WASTEWATER TECHNOLOGY

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

Final Report:

Bio-Microbics, Inc.
MicroFAST® 0.5 Wastewater Treatment System
06/11/2015/060

NSF International
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Evaluation Report:
Bio-Microbics, Inc.
MicroFAST® 0.5 Wastewater Treatment System

Under the provisions of NSF/ANSI Standard 245
Wastewater Treatment Systems – Nitrogen Reduction

October 2008

EXECUTIVE SUMMARY

Testing of the Bio-Microbics MicroFAST® Model 0.5 was conducted under the provisions of NSF/ANSI Standard 245 for Wastewater Treatment Systems – Nitrogen Reduction (March 2007). NSF/ANSI Standard 245 was developed by the NSF Joint Committee on Wastewater Technology.

The performance evaluation was conducted at the NSF Wastewater Technology Test Facility located in Waco, Texas using wastewater diverted from the Waco municipal wastewater collection system, which serves predominantly residential development. The evaluation consisted of sixteen weeks of dosing at design flow, seven and one half weeks of stress testing and two and one half weeks of dosing at design flow. Dosing was initiated on August 14, 2006. After a three-week start up period, sample and data collection for the test was officially started on September 4, 2006. Sampling started in the fall and continued into the spring, covering a range of operating temperatures.

Over the course of the evaluation, the average influent total nitrogen was 38 mg/L. The Bio-Microbics MicroFAST® Model 0.5 produced an average effluent total nitrogen of 17 mg/L, which results in a 55% reduction in the incoming total nitrogen.

The Bio-Microbics MicroFAST® Model 0.5 is Certified as an NSF/ANSI Standard 40 Residential Wastewater Treatment System. The Model 0.5 Standard 40 evaluation produced an average effluent $CBOD_5$ of 3 mg/L, ranging between <2 and 8 mg/L, and an average effluent total suspended solids concentration of 5 mg/L, ranging between <2 mg/L and 29 mg/L. Their effluent successfully met the performance requirements established by NSF/ANSI Standard 40 for Class I effluent.

The maximum 7-day arithmetic mean was 4 mg/L for $CBOD_5$ and 14 mg/L for total suspended solids, both below the allowed maximums of 40 and 45 mg/L respectively. The maximum 30-day arithmetic mean was 4 mg/L for $CBOD_5$ and 11 mg/L for total suspended solids, both below the allowed maximums of 25 mg/L and 30 mg/L respectively. The effluent pH during the entire evaluation ranged between, 6.1 and 7.0, within the required range of 6.0 to 9.0. The Bio-Microbics MicroFAST® 0.5 met the requirements for noise levels (less than 60 dbA at a distance of 20 feet), color, threshold odor, oily film and foam.

Over the course of the Standard 245 evaluation the influent averaged 240 mg/L BOD_5, 310 mg/L TSS, 38 mg/L total nitrogen, 290 mg/L alkalinity, a temperature of 27 °C and a median pH of 6.8, meeting the requirements of Standard 245. The effluent averages over the course of the test were 3 mg/L $CBOD_5$, 4 mg/L TSS and 17 mg/L total nitrogen, representing a 55% reduction, and the effluent pH ranged between 6.8 and 7.0 SU. The effluent values met the requirements of the Standard.

PREFACE

Performance evaluation of nitrogen reduction for residential wastewater treatment systems is achieved within the provisions of NSF/ANSI Standard 245: Wastewater Treatment Systems – Nitrogen Reduction (March 2007), prepared by the NSF Joint Committee on Wastewater Technology and adopted by the NSF Board of Trustees.

Conformance with the Standard is recognized by issuance of the NSF Mark. This is not to be construed as an approval of the equipment, but a certification of the data provided by the test and an indication of compliance with the requirements expressed in the Standard.

Permission to use the NSF Mark is granted only after the equipment has been tested and found to perform satisfactorily, and all other requirements of the Standard have been satisfied. Continued use of the Mark is dependent upon evidence of compliance with the Standard and NSF General and Program Specific Policies, as determined by periodic reinspection of the equipment at the factory, distributors and reports from the field.

NSF Standard 245 requires the testing laboratory to provide the manufacturer of a residential wastewater treatment system, a report including significant data and appropriate commentary relative to the performance evaluation of the system. NSF policy specifies provision of performance evaluation reports to appropriate state regulatory agencies at publication. Subsequent direct distribution of the report by NSF is made only at the specific request of or by permission of the manufacturer.

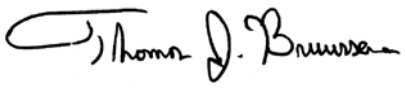
The following report contains results of the entire testing program, a description of the system, its operation and key process control equipment, and a narrative summary of the test program, including test location, procedures and significant occurrences. The system represented herein reflects the equipment authorized to bear the NSF Mark.

CERTIFICATION

NSF International has determined by performance evaluation under the provisions of NSF/ANSI Standard 245 (March 2007) that the Bio-Microbics MicroFAST® 0.5 manufactured by Bio-Microbics, Inc. has fulfilled the requirements of NSF/ANSI Standard 245. The MicroFAST® 0.5 has therefore been authorized to bear the NSF Mark so long as Bio-Microbics continues to meet the requirements of Standard 245 and the NSF General and Program Specific Policies.

General performance evaluation and stress tests were performed at the NSF Wastewater Technology Test Facility located in Waco, Texas. The raw wastewater used in the test was municipal wastewater. The characteristics of the wastewater during the test are included in the tabulated data of this report.

The observations and analyses included in this report are certified to be correct and true copies of the data secured during the performance tests conducted by NSF on the wastewater treatment system described herein. The manufacturer has agreed to present the data in this certification in its entirety whenever it is used in advertising, prospectuses, bids or similar uses.



Thomas J. Bruursema
General Manager
Wastewater Treatment Unit Program

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Technical Manager
Federal Programs

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1.0 PROCESS DESCRIPTION

The MicroFAST® 0.5 wastewater treatment bioreactor utilizes a proprietary attached and suspended growth process to achieve treatment. Since the media used in the plant is submerged, both attached and suspended biological growth occurs simultaneously. In both attached and suspended growth systems, microorganisms remove soluble contaminants from the wastewater, utilizing them as a source of energy for growth and production of new microorganisms.

In the suspended growth mode, organisms dispersed in the wastewater being treated come in contact with the organic matter in the wastewater, while in the fixed growth mode, the organisms form on a fixed media and the wastewater is circulated past them. As new organisms form in the fixed growth mode, the biological growth thickens, resulting in anoxic conditions in the lower layers. As the bacterial mass builds, adhesion is weakened and the upper layers slough off, exposing a new surface on which aerobic growth continues. The accumulation of the biomass on the surface also provides for entrapment of organic solids, which are attacked by extracellular enzymes that solubilize the solids to make them available to the microorganisms as a food source. The conversion of the organic matter from soluble to biological solids allows for removal of the organic matter by settling of the solids in the treatment process.[1]

The organisms primarily responsible for the degradation of the organic matter are aerobic bacteria. As such, the transfer of oxygen into the wastewater by an aeration system is critical to the treatment process. The aeration system also provides for the mixing of the wastewater and organisms to provide contact between the organic contaminants in the wastewater and the organisms that provide for removal of the contaminants. Interruption of the aeration system for a long period of time can have a serious impact on the process.

2.0 PERFORMANCE EVALUATION

2.1 Description of System Evaluated

The MicroFAST® Model 0.5 tested in this evaluation has a rated capacity of 500 gallons per day (gpd). Specifications and drawings are included in Appendix A. The tank was constructed of concrete. The plant utilizes part of the tank for primary treatment, with the secondary treatment achieved in an aerobic zone inside an insert in the tank.

Wastewater enters the tank in the primary treatment zone, which extends from the inlet pipe to the forward bulkhead of the insert. The quiescent condition in the primary zone allows the heavy solids in the wastewater to settle out. There are no skimmers or baffles in the primary zone, but floating materials remain in the zone because the inlet to the secondary zone is below the water surface.

A honeycomb type media block is completely submerged in the tank insert and provides the fixed surface to support most of the biomass in the secondary aerobic zone. Aeration and circulation of the wastewater through the media is achieved by release of air in a draft tube near the bottom of the media block. The release of air causes the wastewater to rise through the tube to a deflector baffle that directs the water out over the media. The continuous circulation of the water establishes velocities in the media that assist in sloughing of excess biomass from the media. Sloughing biomass passes down through the media and

settles to the bottom of the tank below the insert. Treated water passes out of the aerobic zone and the treatment plant through a pipe connected to a vertical channel cut in the media. A stream of partially treated water from the aeration zone is diverted to the non-aerated zone outside the liner to provide for denitrification of the wastewater.

2.2 Test Protocol

Section 8 of NSF/ANSI Standard 245 protocol, "Performance Testing and Evaluation", is included in Appendix B. Start up of the system was accomplished by filling the system with 2/3 water and 1/3 raw sewage. The system was then dosed at the design loading rate of 500 gpd as follows:

6 a.m. to 9 a.m. - 35 percent of daily rated capacity (175 gallons)
11 a.m. to 2 p.m. - 25 percent of daily rated capacity (125 gallons)
5 p.m. to 8 p.m. - 40 percent of daily rated capacity (200 gallons)

Dosing was accomplished by opening an electrically actuated valve to feed wastewater to the test system. Five gallon doses were spread uniformly over each dosing period to comprise the total dose volume for the period.

After a start up period (up to three weeks at the manufacturer's discretion), the system is subjected to the following loading sequence:

Design loading	-	16 weeks
Stress loading	-	7.5 weeks
Design loading	-	2.5 weeks

During the design loading periods, flow proportioned 24-hour composite influent and effluent samples are collected three times per week. The influent samples are analyzed for five-day biochemical oxygen demand (BOD_5), total suspended solids (TSS), alkalinity, Total Kjeldahl Nitrogen (TKN), and ammonia-N. The effluent samples are analyzed for carbonaceous five-day biochemical oxygen demand ($CBOD_5$), total suspended solids (TSS), alkalinity, Total Kjeldahl Nitrogen (TKN), ammonia-N and Nitrate/nitrate-N concentrations. On-site determinations of the influent and effluent pH, temperature and dissolved oxygen are made five days per week through grab samples.

Stress testing is designed to evaluate how the system performs under non-ideal conditions, including varied hydraulic loadings and electrical or system failure. The test sequence includes (1) Wash Day stress, (2) Working Parent stress, (3) Power/Equipment Failure stress, and (4) Vacation stress. Detailed descriptions of the stress sequences are shown in Appendix B.

During the stress test sequences, 24-hour composite samples are collected twice during each stress recovery period (the week following completion of each of the stress simulations described). The analyses and on-site determinations completed on the samples are the same as described for the design load testing. Each stress is followed by seven consecutive days of dosing at design rated capacity before beginning the next stress test. Sample collection is initiated twenty-four hours after completion of Wash Day, Working Parent, and Vacation stresses, and beginning 48 hours after completion of the Power/Equipment Failure stress.

In order for the system to successfully pass the Standard 245 evaluation:

(1) $CBOD_5$: The average of all effluent samples shall not exceed 25 mg/L.

(2) TSS: The average of all effluent samples shall not exceed 30 mg/L.

(3) Total nitrogen: The average total nitrogen concentration of all effluent samples shall be less than 50% of the average total nitrogen concentration of all influent samples.

(3) pH: Individual effluent values remain between 6.0 and 9.0 SU.

Requirements are also specified for effluent color, odor, oily film and foam, as well as maximum noise levels allowed from the system.

2.3 Test Chronology

The system was installed under the direction of the manufacturer on August 1, 2006. The infiltration/exfiltration test, during which the entire system was tested for leaks, was completed on August 9, 2006. The unit was filled with 2/3 fresh water and 1/3 raw sewage and dosing was initiated at the rate of 500 gallons per day beginning August 14, 2006. Sampling for record was initiated on September 4, 2006. The stress test sequence was started on December 25, 2006 and ended on February 14, 2007. Testing was completed on March 2, 2007. Dosing and sampling for nitrogen analyses was continued until April 20, 2006 to gather the required number of samples for the Standard 245 test.

Over the course of the test, there were a number of days with influent strength well in excess of typical domestic wastewater. The impact of these high concentrations on the test is discussed in the following section.

3.0 ANALYTICAL RESULTS

3.1 Summary

Chemical analyses of samples collected during the evaluation were completed using the procedures in *Standard Methods for the Examination of Water and Wastewater*[2] and USEPA methods. Summaries of the data generated during the evaluation are included in Appendix C. Results of the chemical analyses and on-site observations and measurements made during the evaluation are summarized in Table I. Data collected during stress loading and recovery is not included in the overall averages, as outlined in Section 8.4.3 of the Standard. For a complete summary of the results, please see Appendix C. For purposes of determining system performance, only samples collected during design loading periods, described in 8.2.2, shall be used in the calculations. The data collected during the stress sequences shall not be included in the calculations, but shall be included in the final report.

TABLE I. Summary of Analytical Results

	Average	Std. Dev.	Minimum	Maximum	Median	Interquartile Range
Biochemical Oxygen Demand (mg/L)						
Influent (BOD_5)	240	80	110	450	240	180 - 280
Effluent ($CBOD_5$)	3	1.4	<2	8	2	2 - 3
Total Suspended Solids (mg/L)						
Influent	310	110	66	550	300	230 - 380
Effluent	4	3.7	<2	19	2	2 - 3
pH						
Influent	-	-	6.5	7.0	6.8	6.8 – 6.9
Effluent	-	-	6.8	7.0	6.9	6.8 – 6.9
Temperature (°C)						
Influent	27	4	18	31	30	24 – 30
Effluent	26	5	14	31	30	22 – 30
Dissolved Oxygen (mg/L)						
Effluent	1.8	0.4	0.5	3.0	1.7	1.6 – 1.8
Alkalinity (mg/L)						
Influent	290	25	230	390	290	270 - 300
Effluent	170	21	120	230	170	160 - 190
Total Kjeldahl Nitrogen (mg/L as N)						
Influent	38	17	12	130	34	29 - 44
Effluent	2.7	2.5	0.6	13	1.8	1.4 – 3.1
Ammonia-N (mg/L as N)						
Influent	21	6.8	4.4	34	22	16 - 26
Effluent	1.8	1.5	0.05	7.9	1.5	0.9 – 2.5
Nitrate/nitrite-N (mg/L as N)						
Effluent	15	5.2	6.5	29	13	11 - 19
Total Nitrogen (mg/L as N)						
Influent	38	17	12	130	34	29 - 44
Effluent	17	5.5	6.6	32	16	12 - 22

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.

Criteria for evaluating the analytical results from the testing are described in Section 8.4 of NSF/ANSI Standard 245. Section 8.4.1 of the Standard provides guidance addressing the impact of unusual testing conditions, including system upset, improper sampling, improper dosing, or influent characteristics outside the ranges specified in 8.2.1, an assessment shall be conducted to determine the extent to which these conditions adversely affected the performance of the system. Based on this assessment, specific data points may be excluded from the averages.

During the third month of the test, the average monthly influent wastewater characteristics, particularly TSS, were outside the ranges specified by the Standard. The monthly average influent BOD_5 was 360 mg/L and the average influent TSS was 560 mg/L. Per the Standard, data days were excluded to account for the impacts of the out-of-range concentrations, resulting in month three averages of 290 mg/L for BOD_5 and 340 mg/L for TSS. The following dates were excluded from the calculation of averages for month three:

- *November 10, 13, 15, 17, 20, and 27*

Section 8.4.2 of the Standard addresses catastrophic site problems that may occur including, but not limited to, influent characteristics, malfunctions of test site apparatus and acts of God. If these problems jeopardize the validity of the performance testing, manufacturers shall be given the choice to perform maintenance and reinitiate start up of the test, or have the system brought back to pre-existing conditions with no routine maintenance within 3 wks after the site problem has been identified and corrected. No such conditions were observed during this test.

3.2 Biochemical Oxygen Demand

The five-day biochemical oxygen demand (BOD_5) and carbonaceous five-day biochemical oxygen demand ($CBOD_5$) analyses were completed using the EPA Method 405.1. The results of the analyses completed on the samples collected during the testing are shown in Figure 1.

Influent BOD_5:

The influent BOD_5 ranged from 110 to 450 mg/L during the evaluation, with an average concentration of 240 mg/L and a median concentration of 240 mg/L. The average influent BOD_5 delivered to the treatment unit was within the influent characteristics defined under Section 8.2.1 of NSF/ANSI Standard 245.

Effluent $CBOD_5$:

The effluent $CBOD_5$ concentrations ranged from <2 to 8 mg/L over the course of the evaluation, with an average concentration of 3 mg/L. The median effluent $CBOD_5$ concentration was 2 mg/L.

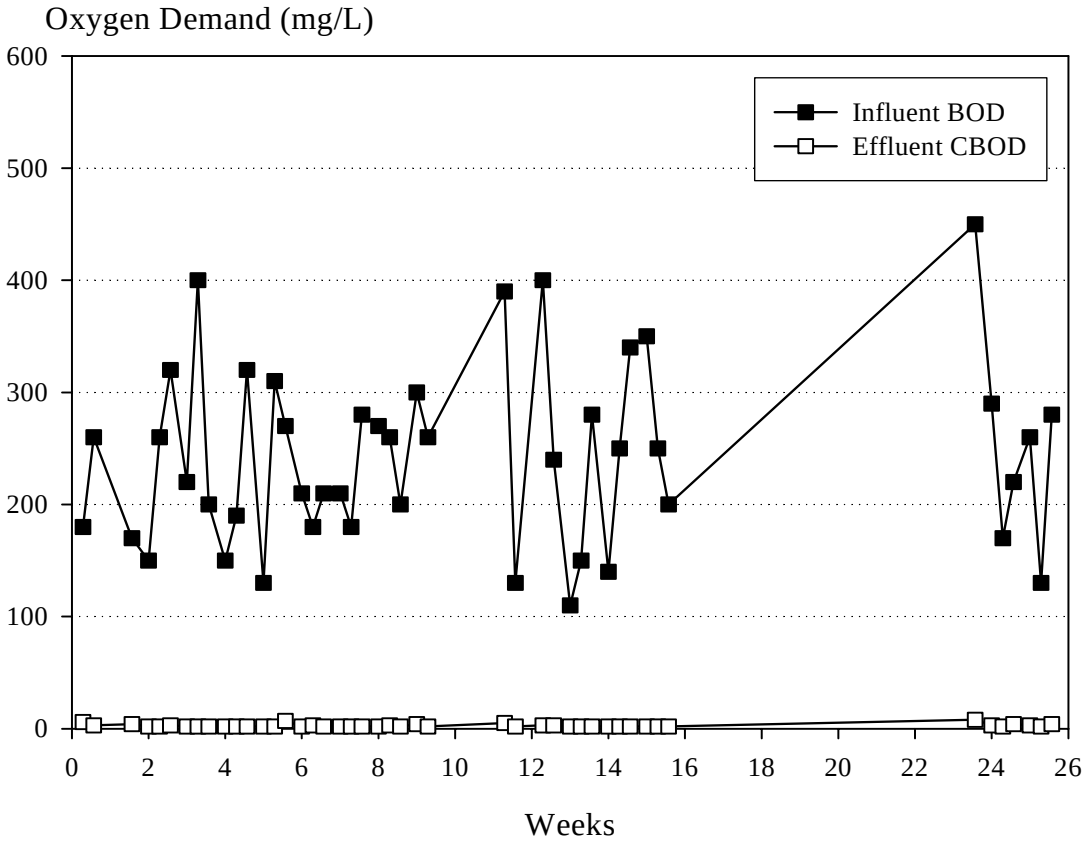

Figure 1. Biochemical Oxygen Demand.

3.3 Total Suspended Solids

TSS analyses were completed using Method 209C of *Standard Methods*. The TSS results over the entire evaluation are shown in Figure 2.

Influent TSS:

The influent TSS ranged from 66 to 550 mg/L during the evaluation, with an average concentration of 310 mg/L and a median concentration of 300 mg/L. The average influent TSS delivered to the treatment unit was within the influent characteristics defined under Section 8.2.1 of NSF/ANSI Standard 245.

Effluent TSS:

The effluent TSS concentration ranged from <2 to 19 mg/L during the evaluation, with an average concentration of 4 mg/L and a median concentration of 2 mg/L.

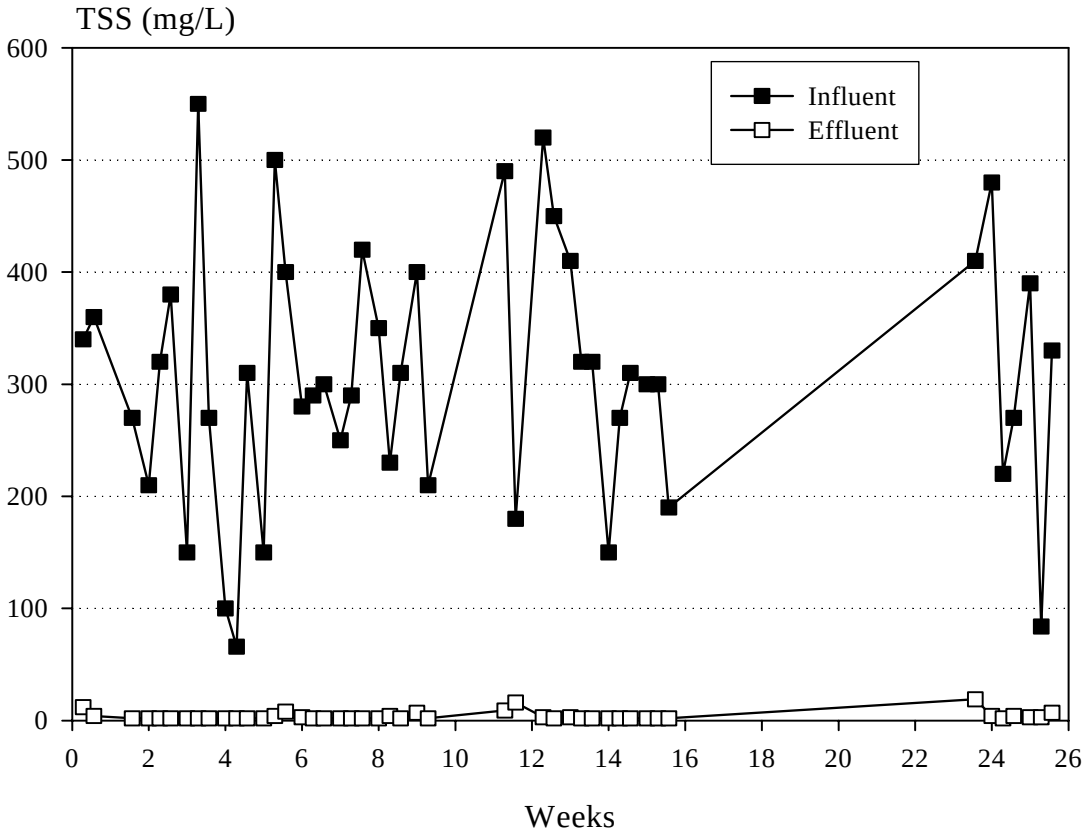

Figure 2. Total Suspended Solids**.**

3.4 pH

Over the entire evaluation period, the influent pH ranged from 6.5 to 7.0 (median of 6.8). The effluent pH ranged from 6.8 to 7.0 during the evaluation (median of 6.9), within the 6 to 9 range required by NSF/ANSI Standard 245. The pH data for the evaluation are shown in Appendix C.

3.5 Temperature

Influent temperatures over the evaluation period ranged from 18 to 31°C (median of 30°C). The temperature data are shown in Appendix C. The Standard requires that the average influent temperature fall within 10 to 30°C. The average influent temperature was within the characteristics defined under Section 8.2.1 of NSF/ANSI Standard 245.

3.6 Dissolved Oxygen

Dissolved Oxygen (DO) was measured in the effluent during the evaluation. The effluent DO ranged between 0.5 to 3.0 mg/L (median of 1.7 mg/L). All dissolved oxygen data are shown in Appendix C.

3.7 Alkalinity

Alkalinity analyses were completed using Method 310.10 from *EPA Methods*. The alkalinity results over the entire evaluation are shown in Figure 3.

Influent Alkalinity:

The influent alkalinity concentration ranged from 230 to 390 mg/L during the evaluation, with an average concentration of 290 mg/L. The influent alkalinity delivered to the treatment unit was within the influent characteristics defined under Section 8.2.1 of NSF/ANSI Standard 245.

Effluent Alkalinity:

The effluent Alkalinity concentration ranged from 120 to 230 mg/L during the evaluation, with an average concentration of 170 mg/L and a median concentration of 170 mg/L.

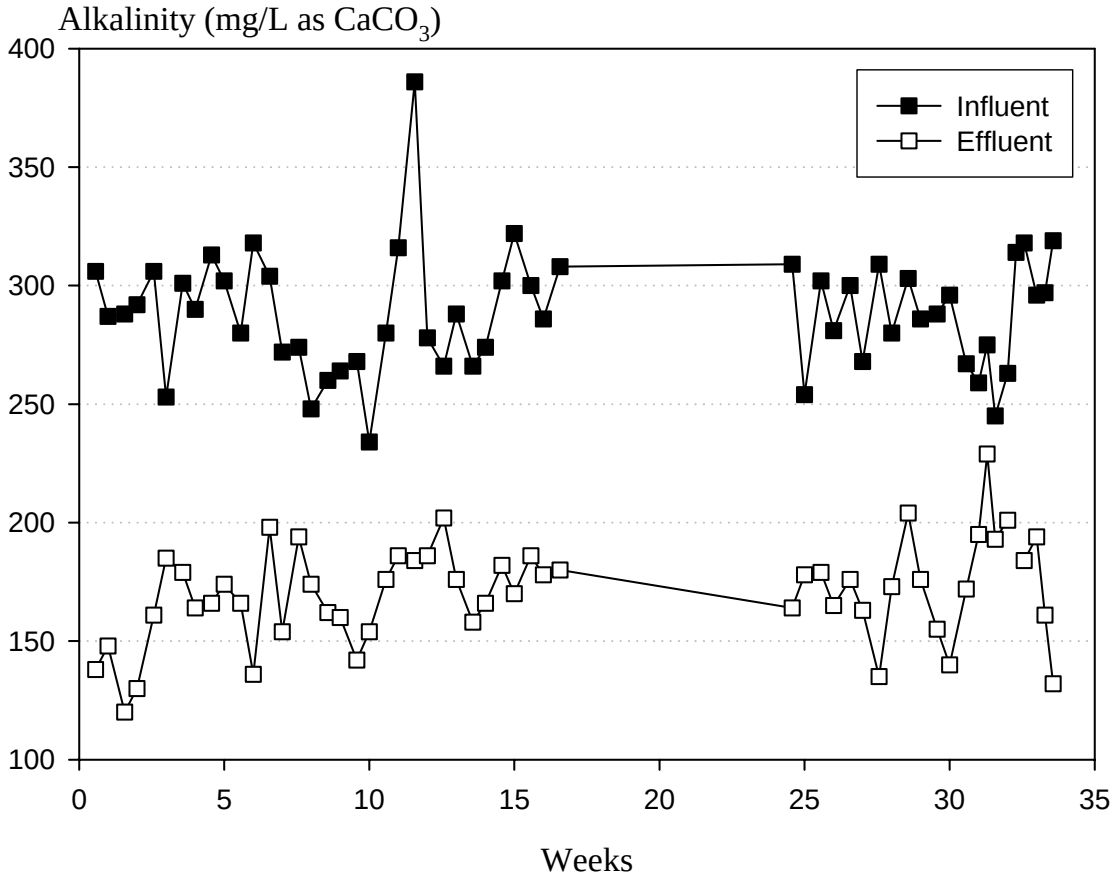

Figure 3: Alkalinity

3.8 Total Kjeldahl Nitrogen (TKN)

TKN analyses were completed using Method 351.2 from *EPA Methods*. The TKN results over the entire evaluation are shown in Figure 4 and reported as mg/L as N.

Influent TKN:

The influent TKN ranged from 12 to 130 mg/L during the evaluation, with an average concentration of 38 mg/L and a median concentration of 34 mg/L. The influent TKN delivered to the treatment unit was within the influent characteristics defined under Section 8.2.1 of NSF/ANSI Standard 245.

Effluent TKN:

The effluent TKN concentration ranged from 0.6 to 13 mg/L during the evaluation, with an average concentration of 2.7 mg/L and a median concentration of 1.8 mg/L.

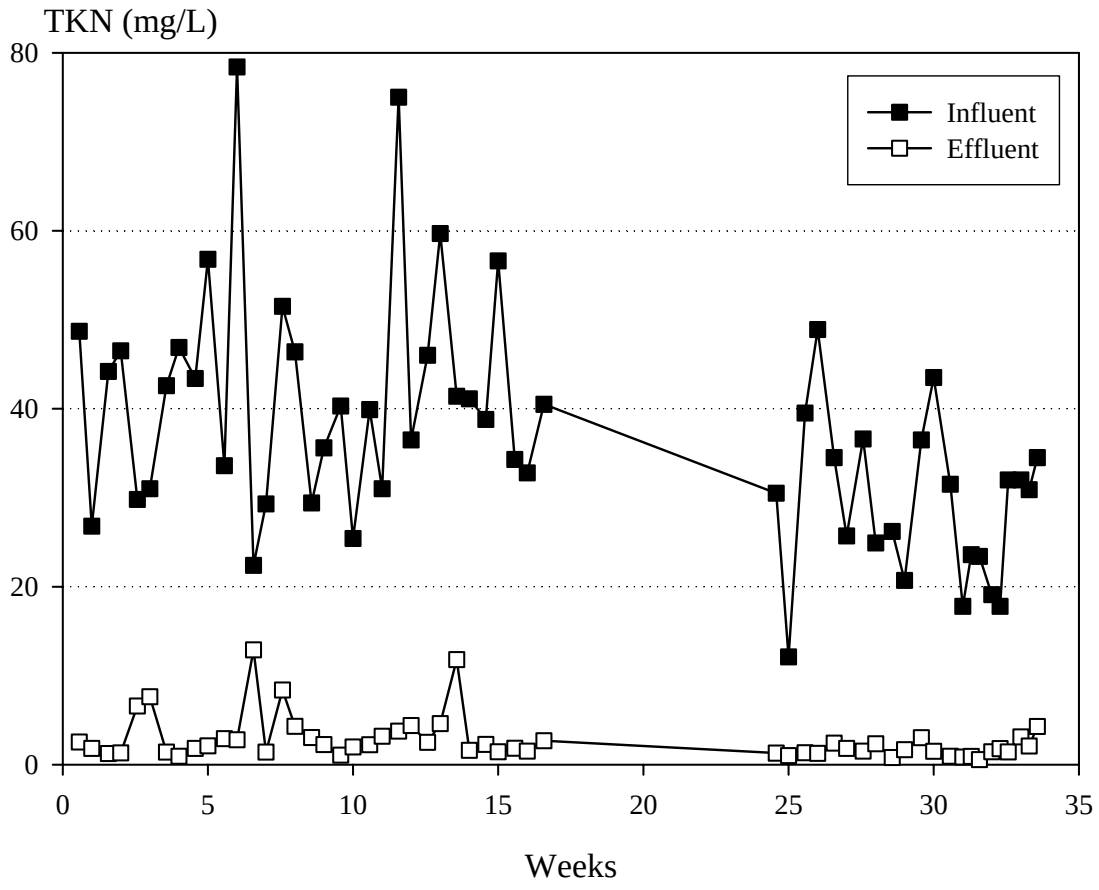

Figure 4: Total Kjeldahl Nitrogen

3.9 Ammonia-N

Ammonia-N analyses were completed using Method 350.1 from *EPA Methods*. The Ammonia-N results over the entire evaluation are shown in Figure 5 and reported as mg/L as N.

Influent Ammonia-N:

The influent Ammonia-N ranged from 4.4 to 34 mg/L during the evaluation, with an average concentration of 21 mg/L and a median concentration of 22 mg/L.

Effluent Ammonia-N:

The effluent Ammonia-N concentration ranged from 0.05 to 7.9 mg/L during the evaluation, with an average concentration of 1.8 mg/L and a median concentration of 1.5 mg/L.

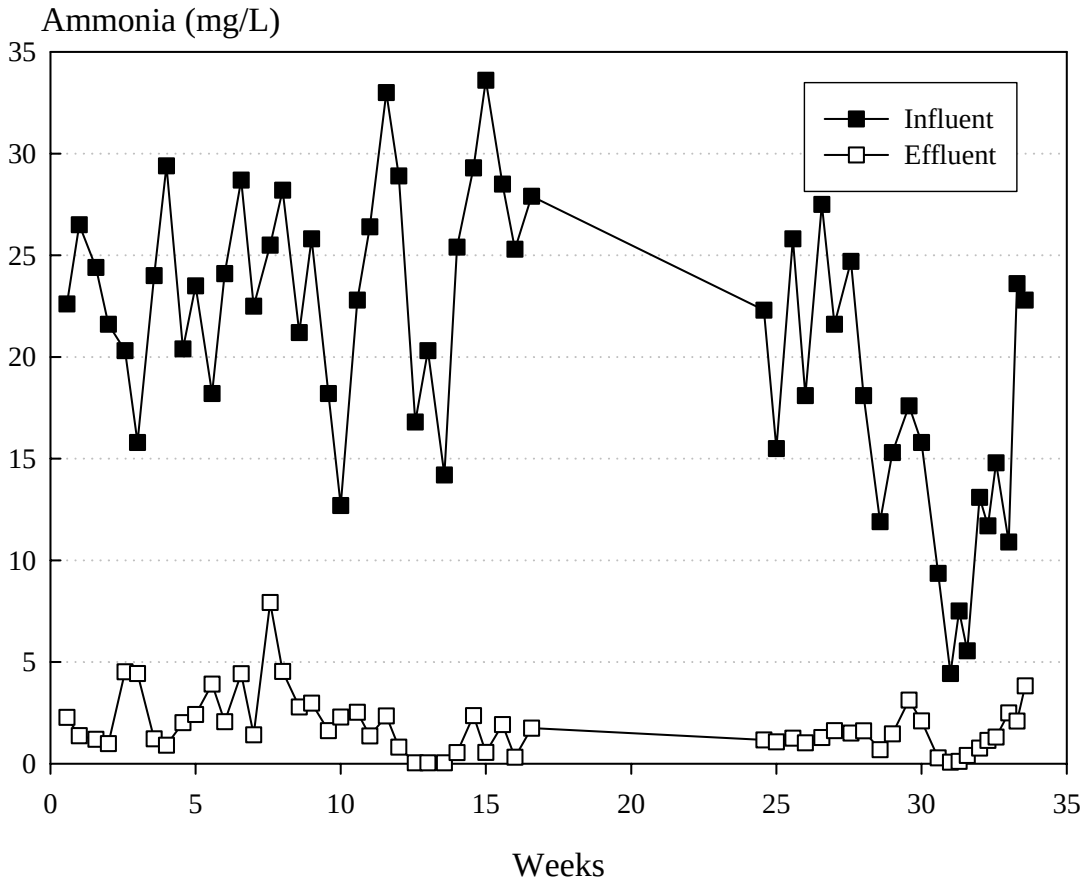

Figure 5: Ammonia

3.10 Nitrate/nitrite-N

Nitrate/nitrite-N analyses were completed using Method 353.2 from *EPA Methods*. The Nitrate/nitrite-N results over the entire evaluation are shown in Figure 6 and reported as mg/L as N.

Effluent Nitrate/nitrite-N:

The effluent Nitrate/nitrite-N concentration ranged from 6.5 to 29 mg/L during the evaluation, with an average concentration of 15 mg/L and a median concentration of 13 mg/L.

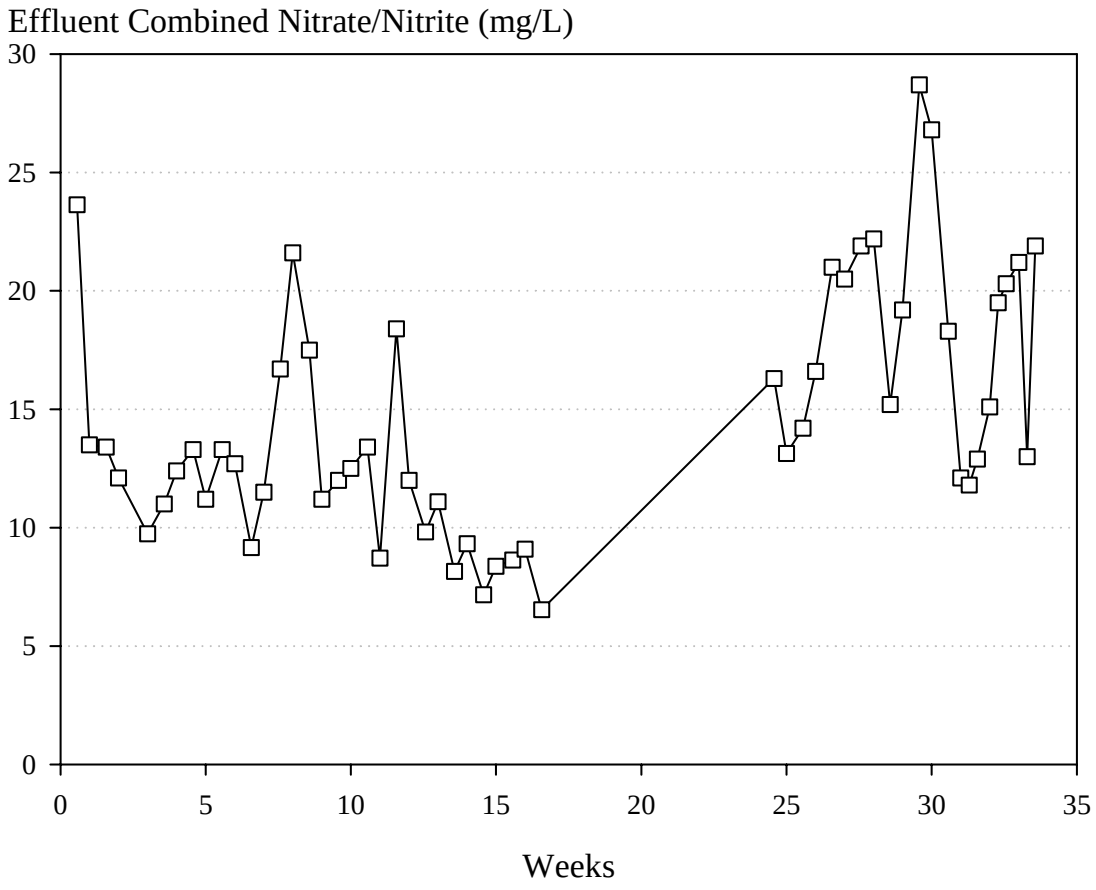

Figure 6: Effluent Nitrate/Nitrite

3.11 Total Nitrogen

Total Nitrogen (TN) is the sum of the total Kjeldahl nitrogen (TKN), nitrite (NO_2) and nitrate (NO_3) in a sample, and is expressed as mg/L as N. The TN results over the entire evaluation are shown in Figure 7 and reported as mg/L as N.

Influent Total Nitrogen

The influent TN ranged from 12 to 130 mg/L during the evaluation, with an average concentration of 38 mg/L and a median concentration of 34 mg/L.

Effluent Total Nitrogen:

The effluent TN concentration ranged from 6.6 to 32 mg/L during the evaluation, with an average concentration of 17 mg/L and a median concentration of 16 mg/L. The MicroFAST® 0.5 successfully met the requirements of Standard 245 by reducing the influent TN by 55%, which exceeds the pass/fail criteria of 50%.

Nitrogen Loading:

Over the course of the evaluation the influent Total Nitrogen loading averaged 0.16 lb/day. The Bio-Microbics MicroFAST® 0.5 achieved an average reduction of 0.09 lbs/day.

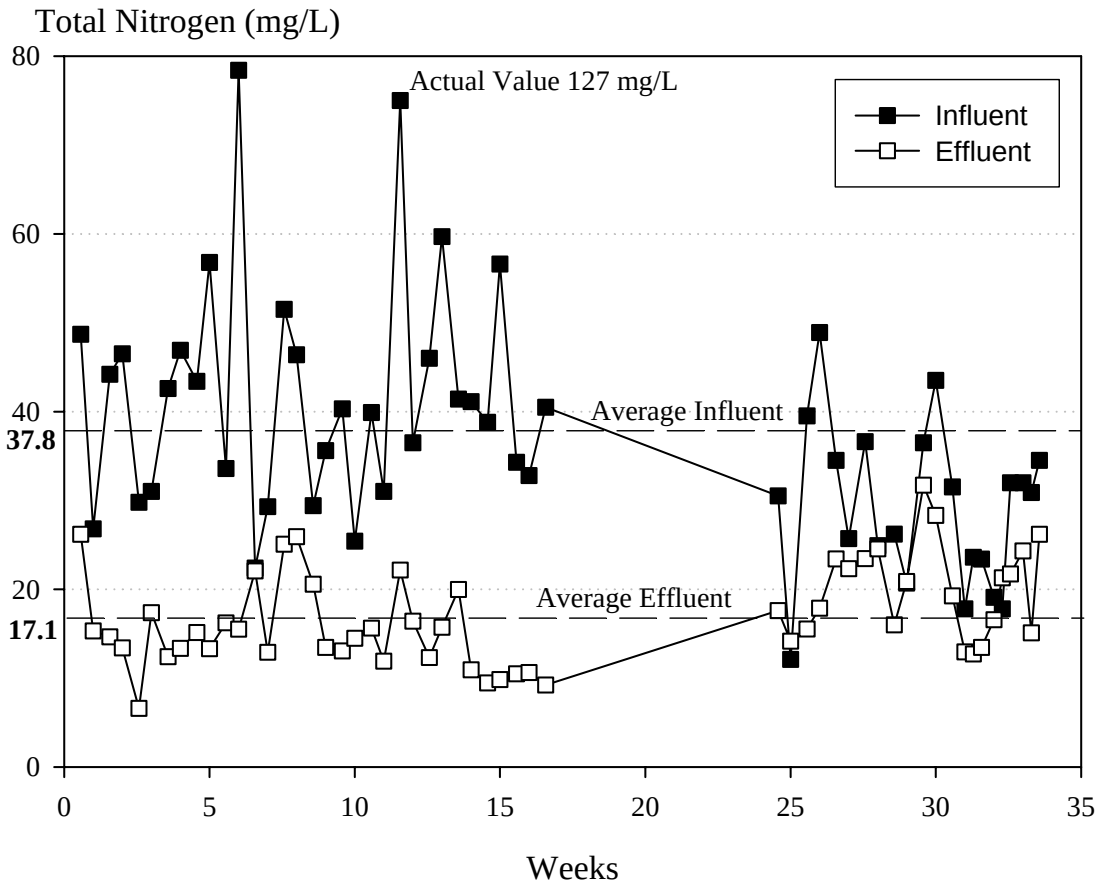

Figure 7: Total Nitrogen

4.0 REFERENCES

1. "Environmental Protection Agency Guidelines for Secondary Treatment", Federal Register, Volume 28, No. 159, 1973.

2. APHA, AWWA, WPCF, Standard Methods for the Examination of Water and Wastewater, 20th Edition, American Public Health Association, Washington, D.C.

3. U.S. EPA, Methods for Chemical Analysis of Water and Wastes, U.S. Environmental Protection Agency, Washington, D.C.

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APPENDIX A

SYSTEM SPECIFICATIONS

SYSTEM SPECIFICATIONS

Bio-Microbics, Inc.
MicroFAST® 0.5

System Capacity

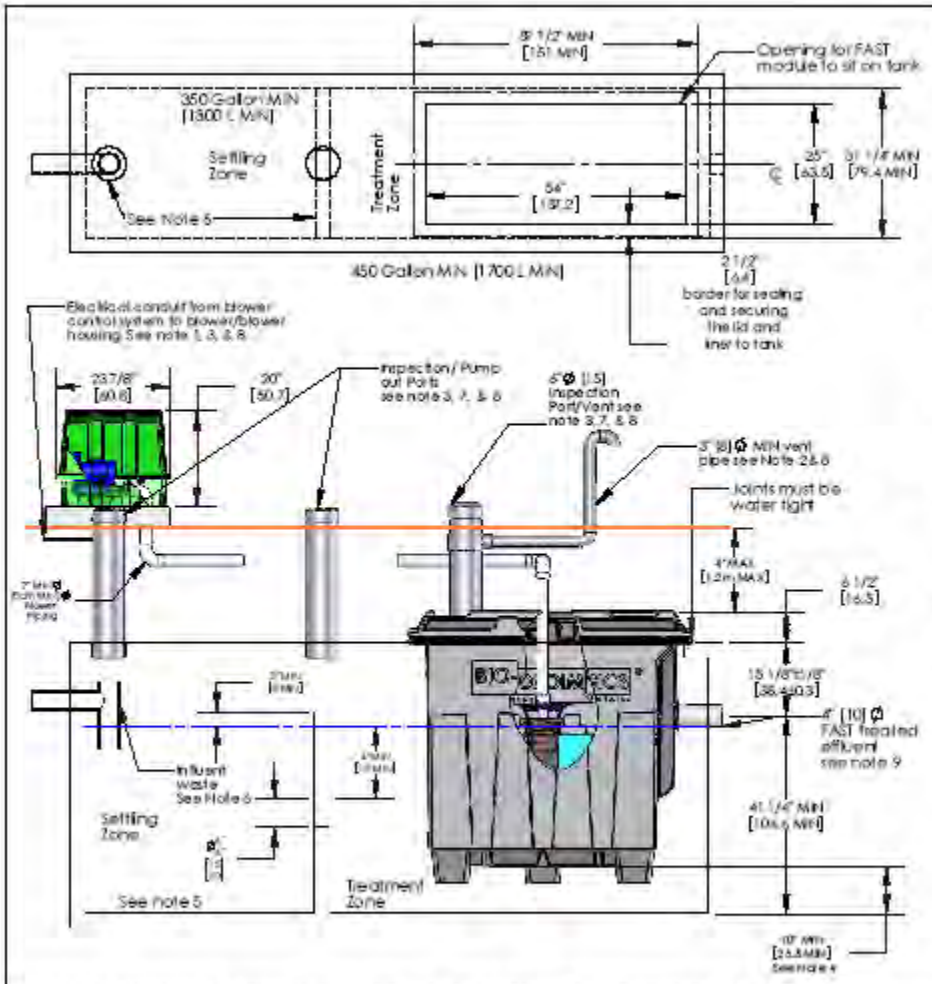
Design Flow	500 gpd
System Hydraulic Capacity	
Pretreatment Chamber	500 gallons
Aeration Chamber	750 gallons
Hydraulic Retention Time (at Design Flow)	
Pretreatment Chamber	24 hours
Aeration Chamber	36 hours
Total Hydraulic Retention Time	60 hours

Aerator

Gast Regenerative Blower	Model R2103

Filter Media Specifications

Material	polypropylene
Standard Module Size	24” x 24” x 48”
Minimum Surface Area per Volume	27 sq.ft./cu.ft.



NOTES

1. Blower piping to FAST® may not exceed 100 FT [30.5m] total length and use 4 elbows maximum. For distances greater than 100 FT [30.5m] - consult factory. Blower must be located above flood/standing water levels on a concrete base 24" X 18" X1" [61X45.7X2.6cm] minimum.
2. Vent to be located above finish grade or higher to avoid infiltration. Cap with vent grate w/at least 7.1 sq in. [45.8 sq. cm] open surface area. Secure with stainless steel screws (see *sheet 4 of 4 MicroFAST® 0.50 Details*)
   or
   Run vent to desired location and cover opening with vent grate w/at least 7.1 sq in. [45.8 sq. cm] of open surface area. Secure with stainless steel screws. Vent piping must not allow excess moisture build up or back pressure.
3. All appurtenances to FAST® (e.g. tank pump outs, etc.) must conform to all country, state, province, and local plumbing and electrical codes. The blower control system is provided by Bio-Microbics, Inc.
4. Tank volume must be increased by 20% if minimum of 10 inches [25.5cm] is used between the unit and the base of tank. Consult factory for approval.
5. The primary compartment may be a separate tank.
6. Either the influent pipe tee shall be fitted with a pipe cap or the baffle separating the two zones shall be extended to the top of the tank. If choosing to use the pipe cap, then the baffle shall be at least 3"[8] higher than the water level as shown on the drawing.
7. All inspection, viewing and pump out ports must be secured to prevent accidental or unauthorized access.
8. Tank, anchors, piping, conduit, blower housing pad and vents are provided by others.
9. All piping and ancillary equipment installed after FAST® must not impede or restrict free flow of effluent.
10. No more than 4 FT [1.2 m] of fill may be placed over unit lid. Unit may stand inside tank (see *sheet 2 of 4 MicroFAST® 0.50 with feet*). Refer to installation manual for more details.

DO NOT SCALE
UNLESS NOTED DIMENSIONS ARE IN INCHES [CENTIMETERS] TOLERANCES ±0.02 IN/IN [±0.05 CM/CM]

BIO-MICROBICS INCORPORATED

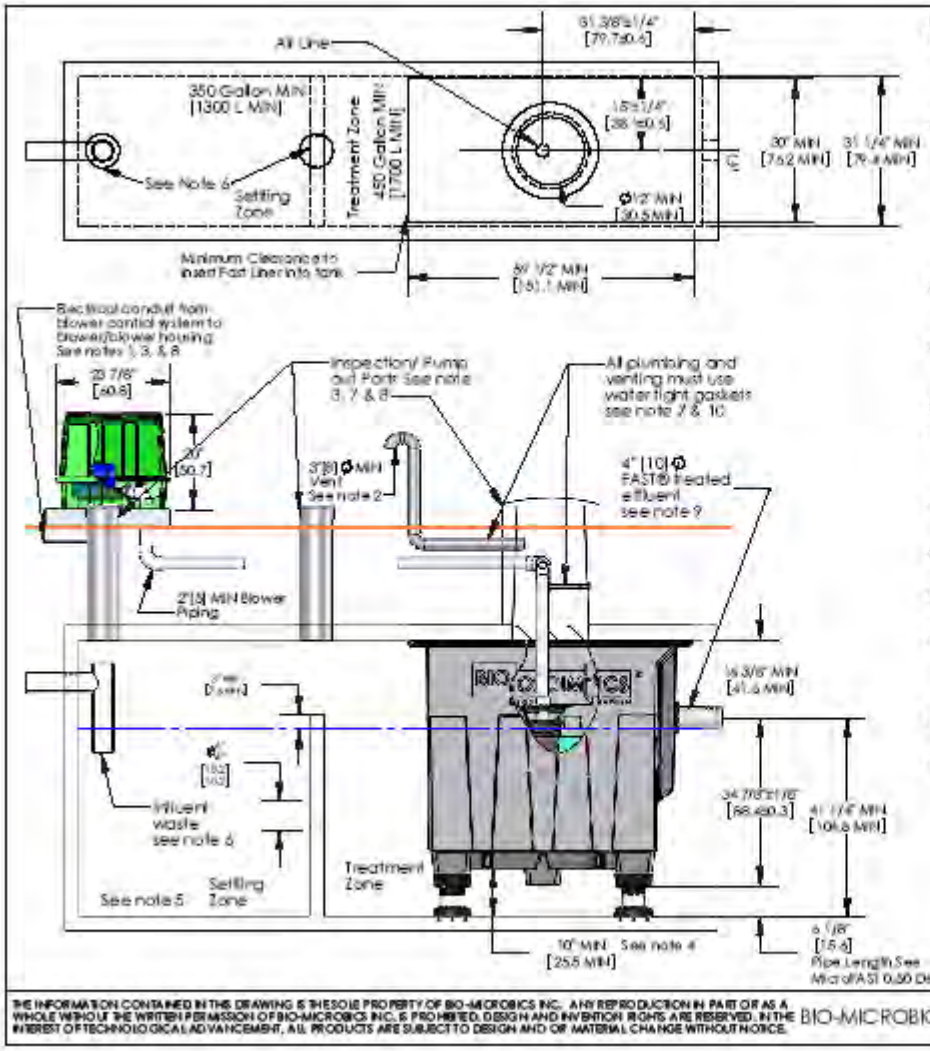
MicroFAST 0.50 FAST Unit

WEIGHT lb | QTY | QUANTITY NUMBER

	NAME	DATE
DRAWN	CTC	
CHECKED	PT	

A | MicroFAST® 0.50 with lid | SHEET 1 OF 4

REVISED Tuesday, July 22, 2008 | REV: IM-02-A



NOTES

1. Blower piping to FAST® may not exceed 100 FT [30.5m] total length and use a maximum of 4 elbows in the piping system (ie. 100FT [30m]). For distances greater than 100 FT [30m] consult factory. Blower must be located above flood levels on a concrete base 24" X 18" X 1" [61 X 45.7 X 2.6cm] min
2. Vent to be located above finish grade or higher to avoid infiltration. Cap with a vent grate with at least 7.1 sq in.[45.8 sq. cm] open surface area. Secure with stainless steel screws (see sheet 4 of 4 *MicroFAST® 0.50 Details*).
   or
   Run Vent to desired location and cover opening with a vent grate with at least 7.1 sq in.[45.8 sq. cm] open surface area. Secure with stainless steel screws. Vent piping must not allow excess moisture build up or back pressure.
3. All appurtenances to FAST® (e.g. tank pump outs, etc.) must conform to all applicable country, state, province, and local plumbing and electrical codes. Blower control system by Bio-Microbics, Inc.
4. Tank volume must be increased by 20% if minimum of 10 inches [25.5cm] is used between the unit and the base of tank. Consult factory for approval.
5. The primary compartment may be a separate tank.
6. Either the influent pipe tee shall be fitted with a pipe cap or the baffle separating the two zones shall be extended all the way to the top of the tank. If choosing to use the pipe cap. Then the baffle shall be at least 3" [8cm] higher than the water level as shown on the drawing.
7. All inspection, viewing and pump out ports must be secured to prevent accidental or unauthorized access.
8. Tank, piping, conduit, blower housing pad and vents are provided by others.
9. All piping and ancillary equipment installed after FAST must not impede or restrict free flow of effluent.
10. The air supply line into the FAST® unit must be secured to prevent vibration induced damage. The air supply line should be secured with a non-corrosive clamp every 2' min [60 cm]. See alternate air supply option on sheet 4 of 4 *MicroFAST® 0.50 Details*.
11. Min height may be reduced, consult factory and reference "Short-FAST-Module-Procedure.pdf."
12. Refer to sheet 4 of 4 *MicroFAST® 0.50 Details* drawing for leg extensions requirements.

DO NOT SCALE
UNLESS NOTED DIMENSIONS ARE IN INCHES [CENTIMETERS] TOLERANCES ±0.02 IN/IN [±0.05 CM/CM]

BIO-MICROBICS® INCORPORATED

MicroFAST 0.50 FAST Unit

WEIGHT	lb				
	NAME	DATE			
DRAWN	CTC		QTY A	MicroFAST® 0.50 with Feet	SHEET 2 OF 4
CHECKED	PT				

REVISED/updated: JULY 22, 2008 REV: IN-02-A

Specifications for MicroFAST 0.50 Wastewater Treatment System

1. GENERAL

The contractor shall furnish and install (1) MicroFAST®0.50 treatment system as manufactured by Bio-Microbics, Inc. The treatment system shall be complete with all needed equipment as shown on the drawings and specified herein.

The principal items of equipment shall include FAST® system insert, leg extensions, or lid, blower assembly, blower controls and alarms. All other items will be provided by others.
The MicroFAST 0.50 unit shall be situated within a 450 Gallon [1700L] minimum compartment or tank as shown on the plans, or in a 800 gallon [3000L] one compartment tank. Suggested Maximum settling zone is (1) X the daily flow. Tank(s) must provide adequate pump out access and conform to local, state, and all other applicable codes. The contractor shall provide coordination between the FAST system and tank supplier with regard to fabrication of the tank, installation of the FAST unit and delivery to the job site.

2. OPERATING CONDITIONS

The MicroFAST 0.50 treatment system shall be capable of treating the wastewater produced by typical family activities (bath, laundry, kitchen, etc.) ranging from (1) one to (8) eight people and not to exceed 500 US Gallons per day (1800 LPD).

3. MEDIA

The FAST media shall be manufactured of rigid PVC, polyethylene, or polypropylene and it shall be supported by the polyethylene insert. The media shall be fixed in position and contain no moving or wearing parts and shall not corrode. The media shall be designed and installed to ensure that sloughed solids descend through the media to the bottom of the septic tank.

4. BLOWER

The MicroFAST 0.50 unit shall come equipped with a regenerative type blower capable of delivering 17-25 CFM [31-46 m3/hr]. The blower assembly shall include an inlet filter with metal filter element.

5. REMOTE MOUNTED BLOWER

The blower shall be mounted , up to 100 feet [30.5 meters] maximum, from the MicroFAST unit on a contractor supplied concrete base. The blower must not set in standing water and its elevation must be higher than the normal flood level. A two-piece, rectangular housing shall be provided. The discharge air line from the blower to the MicroFAST System shall be provided and installed by the contractor.

6. ELECTRICAL

The electrical source should be within 150 feet [45.7 meters] of the blower consult local codes for longer wiring distances. All wiring must conform to all applicable codes(IEC, NEC, etc.). Wiring distances must prevent significant voltage loss. Input power on 60Hz electrical system is 110/220 VAC, single phase, 2.8/1.4 Amps. Input power on 50Hz electrical systems 127/230 VAC, single phase 0.352 kw/hr. All conduit and wiring shall be supplied by contractor.

7. CONTROLS

The control panel provides power to the blower with an alarm system consisting of a visual and audible alarm capable of signaling blower circuit failure and high water conditions. The control panel is equipped with SFR® (Sequencing Fixed Reactor) timed control feature. A manual silence button is included.

8. INSTALLATION AND OPERATING INSTRUCTIONS

All work installation and connections of the MicroFAST 0.50 shall be done in accordance with the written instructions provided by the manufacturer and in accordance with all applicable local codes and regulations. Operations manuals shall be furnished which will include a description of installation, operation, and system maintenance procedures.

9. FLOW AND DOSING

FAST systems have been successfully designed, tested and certified receiving gravity, demand-based influent flow. When influent flow is controlled by pump or other means to help with highly variable flow conditions, then multiple dosing events should be used to help ensure even flow.

10.WARRANTY

Bio-Microbics, Inc. warrants all new residential FAST® models (MicroFAST® 0.50, 0.75, 0.90, and 1.5) against defects in materials and workmanship for a period of two years after installation or three years from date of shipment which ever occurs first, subject to the following terms and conditions. (all other FAST® system models are warranted for a period of one year after installation or eighteen months from date of shipment, whichever occurs first, subject to the following terms and conditions):

During the warranty period, if any part is defective or fails to perform as specified when operating at design conditions, and if the equipment has been installed and is being operated and maintained in accordance with the written instructions provided by Bio-Microbics, Inc., Bio-Microbics, Inc. will repair or replace at its discretion such defective parts free of charge. Defective parts must be returned by owner to Bio-Microbics, Inc.'s factory postage paid, if so requested. The cost of labor and all other expenses resulting from replacement of the defective parts and from installation of parts furnished under this warranty and regular maintenance items such as filters or bulbs shall be borne by the owner. This warranty does not cover general system misuse, aerator components which have been damaged by flooding or any components that have been disassembled by unauthorized persons, improperly installed or damaged due to altered or improper wiring or overload protection. This warranty applies only to the treatment plant and does not include any of the house wiring, plumbing, drainage, septic tank or disposal system. Bio-Microbics, Inc. is reserves the right to revise, change or modify the construction and/or design of the FAST system, or any component part or parts thereof, without incurring any obligation to make such changes or modifications in present equipment. Bio-Microbics, Inc. is not responsible for consequential or incidental damages of any nature resulting from such things as, but not limited to, defect in design, material, or workmanship, or delays in delivery, replacements or repairs.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED. BIO-MICROBICS SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

NO REPRESENTATIVE OR PERSON IS AUTHORIZED TO GIVE ANY OTHER WARRANTY OR TO ASSUME FOR BIO-MICROBICS, INC. ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF ITS PRODUCTS. Contact your local distributor for parts and service.

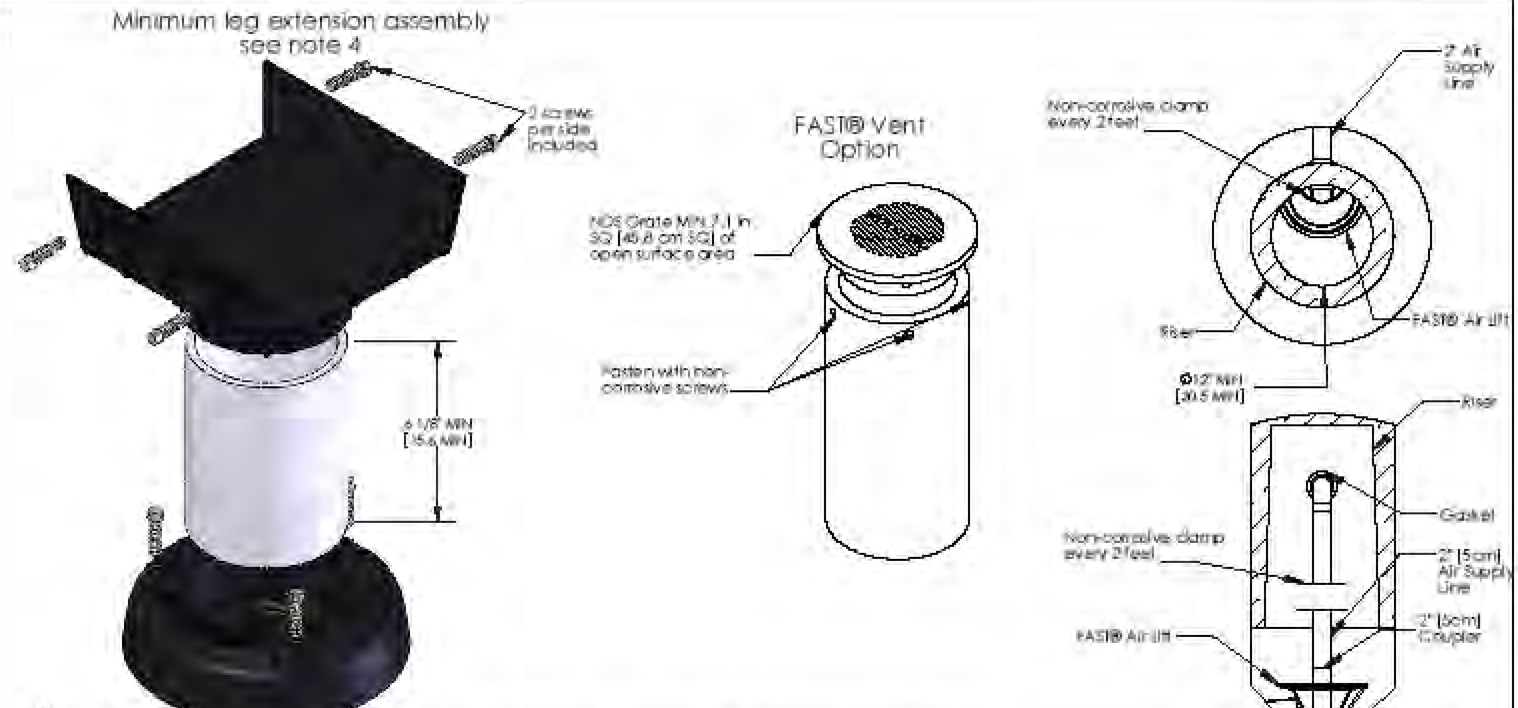
DO NOT SCALE

UNLESS NOTED DIMENSIONS ARE IN INCHES [CENTIMETERS] TOLERANCES ±0.02 IN/IN [±0.05 CM/CM]

BIO-MICROBICS INCORPORATED

MicroFAST 0.50 FAST Unit

WEIGHT	lb	SIZE	DRAWING NUMBER	
	NAME / DATE	A	MicroFAST® 0.50 Specifications	SHEET 3 OF 4
DRAWN	CTC			
CHECKED	FF	7/22/2008	REVISED Tuesday, July 22, 2008	REV. 1N-02-A



Notes
1. Secure leg extension to the FAST® unit by placing two screws on each side of the leg extension (4 screws per foot are included).
2. Cut 4" [10] schd. 40 PVC pipe (not included) to obtain the desired height. Minimum pipe length of 6 1/8" [15.56]; Original leg extension height requires a pipe length of 11 1/8" [28.26]. For heights greater then 18" [45.7] use schd. 80 PVC pipe (not included). Consult factory for extending leg beyond 36"[91].
3. Anchor the leg extensions to the tank with non-corrosive hardware not included at the provided mounting points.
4. Increase minimum tank volume by 20% if minimum leg extension is used.
5. The air supply line into the FAST® unit must be secured so as to prevent damage from pipe vibration. See all notes on *MicroFAST® 0.50 with lid* drawing
6. The air supply line into the FAST® unit must be secured to prevent vibration induced damage. The air supply line should be secured with a non-corrosive clamp every 2' MIN.
7. Tank, anchors, piping conduit blower, housing pad and vents are provided by others.

BIO-MICROBICS ® 2008

DO NOT SCALE
UNLESS NOTED DIMENSIONS ARE IN INCHES [CENTIMETERS] TOLERANCES ±0.02 IN/IN [±0.05 CM/CM]

BIO-MICROBICS INCORPORATED

MicroFAST 0.50 FAST Unit

A — MicroFAST® 0.50 Details — SHEET 4 OF 4

APPENDIX B

NSF STANDARD 245 PERFORMANCE EVALUATION METHOD AND REQUIREMENTS

8 Performance testing and evaluation

This section describes the methods used to evaluate the performance of residential wastewater treatment systems designed to remove nitrogen from residential wastewater. Performance testing and evaluation shall not be restricted to specific seasons.

8.1 Preparations for testing and evaluation

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

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 start-up procedure, ⅔ of the system's capacity shall be filled with water and the remaining ⅓ shall be filled with residential wastewater.

The system shall undergo design loading (see 8.2.2.1) until testing and evaluations are initiated. Sample collection and analysis shall be initiated within three weeks of filling the system and shall continue without interruption until the end of the evaluation period, except as specified in 8.4.2.

If conditions at the test 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.

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

The system shall be operated in accordance with the manufacturer's instructions. However, routine service and maintenance of the system shall not be allowed during the testing and evaluation period.

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

8.2 Testing conditions, hydraulic loading and schedules

8.2.1 Influent wastewater characteristics

Except as required by NSF/ANSI 40 for systems seeking concurrent NSF/ANSI 40 and Nitrogen Reduction certification, the average wastewater characteristics delivered to the system over the course of the testing shall fall within:

BOD_5 – 100 to 300 mg/L
TSS – 100 to 350 mg/L
TKN – 35 to 70 mg/L as N
Alkalinity – > 175 mg/L as $CaCO_3$ (alkalinity may be adjusted if inadequate)
Temperature – 10 to 30 ºC
pH – 6.5 to 9 SU

Unless requested by the manufacturer, the raw influent shall be supplemented with sodium bicarbonate if the wastewater is found to be deficient in alkalinity. In addition, the influent shall be supplemented with urea to meet the required influent TKN concentration. The influent may also be supplemented with methanol to maintain a carbon: nitrogen ratio of no less than 5:1.

> NOTE – For this testing, minimum alkalinity may be calculated as described in Annex A.

If the influent temperature drops below 10 ºC, impacting the nitrification process, sample collection may be suspended until the influent temperature returns to 10 ºC.

8.2.2 Hydraulic loading

The performance of the system shall be evaluated for a minimum of 26 wks. During the testing and evaluation period, the system shall be subjected to 16 wks of design loading, followed by 7.5 wks (52 d) of stress loading, and an additional period of design loading to obtain a minimum of 55 influent and effluent data sets collected during non-stress dosing period.

8.2.2.1 Design loading

The system shall be dosed 7 d/wk with a wastewater volume equivalent to the daily hydraulic capacity of the system. The following schedule shall be adhered to for dosing:

Time Frame	Approximate % rated daily hydraulic capacity
6 a. m. – 9 a. m.	35
11 a. m. – 2 p. m.	25
5 p. m. – 8 p. m.	40

NOTE – An individual dose shall be no more than 10 gal, unless the dosage system is based on a continuous flow, and the doses shall be uniformly applied over the dosing period.

8.2.2.2 Stress loading

Stress loading sequences shall begin in week 17 of the testing and will be completed in the order listed in the following sections. Each stress sequence shall be separated by 7 d of design loading, as described in 8.2.2.1.

8.2.2.2.1 Wash-day stress

The wash-day stress shall consist of 3 washdays in a 5-d period. Each washday shall be separated by a 24-h period. During a wash-day, the system shall be loaded at times and capacities similar to those delivered during design loading (see 8.2.2.1). However, during the first two dosing periods per day, the design loading shall include 3 wash loads (3 wash cycles and 6 rinse cycles).

8.2.2.2.2 Working-parent stress

For five consecutive days, the system shall be subjected to a working-parent stress. During this stress, the system shall be dosed with 40% of its daily hydraulic capacity between 6:00 a. m. and 9:00 a. m. Between 5:00 p. m. and 8:00 p. m., the system shall be dosed with the remaining 60% of its daily hydraulic capacity, which shall include 1 wash load (1 wash cycle and 2 rinse cycles).

8.2.2.2.3 Power/equipment failure stress

Power/equipment failure stress simulation shall consist of a flow pattern where approximately 40% of the total daily flow is received between 5 p. m. and 8 p. m. on the day when the power/equipment failure stress is initiated. Power to the system shall then be turned off at 9 p. m. and the flow pattern shall be discontinued for 48 h. After the 48-h period, power shall be restored and the system shall receive approximately 60% of the total daily flow over a 3-h period, which shall include 1 wash load (1 wash cycle and 2 rinse cycles).

8.2.2.2.4 Vacation stress

Vacation stress simulation shall consist of a flow pattern where approximately 35% of the total daily flow is received between 6 a. m. and 9 a. m. and approximately 25% of the total daily flow is received between 11 a. m. and 2 p. m. on the day that the vacation stress is initiated. The flow pattern shall be discontinued for 8

consecutive days with power continuing to be supplied to the system. Between 5 p. m. and 8 p. m. of the ninth day, the system shall receive 60% of the total daily flow, which shall include 3wash loads (3 wash cycles and 6 rinse cycles).

8.2.3 Dosing volumes

The 30-d average volume of the wastewater delivered to the system shall be within 100% ± 10% of the system's rated hydraulic capacity.

> NOTE – All dosing days, except those with dosing requirements less than the daily hydraulic capacity, shall be included in the 30-d average calculation.

8.3 Sample collection

8.3.1 Sampling frequency

Influent and effluent samples shall be collected three times per week during design loading periods and twice during each stress recovery period (the week following completion of each of the stress simulations described in 8.2.2.2). This schedule shall be continued in the event that testing is extended beyond the 26-wk minimum.

8.3.2 Collection methods

All sample collection shall be in accordance with APHA's *Standard Methods for the Examination of Water and Wastewater*, unless otherwise specified. Influent wastewater samples shall be flow-proportional, 24-h composites obtained during periods of system dosing. Effluent samples shall be flow-proportional, 24-h composites obtained during periods of system discharge. Effluent samples shall be representative of all treated effluent discharged from the system, as sampled from a central point of collection of all treated effluent. Grab samples shall be collected for pH, temperature, and dissolved oxygen (DO). The location of the grab sample shall be appropriate to provide a sample that is representative of the influent or effluent, and shall be determined in conjunction with the manufacturer.

8.3.3 Analyses

The samples collected as described in 8.3.1 and 8.3.2 shall be analyzed as follows:

		Sample location		
Parameter	Sample type	Raw influent	Treated effluent	Testing location
BOD_5	24 h composite	X		Laboratory
$CBOD_5$	24 h composite		X	Laboratory
Total suspended solids	24 h composite	X	X	Laboratory
PH	Grab	X	X	Test site
Temperature (°C)	Grab	X	X	Test site
Dissolved oxygen	Grab		X	Test site
Alkalinity (as $CaCO_3$)	24 h composite	X	X	Laboratory
TKN (as N)	24 h composite	X	X	Laboratory
Ammonia-N (as N)	24 h composite	X	X	Laboratory
Nitrite/nitrate-N (as N)	24 h composite		X	Laboratory

8.3.4 Analytical methods

The appropriate methods in APHA's *Standard Methods for the Examination of Water and Wastewater* shall be

used to complete the analyses indicated in 8.4.3.

8.4 Criteria

8.4.1 Testing conditions

If conditions during the testing and evaluation period result in system upset, improper sampling, improper dosing, or influent characteristics outside the ranges specified in 8.2.1, an assessment shall be conducted to determine the extent to which these conditions adversely affected the performance of the system. Based on this assessment, specific data points may be excluded from the averages. Rationale for all data exclusions shall be documented in the final report.

8.4.2 Catastrophic site problems

In the event that a catastrophic site problem not described in the Standard including, but not limited to, influent characteristics, malfunctions of test site apparatus and acts of God, jeopardizes the validity of the performance testing, manufacturers shall be given the choice to:

– Perform maintenance on the system, reinitiate system start-up procedures, and restart the performance testing; or

– With no routine maintenance performed, have the system brought back to pre-existing conditions and resume testing within 3 wks after the site problem has been identified and corrected. Data collected during the system recovery period shall be excluded from the effluent averages.

NOTE – "Pre-existing conditions" shall be defined as the point when the results of 1 wk's worth of sampling are within 15% of the averages of the samples from the previous 3 wks of sampling.

8.4.3 Effluent quality

For purposes of determining system performance, only samples collected during design loading periods, described in 8.2.2, shall be used in the calculations. The data collected during the stress sequences shall not be included in the calculations, but shall be included in the final report.

8.4.3.1 $CBOD_5$

The average $CBOD_5$ of all effluent samples shall not exceed 25 mg/L.

8.4.3.2 TSS

The average TSS of all effluent samples shall not exceed 30 mg/L.

8.4.3.3 Total nitrogen

The average total nitrogen concentration of all effluent samples shall be less than 50% of the average total nitrogen concentration of all influent samples.

8.4.3.4 pH

The pH of individual effluent samples shall be between 6.0 and 9.0 SU.

8.5 Final report

A final report shall be prepared that presents the following:

– All data collected in accordance with the testing and evaluations within this Standard;

– A table indicating the actual percent reduction over the course of the test (included in the Executive Summary, as well as in the body, of the report);

– Observations made during the testing;

– An estimation of the pounds of nitrogen loaded during the test and the pounds removed;

– A copy of the current edition of the Owner's Manual; and

– Process description and detailed dimensioned drawings of the system evaluated.

A supplemental report shall be prepared for any system(s) approved under the performance classification section (1.4) of this Standard, including process description(s) and dimensioned drawings.

APPENDIX C

ANALYTICAL RESULTS

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: September 3, 2006 Plant Code: Site #5

Weeks Into Test: 1

Weekend Dosing: Sunday 500 gallons Saturday 500 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		500	500	500	500	500
Dissolved Oxygen (mg/L)	aeration chamber					
	effluent	1.9		1.7		1.8
Temperature (C)	influent	31		31		31
	aeration chamber					
	effluent	30		30		30
pH	influent	6.8		6.8		6.8
	aeration chamber					
	effluent	6.8		6.8		6.8
Biochemical Oxygen Demand (mg/L)	influent	150		180		260
	effluent	d		6		3
Total Suspended Solids (mg/L)	influent	230		340		360
	aeration chamber					
	effluent	d		12		4
Volatile Suspended Solids (mg/L)	influent	190		290		310
	aeration chamber					
	effluent	d		11		3
45 Minute Settleable Solids (mL/L)	aeration chamber					

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

Notes: Effluent CBOD and TSS/VSS measurments missed on 9/4 due to laboratory error.

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: September 10, 2006 Plant Code: Site #5

Weeks Into Test: 2

Weekend Dosing: Sunday 500 gallons Saturday 500 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		500	500	500	500	500
Dissolved Oxygen (mg/L)	aeration chamber					
	effluent	1.7		1.8		1.8
Temperature (C)	influent	30		30		30
	aeration chamber					
	effluent	30		30		30
pH	influent	6.8		6.8		6.8
	aeration chamber					
	effluent	6.8		6.8		6.8
Carbonaceous Biochemical Oxygen Demand (mg/L)	influent	190		220		170
	effluent	d		d		4
Total Suspended Solids (mg/L)	influent	490		220		270
	aeration chamber					
	effluent	<2		2		2
Volatile Suspended Solids (mg/L)	influent	420		190		240
	aeration chamber					
	effluent	<2		2		<2
45 Minute Settleable Solids (mL/L)	aeration chamber					

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

Notes: Effluent CBOD measurments missed on 9/11 and 13 due to laboratory error.

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: September 17, 2006 Plant Code: Site #5

Weeks Into Test: 3

Weekend Dosing: Sunday 500 gallons Saturday 500 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		500	500	500	500	500
Dissolved Oxygen (mg/L)	aeration chamber					
	effluent	1.7		1.8		1.7
Temperature (C)	influent	30		30		30
	aeration chamber					
	effluent	30		30		30
pH	influent	6.8		6.8		6.8
	aeration chamber					
	effluent	6.9		6.9		6.8
Biochemical Oxygen Demand (mg/L)	influent	150		260		320
	effluent	2		2		3
Total Suspended Solids (mg/L)	influent	210		320		380
	aeration chamber					
	effluent	<2		2		<2
Volatile Suspended Solids (mg/L)	influent	170		250		300
	aeration chamber					
	effluent	<2		2		<2
45 Minute Settleable Solids (mL/L)	aeration chamber					

(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 24, 2006 Plant Code: Site #5

Weeks Into Test: 4

Weekend Dosing: Sunday 500 gallons Saturday 500 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		500	500	500	500	500
Dissolved Oxygen (mg/L)	aeration chamber					
	effluent	1.8		1.6		1.7
Temperature (C)	influent	30		30		30
	aeration chamber					
	effluent	30		30		30
pH	influent	6.8		6.8		6.9
	aeration chamber					
	effluent	6.9		6.9		6.9
Biochemical Oxygen Demand (mg/L)	influent	220		400		200
	effluent	<2		<2		2
Total Suspended Solids (mg/L)	influent	150		550		270
	aeration chamber					
	effluent	<2		<2		<2
Volatile Suspended Solids (mg/L)	influent	130		470		230
	aeration chamber					
	effluent	<2		<2		<2
45 Minute Settleable Solids (mL/L)	aeration chamber					

(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: October 1, 2006 Plant Code: Site #5

Weeks Into Test: 5

Weekend Dosing: Sunday 500 gallons Saturday 500 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		500	500	500	500	500
Dissolved Oxygen (mg/L)	aeration chamber					
	effluent	1.7		1.7		1.8
Temperature (C)	influent	30		30		30
	aeration chamber					
	effluent	30		30		30
pH	influent	6.9		6.8		6.9
	aeration chamber					
	effluent	6.9		6.9		6.9
Biochemical Oxygen Demand (mg/L)	influent	150		190		320
	effluent	<2		<2		<2
Total Suspended Solids (mg/L)	influent	100		66		310
	aeration chamber					
	effluent	2		<2		<2
Volatile Suspended Solids (mg/L)	influent	85		62		280
	aeration chamber					
	effluent	<2		<2		<2
45 Minute Settleable Solids (mL/L)	aeration chamber					

(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: October 8, 2006 Plant Code: Site #5

Weeks Into Test: 6

Weekend Dosing: Sunday 500 gallons Saturday 500 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		500	500	500	500	500
Dissolved Oxygen (mg/L)	aeration chamber					
	effluent	1.7		1.6		1.8
Temperature (C)	influent	30		30		30
	aeration chamber					
	effluent	31		31		31
pH	influent	6.8		6.8		6.8
	aeration chamber					
	effluent	6.8		6.8		6.8
Biochemical Oxygen Demand (mg/L)	influent	130		310		270
	effluent	<2		2		7
Total Suspended Solids (mg/L)	influent	150		500		400
	aeration chamber					
	effluent	<2		4		8
Volatile Suspended Solids (mg/L)	influent	130		400		310
	aeration chamber					
	effluent	<2		3		7
45 Minute Settleable Solids (mL/L)	aeration chamber					

(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: October 15, 2006 Plant Code: Site #5

Weeks Into Test: 7

Weekend Dosing: Sunday 500 gallons Saturday 500 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		500	500	500	500	500
Dissolved Oxygen (mg/L)	aeration chamber					
	effluent	1.7		1.7		1.6
Temperature (C)	influent	30		30		30
	aeration chamber					
	effluent	31		31		31
pH	influent	6.8		6.8		6.8
	aeration chamber					
	effluent	6.9		6.9		6.8
Biochemical Oxygen Demand (mg/L)	influent	210		180		210
	effluent	<2		3		<2
Total Suspended Solids (mg/L)	influent	280		290		300
	aeration chamber					
	effluent	3		<2		2
Volatile Suspended Solids (mg/L)	influent	220		230		270
	aeration chamber					
	effluent	2		<2		2
45 Minute Settleable Solids (mL/L)	aeration chamber					

(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: October 22, 2006 Plant Code: Site #5

Weeks Into Test: 8

Weekend Dosing: Sunday 500 gallons Saturday 500 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		500	500	500	500	500
Dissolved Oxygen (mg/L)	aeration chamber					
	effluent	1.6		1.6		1.5
Temperature (C)	influent	30		30		30
	aeration chamber					
	effluent	30		30		30
pH	influent	6.8		6.8		6.9
	aeration chamber					
	effluent	6.8		6.9		6.9
Biochemical Oxygen Demand (mg/L)	influent	210		180		280
	effluent	<2		<2		<2
Total Suspended Solids (mg/L)	influent	250		290		420
	aeration chamber					
	effluent	<2		<2		<2
Volatile Suspended Solids (mg/L)	influent	210		230		360
	aeration chamber					
	effluent	<2		<2		<2
45 Minute Settleable Solids (mL/L)	aeration chamber					

(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: October 29, 2006 Plant Code: Site #5

Weeks Into Test: 9

Weekend Dosing: Sunday 500 gallons Saturday 500 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		500	500	500	500	500
Dissolved Oxygen (mg/L)	aeration chamber					
	effluent	1.6		1.6		1.6
Temperature (C)	influent	30		30		30
	aeration chamber					
	effluent	30		30		30
pH	influent	6.8		6.9		6.8
	aeration chamber					
	effluent	6.9		6.9		6.8
Biochemical Oxygen Demand (mg/L)	influent	270		260		200
	effluent	<2		3		<2
Total Suspended Solids (mg/L)	influent	350		230		310
	aeration chamber					
	effluent	<2		4		<2
Volatile Suspended Solids (mg/L)	influent	290		200		240
	aeration chamber					
	effluent	<2		4		<2
45 Minute Settleable Solids (mL/L)	aeration chamber					

(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 5, 2006 Plant Code: Site #5

Weeks Into Test: 10

Weekend Dosing: Sunday 500 gallons Saturday 500 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		500	500	500	500	500
Dissolved Oxygen (mg/L)	aeration chamber					
	effluent	1.5		1.5		1.5
Temperature (C)	influent	30		30		30
	aeration chamber					
	effluent	30		30		30
pH	influent	6.8		6.9		6.8
	aeration chamber					
	effluent	6.8		6.9		6.8
Biochemical Oxygen Demand (mg/L)	influent	300		260		340
	effluent	4		<2		2
Total Suspended Solids (mg/L)	influent	400		210		260
	aeration chamber					
	effluent	7		<2		3
Volatile Suspended Solids (mg/L)	influent	300		180		220
	aeration chamber					
	effluent	6		<2		2
45 Minute Settleable Solids (mL/L)	aeration chamber					

(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 12, 2006 Plant Code: Site #5

Weeks Into Test: 11

Weekend Dosing: Sunday 500 gallons Saturday 500 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		500	500	500	500	500
Dissolved Oxygen (mg/L)	aeration chamber					
	effluent	0.6		0.5		2.3
Temperature (C)	influent	29		26		25
	aeration chamber					
	effluent	20		19		21
pH	influent	6.8		6.5		6.9
	aeration chamber					
	effluent	6.9		6.8		6.9
Biochemical Oxygen Demand (mg/L)	influent	470		200		470
	effluent	8		4		2
Total Suspended Solids (mg/L)	influent	640		740		900
	aeration chamber					
	effluent	14		10		3
Volatile Suspended Solids (mg/L)	influent	540		620		750
	aeration chamber					
	effluent	12		8		<2
45 Minute Settleable Solids (mL/L)	aeration chamber					

(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 19, 2006 Plant Code: Site #5

Weeks Into Test: 12

Weekend Dosing: Sunday 500 gallons Saturday 500 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		500	500	500	500	500
Dissolved Oxygen (mg/L)	aeration chamber					
	effluent	1.9		1.9		1.9
Temperature (C)	influent	25		25		25
	aeration chamber					
	effluent	21		21		21
pH	influent	7.0		7.0		7.0
	aeration chamber					
	effluent	6.9		6.9		6.9
Biochemical Oxygen Demand (mg/L)	influent	770		390		130
	effluent	<2		5		<2
Total Suspended Solids (mg/L)	influent	1400		490		180
	aeration chamber					
	effluent	4		9		16
Volatile Suspended Solids (mg/L)	influent	1200		430		160
	aeration chamber					
	effluent	3		8		14
45 Minute Settleable Solids (mL/L)	aeration chamber					

(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 26, 2006 Plant Code: Site #5

Weeks Into Test: 13

Weekend Dosing: Sunday 500 gallons Saturday 500 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		500	500	500	500	500
Dissolved Oxygen (mg/L)	aeration chamber					
	effluent	1.9		1.8		1.9
Temperature (C)	influent	24		24		24
	aeration chamber					
	effluent	22		22		22
pH	influent	6.8		6.7		6.8
	aeration chamber					
	effluent	6.8		6.8		6.8
Biochemical Oxygen Demand (mg/L)	influent	440		400		240
	effluent	<2		3		3
Total Suspended Solids (mg/L)	influent	790		520		450
	aeration chamber					
	effluent	2		3		2
Volatile Suspended Solids (mg/L)	influent	620		400		390
	aeration chamber					
	effluent	2		<2		<2
45 Minute Settleable Solids (mL/L)	aeration chamber					

(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 3, 2006 Plant Code: Site #5

Weeks Into Test: 14

Weekend Dosing: Sunday 500 gallons Saturday 500 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		500	500	500	500	500
Dissolved Oxygen (mg/L)	aeration chamber					
	effluent	1.8		1.7		1.7
Temperature (C)	influent	24		24		24
	aeration chamber					
	effluent	22		23		23
pH	influent	6.8		6.9		6.8
	aeration chamber					
	effluent	6.9		6.9		6.9
Biochemical Oxygen Demand (mg/L)	influent	110		150		280
	effluent	<2		<2		<2
Total Suspended Solids (mg/L)	influent	410		320		320
	aeration chamber					
	effluent	3		<2		2
Volatile Suspended Solids (mg/L)	influent	350		260		270
	aeration chamber					
	effluent	3		<2		2
45 Minute Settleable Solids (mL/L)	aeration chamber					

(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 10, 2006 Plant Code: Site #5

Weeks Into Test: 15

Weekend Dosing: Sunday 500 gallons Saturday 500 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		500	500	500	500	500
Dissolved Oxygen (mg/L)	aeration chamber					
	effluent	1.6		1.7		1.8
Temperature (C)	influent	24		23		23
	aeration chamber					
	effluent	23		22		22
pH	influent	6.8		7.0		6.9
	aeration chamber					
	effluent	6.8		6.9		6.9
Biochemical Oxygen Demand (mg/L)	influent	140		250		340
	effluent	<2		<2		<2
Total Suspended Solids (mg/L)	influent	150		270		310
	aeration chamber					
	effluent	<2		<2		<2
Volatile Suspended Solids (mg/L)	influent	130		230		260
	aeration chamber					
	effluent	<2		<2		<2
45 Minute Settleable Solids (mL/L)	aeration chamber					

(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 17, 2006 Plant Code: Site #5

Weeks Into Test: 16

Weekend Dosing: Sunday 500 gallons Saturday 500 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		500	500	500	500	500
Dissolved Oxygen (mg/L)	aeration chamber					
	effluent	1.8		1.8		1.7
Temperature (C)	influent	23		23		23
	aeration chamber					
	effluent	23		23		23
pH	influent	6.8		6.9		6.8
	aeration chamber					
	effluent	6.9		6.9		6.8
Biochemical Oxygen Demand (mg/L)	influent	350		250		200
	effluent	<2		<2		<2
Total Suspended Solids (mg/L)	influent	300		300		190
	aeration chamber					
	effluent	<2		<2		2
Volatile Suspended Solids (mg/L)	influent	260		250		160
	aeration chamber					
	effluent	<2		<2		2
45 Minute Settleable Solids (mL/L)	aeration chamber					

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

Notes:

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Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: December 24, 2006 Plant Code: Site #5

Weeks Into Test: 17

		Sun	Mon	Tue	Wed	Thur	Fri	Sat
Dosed Volume (gallons)		500	500	500	500	500	500	500
Dissolved Oxygen (mg/L)	aeration chamber							
	effluent							
Temperature (C)	influent							
	aeration chamber							
	effluent							
pH	influent							
	aeration chamber							
	effluent							
Biochemical Oxygen Demand (mg/L)	influent							
	effluent							
Total Suspended Solids (mg/L)	influent							
	aeration chamber							
	effluent							
Volatile Suspended Solids (mg/L)	influent							
	aeration chamber							
	effluent							
45 Minute Settleable Solids (mL/L)	aeration chamber							

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

Notes: Wash day stress 12/25 through 12/29.

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: December 31, 2006 Plant Code: Site #5

Weeks Into Test: 18

		Sun	Mon	Tue	Wed	Thur	Fri	Sat
Dosed Volume (gallons)		500	500	500	500	500	500	500
Dissolved Oxygen (mg/L)	aeration chamber							
	effluent		1.8				1.6	
Temperature (C)	influent		23				23	
	aeration chamber							
	effluent		23				23	
pH	influent		6.9				6.8	
	aeration chamber							
	effluent		6.9				6.9	
Biochemical Oxygen Demand (mg/L)	influent		140				270	
	effluent		<2				2	
Total Suspended Solids (mg/L)	influent		210				280	
	aeration chamber							
	effluent		2				3	
Volatile Suspended Solids (mg/L)	influent		180				220	
	aeration chamber							
	effluent		<2				3	
45 Minute Settleable Solids (mL/L)	aeration chamber							

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

Notes: Working parent stress started 1/6/07.

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: January 7, 2007 Plant Code: Site #5

Weeks Into Test: 19

		Sun	Mon	Tue	Wed	Thur	Fri	Sat
Dosed Volume (gallons)		500	500	500	500	500	500	500
Dissolved Oxygen (mg/L)	aeration chamber							
	effluent							1.6
Temperature (C)	influent							23
	aeration chamber							
	effluent							22
pH	influent							6.9
	aeration chamber							
	effluent							6.8
Biochemical Oxygen Demand (mg/L)	influent							470
	effluent							6
Total Suspended Solids (mg/L)	influent							810
	aeration chamber							
	effluent							23
Volatile Suspended Solids (mg/L)	influent							d
	aeration chamber							
	effluent							d
45 Minute Settleable Solids (mL/L)	aeration chamber							

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

Notes: Working Parent Stress completed on 1/10. VSS analyses missed on 1/13 due to laboratory error.

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: January 14, 2007 Plant Code: Site #5

Weeks Into Test: 20

		Sun	Mon	Tue	Wed	Thur	Fri	Sat
Dosed Volume (gallons)		500	500	500	500	500	Zero	300
Dissolved Oxygen (mg/L)	aeration chamber							
	effluent				1.5			
Temperature (C)	influent				21			
	aeration chamber							
	effluent				22			
pH	influent				6.9			
	aeration chamber							
	effluent				6.8			
Biochemical Oxygen Demand (mg/L)	influent				200			
	effluent				6			
Total Suspended Solids (mg/L)	influent				140			
	aeration chamber							
	effluent				10			
Volatile Suspended Solids (mg/L)	influent				120			
	aeration chamber							
	effluent				9			
45 Minute Settleable Solids (mL/L)	aeration chamber							

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

Notes: Power/Equipment Failure Stress 1/18 through 1/20.

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: January 21, 2007 Plant Code: Site #5

Weeks Into Test: 21

		Sun	Mon	Tue	Wed	Thur	Fri	Sat
Dosed Volume (gallons)		500	500	500	500	500	500	500
Dissolved Oxygen (mg/L)	aeration chamber							
	effluent				3.4		3.3	
Temperature (C)	influent				19		19	
	aeration chamber							
	effluent				12		13	
pH	influent				6.9		6.8	
	aeration chamber							
	effluent				6.9		6.9	
Biochemical Oxygen Demand (mg/L)	influent				110		540	
	effluent				4		2	
Total Suspended Solids (mg/L)	influent				530		250	
	aeration chamber							
	effluent				4		17	
Volatile Suspended Solids (mg/L)	influent				410		190	
	aeration chamber							
	effluent				4		12	
45 Minute Settleable Solids (mL/L)	aeration chamber							

(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: January 28, 2007 Plant Code: Site #5

Weeks Into Test: 22

		Sun	Mon	Tue	Wed	Thur	Fri	Sat
Dosed Volume (gallons)		300	0	0	0	0	0	0
Dissolved Oxygen (mg/L)	aeration chamber							
	effluent							
Temperature (C)	influent							
	aeration chamber							
	effluent							
pH	influent							
	aeration chamber							
	effluent							
Biochemical Oxygen Demand (mg/L)	influent							
	effluent							
Total Suspended Solids (mg/L)	influent							
	aeration chamber							
	effluent							
Volatile Suspended Solids (mg/L)	influent							
	aeration chamber							
	effluent							
45 Minute Settleable Solids (mL/L)	aeration chamber							

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

Notes: Vacation Stress started 1/28.

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: February 4, 2007 Plant Code: Site #5

Weeks Into Test: 23

		Sun	Mon	Tue	Wed	Thur	Fri	Sat
Dosed Volume (gallons)		0	0	300	500	500	500	500
Dissolved Oxygen (mg/L)	aeration chamber							
	effluent						3.1	
Temperature (C)	influent						19	
	aeration chamber							
	effluent						14	
pH	influent						6.9	
	aeration chamber							
	effluent						6.9	
Biochemical Oxygen Demand (mg/L)	influent						590	
	effluent						5	
Total Suspended Solids (mg/L)	influent						510	
	aeration chamber							
	effluent						22	
Volatile Suspended Solids (mg/L)	influent						450	
	aeration chamber							
	effluent						16	
45 Minute Settleable Solids (mL/L)	aeration chamber							

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

Notes: Vacation Stress completed on 2/6.

NSF International
Standard 40 - Residential Wastewater Treatment Systems
Plant Effluent

Week Beginning: February 11, 2007 Plant Code: Site #5

Weeks Into Test: 24

		Sun	Mon	Tue	Wed	Thur	Fri	Sat
Dosed Volume (gallons)		500	500	500	500	500	500	500
Dissolved Oxygen (mg/L)	aeration chamber							
	effluent			3.0			2.8	
Temperature (C)	influent			20			19	
	aeration chamber							
	effluent			14			14	
pH	influent			6.9			6.9	
	aeration chamber							
	effluent			6.8			6.8	
Biochemical Oxygen Demand (mg/L)	influent			99			450	
	effluent			3			8	
Total Suspended Solids (mg/L)	influent			160			410	
	aeration chamber							
	effluent			2			19	
Volatile Suspended Solids (mg/L)	influent			130			340	
	aeration chamber							
	effluent			2			16	
45 Minute Settleable Solids (mL/L)	aeration chamber							

(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: February 18, 2007 Plant Code: Site #5

Weeks Into Test: 25

Weekend Dosing: Sunday 500 gallons Saturday 500 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		500	500	500	500	500
Dissolved Oxygen (mg/L)	aeration chamber					
	effluent	3.0		3.0		2.9
Temperature (C)	influent	20		20		20
	aeration chamber					
	effluent	15		15		15
pH	influent	7.0		6.9		6.9
	aeration chamber					
	effluent	6.9		7.0		6.9
Biochemical Oxygen Demand (mg/L)	influent	290		170		220
	effluent	3		<2		4
Total Suspended Solids (mg/L)	influent	480		220		270
	aeration chamber					
	effluent	4		<2		4
Volatile Suspended Solids (mg/L)	influent	410		180		230
	aeration chamber					
	effluent	3		<2		3
45 Minute Settleable Solids (mL/L)	aeration chamber					

(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: February 25, 2007 Plant Code: Site #5

Weeks Into Test: 26

Weekend Dosing: Sunday 500 gallons Saturday 500 gallons

		Monday	Tuesday	Wednesday	Thursday	Friday
Dosed Volume (gallons)		500	500	500	500	500
Dissolved Oxygen (mg/L)	aeration chamber					
	effluent	2.0		1.7		1.8
Temperature (C)	influent	18		19		19
	aeration chamber					
	effluent	18		18		18
pH	influent	6.9		6.9		6.8
	aeration chamber					
	effluent	6.9		6.9		6.9
Biochemical Oxygen Demand (mg/L)	influent	260		130		280
	effluent	3		<2		4
Total Suspended Solids (mg/L)	influent	390		84		330
	aeration chamber					
	effluent	3		3		7
Volatile Suspended Solids (mg/L)	influent	320		72		260
	aeration chamber					
	effluent	2		2		5
45 Minute Settleable Solids (mL/L)	aeration chamber					

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

Notes:

APPENDX D

ANALYTICAL REULTS – NITROGEN ANALYSES

Date	Ammonia Nitrogen (mg/L)		Total Kjeldahl Nitrogen (mg/L)		Combined Nitrate-Nitrite		Total Alkalinity (mg/L CaCO3)		Total Nitrogen (mg/L)	
	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent
09/01/06	22.6	2.3	48.7	2.5	0.2	NS	306	138	48.9	2.5
09/04/06	26.5	1.4	26.8	1.8	0.1	13.5	287	148	26.9	15.3
09/08/06	24.4	1.2	44.2	1.2	0.3	13.4	288	120	44.5	14.6
09/11/06	21.6	1.0	46.5	1.3	0.4	12.1	292	130	46.9	13.4
09/15/06	20.3	4.5	29.8	6.6	0.4	NS	306	161	30.2	6.6
09/18/06	15.8	4.4	31.0	7.6	<0.05	9.7	253	185	31.1	17.4
09/22/06	24.0	1.2	42.6	1.4	0.2	11.0	301	179	42.8	12.4
09/25/06	29.4	0.9	46.9	0.9	0.1	12.4	290	164	47.0	13.3
09/29/06	20.4	2.0	43.4	1.8	0.1	13.3	313	166	43.5	15.1
10/02/06	23.5	2.4	56.8	2.1	0.2	11.2	302	174	57.0	13.3
10/06/06	18.2	3.9	33.6	2.9	0.1	13.3	280	166	33.7	16.2
10/09/06	24.1	2.1	78.4	2.8	0.1	12.7	318	136	78.5	15.5
10/13/06	28.7	4.4	22.4	12.9	0.2	9.2	304	198	22.6	22.1
10/16/06	22.5	1.4	29.3	1.4	0.2	11.5	272	154	29.5	12.9
10/20/06	25.5	7.9	51.5	8.4	0.1	16.7	274	194	51.6	25.1
10/23/06	28.2	4.5	46.4	4.3	0.1	21.6	248	174	46.5	25.9
10/27/06	21.2	2.8	29.4	3.1	0.4	17.5	260	162	29.8	20.6
10/30/06	25.8	3.0	35.6	2.3	0.6	11.2	264	160	36.2	13.5

Date	Ammonia Nitrogen (mg/L)		Total Kjeldahl Nitrogen (mg/L)		Combined Nitrate-Nitrite		Total Alkalinity (mg/L CaCO3)		Total Nitrogen (mg/L)	
	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent
11/03/06	18.2	1.6	40.3	1.1	0.1	12.0	268	142	40.4	13.1
11/06/06	12.7	2.3	25.4	2.0	0.1	12.5	234	154	25.5	14.5
11/10/06	22.8	2.5	39.9	2.2	0.1	13.4	280	176	40.0	15.6
11/13/06	26.4	1.4	31.0	3.2	<0.05	8.7	316	186	31.1	11.9
11/17/06	33.0	2.4	127.0	3.8	0.1	18.4	386	184	127.1	22.2
11/20/06	28.9	0.8	36.5	4.4	0.2	12.0	278	186	36.7	16.4
11/24/06	16.8	<0.05	46.0	2.5	0.1	9.8	266	202	46.1	12.3
11/27/06	20.3	<0.05	59.7	4.6	0.6	11.1	288	176	60.3	15.7
12/01/06	14.2	<0.05	41.4	11.8	0.2	8.2	266	158	41.6	20.0
12/04/06	25.4	0.6	41.1	1.6	0.2	9.3	274	166	41.3	10.9
12/08/06	29.3	2.4	38.8	2.3	0.1	7.2	302	182	38.9	9.5
12/11/06	33.6	0.6	56.6	1.5	0.1	8.4	322	170	56.7	9.8
12/15/07	28.5	1.9	34.3	1.8	0.2	8.6	300	186	34.5	10.5
12/18/07	25.3	0.3	32.8	1.5	0.2	9.1	286	178	33.0	10.6
12/22/07	27.9	1.8	40.5	2.7	0.1	6.5	308	180	40.6	9.2
* 12/25/07	16.8	1.1	29.6	2.2	0.1	9.0	232	176	29.7	11.1
* 12/29/07	25.4	1.1	51.7	2.2	0.1	6.9	328	197	51.8	9.1
* 01/01/07	23.7	1.4	34.8	2.1	0.1	6.6	280	180	34.9	8.7
* 01/05/07	17.4	1.2	29.8	2.0	0.1	14.6	276	161	29.9	16.6
* 01/15/07	9.7	1.8	11.6	7.6	1.1	15.7	<4	129	12.7	23.3
* 01/26/07	15.5	1.3	42.1	12.9	<0.05	10.7	94.8	184	42.2	23.6

Date	Ammonia Nitrogen (mg/L)		Total Kjeldahl Nitrogen (mg/L)		Combined Nitrate-Nitrite		Total Alkalinity (mg/L CaCO3)		Total Nitrogen (mg/L)	
	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent
* 02/09/07	23.5	1.6	36.7	6.7	0.08	37.5	251	565	36.8	44.2
* 02/12/07	14.5	4.5	17.7	4.4	<0.05	18.2	274	173	17.8	22.6
02/16/07	22.3	1.2	30.5	1.3	0.07	16.3	309	164	30.6	17.6
02/19/07	15.5	1.1	12.1	1.0	<0.05	13.1	254	178	12.2	14.2
02/23/07	25.8	1.3	39.5	1.3	<0.05	14.2	302	179	39.6	15.5
02/26/07	18.1	1.0	48.9	1.3	<0.05	16.6	281	165	49.0	17.9
03/02/07	27.5	1.3	34.5	2.4	0.09	21.0	300	176	34.6	23.4
03/05/07	21.6	1.6	25.7	1.8	0.05	20.5	268	163	25.8	22.3
03/09/07	24.7	1.5	36.6	1.5	0.13	21.9	309	135	36.7	23.4
03/12/07	18.1	1.6	24.9	2.3	0.14	22.2	280	173	25.0	24.5
03/16/07	11.9	0.7	26.2	0.8	0.06	15.2	303	204	26.3	16.0
03/19/07	15.3	1.5	20.7	1.7	0.07	19.2	286	176	20.8	20.9
03/23/07	17.6	3.1	36.5	3.0	<0.05	28.7	288	155	36.6	31.7
03/26/07	15.8	2.1	43.5	1.5	0.06	26.8	296	140	43.6	28.3
03/30/07	9.4	0.3	31.5	1.0	0.11	18.3	267	172	31.6	19.3
04/02/07	4.4	0.1	17.8	0.9	0.09	12.1	259	195	17.9	13.0
04/04/07	7.5	0.1	23.6	0.9	0.14	11.8	275	229	23.7	12.7
04/06/07	5.6	0.4	23.4	0.6	<0.05	12.9	245	193	23.5	13.5
04/09/07	13.1	0.8	19.1	1.5	0.1	15.1	263	201	19.2	16.6
04/11/07	11.7	1.2	17.8	1.8	<0.05	19.5	314	NS	17.9	21.3
04/13/07	14.8	1.3	32.0	1.4	<0.05	20.3	318	184	32.1	21.7
04/16/07	10.9	2.5	32.0	3.1	<0.05	21.2	296	194	32.1	24.3
04/18/07	23.6	2.1	30.9	2.1	0.06	13.0	297	161	31.0	15.1
04/20/07	22.8	3.8	34.5	4.3	<0.05	21.9	319	132	34.6	26.2

***** *For purposes of determining system performance, only samples collected during design loading periods were used in the calculations. The data collected during the stress sequences (December 25, 2006 – February 14, 2007) was not included in the calculations.*

APPENDIX E

OWNER'S MANUAL

OWNER'S MANUAL

FOR USE WITH MODEL #s
MICROFAST 0.5, 0.75, 0.9, 1.5 (NSF STD. 40 CERT.)
NITRIFAST 0.5, 0.75, 0.9, 1.5 (NON NSF STD. 40 CERT.)
HIGHSTRENGTHFAST 1.0, 1.5 (NON NSF STD. 40 CERT.)

BIO-MICROBICS, INC.
FAST® WASTEWATER TREATMENT SYSTEMS

IMPORTANT: *All work must conform to local electrical plumbing, and building codes.*

TABLE OF CONTENTS

THANK YOU for choosing a FAST® wastewater treatment system for your wastewater treatment needs. Bio-Microbics cares about your safety and satisfaction. Please take the time to read the information in this manual. Safe and proper operation of your FAST system will ensure long product life.

WARNING LABELS
These warning labels are located on the control panel and blower housing. PLEASE follow the information on these labels to ensure your safety.

IMPORTANT INFORMATION
Please read and follow the cautionary notes given below and those found elsewhere in this manual. If you have questions regarding the safety or operation of your FAST Wastewater Treatment System, contact Bio-Microbics, Inc. at:

1-800-753-FAST (3278)

Located on the Blower Housing

Dangers

Electrical equipment located in flooded areas presents an electrical hazard. Should the unit become flooded, call your Bio-Microbics service technician. Do not enter a flooded area. Entering a flooded area may result in electrical shock causing death or serious bodily injury.
There are buried pipes and electric cables located near this equipment. Contact your authorized Bio-Microbics service technician before digging above or near the treatment system. Failure to do so may result in electrical shock causing death or serious bodily injury.

Warnings

1. **DO NOT** attempt to service components of the FAST wastewater treatment system yourself; call your authorized Bio-Microbics service technician.
2. Only authorized service personnel are to remove caps on pipes or covers on the septic tank. Removal by unauthorized personnel may result in death or bodily injury from potentially hazardous gases and waste matter.
3. **DO NOT** allow children to play on or around the vents and blower housing. Such play may result in falls or other accidents causing serious bodily injury.
4. Ice may form around vents during cold weather. Use caution when walking in these areas to avoid falling, causing serious bodily injury.
5. Anyone coming in contact with wastewater must remove any contaminated clothing and thoroughly wash all body areas and clothing exposed to wastewater with soap and water. Then consult a physician to minimize the risk of illness.

6. The treatment unit can be damaged by placing heavy items on the ground above the tank. Vehicles heavier than a lawn tractor should not be driven in the area surrounding the FAST® system to minimize the risk of damage to the septic tank and associated piping (unless the septic tank has been specially designed for use under roadways).
7. The area around the blower housing and vents must be clear so air can enter the housing. Do NOT allow debris or other objects, including drifting snow or ice, to cover the blower housing or vents. When mowing, direct debris from the mower away from the blower housing and vents.

INTRODUCTION

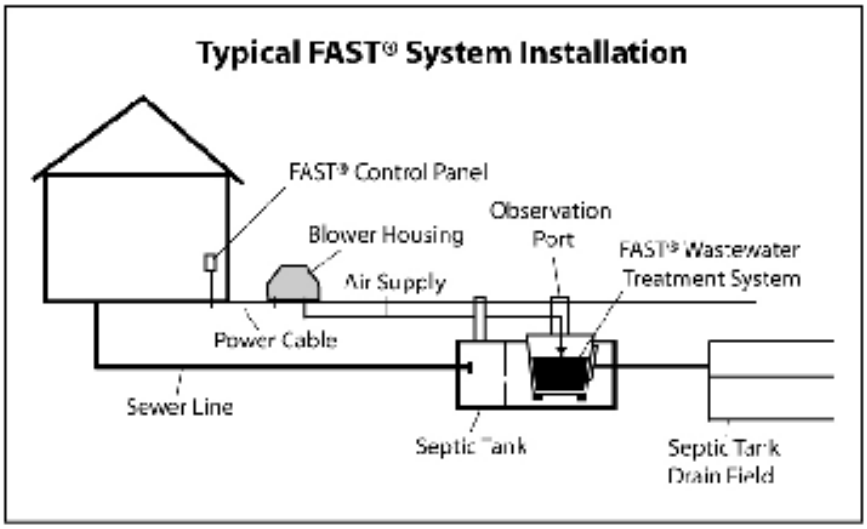
Thank you for choosing a FAST wastewater treatment system for your home. The system is compatible with garbage disposals, dishwashers and other household appliances. The MicroFAST 0.5, 0.75, 0.9 and 1.5 systems have been tested and certified by NSF *International* to meet NSF Standard 40, Class 1.

HOW FAST® TREATMENT SYSTEMS WORK

FAST stands for Fixed Activated Sludge Treatment. In the FAST wastewater treatment system process, a colony of bacteria, called the biomass, breaks down biodegradable waste into carbon dioxide and water. The process occurs continuously as long as the biomass is supplied food (incoming waste) and oxygen (air) in a suitable environment. Solid material that the biomass cannot process settles into the septic tank for normal removal by pump-out.

The heart of the FAST wastewater treatment system is a honeycomb-type media suspended in the septic tank below ground. The media contains the biomass. Above ground, an electric blower blows air through an underground pipe into the media to aerate the wastewater. Aeration circulates the wastewater, thereby providing both food and oxygen to the biomass. An outlet pipe directs treated wastewater into the septic tank drain field.

There are no moving mechanical parts in the FAST wastewater treatment system other than the blower (however there may be other moving parts associated with other portions of your treatment system). With proper use and maintenance, and a healthy environment for the biomass, the FAST wastewater treatment system will perform safely and reliably.



SYSTEM COMPONENTS

A. Underground Treatment System

The underground treatment tank includes the septic tank (supplied by others) and the FAST® wastewater treatment module. Underground pipes carry wastewater into and away from the tank. Depending upon local codes, a pipe or cover may extend upward from the tank. This pipe may serve as a pump-out pipe to remove solid material from the septic tank. An observation port may extend from the top of the module. This can serve as a vent for the module and also used for service.

WARNING: *Only authorized service personnel are to remove caps on pipes or covers on the septic tank. Removal by unauthorized personnel may result in death or bodily injury from potentially hazardous gases and waste matter.*

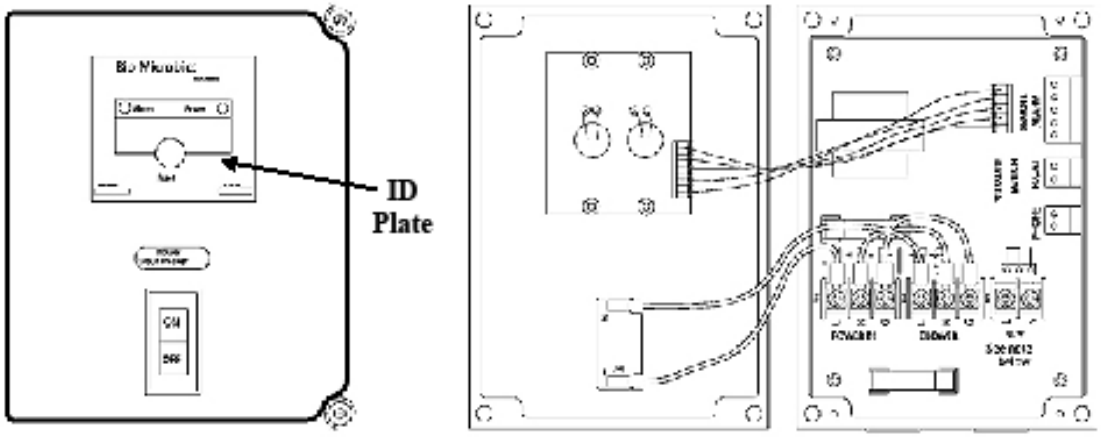
WARNING: *The treatment unit can be damaged by placing heavy items on the ground above the tank. Vehicles heavier than a lawn tractor should not be driven in the area surrounding the FAST system to minimize the risk of damage to the septic tank and associated piping (unless the septic tank has been specially designed for use under roadways).*

B. Control Panel

A light on the control panel reports the status of the system's electrical circuit. If the red light is lit or flashing, there is a problem in the system. A buzzer also sounds when the red light flashes.

If the alarm should sound, check air intake and vents for obvious signs of blockage, but do not attempt to remove caps or open the blower housing.

If there are no signs of blockage, check the circuit breaker switch located in the FAST system control panel. If the switch has tripped, reset the switch. If the alarm stays on, call your authorized Bio-Microbics service technician. The horn may be silenced by pushing the silence button on the control panel.



C. Identification Plate (shown above)

An identification plate, similar to the one shown above, is located on the control panel and on the blower housing. Information that identifies the unit is found on this plate. If you contact your authorized Bio-Microbics service technician or Bio-Microbics, Inc. Customer Service, the service technician may request information on the identification plate.

D. Blower Housing

The blower housing sits above ground and contains the blower and an electric conduit. Air is drawn into the housing, and then directed through an underground pipe to the aeration system in the treatment tank.

WARNING: *Do NOT allow children to play on or around the blower housing. Such play may result in falls or other accidents causing serious bodily injury.*

CAUTION: *Ice may form around vents during cold weather. Use caution when walking in these areas to avoid falling, causing serious bodily injury.*

NOTICE: *Do not cover the blower housing or vents. When mowing the grass, direct debris from the mower away from the blower. The area around the blower housing and vents must be clear so air can enter the housing and vents. Do NOT allow debris or other objects, including drifting snow or ice, to cover over housing and vents.*

E. NSF STANDARD 40, CLASS 1, CERTIFICATION MARK

The NSF mark shown below is displayed on all NSF Standard 40, Class 1 certified FAST wastewater treatment systems. The MicroFAST 0.5, 0.75, 0.9, and 1.5 systems should all have this mark on the side of the control panel housing. Non NSF certified systems will not have this mark.

INTRODUCING SUBSTANCES INTO THE SYSTEM

Introducing harmful substances into the system may reduce the efficiency of the system or stop the treatment process by destroying the biomass. These substances that reduce the efficiency or stop the treatment process can be grouped into two groups, prohibited substances and limited-use substances. While the FAST wastewater treatment system will process most waste produced by the average household, the following information will maximize the system's efficiency and reduce the time period between septic tank pump-outs. In general, if a substance is harmful to humans, or is anti-biotic in nature, it should not be put into any septic system including FAST. If you have a question regarding the effect of a particular substance on the FAST system, call your Bio-Microbics service technician.

NOTICE: *Introducing harmful or damaging chemicals into your FAST system may void the warranty.*

A. Prohibited Substances

Prohibited substances are those substances which, when present in even small amounts, will prevent the FAST system from providing wastewater treatment. Substances that will not dissolve may clog and possibly damage the aeration unit. The following is a partial list of prohibited substances; common sense should be used for other substances not on this list:

1. Plastic or rubber products
2. Petroleum based products, such as motor oil, paint, paint thinner, gasoline, and solvents
3. Non-biodegradable products, such as sanitary napkins, wipes, condoms, diapers and cat litter
4. Toxic substances such as pesticides, strong disinfectants large amounts of strong caustic drain cleaners, paint or anything else that would be toxic to humans. This includes quaternary ammonia compounds (found in some commercial cleaners).
5. Large amounts of paper products, such as paper towels and synthetic fiber-reinforced products advertised as having "wet strength,"
6. Animal fats, such as bacon grease or lard (normal cleaning of pots and pans is acceptable).
7. Liquid fabric softeners
8. Water softener waste (from regeneration) without flow equalization

Chemicals
The following chemicals are prohibited substances and should not be poured into the FAST system tank or leach field:

1. Herbicides
2. Pesticides
3. Paint thinner
4. Motor oil (including transmission oil and hydraulic fluid)

NOTICE: *Contact your Bio-Microbics, Inc. service technician immediately if a substantial spill occurs in the area of the treatment system.*

B. Limited-use Substances
Limited-use substances, in large concentrations, will reduce or stop the treatment process. These same substances in smaller concentrations will have no harmful effect on the treatment process (in general, a small concentration is defined as being the product's recommended dosage, per the manufacturer's directions). You may use the following substances without harming your FAST system if you use the substance according to the manufacturer's directions, use the substances sparingly, and do not introduce concentrated doses into the system.

1. Laundry bleach
2. Detergents with bleach
3. Household cleaners containing sodium bactericides such as:
    a. Pine oil (disinfectant used in general purpose liquid cleaners),
    b. N-alkyl dichlorobenzyl ammonium chloride (disinfectant used in detergents and spray cleaners),
    c. Sodium hydroxide (lye-chemical used in drain openers and cleaners),
    d. Sodium dichlor-s-triazinetrione (powdered bleach used in scouring powders and automatic dishwasher detergents),
    e. Ortho-phenylphenol (bactericide used in tub and toilet bowl cleaners).

Food Waste
Some food waste, whether or not it is run through a garbage disposal, will not be treated by the FAST system, but will remain in solid form and fall to the bottom of the septic tank. Large quantities of organic material introduced into the FAST system from the garbage grinder may organically overload the FAST system and cause more frequent pump-out of the septic tank. Therefore, you should consider not disposing of these food items:

1. Animal bones
2. Melon rinds
3. Corn cobs
4. Pits and seeds
5. Eggshells
6. Any other non-edible waste

C. Acceptable Substances
Substances that are considered to be typical domestic wastewater are human waste, bath and dish water, edible food waste, and coffee and tea grounds.

The following substances may be used regularly without harming your FAST wastewater treatment system:

1. Laundry detergents without bleach
2. Dishwashing detergents without bleach
3. Toilet paper
4. Household cleaners containing sodium bicarbonate, sodium carbonate and sodium borate.

NOTICE: *Sodium borate is found in some household cleaners. It will not harm the FAST wastewater treatment system, but its use may be restricted by local wastewater codes. Check with the appropriate authority before using products containing sodium borate.*

NOTICE: IMMEDIATELY *fix all leaky fixtures. Even the smallest leak will greatly increase the hydraulic load on the FAST unit and may prevent it from fully treating the waste. Excess flow may also cause eventual failure of a drain field system.*

SYSTEM MAINTENANCE AND MONITORING

The FAST wastewater treatment system operates automatically and continuously. The maintenance procedures for the user of the FAST wastewater treatment system include keeping the vents and the blower housing clear of debris. The homeowner should monitor the status of the system, substances introduced into the system, and the frequency of required pump-out as determined by the service provider.

IF WASTEWATER BACKUP OCCURS, do not add water; turn off any taps or appliances, such as a clothes washer, that direct water into the wastewater system and contact service technicians immediately.

If the instructions contained in this manual are carefully followed, the FAST wastewater treatment system can provide years of service. If problems arise due to chemical spills, power outages or alarms, contact your Bio-Microbics service technician. This unit is to be serviced only by trained and certified Bio-Microbics technicians.

EXCESSIVE FOAMING

Some foaming may occur during the startup of the system. This foaming is tan in color and is normal due to massive growth of the bacterial population in the treatment chamber.

The production of pure white foam after the system has been running for at least one week, indicates the excessive use of detergents, or use of detergents that have a large of amount of sudsing agents (Tide is known to produce this condition).

NSF CERTIFIED SYSTEMS SERVICE POLICY

All NSF Standard 40, Class 1 certified wastewater treatment systems (MicroFAST 0.5, 0.75, 0.9, 1.5) have an initial service agreement for two years (two calls per year) included with the system's initial purchase price. To find out who is the NSF initial service provider for your system, check the labels on the blower housing or control panel.

If there are any deficiencies in the FAST systems operation or components, the service person will notify the owner in writing and detail when these deficiencies can be fixed.

If these service calls are not performed on your NSF certified system, or not all of the items are checked, please call Bio-Microbics toll-free at 800-753-FAST (3278).

For the homeowner, operational procedures for the FAST wastewater treatment system are minimal. Normal operation of the unit requires operation of the blower and regular discharge of wastewater to the

unit. Leaves, snow, or other material must not be allowed to block the blower intake. If the blower should fail, follow the procedure given under ALARM WARNING.

During service calls, the authorized service person will check the blower for proper operation and perform preventative maintenance including cleaning of the blower intake and inspection of control panel light. The service provider should also measure the solids level in the septic tank and recommend pump-out when necessary.

When performing an NSF service call, the service provider will run the checks included on the checklist shown below (a service provider's checklist may have a different appearance, but will contain each of these checks).

A. Complete this section ONLY if the FAST® was installed in tank at the jobsite.

Concrete Tank	Trash Tank Clean Out Present
Fiberglass Tank	FAST Chamber Clean Out Present
Anti-Flotation Installed	Trash Tank Vent
H_20 Loading Capabilities	Inspection Port Access to Grade
Fill Over FAST Lid	
Tank Level	
Watertight Joints & Piping	

B. Tankage Yes No **Service & Access Port** Yes No

Tank Manufacturer Tank Model No.
Working Liquid Volume in Trash Collector Chamber
Working Liquid Volume in FAST Treatment Chamber
FAST system installed using which method Lid Suspension
Leg Support
FAST system installed into tank by whom:

C. Alarm Panel/Piping

Visual Alarm Operating	Length of Air Supply Line
Audio Alarm Operating	Diameter of Air Supply Line
Sensor Switch Installed	

D. Air Blower

Filter Element Inside	Inlet & Outlet Pipe Installed Correctly
Blower Hood Installed	Blower Operates Correctly
Blower Hood Secure	Blower Area Subject to Flooding
Blower Area Ventilated	Blower Area Subject to Snow Load
	Blower Hood Vents Clear
Wired for High or Low Voltage	Single Phase or Three Phase
Voltage	50 hz or 60 hz

E. Treatment Unit

Air Lift Operates Correctly	Remote or Inspection Port Vent
Module Insert Stable	Module Sealed & Bolted to Tank
4" Outlet Pipe Place	Air Line Connection Glued to Airlift
Length of Vent Line	Size of Vent Line Pipe

F. Other

Manuals Onsite for Owner	NSF Inspection Service Given to Owner
Warranty to Owner	After NSF Service Contract to Owner

SERVICE AFTER THE FIRST TWO YEARS

An **Extended Service Policy** is available and may be purchased through your local Bio-Microbics distributor. The extended service policy should provide the same service checks as the initial NSF service policy, sludge accumulation levels in the septic and FAST tanks, and perform any additional service required by local regulation. Extended service on NSF certified systems should be performed twice per year.

THE SEPTIC TANK

Periodically, waste will need to be removed from the settling compartment of the septic tank using normal pump-out procedures. Bio-Microbics recommends that pump-out occur if sludge is 18 inches deep, or takes up 75% of the volume of the settling compartment below the port connecting settling chamber to FAST chamber. All stricter, applicable regulations supercede these operational directions. When pump out of the settling compartment occurs, the FAST compartment should also have any sludge removed. Only persons experienced in wastewater treatment or service are authorized to remove the septic tank cover. If the drains in your house require an unusual amount of time to drain, the septic tank may require pumping out.

WARNING: *Do NOT attempt to service components of the FAST wastewater treatment system yourself; call your Bio-Microbics service technician. Only authorized service personnel are to remove caps on pipes or covers on the septic tank. Removal by unauthorized personnel may result in death or bodily injury from potentially hazardous gases and waste matter.*

WARNING: *The treatment unit can be damaged by placing heavy items on the ground above the tank. Vehicles heavier than a lawn tractor should not be driven in the area surrounding the FAST system to minimize the risk of damage to the septic tank and associated piping (unless the septic tank has been specially designed for use under roadways).*

NOTICE: *The area around the blower housing and vents must be clear so air can enter the housing. Do NOT allow debris or other objects, including drifting snow or ice, to cover the blower housing or vents. When mowing the lawn, direct debris away from the blower housing and vents.*

ALARM WARNING

The system is equipped with a red light on the control panel and an alarm horn. Should the red light illuminate or flash and the horn activate, check the breaker on the control panel to ensure it is not off. If the breaker is turned off, attempt to reset it. If the breaker fails to remain reset, call your Bio-Microbics service technician. The alarm horn may be shut off by pushing the silence button. Pushing the silence button will not reactivate the unit, only silence the horn.

BLOWER STOPPAGE OR POWER OUTAGE

The FAST wastewater treatment system requires a supply of oxygen and food for the biomass. Should the blower stop, air flow through the aeration pipe will stop, cutting off the supply of oxygen to the biomass. A prolonged absence of oxygen will seriously affect the condition of the biomass. When the blower is operating, it will emit a humming sound.

If the blower is not operating, first determine whether an electrical power outage has occurred in your community.

If your house is without electricity, call the electric utility. If the electricity is off more than 48 hours, call your Bio-Microbics service technician for treatment system advice.

If your house has electricity, but the blower is not operating, follow the procedure under **ALARM WARNING** (explained on the previous page).

FLOODING

Flood water may cover the septic tank unit, the blower housing, or both, if the FAST system is installed in a low-lying area.

DANGER: *Electrical equipment located in flooded areas presents an electrical hazard. Should the unit become flooded, call your Bio-Microbics service technician. Stay out of a flooded area. Failure to do so may result in electrical shock causing death or serious bodily injury.*

SHOULD water cover all, or part, of the blower housing, IMMEDIATELY disconnect electrical power to the blower at your house circuit breaker box by switching the circuit breaker to "off". Immediately call your Bio-Microbics service technician. Do not attempt to restore electrical power to the blower. The service technician must inspect and evaluate the condition of the FAST unit before electrical power is restored.

Water covering the septic tank unit can be tolerated if there is no leakage or backup into the system. Backup is characterized by wastewater flowing back into the house or slow movement of wastewater in the drains.

WARNING: *Anyone coming in contact with wastewater must remove any contaminated clothing and thoroughly wash all exposed body areas with soap and water. Then consult a physician to minimize the risk of illness.*

EVALUATION OF SYSTEM PERFORMANCE

The FAST wastewater treatment system operates automatically. There are no operating procedures for the user of the FAST wastewater treatment system to perform. However, as with any home appliance or machine, simple periodic checks should, and can be made to aid in the prevention of costly repair problems. Generally, the FAST wastewater treatment system unit can be checked by sight and by smell.

SOUNDS	During normal operation, a uniform humming sound emanates from the system. If unusual noises are heard, it is possible the blower could need maintenance or repairs. Inspection of the treatment chamber should reveal a vigorous splashing sound within the chamber.
SMELL	The FAST SYSTEM is an aerobic system. During normal operation, the system has an earthy smell like that of a well-maintained compost pile. If other odors are noticed, such as a sulfuric "rotten eggs" smell, the aeration process may not be operating or the system may be overloaded. Check the blower for proper operation and make sure the airlift is operating by viewing through the observation port.
SIGHT	The FAST system should produce effluent that is virtually as clear as tap water; however it is NOT fit for consumption. If the system is producing wastewater that is not clear contact the local Bio-Microbics service technician.

DANGER: *DO NOT attempt to service any components of the FAST unit yourself; call your Bio-Microbics service technician. Potentially hazardous gases and waste matter are contained in the treatment tank and only trained, certified service technicians are authorized to service your unit. Servicing by unauthorized personnel may result in death or bodily injury.*

INTERMITTENT USE

The FAST wastewater treatment system will function normally even if wastewater does not enter the system for an extended period of time. The power to the system should be left on during short periods when there is no wastewater flow to the system. Suggestions for intermittent use (Check with local regulations before attempting): If the property is going to used seasonally and shut down completely for an extended period of time (i.e. summer use only and then abandoned for the winter), we suggest that the blower be shut down. The blower should be re-started upon return to the property. Your local service provider may be contacted to perform these functions (It is also possible to arrange for the re-starting of the blower a week or two in advance of return through your local service provider.). If the property will be used on weekends only, it is best to leave the blower on continuously throughout the season for use until an extended period of absence is anticipated. (Extended period being at least 4 weeks or more.) A slight odor may be detected for a couple of days while the system returns to normal operation.

ABANDONMENT OR DECOMMISSIONING

If you plan to connect your house's sewer system to a municipal sewer system, or if your FAST wastewater treatment system is no longer needed, please contact your Bio-Microbics service technician or Bio-Microbics, Inc. (913-422-0707). Procedures specified by regulatory agencies must be followed when the FAST wastewater treatment system is abandoned or decommissioned.

SPECIFICATIONS

Power Requirements

120 or 220 VAC, 1 Phase, 60Hz., 50Hz.

LIMITED 24-MONTH WARRANTY

Bio-Microbics, Inc. warrants every new Residential FAST® system against defects in materials and workmanship for a period of two years after installation subject to the following terms and conditions, (Commercial FAST system for a period of one year after installation or eighteen months from date of shipment, whichever occurs first, subject to the following terms and conditions):

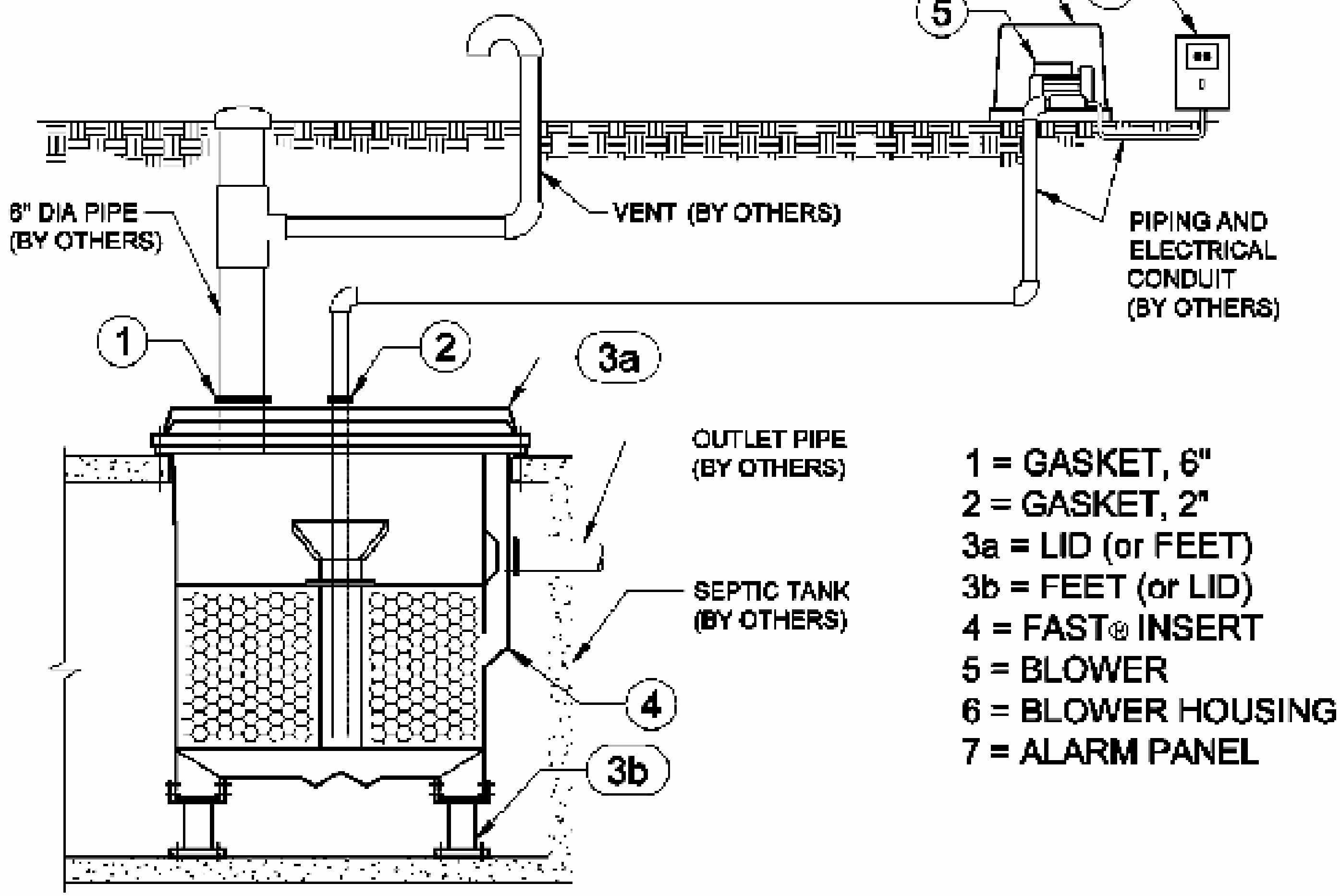
During the warranty period, if any part is defective or fails to perform as specified when operating at design conditions, and if the equipment has been installed and is being operated and maintained in accordance with the written instructions provided by Bio-Microbics, Inc., Bio-Microbics, Inc. will repair or replace at its discretion such defective parts free of charge. Defective parts must be returned by owner to Bio-Microbics, Inc.'s factory postage paid, if so requested. The cost of labor and all other expenses resulting from replacement of the defective parts and from installation of parts furnished under this warranty and regular maintenance items such as filters or bulbs shall be borne by the owner. This warranty does not cover general system misuse, aerator components which have been damaged by flooding or any components that have been disassembled by unauthorized persons, improperly installed or damaged due to altered or improper wiring or overload protection. This warranty applies only to the treatment plant and does not include any of the house wiring, plumbing, drainage, septic tank or disposal system. Bio-Microbics, Inc. is reserves the right to revise, change or modify the construction and/or design of the FAST system, or any component part or parts thereof, without incurring any obligation to make such changes or modifications in present equipment. Bio-Microbics, Inc. is not responsible for consequential or incidental damages of any nature resulting from such things as, but not limited to, defect in design, material, or workmanship, or delays in delivery, replacements or repairs.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED. BIO-MICROBICS SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

NO REPRESENTATIVE OR PERSON IS AUTHORIZED TO GIVE ANY OTHER WARRANTY OR TO ASSUME FOR BIO-MICROBICS, INC., ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF ITS PRODUCTS. Contact your local distributor for parts and service.

Typical FAST® Installation Components

(Actual installed components subject to design specifications)



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