WASTEWATER TECHNOLOGY

NSF/ANSI Standard 40 - *Residential Wastewater Treatment Systems*

Final Report:

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

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

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

Under the provisions of NSF/ANSI Standard 40
Residential Wastewater Treatment Systems

April 2007

EXECUTIVE SUMMARY

Testing of the Bio-Microbics MicroFAST® Model 0.5 was conducted under the provisions of NSF/ANSI Standard 40 for Residential Wastewater Treatment Systems (August 2005 revision). NSF/ANSI Standard 40 was developed by the NSF Joint Committee on Wastewater Technology.

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 effluent $CBOD_5$ was 3 mg/L, ranging between <2 and 8 mg/L, and the average effluent total suspended solids was 5 mg/L, ranging between <2 mg/L and 29 mg/L.

The Bio-Microbics MicroFAST® 0.5 produced an effluent that 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.

PREFACE

Performance evaluation of residential wastewater treatment systems is achieved within the provisions of NSF/ANSI Standard 40: Residential Wastewater Treatment Systems (revised August 2005), 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.

Systems conforming to Standard 40 are classified as Class I or Class II systems according to the quality of effluent produced by the system during the performance evaluation. Class I systems must meet the requirements of EPA Secondary Treatment Guidelines[1] for five day carbonaceous biochemical oxygen demand ($CBOD_5$), total suspended solids (TSS) and pH. Class I systems must also demonstrate performance consistent with the effluent color, odor, oily film and foam requirements of the Standard. Class II system effluent must have no more than 10% of samples exceeding 60 mg/L $CBOD_5$ and 100 mg/L TSS.

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 40 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 40 (revised August 2005) that the Bio-Microbics MicroFAST® 0.5 manufactured by Bio-Microbics, Inc. has fulfilled the requirements of NSF/ANSI Standard 40. 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 40 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

Thomas Stevens
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 occur 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 becomes thicker, 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. A stream of partially treated water from the aeration zone is put outside the liner for denitrification. 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.

2.2 Test Protocol

Section 8 of NSF/ANSI Standard 40 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. Four and a half 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 five days per week. The influent samples are analyzed for five-day biochemical oxygen demand (BOD_5) and total suspended solids (TSS) concentrations. The effluent samples are analyzed for carbonaceous five-day biochemical oxygen demand ($CBOD_5$), and total suspended solids (TSS) concentrations. On-site determinations of the effluent temperature and pH are made five days per week.

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 before and after each stress dosing pattern. 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 achieve Class I effluent it is required to produce an effluent, which meets the EPA guidelines for secondary effluent discharge[1]:

(1) $CBOD_5$: The 30-day average of effluent samples shall not exceed 25 mg/L and each 7-day average of effluent samples shall not exceed 40 mg/L.

(2) TSS: Each 30-day average of effluent samples shall not exceed 30 mg/L and each 7-day average of effluent samples shall not exceed 45 mg/L.

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

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.

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 are 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. Copies 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.

TABLE I. Summary of Analytical Results

	Average	Std. Dev.	Minimum	Maximum	Median	Interquartile Range
Biochemical Oxygen Demand (mg/L)						
Influent (BOD_5)	250	100	69	590	230	170 - 290
Effluent ($CBOD_5$)	3	1.4	<2	8	2	2 - 3
Total Suspended Solids (mg/L)						
Influent	310	140	53	1100	300	220 - 360
Effluent	5	5.1	<2	29	2	2 - 5
Volatile Suspended Solids (mg/L)						
Influent	260	110	46	910	240	190 – 310
Effluent	4	4	<2	16	2	2 – 4
pH						
Influent	-	-	6.5	7.0	6.8	6.8 – 6.9
Effluent	-	-	6.1	7.0	6.9	6.8 – 6.9
Temperature (°C)						
Influent	26	4	18	31	25	23 – 30
Effluent	24	6	12	31	23	21 – 30
Dissolved Oxygen (mg/L)						
Effluent	1.9	0.6	0.5	3.8	1.7	1.6 – 1.9

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 8.5 of NSF/ANSI Standard 40. In completing the pass/fail determination for the data, an allowance is made for effluent TSS and $CBOD_5$ during the first month of testing. The 30 and 7-day averages during this time may equal or exceed 1.4 times the effluent limits required for the rest of the test. This provision recognizes that an immature culture of microorganisms within the system may require additional time to achieve adequate treatment efficiency. Effluent $CBOD_5$ and TSS concentrations from the Bio-Microbics MicroFAST® 0.5 during the first calendar month of testing were within the normal limits and did not need to use this provision.

Section 8.5.1.1 of the Standard provides guidance addressing the impact of unusual testing conditions, including sampling, dosing, or influent characteristics, on operation of a system under test. Specific data points may be excluded from 7- and 30 - day average calculations where determined to have an adverse impact on performance of the system, with rationale for the exclusion to be documented in the final report.

During months three and five of the test, the influent wastewater characteristics were outside the ranges specified by the Standard. Month three had an average influent BOD of 360 mg/L and an average influent TSS of 560 mg/L, while month five had an average influent TSS concentration of 390 mg/L. In order to correct for the excursion, data days were excluded to bring the average to 300 mg/L and 350 mg/L for BOD and TSS respectively. Month three averages resulted in 290 mg/L for BOD and 340 mg/L for TSS. Month five TSS average became 330 mg/L. The following dates were excluded from the overall averages in months three and five:

- *November 10, 13, 14, 15, 17, 20, 27, 28, and 30*
- *January 13 and 27.*

Sections 3.6 and 8.2.1 of the Standard define influent wastewater characteristics as they apply to testing under the Standard. Typical domestic wastewater is defined as having a 30-day average BOD_5 concentration between 100 and 300 mg/L and a 30-day average TSS concentration between 100 and 350 mg/L. The 30-day average influent remained inside this specified range for the duration of the 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 69 to 590 mg/L during the evaluation, with an average concentration of 250 mg/L and a median concentration of 230 mg/L.

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.

The Standard requires that the effluent $CBOD_5$ not exceed 40 mg/L on a 7-day average or 25 mg/L on a 30-day average. Table II shows the 7 and 30-day average effluent $CBOD_5$ concentrations and the 30-day average influent BOD_5 concentrations.

The 7-day average effluent $CBOD_5$ ranged from 2 to 5 mg/L. The 30-day average ranged from 2 to 4 mg/L throughout the test. As shown in Table II, the Bio-Microbics MicroFAST® 0.5 met the requirements of Standard 40 for effluent $CBOD_5$.

BOD_5 Loading:

Over the course of the evaluation the influent BOD_5 loading averaged 1.04 lb/day. The Bio-Microbics MicroFAST® 0.5 achieved an average reduction of 1.02 lbs/day.

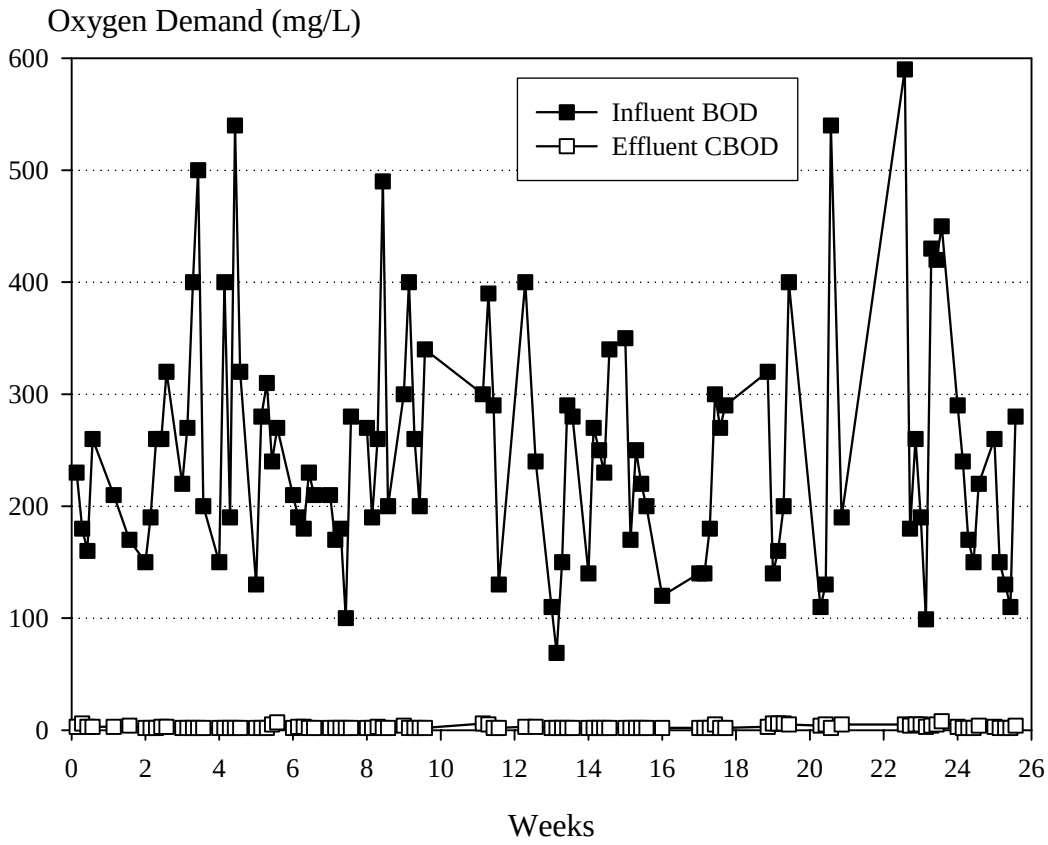


Figure 1. Biochemical Oxygen Demand.

3.3 Total Suspended Solids

TSS and volatile suspended solids (VSS) analyses were completed using Methods 209C and 209D of *Standard Methods*. The TSS results over the entire evaluation are shown in Figure 2. Data from both analyses are summarized in Table I.

Influent TSS:

The influent TSS ranged from 53 to 1100 mg/L during the evaluation, with an average concentration of 310 mg/L and a median concentration of 300 mg/L.

Effluent TSS:

The effluent TSS concentration ranged from <2 to 29 mg/L during the evaluation, with an average concentration of 5 mg/L and a median concentration of 2 mg/L.

Over the course of the evaluation, NSF/ANSI Standard 40 requires that the effluent TSS not exceed 45 mg/L on a 7-day average or 30 mg/L on a 30-day average. Table III shows the 7- and 30-day total suspended solids averages.

The 7-day average effluent TSS ranged from 2 to 14 mg/L and the 30-day average ranged from 3 to 11 mg/L during the test. As shown in Table III, the Bio-Microbics MicroFAST® 0.5 met the requirements of NSF/ANSI Standard 40 for effluent TSS.

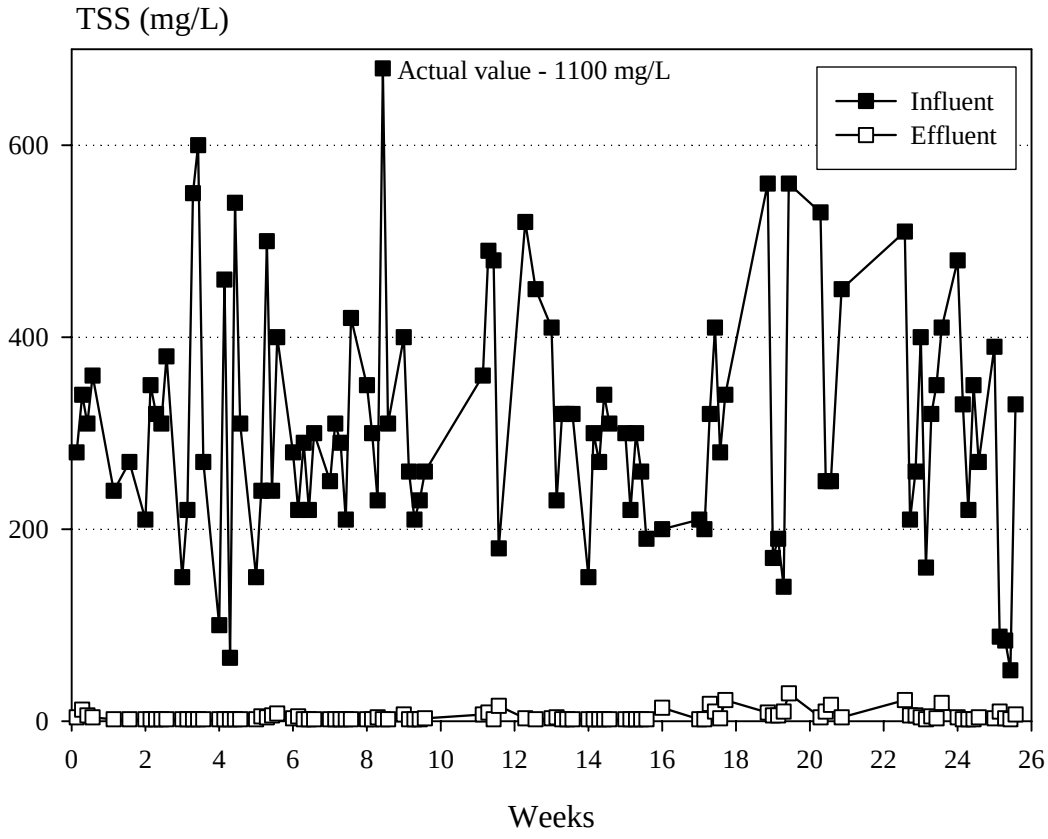


Figure 2. Total Suspended Solids.

Table II. 7- and 30-day Average Effluent $CBOD_5$ and 30-day Average Influent BOD_5

Month	Week	7-day Average Effluent $CBOD_5$ (mg/L)	30-day Average Effluent $CBOD_5$ (mg/L)	30-day Average Influent BOD_5 (mg/L)
1	1	4	3	250
	2	3		
	3	2		
	4	2		
2	5	2	2	250
	6	4		
	7	2		
	8	2		
3	9	2	3	290
	10	3		
	11	3		
	12	3		
4	13	3	2	220
	14	2		
	15	2		
	16	2		
	17	2		
5	18	2	4	240
	19	3		
	20	5		
	21	5		
	22	4		
6	23	5	4	250
	24	5		
	25	3		
	26	3		

Table III. 7- and 30-day Total Suspended Solids

Month	Week	7-day Average Effluent TSS (mg/L)	30-day Average Effluent TSS (mg/L)	30-day Average Influent TSS (mg/L)
1	1	7	3	320
	2	3		
	3	2		
	4	2		
2	5	2	3	330
	6	5		
	7	3		
	8	2		
3	9	2	5	340
	10	4		
	11	4		
	12	9		
4	13	3	3	250
	14	2		
	15	2		
	16	2		
	17	6		
5	18	7	11	330
	19	12		
	20	7		
	21	14		
	22	10		
6	23	10	6	300
	24	7		
	25	3		
	26	5		

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 6.1 to 7.0 during the evaluation (median of 6.9), within the 6 to 9 range required by NSF/ANSI Standard 40. 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 25°C). The temperature data are shown in Appendix C.

3.6 Dissolved Oxygen

Dissolved Oxygen (DO) was measured in the effluent during the evaluation. The effluent DO ranged between 0.5 to 3.8 mg/L (median of 1.7 mg/L). All dissolved oxygen data are shown in Appendix C.

3.7 Color, Threshold Odor, Oily Film, Foam

Three samples of the effluent were analyzed for color, odor, oily film and foam as prescribed in NSF Standard 40. The effluent was acceptable according to the requirements in NSF Standard 40, with color less than 15 units, non-offensive threshold odor, no visible evidence of oily film and no foam.

3.8 Noise

A reading of the noise level at a distance of 20 feet from the system was taken while the system was in operation, using a hand-held decibel meter. The reading was below the 60 dbA required by ANSI/NSF Standard 40.

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.

APPENDIX A

SYSTEM SPECIFICATIONS

SYSTEM SPECIFICATIONS

Bio-Microbics, Inc.
MicroFAST® 0.5

System Capacity

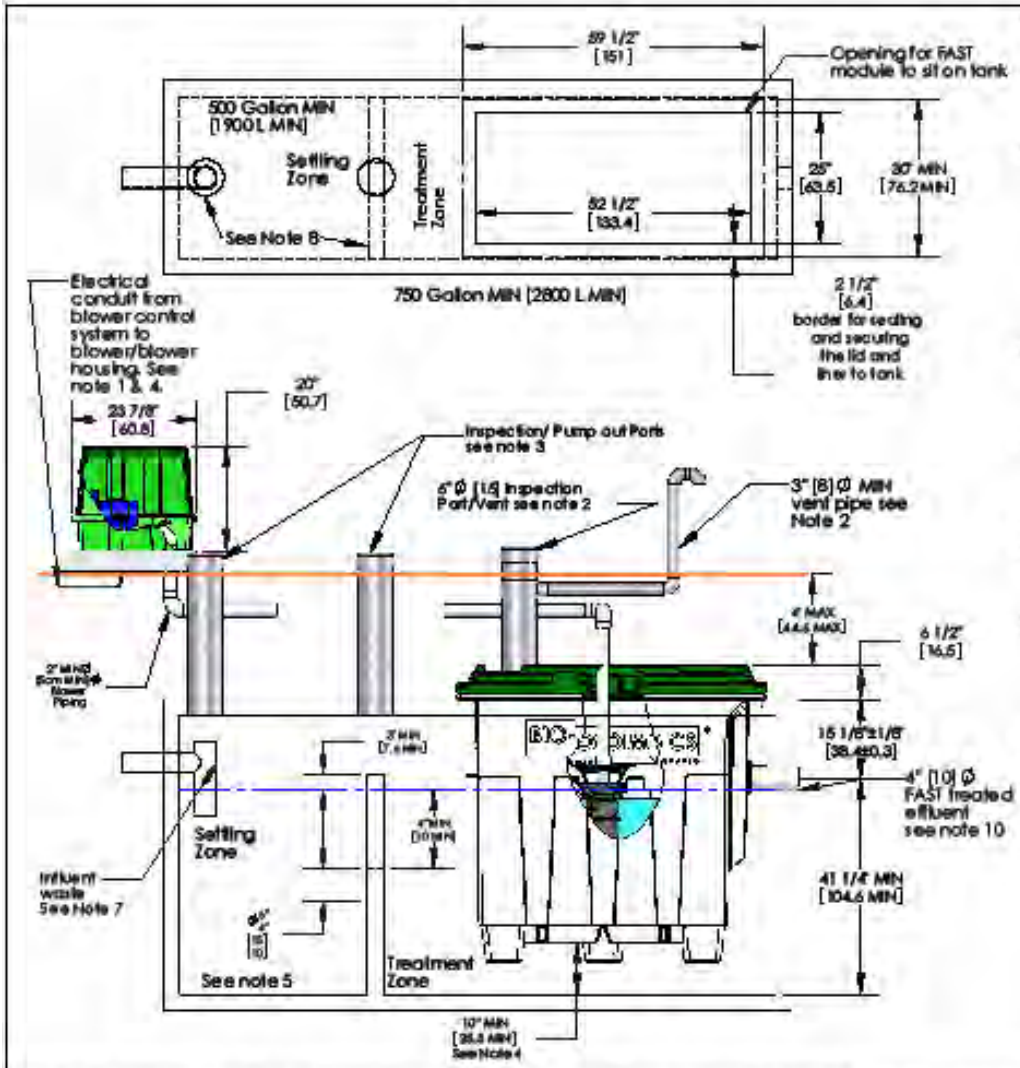
Design Flow	500 gpd
System Hydraulic Capacity	
Pretreatment Chamber	500 gallons
Aeration Chamber	750 gallons
Hydraulic Retention Time (at Design Flow)	
Pretreatment Chamber	24 hours
Aeration Chamber	36 hours
Total Hydraulic Retention Time	60 hours

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



NOTES

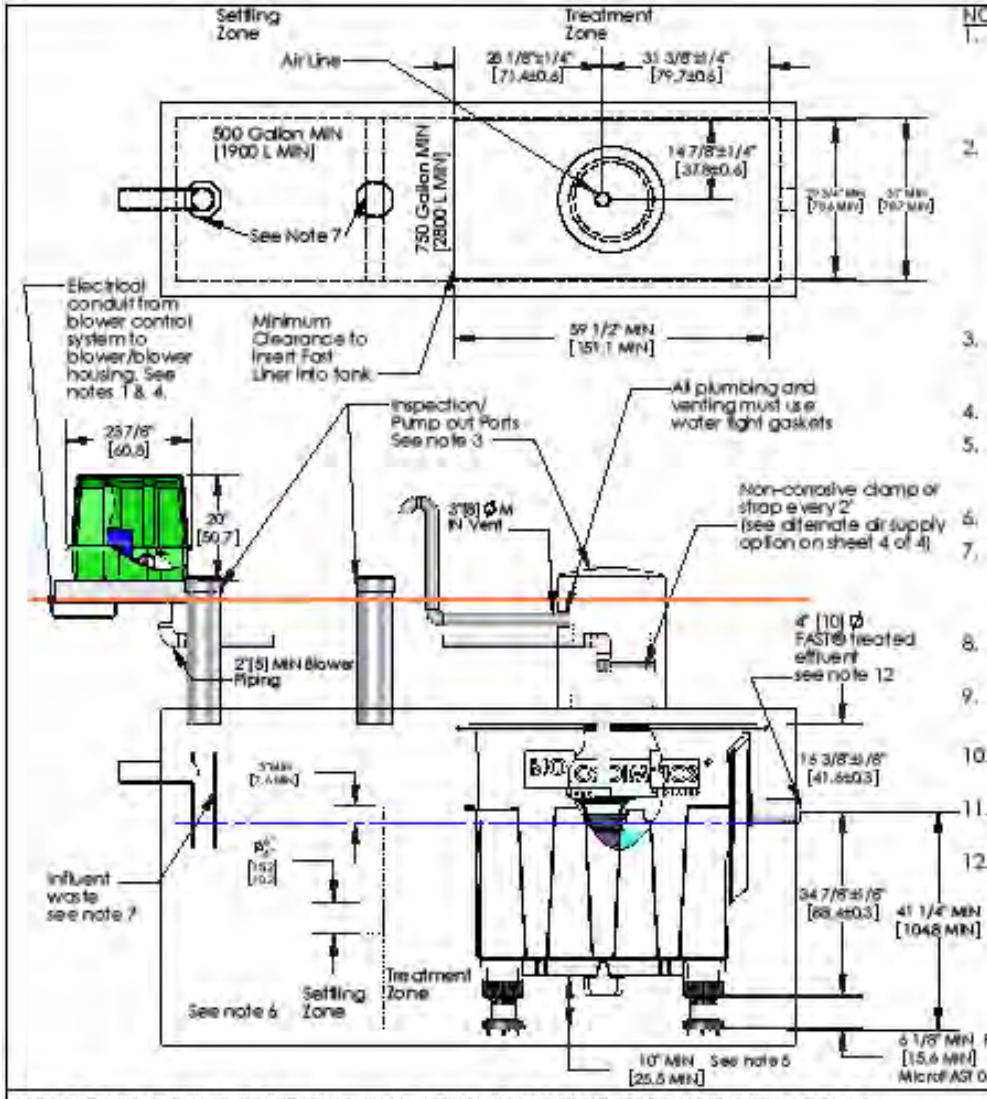
1. Blower piping to FAST® may not exceed 100 FT (30.5m) total length and use 4 elbows maximum. For distances greater than 100 FT - consult factory. Blower must be located above flood/standing water levels on a solid surface or concrete base 24" X 18" X1" (61X45.7X2.6cm) MIN.
2. Vent to be located above finish grade or higher to avoid infiltration. Cap with vent grate w/at least 7.1 sq in. 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. No more than 4 FT 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.
7. 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" higher than the water level as shown on the drawing.
8. All inspection, viewing and pump out ports must be secured to prevent accidental or unauthorized access
9. Tank, anchors, piping, conduit, blower housing pad and vents are provided by others.
10. All piping and ancillary equipment installed after FAST® must not impede or restrict free flow of effluent.

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

BIO-MICROBICS INCORPORATED

0.50 FAST Unit

WEIGHT	lb	SIZE	DRAWING NUMBER		SHEET 1 OF 5
	NAME / DATE	A	MicroFAST® 0.50 with lid		
DRAWN	CDD 12/5/2006				
CHECKED	"W" 4/12/2007	REVISED Thursday, April 12, 2007		REV. IN-801-C	



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 (@ 100FT). For distances greater than 100 FT - Consult factory. Blower must be located above flood levels on a solid surface or concrete base 24" X 18" X1" (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. 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.
4. Blower control system by Bio-Microbics, Inc.
5. Must increase tank size by 20% if minimum of 10 inches (25.5cm) is used between the unit and the base of tank. Consult factory for approval.
6. The primary compartment may be a separate tank.
7. 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" higher than the water level as shown on the drawing.
8. Refer to sheet 4 of 4 *MicroFAST® 0.50 Details* drawing for leg extensions requirements.
9. 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.
10. All inspection, viewing and pump out ports must be secured to prevent accidental or unauthorized access
11. Tank, piping, conduit, blower housing pad and vents are provided by others.
12. All piping and ancillary equipment installed after FAST® must not impede or restrict free flow of effluent

DO NOT SCALE

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

BIO-MICROBICS INCORPORATED

0.50 FAST Unit

WEIGHT	ID	SIZE	DRAWING NUMBER	SHEET
NAME	DATE	A	MicroFAST® 0.50 with feet	2 OF 5
DRAWN cgp	12/19/2006			
CHECKED "W"	4/12/2007	REVISED (Revision April 12, 2007)	REV. 19-01-C	

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 minimum compartment or tank as shown on the plans, or in a 800 gallon one compartment tank. Tank(s) must 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 (1892.7 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 11-25 CFM [0.31-0.71 CMM] 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. The input power required for the blower is 115/230 VAC, Single Phase, 60/50 Hertz, 3.8/1.9Full Load Amps, minimum wire size is 16 A.W.G. (Locked Rotor Amps are 18.6/9.3). All conduit and wiring between the electrical control panel, the power supply, and the blower shall be furnished and installed by the 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 switch 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. There shall be a manual for the installer, service provider, and owner.

9. WARRANTY

Bio-Microbics, Inc. warrants every new residential FAST® models (MicroFAST® 0.50, 0.75, 0.90, and 1.5) system against defects in materials and workmanship for a period of two years after installation or three years from date of shipment, 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

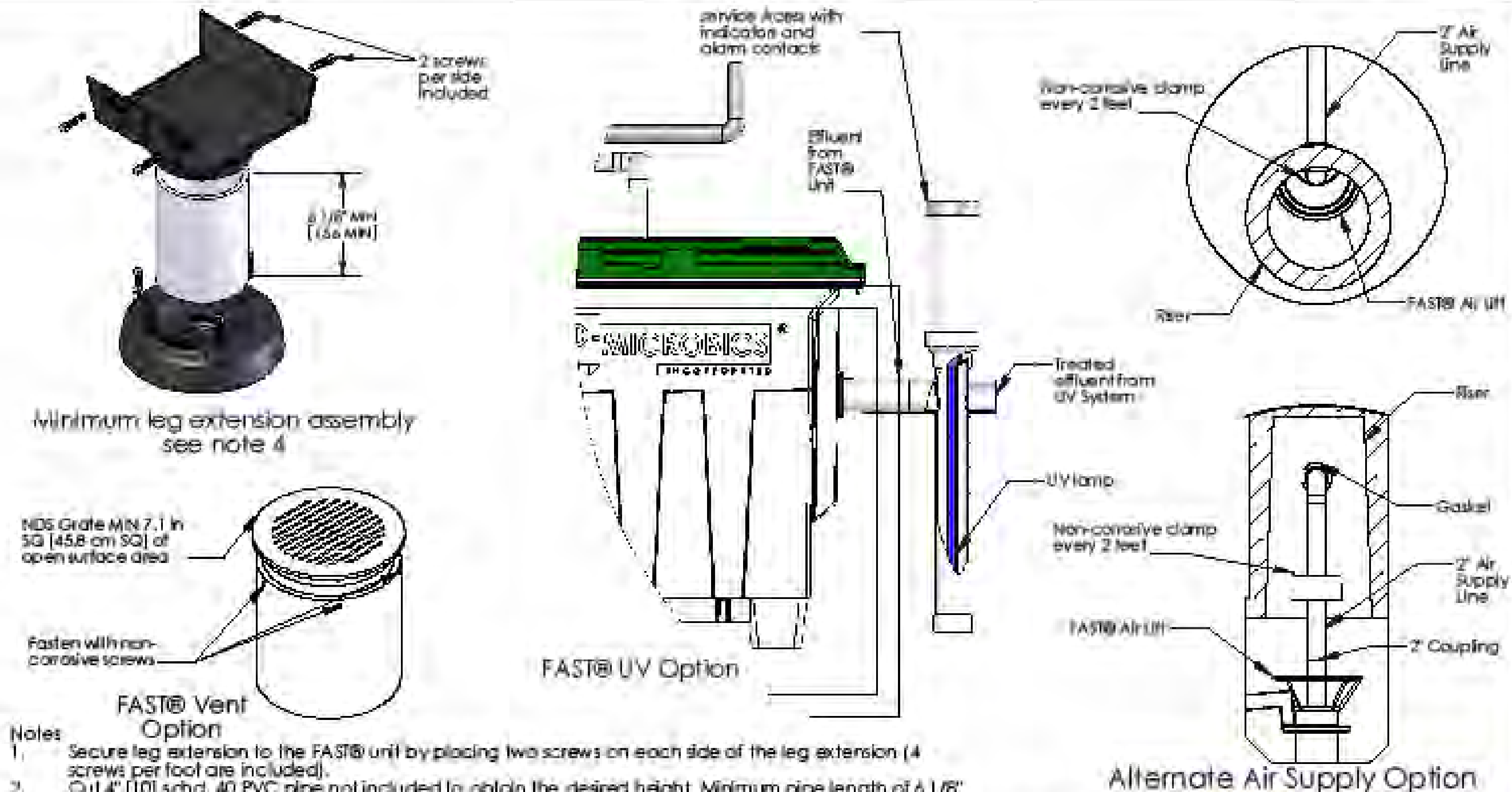
0.50 FAST Unit

WEIGHT lb

	NAME	DATE
DRAWN	CAD	12/5/2006
CHECKED	MP	4/12/2007

SIZE A | DRAWING NUMBER MicroFAST® 0.50 Specifications | SHEET 3 OF 5

REVISED Thursday, April 12, 2007 | REV. 08-01-C



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 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.

DO NOT SCALE

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

BIO-MICROBICS INCORPORATED

0.50 FAST Unit

WEIGHT	lb	SIZE	DRAWING NUMBER	
	NAME / DATE	A	MicroFAST® 0.50 Details	SHEET 4 OF 5
DRAWN	cao 12/1/2006			
CHECKED	PF 4/12/2007	REVISED Revision: April 12, 2007	REV. TH-01-C	

APPENDIX B

NSF STANDARD 40 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. Systems shall be designated as Class I or Class II. The performance classification shall be based upon the evaluation of effluent samples collected from the system over a six-month period.

8.1 Preparations for testing and evaluation

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

8.1.2 The manufacturer shall inspect the system for proper installation. If no defects are detected and the system is judged to be structurally sound, it shall be placed into operation in accordance with the manufacturer's start-up procedures. If the manufacturer does not provide a filling procedure, ⅔ of the system's capacity shall be filled with water and the remaining ⅓ shall be filled with residential wastewater.

8.1.3 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 3 weeks of filling the system and, except as specified in 8.5.1.2, shall continue without interruption until the end of the evaluation period.

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

8.1.5 Performance testing and evaluation of systems shall not be restricted to specific seasons.

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

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

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

8.2 Testing and evaluation conditions, hydraulic loading, and schedules

8.2.1 Influent wastewater characteristics

The 30-d average BOD_5 concentration of the wastewater delivered to the system shall be between 100 mg/L and 300 mg/L.

The 30-d average TSS concentration of the wastewater delivered to the system shall be between 100 mg/L and 350 mg/L.

8.2.2 Hydraulic loading and schedules

The performance of the system shall be evaluated for 26 consecutive weeks. During the testing and

evaluation period, the system shall be subjected to 16 weeks of design loading, followed by 7.5 weeks (52 days) of stress loading, and then an additional 2.5 weeks (18 days) of design loading.

8.2.2.1 Design loading

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

Time frame	% rated daily hydraulic capacity
6:00 a.m. to 9:00 a.m.	approximately 35
11:00 a.m. to 2:00 p.m.	approximately 25
5:00 p.m. to 8:00 p.m.	approximately 40

8.2.2.2 Stress loading

Stress loading is designed to evaluate a system's performance under four non-ideal conditions. Systems shall be subjected to each stress condition once during the 6-month testing and evaluation period, and each of the four stress conditions shall be separated by 7 days of design loading (see 8.2.2.1).

8.2.2.2.1 Wash-day stress

The wash day stress shall consist of 3 wash days in a 5-day period. Each wash day 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 5 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

The system shall be dosed with 40% of its daily hydraulic capacity between 5:00 p.m. and 8:00 p.m. on the day the power/equipment failure stress is initiated. Power to the system shall then be turned off at 9:00 p.m. and dosing shall be discontinued for 48 hours. After 48 hours, power shall be restored and the system shall be dosed over a 3- h period with 60% of its daily hydraulic capacity, which shall include 1 wash load (1 wash cycle and 2 rinse cycles).

8.2.2.2.4 Vacation stress

On the day that the vacation stress is initiated, the system shall be dosed at 35% of its daily hydraulic capacity between 6:00 a.m. and 9:00 a.m. and at 25% between 11:00 a.m. and 2:00 p.m. Dosing shall then be discontinued for 8 consecutive days (power shall continue to be supplied to the system). Between 5:00 p.m. and 8:00 p.m. of the ninth day, the system shall be dosed with 60% of its daily hydraulic capacity, which shall include 3 wash 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.

8.2.4 Color, odor, foam, and oily film assessments

During the 6-month testing and evaluation, a total of 3 effluent samples shall be assessed for color, odor, foam, and oily film. The assessments shall be conducted on effluent composite samples selected randomly during the first phase of design loading (weeks 1 – 16), the period of stress loading (weeks 17 – 23.5), and the second phase of design loading (weeks 23.5 – 26).

8.3 Sample collection

8.3.1 General

8.3.1.1 A minimum of 96 data days shall be required during system performance testing and evaluation. No routine service or maintenance shall be performed on the system whether the time period to achieve the 96 data days falls within or exceeds 6 months.

8.3.1.2 All sample collection methods shall be in accordance with APHA's *Standard Methods for the Examination of Water and Wastewater* unless otherwise specified.

8.3.1.3 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.

8.3.2 Design loading

During periods of design loading, daily composite effluent samples shall be collected and analyzed 5 days a week.

8.3.3 Stress loading

During stress loading, influent and effluent 24-h composite samples shall be collected on the day each stress condition is initiated. Twenty-four hours after the completion of washday, working-parent, and vacation stresses, influent and effluent 24-h composite samples shall be collected for 6 consecutive days. Forty-eight hours after the completion of the power/equipment failure stress, influent and effluent 24-h composite samples shall be collected for 5 consecutive days.

8.4 Analytical descriptions

8.4.1 pH, TSS, BOD_5, and $CBOD_5$

The pH, TSS, and BOD_5 of the collected influent and the pH, TSS and $CBOD_5$ of the collected effluent 24-h composite samples shall be determined with the appropriate methods in APHA's *Standard Methods for the Examination of Water and Wastewater*.

8.4.2 Color, odor, oily film, and foam

8.4.2.1 General

The effluent composite samples shall be diluted 1:1000 with distilled water. Three composite effluent samples shall be tested during the 6-month evaluation period.

8.4.2.2 Color

The apparent color of the diluted effluent samples shall be determined with the visual comparison method described in APHA's *Standard Methods for the Examination of Water and Wastewater*.

8.4.2.3 Odor

A panel consisting of at least 5 evaluators shall qualitatively rate 200 mL aliquots of the diluted effluent samples as offensive or non offensive when compared to odor-free water prepared in accordance with APHA's *Standard Methods for the Examination of Water and Wastewater*.

8.4.2.4 Oily film and foam

Diluted effluent sample aliquots shall be visually evaluated for the presence of an oily film or foaming.

8.5 Criteria

8.5.1 General

8.5.1.1 If conditions during the testing and evaluation period result in system upset, improper sampling, improper dosing, or influent characteristics outside of 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 7-d and 30-d averages of effluent measurements. Rationale for all data exclusions shall be documented in the final report.

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

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

2) With no routine maintenance performed, have the system brought back to pre-existing conditions and resume testing within 3 weeks after the site problem has been identified and corrected. Data collected during the system recovery period shall be excluded from 7-d and 30-d averages of effluent measurements.

NOTE – Pre-existing conditions shall be defined as the point when the results of 3 consecutive data days are within 15% of the previous 30-d average(s).

8.5.1.3 A 7-d average discharge value shall consist of a minimum of 3 data days. If a calendar week contains less than 3 data days, sufficient data days may be transferred from the preceding calendar week to constitute a 7-d average discharge value. If there are not sufficient data days available in the preceding calendar week, the transfer of data days may take place from the following calendar week to constitute a 7-d average discharge value. No data day shall be included in more than one 7-d average discharge value.

8.5.1.4 A 30-d average discharge value shall consist of a minimum of 50% of the regularly scheduled sampling days per month. If a calendar month contains less than the required number of data days, sufficient data days may be transferred from the preceding calendar month to constitute a 30-d average discharge

value. If there are not sufficient data days available in the preceding calendar month, the transfer of data days may take place from the following calendar month to constitute a 30-d average discharge value. No data day shall be included in more than one 30-d average discharge value.

8.5.1.5 During the stress loading sequence, consisting of wash-day, working-parent, power/equipment failure, and vacation stress loading periods, data shall be collected from a minimum of ⅔ of the total scheduled sampling days and from at least 2 of the scheduled sampling days during any single stress loading period.

8.5.2 Class I systems

The following criteria shall be met in order for a system to be classified as a Class I residential wastewater treatment system.

All requirements for each parameter shall be achieved except as provided for in 8.5.2.2.

8.5.2.1 EPA secondary treatment guideline parameters

8.5.2.1.1 $CBOD_5$

The 30-d average of $CBOD_5$ concentrations of effluent samples shall not exceed 25 mg/L.

The 7-d average of $CBOD_5$ concentrations of effluent samples shall not exceed 40 mg/L.

8.5.2.1.2 TSS

The 30-d average of TSS concentrations of effluent samples shall not exceed 30 mg/L.

The 7-d average of TSS concentrations of effluent samples shall not exceed 45 mg/L.

8.5.2.1.3 pH

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

8.5.2.2 Effluent concentration excursions

System performance shall not be considered outside the limits established for Class I systems if, during the first calendar month of performance testing and evaluation, 7-d average and 30-d average effluent $CBOD_5$ and TSS concentrations do not equal or exceed 1.4 times the effluent limits specified in 8.5.2.1.

NOTE – The technology utilized in many residential wastewater treatment systems is biologically based. The allowance of excursions from the effluent limits established in this Standard during the first calendar month of performance testing and evaluation reflects the fact that an immature culture of microorganisms within the system may require additional time to achieve adequate treatment efficiency.

The value of 1.4 is based on the USEPA Technical Review Criteria for Group I Pollutants, including $CBOD_5$ and TSS.

8.5.2.3 Color, odor, oily film, and foam

8.5.2.3.1 Color

The color rating of each of the 3 diluted composite effluent samples shall not exceed 15 units.

8.5.2.3.2 Odor

The overall rating of each of the three diluted composite effluent samples shall be non offensive.

8.5.2.3.3 Oily film and foam

Oily films and foaming shall not be visually detected in any of the diluted composite effluent samples.

8.5.3 Class II systems

The following criteria shall be met in order for a system to be classified as a Class II residential wastewater treatment system.

8.5.3.1 $CBOD_5$

Not more than 10% of the effluent $CBOD_5$ values shall exceed 60 mg/L.

TSS
Not more than 10% of the effluent TSS values shall exceed 100 mg/L.

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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	1.9	1.7	1.7	1.8
Temperature (C)	influent	31	31	31	31	31
	aeration chamber					
	effluent	30	30	30	30	30
pH	influent	6.8	6.8	6.8	6.8	6.8
	aeration chamber					
	effluent	6.8	6.8	6.8	6.8	6.8
Biochemical Oxygen Demand (mg/L)	influent	150	230	180	160	260
	effluent	d	3	6	3	3
Total Suspended Solids (mg/L)	influent	230	280	340	310	360
	aeration chamber					
	effluent	d	4	12	6	4
Volatile Suspended Solids (mg/L)	influent	190	240	290	240	310
	aeration chamber					
	effluent	d	3	11	4	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	1.8	1.8
Temperature (C)	influent	30	30	30	30	30
	aeration chamber					
	effluent	30	30	30	30	30
pH	influent	6.8	6.8	6.8	6.8	6.8
	aeration chamber					
	effluent	6.8	6.8	6.8	6.9	6.8
Carbonaceous Biochemical Oxygen Demand (mg/L)	influent	190	210	220	210	170
	effluent	d	3	d	d	4
Total Suspended Solids (mg/L)	influent	490	240	220	280	270
	aeration chamber					
	effluent	<2	2	2	2	2
Volatile Suspended Solids (mg/L)	influent	420	210	190	240	240
	aeration chamber					
	effluent	<2	<2	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, 13, and 14 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	1.7	1.8	1.6	1.7
Temperature (C)	influent	30	30	30	30	30
	aeration chamber					
	effluent	30	30	30	30	30
pH	influent	6.8	6.8	6.8	6.8	6.8
	aeration chamber					
	effluent	6.9	6.9	6.9	6.9	6.8
Biochemical Oxygen Demand (mg/L)	influent	150	190	260	260	320
	effluent	2	2	2	3	3
Total Suspended Solids (mg/L)	influent	210	350	320	310	380
	aeration chamber					
	effluent	<2	<2	2	<2	<2
Volatile Suspended Solids (mg/L)	influent	170	290	250	250	300
	aeration chamber					
	effluent	<2	<2	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	1.7	1.6	1.8	1.7
Temperature (C)	influent	30	30	30	30	30
	aeration chamber					
	effluent	30	30	30	30	30
pH	influent	6.8	6.8	6.8	6.8	6.9
	aeration chamber					
	effluent	6.9	6.8	6.9	6.9	6.9
Biochemical Oxygen Demand (mg/L)	influent	220	270	400	500	200
	effluent	<2	<2	<2	<2	2
Total Suspended Solids (mg/L)	influent	150	220	550	600	270
	aeration chamber					
	effluent	<2	<2	<2	<2	<2
Volatile Suspended Solids (mg/L)	influent	130	190	470	510	230
	aeration chamber					
	effluent	<2	<2	<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	1.8	1.7	1.7	1.8
Temperature (C)	influent	30	30	30	30	30
	aeration chamber					
	effluent	30	30	30	30	30
pH	influent	6.9	6.8	6.8	6.9	6.9
	aeration chamber					
	effluent	6.9	6.7	6.9	6.9	6.9
Biochemical Oxygen Demand (mg/L)	influent	150	400	190	540	320
	effluent	<2	<2	<2	<2	<2
Total Suspended Solids (mg/L)	influent	100	460	66	540	310
	aeration chamber					
	effluent	2	<2	<2	<2	<2
Volatile Suspended Solids (mg/L)	influent	85	380	62	470	280
	aeration chamber					
	effluent	<2	<2	<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	1.7	1.6	1.7	1.8
Temperature (C)	influent	30	30	30	30	30
	aeration chamber					
	effluent	31	31	31	31	31
pH	influent	6.8	6.8	6.8	6.8	6.8
	aeration chamber					
	effluent	6.8	6.8	6.8	6.8	6.8
Biochemical Oxygen Demand (mg/L)	influent	130	280	310	240	270
	effluent	<2	2	2	5	7
Total Suspended Solids (mg/L)	influent	150	240	500	240	400
	aeration chamber					
	effluent	<2	5	4	6	8
Volatile Suspended Solids (mg/L)	influent	130	200	400	210	310
	aeration chamber					
	effluent	<2	4	3	5	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	1.6	1.7	1.6	1.6
Temperature (C)	influent	30	30	30	30	30
	aeration chamber					
	effluent	31	31	31	31	31
pH	influent	6.8	6.9	6.8	6.9	6.8
	aeration chamber					
	effluent	6.9	6.9	6.9	6.9	6.8
Biochemical Oxygen Demand (mg/L)	influent	210	190	180	230	210
	effluent	<2	3	3	<2	<2
Total Suspended Solids (mg/L)	influent	280	220	290	220	300
	aeration chamber					
	effluent	3	5	<2	2	2
Volatile Suspended Solids (mg/L)	influent	220	180	230	180	270
	aeration chamber					
	effluent	2	4	<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	1.6	1.6	1.5
Temperature (C)	influent	30	30	30	30	30
	aeration chamber					
	effluent	30	30	30	30	30
pH	influent	6.8	6.8	6.8	6.9	6.9
	aeration chamber					
	effluent	6.8	6.9	6.9	6.9	6.9
Biochemical Oxygen Demand (mg/L)	influent	210	170	180	100	280
	effluent	<2	<2	<2	<2	<2
Total Suspended Solids (mg/L)	influent	250	310	290	210	420
	aeration chamber					
	effluent	<2	<2	<2	<2	<2
Volatile Suspended Solids (mg/L)	influent	210	210	230	180	360
	aeration chamber					
	effluent	<2	<2	<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	1.6	1.6
Temperature (C)	influent	30	30	30	30	30
	aeration chamber					
	effluent	30	30	30	30	30
pH	influent	6.8	6.8	6.9	6.8	6.8
	aeration chamber					
	effluent	6.9	6.9	6.9	6.9	6.8
Biochemical Oxygen Demand (mg/L)	influent	270	190	260	490	200
	effluent	<2	<2	3	<2	<2
Total Suspended Solids (mg/L)	influent	350	300	230	1100	310
	aeration chamber					
	effluent	<2	<2	4	<2	<2
Volatile Suspended Solids (mg/L)	influent	290	240	200	910	240
	aeration chamber					
	effluent	<2	<2	4	<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 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	1.5	1.5
Temperature (C)	influent	30	30	30	30	30
	aeration chamber					
	effluent	30	30	30	30	30
pH	influent	6.8	6.8	6.9	6.9	6.8
	aeration chamber					
	effluent	6.8	6.9	6.9	6.8	6.8
Biochemical Oxygen Demand (mg/L)	influent	300	400	260	200	340
	effluent	4	<2	<2	2	2
Total Suspended Solids (mg/L)	influent	400	260	210	230	260
	aeration chamber					
	effluent	7	<2	<2	2	3
Volatile Suspended Solids (mg/L)	influent	300	230	180	190	220
	aeration chamber					
	effluent	6	<2	<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: 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	0.6	0.5	0.6	2.3
Temperature (C)	influent	29	28	26	26	25
	aeration chamber					
	effluent	20	25	19	19	21
pH	influent	6.8	6.8	6.5	6.7	6.9
	aeration chamber					
	effluent	6.9	6.9	6.8	6.1	6.9
Biochemical Oxygen Demand (mg/L)	influent	470	400	200	d	470
	effluent	8	<2	4	<2	2
Total Suspended Solids (mg/L)	influent	640	750	740	1600	900
	aeration chamber					
	effluent	14	2	10	<2	3
Volatile Suspended Solids (mg/L)	influent	540	650	620	1300	750
	aeration chamber					
	effluent	12	2	8	<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: Influent BOD measurement missed on 11/16 due to laboratory error.

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	1.9	1.9
Temperature (C)	influent	25	25	25	25	25
	aeration chamber					
	effluent	21	21	21	21	21
pH	influent	7.0	7.0	7.0	7.0	7.0
	aeration chamber					
	effluent	6.9	6.8	6.9	6.8	6.9
Biochemical Oxygen Demand (mg/L)	influent	770	300	390	290	130
	effluent	<2	6	5	2	<2
Total Suspended Solids (mg/L)	influent	1400	360	490	480	180
	aeration chamber					
	effluent	4	7	9	<2	16
Volatile Suspended Solids (mg/L)	influent	1200	310	430	410	160
	aeration chamber					
	effluent	3	7	8	<2	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	1.8	1.9	1.9
Temperature (C)	influent	24	24	24	24	24
	aeration chamber					
	effluent	22	22	22	22	22
pH	influent	6.8	6.8	6.7	6.7	6.8
	aeration chamber					
	effluent	6.8	6.8	6.8	6.8	6.8
Biochemical Oxygen Demand (mg/L)	influent	440	370	400	500	240
	effluent	<2	5	3	16	3
Total Suspended Solids (mg/L)	influent	790	780	520	890	450
	aeration chamber					
	effluent	2	16	3	8	2
Volatile Suspended Solids (mg/L)	influent	620	590	400	720	390
	aeration chamber					
	effluent	2	14	<2	7	<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	1.6	1.7
Temperature (C)	influent	24	24	24	24	24
	aeration chamber					
	effluent	22	23	23	23	23
pH	influent	6.8	6.8	6.9	6.8	6.8
	aeration chamber					
	effluent	6.9	6.8	6.9	6.9	6.9
Biochemical Oxygen Demand (mg/L)	influent	110	69	150	290	280
	effluent	<2	<2	<2	<2	<2
Total Suspended Solids (mg/L)	influent	410	230	320	320	320
	aeration chamber					
	effluent	3	4	<2	2	2
Volatile Suspended Solids (mg/L)	influent	350	200	260	270	270
	aeration chamber					
	effluent	3	4	<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 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	1.9	1.7	1.7	1.8
Temperature (C)	influent	24	23	23	23	23
	aeration chamber					
	effluent	23	23	22	22	22
pH	influent	6.8	6.9	7.0	6.9	6.9
	aeration chamber					
	effluent	6.8	6.9	6.9	6.9	6.9
Biochemical Oxygen Demand (mg/L)	influent	140	270	250	230	340
	effluent	<2	<2	<2	<2	<2
Total Suspended Solids (mg/L)	influent	150	300	270	340	310
	aeration chamber					
	effluent	<2	<2	<2	<2	<2
Volatile Suspended Solids (mg/L)	influent	130	260	230	280	260
	aeration chamber					
	effluent	<2	<2	<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	1.6	1.8	1.6	1.7
Temperature (C)	influent	23	23	23	23	23
	aeration chamber					
	effluent	23	23	23	23	23
pH	influent	6.8	6.9	6.9	6.8	6.8
	aeration chamber					
	effluent	6.9	6.8	6.9	6.8	6.8
Biochemical Oxygen Demand (mg/L)	influent	350	170	250	220	200
	effluent	<2	<2	<2	<2	<2
Total Suspended Solids (mg/L)	influent	300	220	300	260	190
	aeration chamber					
	effluent	<2	<2	<2	<2	2
Volatile Suspended Solids (mg/L)	influent	260	180	250	230	160
	aeration chamber					
	effluent	<2	<2	<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 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		1.6					
Temperature (C)	influent		23					
	aeration chamber							
	effluent		23					
pH	influent		6.9					
	aeration chamber							
	effluent		6.9					
Biochemical Oxygen Demand (mg/L)	influent		120					
	effluent		<2					
Total Suspended Solids (mg/L)	influent		200					
	aeration chamber							
	effluent		14					
Volatile Suspended Solids (mg/L)	influent		180					
	aeration chamber							
	effluent		12					
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	1.7	1.7	1.6	1.6	1.7
Temperature (C)	influent		23	23	23	23	23	23
	aeration chamber							
	effluent		23	23	23	23	23	23
pH	influent		6.9	7.0	6.9	6.9	6.8	6.8
	aeration chamber							
	effluent		6.9	6.9	6.9	6.9	6.9	6.9
Biochemical Oxygen Demand (mg/L)	influent		140	140	180	300	270	290
	effluent		<2	<2	<2	5	2	2
Total Suspended Solids (mg/L)	influent		210	200	320	410	280	340
	aeration chamber							
	effluent		2	<2	18	10	3	22
Volatile Suspended Solids (mg/L)	influent		180	170	280	340	220	290
	aeration chamber							
	effluent		<2	<2	14	7	3	16
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	1.6	1.7	1.7	1.5	3.8		
Temperature (C)	influent	22	22	20	21	19		
	aeration chamber							
	effluent	22	22	22	22	14		
pH	influent	6.9	6.8	6.8	6.9	7.0		
	aeration chamber							
	effluent	6.9	6.8	6.9	6.8	6.8		
Biochemical Oxygen Demand (mg/L)	influent	320	140	160	200	400		
	effluent	3	6	6	6	5		
Total Suspended Solids (mg/L)	influent	560	170	190	140	560		
	aeration chamber							
	effluent	9	6	6	10	29		
Volatile Suspended Solids (mg/L)	influent	d	d	150	120	430		
	aeration chamber							
	effluent	d	d	5	9	16		
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.
VSS analyses missed on 1/14 and 15 due to laboratory error.

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	3.4	3.3	3.4
Temperature (C)	influent				19	19	19	19
	aeration chamber							
	effluent				12	12	13	12
pH	influent				6.9	6.8	6.8	6.9
	aeration chamber							
	effluent				6.9	6.9	6.9	6.9
Biochemical Oxygen Demand (mg/L)	influent				110	130	540	250
	effluent				4	5	2	9
Total Suspended Solids (mg/L)	influent				530	250	250	730
	aeration chamber							
	effluent				4	10	17	27
Volatile Suspended Solids (mg/L)	influent				410	190	190	610
	aeration chamber							
	effluent				4	8	12	21
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	3.4						
Temperature (C)	influent	19						
	aeration chamber							
	effluent	13						
pH	influent	6.9						
	aeration chamber							
	effluent	6.8						
Biochemical Oxygen Demand (mg/L)	influent	190						
	effluent	5						
Total Suspended Solids (mg/L)	influent	450						
	aeration chamber							
	effluent	4						
Volatile Suspended Solids (mg/L)	influent	360						
	aeration chamber							
	effluent	4						
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	3.2
Temperature (C)	influent						19	19
	aeration chamber							
	effluent						14	14
pH	influent						6.9	6.8
	aeration chamber							
	effluent						6.9	6.8
Biochemical Oxygen Demand (mg/L)	influent						590	180
	effluent						5	4
Total Suspended Solids (mg/L)	influent						510	210
	aeration chamber							
	effluent						22	6
Volatile Suspended Solids (mg/L)	influent						450	190
	aeration chamber							
	effluent						16	5
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	
Dissolved Oxygen (mg/L)	aeration chamber							
	effluent	3.0	2.9	3.0	2.8	2.8	2.8	
Temperature (C)	influent	20	20	20	19	19	19	
	aeration chamber							
	effluent	14	14	14	14	14	14	
pH	influent	6.9	6.8	6.9	6.8	6.8	6.9	
	aeration chamber							
	effluent	6.9	6.8	6.8	6.8	6.8	6.8	
Biochemical Oxygen Demand (mg/L)	influent	260	190	99	430	420	450	
	effluent	5	5	3	4	5	8	
Total Suspended Solids (mg/L)	influent	260	400	160	320	350	410	
	aeration chamber							
	effluent	6	4	2	5	3	19	
Volatile Suspended Solids (mg/L)	influent	240	350	130	280	290	340	
	aeration chamber							
	effluent	5	3	2	4	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	3.0	2.9	2.9
Temperature (C)	influent	20	20	20	20	20
	aeration chamber					
	effluent	15	15	15	15	15
pH	influent	7.0	7.0	6.9	6.9	6.9
	aeration chamber					
	effluent	6.9	6.9	7.0	6.9	6.9
Biochemical Oxygen Demand (mg/L)	influent	290	240	170	150	220
	effluent	3	2	<2	<2	4
Total Suspended Solids (mg/L)	influent	480	330	220	350	270
	aeration chamber					
	effluent	4	2	<2	<2	4
Volatile Suspended Solids (mg/L)	influent	410	310	180	320	230
	aeration chamber					
	effluent	3	2	<2	<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	1.9	1.7	1.8	1.8
Temperature (C)	influent	18	19	19	19	19
	aeration chamber					
	effluent	18	18	18	18	18
pH	influent	6.9	7.0	6.9	6.9	6.8
	aeration chamber					
	effluent	6.9	6.9	6.9	6.9	6.9
Biochemical Oxygen Demand (mg/L)	influent	260	150	130	110	280
	effluent	3	<2	<2	<2	4
Total Suspended Solids (mg/L)	influent	390	88	84	53	330
	aeration chamber					
	effluent	3	10	3	<2	7
Volatile Suspended Solids (mg/L)	influent	320	72	72	46	260
	aeration chamber					
	effluent	2	8	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:

APPENDIX G

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.*

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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

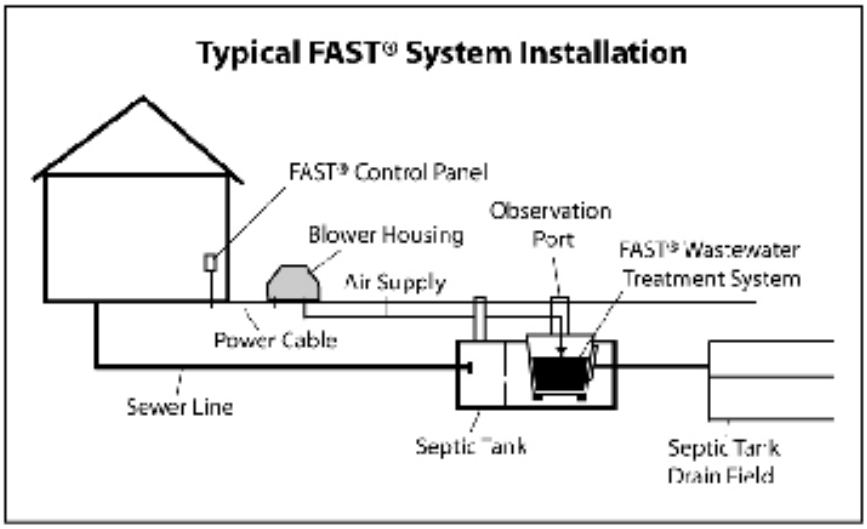
Thank you for choosing a FAST wastewater treatment system for your home. The system is compatible with garbage disposals, dishwashers and other household appliances. The MicroFAST 0.5, 0.75, 0.9 and 1.5 systems have been tested and certified by NSF *International* to meet NSF Standard 40, Class 1.

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.*

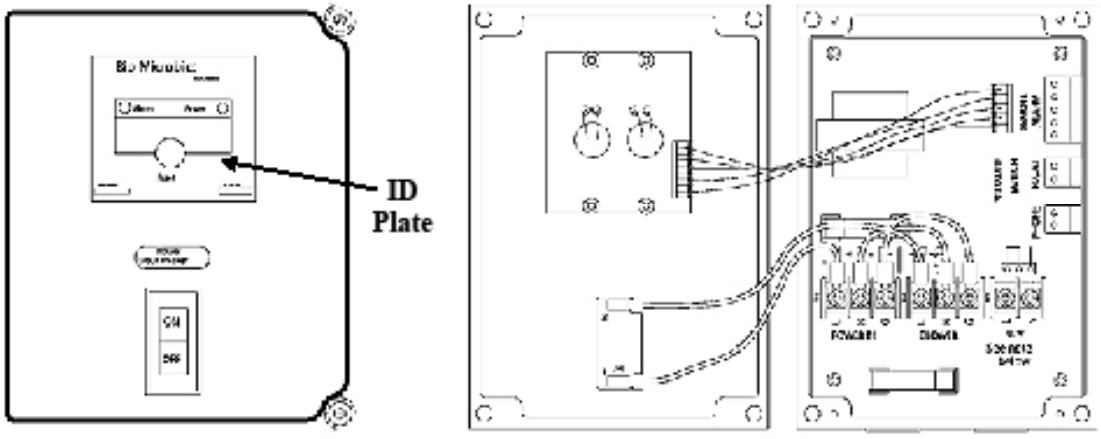
WARNING: *The treatment unit can be damaged by placing heavy items on the ground above the tank. Vehicles heavier than a lawn tractor should not be driven in the area surrounding the FAST system to minimize the risk of damage to the septic tank and associated piping (unless the septic tank has been specially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

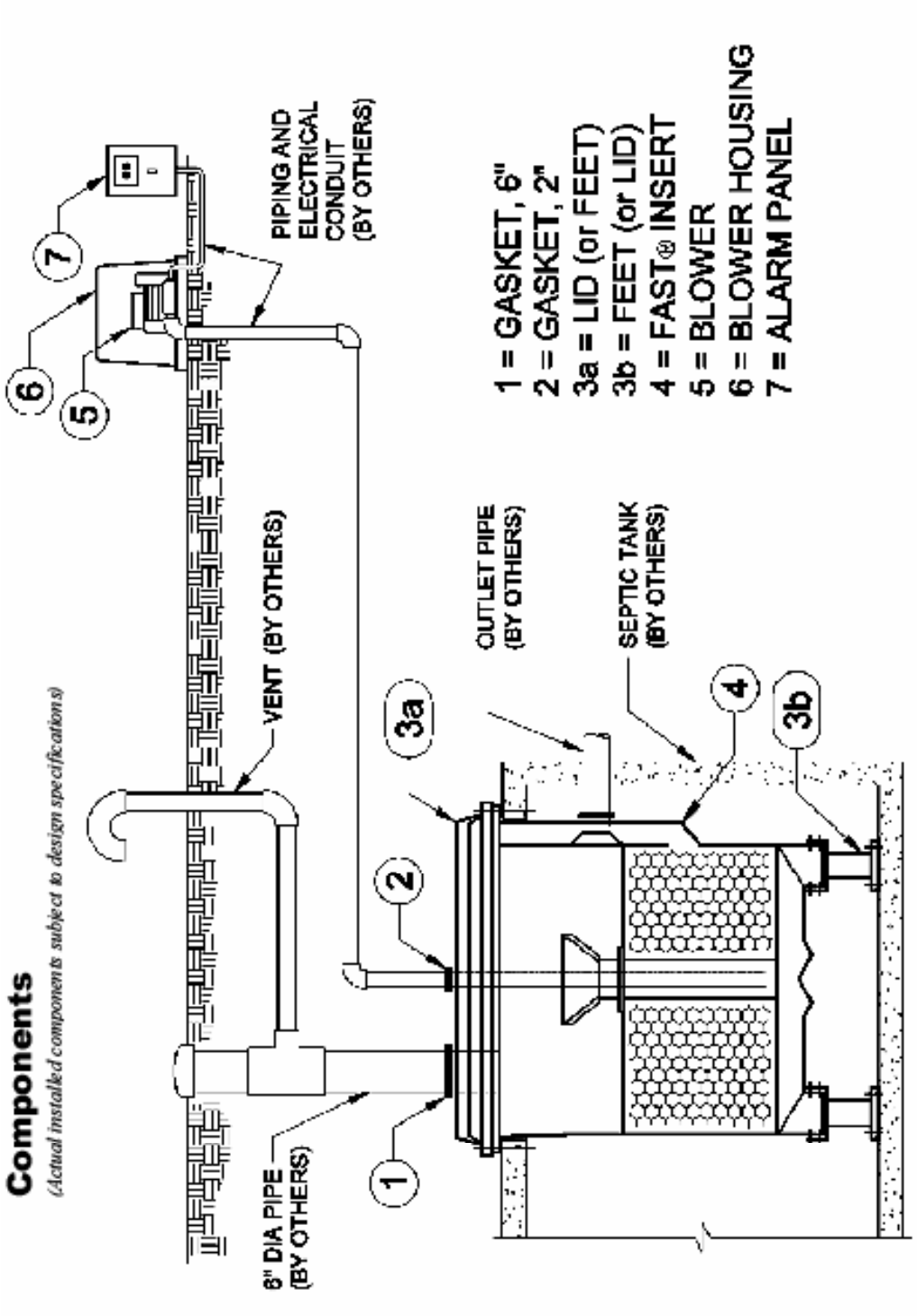
LIMITED 24-MONTH WARRANTY

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.



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