Maine Center for Disease Control and Prevention
An Office of the Department of Health and Human Services
Paul R. LePage, Governor Mary C. Mayhew, Commissioner

Department of Health and Human Services
Maine Center for Disease Control and Prevention
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Augusta, Maine 04333-0011
Tel. (207) 287-8016
Fax (207) 287-9058; TTY (800) 606-0215

Tel. (207) 287-5672 Subsurface Wastewater Unit Fax (207) 287-4172

March 9, 2012

Albert Frick Associates, Inc.
Attn.: Albert Frick
95A County Road
Gorham, ME 04038

Subject: Product Registration, Proprietary Disposal Area and Separation from Limiting Factor, Busse MBR

Dear Mr. Frick:

The Division of Environmental Health has completed a review of a registration application for a disposal areas designed for use specifically with Busse MBR advanced wastewater treatment unit. This information was submitted pursuant to Section 6.HH of the Subsurface Wastewater Disposal Rules for registration for use in Maine.

The Busse MBR was approved for use in Maine in a letter dated 11/19/08, which is incorporated herein by reference.

You have proposed a disposal area design specifically for use with Busse MBR units. The disposal area would consist of two rows of two standard capacity plastic chambers. The chambers would be bedded in 1 ½ inch stone, surrounded by gravelly coarse sand. The disposal area would be separated by 12 inches from the seasonal high groundwater table, restrictive layer, and/or bedrock. The disposal area size would remain constant regardless of soil type.

On the basis of the information and sample product submitted, the Division has determined that the Busse MBR proprietary disposal area is acceptable for use in the State of Maine as proposed with the following conditions:

1. All systems utilizing the Busse MBR proprietary disposal area located outside the shoreland area of major water bodies/courses must be located on soils with a minimum depth to seasonal groundwater table or hydraulically restrictive horizon of 9 inches and a minimum depth to bedrock of 9 inches. (Ref.: Section 4.A.3(a) of the Rules.)

2. All systems utilizing the Busse MBR proprietary disposal area located within the shoreland area of major water bodies/courses must be located on soils with a minimum depth to seasonal groundwater table or hydraulically restrictive horizon of 15 inches and a minimum depth to bedrock of 15 inches. (Ref.: Section 4.A.3(b) of the Rules.)

3. The Busse MBR proprietary disposal area may be separated by 12 inches from the seasonal high groundwater table, restrictive layer, and/or bedrock.

4. The size of the Busse MBR proprietary disposal area may consist of two rows of two standard capacity plastic chambers, regardless of soil type.

5. Installations of the Busse MBR proprietary disposal area must otherwise comply with design and installation provisions of the Rules.

Because installation and owner maintenance has a significant effect on the working order of onsite sewage disposal systems, including their components, the Division makes no representation or guarantee as to the efficiency and/or operation of Busse MBR.

Further, registration of this product and proprietary disposal area for use in the State of Maine does not represent Division preference or recommendation for this product over similar or competing products.

If you have any questions please feel free to contact me at (207) 287-5695.

Sincerely,

James A. Jacobsen

James A. Jacobsen
Project Manager, Webmaster
Division of Environmental Health
Drinking Water Program
Subsurface Wastewater Unit
e-mail: james.jacobsen@state.me.us

/jaj

xc: Product File


BUSSE
BUSSE VF

BUSSE Innovative Systeme GmbH
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BUSSE Innovative Systeme GmbH · Zaucheweg 6 · D-04316 Leipzig

Albert Frick Associates, Inc.
Environmental Consultants
95 A County Road
Gorham, ME 04038
(207) 839-5563
www.albertfrick.com

Leipzig, 2012-February-23

Authorization to obtain the General Permission for the Busse MBR small scale waste water treatment systems in the State of Maine on behalf of our company

Dear Mr. Frick,

We hereby authorize you to obtain the General Permission for the Busse MBR small scale waste water treatment systems for the State of Maine on behalf of Busse Innovative Systeme GmbH and our US daughter company Busse Green Technologies Inc. as well.

We kindly ask you to edit and forward all necessary documents to apply for the General permission of our system in the State of Maine.
We permit you to act on our behalf applying for the General Permission and all other approvals tied to it.

Best regards,

Anja Busse

Anja Busse
Managing Director & Owner

Ingo F. Schaefer
Green Technologies Inc.
P.O. Box 1123
Oak Park, Illinois 60304 U.S.A.
708-204-3504
www.busse-gt.com

February 23, 2012

James A. Jacobsen
Project Manager, Webmaster
Division of Environmental Health
Drinking Water Program
Subsurface Wastewater Unit
286 Water Street, Augusta, ME 04333
Phone: 207-287-5695 Fax: 207-287-3165

Dear Mr. Jacobsen

Please be advised that Busse Green technologies Inc. is a sister company of Busse IS GmbH of Leipzig Germany and has authority to act in their behalf for the US market.

We have been working closely with Albert Frick and hereby authorize him to act in our behalf in regards to this project.

Please let me know if you might need anything else from me.

Sincerely;

Ingo F. Schaefer

Ingo F. Schaefer

Albert Frick Associates, Inc
Environmental Consultants
95A County Road Gorham, Maine 04038

(207) 839-5563 FAX (207) 839-5564

www.albertfrick.com info@albertfrick.com

Albert Frick, SS, SE
James Logan, SS, SE
Matthew Logan, SE
Brady Frick, SE
Bryan Jordan, SE
William O'Connor,
Noel Dunn, Office Manager

February 23, 2012

James Jacobsen
Dept. of Environmental Health
11 State House Station
Augusta, ME 04333

Re: Proposed BUSSE disposal area to be utilized for disposal of treated effluent from single-family dwelling units.

Dear James Jacobsen:

We spoke on January 27, 2012 about working with the Maine Division of Environmental Health (DEH) to advance and implement the BUSSE Advanced Treatment System with a subsurface wastewater disposal system that is proper for the quality of effluent, in keeping with the spirit of the *Roger Crouse* and *Brian Kavanah* joint letter of January 9, 2012 (see Exhibit A).

You stated that there is clear precedent for DEH approving an appropriate leaching field presented by a proprietary manufacturer with supporting data (e.g. *SeptiTech* and 75% reduction for stone trench, *SoilAir* and *Geomatric* leaching areas, *OxyPro* and Mound Buster, separation distance reduction for *SeptiTech, OxyPro, SoilAir, Cromoglas,* and 75% reduction for a stone bed for *Clean Solutions).*

The BUSSE system is currently permitted in Europe for use, and these installations have been successful in producing *'rainwater quality'* discharge. Consequently, the treated wastewater effluent is permitted in Europe to be discharged to land, direct discharge to surface water, and drip irrigation. The BUSSE system is pending approval from the National Sanitation Foundation Standard 350 for blackwater re-use (see Exhibit B NSF 350 attached).

Also, the BUSSE system was tested under NSF 40 Standard Septic System (Exhibit C), and 245 Nitrogen Reduction. The BUSSE system was also subjected to fecal coliform reduction testing at Massachusetts Alternative Septic System Test Center (MASSTC) (see page 6 of MASSTC, November 2009 report attached)(see Exhibit E).

Understanding your perspective to be conservative until proven by experience, we are submitting the test results from the permitted system in Maine (Littlefield, Harpswell) (see Exhibit F). We are proposing to utilize the attached disposal area for a single family dwelling unit (see Exhibit G). The disposal system area size is very conservative, from our perspective, since no plugging of soil will occur due to bio mat formation. We are proposing 4 inspection ports to be able to monitor the hydraulics in the disposal field and test the effluent quality as needed. The effluent from the BUSSE System, which meets rainwater quality from the BUSSE treatment unit, is proposed to be additionally treated by soil filtration and chelation processes as it drains from the proposed subsurface wastewater disposal area.

Note: A supplemental e-mail communication was sent to interested parties that contains complete electronic copies of all the NSF documents, as well as an Excel spread sheet with testing of numerous existing sites in Europe.

Please contact me if you have any questions or additional matters for discussion regarding the proposed application and current conditions.

Respectfully,

Albert Frick

Albert Frick
Certified Soil Scientist # 66
Licensed Site Evaluator #163

AF/nd

Enc. Subsurface wastewater disposal system plan (generic)
NSF 40 (complete document sent electronically)
NSF 245 (complete document sent electronically)
NSF 350 (complete document sent electronically)
BUSSE European test results (sent electronically as an Excel spreadsheet scan)
BUSSE Maine test results
MASSTC, Fecal reduction

Cc. Roger Crouse, DEH
Brian Kavanah, DEP
Ingo Shaeffer
Ralf Busse, BUSSE
Robert Anuszewski

EXHIBIT A

DHE/DEP letter of January 9, 2012

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PAUL R. LEPAGE
GOVERNOR

PATRICIA W. AHO
COMMISSIONER

January 9, 2012

Mr. Albert Frick
Albert Frick Associates, Inc.
95A County Road
Gorham, ME 04038

Mr. Ingo Schaefer
Busse Green Technologies, Inc.
P.O. Box 1123
Oak Park, IL 60304

Dear Mr. Frick and Mr. Schaefer:

This letter follows several discussions between you and the Departments of Environmental Protection (DEP) and Health and Human Services (DHHS) regarding the Busse technology and applicable regulatory requirements in Maine. Most recently, the DEP met with you on December 8, 2011 to discuss this technology and its application in Maine for replacement systems, including overboard discharges (OBDs), as well as for first-time systems. DEP committed to meet with DHHS to ensure a coordinated response regarding the appropriate mechanisms and regulatory agency to review proposals to use the Busse system in Maine.

On January 3, 2012, DEP and DHHS met to discuss our respective roles in approving wastewater disposal systems, with specific focus on the advanced Busse system. Both agencies agree that application of the Busse system as replacement systems for failed subsurface systems, and particularly to eliminate OBDs, is an intriguing method of reducing the potential public health threat from discharges if they can be designed and installed in accordance with applicable standards and with proper approval.

The ultimate disposal method you described was subsurface disposal or drip irrigation on the ground surface with bark mulch or other suitable organic matter used to ensure treated effluent from the Busse system would not pond at the surface or directly enter surface or ground waters through bedrock fractures. The *Subsurface Wastewater Disposal Rules*, 10 CMR 241, and Maine law [30-A M.R.S.A. § 4201(5)] define subsurface wastewater disposal as "[a]ny system for the disposal of waste or waste water on or beneath the surface of the earth...." Consequently, discharges of treated domestic wastewater or domestic-like wastewater from the Busse system on or beneath the surface of the earth are exclusively under jurisdiction of the DHHS. The intent of the guiding statutes and rules is that DHHS is the regulatory agency for discharges on and beneath the land surface of wastewater generated by ordinary living uses and that the DEP is the appropriate regulatory agency for discharges to ground water, either by

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1235 CENTRAL DRIVE, SKYWAY PARK
PRESQUE ISLE, MAINE 04679-2094
(207) 764-0477 FAX: (207) 760-3143

web site: www.maine.gov/dep

spray irrigation or subsurface disposal, resulting from heavy commercial or industrial type sources.

When a variance from one or more standards established in the plumbing code is required to facilitate the installation of a Busse system on a particular property, the procedure for approval begins at the local level with the plumbing inspector. If the variance request exceeds the approval authority of the local plumbing inspector (LPI), the LPI should forward the variance request and supporting plans to the Division of Environmental Health at DHHS for review and consideration. The DEP and DHHS are equally committed to exhausting all available approved technologies, including the Busse system, to reduce or eliminate potential pubic health risks associated with discharges to waters of the State from overboard discharges and malfunctioning existing subsurface systems. The *Subsurface Wastewater Disposal Rules* establishes separate setback and siting criteria for first-time systems and replacement systems. Variance requests will be reviewed by the Division of Environmental Health on a case-by-case basis with consideration given to existing conditions and the potential human health and environmental benefits or risks associated with the requested variances.

Thus, it is DHHS and not DEP that administers the statutes and rules for discharges of domestic wastewater or domestic-like wastewater on or beneath the land surface. Discharges of treated domestic wastewater or domestic-like wastewater to surface waters are subject to DEP licensing requirements pursuant to 38 M.R.S.A. § 413(1). "An 'overboard [d]ischarge' is a discharge to the surface waters of the State of domestic pollutants not conveyed to and treated in municipal or quasi-municipal sewage treatment facilities." [*Overboard discharges: licenses and abandonment,* 06-096 CMR 596(6)(B)(2) (last amended November 27, 2004)] *Id.* at 38 M.R.S.A. § 466(9). The DEP currently licenses OBDs under individual waste discharge licenses. The two goals of OBD removal are opening shellfish growing areas and overall improvement in ambient water quality. Regardless of effluent quality, an outfall pipe to estuarine or marine waters from a domestic wastewater treatment system will force the closure of any potential shellfish growing areas in the vicinity of the pipe.

In conclusion, both agencies encourage site evaluators to think creatively for solutions to difficult site conditions and to eliminate OBDs. Variance requests will be thoughtfully considered by DHHS. Where the continued discharge from an OBD is the only viable solution, the DEP is committed to expeditiously, although thoroughly, reviewing license applications.

Thank you for engaging our departments in discussing this relatively new and seemingly promising technology for use in Maine. We look forward to continued collaborative cooperation with you.

Respectfully,

Brian Kavanah
Director
Division of Water Quality Management
Maine Dept. of Environmental Protection

Roger Crouse
Director, Drinking Water Program
Division of Environmental Health
Maine Dept. of Health and Human Services

EXHIBIT B

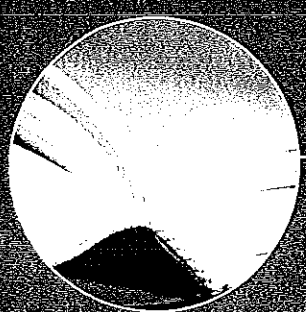
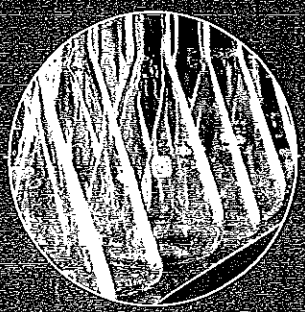
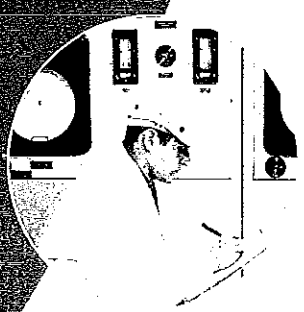
NSF 350
Water Re-use

Electronic copy of complete document sent with e-mail attachment

NSF International Standard /
American National Standard

NSF/ANSI 350 - 2011

Onsite Residential and Commercial Water Reuse Treatment Systems

facilities, and those that treat bathing water. Systems shall be classified as Class R (single-family residential), or Class C (multi-family or commercial), in accordance with 8.6. The performance classification shall be based upon the evaluation of effluent samples collected over a minimum 6 m (26 wk [182 d]) testing period. Manufacturers that recommend a service frequency longer than 6 m (26 wk [182 d]) shall be tested for the full period of the recommended service frequency.

8.1.1 Preparations for testing and evaluation of graywater treatment systems

8.1.1.1 The system shall be assembled, installed, and filled in accordance with the manufacturer's instructions.

8.1.1.2 The manufacturer shall inspect the system for proper installation. If no defects are detected and the system is judged to be structurally sound, it shall be placed into operation in accordance with the manufacturer's start-up procedures. If the manufacturer does not provide a filling procedure, ⅔ of the system's capacity shall be filled with water meeting the specifications of 8.1.2.1, and the remaining ⅓ shall be filled with graywater meeting the specifications of 8.1.2.1.1, 8.1.2.1.2, or 8.1.2.1.3, as appropriate based upon manufacturer's decision to test with bathing water, laundry water, or both.

8.1.1.3 The system shall undergo design loading (see 8.1.2.2.1) until testing and evaluations are initiated. Sample collection and analysis shall be initiated within 3 wk (21 d) of filling the system and, except as specified in 8.6.1.2, shall continue without interruption until the end of the evaluation period.

8.3.1.4 If the system is to be installed outdoors, and conditions at the testing site preclude installation of the system at its normally prescribed depth, the manufacturer shall be permitted to cover the system with soil to achieve normal installation depth.

8.1.1.5 If the system is to be installed outdoors, performance testing and evaluation of systems shall not be restricted to specific seasons.

8.1.1.6 When possible, electrical or mechanical defects shall be repaired to prevent evaluation delays. All repairs made during the performance testing and evaluation shall be documented in the final report.

8.1.1.7 The system shall be operated in accordance with the manufacturer's instructions. Routine service and maintenance of the system shall not be permitted during the performance testing and evaluation period.

> NOTE – The manufacturer may recommend or offer more frequent service and maintenance of the system but for the purpose of performance testing and evaluation, service and maintenance shall not be performed beyond what is specified in this Standard.

8.1.2 Testing and evaluation conditions, hydraulic loading, and schedules

8.1.2.1 Graywater challenge water: Base water supply

A public water supply shall be used as the base water to which individual ingredients are added, as described in 8.1.2.1.1, 8.1.2.1.2, and 8.1.2.1.3. The 30-d average concentration of the base water supply shall meet or be adjusted to meet the following requirements:

Parameter	Required range
hardness	110 – 220 mg/L
alkalinity	> 40 mg/L as $CaCO_3$

8.1.2.1.1 Graywater challenge water: Systems treating bathing source water

Prepare the challenge water according to the following formula:

Wastewater components[1]	Amount/100 L
body wash with moisturizer	30 g
toothpaste	3 g
deodorant	2 g
shampoo	19 g
conditioner	21 g
lactic acid	3 g
secondary effluent	2 L
bath cleaner	10 g
liquid hand soap	23 g
test dust[2]	10 g

[1] See Annex C for example products.

[2] See ISO 12103-1, Road Vehicles – Test Dust for Filter Evaluation. The test dust shall meet the specification of ISO 12103-1, A2 - Fine test dust. A test dust that meets these specifications is available from Powder Technology, Inc., PO Box 1464, Burnsville, MN 55337 <www.powdertechnologyinc.com/products/test-dust/testdust.php>.

NOTE – The amount of individual wastewater components are recommendations. If the required range for the 30-d average concentration of individual parameters are not met using the recommended volumes, then the volume of wastewater components can be adjusted to achieve the required 30-d average concentrations. All necessary adjustments to the ingredient volumes shall be reported in the final report.

The 30-d average concentration of the bathing water delivered to the system shall be as follows:

Parameter	Required range
TSS	50 – 100 mg/L
BOD_5	100 – 180 mg/L
temperature	25 – 35 °C
pH	6.0 –7.5
turbidity	30 – 70 NTU
total phosphorous – P	1.0 – 4.0 mg/L
total Kjeldahl nitrogen – N	3.0 – 5.0 mg/L
COD	200 – 400 mg/L
TOC	30 – 60 mg/L
total coliforms	10^3 – 10^4 cfu/100 mL
E. coli (*Escherichia coli* – ATCC[7] 11775)	10^2 – 10^3 cfu/100 mL

[7] ATTC, American Type Culture Collection PO Box 1549, Manassas, VA 20108 <www.atcc.org>.

8.1.2.1.2 Graywater challenge water: Systems treating laundry source water

Prepare the challenge water according to the following formula:

Wastewater components[1]	Amount/100 L
liquid laundry detergent (2X)	40 mL
test dust[2]	10 g
secondary effluent	2 L
liquid laundry fabric softener	21 mL
Na_2SO_4	4 g
$NaHCO_3$	2 g
Na_2PO_4	4 g

[1] See Annex C for example products.

[2] See ISO 12103-1, Road Vehicles – Test Dust for Filter Evaluation. The test dust shall meet the specification of ISO 12103-1, A2 - Fine test dust. A test dust that meets these specifications is available from Powder Technology, Inc., P.O. Box 1464, Burnsville, MN 55337. <www.powdertechnologyinc.com/products/test-dust/testdust.php>.

NOTE – The amount of individual wastewater components are recommendations. If the required range for the 30-d average concentration of individual parameters are not met using the recommended volumes, then the volume of wastewater components can be adjusted to achieve the required 30-d average concentrations. All necessary adjustments to the ingredient volumes shall be reported in the final report.

The 30-d average concentration of the laundry water delivered to the system shall be as follows:

Parameter	Required range
TSS	50 – 100 mg/L
BOD_5	220 – 300 mg/L
temperature	25 – 35 °C
pH	7.0 – 8.5
turbidity	50 – 90 NTU
total phosphorous – P	< 2 mg/L
total Kjeldahl nitrogen – N	4.0 – 6.0 mg/L
COD	300 – 500 mg/L
TOC	50 – 100 mg/L
total coliforms	10^3 – 10^4 cfu/100 mL
E. coli	10^2 – 10^3 cfu/100 mL

8.1.2.1.3 Graywater challenge water: Systems treating bathing and laundry source waters combined

Each 100 L challenge water shall be prepared using 53 L of 8.1.2.1.1 and 47 L of 8.1.2.1.2. The 30-d average concentration of the graywater delivered to the system shall be as follows:

Parameter	Required range
TSS	80 – 160 mg/L
BOD_5	130 – 180 mg/L
temperature	25 – 35 °C
pH	6.5 – 8.0
turbidity	50 – 100 NTU
total phosphorous – P	1.0 – 3.0 mg/L
total Kjeldahl nitrogen – N	3.0 – 5.0 mg/L
COD	250 – 400 mg/L
TOC	50 – 100 mg/L
total coliforms	10^3 – 10^4 cfu/100 mL
E. coli	10^2 – 10^3 cfu/100 mL

8.1.2.2 Hydraulic loading and schedules

During the minimum 6 m (26 wk [182 d]) testing and evaluation period, the system shall be subjected to periods of design loading, followed by stress loading, and then additional weeks of design loading. Class R and Class C systems claiming service intervals of greater than 6 m (26 wk [182 d]) shall be loaded beginning in week 27 at design loading, according to the time frame and % rated daily hydraulic capacity as shown below, and shall continue dosing such that the test period equals the prescribed service interval.

Loading of the systems will be based on the following matrix:

System design	Design loading[1]					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[2]
R–Bathing only	×			×			×	×	×	
R–Laundry only	×				×	×	×	×	×	
R–Combined	×				×	×	×	×	×	
C–Bathing only		×	×				×	×		
C–Laundry only		×	×				×	×		
C–Combined		×	×				×	×		×

[1] For 6 m (26 wk [182 d]) test.

[2] Addition of cleaning solution during final 4.5 wk (31 d) of test.

EXHIBIT C

NSF Standard 40
(Residential Wastewater Treatment Systems)

Electronic copy of complete document sent with e-mail attachment

Residential wastewater treatment systems

NSF International Standard/
American National Standard

NSF/ANSI 40 – 2005

EXHIBIT D

NSF Standard 245
Nitrogen Reduction

Electronic copy of complete document sent with e-mail attachment

WASTEWATER TECHNOLOGY

NSF/ANSI Standard 245 - *Wastewater Treatment Systems – Nitrogen Reduction*

Final Report:

Busse Innovative Systeme GmbH
Model MF-B-400 Wastewater Treatment System
07/11/055/0030

NSF International
789 N. Dixboro Road
PO Box 130140
Ann Arbor, Michigan 48113-0140 USA

EXHIBIT E

MASS TC
November 2009

Fecal Reduction Testing

Analysis of Fecal Coliform Reduction

Busse Innovative Systeme GmbH

Model MF-B-400 Wastewater Treatment System

Work completed under Contract No. 07/11/055/0030

November 2009

EXECUTIVE SUMMARY

In 2007, the Busse Model MF-B-400 wastewater treatment system was evaluated under the provisions of NSF/ANSI Standard 40 for Residential Wastewater Treatment Systems (August 2005 Revision). NSF/ANSI Standard 40 was developed by the NSF Joint Committee on Wastewater Technology. Busse Innovative Systeme GmbH requested that additional sampling be completed during the NSF/ANSI Standard 40 test period to evaluate the performance of the Model MF-B-400 for fecal coliform reduction.

The performance evaluation was conducted at the Massachusetts Alternative Septic System Test Center (MASSTC) located at Otis Air National Guard Base in Bourne, Massachusetts, using sanitary sewage from the base residential housing. Testing took place from June through December 2007. Initial dosing to the treatment system began on June 6, 2007. Sample collection was initiated on June 11, 2007, five days after initial dosing. The Standard 40 test was completed on December 7, 2007. Fecal coliform sampling continued until December 20, 2007. The sampling points covered a range of seasonal operating temperatures.

The Busse Model MF-B-400 system performance is summarized below. A detailed data set of all individual sample points is available in the complete NSF Test Report:

> The effluent geometric mean for fecal coliform was 1.1 cfu/100 mL. The 30-day geometric means of the system effluent fecal coliform concentration ranged from <1 to 1.3 cfu/100 mL. The minimum 30-day geometric mean of the system influent fecal coliform concentration was 3.45×10^6 cfu/100 mL while the maximum 30-day geometric mean of the influent fecal coliform concentration was 8.26×10^6 cfu/100 mL. Over the course of the evaluation, the average effluent $CBOD_5$ was 2 mg/L, ranging between <2 and 4 mg/L. The average effluent total suspended solids was 6 mg/L, ranging between <5 and 15 mg/L. Additionally, data were collected for temperature, pH, and dissolved oxygen. The effluent temperature ranged from 9.3 °C to 26 °C. The effluent pH ranged from 5.5 to 7.4. The effluent dissolved oxygen ranged from 2.3 to 8.5 mg/L.

This report includes fecal coliform data generated during the performance evaluation along with verification of the 30-day geometric means of influent and effluent fecal coliform data.

1.0 Introduction

During the evaluation of the Busse Model MF-B-400 wastewater treatment system for compliance with NSF/ANSI Standard 40 - *Residential Wastewater Treatment Systems* (August 2005), Busse Innovative Systeme GmbH requested that additional samples be collected to determine the performance of the Busse Model MF-B-400 for fecal coliform reduction.

Chemical analyses of samples collected during the evaluation were completed using the procedures in *Standard Methods for the Examination of Water and Wastewater* (19th Edition) and USEPA methods. The Busse Model MF-B-400 system met the Class I effluent requirements of NSF/ANSI Standard 40. Results of the chemical analyses and on-site observations and measurements made during the evaluation are summarized in Table 1. Plant specifications are provided in Appendix A. The individual data points for the Standard 40 test are documented in Appendix B

This report describes the procedures and observations occurring during the test, and includes all fecal coliform data generated June 11, 2007 through December 20, 2007 along with verification of the 30-day influent averages of both BOD_5 and TSS. Additional information regarding the Standard 40 performance evaluation is provided in the NSF Wastewater Technology Report for the Busse Model MF-B-400. This evaluation report should not be construed as an NSF approval of disinfection equipment.

TABLE I. SUMMARY OF ANALYTICAL RESULTS

	Average	Std. Dev.	Minimum	Maximum	Median	Interquartile Range
Biochemical Oxygen Demand (mg/L)						
Influent (BOD_5)	210	94	80	920	180	150 – 230
Effluent ($CBOD_5$)	2	0.3	<2	4	<2	<2 - <2
Total Suspended Solids (mg/L)						
Influent	170	72	45	480	180	140 – 210
Effluent	6	1.3	<5	15	<5	<5 - <5
pH						
Influent	-	-	6.5	7.4	7.0	6.9 – 7.1
Effluent	-	-	5.5	7.4	6.7	6.4 – 6.9
Temperature (°C)						
Influent	19	2.8	9.9	23	20	18 – 22
Effluent	21	4	9.3	26	22	19 – 24
Dissolved Oxygen (mg/L)						
Effluent	5.4	1.1	2.3	8.5	5.6	4.7 – 6.1

Notes: The median is the point where half of the values are greater and half are less.
The interquartile range is the range of values about the median between the upper and lower 25 percent of all values.

2.0 Process Description

The Busse Model MF-B-400 wastewater treatment system is a small-scale membrane bioreactor. A complete description of the Busse Model MF-B-400 and the treatment processes included in the system are provided in the system's NSF/ANSI Standard 40 Wastewater Technology Report.

3.0 Evaluation Methods

3.1 Sampling Methods

During the evaluation, all influent BOD_5 and TSS samples and effluent $CBOD_5$ and TSS samples were 24-hour composite samples, collected by automatic samplers programmed to collect samples in coordination with the charge of influent wastewater into the system. Samples were stored at 2 ± 2 °C. Fecal coliform grab samples were collected three days per week, alternately during one of each of the three dosing periods defined under Section 8.2.2.1 of NSF/ANSI Standard 40 (August

2005 revision). Samples were collected of the influent to the Busse Model MF-B-400 and the effluent from the Busse Model MF-B-400.

3.2 Analytical Methods

Fecal coliform samples collected during the evaluation were analyzed by an ANSI-accredited subcontract lab, Barnstable County Laboratory, using Method 9222D of *Standard Methods*.

4.0 Evaluation Results

Dosing to the Busse Model MF-B-400 at a rate of 400 gallons per day began on June 6, 2007, and sampling began on June 11, 2007, concurrent with the Standard 40 evaluation. Results for all of the fecal coliform samples collected during this evaluation are also included in Appendix C.

The 30-day average concentrations for influent BOD_5 and TSS met the requirements of Standard 40 throughout the fecal coliform reduction test.

Table 2. 30-Day Influent Averages

Month	Influent 30-Day Average (mg/L)	
	BOD_5	TSS
1	210	170
2	200	200
3	200	210
4	180	190
5	160	150
6	200	210

The influent fecal coliform daily concentrations were highly variable during the course of the test, ranging from a low of 1.5×10^6 cfu/100mL to a high of 2.4×10^7 cfu/100mL. This variation is not surprising considering the inherent variability in grab sampling and the increase in fecal coliform when particulate matter is properly mixed.

The 30-day geometric means for the treated effluents were below the requirement of 200 cfu/100mL throughout the test period reported below. The complete set of fecal coliform data, as well as data for temperature, pH, and DO, are provided in Appendix C.

Table 3. Fecal Coliform 30-day Geometric Mean Results

Month	Fecal Coliform Geometric Mean (cfu/100 mL)	
	System Influent	System Effluent
1	3.8×10^6	1.0
2	4.8×10^6	1.2
3	8.3×10^6	1.3
4	7.0×10^6	<1
5	5.2×10^6	<1
6	3.4×10^6	<1

Section 8.5.5.1 of Standard 40 provides for data collected during an evaluation to be excluded from pass/fail evaluations because of circumstances at the testing facility or the analytical laboratory. During this evaluation, there were no scheduled fecal coliform samples that were not analyzed, not collected or were subject to laboratory error.

5.0 Summary

NSF conducted a six-month evaluation of the Busse Model MF-B-400. The testing was conducted in accordance with NSF/ANSI Standard 40 protocol with dosing starting on June 6, 2007. The Busse Model MF-B-400 received an influent wastewater having overall average BOD_5 and TSS concentrations within the ranges set by Standard 40. The influent fecal coliform concentrations were within the $10^5 - 10^7$ range for the entire testing period. The 30-day geometric means for the treated effluents ranged from <1 cfu/100 mL to 1.3 cfu/100 mL.

Residential wastewater treatment systems

NSF International Standard/ American National Standard

NSF/ANSI 40 – 2005

facilities, and those that treat bathing water. Systems shall be classified as Class R (single-family residential), or Class C (multi-family or commercial), in accordance with 8.6. The performance classification shall be based upon the evaluation of effluent samples collected over a minimum 6 m (26 wk [182 d]) testing period. Manufacturers that recommend a service frequency longer than 6 m (26 wk [182 d]) shall be tested for the full period of the recommended service frequency.

8.1.1 Preparations for testing and evaluation of graywater treatment systems

8.1.1.1 The system shall be assembled, installed, and filled in accordance with the manufacturer's instructions.

8.1.1.2 The manufacturer shall inspect the system for proper installation. If no defects are detected and the system is judged to be structurally sound, it shall be placed into operation in accordance with the manufacturer's start-up procedures. If the manufacturer does not provide a filling procedure, ⅔ of the system's capacity shall be filled with water meeting the specifications of 8.1.2.1, and the remaining ⅓ shall be filled with graywater meeting the specifications of 8.1.2.1.1, 8.1.2.1.2, or 8.1.2.1.3, as appropriate based upon manufacturer's decision to test with bathing water, laundry water, or both.

8.1.1.3 The system shall undergo design loading (see 8.1.2.2.1) until testing and evaluations are initiated. Sample collection and analysis shall be initiated within 3 wk (21 d) of filling the system and, except as specified in 8.6.1.2, shall continue without interruption until the end of the evaluation period.

8.3.1.4 If the system is to be installed outdoors, and conditions at the testing site preclude installation of the system at its normally prescribed depth, the manufacturer shall be permitted to cover the system with soil to achieve normal installation depth.

8.1.1.5 If the system is to be installed outdoors, performance testing and evaluation of systems shall not be restricted to specific seasons.

8.1.1.6 When possible, electrical or mechanical defects shall be repaired to prevent evaluation delays. All repairs made during the performance testing and evaluation shall be documented in the final report.

8.1.1.7 The system shall be operated in accordance with the manufacturer's instructions. Routine service and maintenance of the system shall not be permitted during the performance testing and evaluation period.

> NOTE – The manufacturer may recommend or offer more frequent service and maintenance of the system but for the purpose of performance testing and evaluation, service and maintenance shall not be performed beyond what is specified in this Standard.

8.1.2 Testing and evaluation conditions, hydraulic loading, and schedules

8.1.2.1 Graywater challenge water: Base water supply

A public water supply shall be used as the base water to which individual ingredients are added, as described in 8.1.2.1.1, 8.1.2.1.2, and 8.1.2.1.3. The 30-d average concentration of the base water supply shall meet or be adjusted to meet the following requirements:

Parameter	Required range
hardness	110 – 220 mg/L
alkalinity	> 40 mg/L as $CaCO_3$

8.1.2.1.1 Graywater challenge water: Systems treating bathing source water

Prepare the challenge water according to the following formula:

Wastewater components[1]	Amount/100 L
body wash with moisturizer	30 g
toothpaste	3 g
deodorant	2 g
shampoo	19 g
conditioner	21 g
lactic acid	3 g
secondary effluent	2 L
bath cleaner	10 g
liquid hand soap	23 g
test dust[2]	10 g

[1] See Annex C for example products.

[2] See ISO 12103-1, Road Vehicles – Test Dust for Filter Evaluation. The test dust shall meet the specification of ISO 12103-1, A2 - Fine test dust. A test dust that meets these specifications is available from Powder Technology, Inc., PO Box 1464, Burnsville, MN 55337 <www.powdertechnologyinc.com/products/test-dust/testdust.php>.

NOTE – The amount of individual wastewater components are recommendations. If the required range for the 30-d average concentration of individual parameters are not met using the recommended volumes, then the volume of wastewater components can be adjusted to achieve the required 30-d average concentrations. All necessary adjustments to the ingredient volumes shall be reported in the final report.

The 30-d average concentration of the bathing water delivered to the system shall be as follows:

Parameter	Required range
TSS	50 – 100 mg/L
BOD_5	100 – 180 mg/L
temperature	25 – 35 °C
pH	6.0 –7.5
turbidity	30 – 70 NTU
total phosphorous – P	1.0 – 4.0 mg/L
total Kjeldahl nitrogen – N	3.0 – 5.0 mg/L
COD	200 – 400 mg/L
TOC	30 – 60 mg/L
total coliforms	10^3 – 10^4 cfu/100 mL
E. coli (*Escherichia coli* – ATCC[7] 11775)	10^2 – 10^3 cfu/100 mL

[7] ATTC, American Type Culture Collection PO Box 1549, Manassas, VA 20108 <www.atcc.org>.

8.1.2.1.2 Graywater challenge water: Systems treating laundry source water

Prepare the challenge water according to the following formula:

Wastewater components[1]	Amount/100 L
liquid laundry detergent (2X)	40 mL
test dust[2]	10 g
secondary effluent	2 L
lquid laundry fabric softener	21 mL
Na_2SO_4	4 g
$NaHCO_3$	2 g
Na_2PO_4	4 g

[1] See Annex C for example products.

[2] See ISO 12103-1, Road Vehicles – Test Dust for Filter Evaluation. The test dust shall meet the specification of ISO 12103-1, A2 - Fine test dust. A test dust that meets these specifications is available from Powder Technology, Inc., P.O. Box 1464, Burnsville, MN 55337. <www.powdertechnologyinc.com/products/test-dust/testdust.php>.

NOTE – The amount of individual wastewater components are recommendations. If the required range for the 30-d average concentration of individual parameters are not met using the recommended volumes, then the volume of wastewater components can be adjusted to achieve the required 30-d average concentrations. All necessary adjustments to the ingredient volumes shall be reported in the final report.

The 30-d average concentration of the laundry water delivered to the system shall be as follows:

Parameter	Required range
TSS	50 – 100 mg/L
BOD_5	220 – 300 mg/L
temperature	25 – 35 °C
pH	7.0 – 8.5
turbidity	50 – 90 NTU
total phosphorous – P	< 2 mg/L
total Kjeldahl nitrogen – N	4.0 – 6.0 mg/L
COD	300 – 500 mg/L
TOC	50 – 100 mg/L
total coliforms	10^3 – 10^4 cfu/100 mL
E. coli	10^2 – 10^3 cfu/100 mL

8.1.2.1.3 Graywater challenge water: Systems treating bathing and laundry source waters combined

Each 100 L challenge water shall be prepared using 53 L of 8.1.2.1.1 and 47 L of 8.1.2.1.2. The 30-d average concentration of the graywater delivered to the system shall be as follows:

Parameter	Required range
TSS	80 – 160 mg/L
BOD_5	130 – 180 mg/L
temperature	25 – 35 °C
pH	6.5 – 8.0
turbidity	50 – 100 NTU
total phosphorous – P	1.0 – 3.0 mg/L
total Kjeldahl nitrogen – N	3.0 – 5.0 mg/L
COD	250 – 400 mg/L
TOC	50 – 100 mg/L
total coliforms	10^3 – 10^4 cfu/100 mL
E. coli	10^2 – 10^3 cfu/100 mL

8.1.2.2 Hydraulic loading and schedules

During the minimum 6 m (26 wk [182 d]) testing and evaluation period, the system shall be subjected to periods of design loading, followed by stress loading, and then additional weeks of design loading. Class R and Class C systems claiming service intervals of greater than 6 m (26 wk [182 d]) shall be loaded beginning in week 27 at design loading, according to the time frame and % rated daily hydraulic capacity as shown below, and shall continue dosing such that the test period equals the prescribed service interval.

Loading of the systems will be based on the following matrix:

System design	Design loading[1]					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[2]
R–Bathing only	×			×			×	×	×	
R–Laundry only	×				×	×	×	×	×	
R–Combined	×				×	×	×	×	×	
C–Bathing only		×	×				×	×		
C–Laundry only		×	×				×	×		
C–Combined		×	×				×	×		×

[1] For 6 m (26 wk [182 d]) test.

[2] Addition of cleaning solution during final 4.5 wk (31 d) of test.

WASTEWATER TREATMENT DEVICE
STANDARD 40 STRESS TEST
STRESS SEQUENCE SCHEDULE

Manufacturer: Busse

Stress Starts: Monday October 1, 2007

Site Location/Site Test Number: Busse

Date Issued: Wednesday, August 1, 2007

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
30	1	2 Wash	3 Day	4 Stress	5	6
7	8	9	10	11	12	13
14 Working	15 Parent	16 Stress	17	18	19	20
21	22	23	24	25	26 Equipment/ Failure	27 Power Stress
28	29	30	Sample for color, odor, foam & oily film (2). 31	1	2	3
4	5	6	7 Vacation	8	9 Stress	10
11	12	13	14	15	16	17
18	19	20	21	22 Return to Normal Sample Schedule	23	24

Appendix A
Plant Specifications and Drawings

PLANT SPECIFICATIONS

Busse Innovative Systeme GmbH
Model MF-B-400

Process Type

Membrane bioreactor (MBR)

Plant Capacity

Design Flow	400 gpd
Plant Hydraulic Capacity	
2-compartment Septic Tank	528 gallons
Process Tank	528 gallons
Average Hydraulic Retention Time (at Design Flow)	
Pretreatment Tank	12 hours
Process Tank	12 hours

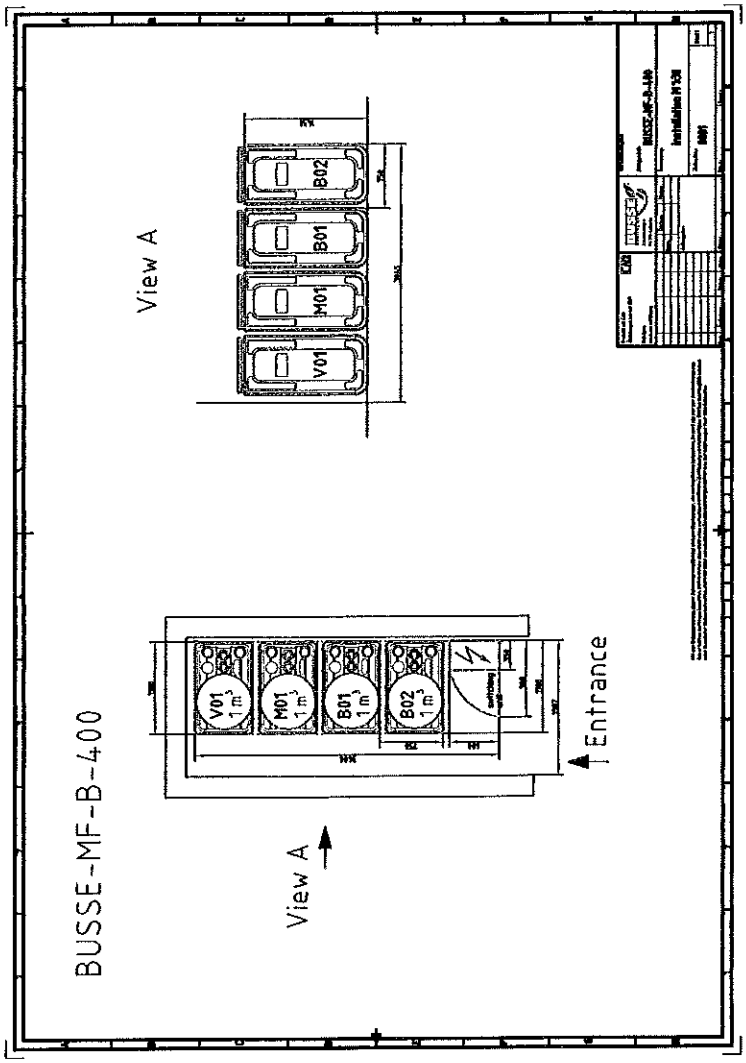
Equipment Specifications

Compressor Specifications
Medo USA Model LA-120-A1108-E1-0513
120V AC / 60Hz
2.4 A
2.56 PSI

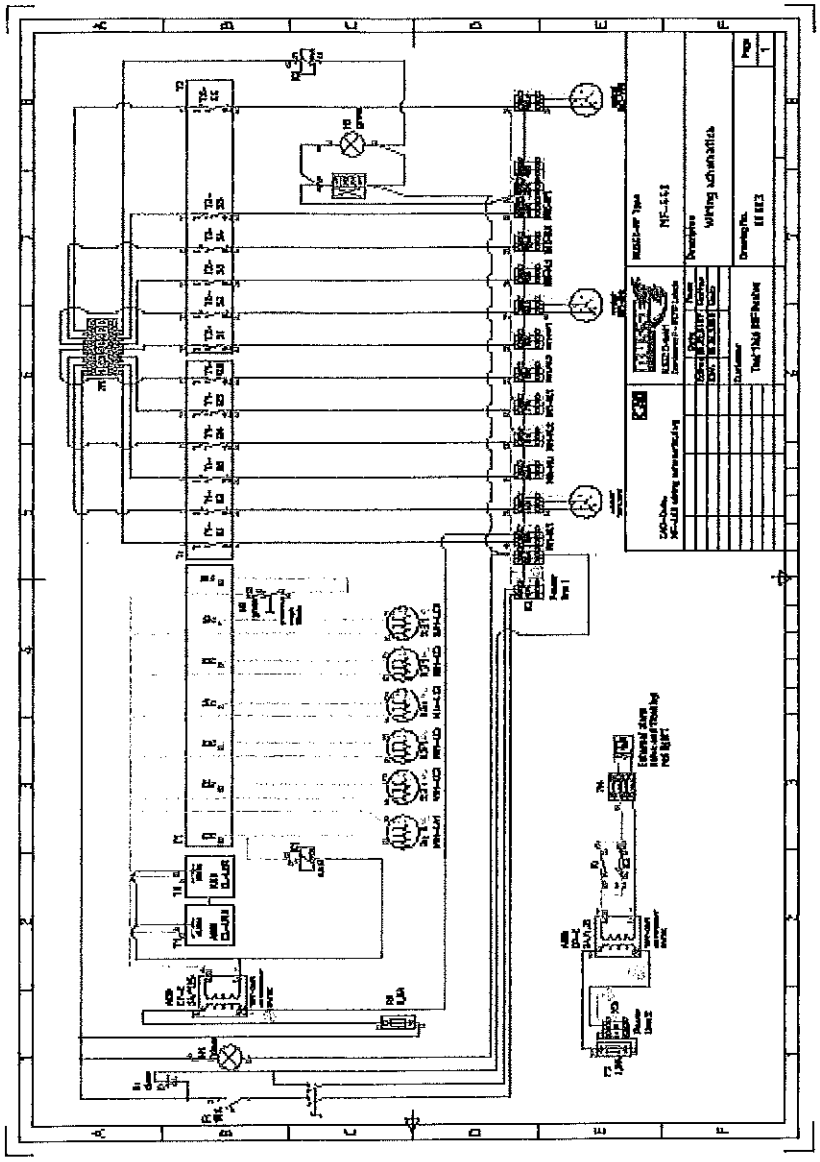
Media Specifications

The membrane panels, manufactured by Kubota Corporation, consist of an ABS support covered with a felt spacing material and a chlorinated polyethylene membrane (PEC). Each one of the two membrane modules contained 12 membranes.

The membrane material has a nominal pore size in the range of 0.1 – 0.4 µm.



1.11 Wiring schematics for the systems electrical components



Appendix B
Standard 40 Analytical Results

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: June 10, 2007 Plant Code: Busse

Weeks Into Test: 1

Weekend Dosing: Sunday 400 gallons Saturday 400 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		400	400	400	400	400
Dissolved Oxygen (mg/L)	aeration chamber					
	effluent	6.4	6.3	6.2	6.1	6.1
Temperature (C)	influent	17	17	16	16	17
	aeration chamber					
	effluent	19	19	19	18	18
pH	influent	7.0	6.5	7.2	7.1	6.9
	aeration chamber					
	effluent	7.2	7.1	7.0	6.7	6.4
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	120	190	130	150	400
	effluent ($CBOD_5$)	<2	<2	<2	<2	3
Suspended Solids (mg/L)	influent	100	100	76	130	280
	aeration chamber					
	effluent	<5	<5	<5	<5	<5
Volatile Suspended Solids (mg/L)	influent					
	aeration chamber					
	effluent					
45 Minute Settleable Solids (mL/L)	Influent	20	18	17	10	30

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes:

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: June 17, 2007 Plant Code: Busse

Weeks Into Test: 2

Weekend Dosing: Sunday 400 gallons Saturday 400 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		400	400	400	400	400
Dissolved Oxygen (mg/L)	aeration chamber					
	effluent	7.3	4.7	5.1	3.6	6.1
Temperature (C)	influent	18	17	18	19	18
	aeration chamber					
	effluent	20	21	21	21	21
pH	influent	7.0	7.1	7.1	7.0	7.1
	aeration chamber					
	effluent	6.8	6.6	6.6	6.6	6.7
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	130	230	230	280	240
	effluent ($CBOD_5$)	<2	<2	<2	<2	<2
Suspended Solids (mg/L)	influent	96	210	240	200	160
	aeration chamber					
	effluent	<5	<5	15	15	<5
Volatile Suspended Solids (mg/L)	influent					
	aeration chamber					
	effluent					
45 Minute Settleable Solids (mL/L)	Influent	16	14	22	20	20

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes:

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: June 24, 2007 Plant Code: Busse

Weeks Into Test: 3

Weekend Dosing: Sunday 400 gallons Saturday 400 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		400	400	400	400	400
Dissolved Oxygen (mg/L)	aeration chamber					
	effluent	5.7	5.7	6.0	4.1	5.6
Temperature (C)	influent	19	19	20	20	19
	aeration chamber					
	effluent	21	22	23	23	23
pH	influent	7.1	7.1	7.1	7.0	7.3
	aeration chamber					
	effluent	6.9	7.0	6.9	7.0	7.1
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	250	160	160	190	310
	effluent ($CBOD_5$)	<2	<2	3	<2	<2
Suspended Solids (mg/L)	influent	260	230	150	76	200
	aeration chamber					
	effluent	<5	<5	<5	<5	<5
Volatile Suspended Solids (mg/L)	influent					
	aeration chamber					
	effluent					
45 Minute Settleable Solids (mL/L)	Influent	23	26	18	13	18

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes:

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: July 1, 2007 Plant Code: Busse

Weeks Into Test: 4

Weekend Dosing: Sunday 400 gallons Saturday 400 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		400	400	400	400	400
Dissolved Oxygen (mg/L)	aeration chamber					
	effluent	5.1	6.6		5.0	5.8
Temperature (C)	influent	18	18		19	20
	aeration chamber					
	effluent	21	21		21	23
pH	influent	6.9	7.0		7.0	7.2
	aeration chamber					
	effluent	6.9	6.8		6.9	6.9
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	110	270		160	270
	effluent ($CBOD_5$)	<2	<2		<2	<2
Suspended Solids (mg/L)	influent	62	230		150	270
	aeration chamber					
	effluent	<5	<5		<5	<5
Volatile Suspended Solids (mg/L)	influent					
	aeration chamber					
	effluent					
45 Minute Settleable Solids (mL/L)	Influent	9	19		12	27

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: No samples on 7/4 due to laboratory error.

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: July 8, 2007 Plant Code: Busse

Weeks Into Test: 5

Weekend Dosing: Sunday 400 gallons Saturday 400 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		400	400	400	400	400
Dissolved Oxygen (mg/L)	aeration chamber					
	effluent	4.8	4.9	4.3	4.2	4.6
Temperature (C)	influent	20	20	20	20	20
	aeration chamber					
	effluent	23	23	23	24	23
pH	influent	7.2	7.0	6.9	6.8	7.1
	aeration chamber					
	effluent	6.9	7.0	6.8	6.9	6.8
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	150	130	200	280	220
	effluent ($CBOD_5$)	<2	<2	<2	<2	<2
Suspended Solids (mg/L)	influent	130	140	98	320	230
	aeration chamber					
	effluent	<5	<5	<5	<5	<5
Volatile Suspended Solids (mg/L)	influent					
	aeration chamber					
	effluent					
45 Minute Settleable Solids (mL/L)	Influent	18	12	20	28	18

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes:

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: July 15, 2007 Plant Code: Busse

Weeks Into Test: 6

Weekend Dosing: Sunday 400 gallons Saturday 400 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		400	400	400	400	400
Dissolved Oxygen (mg/L)	aeration chamber					
	effluent	4.8	5.0	4.5	4.9	4.8
Temperature (C)	influent	20	21	21	21	21
	aeration chamber					
	effluent	24	24	24	24	24
pH	influent	7.1	7.0	7.0	7.0	6.9
	aeration chamber					
	effluent	6.8	6.8	6.7	6.5	6.7
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	130	160	300	160	230
	effluent ($CBOD_5$)	<2	<2	<2	<2	<2
Suspended Solids (mg/L)	influent	86	180	270	170	180
	aeration chamber					
	effluent	<5	<5	<5	<5	<5
Volatile Suspended Solids (mg/L)	influent					
	aeration chamber					
	effluent					
45 Minute Settleable Solids (mL/L)	Influent	5	16	20	12	18

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes:

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: July 22, 2007 Plant Code: Busse

Weeks Into Test: 7

Weekend Dosing: Sunday 400 gallons Saturday 400 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		400	400	400	400	400
Dissolved Oxygen (mg/L)	aeration chamber	0.1	0.1	0.2	0.1	0.2
	effluent	6.0	5.2	5.4	4.9	3.7
Temperature (C)	influent	20	21	21	21	21
	aeration chamber					
	effluent	23	23	23	24	24
pH	influent	7.0	6.9	7.0	6.9	7.0
	aeration chamber					
	effluent	6.4	6.4	6.3	6.4	6.7
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	150	170	240	180	230
	effluent ($CBOD_5$)	<2	2	<2	<2	<2
Suspended Solids (mg/L)	influent	100	160	310	210	200
	aeration chamber					
	effluent	<5	<5	<5	<5	<5
Volatile Suspended Solids (mg/L)	influent					
	aeration chamber					
	effluent					
45 Minute Settleable Solids (mL/L)	Influent	7	13	16	17	18

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes:

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: July 29, 2007 Plant Code: Busse

Weeks Into Test: 8

Weekend Dosing: Sunday 400 gallons Saturday 400 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		400	400	400	400	400
Dissolved Oxygen (mg/L)	aeration chamber	0.2	0.1	0.1	0.1	0.1
	effluent	5.1	4.7	3.4	3.7	4.5
Temperature (C)	influent	22	21	22	22	22
	aeration chamber					
	effluent	25	24	25	25	26
pH	influent	6.9	6.8	7.0	6.9	6.9
	aeration chamber					
	effluent	6.7	7.1	7.0	7.0	7.1
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	150	320	240	220	170
	effluent ($CBOD_5$)	<2	<2	<2	<2	<2
Suspended Solids (mg/L)	influent	110	310	250	210	180
	aeration chamber					
	effluent	<5	<5	<5	<5	<5
Volatile Suspended Solids (mg/L)	influent					
	aeration chamber					
	effluent					
45 Minute Settleable Solids (mL/L)	Influent	15	30	25	21	15

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes:

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: August 5, 2007 Plant Code: Busse

Weeks Into Test: 9

Weekend Dosing: Sunday 400 gallons Saturday 400 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		400	400	400	400	400
Dissolved Oxygen (mg/L)	aeration chamber	0.1	0.2	0.1	0.1	0.1
	effluent	5.8	5.5	4.3	3.8	3.5
Temperature (C)	influent	22	22	22	22	22
	aeration chamber					
	effluent	24	24	25	25	24
pH	influent	7.0	7.2	6.8	7.0	7.0
	aeration chamber					
	effluent	7.0	6.9	6.6	6.7	6.7
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	150	210	200	200	260
	effluent ($CBOD_5$)	<2	<2	<2	<2	<2
Suspended Solids (mg/L)	influent	140	310	200	280	170
	aeration chamber					
	effluent	<5	<5	<5	<5	<5
Volatile Suspended Solids (mg/L)	influent					
	aeration chamber					
	effluent					
45 Minute Settleable Solids (mL/L)	Influent	9	20	22	22	18

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes:

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: August 12, 2007 Plant Code: Busse

Weeks Into Test: 10

Weekend Dosing: Sunday 400 gallons Saturday 400 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		400	400	400	400	400
Dissolved Oxygen (mg/L)	aeration chamber	0.1	0.1	0.1	0.2	0.2
	effluent	4.4	3.5	4.1	2.6	3.7
Temperature (C)	influent	22	22	22	22	23
	aeration chamber					
	effluent	24	24	24	24	25
pH	influent	7.0	6.9	6.9	6.9	6.9
	aeration chamber					
	effluent	6.4	6.5	6.8	6.9	7.1
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	200	180	210	290	180
	effluent ($CBOD_5$)	<2	<2	<2	<2	<2
Suspended Solids (mg/L)	influent	120	270	250	260	210
	aeration chamber					
	effluent	<5	<5	<5	<5	<5
Volatile Suspended Solids (mg/L)	influent					
	aeration chamber					
	effluent					
45 Minute Settleable Solids (mL/L)	Influent	12	27	20	(d)	20

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: There was not enough volume in the influent sample on 8/16 for the 45 minute settleable solids measurement due to QC samples.

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: August 19, 2007 Plant Code: Busse

Weeks Into Test: 11

Weekend Dosing: Sunday 400 gallons Saturday 400 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		400	400	400	400	400
Dissolved Oxygen (mg/L)	aeration chamber	0.1	0.1	0.1	0.2	0.1
	effluent	4.8	6.1	5.7	6.1	5.7
Temperature (C)	influent	22	22	21	21	22
	aeration chamber					
	effluent	23	23	22	22	22
pH	influent	7.0	6.9	7.1	6.9	6.9
	aeration chamber					
	effluent	7.0	6.6	7.0	6.8	6.5
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	150	180	180	170	180
	effluent ($CBOD_5$)	<2	<2	<2	<2	<2
Suspended Solids (mg/L)	influent	120	180	210	180	190
	aeration chamber					
	effluent	<5	<5	<5	<5	<5
Volatile Suspended Solids (mg/L)	influent					
	aeration chamber					
	effluent					
45 Minute Settleable Solids (mL/L)	Influent	8	(d)	11	15	20

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: There was not enough volume in the influent sample on 8/21 for the 45 minute settleable solids measurement due to QC samples.

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: August 26, 2007 Plant Code: Busse

Weeks Into Test: 12

Weekend Dosing: Sunday 400 gallons Saturday 400 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		400	400	400	400	400
Dissolved Oxygen (mg/L)	aeration chamber	0.1	0.1	0.1	0.1	0.2
	effluent	4.3	2.3	5.6	3.9	6.2
Temperature (C)	influent	22	21	22	22	22
	aeration chamber					
	effluent	25	24	24	24	25
pH	influent	7.0	7.0	7.2	7.0	6.9
	aeration chamber					
	effluent	6.2	6.3	6.5	6.8	6.8
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	170	180	190	170	360
	effluent ($CBOD_5$)	<2	<2	<2	<2	<2
Suspended Solids (mg/L)	influent	120	220	200	200	320
	aeration chamber					
	effluent	<5	<5	<5	<5	<5
Volatile Suspended Solids (mg/L)	influent					
	aeration chamber					
	effluent					
45 Minute Settleable Solids (mL/L)	Influent	17	20	19	18	28

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes:

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: September 2, 2007 Plant Code: Busse

Weeks Into Test: 13

Weekend Dosing: Sunday 400 gallons Saturday gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		400	400	400	400	400
Dissolved Oxygen (mg/L)	aeration chamber		0.2	0.1	0.1	0.1
	effluent		5.8	6.1	6.0	2.5
Temperature (C)	influent		22	22	22	22
	aeration chamber					
	effluent		23	23	23	23
pH	influent		6.9	6.9	7.0	7.2
	aeration chamber					
	effluent		6.6	6.6	6.7	6.9
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)		160	150	160	320
	effluent ($CBOD_5$)		<2	<2	<2	2
Suspended Solids (mg/L)	influent		160	210	210	310
	aeration chamber					
	effluent		<5	<5	<5	<5
Volatile Suspended Solids (mg/L)	influent					
	aeration chamber					
	effluent					
45 Minute Settleable Solids (mL/L)	Influent		12	15	20	27

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: No samples on 9/3 due to laboratory error.

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: September 9, 2007 Plant Code: Busse

Weeks Into Test: 14

Weekend Dosing: Sunday 400 gallons Saturday 400 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		400	400	400	400	400
Dissolved Oxygen (mg/L)	aeration chamber	0.1	0.1	0.1	0.1	0.2
	effluent	6.2	4.9	5.3	4.0	5.7
Temperature (C)	influent	22	22	22	21	22
	aeration chamber					
	effluent	24	25	23	23	23
pH	influent	6.9	7.0	6.9	7.0	7.1
	aeration chamber					
	effluent	6.6	6.7	6.6	6.8	6.7
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	170	150	300	140	230
	effluent ($CBOD_5$)	<2	<2	<2	<2	<2
Suspended Solids (mg/L)	influent	120	210	280	200	190
	aeration chamber					
	effluent	<5	<5	<5	<5	<5
Volatile Suspended Solids (mg/L)	influent					
	aeration chamber					
	effluent					
45 Minute Settleable Solids (mL/L)	Influent	11	25	22	25	20

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes:

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: September 16, 2007 Plant Code: Busse

Weeks Into Test: 15

Weekend Dosing: Sunday 400 gallons Saturday 400 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		400	400	400	400	400
Dissolved Oxygen (mg/L)	aeration chamber	0.1	0.1	0.2	0.2	0.1
	effluent	4.8	5.8	6.8	5.1	4.8
Temperature (C)	influent	21	21	21	21	20
	aeration chamber					
	effluent	21	21	21	21	22
pH	influent	7.1	7.1	7.1	7.0	7.0
	aeration chamber					
	effluent	6.3	6.2	6.2	6.1	6.0
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	220	190	150	140	140
	effluent ($CBOD_5$)	<2	<2	<2	<2	<2
Suspended Solids (mg/L)	influent	150	210	190	100	160
	aeration chamber					
	effluent	<5	<5	<5	<5	<5
Volatile Suspended Solids (mg/L)	influent					
	aeration chamber					
	effluent					
45 Minute Settleable Solids (mL/L)	Influent	12	30	20	25	28

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes:

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: September 23, 2007 Plant Code: Busse

Weeks Into Test: 16

Weekend Dosing: Sunday 400 gallons Saturday 400 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		400	400	400	400	400
Dissolved Oxygen (mg/L)	aeration chamber	0.1	0.1	0.1	0.2	0.1
	effluent	5.7	4.7	5.7	5.7	5.3
Temperature (C)	influent	21	21	21	21	21
	aeration chamber					
	effluent	23	23	23	23	23
pH	influent	7.0	7.0	7.0	7.0	7.0
	aeration chamber					
	effluent	6.0	6.0	6.0	5.8	5.9
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	150	150	170	100	330
	effluent ($CBOD_5$)	<2	<2	<2	<2	<2
Suspended Solids (mg/L)	influent	110	170	180	150	480
	aeration chamber					
	effluent	<5	<5	<5	<5	<5
Volatile Suspended Solids (mg/L)	influent					
	aeration chamber					
	effluent					
45 Minute Settleable Solids (mL/L)	Influent	8	16	18	10	16

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes:

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: September 30, 2007 Plant Code: Busse

Weeks Into Test: 17

		Sun	Mon	Tue	Wed	Thur	Fri	Sat
Dosed Volume (gallons)		400	400	400	400	400	400	400
Dissolved Oxygen (mg/L)	aeration chamber		0.2					
	effluent		4.8					
Temperature (C)	influent		20					
	aeration chamber							
	effluent		21					
pH	influent		7.0					
	aeration chamber							
	effluent		6.2					
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)		170					
	effluent ($CBOD_5$)		<2					
Suspended Solids (mg/L)	influent		140					
	aeration chamber							
	effluent		<5					
Volatile Suspended Solids (mg/L)	influent							
	aeration chamber							
	effluent							
45 Minute Settleable Solids (mL/L)	Influent		18					

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: Wash day stress 10/1 through 10/5.

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: October 7, 2007 Plant Code: Busse

Weeks Into Test: 18

		Sun	Mon	Tue	Wed	Thur	Fri	Sat
Dosed Volume (gallons)		400	400	400	400	400	400	400
Dissolved Oxygen (mg/L)	aeration chamber			0.2	0.2	0.1	0.2	0.2
	effluent			5.7	5.6	4.3	5.1	6.4
Temperature (C)	influent			20	20	20	20	20
	aeration chamber							
	effluent			21	20	20	20	19
pH	influent			6.9	7.1	7.2	7.0	7.4
	aeration chamber							
	effluent			6.6	6.6	6.4	6.1	6.3
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)			170	170	150	190	150
	effluent ($CBOD_5$)			<2	<2	<2	4	<2
Suspended Solids (mg/L)	influent			180	180	140	220	160
	aeration chamber							
	effluent			<5	<5	<5	<5	<5
Volatile Suspended Solids (mg/L)	influent							
	aeration chamber							
	effluent							
45 Minute Settleable Solids (mL/L)	Influent			20	24	15	29	14

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: No samples on 10/8 due to laboratory error.
Working parent stress started 10/13.

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: October 14, 2007 Plant Code: Busse

Weeks Into Test: 19

		Sun	Mon	Tue	Wed	Thur	Fri	Sat
Dosed Volume (gallons)		400	400	400	400	400	400	400
Dissolved Oxygen (mg/L)	aeration chamber							0.0
	effluent							5.3
Temperature (C)	influent							20
	aeration chamber							
	effluent							22
pH	influent							7.2
	aeration chamber							
	effluent							6.3
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)							140
	effluent ($CBOD_5$)							<2
Suspended Solids (mg/L)	influent							130
	aeration chamber							
	effluent							<5
Volatile Suspended Solids (mg/L)	influent							
	aeration chamber							
	effluent							
45 Minute Settleable Solids (mL/L)	Influent							10

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: Working parent stress completed on 10/17.

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: October 21, 2007 Plant Code: Busse

Weeks Into Test: 20

		Sun	Mon	Tue	Wed	Thur	Fri	Sat
Dosed Volume (gallons)		400	400	400	400	400	0	240
Dissolved Oxygen (mg/L)	aeration chamber	0.1	0.2	0.1	0.2	0.1		
	effluent	5.5	5.5	6.2	5.9	5.7		
Temperature (C)	influent	20	20	19	20	19		
	aeration chamber							
	effluent	21	21	21	21	20		
pH	influent	7.0	6.9	6.9	6.8	6.7		
	aeration chamber							
	effluent	5.8	5.8	5.6	5.5	5.7		
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	130	150	150	170	160		
	effluent ($CBOD_5$)	<2	<2	<2	<2	<2		
Suspended Solids (mg/L)	influent	130	130	130	180	160		
	aeration chamber							
	effluent	<5	<5	<5	<5	<5		
Volatile Suspended Solids (mg/L)	influent							
	aeration chamber							
	effluent							
45 Minute Settleable Solids (mL/L)	Influent	(d)	10	12	19	20		

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: Power/equipment failure stress 10/25 through 10/27.
There was not enough volume in the influent sample on 10/21 for the 45 minute settleable solids measurement due to QC samples.

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: October 28, 2007 Plant Code: Busse

Weeks Into Test: 21

		Sun	Mon	Tue	Wed	Thur	Fri	Sat
Dosed Volume (gallons)		400	400	400	400	400	400	400
Dissolved Oxygen (mg/L)	aeration chamber				0.2	0.4	0.1	0.0
	effluent				5.3	6.1	8.1	5.8
Temperature (C)	influent				19	18	18	18
	aeration chamber							
	effluent				18	19	19	18
pH	influent				6.9	6.9	7.1	7.3
	aeration chamber							
	effluent				6.9	6.4	6.6	6.8
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)				220	160	210	160
	effluent ($CBOD_5$)				4	<2	<2	<2
Suspended Solids (mg/L)	influent				200	160	150	110
	aeration chamber							
	effluent				<5	<5	<5	<5
Volatile Suspended Solids (mg/L)	influent							
	aeration chamber							
	effluent							
45 Minute Settleable Solids (mL/L)	Influent				24	15	14	10

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes:

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: November 4, 2007 Plant Code: Busse

Weeks Into Test: 22

		Sun	Mon	Tue	Wed	Thur	Fri	Sat
Dosed Volume (gallons)		240	O	O	O	O	O	O
Dissolved Oxygen (mg/L)	aeration chamber	0.3						
	effluent	6.7						
Temperature (C)	influent	17						
	aeration chamber							
	effluent	16						
pH	influent	7.1						
	aeration chamber							
	effluent	7.0						
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	80						
	effluent ($CBOD_5$)	<2						
Suspended Solids (mg/L)	influent	82						
	aeration chamber							
	effluent	<5						
Volatile Suspended Solids (mg/L)	influent							
	aeration chamber							
	effluent							
45 Minute Settleable Solids (mL/L)	Influent	3						

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: Vacation Stress started on 11/4.

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: November 11, 2007 Plant Code: Busse

Weeks Into Test: 23

		Sun	Mon	Tue	Wed	Thur	Fri	Sat
Dosed Volume (gallons)		0	0	240	400	400	400	400
Dissolved Oxygen (mg/L)	aeration chamber						0.1	0.9
	effluent						7.7	8.5
Temperature (C)	influent						16	16
	aeration chamber							
	effluent						16	16
pH	influent						7.2	7.2
	aeration chamber							
	effluent						6.0	5.8
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)						120	110
	effluent ($CBOD_5$)						<2	<2
Suspended Solids (mg/L)	influent						210	45
	aeration chamber							
	effluent						<5	<5
Volatile Suspended Solids (mg/L)	influent							
	aeration chamber							
	effluent							
45 Minute Settleable Solids (mL/L)	Influent						23	18

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: Vacation Stress completed on 11/13.

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: November 18, 2007 Plant Code: Busse

Weeks Into Test: 24

		Sun	Mon	Tue	Wed	Thur	Fri	Sat
Dosed Volume (gallons)		400	400	400	400	400	400	400
Dissolved Oxygen (mg/L)	aeration chamber	0.4	0.3	0.1	0.4		0.1	
	effluent	6.8	4.4	7.1	7.0		5.4	
Temperature (C)	influent	16	15	15	15		15	
	aeration chamber							
	effluent	15	15	15	15		17	
pH	influent	6.9	6.9	7.0	7.0		6.9	
	aeration chamber							
	effluent	5.7	5.9	6.4	6.5		6.6	
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	130	140	170	180		210	
	effluent ($CBOD_5$)	<2	<2	<2	<2		<2	
Suspended Solids (mg/L)	influent	140	190	190	170		150	
	aeration chamber							
	effluent	<5	<5	<5	<5		<5	
Volatile Suspended Solids (mg/L)	influent							
	aeration chamber							
	effluent							
45 Minute Settleable Solids (mL/L)	Influent	15	20	17	12		15	

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes: No samples on 11/22 due to laboratory error.

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: November 25, 2007 Plant Code: Busse

Weeks Into Test: 25

Weekend Dosing: Sunday 400 gallons Saturday 400 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		400	400	400	400	400
Dissolved Oxygen (mg/L)	aeration chamber	1.1	0.3	0.2	0.2	0.1
	effluent	6.8	5.9	6.3	5.8	6.8
Temperature (C)	influent	14	15	14	14	14
	aeration chamber					
	effluent	15	16	16	16	15
pH	influent	6.9	6.9	7.1	7.3	7.1
	aeration chamber					
	effluent	6.8	6.8	6.9	7.0	7.2
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	250	340	350	140	310
	effluent ($CBOD_5$)	<2	<2	<2	<2	4
Suspended Solids (mg/L)	influent	200	330	210	160	210
	aeration chamber					
	effluent	<5	<5	<5	<5	<5
Volatile Suspended Solids (mg/L)	influent					
	aeration chamber					
	effluent					
45 Minute Settleable Solids (mL/L)	Influent	20	18	23	26	14

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes:

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: December 2, 2007 Plant Code: Busse

Weeks Into Test: 26

Weekend Dosing: Sunday 400 gallons Saturday 400 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		400	400	400	400	400
Dissolved Oxygen (mg/L)	aeration chamber	1.0	0.5	0.5	0.6	0.2
	effluent	6.7	6.3	6.6	6.1	6.7
Temperature (C)	influent	14	13	13	13	13
	aeration chamber					
	effluent	13	13	12	12	12
pH	influent	6.7	7.2	7.3	6.9	7.3
	aeration chamber					
	effluent	7.2	7.2	7.3	7.1	7.3
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	150	920	180	150	370
	effluent ($CBOD_5$)	<2	<2	<2	3	<2
Suspended Solids (mg/L)	influent	180	360	160	110	380
	aeration chamber					
	effluent	<5	<5	<5	<5	<5
Volatile Suspended Solids (mg/L)	influent					
	aeration chamber					
	effluent					
45 Minute Settleable Solids (mL/L)	Influent	32	38	15	12	25

(a) Site problem
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Notes:

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: December 9, 2007 Plant Code: Busse

Weeks Into Test: 27

Weekend Dosing: Sunday 400 gallons Saturday 400 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		400	400	400	400	400
Dissolved Oxygen (mg/L)	influent	0.2	0.6	0.6	1.1	1.3
	effluent	6.5	7.7	6.8	5.7	4.7
Temperature (C)	influent	13	12	12	12	12
	aeration chamber					
	effluent	13	13	13	13	12
pH	influent	7.1	7.3	7.2	7.2	7.1
	aeration chamber					
	effluent	6.5	7.2	7.3	7.3	7.1
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	160	180	310	310	180
	effluent ($CBOD_5$)	<2	2	<2	<2	<2
Suspended Solids (mg/L)	influent	160	180	310	270	180
	aeration chamber					
	effluent	<5	<5	<5	<5	<5
Volatile Suspended Solids (mg/L)	influent					
	aeration chamber					
	effluent					
45 Minute Settleable Solids (mL/L)	influent	20	25	30	28	30

(a) Site problem Notes:
(b) Malfunction of system under test
(c) Weather problem
(d) Other

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: December 16, 2007 Plant Code: Busse

Weeks Into Test: 28

Weekend Dosing: Sunday 400 gallons Saturday 400 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		400	400	400	400	400
Dissolved Oxygen (mg/L)	influent	0.6	0.9	0.4	0.3	0.2
	effluent	6.7	7.7	7.8	7.2	6.8
Temperature (C)	influent	11	11	11	11	11
	aeration chamber					
	effluent	11	10	10	11	12
pH	influent	7.3	7.0	6.8	7.2	7.0
	aeration chamber					
	effluent	7.1	6.9	7.0	7.1	6.9
Biochemical Oxygen Demand (mg/L)	influent (BOD_5)	180	160	180	180	100
	effluent ($CBOD_5$)	<2	3	<2	<2	<2
Suspended Solids (mg/L)	influent	200	140	250	200	50
	aeration chamber					
	effluent	<5	<5	<5	<5	<5
Volatile Suspended Solids (mg/L)	influent					
	aeration chamber					
	effluent					
45 Minute Settleable Solids (mL/L)	influent	28	15	20	27	8

(a) Site problem Notes:
(b) Malfunction of system under test
(c) Weather problem
(d) Other

Appendix C
Analytical Results for Fecal Coliform Reduction

Month	Date	Raw Influent (cfu/100 mL)	System Eff. (cfu/100 mL)	Temp (°C)	pH	D.O. (mg/L)
1	6/11/2007	3.4×10^6	<1	19	7.2	6.4
	6/13/2007	2.9×10^6	2	19	7.0	6.2
	6/14/2007	3.9×10^6	<1	18	6.7	6.1
	6/18/2007	2.4×10^6	<1	20	6.8	7.3
	6/20/2007	3.0×10^6	<1	21	6.6	5.1
	6/21/2007	3.5×10^6	<1	21	6.6	3.6
	6/25/2007	4.6×10^6	<1	21	6.9	5.7
	6/27/2007	5.0×10^6	<1	23	6.9	6.0
	6/28/2007	4.6×10^6	<1	23	7.0	4.1
2	7/2/2007	8.1×10^6	<1	21	6.9	5.1
	7/4/2007	2.5×10^6	<1			
	7/5/2007	5.9×10^6	<1	21	6.9	5.0
	7/9/2007	2.8×10^6	<1	23	6.9	4.8
	7/11/2007	2.4×10^6	<1	23	6.8	4.3
	7/12/2007	2.7×10^6	<1	24	6.9	4.2
	7/15/2007	6.4×10^6	<1			
	7/17/2007	2.7×10^6	<1	24	6.8	5.0
	7/19/2007	3.2×10^6	<1	24	6.5	4.9
	7/23/2007	2.7×10^6	<1	23	6.4	6.0
	7/24/2007	4.3×10^6	<1	23	6.4	5.2
	7/26/2007	3.5×10^6	<10	24	6.4	4.9
	7/31/2007	7.2×10^6	<1	24	7.1	4.7
3	8/1/2007	3.8×10^6	<1	25	7.0	3.4
	8/2/2007	7.5×10^6	<1	25	7.0	3.7
	8/5/2007	9.9×10^6	<1			
	8/7/2007	5.1×10^6	<1	24	6.9	5.5
	8/9/2007	2.4×10^7	<1	25	6.7	3.8
	8/13/2007	2.4×10^7	<1	24	6.4	4.4
	8/14/2007	9.6×10^6	<1	24	6.5	3.5

Month	Date	Raw Influent (cfu/100 mL)	System Eff. (cfu/100 mL)	Temp (°C)	pH	D.O. (mg/L)
	8/16/2007	2.4×10^7	<1	24	6.9	2.6
	8/20/2007	5.3×10^6	29	23	7.0	4.8
	8/21/2007	4.6×10^6	<1	23	6.6	6.1
	8/23/2007	4.7×10^6	<1	22	6.8	6.1
	8/27/2007	4.8×10^6	<1	25	6.2	4.3
	8/28/2007	6.6×10^6	<1	24	6.3	2.3
	8/30/2007	9.1×10^6	<1	24	6.8	3.9
	9/3/2007	9.5×10^6	<1			
	9/4/2007	6.9×10^6	<1	23	6.6	5.8
	9/6/2007	8.4×10^6	<1	23	6.7	6.0
	9/10/2007	1.4×10^7	<1	24	6.6	6.2
	9/12/2007	8.6×10^6	<1	23	6.6	5.3
	9/13/2007	6.9×10^6	<1	23	6.8	4.0
4	9/16/2007	8.2×10^6	<1			
	9/18/2007	5.6×10^6	<1	21	6.2	5.8
	9/20/2007	8.3×10^6	<1	21	6.1	5.1
	9/23/2007	6.1×10^6	<1			
	9/25/2007	8.2×10^6	<1	23	6.0	4.7
	9/27/2007	4.5×10^6	<1	23	5.8	5.7
	9/30/2007	6.9×10^6	<1			
5	10/2/2007	5.2×10^6	<1			
	10/4/2007	4.7×10^6	<1			
	10/8/2007	7.5×10^6	<1			
	10/10/2007	5.7×10^6	<1	20	6.6	5.6
	10/11/2007	8.1×10^6	<1	20	6.4	4.3
	10/14/2007	8.5×10^6	<1			
	10/17/2007	5.0×10^6	<1			
	10/18/2007	4.5×10^6	<1			
	10/21/2007	7.2×10^6	<1	21	5.8	5.5

Month	Date	Raw Influent (cfu/100 mL)	System Eff. (cfu/100 mL)	Temp (°C)	pH	D.O. (mg/L)
	10/23/2007	4.1×10^6	<1	21	5.6	6.2
	10/25/2007	3.0×10^6	<1	20	5.7	5.7
	10/30/2007	4.7×10^6	<1			
	10/31/2007	4.8×10^6	<1	18	6.9	5.3
6	11/1/2007	3.8×10^6	<1	19	6.4	6.1
	11/14/2007	4.3×10^6	<1			
	11/19/2007	4.4×10^6	<1	15	5.9	4.4
	11/20/2007	1.5×10^6	<1	15	5.9	7.1
	11/25/2007	2.3×10^6	<1			
	11/27/2007	3.3×10^6	<1	16	6.8	5.9
	11/28/2007	3.5×10^6	<1	16	6.9	6.3
7	12/2/2007	3.4×10^6	<1			
	12/4/2007	3.8×10^6	<1	13	7.2	6.3
	12/6/2007	8.2×10^6	<1	12	7.1	6.1
	12/11/2007	3.7×10^6	<1	13	7.2	7.7
	12/13/2007	2.0×10^6	<1	13	7.3	5.7
	12/16/2007	2.9×10^6	<1			
	12/18/2007	5.4×10^6	<1	10	6.9	7.7
	12/20/2007	3.7×10^6	<1	11	7.1	7.2

Appendix D
Stress Schedule

WASTEWATER TREATMENT DEVICE
STANDARD 40 STRESS TEST
SAMPLE SCHEDULE

Manufacturer: Busse

Stress Starts: Monday October 1, 2007

Site Location/Site Test Number: Busse

Date Issued: Wednesday, August 1, 2007

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
30	1 BOD (2) SS/VSS (2) AC SS/VSS	2	3	5	5	6
7	8 BOD (2) SS/VSS (2) AC SS/VSS	9 BOD (2) SS/VSS (2) AC SS/VSS	10 BOD (2) SS/VSS (2) AC SS/VSS	11 BOD (2) SS/VSS (2) AC SS/VSS	12 BOD (2) SS/VSS (2) AC SS/VSS	13 BOD (2) SS/VSS (2) AC SS/VSS
14	15	16	17	18	19	20 BOD (2) SS/VSS (2) AC SS/VSS
21 BOD (2) SS/VSS (2) AC SS/VSS	22 BOD (2) SS/VSS (2) AC SS/VSS	23 BOD (2) SS/VSS (2) AC SS/VSS	24 BOD (2) SS/VSS (2) AC SS/VSS	25 BOD (2) SS/VSS (2) AC SS/VSS	26	27
28	29	30	(Color, odor, foam & oily film) BOD (2) SS/VSS (2) AC SS/VSS	1 BOD (2) SS/VSS (2) AC SS/VSS	2 BOD (2) SS/VSS (2) AC SS/VSS	3 BOD (2) SS/VSS (2) AC SS/VSS
4 BOD (2) SS/VSS (2) AC SS/VSS	5	6	7	8	9	10
11	12	13	14	15	16 BOD (2) SS/VSS (2) AC SS/VSS	17 BOD (2) SS/VSS (2) AC SS/VSS
18 BOD (2) SS/VSS (2) AC SS/VSS	19 BOD (2) SS/VSS (2) AC SS/VSS	20 BOD (2) SS/VSS (2) AC SS/VSS	21 BOD (2) SS/VSS (2) AC SS/VSS	22 Return to Normal Sample Schedule	23	24

EXHIBIT F

Test Results for Littlefield, Harpswell

BUSSE SYSTEM

WRIGHT-PIERCE
Engineering a Better Environment
99 Main Street
Topsham, Maine 04086
207-725-8721

LABORATORY REPORT
LABORATORY I.D. NO. ME00029

PROJECT NAME: WATER QUALITY & COMPLIANCE SERVICES 6000

DATE SAMPLED: 11/29/11 DATE RECEIVED: 11/29/11
DATE REPORTED: 12/28/11
SAMPLE: RON LITTLEFIELD

PARAMETER	INFLUENT	MDL	DATE ANALYZED	METHOD
BOD	830	2	11/29/11	*5210B
TKN	58.0	10.0	12/06/11	4500-N_{org}B+4500-NH_3E
AMMONIA-N	5.1	2.0	12/20/11	4500-NH_3E
NITRATE-N	<1.0	1.0	11/30/2011	4500-NO_3D
NITRITE-N	<0.01	0.05	11/30/2011	4500-NO_2B
FECAL COLIFORM (colonies/100 ml)	$2.2X10^5$	0	11/29/11	9222D

PARAMETER	EFFLUENT	MDL	DATE ANALYZED	METHOD
BOD	<2	2	11/29/11	*5210B
TKN	2.9	2.0	12/06/11	4500-N_{org}B+4500-NH_3E
AMMONIA-N	<2.0	2.0	12/20/11	4500-NH_3E
NITRATE-N	13.4	1.0	11/30/2011	4500-NO_3D
NITRITE-N	0.11	0.05	11/30/2011	4500-NO_2B
FECAL COLIFORM (colonies/100 ml)	0	0	11/29/11	9222D

PARAMETER	DRINKING WATER	MDL	DATE ANALYZED	METHOD
TOTAL COLIFORM (colonies/100 ml)	ABSENT	ABSENT	11/29/2011	*9223B COLISURE

RESULTS ARE EXPRESSED AS MG/L UNLESS OTHERWISE INDICATED.

METHOD REFERENCE: STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, 18TH EDITION, 1992.
*STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, 20TH EDITION, 1999.

WRIGHT-PIERCE

GLADYS J. DeWICK
LABORATORY MANAGER

WRIGHT-PIERCE
Engineering a Better Environment

99 Main Street
Topsham, Maine 04086
207-725-8721

LABORATORY REPORT
LABORATORY I.D. NO. ME00029

PROJECT NAME: WATER QUALITY & COMPLIANCE SERVICES 6000

DATE SAMPLED: 12/06/11 DATE RECEIVED: 12/06/11
DATE REPORTED: 12/28/11
SAMPLE: RON LITTLEFIELD

PARAMETER	INFLUENT	MDL	DATE ANALYZED	METHOD
BOD	884	2	12/06/11	*5210B
TKN	64.4	10.0	12/28/11	4500-N_{org}B+4500-NH_3E
AMMONIA-N	7.6	2.0	12/20/11	4500-NH_3E
NITRATE-N	<1.0	1.0	12/8/2011	4500-NO_3D
NITRITE-N	<0.01	0.01	12/8/2011	4500-NO_2B
FECAL COLIFORM (colonies/100 ml)	$3.4X10^4$	0	12/06/11	9222D

PARAMETER	EFFLUENT	MDL	DATE ANALYZED	METHOD
BOD	2	2	12/06/11	*5210B
TKN	2.7	2.0	12/28/11	4500-N_{org}B+4500-NH_3E
AMMONIA-N	<2.0	2.0	12/20/11	4500-NH_3E
NITRATE-N	23.1	1.0	12/8/2011	4500-NO_3D
NITRITE-N	0.01	0.01	12/8/2011	4500-NO_2B
FECAL COLIFORM (colonies/100 ml)	0	0	12/06/11	9222D

RESULTS ARE EXPRESSED AS MG/L UNLESS OTHERWISE INDICATED.

METHOD REFERENCE: STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, 18TH EDITION, 1992.
*STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, 20TH EDITION, 1999.

WRIGHT-PIERCE

GLADYS J. DeWICK
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Engineering a Better Environment
99 Main Street
Topsham, Maine 04086
207-725-8721

LABORATORY REPORT
LABORATORY I.D. NO. ME00029

PROJECT NAME: WATER QUALITY & COMPLIANCE SERVICES 6000

DATE SAMPLED: 12/13/11 DATE RECEIVED: 12/13/11
DATE REPORTED: 12/28/11
SAMPLE: RON LITTLEFIELD

PARAMETER	INFLUENT	MDL	DATE ANALYZED	METHOD
BOD	395	2	12/13/11	*5210B
TKN	57.1	10.0	12/28/11	4500-N_{org}B+4500-NH_3E
AMMONIA-N	5.6	2.0	12/20/11	4500-NH_3E
NITRATE-N	<1.0	1.0	12/14/2011	4500-NO_3D
NITRITE-N	<0.01	0.01	12/14/2011	4500-NO_2B
FECAL COLIFORM (colonies/100 ml)	$4X10^4$	0	12/13/11	9222D

PARAMETER	EFFLUENT	MDL	DATE ANALYZED	METHOD
BOD	<2	2	12/13/11	*5210B
TKN	2.6	2.0	12/28/11	4500-N_{org}B+4500-NH_3E
AMMONIA-N	<2.0	2.0	12/20/11	4500-NH_3E
NITRATE-N	28.4	1.0	12/14/2011	4500-NO_3D
NITRITE-N	0.01	0.01	12/14/2011	4500-NO_2B
FECAL COLIFORM (colonies/100 ml)	0	0	12/13/11	9222D

RESULTS ARE EXPRESSED AS MG/L UNLESS OTHERWISE INDICATED.

METHOD REFERENCE: STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, 18TH EDITION, 1992.
*STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, 20TH EDITION, 1999.

WRIGHT-PIERCE

GLADYS J. DeWICK
LABORATORY MANAGER

WRIGHT-PIERCE
Engineering a Better Environment

99 Main Street
Topsham, Maine 04086
207-725-8721

LABORATORY REPORT
LABORATORY I.D. NO. ME00029

PROJECT NAME: WATER QUALITY & COMPLIANCE SERVICES 6000

DATE SAMPLED: 12/19/11 DATE RECEIVED: 12/19/11
DATE REPORTED: 12/30/11
SAMPLE: RON LITTLEFIELD

PARAMETER	INFLUENT	MDL	DATE ANALYZED	METHOD
BOD	138	2	12/19/11	*5210B
TKN	44.2	10.0	12/28/11	4500-N_{org}B+4500-NH_3E
AMMONIA-N	2.2	2.0	12/20/11	4500-NH_3E
NITRATE-N	<1.0	1.0	12/21/2011	4500-NO_3D
NITRITE-N	0.03	0.01	12/20/2011	4500-NO_2B
FECAL COLIFORM (colonies/100 ml)	$8X10^3$	0	12/19/11	9222D

PARAMETER	EFFLUENT	MDL	DATE ANALYZED	METHOD
BOD	<2	2	12/19/11	*5210B
TKN	2.6	2.0	12/28/11	4500-N_{org}B+4500-NH_3E
AMMONIA-N	<2.0	2.0	12/20/11	4500-NH_3E
NITRATE-N	35.4	1.0	12/21/2011	4500-NO_3D
NITRITE-N	0.01	0.01	12/20/2011	4500-NO_2B
FECAL COLIFORM (colonies/100 ml)	0	0	12/19/11	9222D

RESULTS ARE EXPRESSED AS MG/L UNLESS OTHERWISE INDICATED.

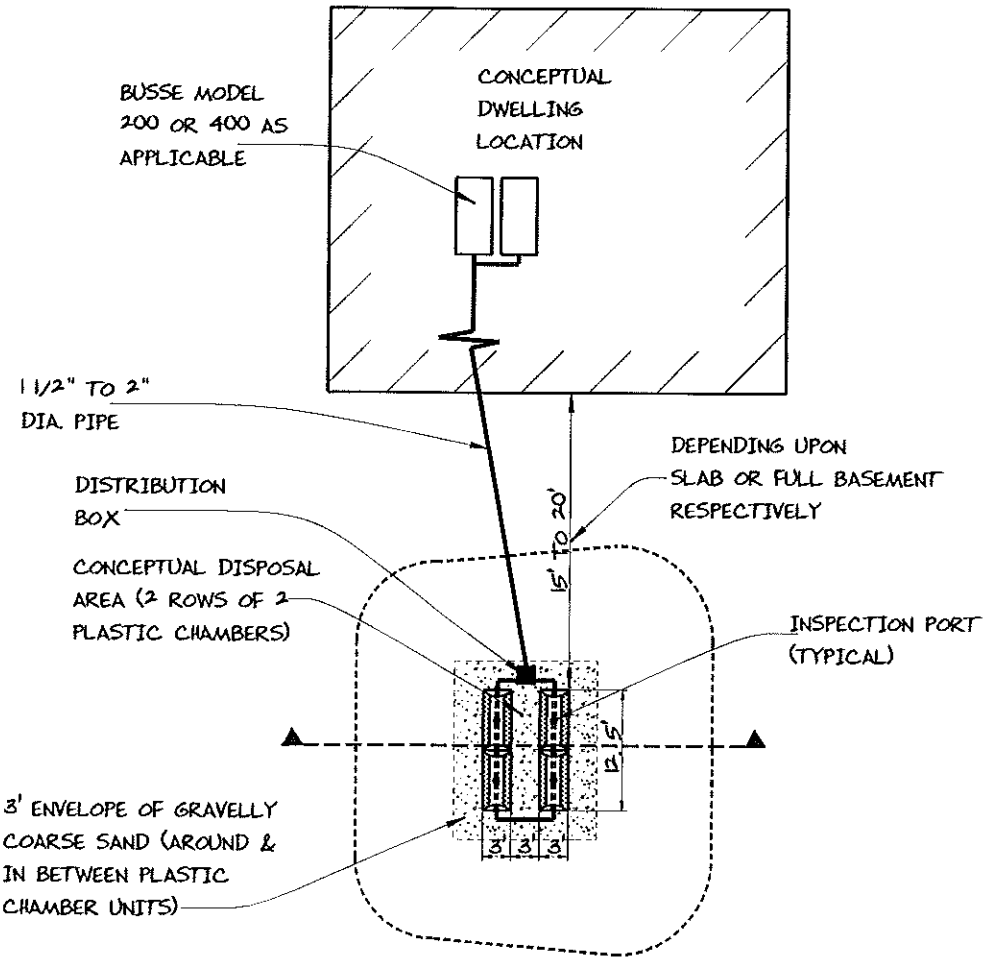
METHOD REFERENCE: STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, 18TH EDITION, 1992.
*STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, 20TH EDITION, 1999.

WRIGHT-PIERCE

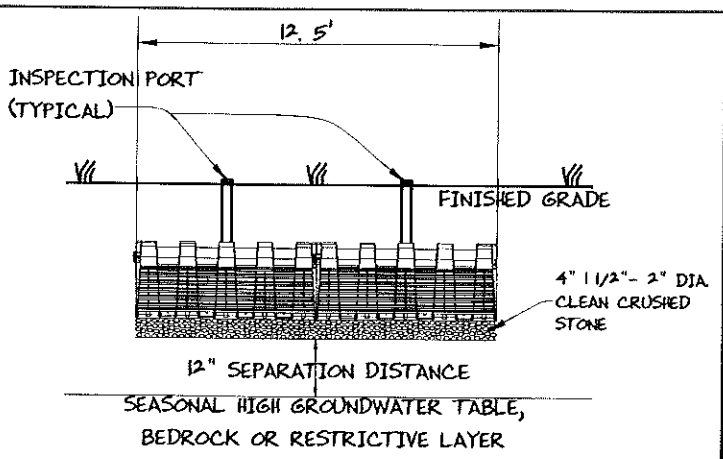
GLADYS J. DeWICK
LABORATORY MANAGER

EXHIBIT G

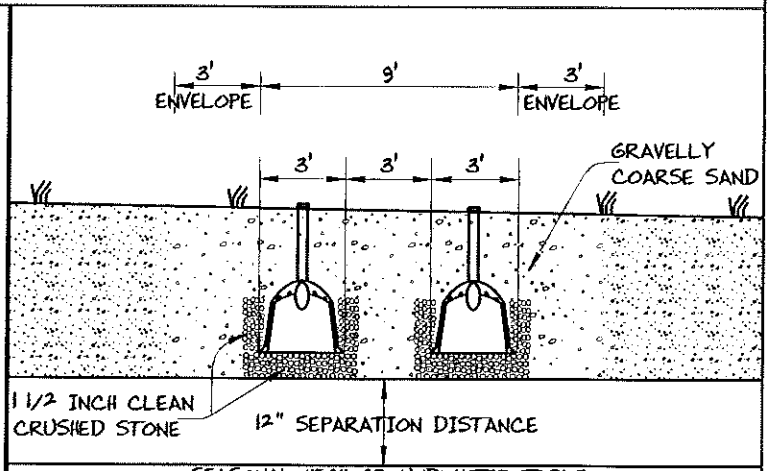
Proposed BUSSE disposal area to be utilized
for single-family dwelling, in conjunction with
BUSSE approved Advanced Wastewater Treatment Unit.



PLAN VIEW
1" = 20'



SIDE VIEW
(NOT TO SCALE)



END VIEW
(NOT TO SCALE)

BUSSE SYSTEM SUBSURFACE DISPOSAL AREA

(UTILIZING PLASTIC CHAMBER UNITS)

Albert Frick Associates, Inc.
Environmental Consultants
Gorham, Maine

Date:	Revision Description

Drawn By: B.O.	Checked By: A.F.
Date: 2/23/12	Scale: AS NOTED

Maine Center for Disease Control and Prevention
An Office of the Department of Health and Human Services
John E. Baldacci, Governor Brenda M. Harvey, Commissioner

Department of Health and Human Services
Maine Center for Disease Control and Prevention
286 Water Street
11 State House Station
Augusta, Maine 04333-0011
Tel: (207) 287-8016
Fax: (207) 287-9058; TTY: 1-800-606-0215

November 19, 2008

Busse I.S.
Attn.: Ingo F. Schaefer
P.O. Box 1123
Oak Park, Illinois 60304

Subject: Product Registration, BUSSE GmbH, BusseMF

Dear Mr. Schaefer:

The Division of Environmental Health has completed a review of a registration application for your company's product. This information was submitted pursuant to Section 1802 of the Maine State Plumbing Code, Subsurface Wastewater Disposal Rules (Rules), for code registration, for use in Maine.

Product Description

The BusseMF consists of two stage advanced treatment system. The system is contained in two cabinets connected in series. In the first cabinet, raw sanitary waste is allowed to settle. Raw effluent from the first stage is lifted by an air column, within a screen separator to exclude large waste particles.

The raw effluent is aerated in the second stage cabinet and then processed by an integral microfiltration membrane. The microfiltration membrane has an effective pore size of 0.4 µm which excludes particles as small as bacteria. The treated water, known as permeate, typically has BOD_5 levels of less than 5 mg/l and negligible suspended solids. Permeate can be discharged to any disposal system conforming to relevant regulatory criteria, used as non-potable water (toilet flushing, etc.,), or directed back to the first stage cabinet in a low flow closed system configuration.

Claim

According to the information you provided, the BusseMF has been received approval from Deutsches Institut für Bautechnik (DIBt), Z-55.3-60; Federal Environment Agency (Germany); and Deutsche Bundesstiftung Umwelt. These agencies are analogues to the National Standards Foundation and Canadian Standards Authority, and the U.S.E.P.A.

Determination

On the basis of the information ~~and sample product~~ submitted, the Division has determined that the BusseMF is acceptable for use in the State of Maine, provided that it is installed, operated, and maintained in conformance with the manufacturer's directions. Use of permeate as a nonpotable water source will require separate plumbing from the potable water plumbing.

In the event that the product fails to perform as claimed by the applicant, use of the product in Maine, including all installations approved pursuant to Chapter 18 of the Rules, shall cease. Use of the product shall not resume until the applicant and the Division have reached a mutually acceptable agreement for resolving the failure to perform as claimed.

Because installation and owner maintenance has a significant effect on the working order of onsite sewage disposal systems, including their components, the Division makes no representation or guarantee as to the efficiency and/or operation of BusseMF. Further, registration of this product for use in the State of Maine does not represent Division preference or recommendation for this product over similar or competing products.

This letter supersedes all prior letters regarding this product. If you have any questions please feel free to contact me at (207) 287-5695.

Sincerely,

James A. Jacobsen

James A. Jacobsen, Environmental Specialist IV
Wastewater and Plumbing Control Program
Division of Health Engineering
e-mail: james.jacobsen@state.me.us

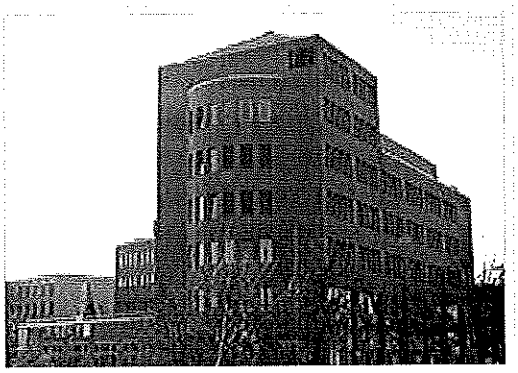
/jaj

xc: Product File

Deutsches Institut für Bautechnik

From Wikipedia, the free encyclopedia

Deutsches Institut für Bautechnik (DIBt) may be translated as **German Institute for Building Technology**, however, the institute officially does not approve of any translation of its name and wishes to be called only by its original German name. It is an agency of the German federal government (http://www.bundesregierung.de/) , with an office building in Berlin. DIBt is an accreditation organisation.



Deutsches Institut für Bautechnik (DIBt) in Berlin

Contents

Areas of activity

- **Granting of European technical approvals (ETA)** for construction products and systems (kits) by virtue of the Construction Products Directive (89/106/EEC) of 21. December 1988 transposed in Germany by the Bauproduktengesetz ("Construction Products Law") on 10. August 1992.
- **Granting of *allgemeine bauaufsichtliche Zulassungen* ('national technical approvals')** for construction products and types of construction on the basis of the building laws of the Laender of the Federal Republic of Germany.
- **Preparation of technical decisions** such as the list of *Technische Baubestimmungen* ("Technical construction regulations")
- **Accreditation of testing laboratories, inspection bodies, and certification bodies** according to the *Bauproduktengesetz* ("Construction Products Law") (European relevance) or according to the *Landesbauordnungen* ("Building regulations of the Land") (national relevance).
- **Participation in the drafting of technical rules (standards in particular) at national, European, and international levels.**
- **To suggest, place, report on, and attend to technical studies including building research contracts as well as to evaluate building research reports.**
- **To deliver expert reports on technical matters for the parties to the agreement (Federal Government and Laender).**
- **To carry out type tests.**
- In addition to the above referenced items, DIBt has also published a standard for testing the

longevity (http://www.geocities.com/ghering2000/dibt.html) of intumescent products.

Organisation

- Division Z General Affairs
- Division I Construction Engineering (*Bautechnisches Prüfamt*)
- Division II Structured Design, Building Physics, Health Protection
- Division III Fire protection, Technical Building Equipment

Committees

- **The Verwaltungsrat ("Supervisory board")** is one of the two bodies of the Institute. They decide on all fundamental affairs (promulgation of statutes, appointment of the president, determination of the budget, formation of *Ausschüsse* (Committees) für *Grundsatzfragen* ("committees dealing with basic issues") and their composition, formation and staffing of *Sachverständigenausschüsse* ("expert committees")); however, it is also their responsibility to finance DIBt according to the Agreement.
- **The Ausschüsse für Grundsatzfragen ("committees dealing with basic issues")** have the task of giving advice to the Institute on fundamental technical and legal questions.
- **The Sachverständigenausschüsse (SVa) ("expert committees")** are set up to give technical advice to the Institute. More than 600 honorary experts from science, economy and administration are on approx. 60 *Sachverständigenausschüsse* ("expert committees").

See also

- Accreditation
- Product certification

External links

- DIBt homepage (http://www.dibt.de/)
- Example DIBt approval on Würth firestop pillows (http://www.reinholdwürth.de/de/produkte/brandschutz/abschottung/zulassungen/z-19-15-1117.pdf)

Retrieved from "http://en.wikipedia.org/wiki/Deutsches_Institut_f%C3%BCr_Bautechnik"
Categories: Quality assurance | Passive fire protection | Construction | Organisations based in Germany | Standards organizations

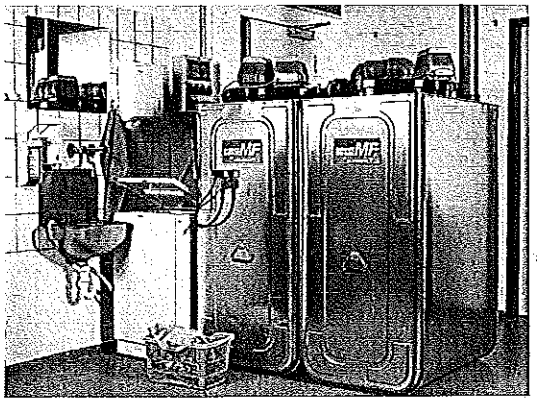
Small size sewage treatment system with microfiltration

BUSSE MF

water of the next generation

Turns domestic waste water into *service water*

Plant type MF-HKA 4, installed in a cellar



Water is one of the most precious resources on earth. A resource that is not available in unlimited abundance but requires correct treatment to ensure that it can also be used by coming generations.
In addition to a responsible approach to the use of the resource, only high-class waste water treatment is likely to sustain our quality of life. Facing this exciting challenge, we have developed waste water treatment technology of the next generation.

The BUSSE*MF* Domestic Sewage Treatment System uses microfiltration, currently the most advanced method of local waste water treatment. Microfiltration eliminates even bacteria and germs. This restores waste water to hygienic condition fit for use as service water, for example, to water the garden or flushing the toilet. In this way the consumption of drinking water in a household can be reduced by about one third.

Fig. 1:
Complete solution for single and shared occupancy houses with a cellar

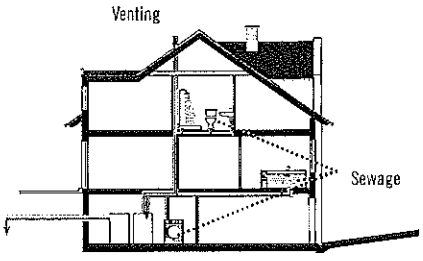
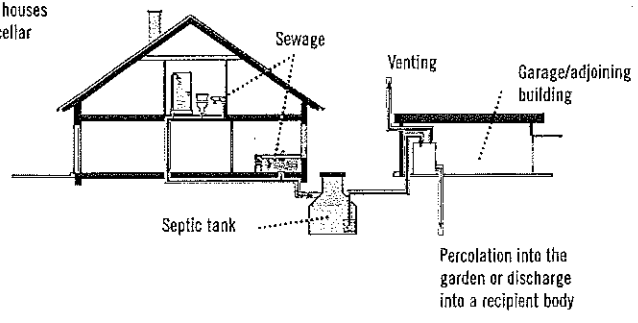


Fig. 2:
Complete solution for single and shared occupancy houses without a cellar



The consistently high level of water treatment in the BUSSE*MF* system ensures that the discharged water is considerably cleaner than the law requires, it is even better than the limits for bathing water prescribed by EC legislation. Thus, water treated by microfiltration can be discharged in sensitive areas and water protection zones. Even if still stricter legislation should be enacted and more stringent treatment values prescribed, the BUSSE*MF* system remains a product with a future.

Other advantages of this new compact technology are the small footprint and the fact that it can be installed without expensive earth-moving work. The system, which consists of double-wall safety tanks, is installed in a few hours and is immediately ready for operation. It requires little maintenance because the necessity of constant disposal of sewage sludge is avoided.

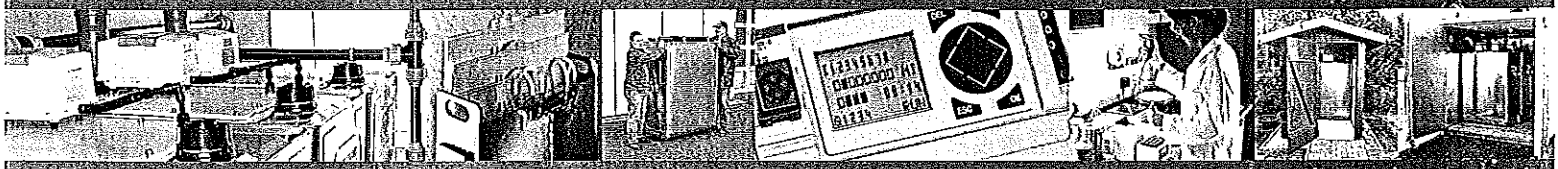
In addition to the installation of the system in the basement *(Fig. 1)*, existing systems, e.g., septic tanks, can be adapted *(Fig. 2)*. The design makes the system suitable also for larger developments, such as hotels, camping sites or office buildings up to 100 population equivalent.

The BUSSE*MF* Small Size Sewage Treatment System has been used successfully in Germany since 1997 and now also with success for waste water treatment and water recovery in numerous countries throughout Europe and the world.

How it works

The BUSSE*MF* Small Size Sewage Treatment System is designed on the basis of German regulation "DIN 4261" part 2 and comprises two treatment steps, namely pre-treatment ① and aeration ②. At the pretreatment step, which also serves as waste water store, biologically degradable coarse material, such as, faeces, toilet paper, is dissolved and the non-dissolving components separated from the waste water by an aerated sieve ③. A pump ④ pumps the waste water, from which the coarse material has been separated, to the aeration section. At this step the organic matter in the waste water is degraded biologically by microorganisms and oxygen ⑤. In addition to this, the waste water is treated physically by microfiltration membranes ⑥ (ultrafine filter with 0.4 µm pore size). These membrane filters eliminate suspended material, even bacteria and germs, ensuring that only absolutely clear, odourless, hygienically harmless water (permeate) leaves the system.

The BUSSE*MF* system was tested successfully by the University of Hannover and the Technical University in Berlin and the water from the system in practical service is significantly better than the limits set by DIBt Berlin* (Z-55.3-60) and the applicable law. Due to the immersed microfiltration membranes, in combination with a technologically required high concentration of biomass, the COD level in the discharged water can be reduced to under 30 mg/l* and the BOD_5 value to under 5 mg/l*.



Design qualification approval of DIBt Z-55.3-60
24-h-trial run

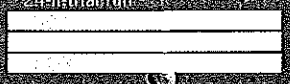


Fig. 3:
Diagram of the microfiltration technology

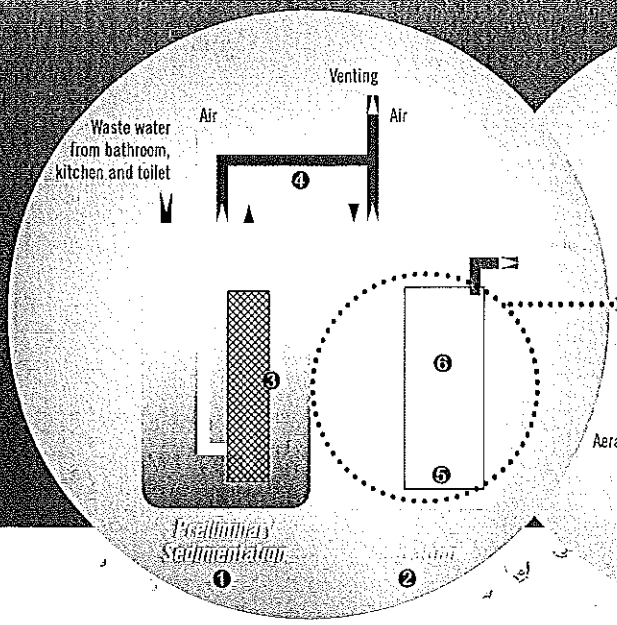


Fig. 4:
Functional diagram of the membrane module

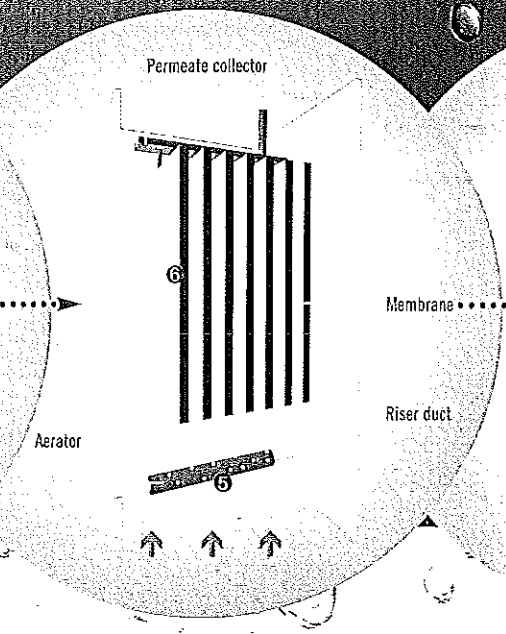
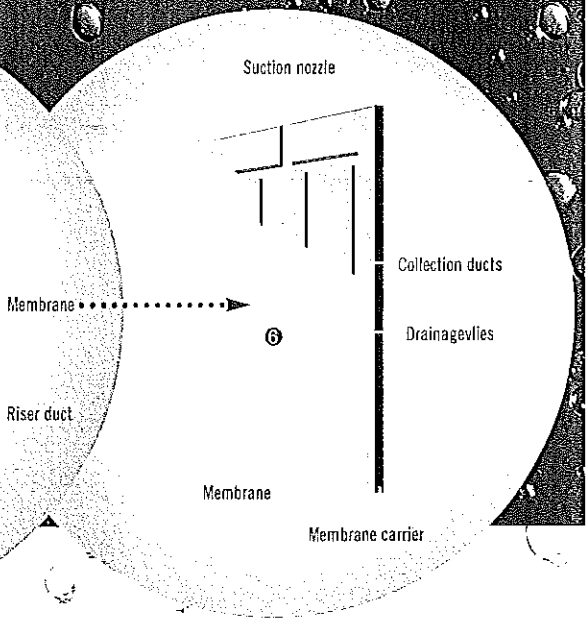


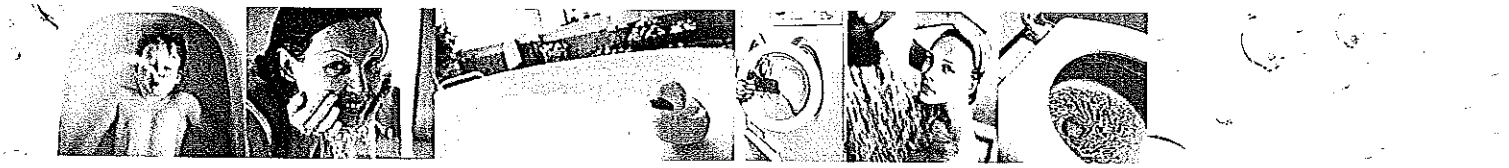
Fig. 5:
Sectional view of a membrane



The BUSSE MF Small Size Sewage Treatment System has been designed for plots exempted from the obligation to connect to the public sewage system.

Advantages at a glance

- Cleaning of domestic waste water without addition of rain water
- Reduction of the consumption of drinking water in the household by up to one third due to the use of the treated waste water as service water (e. g., for watering the garden or flushing the toilet)
- Low operating cost due to intelligent control



- Reliable function and high sustained cleaning effect ensured by qualified maintenance personnel
- The technological process obviates the need for regular sewage sludge disposal
- System needs only a few hours to be installed and ready for service
- No additional building cost for standard installation
- Small footprint due to the novel technological solution
- Low noise level due to quiet running compressors
- Modular construction ensures that the system can be expanded from 4 up to 100 population equivalent
- Automatic unattended mode ensures that the biological capacity of the system remains fully functioning for up to 4 weeks of your vacation
- Secure investment because the actual values of the treated water are very much below the limits currently permitted by law

Design qualification approval of "Deutsches Institut für Bautechnik DIBT"

Z-55.3-60

Recommended by Federal Environment Agency

Umweltbundesamt

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