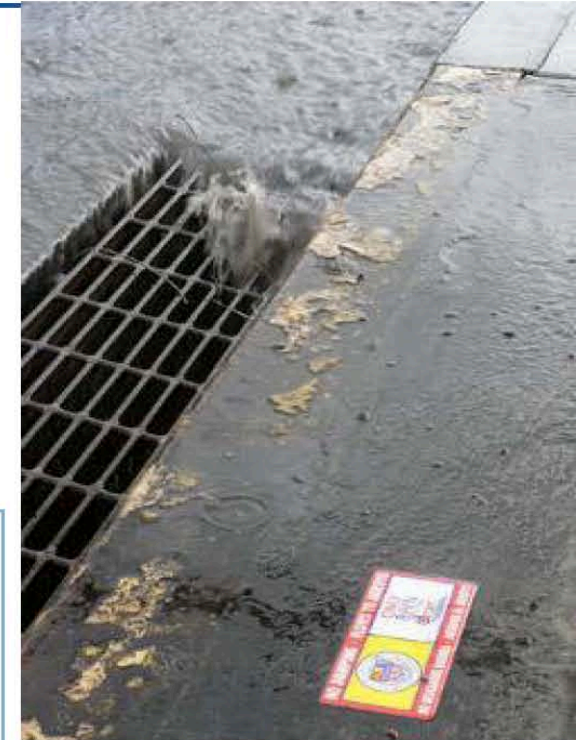
**Consumers
Laboratories
Utilities
Consultants**

**Federal
State
Local**

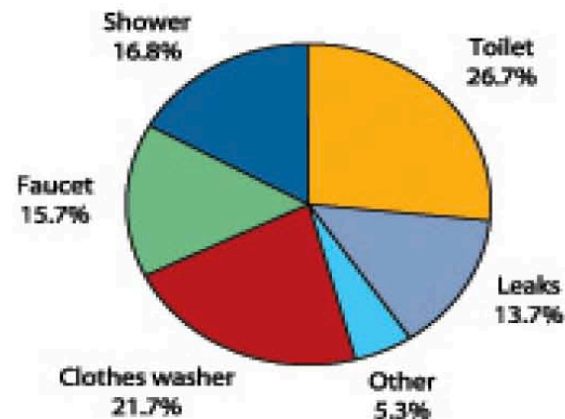


Broad Scope of Available Water Sources

- **Nature generated**
 - Rainfall
 - Storm runoff
- **Human generated**
 - Graywater
 - Residential wastewater



How Much Water Do We Use?

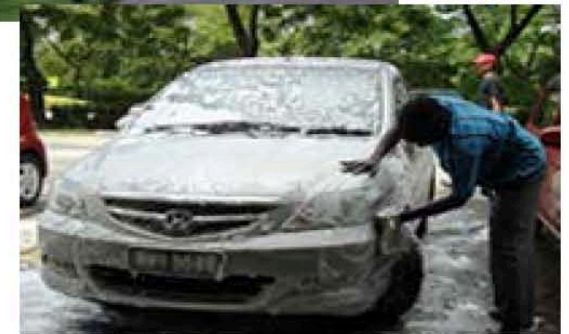
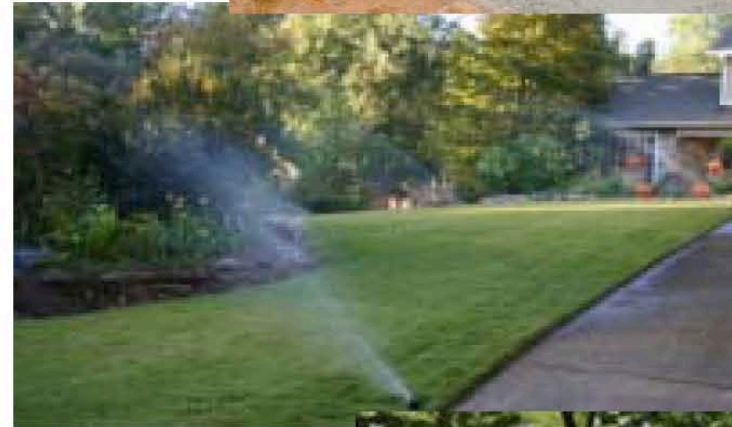


Source: American Water Works Association Research Foundation, "Residential End Uses of Water," 1999

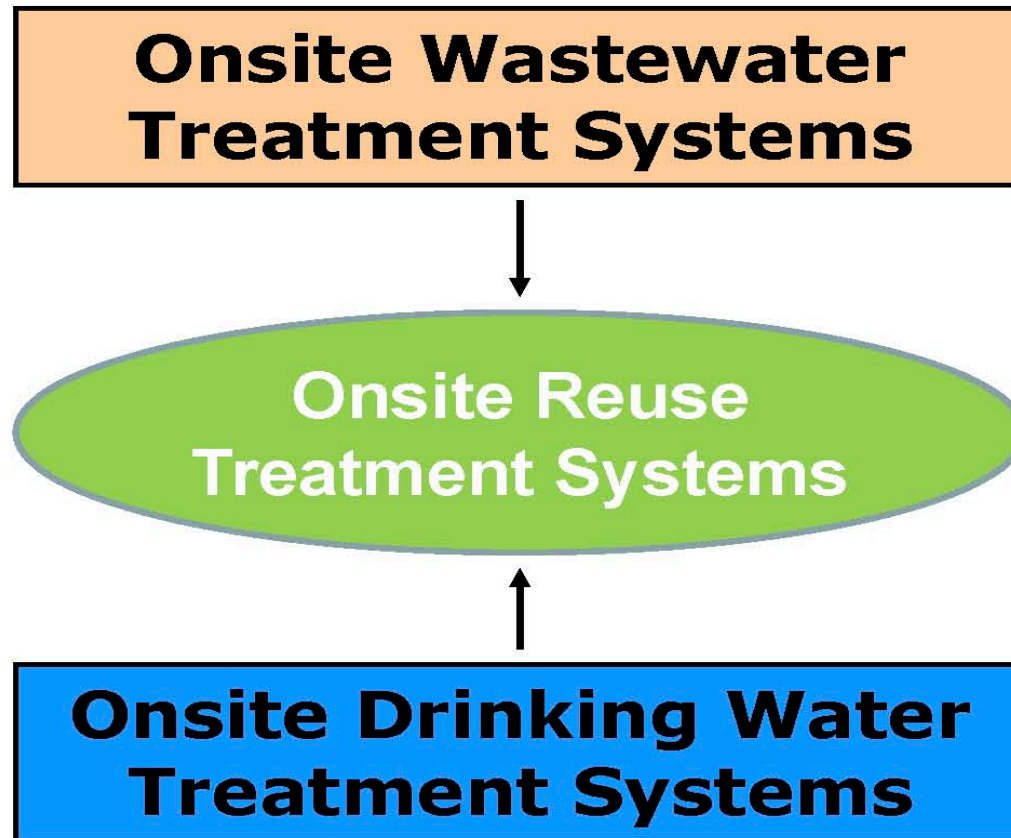


Broad Scope of Non-potable Reuse Applications

- **Use of treated effluent:**
 - Irrigation
 - Toilet/urinal flushing
 - Vehicle washing
 - Fire protection
 - Laundry
 - Fountains
 - Dust control
 - Construction



Leverage Existing Standards and Technologies



Current NSF/ANSI Onsite Wastewater Standards

- **Standard 40 (1970):** Complete residential treatment system with a capacity of 400 to 1500 gpd; CBOD and TSS reduction.
- **Standard 245 (2007):** Complete residential treatment system with a capacity of 400 to 1500 gpd; Nitrogen reduction.



NSF POU/POE Drinking Water Standards

NSF/ANSI 42 Filters - Aesthetic Claims

NSF/ANSI 53 Filters - Health Claims

NSF/ANSI 58 Reverse Osmosis (RO)

NSF/ANSI 44 Softeners

NSF/ANSI 62 Distillation

NSF/ANSI 55 Ultraviolet (UV)

NSF/ANSI 177 Shower Filters



New Product Standards

NSF 350 Onsite residential and commercial reuse treatment systems

and

NSF 350-1 Onsite residential and commercial graywater treatment systems for subsurface discharge

NSF Committee

- **Initiated in 2007**
- **Members:**
 - Drinking water and wastewater treatment industry
 - Plumbing component manufacturers
 - Public health officials (EPA, state, local)
 - Other interested parties (NRDC, AWE, several trade associations)

New Product Standards

NSF 350 Onsite residential and commercial reuse treatment systems

Scope: Standard 350

- **Residential and commercial treatment systems**
- **Sources; graywater and combined wastewater**
 - Graywater: laundry and bathing, excluding toilet and kitchen.
 - Combined: blackwater and graywater.
- **Non-potable effluent uses**
 - Indoor; toilet and urinal flushing.
 - Outdoor; surface and subsurface irrigation.

System Sizes: Standard 350

- **Residential wastewater; Up to 1500 gpd**
 - Laboratory testing with actual wastewater.
- **Graywater; Up to 1500 gpd**
 - Laboratory testing with synthetic wastewater; bathing, laundry, or both
 - Exception; commercial laundry water
- **Systems exceeding 1500 gpd, and commercial laundry**
 - Field evaluation using actual building wastewater.

Commercial Facilities

“Businesses such as lodging establishments, business parks and campuses, shopping facilities, places of public assembly where no manufacturing, assembly, industrial or food processing is involved, and laundering facilities for hospitals, hotels, rental uniforms, and other facilities likely to handle high amounts of soiling or high strength commercial cleaners.”

Overall Test Requirements: Standard 350

- **Requirements for:**
 - Water tightness
 - Noise levels
 - Access ports
 - Failure sensing and signaling
 - Mechanical and electrical
 - High water
 - Bypass protection; malfunction, overflow
 - Product literature; owner, installation, operation, troubleshooting and repair manuals
 - Performance (effluent quality) evaluation

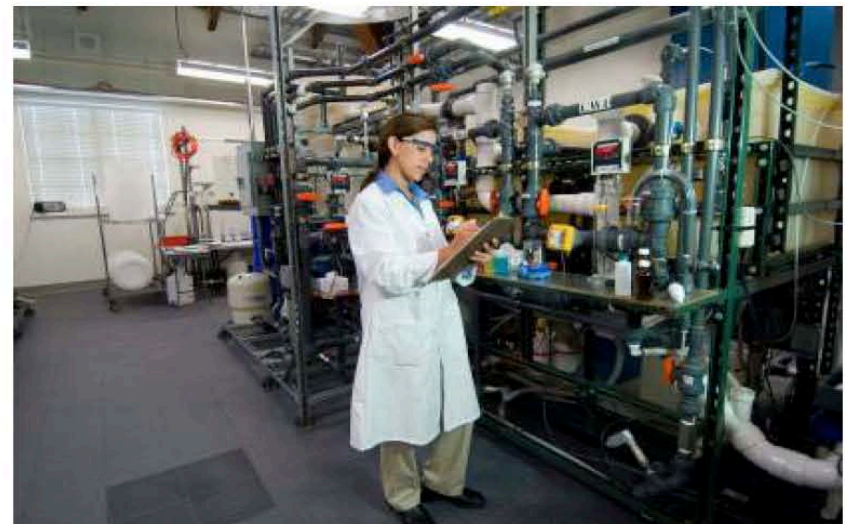
Performance Evaluation: Standard 350

- **Residential wastewater treatment systems; tested with actual wastewater**
 - BOD₅: 100 mg/L - 300 mg/L
 - TSS: 100 mg/L - 350 mg/L



Performance Evaluation: Standard 350

- **Graywater treatment systems; tested with synthetic challenge water:**
 - 52% Laundry; liquid detergent and softener, dirt.
 - 46% Bathing; shampoo, conditioner, deodorant, toothpaste, soap, cleaner.
 - 2% as secondary treated residential wastewater; source of total coliforms and E. coli



Graywater Influent Test Water: Standard 350

Parameter	Required range
TSS	80-160 mg/L
CBOD₅	130-180 mg/L
Temperature	25-35 C
pH	6.5-8.0
Turbidity	50-100 NTU
Total phosphorous	1.0-3.0 mg/L
Total nitrogen	3.0-5.0 mg/L
Total coliforms	10³-10⁴ CFU/100mL
E. coli	10²-10³ CFU/100mL

Product Test Conditions: Standard 350

- **Installed per manufacturer's instructions.**
- **No restriction for seasons.**
- **Operated in accordance with manufacturer's instruction.**
- **Minimum six month evaluation.**
- **No service or maintenance during entire test.**
- **All test data reported.**
- **No allowance for discard of any data, except if test facility fails to provide an acceptable test.**

Graywater Dosing Schedule: Standard 350

System design	Design loading					Stress tests				
	First 16 weeks	First 20 weeks	Last 4 weeks	Last 3.5 weeks	Last 2.5 weeks	Wash-day surge	Power/equipment failure	Vacation	Water Efficiency	Cleaning solution
R–Bathing only	x			x			x	x	x	
R–Laundry only	x				x	x	x	x	x	
R–Combined	x				x	x	x	x	x	
C–Bathing only		x	x				x	x		
C–Laundry only		x	x				x	x		
C–Combined		x	x				x	x		x

Parameter	Sample type	Sample location	
		Raw influent	Treated effluent
BOD ₅	24 h composite	X	
CBOD ₅	24 h composite		X
Total suspended solids	24 h composite	X	X
pH	Grab	X	X
Temperature (°C)	Grab	X	
E. coli	Grab	X	X
Turbidity	24 h composite	X	X
TKN	24 h composite	X	
NO ₂ /NO ₃	24 h composite	X	
Total phosphorous	24 h composite	X	
COD	24 h composite	X	
Total coliforms	Grab	X	
TOC	24 h composite	X	
Surfactants	24 h composite	X	
Fats, oil and grease	24 h composite	X	
Iron	24 h composite	X	

Effluent Criteria: Standard 350

Parameter	Class R	Class C
CBOD₅	10 mg/L (25)	10 mg/L (25)
TSS	10 mg/L (30)	10 mg/L (30)
Turbidity	5 NTU (10)	2 NTU (5)
E. coli	14 MPN/100 mL (240)	2.2 MPN/100 mL (200)
pH	6.0 – 9.0	6.0 – 9.0
Chlorine	0.5 - 2.5 mg/L	0.5 - 2.5 mg/L

New Product Standards

NSF 350-1 Onsite residential and commercial graywater treatment systems for subsurface discharge

Scope: Standard 350-1

- **Residential and commercial treatment systems**
- **Source; graywater only**
 - Graywater: laundry and bathing, excluding toilet and kitchen.
- **Non-potable effluent use**
 - Outdoor; subsurface discharge.

Test Procedure: Standard 350-1

- **Identical to Standard 350**
 - Loading
 - Duration
 - Graywater characteristics
 - Sampling

Test Procedure: Standard 350-1

- **Identical to Standard 350**
 - Loading
 - Duration
 - Graywater characteristics
 - Sampling

Effluent Criteria: Standard 350-1

Parameter	Criteria
CBOD₅	25 mg/L
TSS	30 mg/L

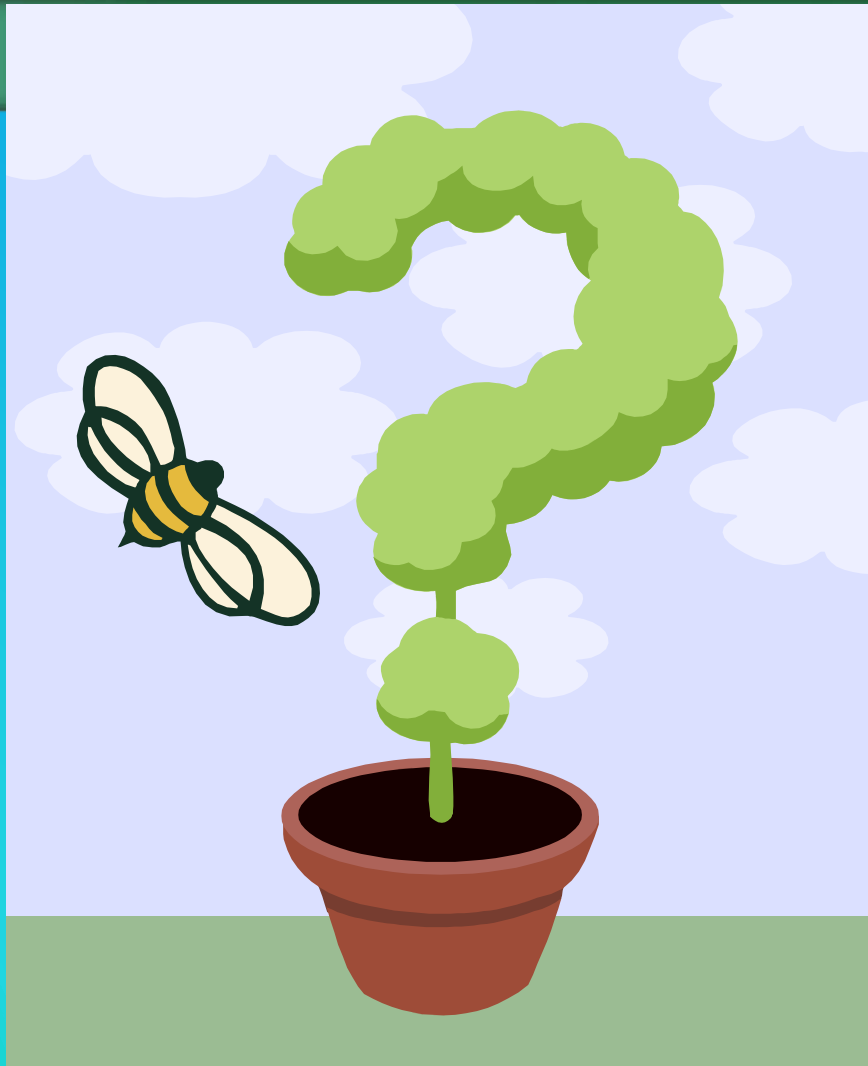
Approval of Alternate Sizes

- **Systems of similar design and specifications varying only in size proportionality and rated treatment capacity.**
- **Testing of one system can qualify a series of systems.**
 - Residential; (1) below 400 gpd and (2) 400 to 1500 gpd
 - Graywater; (1) below 400 gpd and (2) 400 to 1500 gpd
 - Commercial; 1500 gpd and larger
 - Wastewater characteristics
 - Loading conditions

Summary

- **New NSF Standards will provide the proper testing and criteria to enable recognition and acceptance of reuse treatment technologies.**
- **Standards are one piece of a series of steps necessary to enable full use of reuse technologies, but a critical step in creating product safety and public health protection.**

WHY IS NSF 350 IMPORTANT



2013 CA Plumbing Code



1601.7 Minimum Water Quality Requirements

The minimum water quality for alternative water source systems shall meet the applicable water quality requirements for the intended application as determined by the Authority Having Jurisdiction. In the absence of water quality requirements for on-site nonpotable treated gray water systems, the requirements of NSF 350 shall apply.





IgCC: 2012 - 704.3 Onsite reclaimed water treatment systems. Onsite reclaimed water treatment systems, including gray water reuse treatment systems and waste water treatment systems, used to produce nonpotable water for use in water closet and urinal flushing, surface irrigation and similar applications shall listed and labeled to NSF 350.



Uniform Plumbing Code



**Currently has similar language
referencing NSF 350 in the
2015 Draft**



BioBarrier® MBR



Membrane Biological Reactors (MBR)





The Public Health and Safety Organization



NSF Product and Service Listings

These NSF Official Listings are current as of Wednesday, January 22, 2014 at 12:15 a.m. Eastern Time. Please [click on NSF Interiors](#) to confirm the status of any listing, report errors, or make suggestions.

Alert: NSF is concerned about fraudulent downloading and manipulation of website text. Always confirm this information by clicking on the below link for the most accurate information on: <http://info.nsf.org/Certified/Wastewater/Listings.aspx?category=3309>

NSF/ANSI 350 Onsite Residential and Commercial Water Reuse Treatment

Bio-Microbics, Inc.



8450 Cole Parkway
Shawnee, KS 66227
United States
800-753-FAST
913-422-0707

[Visit this company's website](#)

Facility : Shawnee, KS

Model Number	Rated Capacity Gallons/Day	Classification	Type
BioBarrier® MBR 0.5	500	Class R	Wastewater
BioBarrier® MBR 0.5-N	500	Class R	Wastewater
BioBarrier® MBR 1.0	1000	Class R	Wastewater
BioBarrier® MBR 1.0-N	1000	Class R	Wastewater
BioBarrier® MBR 1.5	1500	Class R	Wastewater
BioBarrier® MBR 1.5-N	1500	Class R	Wastewater

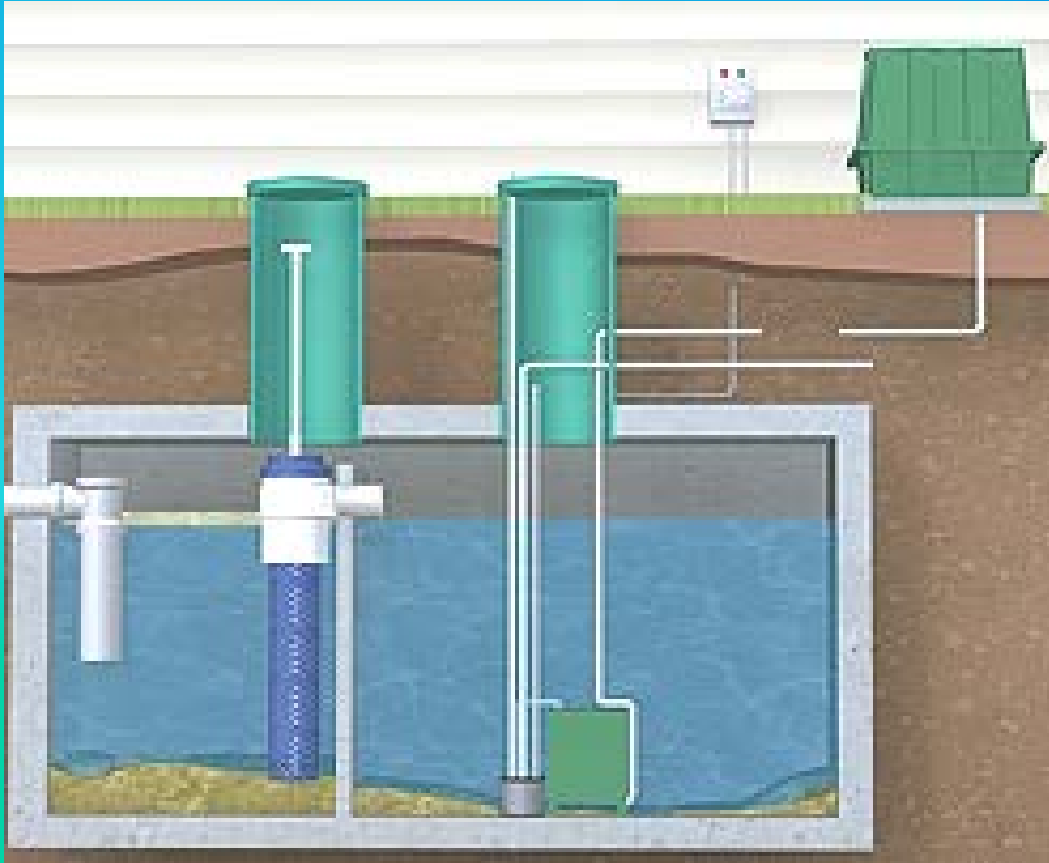
NOTE: Class C - Multi-family residential units and commercial facilities
Class R - Single family residential dwellings

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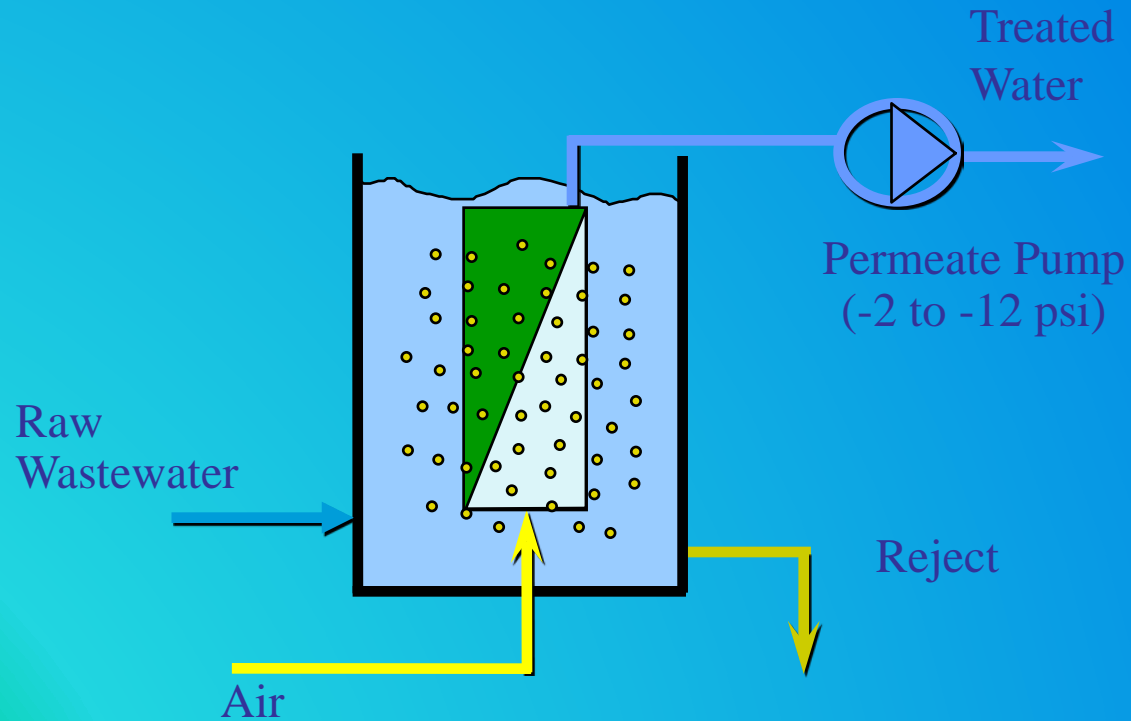
BioBarrier™

MEMBRANE BIOREACTOR



Vacuum Driven - Immersed

Outside-In Membranes



NSF Certifications

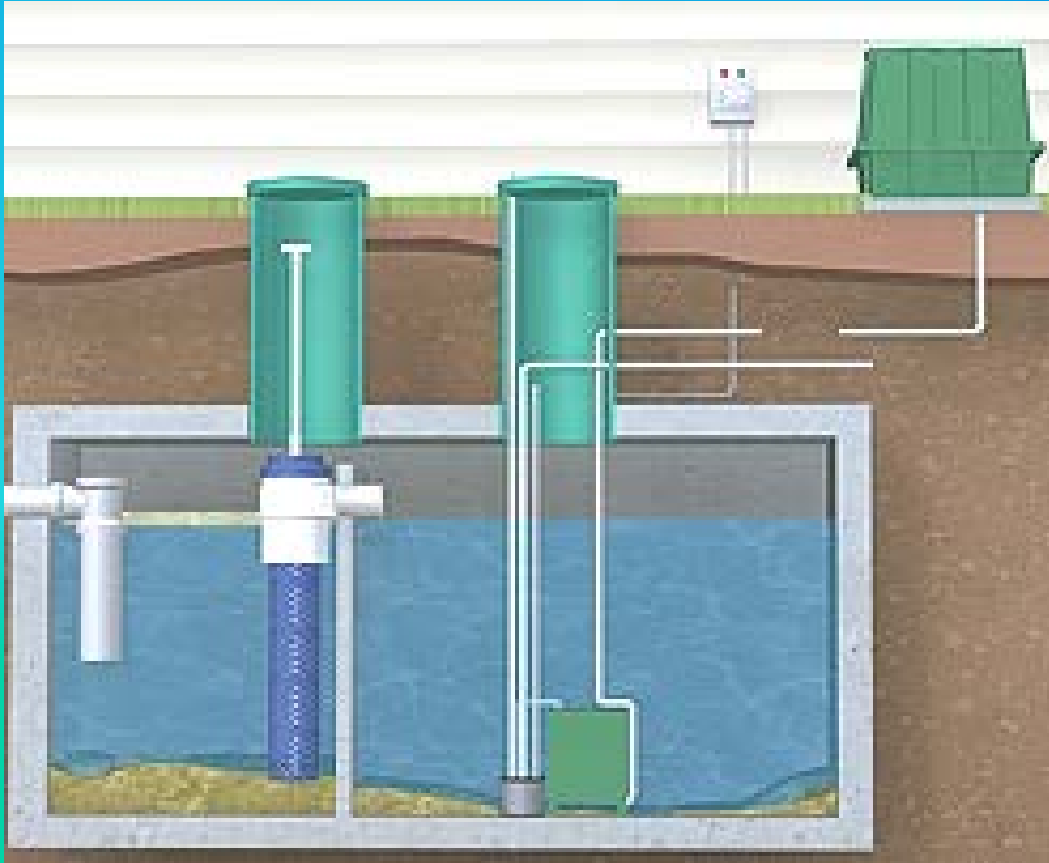


- **Standard 40 for BOD/TSS**
- **Standard 245 for TN Reduction**
- **New Standard 350 for Water Reuse**



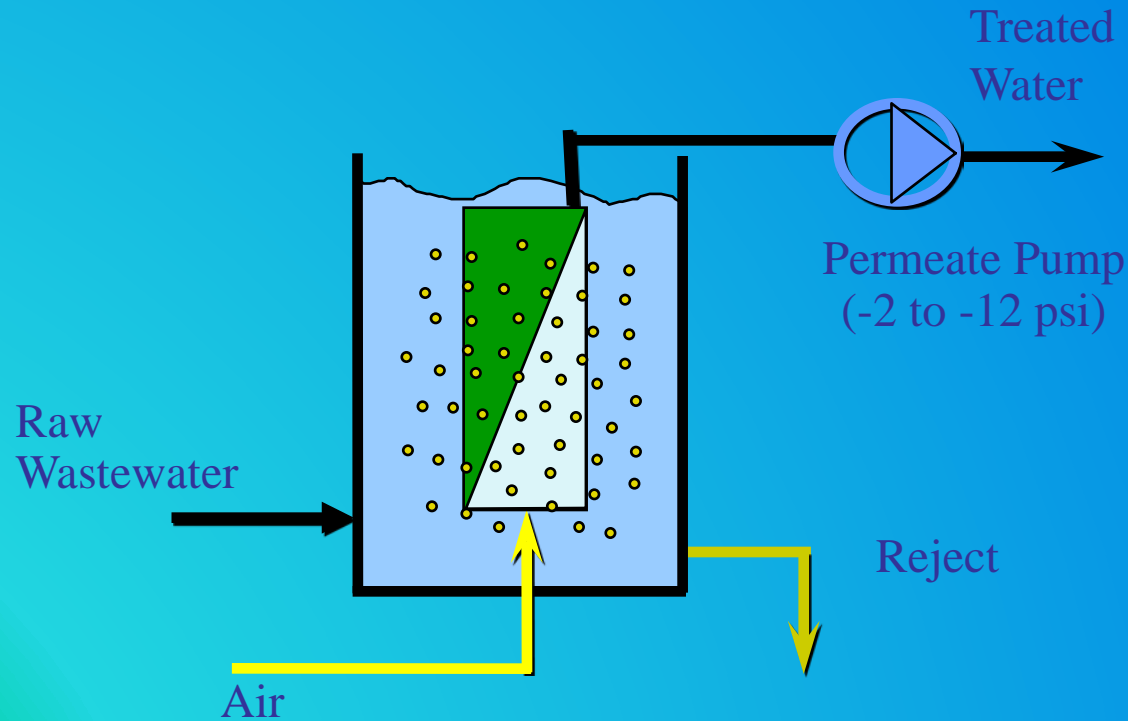
BioBarrier™

MEMBRANE BIOREACTOR



Vacuum Driven - Immersed

Outside-In Membranes



NSF Certifications



- **Standard 40 for BOD/TSS**
- **Standard 245 for TN Reduction**
- **New Standard 350 for Water Reuse**





BioBarrier® 0.5 



BioBarrier® HSMBR 4.5



BioBarrier® NSF Test Results



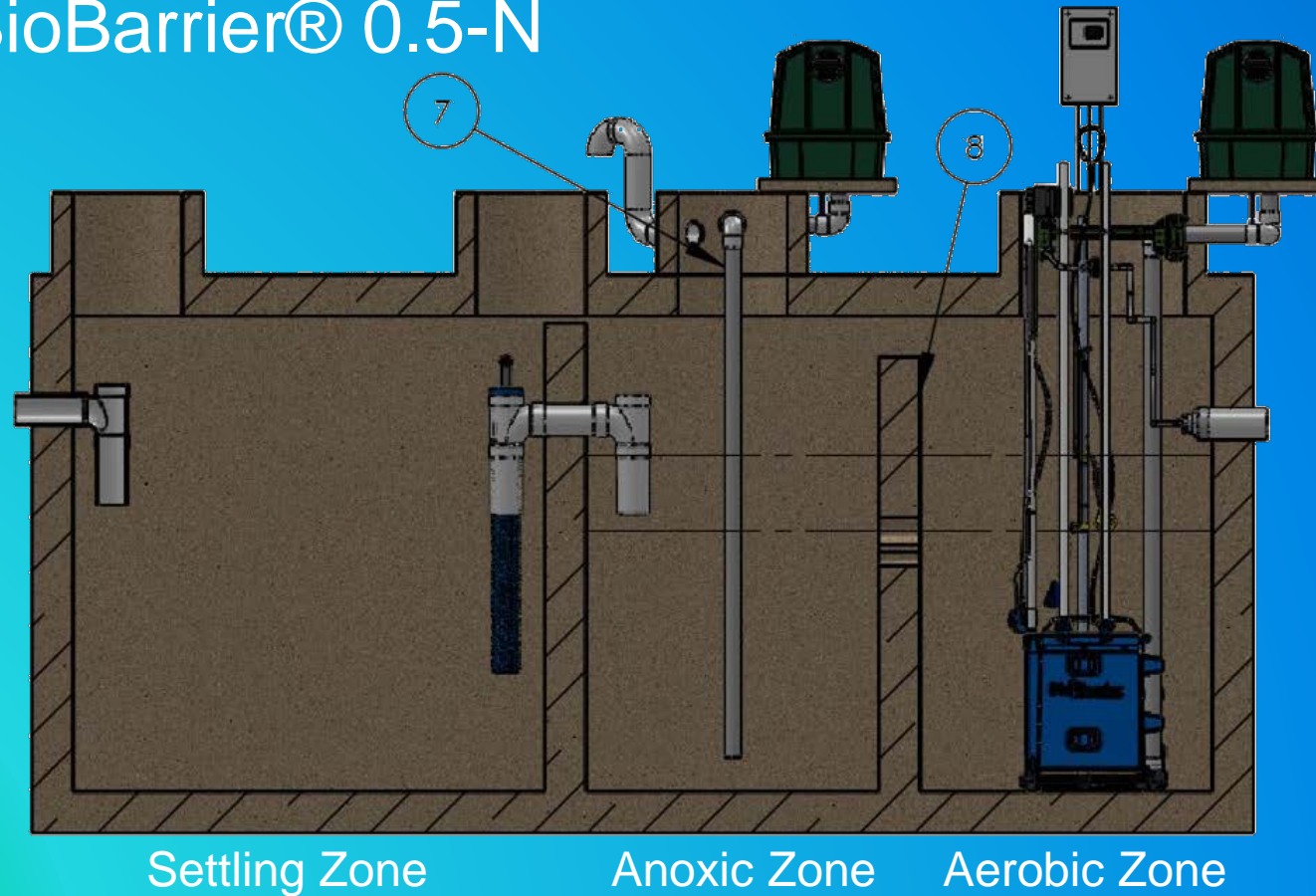
Parameters	Influent	Effluent
Flow, gpd	500	500
BOD, mg/L	220	<2
TSS, mg/L	220	<2
NH3-N, mg/L	30*	2.1
Total Nitrogen, mg/L	43*	9.0
Fecal Coliform, cfu /100ml (GeoMean)	>2 x 10 ⁶	1.2
No of days in service	>180	>180



BioBarrier® for TN Reduction



BioBarrier® 0.5-N



BioBarrier[®] NSF 350 Test Results

Parameters	Influent (Average)	Effluent (Average)
Flow, gpd	500	500
BOD, mg/L	220	<2
TSS, mg/L	220	<2
Turbidity, NTU	110	0.25
E- Coli, MPN/100 ml	2.09×10^6	1.3*
No of days in service	>180	>180

* Value is a Geometric Mean



Effluent Criteria: Standard 350

Parameter	Class R	Class C
CBOD₅	10 mg/L (25)	10 mg/L (25)
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QUESTIONS

