

# WASTEWATER TECHNOLOGY

---

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

**Final Report:**

**E-Z Treat  
Model #600  
13/12/055/0030**



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

**Evaluation Report:  
E-Z Treat #600 - Wastewater Treatment System**

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

**January 2016**

## EXECUTIVE SUMMARY

Testing of the E-Z Treat Model #600 was conducted under the provisions of NSF/ANSI Standard 245 for Residential Wastewater Treatment Systems (April 2013 revision). NSF/ANSI Standard 245 was developed by the NSF Joint Committee on Wastewater Technology.

The performance evaluation was conducted at the NSF Wastewater Technology Testing 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 an additional two and one half weeks of dosing at design flow. The stress weeks were repeated due to sampling error and the test was extended for 34 weeks. Sampling started in the spring, summer and continued through fall, covering a range of operating temperatures.

Over the course of the evaluation, the average influent Total Nitrogen was 41 mg/L, ranging between 20.9 and 77.4 mg/L. The Model #600 produced an average effluent Total Nitrogen of 15 mg/L, which resulted in a 64% reduction in the influent Total Nitrogen.

The Model #600 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 12 mg/L for CBOD<sub>5</sub> and 8 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 6 mg/L for CBOD<sub>5</sub> and 4 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 6.8 and 7.5, within the required range of 6.0 to 9.0. The #600 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 nitrogen reduction for residential wastewater treatment systems is achieved within the provisions of NSF/ANSI Standard 245: Wastewater Treatment Systems – Nitrogen Reduction (April 2013), 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 245 are classified as having met the requirements of the Standard. Permission to use the NSF Mark is granted only after the equipment has been tested and found to perform satisfactorily, and all other requirements of the Standard have been satisfied. Continued use of the Mark is dependent upon evidence of compliance with the Standard and NSF General and Program Specific Policies, as determined by periodic reinspection of the equipment at the factory, distributors and reports from the field.

NSF Standard 245 requires the testing laboratory to provide the manufacturer of a residential wastewater treatment system a report including significant data and appropriate commentary relative to the performance evaluation of the plant. 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 plant, its operation and key process control equipment, and a narrative summary of the test program, including test location, procedures and significant occurrences. The plant represented herein reflects the equipment authorized to bear the NSF Mark.

## CERTIFICATION

NSF International has determined by performance evaluation under the provisions of NSF/ANSI Standard 245 (revised April 2013) that the Model #600 manufactured by E-Z Treat has fulfilled the requirements of NSF/ANSI Standard 245. The #600 has therefore been authorized to bear the NSF Mark so long as E-Z Treat continues to meet the requirements of Standard 245 and NSF General and Program Specific Policies.

General performance evaluation and stress tests were performed at the Wastewater Technology Site located at the NSF Wastewater Technology Testing Facility located in Waco, Texas. The raw wastewater used in the test was residential 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.



Jenny Oorbeck  
General Manager  
Wastewater Treatment Unit Certification



Sharon Steiner  
Business Unit Manager  
Wastewater Treatment Unit Program

## TABLE OF CONTENTS

	<u>Page</u>
Executive Summary .....	2
Preface.....	3
Certification .....	4
Table of Contents.....	5
1.0 Process Description .....	7
2.0 Performance Evaluation.....	7
2.1 Description of Unit Evaluated .....	7
2.2 Test Protocol .....	8
2.3 Test Chronology.....	9
3.0 Analytical Results.....	9
3.1 Summary.....	10
3.2 Biochemical Oxygen Demand .....	11
3.3 Total Suspended Solids .....	12
3.4 pH.....	13
3.5 Temperature.....	13
3.6 Dissolved Oxygen .....	14
3.7 Alkalinity .....	14
3.8 TKN .....	15
3.9 Ammonia-N .....	16
3.10 Nitrite/nitrate-N .....	17
3.11 Total Nitrogen.....	18
4.0 References.....	19

### Appendices

- Appendix A - Plant Specifications and Drawings
- Appendix B - Standard 245 Section 8 - Performance testing and evaluation
- Appendix C - Analytical Results – BOD<sub>5</sub>, CBOD<sub>5</sub>, TSS, pH and Temperature
- Appendix D - Analytical Results – Nitrogen Analyses
- Appendix E - Owner's Manual

**This page intentionally blank**

## 1.0 PROCESS DESCRIPTION

The E-Z Treat Synthetic Sand/Media Filter System operates as a fixed media, packed-bed filter system. In these treatment systems, larger solids contained in the applied wastewater are retained within the media by filtration, typically in the upper level of the filter media. A bacterial film forms on the surface of media grains and provides for removal of soluble organic material and small colloidal matter by absorption by the bacteria in the film. Decomposition of the absorbed material occurs during rest periods in the filter, when there is no application of wastewater. The organic material becomes an energy source for the bacteria to maintain themselves and produce new cells. Over time, as the filter matures, the film layer forms throughout the depth of the filter media and by-products of the biological process pass out of the filter. Recirculation of the water leaving the filter back through the filter surface provides for additional treatment by the bacteria in the media bed, as well as a mechanism for moving partially decomposed organic materials, bacterial waste products and other debris from the filter. This keeps the pore spaces within the media from clogging. Treatment using recirculating media filtration systems is generally an aerobic process and reaeration of the media, which occurs during the resting (non-dosing) periods, is essential for proper treatment. Long periods with no dosing, such a prolonged power outages, or excessive organic or grease loading can have a significant impact on the system operation.

## 2.0 PERFORMANCE EVALUATION

### 2.1 Description of Plant Evaluated

The #600 model tested in this evaluation has a rated capacity of 600 gallons per day (gpd), and was constructed of injection molded polyethylene. Specifications and drawings are included in Appendix A.

Raw wastewater was treated in a 1,000 gallon (gal), two compartment septic tank fitted with an effluent filter designed to remove solids greater than 1/16 inch (in). The septic tank discharged to a 1,000 gal re-circulation tank that was fitted with a float ball by-pass valve and re-circulation pump. The float ball by-pass valve inside the re-circulation tank connected to a 4-in return line from the sand filter. The float by-pass valve maintains a constant liquid volume in the re-circulation tank and allows the effluent to be constantly re-circulated through the sand/media filter, discharging only the daily forward flow volume after it has passed through the filter.

The E-Z Treat Model #600 filter media was installed in a specially designed chamber fitted with an irrigation system for distribution of wastewater over the surface of the media. The spray manifold had eight evenly spaced wide-angle spray nozzles. The nozzles were brass construction with a free passage of 0.0625-in diameter; this large free passage prevents nozzle clogging while maintaining a consistent misting spray. The manifold was assembled with a pressure gauge and valves allowing for flow and rate adjustments

E-Z Treat synthetic sand filter employs a manufactured synthetic media encapsulated in a mattress like container. The mattress is fabricated from a non-biodegradable, chemically resistant, loose weave polypropylene material with a weave pattern at 90 degree intersections. This creates .078-in square openings allowing effluent and air to flow freely while containing the media material. This media is very uniform and provides ample surface area for biological growth. The media also has enough voids to



accommodate good air and liquid flow and the passage of very small solids that would clog many filters. The media is very lightweight making it resistant to compaction which can lead to poor air and liquid flows, a problem that plagues many media filters. The media consists of lightweight, non-biodegradable plastic spheres.

## 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 plant was accomplished by filling the plant with 2/3 water and 1/3 raw sewage. The plant was then dosed at the design loading rate of 600 gpd as follows:

- 6 a.m. to 9 a.m. - 35 percent of daily rated capacity (210 gallons)
- 11 a.m. to 2 p.m. - 25 percent of daily rated capacity (150 gallons)
- 5 p.m. to 8 p.m. - 40 percent of daily rated capacity (240 gallons)

Dosing was accomplished by opening an electrically actuated valve to feed wastewater to the test plant. Ten 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 plant is subjected to the following loading sequence:

- Design loading - 16 weeks
  - Stress loading - 7.5 weeks
  - Design loading - 2.5 weeks
- Note this test was extended to 34 weeks, stress was repeated due to sampling error.

During the design loading periods, flow proportioned 24-hour composite influent and effluent samples are collected three times per week. The influent samples are analyzed for five-day biochemical oxygen demand (BOD<sub>5</sub>), total suspended solids (TSS), alkalinity, total Kjeldahl nitrogen (TKN), and ammonia-N. The effluent samples are analyzed for carbonaceous five-day biochemical oxygen demand (CBOD<sub>5</sub>), TSS, alkalinity, TKN, ammonia-N and nitrite/nitrate-N concentrations. Onsite determinations of the influent and effluent pH, temperature and dissolved oxygen are made five days per week on grab samples.

Stress testing is designed to evaluate how the plant 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 successfully pass the Standard 245 evaluation:

- (1) CBOD<sub>5</sub>: The average of all effluent samples shall not exceed 25 mg/L.
- (2) TSS: The average of all effluent samples shall not exceed 30 mg/L.
- (3) Total Nitrogen: The average total nitrogen concentration of all effluent samples shall be less than 50% of the average total nitrogen concentration of all influent samples.
- (4) pH: Individual effluent values shall remain between 6.0 and 9.0 SU.

### 2.3 Test Chronology

The system was installed under the direction of the manufacturer on October 11, 2013. The infiltration/exfiltration test, during which the entire system was tested for leaks, was completed on October 11, 2013. The unit was filled with 2/3 fresh water and 1/3 raw sewage and dosing was initiated at the rate of 600 gallons per day beginning March 15, 2015. After a three-week start up period, the test was officially started on April 5, 2015. The stress test sequence was started on July 27, 2015 and ended on November 13, 2015. The stress weeks were repeated due to test site error and the test was extended to 34 weeks. Testing was completed on December 4, 2015.

## 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* 22nd edition. 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**

	<u>Average</u>	<u>Std. Dev.</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Median</u>	<u>Interquartile Range</u>
Biochemical Oxygen Demand (mg/L)						
<i>Influent (BOD<sub>5</sub>)</i>	200	88	39	590	200	200 - 290
<i>Effluent (CBOD<sub>5</sub>)</i>	3	3	<1	15	2	2 - 4
Total Suspended Solids (mg/L)						
<i>Influent</i>	190	81	26	600	180	180 - 260
<i>Effluent</i>	2	2	<1	10	1	2 - 3
pH						
<i>Influent</i>	-	-	6.8	7.9	7.4	7.3 – 7.5
<i>Effluent</i>	-	-	6.8	7.5	7.3	7.3 – 7.4
Temperature (°C)						
<i>Influent</i>	28	2	22	32	28	28 - 30
<i>Effluent</i>	28	4	20	36	29	29 - 32
Dissolved Oxygen (mg/L)						
<i>Tank 2</i>	0.8	0.6	0.3	2.6	0.5	0.5 – 1.6
<i>Effluent</i>	3.3	1.7	0.5	14	3.2	3.2 – 4.7
Alkalinity (mg/L)						
<i>Influent</i>	320	40	230	420	320	320 - 350
<i>Effluent</i>	220	27	180	310	220	210 - 240
Total Kjeldahl Nitrogen						
<i>Influent</i>	40	12	21	77	38	41 – 54
<i>Effluent</i>	5	5	0.05	20	3.6	3 – 10
Ammonia-N						
<i>Influent</i>	25	8	12	44	25	25 – 33
<i>Effluent</i>	4	4	0.05	17	3	3 – 8
Nitrite/nitrate-N (mg/L)						
<i>Influent</i>	0.3	0.4	0.05	1.4	0.1	0.1 – 0.9
<i>Effluent</i>	9	4	0.9	18	10	9 – 12
Total Nitrogen						
<i>Influent</i>	41	12	21	77	38	41 - 55
<i>Effluent</i>	15	4	7	24	14	13 - 19

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<sub>5</sub> during the first month of testing. The 30- and 7-day averages during this time may not 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<sub>5</sub> and TSS concentrations from the #600 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. There were no such conditions during this test.

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<sub>5</sub> 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<sub>5</sub>) and five-day carbonaceous biochemical oxygen demand (CBOD<sub>5</sub>) analyses were completed using *Standard Methods for the Examination of Water and Wastewater* 22nd edition. The results of both analyses are shown in Figure 1.

#### *Influent BOD<sub>5</sub>:*

Individual influent BOD<sub>5</sub> concentrations ranged from 39 to 590 mg/L during the evaluation, with an average and median concentration of 200 mg/L. Thirty day average concentrations ranged from 160 to 280 mg/L. The average influent BOD<sub>5</sub> delivered to the treatment unit was within the influent characteristics defined under Section 8.2.1 of NSF/ANSI Standard 245.

#### *Effluent CBOD<sub>5</sub>:*

Effluent CBOD<sub>5</sub> concentrations ranged from <1 to 15 mg/L over the course of the evaluation, with an average concentration of 3 mg/L. The median effluent CBOD<sub>5</sub> concentration was 3 mg/L.

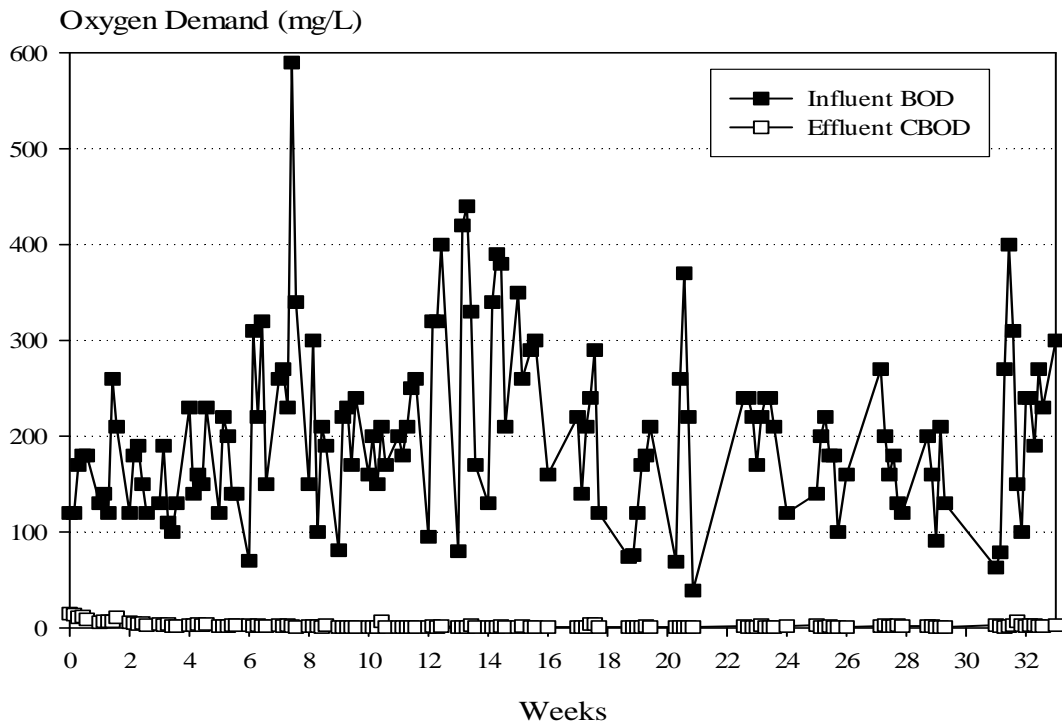


Figure 1. Biochemical Oxygen Demand

### 3.3 Total Suspended Solids

TSS analyses were completed using *Standard Methods for the Examination of Water and Wastewater* 22nd edition. The TSS results over the entire evaluation are shown in Figure 2. Data from the TSS analyses are summarized in Table I.

#### *Influent TSS:*

The influent TSS ranged from 26 to 600 mg/L during the evaluation, with an average concentration of 190 mg/L and a median concentration of 180 mg/L. The 30-day average concentrations during the test ranged from 130 to 240 mg/L. The average influent TSS delivered to the treatment unit was within the influent characteristics defined under Section 8.2.1 of NSF/ANSI Standard 245.

#### *Effluent TSS:*

The effluent TSS concentration ranged from <1 to 10 mg/L during the evaluation, with an average concentration of 2 mg/L and a median concentration of 1 mg/L.

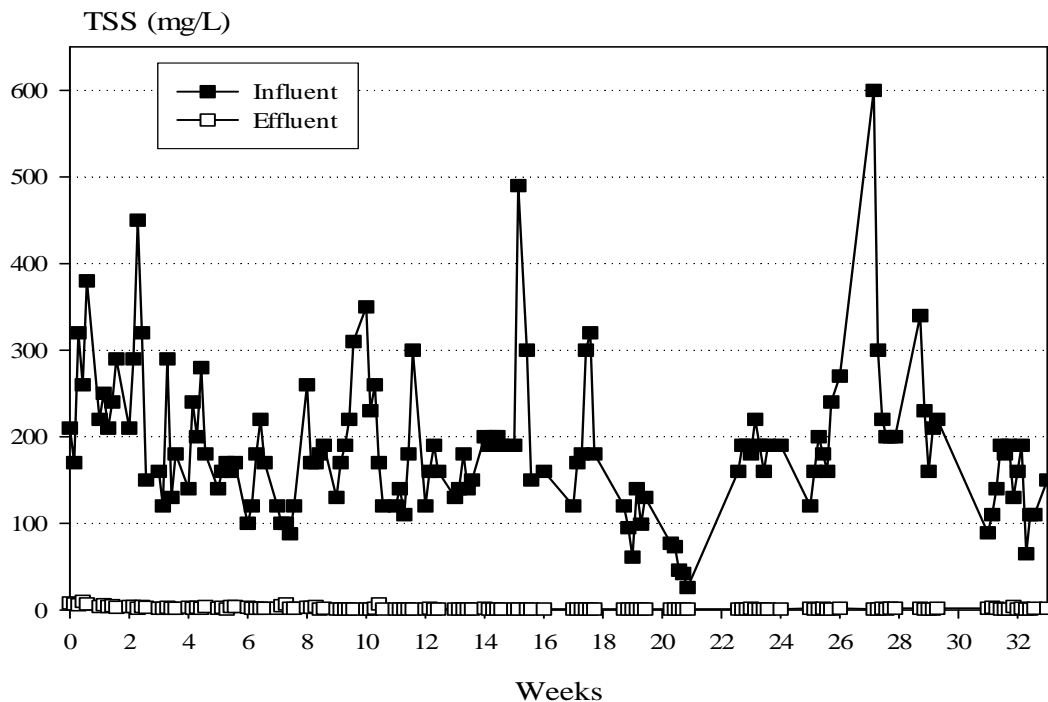


Figure 2. Total Suspended Solids

### 3.4 pH

Over the entire evaluation period, the influent pH ranged from 6.8 to 7.9 (median of 7.4). The effluent pH ranged from 6.8 to 7.5 during the evaluation (median of 7.3) within the 6 to 9 range required by NSF/ANSI Standard 245. The pH data for the evaluation are shown in Appendix C.

### 3.5 Temperature

Influent temperatures over the evaluation period ranged from 22 to 32°C (median of 28°C). The temperature data are shown in Appendix C. The Standard requires that the average influent temperature fall within 10 to 30 °C. The average influent temperature was within the characteristics defined under Section 8.2.1 of NSF/ANSI Standard 245.

### 3.6 Dissolved Oxygen

Dissolved Oxygen (DO) was measured in the effluent during the evaluation. The effluent DO ranged between 0.5 to 14 mg/L (median of 3.2 mg/L). All dissolved oxygen data are shown in Appendix C.

### 3.7 Alkalinity

Alkalinity analyses were completed using *Standard Methods for the Examination of Water and Wastewater* 22nd edition. The alkalinity results over the entire evaluation are shown in Figure 3. The influent and effluent alkalinities were all well within the range required by the Standard, and review of the nitrogen data indicates that alkalinity was not a limiting factor for nitrification in the system.

#### *Influent Alkalinity*

The influent alkalinity averaged 320 mg/L, ranging from 230 to 420 mg/L, with a median concentration of 320 mg/L. The influent alkalinity delivered to the treatment unit was within the influent characteristics defined under Section 8.2.1 of NSF/ANSI Standard 245.

#### *Effluent Alkalinity*

The effluent Alkalinity concentration ranged from 180 to 310 mg/L during the period when alkalinity samples were collected, with an average concentration of 220 mg/L and a median concentration of 220 mg/L.

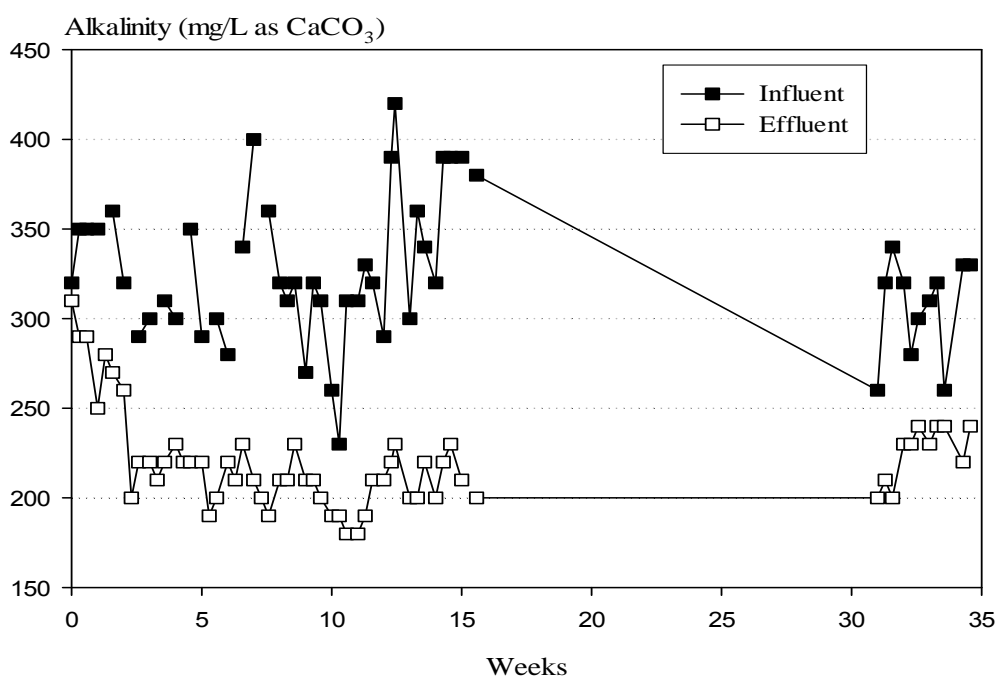


Figure 3: Alkalinity

### 3.8 Total Kjeldahl Nitrogen (TKN)

TKN analyses were completed using *Standard Methods for the Examination of Water and Wastewater* 22nd edition. The TKN results over the entire evaluation are shown in Figure 4.

### Influent TKN:

The influent TKN ranged from 21 to 77 mg/L during the evaluation, with average of 40 mg/L and a median concentration of 38 mg/L. The influent TKN delivered to the treatment unit was within the influent characteristics defined under Section 8.2.1 of NSF/ANSI Standard 245.

### Effluent TKN:

The effluent TKN concentration ranged from 0.05 to 20 mg/L during the evaluation, with an average concentration of 5 mg/L and a median concentration of 3.6 mg/L.

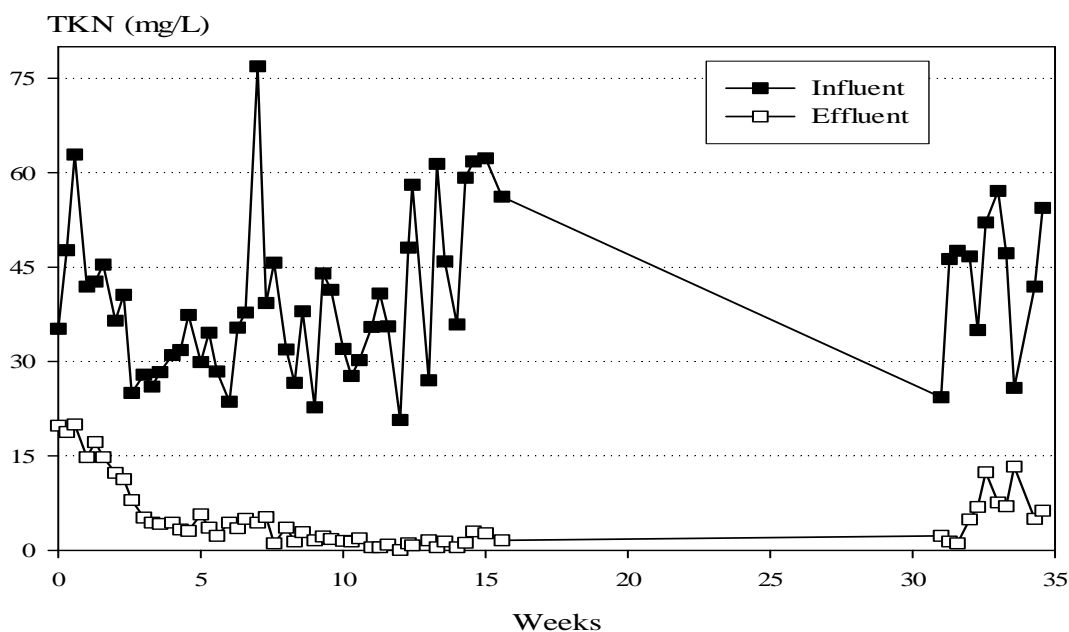


Figure 4: Total Kjeldahl Nitrogen

### 3.9 Ammonia-N

Ammonia-N analyses were completed using *Standard Methods for the Examination of Water and Wastewater* 22nd edition. The Ammonia-N results over the entire evaluation are shown in Figure 5.

### Influent Ammonia-N:

The influent Ammonia-N ranged from 12 to 44 mg/L during the evaluation, with an average and median concentrations of 25 mg/L.

### Effluent Ammonia-N:



The effluent Ammonia-N concentration ranged from 0.05 to 17 mg/L during the evaluation, with an average of 4 mg/L and a median concentration of 3 mg/L.

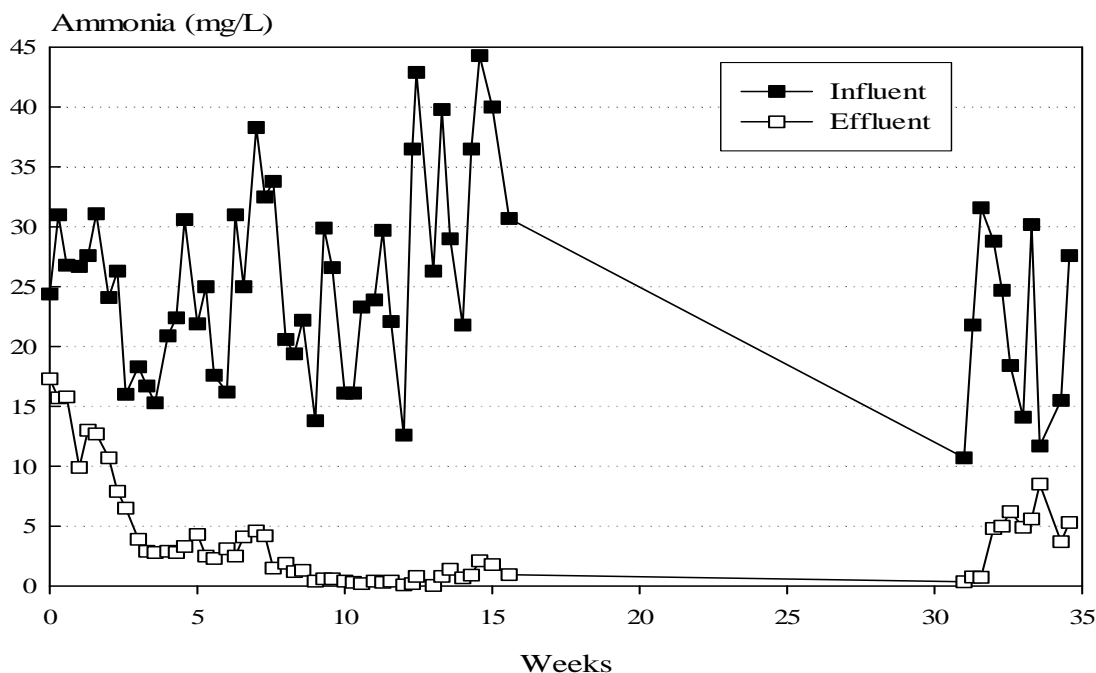


Figure 5: Ammonia

### 3.10 Nitrite/nitrate-N

Nitrite/nitrate-N analyses were completed using *Standard Methods for the Examination of Water and Wastewater* 22nd edition. The Nitrite/nitrate-N results over the entire evaluation are shown in Figure 6.

#### *Influent Nitrite/nitrate-N:*

The influent Nitrite/nitrate-N ranged from 0.05 to 1.4 mg/L during the evaluation, with average concentration of 0.3 mg/L and a median concentration of 0.1 mg/L.

#### *Effluent Nitrite/nitrate-N:*

The effluent Nitrite/nitrate-N concentration ranged from 0.9 to 18 mg/L during the evaluation, with an average of 9 mg/L and a median concentration of 10 mg/L.

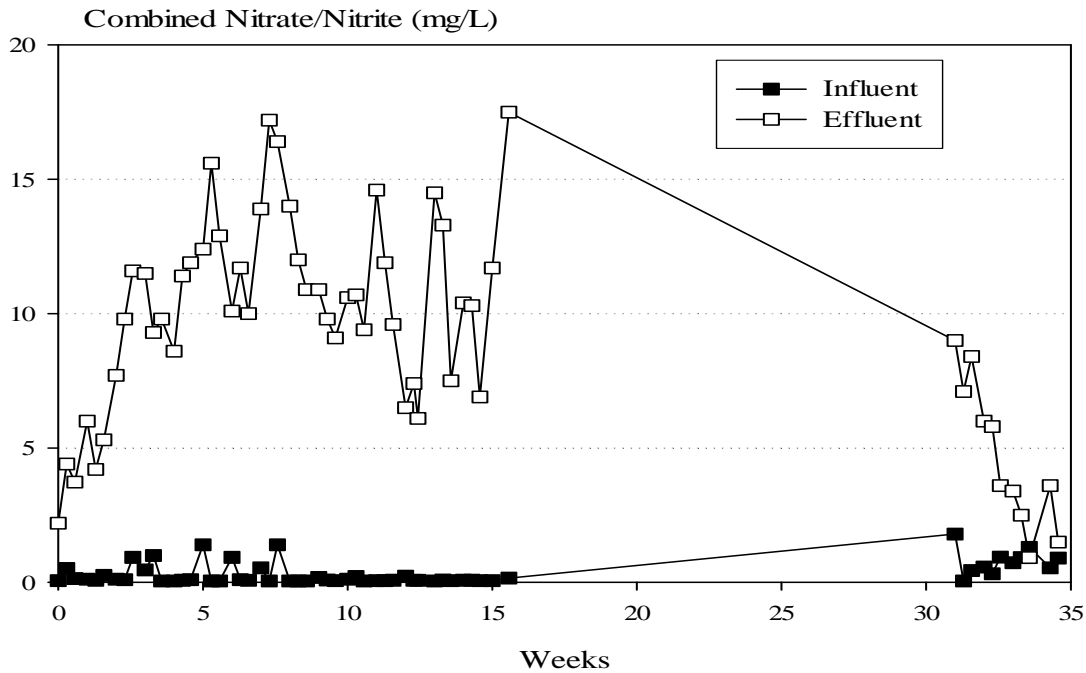


Figure 6: Effluent Nitrate/Nitrite

### 3.11 Total Nitrogen

Total Nitrogen (TN) is the sum of the total Kjeldahl nitrogen (TKN), nitrite (NO<sub>2</sub>) and nitrate (NO<sub>3</sub>) in a sample, and is expressed as mg/L as N. The TN results over the entire evaluation are shown in Figure 7.

#### *Influent Total Nitrogen*

The influent TN ranged from 21 to 77 mg/L during the evaluation, with average concentration of 41 mg/L and median concentration of 38 mg/L.

#### *Effluent Total Nitrogen:*

The effluent TN concentration ranged from 7 to 24 mg/L during the evaluation, with an average concentration of 15 mg/L and a median concentration of 14 mg/L. The E-Z Treat #600 successfully met the requirements of Standard 245 by reducing the influent TN by 64%, which exceeds the pass/fail criteria of 50%.

#### *Nitrogen Loading:*

Over the course of the evaluation the influent Total Nitrogen loading averaged 0.20 lb/day. The E-Z Treat #600 achieved an average reduction of 0.13 lbs/day.

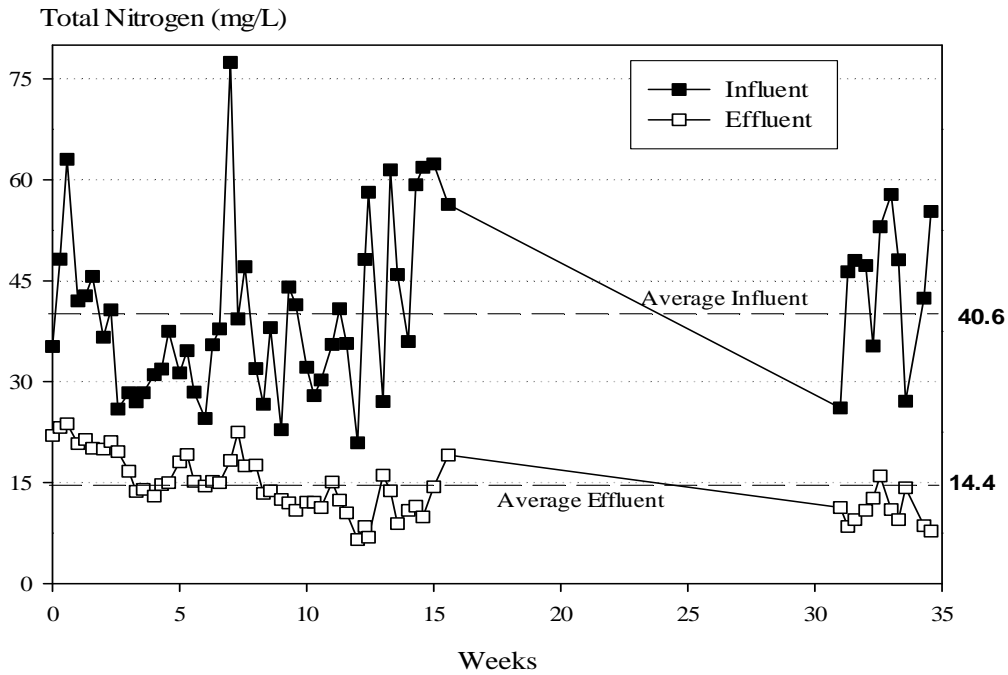


Figure 7: Total Nitrogen

#### 4.0 REFERENCES

1. American Public Health Association (APHA), American Water Works Association (AWWA) & Water Environment Federation (WEF): *Standard Methods for the Examination of Water and Wastewater*, 21<sup>st</sup> Edition, 2005 (hereinafter referred to as *Standard Methods*)
2. ANSI/AWS D.1.1/D1.1M:2010, *Structural Welding Code – Steel* and ANSI/AWS D1.3/D1.3M:2008, *Structural Welding Code – Sheet Steel*, 5th Edition, with Errata
3. NFPA 70®: *National Electrical Code®* (NEC®), 2011
4. NSF/ANSI 40, *Residential Wastewater Treatment Systems*
5. US EPA, *Code of Federal Regulations (CFR), Title 40: Protection of Environment, July 1, 2010*

**This page intentionally blank**

**APPENDIX A**  
**PLANT SPECIFICATIONS**

## PLANT SPECIFICATIONS

E-Z Treat Model #600  
600 GPD

### Plant Capacity

Design Flow 600 gpd

### System Hydraulic Capacity

Pretreatment Chamber	1000 gallons
Re-Circulation Chamber	1000 gallons
Total Hydraulic Capacity	600 gallons

### Hydraulic Retention Time (at Design Flow)

Pretreatment Chamber	12 hours
Re-Circulation Chamber	12 hours
Total Hydraulic Retention	24 hours

### Filter Media

Manufacture	International Cushioning Company
Model #	Styrene Media
Shape	Spheres
Size	0.165 to 0.200 in. diameter
Material	Plastic

### Re-Circulation Pump

Sta-Rite STEP 20	110V 1/2 HP 25 gpm @ 55 head
------------------	------------------------------------

### Effluent Filter

Manufacture Zabel	300
-------------------	-----

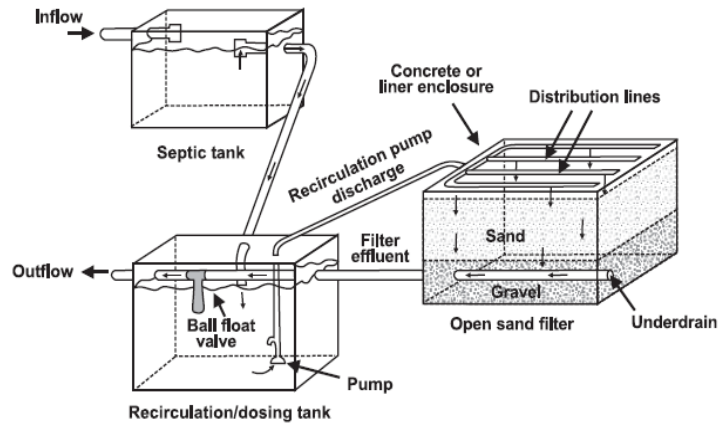
### Alarm Panel

Manufacture OEC Company	Model # 2/11 – 254X
-------------------------	---------------------

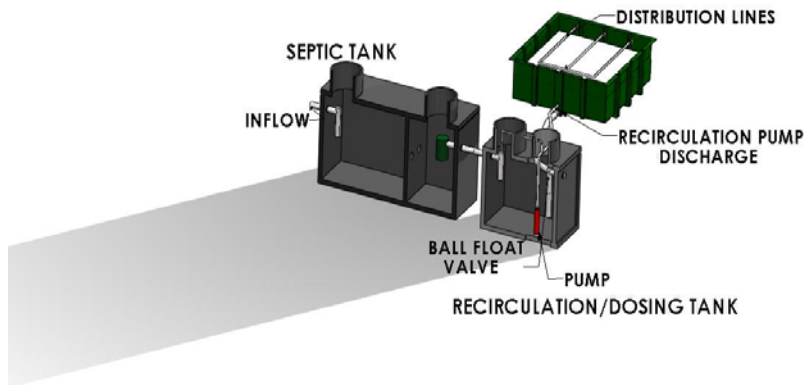


## E-Z Treat System Overview

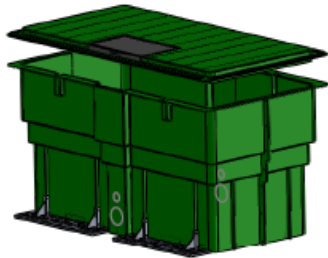
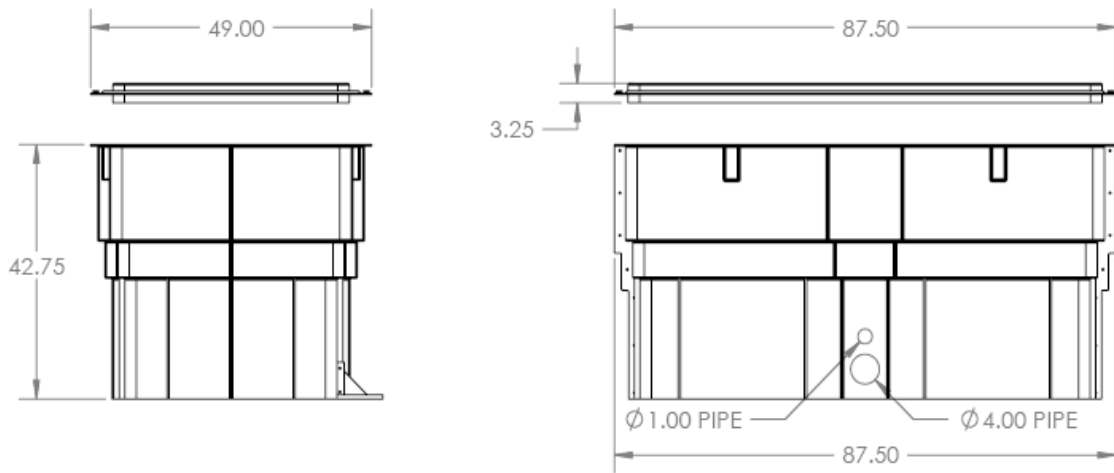
Figure 1. Typical Recirculating sand filter system



### E-Z TREAT RECIRCULATION SAND/MEDIA FILTERS



E-Z Treat Model #600 Pod/Unit



PROPRIETARY AND CONFIDENTIAL  
 THE INFORMATION CONTAINED IN THIS  
 DRAWING IS THE SOLE PROPERTY OF  
 E-Z TREAT INC. ANY  
 REPRODUCTION IN PART OR AS A WHOLE  
 WITHOUT THE WRITTEN PERMISSION OF  
 E-Z TREAT INC. IS  
 PROHIBITED.

		UNLESS OTHERWISE SPECIFIED:		NAME	DATE	
		DIMENSIONS ARE IN INCHES				MODEL - 600
		TOLERANCES:				
		FRACTIONAL: ±				
		ANGULAR: MACH: ± BEND: ±				
		TWO PLACE DECIMAL: ±				
		THREE PLACE DECIMAL: ±				
		INTERPRET GEOMETRIC TOLERANCING PER:				
		MATERIAL				
		FINISH				
NEXT ASSY	USED ON					SIZE DWG. NO. REV
						<b>A</b> E-Z TREAT MODEL- 600 ASSEMBLY
APPLICATION		DO NOT SCALE DRAWING				SCALE: 1:24 WEIGHT: SHEET 1 OF 1



## **APPENDIX B**

### **NSF STANDARD 245 PERFORMANCE EVALUATION METHOD AND REQUIREMENTS**

## 8 Performance testing and evaluation

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

### 8.1 Preparations for testing and evaluation

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

The manufacturer shall inspect the system for proper installation. If no defects are detected and the system is judged to be structurally sound, it shall be placed into operation in accordance with the manufacturer's start-up procedures. If the manufacturer does not provide a start-up procedure,  $\frac{2}{3}$  of the system's capacity shall be filled with water and the remaining  $\frac{1}{3}$  shall be filled with residential wastewater.

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

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

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

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

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

### 8.2 Testing conditions, hydraulic loading and schedules

#### 8.2.1 Influent wastewater characteristics

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

- BOD5: 100 to 300 mg/L
- TSS: 100 to 350 mg/L
- TKN: 35 to 70 mg/L as N
- alkalinity: > 175 mg/L as CaCO<sub>3</sub> (alkalinity may be adjusted if inadequate)
- temperature: 10 to 30 °C (50 to 86 °F)

- pH: 6.5 to 9 SU

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

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

If the influent temperature drops below 10 °C (50 °F), impacting the nitrification process, sample collection may be suspended until the influent temperature returns to 10 °C (50 °F).

## 8.2.2 Hydraulic loading

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

### 8.2.2.1 Design loading

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

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

NOTE – An individual dose shall be no more than 10 gal (37.9 L), unless the dosage system is based on a continuous flow, and the doses shall be uniformly applied over the dosing period.

### 8.2.2.2 Stress loading

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

#### 8.2.2.2.1 Wash-day stress

The wash-day stress shall consist of 3 wash-days in a 5-d 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 five consecutive days, the system shall be subjected to a working-parent stress. During this stress, the system shall be dosed with 40% of its daily hydraulic capacity between 6:00 a. m. and 9:00 a. m. Between 5:00 p. m. and 8:00 p. m., the system shall be dosed with the remaining 60% of its daily hydraulic capacity, which shall include 1 wash load (1 wash cycle and 2 rinse cycles).

#### **8.2.2.2.3 Power/equipment failure stress**

Power/equipment failure stress simulation shall consist of a flow pattern where approximately 40% of the total

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

#### **8.2.2.2.4 Vacation stress**

Vacation stress simulation shall consist of a flow pattern where approximately 35% of the total daily flow is received between 6 a. m. and 9 a. m. and approximately 25% of the total daily flow is received between 11 a. m. and 2 p. m. on the day that the vacation stress is initiated. The flow pattern shall be discontinued for 8 consecutive days with power continuing to be supplied to the system. Between 5 p. m. and 8 p. m. of the ninth day, the system shall receive 60% of the total daily flow, which shall include 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  $100\% \pm 10\%$  of the system's rated hydraulic capacity.

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

## **8.3 Sample collection**

### **8.3.1 Sampling frequency**

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

### **8.3.2 Collection methods**

All sample collection shall be in accordance with *Standard Methods*, unless otherwise specified. Influent

wastewater samples shall be flow-proportional, 24-h composites obtained during periods of system dosing. Effluent samples shall be flow-proportional, 24-h composites obtained during periods of system discharge. Effluent samples shall be representative of all treated effluent discharged from the system, as sampled from a

central point of collection of all treated effluent. Grab samples shall be collected for pH, temperature, and dissolved oxygen (DO). The location of the grab sample shall be appropriate to provide a sample that is representative of the influent or effluent, and shall be determined in conjunction with the manufacturer. Grab samples shall be collected during the morning dosing period for gravity flow systems and during a time of discharge for systems that are pump discharged.

### 8.3.3 Analyses

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

Parameter	Sample type	Sample location		Testing location
		Raw influent	Treated effluent	
BOD <sub>5</sub>	24 h composite	X		Laboratory
CBOD <sub>5</sub>	24 h composite		X	Laboratory
Total suspended solids	24 h composite	X	X	Laboratory
PH	Grab	X	X	Test site
Temperature (°C)	Grab	X	X	Test site
Dissolved oxygen	Grab		X	Test site
Alkalinity (as CaCO <sub>3</sub> )	24 h composite	X	X	Laboratory
TKN (as N)	24 h composite	X	X	Laboratory
Ammonia-N (as N)	24 h composite	X	X	Laboratory
Nitrite/nitrate-N (as N)	24 h composite	X	X	Laboratory

### 8.3.4 Analytical methods

The appropriate methods in *Standard Methods* shall be used to complete the analyses indicated in 8.3.3.

## 8.4 Criteria

### 8.4.1 Testing conditions

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

### 8.4.2 Catastrophic site problems

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

- perform maintenance on the system, reinitiate system start-up procedures, and restart the performance testing; or
- with no routine maintenance performed, have the system brought back to pre-existing conditions and resume testing within 3 wks after the site problem has been identified and corrected. Data collected during the system recovery period shall be excluded from the effluent averages.

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

### **8.4.3 Effluent quality**

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

#### **8.4.3.1 CBOD5**

The average CBOD5 of all effluent samples shall not exceed 25 mg/L.

#### **8.4.3.2 TSS**

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

#### **8.4.3.3 Total nitrogen**

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

#### **8.4.3.4 pH**

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

### **8.5 Final report**

A final report shall be prepared that presents the following:

- all data collected in accordance with the testing and evaluations within this Standard;
- a table indicating the actual percent reduction over the course of the test (included in the Executive Summary, as well as in the body, of the report);
- observations made during the testing;

- an estimation of the pounds of nitrogen loaded during the test and the pounds removed;
- any adjustments made to the alkalinity of the influent wastewater;
- a copy of the current edition of the Owner’s Manual; and
- process description and detailed dimensioned drawings of the system evaluated.

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

**APPENDIX C**  
**ANALYTICAL RESULTS**



**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Week Beginning: 5-Apr-15 Plant Code: EZ Treat

Weeks Into Test: 1

Weekend Dosing: Sunday 600 gallons Saturday 600 gallons Friday 600 gallons

Dosed Volume (gallons)	Monday	Tuesday	Wednesday	Thursday	Friday
Dissolved Oxygen (mg/L)	0.59	0.54	0.57	0.50	0.66
Temperature (C)	6.14	5.90	6.88	5.97	5.44
	23	23	24	24	24
pH	22	23	23	23	23
	22	23	23	23	23
Biochemical Oxygen Demand (mg/L)	7.1	7.0	7.2	7.0	7.3
	7.2	7.1	7.2	7.2	7.3
Suspended Solids (mg/L)	7.4	7.3	7.3	7.3	7.4
	120	120	170	180	180
Dissolved Oxygen (mg/L)	15	14	11	12	9
	210	170	320	260	380
Temperature (C)	8	7	6	10	7
	22	23	23	23	23

Notes:

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

**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Week Beginning: 12-Apr-15 Plant Code: EZ Treat

Weeks Into Test: 2

Weekend Dosing: Sunday 600 gallons Saturday 600 gallons Friday 600 gallons

Dosed Volume (gallons)	Monday	Tuesday	Wednesday	Thursday	Friday
Dissolved Oxygen (mg/L)	0.51	0.41	0.61	0.53	0.45
Temperature (C)	4.88	5.19	4.69	5.51	4.33
	25	24	24	25	24
pH	24	24	23	24	24
	24	23	23	24	24
Biochemical Oxygen Demand (mg/L)	7.2	7.1	6.9	7.3	7.0
	7.2	7.2	7.1	7.3	7.1
Suspended Solids (mg/L)	7.3	7.4	7.3	7.4	7.2
	130	140	120	260	210
Dissolved Oxygen (mg/L)	6	7	7	7	11
	220	250	210	240	290
Temperature (C)	4	6	4	5	3
	24	23	23	24	24

Notes:

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

**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Plant Effluent

Week Beginning: 19-Apr-15 Plant Code: EZ\_Treat

Weeks Into Test: 3

Weekend Dosing: Sunday 600 gallons Saturday 600 gallons Friday 600 gallons

Dosed Volume (gallons)	Monday					Tuesday					Wednesday					Thursday					Friday									
	600					600					600					600					600									
Dissolved Oxygen (mg/L)	aeration chamber effluent					0.57					0.54					0.35					0.47					0.43				
	influent					3.84					4.63					4.33					4.08					5.18				
Temperature (C)	aeration chamber					22					25					24					24					25				
	effluent					24					24					24					24					24				
pH	influent					6.8					7.2					7.0					6.9					7.2				
	aeration chamber effluent					7.2					7.2					7.2					7.1					7.2				
Biochemical Oxygen Demand (mg/L)	influent (BOD <sub>5</sub> )					120					180					190					150					120				
	effluent (CBOD <sub>5</sub> )					6					5					4					5					3				
Suspended Solids (mg/L)	influent					210					290					450					320					150				
	aeration chamber effluent					4					4					2					4					3				

Notes:

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

**NSF International**

**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Plant Effluent

Week Beginning: 26-Apr-15 Plant Code: EZ\_Treat

Weeks Into Test: 4

Weekend Dosing: Sunday 600 gallons Saturday 600 gallons Friday 600 gallons

Dosed Volume (gallons)	Monday					Tuesday					Wednesday					Thursday					Friday									
	600					600					600					600					600									
Dissolved Oxygen (mg/L)	aeration chamber effluent					0.44					0.53					0.60					0.62					0.54				
	influent					5.45					2.67					4.58					4.66					4.68				
Temperature (C)	aeration chamber					25					24					24					24					23				
	effluent					24					24					24					25					24				
pH	influent					7.1					6.8					7.1					7.2					7.0				
	aeration chamber effluent					7.1					7.0					7.2					6.5					7.1				
Biochemical Oxygen Demand (mg/L)	influent (BOD <sub>5</sub> )					130					190					110					99					130				
	effluent (CBOD <sub>5</sub> )					4					3					4					2					2				
Suspended Solids (mg/L)	influent					160					120					290					130					180				
	aeration chamber effluent					2					2					3					2					2				

Notes:

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

**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Plant Effluent  
 Week Beginning: 3-May-15 Plant Code: EZ Treat  
 Weeks Into Test: 5  
 Sunday 600 gallons Saturday 600 gallons  
 Weekend Dosing: 600 gallons

Dosed Volume (gallons)	Monday	Tuesday	Wednesday	Thursday	Friday
Dissolved Oxygen (mg/L)	0.54	0.50	0.57	0.53	0.54
Temperature (C)	4.47	5.10	6.07	6.12	5.44
	25	25	26	26	25
pH	24	25	25	25	25
	25	25	25	25	25
Biochemical Oxygen Demand (mg/L)	6.9	6.8	7.0	7.1	6.9
	7.1	7.0	7.1	7.2	7.1
Suspended Solids (mg/L)	7.2	7.1	7.2	7.2	7.2
	230	140	160	150	230
Suspended Solids (mg/L)	3	3	4	3	4
	140	240	200	280	180
Suspended Solids (mg/L)	3	2	3	2	4

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

**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Plant Effluent  
 Week Beginning: 10-May-15 Plant Code: EZ Treat  
 Weeks Into Test: 6  
 Sunday 600 gallons Saturday 600 gallons  
 Weekend Dosing: 600 gallons

Dosed Volume (gallons)	Monday	Tuesday	Wednesday	Thursday	Friday
Dissolved Oxygen (mg/L)	0.49	0.43	0.61	0.55	0.52
Temperature (C)	4.49	3.08	4.61	5.46	4.41
	26	26	26	25	26
pH	26	25	25	25	25
	26	25	26	25	26
Biochemical Oxygen Demand (mg/L)	7.0	6.9	7.1	6.8	7.0
	7.2	7.0	7.2	7.0	7.1
Suspended Solids (mg/L)	7.2	7.1	7.2	7.1	7.2
	120	220	200	140	140
Suspended Solids (mg/L)	2	2	2	3	3
	140	160	170	160	170
Suspended Solids (mg/L)	2	3	1	4	4

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

**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Plant Effluent  
 Week Beginning: 17-May-15 Plant Code: EZ Treat  
 Weeks Into Test: 7  
 Sunday 600 gallons Saturday 600 gallons  
 Weekend Dosing: 600 gallons

Dosed Volume (gallons)	Monday					Tuesday					Wednesday					Thursday					Friday									
	aeration chamber effluent					influent					aeration chamber effluent					influent					aeration chamber effluent					influent				
Dissolved Oxygen (mg/L)	0.60					4.24					26					26					26					26				
Temperature (C)	26					26					26					26					26					26				
pH	6.9					7.2					7.0					7.1					7.1					7.2				
Biochemical Oxygen Demand (mg/L)	70					3					2					3					2					2				
Suspended Solids (mg/L)	100					100					120					180					220					170				
	3					2					2					2					2					2				

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

**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Plant Effluent  
 Week Beginning: 24-May-15 Plant Code: EZ Treat  
 Weeks Into Test: 8  
 Sunday 600 gallons Saturday 600 gallons  
 Weekend Dosing: 600 gallons

Dosed Volume (gallons)	Monday					Tuesday					Wednesday					Thursday					Friday								
	aeration chamber effluent					influent					aeration chamber effluent					influent					aeration chamber effluent					influent			
Dissolved Oxygen (mg/L)	d					d					d					d					d								
Temperature (C)	d					d					d					d					d								
pH	d					d					d					d					d								
Biochemical Oxygen Demand (mg/L)	260					3					2					3					2								
Suspended Solids (mg/L)	120					120					100					100					88								
	2					5					7					2					2								

Notes: The on-site measurements were not completed on 5/25 due to the holiday.  
 (a) Site problem  
 (b) Malfunction of system under test  
 (c) Weather problem  
 (d) Other

**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Plant Effluent  
 Week Beginning: 31-May-15 Plant Code: EZ Treat  
 Weeks Into Test: 9  
 Sunday 600 gallons Saturday 600 gallons  
 Weekend Dosing: 600 gallons

Dosed Volume (gallons)	Monday	Tuesday	Wednesday	Thursday	Friday
Dissolved Oxygen (mg/L)	0.60	a	0.56	0.77	0.64
Temperature (C)	4.24	a	4.15	4.32	4.24
	26	a	26	26	26
pH	26	a	26	26	26
	6.9	a	a	a	a
Biochemical Oxygen Demand (mg/L)	7.2	a	a	a	a
	7.2	a	a	a	a
Suspended Solids (mg/L)	150	300	97	210	190
	2	2	2	1	<3
Dosed Volume (gallons)	260	170	170	180	190
	3	3	4	1	2

Notes: The pH meter failed on 6/2, resulting in loss of pH, temperature, and D.O. data on that day. pH measurements were not completed until the problem was resolved on 6/12.

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

**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Plant Effluent  
 Week Beginning: 7-Jun-15 Plant Code: EZ Treat  
 Weeks Into Test: 10  
 Sunday 600 gallons Saturday 600 gallons  
 Weekend Dosing: 600 gallons

Dosed Volume (gallons)	Monday	Tuesday	Wednesday	Thursday	Friday
Dissolved Oxygen (mg/L)	1.36	0.48	0.51	0.78	0.97
Temperature (C)	4.78	0.93	2.11	2.61	4.17
	27	27	27	27	27
pH	30	30	29	30	29
	30	29	30	30	29
Biochemical Oxygen Demand (mg/L)	a	a	a	a	7.4
	a	a	a	a	7.3
Suspended Solids (mg/L)	a	a	a	a	7.4
	81	220	230	170	240
Dosed Volume (gallons)	<1	<1	1	<1	<1
	130	170	190	220	310
Dosed Volume (gallons)	<1	<1	1	<1	<1
	<1	<1	1	<1	<1

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

NSF International

Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction  
Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems

Plant Effluent

Week Beginning: 14-Jun-15 Plant Code: EZ Treat

Weeks Into Test: 11

Weekend Dosing: Sunday 600 gallons Saturday 600 gallons Friday 600 gallons

Dosed Volume (gallons)	Monday	Tuesday	Wednesday	Thursday	Friday
Dissolved Oxygen (mg/L)	0.95	1.27	1.21	1.41	1.21
Temperature (C)	4.67	4.22	4.03	3.30	3.99
	27	28	27	27	27
pH	29	29	29	28	29
	30	29	29	29	29
Biochemical Oxygen Demand (mg/L)	7.5	7.4	7.5	7.6	7.5
	7.3	7.3	7.3	7.3	7.3
Suspended Solids (mg/L)	7.3	7.2	7.3	7.2	7.2
	160	200	150	210	170
Suspended Solids (mg/L)	<1	<1	<1	7	<1
	350	230	260	170	120
Suspended Solids (mg/L)	<1	<1	<2	7	<1
	<1	<1	<2	7	<1

Notes:

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

NSF International

Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction  
Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems

Plant Effluent

Week Beginning: 21-Jun-15 Plant Code: EZ Treat

Weeks Into Test: 12

Weekend Dosing: Sunday 600 gallons Saturday 600 gallons Friday 600 gallons

Dosed Volume (gallons)	Monday	Tuesday	Wednesday	Thursday	Friday
Dissolved Oxygen (mg/L)	1.82	1.84	1.96	1.87	1.87
Temperature (C)	4.07	4.21	4.87	5.01	4.54
	27	27	27	28	28
pH	28	28	28	29	28
	28	29	28	28	28
Biochemical Oxygen Demand (mg/L)	7.6	7.3	7.5	7.4	7.5
	7.3	7.2	7.1	7.5	7.3
Suspended Solids (mg/L)	7.2	7.2	7.0	7.1	7.1
	200	180	210	250	260
Suspended Solids (mg/L)	<1	1	1	<1	1
	120	140	110	180	300
Suspended Solids (mg/L)	<1	<1	<1	<1	<1
	<1	<1	<1	<1	<1

Notes:

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

**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Plant Effluent  
 Week Beginning: 28-Jun-15 Plant Code: EZ.Treat  
 Weeks Into Test: 13  
 Sunday 600 gallons Saturday 600 gallons  
 Weekend Dosing: 13 gallons

Dosed Volume (gallons)	Monday	Tuesday	Wednesday	Thursday	Friday
Dissolved Oxygen (mg/L)	2.27	1.87	2.09	2.08	d
Temperature (C)	6.30	5.70	5.42	5.82	d
pH	28	28	28	28	d
	31	31	31	31	d
Biochemical Oxygen Demand (mg/L)	32	30	30	31	d
	7.6	7.5	7.6	7.5	d
Suspended Solids (mg/L)	7.1	7.3	7.3	7.2	d
	7.3	7.4	7.4	7.4	d
Suspended Solids (mg/L)	95	320	320	400	d
	1	2	1	2	d
Suspended Solids (mg/L)	120	160	190	160	d
	1	2	<1	<1	d

Notes: No sampling and field data on 7/3 due to the holiday.  
 Replaced UV bulb due to broken filament on 7/1.

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

**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Plant Effluent  
 Week Beginning: 5-Jul-15 Plant Code: EZ.Treat  
 Weeks Into Test: 14  
 Sunday 600 gallons Saturday 600 gallons  
 Weekend Dosing: 14 gallons

Dosed Volume (gallons)	Monday	Tuesday	Wednesday	Thursday	Friday
Dissolved Oxygen (mg/L)	600	600	600	600	600
Temperature (C)	2.21	2.46	2.11	2.32	2.28
pH	4.27	5.07	4.84	4.33	4.63
	28	28	28	28	28
Biochemical Oxygen Demand (mg/L)	29	29	29	29	29
	31	30	30	31	31
Suspended Solids (mg/L)	7.7	7.7	7.8	7.8	7.9
	7.1	7.4	7.4	7.2	7.3
Suspended Solids (mg/L)	7.1	7.4	7.3	7.2	7.2
	80	420	440	330	170
Suspended Solids (mg/L)	1	1	1	3	<1
	130	140	180	140	150
Suspended Solids (mg/L)	<1	<1	<1	<1	<1

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

c

**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Plant Effluent  
 Week Beginning: 12-Jul-15 Plant Code: EZ Treat  
 Weeks Into Test: 15  
 Sunday 600 gallons Saturday 600 gallons  
 Weekend Dosing: 600 gallons

Dosed Volume (gallons)	Monday	Tuesday	Wednesday	Thursday	Friday
Dissolved Oxygen (mg/L)	d	1.34	1.55	1.51	1.47
Temperature (C)	eration chamber effluent	4.34	4.06	3.70	4.03
	inlet	29	29	29	29
pH	eration chamber effluent	30	30	30	30
	inlet	31	31	31	31
Biochemical Oxygen Demand (mg/L)	eration chamber effluent	7.5	7.5	7.3	7.4
	inlet (BOD <sub>5</sub> )	7.3	7.3	7.2	7.3
Suspended Solids (mg/L)	eration chamber effluent	7.2	7.3	7.2	7.2
	inlet (CBOD <sub>5</sub> )	130	340	390	380
		1	1	2	1
	200	190	200	200	190
	2	<1	<1	<1	1

Notes: On-site data was not measured on 7/15 due to lab error.  
 (a) Site problem  
 (b) Malfunction of system under test  
 (c) Weather problem  
 (d) Other

**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Plant Effluent  
 Week Beginning: 19-Jul-15 Plant Code: EZ Treat  
 Weeks Into Test: 16  
 Sunday 600 gallons Saturday 600 gallons  
 Weekend Dosing: 600 gallons

Dosed Volume (gallons)	Monday	Tuesday	Wednesday	Thursday	Friday
Dissolved Oxygen (mg/L)	1.21	1.21	1.86	2.26	1.74
Temperature (C)	eration chamber effluent	3.84	3.75	a	2.43
	inlet	29	31	a	31
pH	eration chamber effluent	31	31	31	31
	inlet	31	32	a	29
Biochemical Oxygen Demand (mg/L)	eration chamber effluent	7.2	7.4	a	7.3
	inlet (BOD <sub>5</sub> )	7.2	7.2	7.2	7.3
Suspended Solids (mg/L)	eration chamber effluent	7.1	7.1	a	7.2
	inlet (CBOD <sub>5</sub> )	350	260	a	290
	1	2	a	1	1
	190	490	a	300	150
	<1	<1	a	<1	<1

Notes: Evening dosing was missed on 7/21 and morning dosing was missed on 7/22 due to problems with the Waco test site dosing system.  
 (a) Site problem  
 (b) Malfunction of system under test  
 (c) Weather problem  
 (d) Other



**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Plant Effluent  
 Plant Code: EZ Treat

Week Beginning: 26-Jul-15

Weeks Into Test: 17

	26	27	28	29	30	31	1
	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Dosed Volume (gallons)	600	600	600	600	600	600	600
Dissolved Oxygen (mg/L)	eration chamber	1.79	1.71	1.65	1.41	1.57	1.63
	effluent	-	3.25	3.73	3.44	3.69	3.33
Temperature (C)	influent	29	30	30	30	30	30
	eration chamber	-	31	31	31	31	31
pH	effluent	-	32	32	33	32	32
	influent	7.3	7.4	7.7	7.6	7.4	7.5
Biochemical Oxygen Demand (mg/L)	eration chamber	-	7.3	7.4	7.4	7.3	7.4
	effluent	-	7.3	7.2	7.2	7.1	7.2
Suspended Solids (mg/L)	influent	160				160	
	eration chamber		1			d	
effluent		160			140		
		1				d	

- (a) Site problem  
 (b) Malfunction of system under test  
 (c) Weather problem  
 (d) Other
- Notes: Wash Day Stress 7/27 through 7/31.  
 Effluent CBOD and TSS samples missed on 7/31 due to lab error.

**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Plant Effluent  
 Plant Code: EZ Treat

Week Beginning: 2-Aug-15

Weeks Into Test: 18

	2	3	4	5	6	7	8
	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Dosed Volume (gallons)	600	600	600	600	600	600	600
Dissolved Oxygen (mg/L)	eration chamber	1.51	1.66	1.52	1.45	1.69	1.61
	effluent	2.31	2.56	1.89	2.21	1.97	2.08
Temperature (C)	influent	31	30	30	30	31	30
	eration chamber	32	31	32	32	32	31
pH	effluent	32	32	31	32	31	31
	influent	7.2	7.6	7.5	7.3	7.3	7.5
Biochemical Oxygen Demand (mg/L)	eration chamber	7.2	7.2	7.3	7.2	7.2	7.2
	effluent	7.1	7.2	7.2	7.2	7.2	7.2
Suspended Solids (mg/L)	influent	220	220	140	210	240	120
	eration chamber		1	1	<1	4	4
effluent		120	170	180	300	320	180
		<1	<1	<1	<1	<1	<1

- (a) Site problem  
 (b) Malfunction of system under test  
 (c) Weather problem  
 (d) Other
- Notes: Working Parent Stress started on 8/8.

**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Plant Effluent  
 Plant Code: EZ Treat

Week Beginning: 9-Aug-15

Weeks Into Test: 19

	9	10	11	12	13	14	15
	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Dosed Volume (gallons)	600	600	600	600	600	600	600
Dissolved Oxygen (mg/L)	1.68	1.19	0.42	0.47	0.39	0.39	0.41
	3.54	2.48	3.87	3.22	2.14	3.08	3.21
Temperature (C)	31	32	32	32	32	31	32
	32	32	32	32	32	32	32
pH	33	32	34	34	36	34	34
	7.3	7.5	7.4	7.4	7.5	7.4	7.4
Biochemical Oxygen Demand (mg/L)	7.2	7.4	7.3	7.3	7.4	7.3	7.3
	7.2	7.2	7.2	7.3	7.4	7.3	7.3
Suspended Solids (mg/L)	76	d	110	200	d	d	74
	d	d	120	d	d	d	120
	d	d	d	d	d	d	d

- (a) Site problem  
 (b) Malfunction of system under test  
 (c) Weather problem  
 (d) Other
- Notes: Working Parent Stress completed on Aug 12  
 Effluent CBOD and TSS samples missed on 8/10 and 8/12 due to lab error.

**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Plant Effluent  
 Plant Code: EZ Treat

Week Beginning: 16-Aug-15

Weeks Into Test: 20

	16	17	18	19	20	21	22
	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Dosed Volume (gallons)	600	600	600	600	600	0	353
Dissolved Oxygen (mg/L)	0.39	0.34	0.34	0.35	0.33	0.29	0.27
	3.57	3.42	2.86	3.30	3.07	-	-
Temperature (C)	31	32	31	31	31	31	31
	32	33	32	33	32	32	32
pH	33	34	35	35	34	-	-
	7.3	7.4	7.6	7.5	7.5	7.5	7.4
Biochemical Oxygen Demand (mg/L)	7.4	7.3	7.4	7.3	7.2	7.1	7.3
	7.4	7.4	7.4	7.4	7.4	-	-
Suspended Solids (mg/L)	76	120	170	180	210	-	-
	1	<1	1	2	1	-	-
	95	61	140	99	130	-	-
	1	<1	<1	<1	1	-	-

- (a) Site problem  
 (b) Malfunction of system under test  
 (c) Weather problem  
 (d) Other
- Notes: Power/Equipment Failure Stress 8/20 through 8/22.

**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Week Beginning: 30-Aug-15 Plant Code: EZ Treat  
 Weeks Into Test: 22

	30	31	1	2	3	4	5
	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Dosed Volume (gallons)	360	0	0	0	0	0	0
Dissolved Oxygen (mg/L)	aeration chamber	0.48	0.39	0.37	0.47	1.11	1.56
	effluent	1.58	-	-	-	-	-
Temperature (C)	influent	31	-	-	-	-	-
	aeration chamber	31	31	32	32	32	32
pH	effluent	32	-	-	-	-	-
	influent	7.3	-	-	-	-	-
Biochemical Oxygen Demand (mg/L)	aeration chamber	7.3	7.3	7.3	7.4	7.5	7.4
	effluent	7.3	-	-	-	-	-
Suspended Solids (mg/L)	influent (BOD <sub>5</sub> )	<39	-	-	-	-	-
	effluent (CBOD <sub>5</sub> )	<1	-	-	-	-	-
45 Minute Settleable Solids (mL/L)	influent	26	-	-	-	-	-
	aeration chamber	<1	-	-	-	-	-
	effluent	<1	-	-	-	-	-
	aeration chamber						

Notes: Vacation Stress started on 8/30.

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

**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Week Beginning: 23-Aug-15 Plant Code: EZ Treat  
 Weeks Into Test: 21

	23	24	25	26	27	28	29
	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Dosed Volume (gallons)	600	600	600	600	600	600	600
Dissolved Oxygen (mg/L)	aeration chamber	0.51	0.47	0.57	0.48	0.46	0.52
	effluent	3.26	3.18	3.02	3.27	3.15	2.86
Temperature (C)	influent	31	31	31	31	32	31
	aeration chamber	31	31	31	31	31	31
pH	effluent	32	32	32	32	32	32
	influent	7.4	7.6	7.5	7.5	7.5	7.5
Biochemical Oxygen Demand (mg/L)	aeration chamber	7.3	7.3	7.2	7.2	7.3	7.3
	effluent	7.3	7.3	7.3	7.2	7.3	7.3
Suspended Solids (mg/L)	influent (BOD <sub>5</sub> )				69	260	220
	effluent (CBOD <sub>5</sub> )				1	1	1
45 Minute Settleable Solids (mL/L)	influent				77	73	46
	aeration chamber						
	effluent				1	1	<1
	aeration chamber						

Notes: odor <1 T.O.N measured on 8/26.

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

**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Week Beginning: 6-Sep-15 Plant Code: EZ Treat

Weeks Into Test: 23

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Dosed Volume (gallons)	0	0	360	600	600	600	600
Dissolved Oxygen (mg/L)	1.76	1.91	2.57	0.34	0.36	0.33	0.34
	-	-	-	1.40	1.80	2.17	1.98
Temperature (C)	-	-	31	31	31	30	31
	32	32	32	32	32	32	32
pH	-	-	7.4	7.4	7.1	7.3	7.3
	7.5	7.5	7.6	7.6	7.5	7.5	7.6
Biochemical Oxygen Demand (mg/L)	-	-	-	7.5	7.5	7.5	7.5
	-	-	-	-	240	240	240
Suspended Solids (mg/L)	-	-	-	-	-	2	1
	-	-	-	-	-	160	190
	Vacation stress						
	Vacation stress						

Notes: Vacation Stress completed on 9/8.  
(a) Site problem  
(b) Malfunction of system under test  
(c) Weather problem  
(d) Other

**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Week Beginning: 13-Sep-15 Plant Code: EZ Treat

Weeks Into Test: 24

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Dosed Volume (gallons)	600	600	600	600	600	600	600
Dissolved Oxygen (mg/L)	0.35	0.37	0.42	0.36	0.29	0.31	-
	2.57	2.70	1.41	1.39	2.32	1.31	-
Temperature (C)	30	30	30	30	30	30	-
	31	31	31	31	31	31	-
pH	32	33	32	32	33	32	-
	7.5	7.5	7.4	7.4	7.4	7.4	-
Biochemical Oxygen Demand (mg/L)	7.2	7.3	7.3	7.2	7.2	7.2	-
	7.3	7.3	7.3	7.3	7.3	7.3	-
Suspended Solids (mg/L)	220	170	220	240	240	210	-
	1	1	3	1	1	1	-
	190	180	220	190	160	190	-
	<1	2	<1	<1	<1	<1	-

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

**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Week Beginning: 20-Sep-15

Plant Effluent Plant Code: EZ Treat

Weeks Into Test: 25

Dosed Volume (gallons)	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	600	700	600	700	600	700	600
Dissolved Oxygen (mg/L)	0.38	0.36	0.37	0.39	0.38	0.36	0.37
Temperature (C)	1.37	1.29	0.49	1.52	0.67	1.31	1.11
	30	30	30	30	29	29	29
pH	31	31	31	31	31	31	31
	32	32	32	31	32	32	32
Biochemical Oxygen Demand (mg/L)	7.4	7.4	7.4	7.4	7.3	7.3	7.3
	7.2	7.2	7.3	7.2	7.2	7.2	7.2
Suspended Solids (mg/L)	7.3	7.3	7.3	7.3	7.3	7.3	7.3
		120		260		140	
aeration chamber effluent		2	1	1		1	
		190		220		160	
aeration chamber effluent		1		<1		<1	

Notes: The stress sequences were repeated, starting in week 25 because some of the required sampling was missed during the first set of stress sequences.  
 Wash Day Stress 9/21 through 9/25.  
 Wash loads were added on the wash days, without adjusting the normal dosing, due to lab error. This resulted in 100 extra gallons of dosing on 9/21, 23, and 25.

**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Week Beginning: 27-Sep-15

Plant Effluent Plant Code: EZ Treat

Weeks Into Test: 26

Dosed Volume (gallons)	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	600	600	600	600	600	600	600
Dissolved Oxygen (mg/L)	0.46	0.33	0.41	0.33	0.30	0.36	0.37
Temperature (C)	0.75	0.67	0.77	1.28	0.62	0.71	0.77
	29	29	29	30	30	30	29
pH	30	30	30	30	30	30	30
	32	30	30	30	29	30	30
Biochemical Oxygen Demand (mg/L)	7.1	7.3	7.6	7.4	7.3	7.3	7.3
	7.2	7.3	7.3	7.2	7.2	7.2	7.2
Suspended Solids (mg/L)	7.2	7.3	7.3	7.2	7.3	7.2	7.3
		140	200	220	180	180	100
aeration chamber effluent		3	1	1	2	1	1
		120	160	200	180	160	240
aeration chamber effluent		2	1	<1	2	1	1

Notes: Working Parent Stress didn't start on 10/3 as scheduled, due to a site technical issue with the influent.

**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Week Beginning: 4-Oct-15  
 Weeks Into Test: 27

Plant Effluent  
 Plant Code: EZ Treat

Dosed Volume (gallons)	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	600	600	600	600	600	600	600
Dissolved Oxygen (mg/L)	aeration chamber	0.48	0.64	0.39	0.41	0.44	0.46
	effluent	1.14	1.10	1.51	3.23	2.42	2.38
Temperature (C)	influent	29	29	30	30	30	30
	aeration chamber	29	29	29	29	30	29
pH	effluent	30	30	29	29	30	30
	influent	7.2	7.3	7.6	7.3	7.3	7.4
Biochemical Oxygen Demand (mg/L)	aeration chamber	7.3	7.2	7.3	7.3	7.1	7.2
	effluent	7.3	7.3	7.4	7.3	7.2	7.3
Suspended Solids (mg/L)	influent (BOD <sub>5</sub> )		<39	160	220	180	210
	effluent (CBOD <sub>5</sub> )	1	1	1	1	3	2
Other	influent	31	270	240		230	280
	aeration chamber						
effluent		<1	2	<1		2	2

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

Notes: No sampling on 10/4 because there was site technical issue with the influent on 10/3 and 4, which was resolved on 10/5.  
 Working Parent Stress 10/6 through 10/10.

**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Week Beginning: 11-Oct-15  
 Weeks Into Test: 28

Plant Effluent  
 Plant Code: EZ Treat

Dosed Volume (gallons)	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	600	600	600	600	600	600	600
Dissolved Oxygen (mg/L)	aeration chamber	0.37	0.33	0.38	0.37	0.35	0.34
	effluent	1.79	1.52	0.83	1.22	1.60	1.38
Temperature (C)	influent	30	30	30	30	30	30
	aeration chamber	30	30	30	30	30	30
pH	effluent	30	30	30	30	29	30
	influent	7.3	7.3	7.3	7.3	7.4	7.3
Biochemical Oxygen Demand (mg/L)	aeration chamber	7.1	7.0	7.1	7.0	7.1	7.0
	effluent	7.3	7.3	7.3	7.2	7.3	7.2
Suspended Solids (mg/L)	influent (BOD <sub>5</sub> )			270	200	160	130
	effluent (CBOD <sub>5</sub> )			2	3	2	2
Other	influent			600	300	220	200
	aeration chamber						
effluent			<1	1	2	1	2

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

Notes: 10/14 measurements:  
 Color: 35 Pt-Co units  
 Odor: 5 T.O.N  
 Only film and foam: Not detected

**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Plant Effluent  
 Plant Code: EZ Treat  
 Week Beginning: 25-Oct-15  
 30  
 Weeks Into Test:

	25	26	27	28	29	30	31
	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Dosed Volume (gallons)	600	600	600	360	0	0	0
Dissolved Oxygen (mg/L)	aeration chamber	0.41	0.47	0.54	0.37	0.46	0.42
	effluent	1.46	2.83	1.79	3.06	-	-
Temperature (C)	influent	27	27	27	27	-	-
	aeration chamber	27	26	26	26	26	25
pH	effluent	26	26	26	26	-	-
	aeration chamber	7.3	7.3	7.5	7.4	-	-
Biochemical Oxygen Demand (mg/L)	influent	7.1	7.2	7.2	7.2	7.2	7.2
	effluent	7.2	7.2	7.3	7.3	-	-
Suspended Solids (mg/L)	influent (BOD <sub>5</sub> )	160	91	210	130	-	-
	effluent (CBOD <sub>5</sub> )	2	1	1	1	-	-
Suspended Solids (mg/L)	influent	230	160	210	220	-	-
	aeration chamber	-	-	-	-	-	-
effluent	1	1	1	2	-	-	

Notes: Vacation Stress started on 10/28.  
 (a) Site problem  
 (b) Malfunction of system under test  
 (c) Weather problem  
 (d) Other

**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Plant Effluent  
 Plant Code: EZ Treat  
 Week Beginning: 18-Oct-15  
 29  
 Weeks Into Test:

	18	19	20	21	22	23	24
	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Dosed Volume (gallons)	600	0	360	600	600	600	600
Dissolved Oxygen (mg/L)	aeration chamber	0.32	0.36	0.33	0.48	0.41	0.37
	effluent	1.21	-	-	0.65	0.75	0.89
Temperature (C)	influent	29	-	-	29	29	28
	aeration chamber	29	29	29	28	28	28
pH	effluent	27	-	-	23	28	27
	aeration chamber	7.4	-	-	7.3	7.3	7.3
Biochemical Oxygen Demand (mg/L)	influent	7.0	7.0	7.0	7.0	7.2	7.0
	effluent	7.2	-	-	7.2	7.1	7.2
Suspended Solids (mg/L)	influent (BOD <sub>5</sub> )	120	-	-	-	-	200
	effluent (CBOD <sub>5</sub> )	2	-	-	-	-	2
Suspended Solids (mg/L)	influent	200	-	-	-	-	340
	aeration chamber	-	-	-	-	-	-
effluent	2	-	-	-	-	-	

Notes: Power/Equipment Failure Stress 10/18 through 10/20.  
 (a) Site problem  
 (b) Malfunction of system under test  
 (c) Weather problem  
 (d) Other

**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Plant Effluent  
 Plant Code: EZ Treat

Week Beginning: 1-Nov-15  
 Weeks Into Test: 31

Dosed Volume (gallons)	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Dissolved Oxygen (mg/L)	0	0.44	0.45	0.47	0.51	0.67	0.71
Temperature (C)	-	-	-	-	-	-	-
pH	-	7.3	7.3	7.2	7.3	7.3	7.3
Biochemical Oxygen Demand (mg/L)	-	-	-	-	-	-	-
Suspended Solids (mg/L)	-	-	-	-	-	-	-

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

Notes: Vacation stress completed on 11/6.

**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Plant Effluent  
 Plant Code: EZ Treat

Week Beginning: 8-Nov-15  
 Weeks Into Test: 32

Dosed Volume (gallons)	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Dissolved Oxygen (mg/L)	0.55	0.41	0.48	0.44	0.39	0.32	0.34
Temperature (C)	24	24	24	24	24	24	24
pH	7.3	7.3	7.3	7.1	7.2	7.3	7.2
Biochemical Oxygen Demand (mg/L)	7.4	63	79	270	400	310	150
Suspended Solids (mg/L)	2	89	110	140	190	180	190

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

Notes: 11/11 measurements:  
 Color: 25 Pt-Co units  
 Odor: 5 T.O.N  
 Only film and foam: Not detected



**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Plant Effluent  
 Plant Code: EZ Treat

Week Beginning: 15-Nov-15  
 Weeks Into Test: 33

Dosed Volume (gallons)	15 16 17 18 19 20						
	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Dissolved Oxygen (mg/L)	600	600	600	600	600	600	600
	0.39	0.41	0.52	0.61	0.58	0.59	
Temperature (C)	24	24	24	24	23	24	
	24	24	24	24	24	24	
pH	7.4	7.5	7.4	7.1	7.2	7.3	7.5
	7.3	7.2	7.2	7.1	7.2	7.2	
Biochemical Oxygen Demand (mg/L)	100	240	240	190	270	230	
	3	2	3	3	2	2	
Suspended Solids (mg/L)	130	160	190	65	110	110	
	4	1	2	1	1	2	

- Notes: D.O., temperature, and pH data collected from 11/14 through 11/20 was measured with an instrument that was past it's calibration due date. However, the instrument was calibrated in house for both pH and DO each day before collecting data.
- (a) Site problem
  - (b) Malfunction of system under test
  - (c) Weather problem
  - (d) Other

**NSF International**  
**Standard 245 - Wastewater Treatment Systems- Nitrogen Reduction**  
**Standard 350 - Onsite Residential and Commercial Water Reuse Treatment Systems**

Plant Effluent  
 Plant Code: EZ Treat

Week Beginning: 22-Nov-15  
 Weeks Into Test: 34

Dosed Volume (gallons)	23 24 25 26 27						
	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Dissolved Oxygen (mg/L)	600	600	600	600	600	600	600
		0.89	1.37	1.99	2.14	2.02	
Temperature (C)	24	23	23	24	25	25	23
		22	22	22	23	23	
pH	7.5	7.5	7.6	7.7	7.5	7.1	7.2
		7.2	7.2	7.2	7.2	7.3	
Biochemical Oxygen Demand (mg/L)		300	300	380	240	200	
		3	6	6	7	9	
Suspended Solids (mg/L)		150	230	180	180	200	
		2	2	5	2	3	

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

## **APPENDIX D**

### **ANALYTICAL RESULTS – Nitrogen Analyses**

	Date	Ammonia Nitrogen (mg/L)		Total Kjeldahl Nitrogen (mg/L)		Nitrate/Nitrite (mg/L)		Total Nitrogen (mg/L)		Total Alkalinity (mg/L CaCO3)	
		Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent
Week 1	04/06/15	24.4	17.3	35.2	19.8	0.06	2.2	35.3	22.0	320	310
	04/08/15	31	15.7	47.7	18.8	0.52	4.4	48.2	23.2	350	290
	04/10/15	26.8	15.8	62.9	20	0.14	3.73	63.0	23.7	350	290
Week 2	04/13/15	26.7	9.9	41.9	14.8	0.12	6	42.0	20.8	350	250
	04/15/15	27.6	13	42.7	17.2	0.07	4.2	42.8	21.4		280
	04/17/15	31.1	12.7	45.4	14.8	0.26	5.3	45.7	20.1	360	270
Week 3	04/20/15	24.1	10.7	36.5	12.3	0.12	7.7	36.6	20.0	320	260
	04/22/15	26.3	7.9	40.6	11.3	0.1	9.8	40.7	21.1		200
	04/24/15	16.0	6.5	25	8	0.93	11.6	25.9	19.6	290	220
Week 4	04/27/15	18.3	3.9	27.9	5.2	0.46	11.5	28.4	16.7	300	220
	04/29/15	16.7	2.9	26	4.4	1	9.3	27.0	13.7		210
	05/01/15	15.3	2.8	28.3	4.2	0.05	9.8	28.4	14.0	310	220
Week 5	05/04/15	20.9	2.9	31	4.4	0.05	8.6	31.1	13.0	300	230
	05/06/15	22.4	2.8	31.8	3.3	0.08	11.4	31.9	14.7		220
	05/08/15	30.6	3.3	37.4	3.1	0.1	11.9	37.5	15.0	350	220
Week 6	05/11/15	21.9	4.3	29.9	5.7	1.4	12.4	31.3	18.1	290	220
	05/13/15	25	2.5	34.6	3.6	0.05	15.6	34.7	19.2		190
	05/15/15	17.6	2.3	28.4	2.3	0.05	12.9	28.5	15.2	300	200
Week 7	05/18/15	16.2	3.1	23.6	4.4	0.93	10.1	24.5	14.5	280	220
	05/20/15	31	2.5	35.4	3.5	0.1	11.7	35.5	15.2		210
	05/22/15	25	4.1	37.8	5	0.07	10	37.9	15.0	340	230
Week 8	05/25/15	38.3	4.6	76.9	4.4	0.54	13.9	77.4	18.3	400	210
	05/27/15	32.5	4.2	39.3	5.3	0.05	17.2	39.4	22.5		200
	05/29/15	33.8	1.5	45.7	1.1	1.4	16.4	47.1	17.5	360	190
Week 9	06/01/15	20.6	1.9	31.9	3.6	0.05	14	32.0	17.6	320	210
	06/03/15	19.4	1.2	26.6	1.4	0.05	12	26.7	13.4	310	210
	06/05/15	22.2	1.3	38	2.9	0.05	10.9	38.1	13.8	320	230
Week 10	06/08/15	13.8	0.4	22.7	1.6	0.18	10.9	22.9	12.5	270	210
	06/10/15	29.9	0.6	44	2.2	0.09	9.8	44.1	12.0	320	210
	06/12/15	26.6	0.6	41.4	1.8	0.06	9.1	41.5	10.9	310	200
Week 11	06/15/15	16.1	0.4	32	1.5	0.12	10.6	32.1	12.1	260	190
	06/17/15	16.1	0.3	27.7	1.4	0.22	10.7	27.9	12.1	230	190
	06/19/15	23.3	0.2	30.2	1.9	0.05	9.4	30.3	11.3	310	180

Week 12	06/22/15	23.9	0.4	35.5	0.5	0.06	14.6	35.6	15.1	310	180
	06/24/15	29.7	0.3	40.8	0.5	0.06	11.9	40.9	12.4	330	190
	06/26/15	22.1	0.4	35.6	0.9	0.08	9.6	35.7	10.5	320	210
Week 13	06/29/15	12.6	0.1	20.7	0.05	0.23	6.5	20.9	6.6	290	210
	07/01/15	36.5	0.2	48.1	1.1	0.07	7.4	48.2	8.5	390	220
	07/02/15	42.9	0.8	58.1	0.8	0.07	6.1	58.2	6.9	420	230
Week 14	07/06/15	26.3	0.05	27	1.6	0.05	14.5	27.1	16.1	300	200
	07/08/15	39.8	0.8	61.4	0.50	0.09	13.3	61.5	13.8	360	200
	07/10/15	29	1.4	45.9	1.4	0.06	7.5	46.0	8.9	340	220
Week 15	07/13/15	21.8	0.68	35.9	0.5	0.08	10.4	36.0	10.9	320	200
	07/15/15	36.5	0.91	59.2	1.2	0.08	10.3	59.3	11.5	390	220
	07/17/15	44.3	2.1	61.8	3	0.06	6.9	61.9	9.9	390	230
Week 16	07/20/15	40.0	1.8	62.3	2.7	0.06	11.7	62.4	14.4	390	210
	07/22/15										
	07/24/15	30.7	0.94	56.2	1.6	0.16	17.5	56.4	19.1	380	200
week 17-23	7/27/2015*										
	9/12/2015*										
Week 24	9/14/2015*	35.1	1.0	47.3	1.3	0.13	8	47.4	9.3	350	200
	9/16/2015*	39.5	1.3	55.6	2.1	0.25	8.2	55.9	10.3	310	200
	9/18/2015*	31.5	1.3	47.4	2.6	0.09	8.5	47.5	11.1	340	210
Week 25	9/21/2015*	31.5	3.0	45.6	3.20	0.12	7.6	45.7	10.8	340	220
	9/23/2015*	44.6	3.4	63.9	4.70	0.11	6.5	64.0	11.2	370	230
	9/25/2015*	25.8	5.2	43.4	8	0.09	3.2	43.5	11.2	330	260
Week 26	9/28/2015*	23.2	4.7	38.9	7	1.7	4.1	40.6	11.1	290	270
	9/30/2015*	31.3	3.2	50.6	4.7	0.2	7.8	50.8	12.5	310	230
	10/2/2015*	30.3	2.5	46	3.3	0.23	3.2	46.2	6.5	350	230
Week 27	10/6/2015*	28.1	0.45	44.3	1.2	0.27	11.2	44.6	12.4	280	200
	10/7/2015*	29	0.2	52	0.5	0.11	12	52.1	12.5	290	180
	10/9/2015*	29.9	4.1	47.9	6.2	0.16	4.9	48.1	11.1	310	220
Week 28	10/13/2015*	36.9	7	76.2	8.9	0.13	8.4	76.3	17.3	350	250
	10/14/2015*	23.3	7.6	46.7	10.4	0.14	2.2	46.8	12.6	300	250
	10/16/2015*	28.9	8.2	48.1	11.1	1.6	4.2	49.7	15.3	320	250

Week 29	10/17/2015*	31.4	8.1	49.5	10.4	0.11	3.8	49.6	14.2	340	240
	10/18/2015*	32.9	8.2	40.6	10.6	0.5	6.1	41.1	16.7	330	240
	10/24/2015*	20	3.7	33.6	2.6	0.14	13.6	33.7	16.2	260	200
Week 30	10/26/2015*	7.38	2	18.5	2.5	2	16	20.5	18.5	200	180
	10/27/2015*	19.6	1.6	30.7	2.6	2.3	12.3	33.0	14.9	280	180
	10/28/2015*	17.6	1.3	34.8	1.5	0.8	11	35.6	12.5	260	180
Week 31	11/2/2015*										
	11/4/2015*										
	11/6/2015*										
Week 32	11/9/2015*	10.7	0.36	24.3	2.3	1.8	9.0	26.1	11.3	260	200
	11/11/2015*	21.8	0.75	46.3	1.4	0.05	7.1	46.4	8.5	320	210
	11/13/2015*	31.6	0.73	47.6	1.1	0.44	8.4	48.0	9.5	340	200
Week 33	11/16/15	28.8	4.8	46.7	4.9	0.57	6	47.3	10.9	320	230
	11/18/15	24.7	5	35	6.9	0.32	5.8	35.3	12.7	280	230
	11/20/15	18.4	6.2	52.1	12.4	0.94	3.6	53.0	16.0	300	240
Week 34	11/23/15	14.1	4.9	57.1	7.6	0.73	3.4	57.8	11.0	310	230
	11/25/15	30.2	5.6	47.2	7	0.92	2.5	48.1	9.5	320	240
	11/27/15	11.7	8.5	25.8	13.3	1.3	0.92	27.1	14.2	260	240
	12/02/15	15.5	3.7	41.9	5	0.54	3.6	42.4	8.6	330	220
	12/04/15	27.6	5.3	54.4	6.3	0.9	1.5	55.3	7.8	330	240

\* Data noted with asterisk is stress data and was not used in the nitrogen reduction calculations per section 8.4.3

**APPENDIX E  
OWNERS MANUAL**



PO Box 176  
Haymarket, Virginia 20168

## Attention System Owner and Users

Your E-Z Treat system is a Class I system meeting NSF/ANSI 40 and has been tested and Listed under NSF Standard 40.

**Caution: Do Not Open or Enter Any System Components for Any Reason. If a Problem Exists or You have Questions about Your System, Call Your Certified Services Provider.**

Once the E-Z Treat System is installed, a post-construction conference is recommended. This is an opportunity to familiarize the owner with the system. No attempt should be made to adjust any component of this system except by a Certified Operator.

Your system, as terms of sale, and/or as required by your states regulations, shall have a 2 Year service policy to include semiannual visits. In order to assure long term high quality, reliable and economical service from your treatment system contact your local service provider or E-Z Treat Company for information about an extended service policy this policy will containing terms comparable to the terms offered in your initial service policy.

Your service policy should, as a minimum, include semi- annual service visit during the first two years. During the service visit the provider will inspect the general condition of the system, make needed adjustments to the system, clean all filters and spray nozzles, check for leaks, evaluate the effluent quality to assure the system meets effluent quality specified by the state, if needed replace any components and provide a written report to the owner. **All state regulations governing on-site services preempt E-Z Treats' suggested service guidelines.**

The E-Z Treat Synthetic Sand/Media Filter System allows the homeowner to receive a high quality, reliable and economical wastewater system that protects the environment. As with any onsite wastewater treatment system, the homeowner should be familiar with basic guidelines which help the system achieve repetitive, reliable performance. Please do not hesitate to contact your certified operator or E-Z Treat Company with any questions, concerns or comments about your E-Z Treat Synthetic Sand/Media Filter.

E-Z Treat is a fixed media treatment system. Periods of inactivity such as vacations or intermittent use will not affect the performance of your E-Z Treat system, adjustments to the system are not necessary. If you are concerned about power consumption call your service provider and they will make adjustments to the system run time timers. If you chose to have the run timers adjusted make sure you notify your service provider as to when you anticipate normal activity.

## **Attention System Owners and Users**

Users of the System.....**Remember!** Your E-Z Treat system is designed to treat domestic strength waste generated from residential kitchen and baths.

To assure proper performance of your E-Z Treat Re-Circulating Synthetic Sand/Media Filter, you should avoid disposing of the following products into your septic tank:

- Oil & Grease (kitchen waste)
- Water Softener backwash
- Wax & resins
- Petroleum Products
- Paint & Paint Solvents
- Pesticides
- Condoms & sanitary napkins
- Toxic substances (Liquid Plumber, Drano, etc.)
- Non-Biodegradable products (cigarette butts, antibacterial wipes, etc.)
- Any kind of septic tank additive (Rid-X, etc.)
- Keep heavy loads and traffic off of your onsite system components and drainfield
- Never drive cars or trucks within 10 feet of any system access lids
- Landscaping or future building projects should be planned with the drainfield and drainfield repair area in mind.
- Do not shovel or blow snow on top of your onsite wastewater system. This will temporarily limit access to your system and could overload and damage the system.
- Makes sure drainage from the house or around the property is carried away from your onsite system.
- **DO NOT OPEN OR ENTER ANY OF THE TREATMENT SYSTEM TANKS, SEPTIC GASSES CAN BE TOXIC, CAUSING SERIOUS INJURY OR DEATH!**



## **You should call your Service Provider if:**

Your E-Z Treat system located outside of your house will have a data plate affixed to the lid stating the Model # and Serial # of the unit. The service provider and installing contractor contact information will be listed on the inside of the E-Z Treat Control panel door. This control may be located inside your home or it may be outside, it is clearly marked with the E-Z Treat name.

- You notice water surfacing around the area of your E-Z Treat system or your system components.
- You smell strong odors emitting from any component of your treatment system.
- You see any red flashing lights.
- You hear any loud pulsing noise coming from any of the components of the treatment system.

Your E-Z Treat system and components are equipped with Pulsing Audible Alarms if this alarm activates you can turn it off by pressing the clearly marked “**OFF**” button located next to the audible alarm. **Immediately Call Your Service Provider.**