



preserve our community



protect our environment



manage our resources



explore innovative solutions

City of Portsmouth
Wastewater Master Plan

Phase 2 Initial Piloting Technical Memorandum

Volume Two • September, 2012

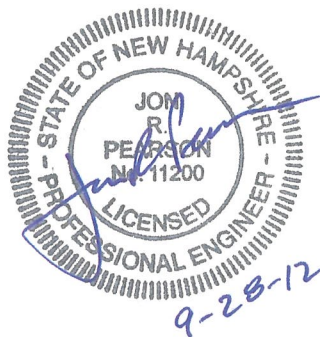


**City of Portsmouth, New Hampshire
Wastewater Master Plan**

**Phase 2 Initial Piloting
Technical Memorandum**

Volume Two of Two

September, 2012



Prepared by

AECOM

**CITY OF PORTSMOUTH, NH
PHASE 2 INITIAL PILOTING TECHNICAL MEMORANDUM**

TABLE OF CONTENTS

	<u>Page</u>
Letter of Transmittal	i
Table of Contents	ii
List of Attachments	iii
List of Figures	iv
List of Tables	vi
List of Abbreviations	viii
Acknowledgements	x

Volume One of Two

EXECUTIVE SUMMARY

Section1- Introduction and Purpose.....	ES-1
Introduction	ES-1
Purpose.....	ES-2
Consent Decree Requirements	ES-2
Section 2 - Pilot Process, Equipment, and Approach	ES-2
Section 3 - Pilot Data Analysis.....	ES-2
Ability to Meet Study Effluent Goals	ES-3
Effluent Performance Comparison	ES-3
Vendor Constituent Loading Rate Validation and Potential to Reduce Technology Size.....	ES-4
Hydraulic Stress Test Summary.....	ES-5
Section 4 - Wastewater Data and Revised Full scale Design Criteria	ES-6
Wastewater Characterization Program.....	ES-6
Revised Flows and Loads.....	ES-6
Section 5 - Secondary Process Resizing and Comparison.....	ES-7
Approach.....	ES-8
Capital Cost Comparison	ES-8
Operations and Maintenance Comparison	ES-9
Life Cycle Cost Comparison.....	ES-9
Section 6 - Non-Monetary Evaluation Factors Update.....	ES-9
Technology Comparison and Ranking	ES-10
Section 7 – Pilot technical Memorandum Recommendations.....	ES-10
Secondary Treatment Facilities Design Capacity	ES-10
Design Recommendations.....	ES-10

SECTION ONE – INTRODUCTION AND PURPOSE

Background.....	1-1
WWMP Piloting – Phase 1 Evaluation	1-1
Purpose.....	1-2
Consent Decree Requirements	1-3

SECTION TWO - PILOT PROCESSES, EQUIPMENT, AND APPROACH

Introduction	2-1
Overview of Piloted Technologies.....	2-1
BAF.....	2-1

	<u>Page</u>
CAS with BioMag.....	2-1
MBBR with DAF	2-2
Pilot Equipment.....	2-2
Primary Clarifier.....	2-3
BAF.....	2-6
CAS with BioMag.....	2-7
MBBR with DAF	2-8
Piloting Approach.....	2-10

SECTION THREE – PILOT DATA ANALYSIS

Introduction.....	3-1
Review of Pilot Testing.....	3-1
Sample Pilot Loading vs. Constituent Removal Graph.....	3-1
Biological Aerated Filter	3-3
Experimental Plan Summary.....	3-4
Data Presentation.....	3-4
Ability to Meet Pilot Study Effluent Concentration Goals.....	3-6
Load Rate Validation	3-6
Hydraulic Stress Testing Performance	3-17
Concerns with Fats, Oils, and Grease.....	3-23
Piloting Observations and Considerations for Full Scale Implementation	3-23
Conventional Activated Sludge with BioMag.....	3-25
Experimental Plan Summary.....	3-26
Data Presentation.....	3-26
Ability to Meet Pilot Study Effluent Concentration Goals.....	3-26
Load Rate Validation	3-28
Hydraulic Stress Testing Performance	3-43
Piloting Observations and Considerations for Full Scale Implementation.....	3-47
Moving Bed Bioreactor with Dissolved Air Floatation	3-50
Experimental Plan Summary.....	3-50
Data Presentation.....	3-50
Ability to Meet Pilot Study Effluent Concentration Goals.....	3-52
Load Rate Validation	3-53
Hydraulic Stress Testing Performance	3-62
Piloting Observations and Considerations for Full Scale Implementation.....	3-66
Pilot Data Analysis Summary	3-68
Experimental Plan Results and Ability to Meet the Treatment Goals.....	3-68
Comparison of Effluent Concentrations.....	3-68
Vendor Constituent Loading Rate Validation and Potential to Reduce Technology Size.....	3-73
Hydraulic Stress Test Summary.....	3-74

SECTION FOUR- WASTEWATER DATA AND REVISED FULL SCALE DESIGN CRITERIA

Introduction.....	4-1
Wastewater Characterization Program	4-1
Recalcitrant Dissolved Organic Nitrogen (rDON)	4-2
Revised Flows and Loads	4-3
Secondary Treatment Revised Flows Analysis.....	4-4
Secondary Treatment Revised Loads Analysis	4-5
Upgraded WWTF Effluent Treatment Requirements.....	4-6

	<u>Page</u>
SECTION FIVE - SECONDARY PROCESS RESIZING AND COMPARISON	
Introduction	5-1
Approach	5-1
Common Elements	5-2
BAF Process	5-3
Conventional Activated Sludge with BioMag Process	5-5
MBBR with DAF Process	5-12
Cost Comparison	5-13
Capital Cost Comparison	5-13
Operation and Maintenance Cost Comparison	5-16
Life Cycle Cost Comparison	5-16
SECTION SIX - NON-MONETARY EVALUATION FACTORS UPDATE	
Introduction	6-1
Peirce Island WWTF Operators Questionnaire	6-1
Revised Criteria Evaluation Matrix	6-2
Eliminated Phase 1 Evaluation Criteria	6-2
Added Phase 2 Evaluation Criteria	6-6
Unchanged Evaluation Criteria	6-7
Phase 2 Evaluation Criteria	6-7
Technology Comparison and Ranking	6-7
SECTION SEVEN - DESIGN RECOMMENDATIONS	
Secondary Treatment Facilities Design Capacity	7-1
Design Recommendations	7-1
Recommended next Steps	7-1

LIST OF ATTACHMENTS

ATTACHMENT A	PHASE 1 TECHNOLOGY EVALUATION AND FINAL TECHNICAL MEMORANDUM
<u>Volume Two of Two</u>	
ATTACHMENT B	BLUELEAF INCORPORATED PILOT REPORT
ATTACHMENT C	REVISED FLOW AND LOADING TECHNICAL MEMORANDUM
ATTACHMENT D	FINAL WASTEWATER CHARACTERIZATION DATA
ATTACHMENT E	2007 NPDES PERMIT
ATTACHMENT F	UPDATED EQUIPMENT/TECHNOLOGY SIZING COST PROPOSALS
ATTACHMENT G	OPINION OF COSTS
ATTACHMENT H	BLANK OPERATOR EVALUATION QUESTIONNAIRE
ATTACHMENT I	EPA JULY 31, 2012 LETTER

LIST OF FIGURES

	<u>Page</u>
Figure ES-1. Box Plot of Effluent TSS for All Processes, All Experimental Plans.....	ES-4
Figure ES-2. Box Plot of Effluent BOD for All Processes, All Experimental Plans.....	ES-5
Figure ES-3. Box Plot of Effluent TN for All Processes, Experimental Plans-05/06.....	ES-6
Figure 2-1. Pilot Process Flow Schematic.....	2-4
Figure 2-2. Pilot Floor Plan	2-5
Figure 2-3. Pilot Primary Clarifier	2-3
Figure 2-4. BAF Pilot Units	2-6
Figure 2-5. CAS with BioMag Aeration Tank.....	2-7
Figure 2-6. CAS with BioMag Clarifier.....	2-8
Figure 2-7. MBBR Aeration Tank.....	2-9
Figure 2-8. MBBR DAF.....	2-10
Figure 3-1. Sample Pilot Loading vs. Constituent Removal Graph	3-2
Figure 3-2A. BOD Loading Rate and Removal through Stage 1 BAF.....	3-7
Figure 3-2B. Ammonia Loading Rate and Removal through Stage 1 BAF	3-10
Figure 3-2C. Average Daily Effluent Ammonia Through BAF Process	3-11
Figure 3-2D. Nitrate Loading Rate and Removal through Stage 2 BAF	3-13
Figure 3-2E. Estimated Average Daily Effluent Total Nitrogen Through Stage 2 BAF	3-15
Figure 3-2F. Stage 1 BAF and Stage 2 BAF Average Daily Effluent TSS	3-16
Figure 3-3A. BOD Volumetric Loading Rate and Removal through CAS-BioMag.....	3-29
Figure 3-3B. BOD Mass Loading Rate and Removal through CAS-BioMag	3-30
Figure 3-3C. Ammonia Volumetric Loading Rate and Removal through CAS-BioMag.....	3-33
Figure 3-3D. Ammonia Mass Loading Rate and Removal through CAS-BioMag	3-34
Figure 3-3E. CAS-BioMag Average Daily Effluent Nitrogen Species.....	3-36
Figure 3-3F. Solids Loading vs. CAS-BioMag Average Daily Clarifier Effluent TSS	3-39
Figure 3-3G. Surface Overflow Loading vs. CAS-BioMag Average Daily Clarifier Effluent TSS	3-40
Figure 3-3H. CAS-BioMag Mixed Liquor Magnetite:VSS Ratio vs. SVI	3-42
Figure 3-3I. CAS-BioMag Effect of Polymer on Settling Times of Mixed Liquor.....	3-44

	<u>Page</u>
Figure 3-4A. BOD Loading Rate and Removal through MBBR BOD Reactor.....	3-54
Figure 3-4B. Ammonia Loading Rate and Removal through MBBR N1 & N2 Reactors	3-56
Figure 3-4C. Average Daily Effluent Ammonia Through MBBR-DAF Processes	3-58
Figure 3-4D. Nitrate Loading Rate and Removal through MBBR DN1 & DN2 Reactors.....	3-59
Figure 3-4E. MBBR-DAF Average Daily Effluent TSS	3-61
Figure 3-5A. Sample Box Plot.....	3-70
Figure 3-5B. Box Plot of Effluent TSS for All Processes, All Experimental Plans.....	3-72
Figure 3-5C. Box Plot of Effluent BOD for All Processes, All Experimental Plans.....	3-73
Figure 3-5D. Box Plot of Effluent TN for All Processes, Experimental Plans-05/06.....	3-74
Figure 5-1. BAF Total Nitrogen < 8 mg/l Process Flow Schematic.....	5-6
Figure 5-2. BAF Total Nitrogen < 8 mg/l Site Layout	5-7
Figure 5-3. CAS with BioMag Total Nitrogen < 8 mg/l Process Flow Schematic	5-9
Figure 5-4. CAS with BioMag Total Nitrogen < 8 mg/l Site Layout	5-10
Figure 5-5. MBBR with DAF Total Nitrogen < 8 mg/l Process Flow Schematic	5-13
Figure 5-6. MBBR with DAF Total Nitrogen < 8 mg/l Site Layout.....	5-14

LIST OF TABLES

	<u>Page</u>
Table ES-1. Projected Year 2032 Design Flows and Loads to Secondary.....	ES-7
Table ES-2. Opinion of Capital Cost Summary	ES-8
Table ES-3. Estimated Annual Operation and Maintenance Costs Summary	ES-9
Table ES-4. Estimated Life Cycle Costs Summary (\$MM)	ES-9
Table ES-5. Criteria Evaluation Matrix.....	ES-11
Table ES-6. Option Evaluation Matrix.....	ES-12
Table ES-7. Secondary Treatment Facilities Design Capacity	ES-13
Table 1-1. Consent Decree Modification Peirce Island WWTF Milestones and Dates.....	1-3
Table 3-1. BAF Experimental Plan Summary	3-4
Table 3-2. BAF Experimental Plan Data Result.....	3-5
Table 3-3. Maximum BOD Concentrations with Primary and Single Stage BAF Treatment To Meet WWTF Permit Conditions.....	3-8
Table 3-4. BAF Hydraulic Stress Test Summary	3-18
Table 3-5. CAS-Biomag Experimental Plan Summary.....	3-26
Table 3-6. CAS-BioMag Experimental Plan Data Results	3-27
Table 3-7. Maximum BOD Concentrations with Primary and CAS-BioMag Treatment To Meet WWTF Permit Conditions	3-32
Table 3-8. CAS-BioMaAg Hydraulic Stress Test Summary	3-46
Table 3-9. MBBR-DAF Experimental Plan Summary	3-50
Table 3-10. MBBR-DAF Experimental Plan Data Results	3-51
Table 3-11. Maximum BOD Concentrations with Primary and MBBR-DAF Treatment To Meet WWTF Permit Conditions	3-55
Table 3-12. MBBR-DAF Hydraulic Stress Test Summary.....	3-63
Table 3-13. Experimental Plan Summary.....	3-69
Table 3-14. Ability to meet Pilot Study Effluent Concentration Goals.....	3-68
Table 3-15. Pilot Technology Effluent TSS Concentration ANOVA Analysis.....	3-71
Table 3-16. Pilot Technology Effluent BOD Concentration ANOVA Analysis	3-71

	<u>Page</u>
Table 3-17. Pilot Technology Effluent TN Concentration ANOVA Analysis.....	3-72
Table 3-18. Vendor Constituent Loading Rate Validation Summary	3-75
Table 4-1. Sampling and Analysis Summary.....	4-1
Table 4-2. Final Average Wastewater Characterization Results	4-2
Table 4-3. Peirce Island Raw Wastewater rDON Test Data	4-3
Table 4-4. Secondary Treatment Process Design Flow Rates.....	4-5
Table 4-5. Projected Year 2032 Design Flows and Loads to Secondary.....	4-6
Table 4-6. 2007 Peirce Island WWTF NPDES Permit Limits	4-7
Table 5-1. CAS-BioMag Bioreactor and Clarifier Dimensions.....	5-5
Table 5.2. MBBR Bioreactor Dimensions.....	5-11
Table 5-3. Total Nitrogen < 8 mg/L Opinion of Capital Cost Summary	5-15
Table 5-4. Estimated Annual Operation and Maintenance Costs Summary.....	5-15
Table 5-5. Estimated Life Cycle Costs Summary (\$MM)	5-16
Table 6-1. Portsmouth WWTF Operator Pilot Evaluation.....	6-3
Table 6-2. Portsmouth WWTF Operator Pilot Evaluation by Category	6-4
Table 6-3. Criteria Evaluation Matrix.....	6-9
Table 6-4. Option Evaluation Matrix.....	6-10
Table 7-1. Secondary Treatment Facilities Design Capacity.....	7-1

LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
BAF	Biologically Aerated Filter
BDL	Below Detection Limit
BOD	Biochemical Oxygen Demand
C	Celsius
Cf	Cubic Foot
CaCO ₃	Calcium Carbonate
CAS	Conventional Activated Sludge
CAS-BioMag	Conventional Activated Sludge with BioMag
CASB	Conventional Activated Sludge with BioMag
CEPT	Chemically Enhanced Primary Treatment
CSO	Combine Sewer Overflow
COD	Chemical Oxygen Demand
C/N	Carbon and Nitrification Removal
CWT	Cambridge Water Technologies
DAF	Dissolved Air Floatation
DN	Denitrification
DN1	Denitrification Reactor Tank 1
DN2	Denitrification Reactor Tank 2
DO	Dissolved Oxygen
DPE	Diluted Strength, Peak Flow, Extended Duration Trial
EP	Experimental Plan
EPA	Environmental Protection Agency
F/M	Food to Microorganism Ratio
FMS	Full Strength, Mid Flow, Short Duration Trial
FOG	Fats, Oils, and Grease
FPS	Full Strength, Peak Flow, Short Duration Trial
FPM	Full Strength, Peak Flow, Medium Duration Trial
Ft	Feet
FXM	Full Strength, High-Peak Flow, Medium Duration Trial
FXE	Full Strength, High-Peak Flow, Extended Duration Trial
gpm	Gallons per Minute
gpm/sf	Gallons per Minute per Square Foot (of surface area)
gpd	Gallons per Day
g	Gram
I&C	Instrumentation and Control
IR	Internal Recycle Rate
Hr	Hour
L	Liter
Lab	Laboratory
Lb	Pound
LTCP	Long Term Control Plan
MBBR	Moving Bed Bioreactor
mg	Milligram
MG	Million Gallons
MGD	Million Gallons per Day

mg/l	Milligrams per liter (equivalent to ppm)
min	Minutes
ML	Mixed Liquor
MLE	Modified Ludzack-Ettinger
MLSS	Mixed Liquor Suspended Solids
MLVSS	Mixed Liquor Volatile Suspended Solids
MBR	Membrane Bioreactor
MOR	Monthly Operating Report
mV	Millivolt
N	Nitrogen
N1	Nitrification Reactor Tank 1
N2	Nitrification Reactor Tank 2
NA	Not Applicable
NO _x	Nitrogen Oxides
NO ₃	Nitrate
NR1	Nitrification Reactor Tank 1
NR2	Nitrification Reactor Tank 1
NH ₃	Ammonia
NHDES	New Hampshire Department of Environmental Services
µg/L	Micrograms per liter (equivalent to ppb)
N/A	Not Available / Not Applicable
ND	Not Detected
O&M	Operation and Maintenance
ORP	Oxidation Reduction Potential
PID	Proportional Integral Derivative
ppb	Parts per Billion
ppm	Parts per Million
R ²	Coefficient of Determination
RAS	Return Activated Sludge
rDOM	Recalcitrant Dissolved Organic Nitrogen
SALR	Surface Area Loading Rate
SARR	Surface Area Removal Rate
SBR	Sequencing Batch Reactor
Sf	Square Foot
SLR	Solids Loading Rate
SOR	Surface Overflow Rate
SRT	Solids Retention Time
SVI	Sludge Volume Index
TKN	Total Kjeldahl Nitrogen
TN	Total Nitrogen
TP	Total Phosphorus
PO ₄ -P	Phosphate
TSS	Total Suspended Solids
µM	Micrometer
VSS	Volatile Suspended Solids
WAS	Waste Activated Sludge
WWMP	Wastewater Master Plan
WWTF	Wastewater Treatment Facility

ACKNOWLEDGMENTS

We would like to acknowledge the invaluable assistance and cooperation of the staff of the Portsmouth Department of Public Works and the Peirce Island WWTF. In particular, we extend our thanks to Mr. David Allen, Assistant City Manager; Mr. Peter Rice, Deputy Director of Public Works; Mr. Terry Desmarais, City Engineer; Ms. Paula Anania, WWTF Chief Plant Operator; Mr. Michael Baker, WWTF Assistant Chief Plant Operator; Mr. David Lovely, Assistant Chief Plant Operator; and Ms. Roxanna Chomas, Plant Operator.

This Technical Memorandum was prepared by Mr. Matthew Formica, Project Manager, and Mr. Jon Pearson Project Manager and Vice President, under the direction of Donald Chelton, Vice President. Technical review and guidance was Provided by Mr. Mark Laquidara, Vice President.

The Cover Photos are used under Creative Commons Public License from Doug Kerr; and the project consulting team.

ATTACHMENT B

BLUELEAF INCORPORATED PILOT REPORT



Blueleaf, Inc.

RESEARCH · INVESTIGATE · EXPERIMENT · SOLVE · AUDIT · ANALYZE · EXPLORE · INSPECT · EVALUATE · CHARACTERIZE · DEMONSTRATE · PILOT

PILOT STUDY REPORT WASTEWATER MASTER PLAN PILOTING EFFORT PHASE 2 – INITIAL PILOT PHASE

PORTSMOUTH NH
PEIRCE ISLAND WASTEWATER TREATMENT FACILITY

SEPTEMBER 2012

Submitted by: Blueleaf, Inc.
57 Dresser Hill Road
Charlton MA 01507

For: AECOM
701 Edgewater Drive
Wakefield, MA 01880

Date: September 14, 2012

EXECUTIVE SUMMARY

This Pilot Study Report details the approach, equipment, analytical and experimental methods, and results of a pilot study completed at the City of Portsmouth's Peirce Island Wastewater Treatment Facility between August 2011, and August 2012. The work was completed under the direction of AECOM as part of the Wastewater Master Plan Phase 2, Initial Piloting Evaluation. In 2011, AECOM began a wastewater characterization study, completed a desktop evaluation of eight potential treatment processes, and selected three processes for an initial six-month pilot scale evaluation.

The three wastewater treatment processes that were piloted in parallel were: Biological Aerated Filter (BAF), Moving Bed Bioreactor (MBBR) with Dissolved Air Flotation (DAF), and Conventional Activated Sludge with a proprietary ballasted process marketed as BioMag (CASB). The intention of the initial phase of piloting in Phase 2 was to develop data to choose one of the three processes for further piloting, Vendor selection, or preliminary design. Additional pilot testing may be undertaken in a second piloting phase to compare competing Vendors of the technology, to allow the selection of a Vendor for the upgrade of the Peirce Island WWTF, or to provide operational experience for the Portsmouth wastewater treatment plant operators, but the additional testing is not described in this document.

The pilot-scale testing equipment was designed based on sizing information provided by the process vendors, typical engineering practice, the experience of the pilot operators, and the limits of the budget and schedule. The pilot equipment consisted of a primary clarifier, Moving Bed Bioreactor, and Conventional Activated Sludge reaction tank and clarifiers, and necessary appurtenant equipment, all constructed on site. The Dissolved Air Flotation equipment, and Biological Aerated Filters were provided by the equipment vendor, and appurtenant equipment was added to the filter on site. The pilot equipment operated each process at between 3 gallons per minute and 28 gallons per minute.

Onsite testing found that the influent organics concentration was higher than had been expected, and that the influent nitrogen concentration was slightly lower than expected. In most cases, the flow rates into the pilot processes were decreased to handle the increased organic loadings, and supplemental ammonia was added to the influent stream to mimic the design nitrogen loading.

A total of 26 planned experiments were conducted on the processes.

Five of the experiments focused on meeting the secondary treatment goal of 30 mg/L BOD and 30 mg/L of TSS. Two of the five experiments (Experimental Plan 01) were conducted at an average month load condition, and three (Experimental Plan 02) were conducted under a maximum month load condition. All three processes were able to meet the treatment goals for Secondary Treatment under the appropriate organic loading.

Two experiments (Experimental Plan 03) achieved Total Nitrogen removal to below 8 mg/L with the ambient concentration of ammonia in the raw water. The CASB and MBBR/DAF processes were successful in producing effluent total nitrogen concentration below 8 mg/L. The Biological Aerated Filter was not tested with the ambient nitrogen concentration.

Three experiments (Experimental Plan 05) evaluated the three processes for total nitrogen removal to below 8 mg/L with an increased nitrogen concentration in the influent stream. The Biological Aerated Filter effluent total nitrogen averaged 4.9 mg/L. The Conventional Activated Sludge with BioMag process effluent Total Nitrogen concentration averaged 5.8 mg/L, and the Moving Bed Bioreactor and DAF process effluent Total Nitrogen averaged 5.3 mg/L.

Two experiments (Experimental Plan 06) included the conversion of the Conventional Activated Sludge with BioMag process and the Moving Bed Bioreactor process into alternate layouts that could achieve effluent total nitrogen concentrations of less than 3 mg/L. The conversion of the Biological Aerated Filter was not necessary, as the configuration for total nitrogen removal to below 3 is the same as the total nitrogen to below 8. None of the processes reliably produced effluent total nitrogen below 3 mg/L. The Biological Aerated Filter effluent total nitrogen averaged 4.9 mg/L. The Conventional Activated Sludge with BioMag process effluent total nitrogen concentration averaged 4.2 mg/L, and the Moving Bed Bioreactor and DAF process effluent Total Nitrogen averaged 5.1 mg/L. Additional time may have been required to optimize the processes, or to acclimate the media for lower effluent total nitrogen concentrations.

Fourteen experiments (Experimental Plan 04) were conducted to evaluate the processes at a variety of high flow conditions. The stress tests were designed to mimic high flow events in the biological processes, and to evaluate treatment performance, solids retention and recovery time. None of the high stress conditions caused the Conventional Activated Sludge with BioMag process effluent to exceed TSS of 30 mg/L or total nitrogen of 8 mg/L. Both the Biological Aerated Filter and the Moving Bed Bioreactor exceeded total nitrogen limit of 8 during most of the high stress conditions, but generally recovered within four hours after the flow condition was stopped. It is difficult to directly compare the results of the hydraulic stress tests, however, as each process experienced a different flow condition. For instance, the flow rate through the Conventional Activated Sludge with BioMag process was doubled to achieve the peak flow rates, while the flow rate through the Biological Aerated Filter was increased by a factor of 3, and then 6. None of the processes appeared to lose biosolids as a result of the increased flow rates.

Data was also collected throughout the pilot testing period to evaluate the loading capacity of each process. The pilot operators also made careful observations on several factors of each process to provide information on the operability, robustness, advantages and disadvantages of each process, and on design issues that should be evaluated for the full-scale design.

This Pilot Study Report does not include a recommended process for full-scale application. Instead it is intended to be used by the design engineer to evaluate the performance and limitations of each process that was evaluated.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	i
TABLE OF CONTENTS.....	iii
LIST OF TABLES	vi
LIST OF FIGURES	ix
LIMITATIONS	xii
RESPONSIBILITIES	xiii
ABBREVIATIONS	xv
1 INTRODUCTION	1
2 METHODS AND MATERIALS	3
2.1 Pilot Equipment description, General	3
2.1.1 City Water	7
2.1.2 Raw Water Supply	7
2.1.3 Site-Built Tank Construction for Clarifiers, Bioreactors, and Sumps	7
2.1.4 Primary Clarifier	8
2.2 Pilot Equipment Description, Biological Aerated Filter	13
2.2.1 Full Scale BAF Systems	13
2.2.2 Pilot Scale BAF System	14
2.3 Pilot Equipment description, Conventional Activated Sludge with BioMag.....	17
2.3.1 Proposed Full-Scale CASB Design	17
2.3.2 Pilot-Scale CASB Design.....	18
2.4 Pilot Equipment Description, MBBR and DAF	26
2.4.1 MBBR.....	26
2.4.2 DAF	36
2.5 Chemical Addition	41
2.6 Statistical Methods	43
2.7 Analytical Methods	47
2.7.1 Field Analytical Methods.....	47
2.7.2 Laboratory Methods	50
2.7.3 Quality Assurance/Quality Control	50
2.8 Experimental Plans.....	60

3	RESULTS	62
3.1	Raw Water Quality	62
3.1.1	Raw Water Quality Field Data	62
3.1.2	Pilot Raw Water Quality Data vs. MOR Data for January-August 2012	72
3.1.3	Comparison of MOR Raw Water Quality Data for 2012 vs. 2008-2011	76
3.2	Chemical Feed Rates for Alkalinity Adjustment	78
3.3	Primary Clarifier Water Quality and Removal Rates	80
3.3.1	Primary Effluent Water Quality Data	80
3.3.2	Primary Clarifier Performance	89
3.4	Water Quality COD:BOD Ratios	96
3.4.1	Raw Water (Pilot Plant Influent) COD:BOD Ratio	96
3.4.2	Pilot Plant Primary Effluent COD:BOD Ratio	96
3.5	Biological Aerated Filter Results	99
3.5.1	Schedule of BAF Experiments	99
3.5.2	Results	101
3.5.3	Experimental Plan Results	128
3.5.4	Hydraulic Stress Results, BAF Experimental Plan 04	135
3.5.5	BOD Removal Rates	182
3.5.6	Ammonia Removal Capacity	182
3.5.7	Nitrate Removal Capacity	182
3.6	Conventional Activated Sludge with BioMag	187
3.6.1	Schedule of Conventional Activated Sludge with BioMag (CASB) Experiments	187
3.6.2	Results	190
3.6.3	Experimental Plan Results	227
3.6.4	Stress Trial Results, Results of Experimental Trial 04	242
3.6.5	BOD Removal Rates	261
3.6.6	Ammonia Removal Capacity	261
3.6.7	Nitrate Removal Capacity	261
3.7	MBBR and DAF Results	269
3.7.1	Schedule of MBBR and DAF Experiments	269
3.7.2	Results	272
3.7.3	Experimental Plan Results	307

3.7.4	Stress Trial Results, Results of Experimental Trial 04	323
3.7.5	Media Mass Calculations	354
3.7.6	BOD Removal Capacity.....	355
3.7.7	Ammonia Removal Capacity	355
3.7.8	Nitrate Removal Capacity	355
3.7.9	DAF Operation and Performance.....	359
4	Summary	362

LIST OF TABLES

Table 2.1-01: Primary Clarifier Dimensions	11
Table 2.1-02: Proposed Full-Scale BAF Design Parameters	13
Table 2.1-03: Proposed Pilot-Scale BAF Operating Parameters	14
Table 2.1-04: CASB (BioMag) Bioreactor Design Parameters	17
Table 2.1-05: CASB Secondary Clarifier Design Parameters	18
Table 2.1-06: CASB Proposed Pilot-Scale Bioreactor Design Parameters.....	23
Table 2.1-07: CASB Proposed Pilot-Scale Clarifier Design Parameters.....	23
Table 2.1-08: MBBR Design Parameters per World Water Works, for 30/30 Treatment Option	27
Table 2.1-09: MBBR Design Parameters per World Water Works, for TN<8 Treatment Option	28
Table 2.1-10: MBBR Design Parameters per World Water Works, for TN<3 Treatment Option	29
Table 2.1-11: MBBR Pilot System Dimensions and Flow Rates for 30/30 Treatment Option	33
Table 2.1-12: MBBR Pilot System Dimensions and Flow Rates for TN<8 Treatment Option	34
Table 2.1-13: MBBR Pilot System Dimensions and Flow Rates for TN<3 Treatment Option	35
Table 2.1-14: DAF Full Scale Design Parameters per World Water Works.....	36
Table 2.1-15: Summary of Chemical Feed Systems	42
Table 2.7-01: Parameters Analyzed by Certified Laboratory.....	50
Table 2.7-02: QAQC Standard	51
Table 2.7-03: Results of four-way split of BOD Samples on April 12, 2012	53
Table 2.8-01: List of Experimental Plans and Completion Dates	61
Table 3.1-01: Summary Raw Water Quality Data by Field Methods	63
Table 3.1-02: Raw Water Quality Statistics of Field Parameters	70
Table 3.1-03: MOR Raw Water Quality Data for 2012 vs. 2008-2011 for TSS and Total BOD.....	76
Table 3.3-01: Primary Effluent Field Data	81
Table 3.3-02: Primary Effluent Water Quality Data by Laboratory Methods	87
Table 3.3-03: TSS and BOD Removal Rates for Pilot Primary Clarifier.....	89
Table 3.3-04: TSS and BOD Removal Rates for CEPT	92
Table 3.4-01: COD:BOD Ratios for Calculating BOD from COD Data	96
Table 3.5-01: BAF Trial Schedule.....	99
Table 3.5-02: BAF Stage #2 and Stage #2 Data Report	103
Table 3.5-03: Results for BAF Experimental Trial 02.....	128
Table 3.5-04: Results for BAF Experimental Trial 05/06	134
Table 3.5-05a: Water Quality Results for BAF Experimental Plan 04 FMS	140
Table 3.5-05b: Water Quality Results for BAF Experimental Plan 04 FMS	141
Table 3.5-05c: Water Quality Results for BAF Experimental Plan 04 FMS.....	142
Table 3.5-05d: Water Quality Results for BAF Experimental Plan 04 FMS	143
Table 3.5-06 BAF Experimental Plan 04 FMS – Summary of ANOVA Results	144
Table 3.5-07: BAF 1&2 Experimental Plan 04 FMS – Summary of ANOVA Results	146
Table 3.5-08a: Water Quality Results for BAF Experimental Plan 04 FPS.....	150
Table 3.5-08b: Water Quality Results for BAF Experimental Plan 04 FPS	151

Table 3.5-09: BAF Experimental Plan 04 FPM – Summary of ANOVA Results	152
Table 3.5-10a: Water Quality Results for BAF Experimental Plan 04 FPM	156
Table 3.5-10b: Water Quality Results for BAF Experimental Plan 04 FPM	157
Table 3.5-10b: Water Quality Results for BAF Experimental Plan 04 FPM	158
Table 3.5-11: BAF Experimental Plan 04 DPE – Summary of ANOVA Results.....	160
Table 3.5-12a: Water Quality Results for BAF Experimental Plan 04 DPE	164
Table 3.5-12b: Water Quality Results for BAF Experimental Plan 04 DPE.....	165
Table 3.5-12b: Water Quality Results for BAF Experimental Plan 04 DPE.....	166
Table 3.5-13: BAF Experimental Plan 04 FXM – Summary of ANOVA Results.....	167
Table 3.5-14a: Water Quality Results for BAF Experimental Plan 04 FXM	171
Table 3.5-14b: Water Quality Results for BAF Experimental Plan 04 FXM	172
Table 3.5-15: BAF Experimental Plan 04 FXE – Summary of ANOVA Results	176
Table 3.5-16a: Water Quality Results for BAF Experimental Plan 04 FXE.....	177
Table 3.5-16b: Water Quality Results for BAF Experimental Plan 04 FXE	178
Table 3.5-16c: Water Quality Results for BAF Experimental Plan 04 FXE.....	179
Table 3.5-16d: Water Quality Results for BAF Experimental Plan 04 FXE	180
Table 3.5-16e: Water Quality Results for BAF Experimental Plan 04 FXE	181
Table 3.6-01: CASB Trial Schedule	187
Table 3.6-02: Conventional Activated Sludge with BioMag Data Report	192
Table 3.6-03: Results for CASB Experimental Trial 01.....	227
Table 3.6-04: Results for CASB Experimental Trial 02.....	230
Table 3.6-05: Results for CASB Experimental Trial 03.....	233
Table 3.6-06: Laboratory Results for Dissolved Contaminants from CASB Experimental Trial 03	235
Table 3.6-07: Results for CASB Experimental Trial 05.....	237
Table 3.6-08: Results for CASB Experimental Trial 06.....	240
Table 3.6-08 CASB Experimental Plan 04 FMS – Summary of ANOVA Results	243
Table 3.6-09: Water Quality Results for CASB Experimental Plan 04 FMS	246
Table 3.6-09 CASB Experimental Plan 04 FPS – Summary of ANOVA Results	247
Table 3.6-10a: Water Quality Results for CASB Experimental Plan 04 FPS.....	250
Table 3.6-10b: Water Quality Results for CASB Experimental Plan 04 FPS	251
Table 3.6-11 CASB Experimental Plan 04 FPM – Summary of ANOVA Results.....	252
Table 3.6-12a: Water Quality Results for CASB Experimental Plan 04 FPM	255
Table 3.6-12b: Water Quality Results for CASB Experimental Plan 04 FPM.....	256
Table 3.6-13 CASB Experimental Plan 04 DPE – Summary of ANOVA Results.....	257
Table 3.6-14: Water Quality Results for CASB Experimental Plan 04 DPE.....	260
Table 3.6-14: Settling Data for Conventional Activated Sludge with BioMag	266
Table 3.7-01: MBBR and DAF Trial Schedule	269
Table 3.7-02: MBBR and DAF Data Report.....	275
Table 3.7-03: Results for Experimental Plan 01 on MBBR and DAF.....	307
Table 3.7-04: Results for Experimental Trial 02 on MBBR and DAF.....	312
Table 3.7-05: Results for Experimental Trial 03 on MBBR and DAF.....	316
Table 3.7-06: Laboratory Results for MBBR/DAF Experimental Trial 03	316

Table 3.7-07: Results for Experimental Trial 05 on MBBR and DAF.....	319
Table 3.7-08: Results for Experimental Trial 06 on MBBR and DAF.....	322
Table 3.7-09: MBBR/DAF Experimental Plan 04 FMS – Summary of ANOVA Results	324
Table 3.7-10a: Water Quality Results for MBBR/DAF Experimental Plan 04 FMS.....	329
Table 3.7-10b: Water Quality Results for MBBR/DAF Experimental Plan 04 FMS (continued).....	330
Table 3.7-10c: Water Quality Results for MBBR/DAF Experimental Plan 04 FMS (continued)	331
Table 3.7-11: MBBR/DAF Experimental Plan 04 FPS – Summary of ANOVA Results.....	332
Table 3.7-12a: Water Quality Results for MBBR/DAF Experimental Plan 04 FPS	335
Table 3.7-12b: Water Quality Results for MBBR/DAF Experimental Plan 04 FPS (continued)	336
Table 3.7-12c: Water Quality Results for MBBR/DAF Experimental Plan 04 FPS (continued)	337
Table 3.7-12d: Water Quality Results for MBBR/DAF Experimental Plan 04 FPS (continued)	338
Table 3.7-13: MBBR/DAF Experimental Plan 04 FPM – Summary of ANOVA Results	339
Table 3.7-14a: Water Quality Results for MBBR/DAF Experimental Plan 04 FPM	342
Table 3.7-14b: Water Quality Results for MBBR/DAF Experimental Plan 04 FPM (continued)	343
Table 3.7-14c: Water Quality Results for MBBR/DAF Experimental Plan 04 FPM (continued).....	344
Table 3.7-15: MBBR/DAF Experimental Plan 04 DPE – Summary of ANOVA Results.....	345
Table 3.7-16a: Water Quality Results for MBBR/DAF Experimental Plan 04 DPE	349
Table 3.7-16b: Water Quality Results for MBBR/DAF Experimental Plan 04 DPE (continued)	350
Table 3.7-16c: Water Quality Results for MBBR/DAF Experimental Plan 04 DPE (continued).....	351
Table 3.7-16d: Water Quality Results for MBBR/DAF Experimental Plan 04 DPE (continued)	352
Table 3.7-16e: Water Quality Results for MBBR/DAF Experimental Plan 04 DPE (continued)	353
Table 3.7-17: Media Mass Results	354
Table 3.7-18: MBBR DAF Polymer doses	361

LIST OF FIGURES

Figure 2.1-01: Pilot Plant Physical Layout	5
Figure 2.1-02 Pilot Plant Flow Schematic.....	6
Figure 2.1-03: Primary Clarifier Plan and Sections.....	9
Figure 2.1-04: BAF Pilot System Schematic	16
Figure 2.1-05: CASB Bioreactor Plan and Sections.....	24
Figure 2.1-06: CASB Bioreactor and Clarifier Sections	25
Figure 2.1-07: MBBR Plan and Sections	39
Figure 2.1-08: MBBR Sections, DAF Plan and Sections	40
Figure 2.7-01: Comparison of Lab and Field Analyses for TSS	52
Figure 2.7-02: Comparison of Field and Lab BOD Results.....	55
Figure 2.7-03: Comparison of Field and Lab Ammonia Results	56
Figure 2.7-04: Comparison of Field and Lab Total Nitrogen Results	58
Figure 2.7-05: Analysis of Nitrate Standards by Field Methods.....	59
Figure 3.1-01: Raw Water Quality Field Data for TSS and Total BOD	69
Figure 3.1-02: Boxplot of Differences for Directly Analyzed 5-Day BODs vs. Calculated BODs.....	72
Figure 3.1-03: Comparison of Pilot Data to MOR Data Jan-Aug 2012, for Raw Water TSS	73
Figure 3.1-04: Comparison of Pilot Data to MOR Data Jan-Aug 2012, for Raw Water Total BOD	74
Figure 3.1-05: Raw Water TSS for 2012 vs. 2008-2011 from MOR Data	77
Figure 3.1-06: Raw Water Total BOD for 2012 vs. 2008-2011 from MOR Data	77
Figure 3.2-01: Soda Ash Titrations for Primary Effluent Alkalinity Control	79
Figure 3.3-01: Primary TSS and Total BOD Data	88
Figure 3.3-02: Pilot Primary Clarifier Performance: Influent TSS vs. Effluent TSS	90
Figure 3.3-03: Pilot Primary Clarifier Performance: Influent BOD(t) vs. Effluent BOD(t)	91
Figure 3.3-04: CEPT Influent TSS vs. CEPT Effluent TSS	93
Figure 3.3-05: CEPT Influent BOD(t) vs. CEPT Effluent BOD(t).....	93
Figure 3.3-06: Pilot Primary Effluent vs. Historical CEPT Effluent for TSS	94
Figure 3.3-07: Pilot Primary Effluent vs. Historical CEPT Effluent for Total BOD.....	95
Figure 3.4-01: Raw Water COD(t) versus BOD(t)	97
Figure 3.4-02: Primary Effluent COD(t) versus BOD(t).....	98
Figure 3.5-01: Results from Experimental Trial 02 - BAF Stage 1	129
Figure 3.5-02: Boxplot of BAF Experimental Plan 02 Results.....	130
Figure 3.5-03: Results from Experimental Trial 05/06 - BAF Stage #1	132
Figure 3.5-04: Results from Experimental Trial 05/06 - BAF Stage #2.....	133
Figure 3.5-05: Boxplot of BAF Experimental Plan 05/06 Results	135
Figure 3.5-06: Effect of BAF Stage #1 Runtime on Effluent TSS.....	136
Figure 3.5-07: BAF#1 FMS 2-hour, Medium Flow Stress Test.....	137
Figure 3.5-08: BAF#2 FMS 2-hour, Medium Flow Stress Test.....	139
Figure 3.5-09: BoxPlots BAF FMS Stress Test, TSS and COD	145
Figure 3.5-10: Boxplots BAF FMS Stress Test, Ammonia, NOx, and TN	145

Figure 3.5-11: BAF#1 FPS 2-hour, Peak Flow Stress Test	147
Figure 3.5-12: BAF#2 FPS 2-hour, Peak Flow Stress Test	148
Figure 3.5-13: Boxplots for BAF FPS Stress Test, TSS and COD	149
Figure 3.5-14: Boxplots for BAF FPS Stress Test, Ammonia, NOx, and TN	149
Figure 3.5-15: BAF#1 FPM 2-hour, Peak Flow Stress Test.....	153
Figure 3.5-16: BAF#2 FPM 2-hour, Peak Flow Stress Test.....	154
Figure 3.5-17: Boxplots for BAF FPM Stress Test, TSS and COD	155
Figure 3.5-18: Boxplots for BAF FPM Stress Test, ...	155
Figure 3.5-19: BAF#1 DPE 24-hour, Peak Flow Stress Test, Diluted.....	161
Figure 3.5-20: BAF#2 DPE 24-hour, Peak Flow Stress Test, Diluted.....	162
Figure 3.5-21: Boxplots for BAF DPE Stress Test, TSS and COD	163
Figure 3.5-22: Boxplots for BAF FPS Stress Test, Ammonia, NOx, and TN	163
Figure 3.5-23: BAF#1 FXM 6-hour, High Peak Flow Stress Test	168
Figure 3.5-24: BAF#2 FXM 6-hour, High Peak Flow Stress Test	169
Figure 3.5-25: Boxplots for BAF FXM Stress Test, TSS and COD	170
Figure 3.5-26: Boxplots for BAF FXM Stress Test, Ammonia	170
Figure 3.5-27: BAF#1 FXE 24-hour, High Peak Flow Stress Test.....	174
Figure 3.5-28: BAF#2 FXE 24-hour, High Peak Flow Stress Test.....	175
Figure 3.5-29: Boxplots for BAF FXE Stress Test, TSS and COD	176
Figure 3.5-30: BAF Stage #1 Operation at Peirce Island Pilot Study	183
Figure 3.5-31: BOD Loading Rates and Removal through BAF Stage #1.....	184
Figure 3.5-32: Ammonia Loading and Removal through BAF Stage #1	185
Figure 3.5-33: Nitrate Loading and Removal through BAF Stage #2	186
Figure 3.6-01: Results of CASB Experimental Trial 01.....	228
Figure 3.6-02: Boxplot of CASB Results for Experiment Trial 01.....	229
Figure 3.6-03: Results of CASB Experimental Trial 02.....	231
Figure 3.6-04: Boxplot of CASB Experimental Plan 02 Results	232
Figure 3.6-05: Results of CASB Experimental Trial 03.....	234
Figure 3.6-06: Boxplot of CASB Experimental Plan 03 Results	235
Figure 3.6-07: Results of CASB Experimental Trial 05.....	238
Figure 3.6-08: Boxplot of CASB Experimental Plan 05 Results	239
Figure 3.6-09: Results of CASB Experimental Trial 06.....	241
Figure 3.6-10: Boxplot of CASB Experimental Plan 06 Results	242
Figure 3.6-11: CASB FMS 2-hour, Medium Flow Stress Test.....	244
Figure 3.6-12: BoxPlots CASB FMS Stress Test, TSS and COD	245
Figure 3.6-13: Boxplots CASB FMS Stress Test, Ammonia, NOx, and TN	245
Figure 3.6-14: CASB FPS 2-hour, Peak Flow Stress Test	248
Figure 3.6-15: BoxPlots CASB FPS Stress Test, TSS and COD	249
Figure 3.6-16: Boxplots CASB FPS Stress Test, Ammonia, NOx, and TN	249
Figure 3.6-17: CASB FPM 6-hour, Peak Flow Stress Test	253
Figure 3.6-18: BoxPlots CASB FPM Stress Test, TSS and COD.....	254
Figure 3.6-19: Boxplots CASB FPM Stress Test, Ammonia, NOx, and TN.....	254

Figure 3.6-20: CASB DPE 24-hour, Peak Flow Stress Test, Diluted.....	258
Figure 3.6-21: BoxPlots CASB DPE Stress Test, TSS and COD.....	259
Figure 3.6-22: Boxplots CASB DPE Stress Test, Ammonia, NOx, and TN	259
Figure 3.6-23: BOD Loading Rates and Removal through CASB	262
Figure 3.6-24: Ammonia Loading and Removal through CASB.....	263
Figure 3.6-25: SDNR Removal through CASB.....	264
Figure 3.6-25: Effect of Polymer on Settling Times of Mixed Liquor	267
Figure 3.6-26: Relationship between SVI and Magnetite Concentration	268
Figure 3.7-01: Results from Experimental Trial 01 – MBBR and DAF	308
Figure 3.7-02: Boxplot of Experimental Plan 01 Results, MBBR and DAF	309
Figure 3.7-03: Results from Experimental Trial 02 - MBBR and DAF	311
Figure 3.7-04: Accumulated Solids in DAF Effluent Piping on March 28, 2012	312
Figure 3.7-05: Boxplot of Experimental Plan 02 Results, MBBR and DAF	313
Figure 3.7-06: Results from Experimental Trial 03 - MBBR and DAF	315
Figure 3.7-07: Boxplot of Experimental Plan 03 Results, MBBR and DAF	317
Figure 3.7-08: Results from Experimental Trial 05 - MBBR and DAF	318
Figure 3.7-09: Boxplot of Experimental Plan 05 Results, MBBR and DAF	320
Figure 3.7-10: Results from Experimental Trial 06 - MBBR and DAF	321
Figure 3.7-11: Boxplot of Experimental Plan 06 Results, MBBR and DAF	322
Figure 3.7-12: Results from Experimental Trial 02 - MBBR and DAF	326
Figure 3.7-13: Boxplot of MBBR and DAF Experimental Plan 04 FMS Results, TSS and COD	327
Figure 3.7-14: Boxplot of MBBR/DAF Experimental Plan 04 FMS Results, Ammonia, NOx and TN and NOx	328
Figure 3.7-15: MBBR FPS 2-Hour, Peak Flow Stress Test	333
Figure 3.7-16: Boxplot of MBBR/DAF Experimental Plan 04 FPS Results, TSS and COD.....	334
Figure 3.7-17: Boxplot of MBBR/DAF Experimental Plan 04 FPS Results, Ammonia, TN and NOx	334
Figure 3.7-18: MBBR FPM 6-Hour, Peak Flow Stress Test.....	340
Figure 3.7-19: Boxplot of MBBR/DAF Experimental Plan 04 FPM Results, TSS and COD	341
Figure 3.7-20: Boxplot of MBBR/DAF Experimental Plan 04 FPM Results, Ammonia, NOx, and TN	341
Figure 3.7-21: MBBR DPE 24-hour, Peak Flow, Diluted Influent.....	347
Figure 3.7-22: Boxplot of MBBR/DAF Experimental Plan 04 DPE Results, TSS and COD	348
Figure 3.7-23: Boxplot of MBBR/DAF Experimental Plan 04 DPE Results, Ammonia, NOx, and TN	348
Figure 3.7-24: Media Mass on the MBBR Media	354
Figure 3.7-25: BOD Removal through MBBR BOD Reactor.....	356
Figure 3.7-26: Ammonia Removal through MBBR NR1&NR2 Reactor	357
Figure 3.7-27: Nitrate Removal through MBBR DN1&DN2 Reactors	358
Figure 4.1-01: Frequency Distribution for Raw Water BOD Estimates	363
Figure 4.1-02: Boxplot of Effluent TSS Laboratory Results for All Processes, All Experimental Plans	365
Figure 4.1-02: Boxplot of Effluent BOD Laboratory Results for All Processes, All Experimental Plans	366
Figure 4.1-04: Boxplot of Effluent TN Laboratory Results for All Processes, All Experimental Plans	368

LIMITATIONS

This pilot test report was prepared for AECOM and the City of Portsmouth, for the purpose of evaluating treatment technologies for removing total nitrogen from wastewater at the Peirce Island Wastewater Treatment Facility in Portsmouth, NH. The findings provided in this report are based solely on the information contained and referenced herein. All the original field data and laboratory data that are presented herein as “Results” were collected during onsite investigations. All field operations, field analyses, data compilation and reporting, data analysis and reporting were completed in a fair and impartial manner and are intended to be an accurate representation of treatment performance. Additional quantitative information regarding the raw wastewater, or other treatment goals and concerns that were not available to Blueleaf, Inc. at the time of the pilot study may result in modification of the stated findings. Note that pilot scale studies may not identify issues arising from long-term changes to raw water quality, nor predict long-term performance of the treatment processes tested.

This report has been prepared and submitted in confidence and is to be used solely for the purpose for which it is furnished. This document and such information is not to be reproduced, transmitted, disclosed or used otherwise in whole or in part without the written authorization of Blueleaf Incorporated.

RESPONSIBILITIES

City of Portsmouth Department of Public Works

680 Peverly Hill Road, Portsmouth, NH 03801

Maintains the municipal infrastructure that includes all streets, parks, municipal buildings, the water system, and the sanitary sewer collection and treatment system.

- Peter Rice, P.E., Deputy Director (603) 427-1530
- Terry Desmarais, P.E., City Engineer

City of Portsmouth DPW Sewer Division

200 Peirce Island Road, Portsmouth, NH 03801

Operates the Peirce Island and Pease Wastewater Treatment Facilities

- Paula Anania, Chief Plant Operator (603) 427-1553
- Michael Baker, Assistant Chief Plant Operator
- David Lovely, Assistant Chief Plant Operator
- Roxanna Chomas, Pease Plant Operator (603) 817-7611

AECOM

701 Edgewater Drive, Wakefield, MA 01880

Consulting Engineer for the City of Portsmouth.

- Don Chelton, P.E., VP and Principal-In-Charge (781) 246-5200
- Jon Pearson, P.E. VP and Project Manager
- Mathew Formica, P.E., Piloting Services
- Mark Laquidara, PhD, P.E., Wastewater Process Advisor
- Beverly Stinson, PhD, Nutrient Removal Advisor

Blueleaf Incorporated

57 Dresser Hill Road, Charlton MA 01507

Contracted by AECOM to construct and conduct pilot study and produce Pilot Study Report.

- Erik Grotton, P.E., President (508) 248-7094
- George Swedberg, Pilot Engineer (508) 340-7952
- Aaron Davis, Project Manager (774) 200-8029
- Russell Hauver, Pilot Engineer (508) 868-6734
- Mario Rogriguez, Pilot Engineer (508) 248-7094

Eastern Analytical

25 Chenell Drive, Concord, NH 03301

Certified Laboratory Services.

- Michael Becker, Client Services (800) 287-0525

I. Krueger, Inc.

401 Harrison Oaks Blvd., Suite 100, Cary, NC 27513

Vendor of the BIOS TYR Biological Aerated Filtration (BAF) System.

- David Foster, Process Manager (919) 677-8310
- Louis Ortenzio, Process Engineer
- John He, Process Engineer

Siemens Industry, Inc.

41 Hutchins Drive, Portland, ME 04102

Vendor of the Biomag™ System.

- Steve Woodard, Chief Technical Officer (207) 221-8225
- Andy Bishop, Engineering Manager
- Matt Varieka, Pilot Engineer

World Water Works, Inc.

4061 NW 3rd Street, Oklahoma City, OK 73107

Vendor of the Moving Bed Bioreactor (MBBR) System.

- Chandler Johnson, Chief Technology Officer (800) 607-7873
- Kyle Booth, Executive Vice President

Butterfield Environmental Corp.

3 Obery Street, Plymouth, MA 02360

Local representative for Aries Chemical. Provided polymer products for the pilot study.

- Nate Butterfield, President (508) 830-0410

ABBREVIATIONS

ANOVA	Analysis of Variance
BAF	Biologically Aerated Filter
BDL	Below Detection Limit
BOD	Biochemical Oxygen Demand
CaCO ₃	Calcium Carbonate
CASB	Conventional Activated Sludge with BioMag
COD	Chemical Oxygen Demand
C/N	Carbon and Nitrification Removal
CWT	Cambridge Water Technologies
DAF	Dissolved Air Floatation
DN	Denitrification
DN1	Denitrification Reactor Tank 1
DN1	Denitrification Reactor Tank 2
DO	Dissolved Oxygen
DPE	Diluted Strength, Peak Flow, Extended Duration Trial
F/M	Food to Microorganism Ratio
FMS	Full Strength, Mid Flow, Short Duration Trial
FPS	Full Strength, Peak Flow, Short Duration Trial
FPM	Full Strength, Peak Flow, Medium Duration Trial
FXM	Full Strength, High-Peak Flow, Medium Duration Trial
FXE	Full Strength, High-Peak Flow, Extended Duration Trial
gpm	Gallons per Minute
gpm/sf	Gallons per Minute per Square Foot (of surface area)
gpd	Gallons per Day
gr	Gram
IR	Internal Recycle Rate
L	Liter
MBBR	Moving Bed Bioreactor
mg	Milligram
MG	Million Gallons
MGD	Million Gallons per Day
mg/L	Milligrams per Liter (equivalent to ppm)
min	Minutes
ML	Mixed Liquor
MLE	Modified Ludzack-Ettinger
MLSS	Mixed Liquor Suspended Solids
MLVSS	Mixed Liquor Volatile Suspended Solids
mV	Millivolt
N	Nitrogen

NOx	Nitrogen Oxides
NR1	Nitrification Reactor Tank 1
NR2	Nitrification Reactor Tank 1
NH3	Ammonia
µg/L	Micrograms per Liter (equivalent to ppb)
N/A	Not Available / Not Applicable
ND	Not Detected
ORP	Oxidation Reduction Potential
PID	Proportional Integral Derivative
ppb	Parts per Billion
ppm	Parts per Million
RAS	Return Activated Sludge
SALR	Surface Area Loading Rate
SARR	Surface Area Removal Rate
SRT	Solids Retention Time
TKN	Total Kjeldahl Nitrogen
TN	Total Nitrogen
TSS	Total Suspended Solids
VSS	Volatile Suspended Solids
WAS	Waste Activated Sludge
WWTF	Waste Water Treatment Facility

1 INTRODUCTION

The City of Portsmouth NH has been issued a Consent Decree by the US Environmental Protection Agency (EPA) to upgrade the existing Peirce Island WWTF to provide secondary treatment. This Pilot Study was conducted as part of the planning process undertaken by the City in meeting the requirements of the Consent Decree. A Wastewater Master Plan and Long Term Control Plan (WMP/LTCP) was completed by Weston & Sampson Engineers and Brown & Caldwell in 2010, with Drafts submitted to the EPA in March and June, and a Final Supplement submitted in November. The Master Plan recommendation was to construct upgrades to the Sand Filter Building at Peirce Island WWTF to treat approximately 5 MGD Average Daily Flow, and 7.5 MGD Maximum Monthly Flow to Secondary Treatment Standards.

Additional engineering services were begun by AECOM in the Spring of 2011 to evaluate and select small footprint treatment processes for implementation at Peirce Island WWTF. This effort considered the ability of the processes to provide secondary treatment and to reduce effluent total nitrogen. Total nitrogen performance was considered in part due to a review of the ecological health of Great Bay that suggested nitrogen from point and non-point sources are contributing to seasonal anoxic conditions within the estuary. In addition, other communities around Great Bay had received draft NPDES permits limiting effluent nitrogen concentration in their treated wastewater effluent. Though nitrogen limits were not originally included in the treatment requirements for the Peirce Island WWTF, based on discussions with the EPA, the City believed that a nitrogen limit might be implemented in the future, and wanted to be prepared to include reasonable provisions in any capital improvements to include nitrogen removal. At the time that the pilot planning began, there was little information available to guide the City on the eventual limit that might be imposed. Since the timeframe for a potential total nitrogen permit limit and the treatment level was unknown, total nitrogen removal was not initially the primary focus of this pilot. Achieving results for secondary treatment was the first priority and operation of pilot units to achieve total nitrogen removal was to be completed as the schedule and budget allow.

As part of Phase 1 of the piloting project, AECOM completed a Technology Evaluation Final Technical Memorandum in September 2011, in which three processes were selected for an initial 6-month pilot scale evaluation. The three processes were: Biologically Activated Filtration (BAF), Moving Bed Bioreactor (MBBR), and Conventional Activated Sludge with a proprietary ballasted marketed as BioMag (CASB). The intention of the initial phase of piloting in Phase 2 was to develop data to choose one of the three processes for further piloting, Vendor selection, or preliminary design. The initial pilot testing is the subject of this Pilot Testing Protocol. Additional pilot testing may be undertaken in a second piloting phase to compare competing Vendors of the technology, to allow the selection of a Vendor for the upgrade of the Peirce Island WWTF, or to provide operational experience for the Portsmouth wastewater treatment plant operators, but the additional testing is not described in this document.

This Pilot Study Report details the approach, methods, results and conclusions of the pilot study completed between August 2011, and August 2012. The pilot system was designed, constructed, and operated by Blueleaf Incorporated, and the data was analyzed, and the report was written by Blueleaf

operators and engineers who conducted the field work on the pilot. Blueleaf is an independent and impartial firm, with no contractual relationship with any of the prospective vendors.

The pilot study report is separated into three sections to promote impartiality in the evaluation of the three processes included in the pilot study.

The Methods and Materials Section describes the pilot equipment, field testing procedures and Experimental Trials in detail.

The Results section contains the data produced during the pilot study without observations or subjective commentary. The intent is to allow the reader to consider the data without the opinion of the authors of this report.

The Summary section includes a comparison of the three processes, observations, comments on potential issues with the full-scale application of the three processes, and is more subjective than the results section. The Summary Section is intended to document the experience and observations of the pilot operators for its potential use as part of the process selection procedure.

This Pilot Study Report does not include a recommendation for process selection. Process selection must include design decisions including sizing, capital and operating costs, and a number of other factors that were not directly included in this phase of the Study. This Pilot Report is intended to provide some of the data that will aid the City in process selection.

2 METHODS AND MATERIALS

2.1 PILOT EQUIPMENT DESCRIPTION, GENERAL

Figure 2.1-01 shows the general physical layout of the pilot plant, and Figure 2.1-02 shows a schematic flow diagram of the pilot plant. The pilot plant was situated inside the northwest corner of the perimeter fence of the Peirce Island WWTF, adjacent to the entry gate. The pilot plant was constructed from October to December 2011. Main components of the pilot plant are listed below.

1. Primary clarifier and effluent sump.
2. BAF: Biological Aerated Filtration consisting of BOD removal/nitrification (stage 1) and denitrification (stage 2).
3. CASB: Conventional Activated Sludge with BioMag (biological reactor with magnetite ballast) followed by two parallel sedimentation clarifiers.
4. MBBR/DAF: Mixed Bed Biological Reactor, followed by Dissolved Air Flotation for clarification.

Miscellaneous equipment included a raw water supply pump, aeration blower, air compressor, chemical feed pumps and day tanks, feed pumps to re-pump primary effluent to secondary processes, various tanks, clean water supply, and waste drainage lines. There was a mobile laboratory and office for performing field analyses and monitoring processes via online meters and probes.

There were several pre-manufactured pilot units:

5. The DAF was a portable pilot-scale unit with appurtenant equipment, provided by the MBBR vendor World Water Works (WWW).
6. The two BAF stages were large mobile units provided by the vendor, Kruger, and delivered to the site with an associated control shed. The two BAF units and control shed were set up adjacent to the primary clarifier. The BAF towers and three appurtenant tanks were weather protected with clear plastic shrink wrapping.

Pilot components that were built onsite included:

7. Primary clarifier and primary effluent sump.
8. MBBR bioreactor.
9. CASB bioreactor (BioMag)
10. Two CASB secondary clarifiers.

The site-built components were all 4 ft wide x 8 ft deep tanks of various lengths. The tops of the tanks were open at approximately 8 ft to 9 ft above grade. The tanks were adjoined by decks that provided access to the tops of the tanks, the internal components, and the water volumes inside. The space under the decks was enclosed and weatherized. This space was used to house miscellaneous equipment including:

- DAF and appurtenances

- Aeration blower
- Air compressor and pressure tank
- Feed pumps for MBBR and CASB
- Return Activated Sludge (RAS) pumps for CASB
- Chemical feed pumps and day tanks
- Waste Activated Sludge (WAS) tank for DAF residuals
- Pilot waste return drain lines for effluent streams and residuals.

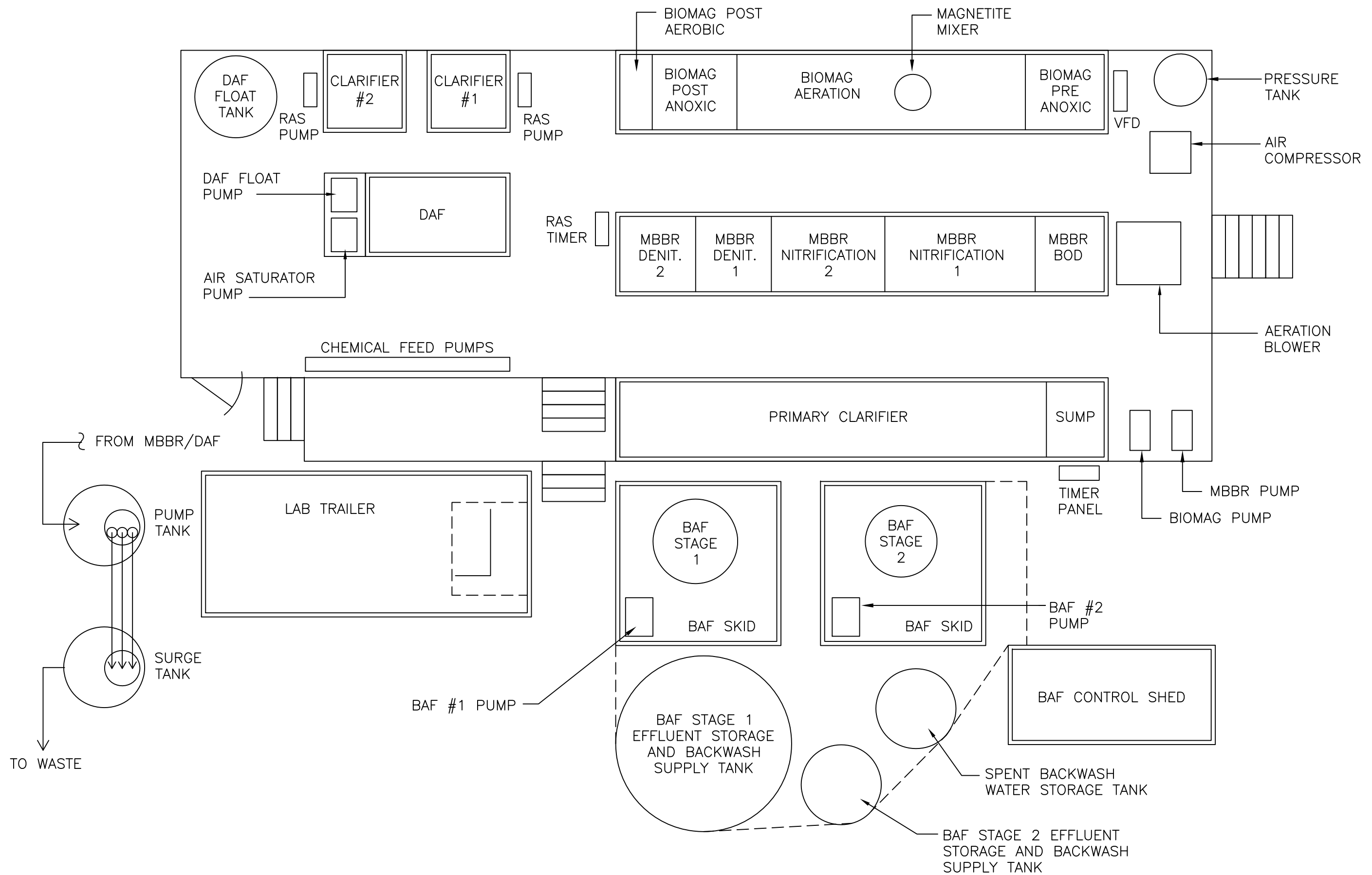


Figure 2.1-01: Pilot Plant Physical Layout

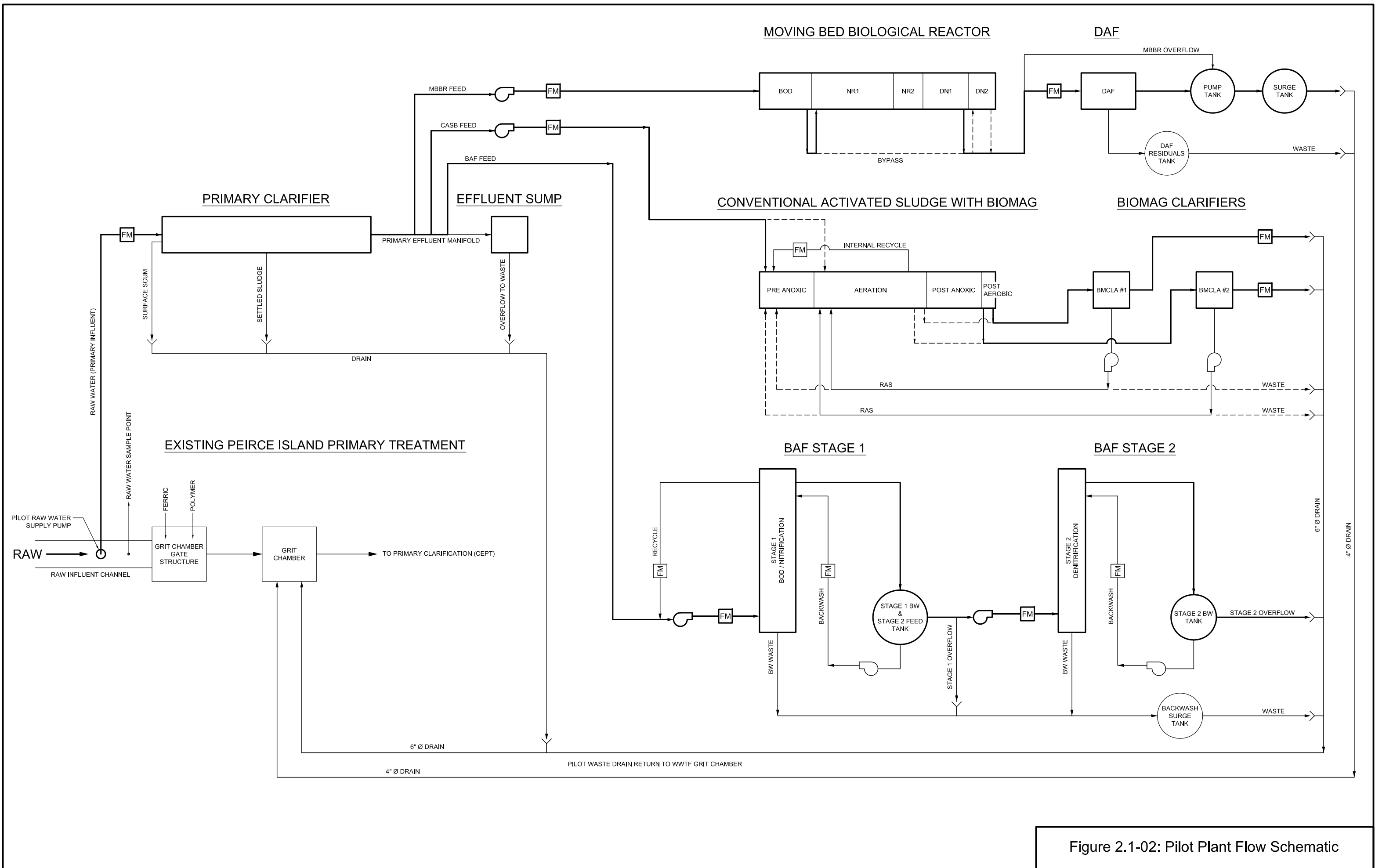


Figure 2.1-02: Pilot Plant Flow Schematic

2.1.1 City Water

City water was supplied to the pilot from a hose cock at the grit building, via approximately 300 ft of ¾" garden hose, for uses including the laboratory sink, makeup water for chemical feeds, and hoses for wash down.

City water was also supplied from a yard hydrant adjacent to the sludge thickener, via approximately 300 ft of 3" pipe for dilution water during hydraulic stress testing. Dilution water flows were controlled by a 1" PVC ball valve, and monitored by a 50 gpm rotameter.

2.1.2 Raw Water Supply

Raw water was supplied to the pilot by a 100 gpm submersible grinder pump placed in the influent channel to the aeration chambers, upstream of any chemical injection point. Raw water was conveyed from the pump to the primary clarifier via approximately 350 ft of 4" PVC pipe, against approximately 15 ft of elevation head. The flow rate was controlled by a 3" PVC ball valve at the pilot primary clarifier. The flow rate was monitored by a magnetic flow meter, and raw water flow was continuously logged by a data logger.

2.1.3 Site-Built Tank Construction for Clarifiers, Bioreactors, and Sumps

A series of tanks were constructed onsite to serve as pilot scale clarifiers and bioreactors. The location for the site-built tanks was graded and a layer of 1" stone was placed. The tanks were supported on 8" x 8" railroad timbers that were placed over the stone layer and leveled. Structural steel channels and angles formed a crib structure to support the tank floor, and contain the walls against hydraulic pressure. Steel angles were installed across the width of each tank at 3 ft intervals, to resist the outward hydraulic pressure. These angles also provided a framework that supported various components and platforms directly above the water surfaces. The tank walls and floors were constructed of structural grade lumber and ¾" thick exterior plywood panels. The interiors of the tanks were waterproofed with rubber liners.

There were four tank structures as follows:

1. Primary clarifier and effluent storage sump;
2. MBBR biological reactor tanks;
3. CASB biological reactor tanks;
4. Two secondary clarifiers for CASB process.

All of the site-built tanks measured 4 ft wide x 8 ft deep. Each of the four tank structures listed above was subdivided into smaller tanks of various lengths by internal dividing walls. Dividing walls between tanks in series were either:

- a. Bulkhead walls, which were constructed of lumber and plywood and waterproofed with rubber liners;
- b. Baffle walls, which were constructed of ½" polyethylene sheets fastened between the sidewalls of a larger tank to form an internal division, with circular or rectangular holes to allow flow to pass through.

There were numerous penetrations for solid piping through the sidewalls below waterline for the various tanks. PVC bulkhead fittings were used for penetrations, often with the addition of silicone or water-stop caulking to prevent leakage. Bulkhead fittings varied in size from 1½" to 4" diameter.

Other components of the various tanks were specific to the processes. These included piping, inlet/outlet structures, drains, pumps, mixers, etc. These are described in the appropriate sections.

2.1.4 Primary Clarifier

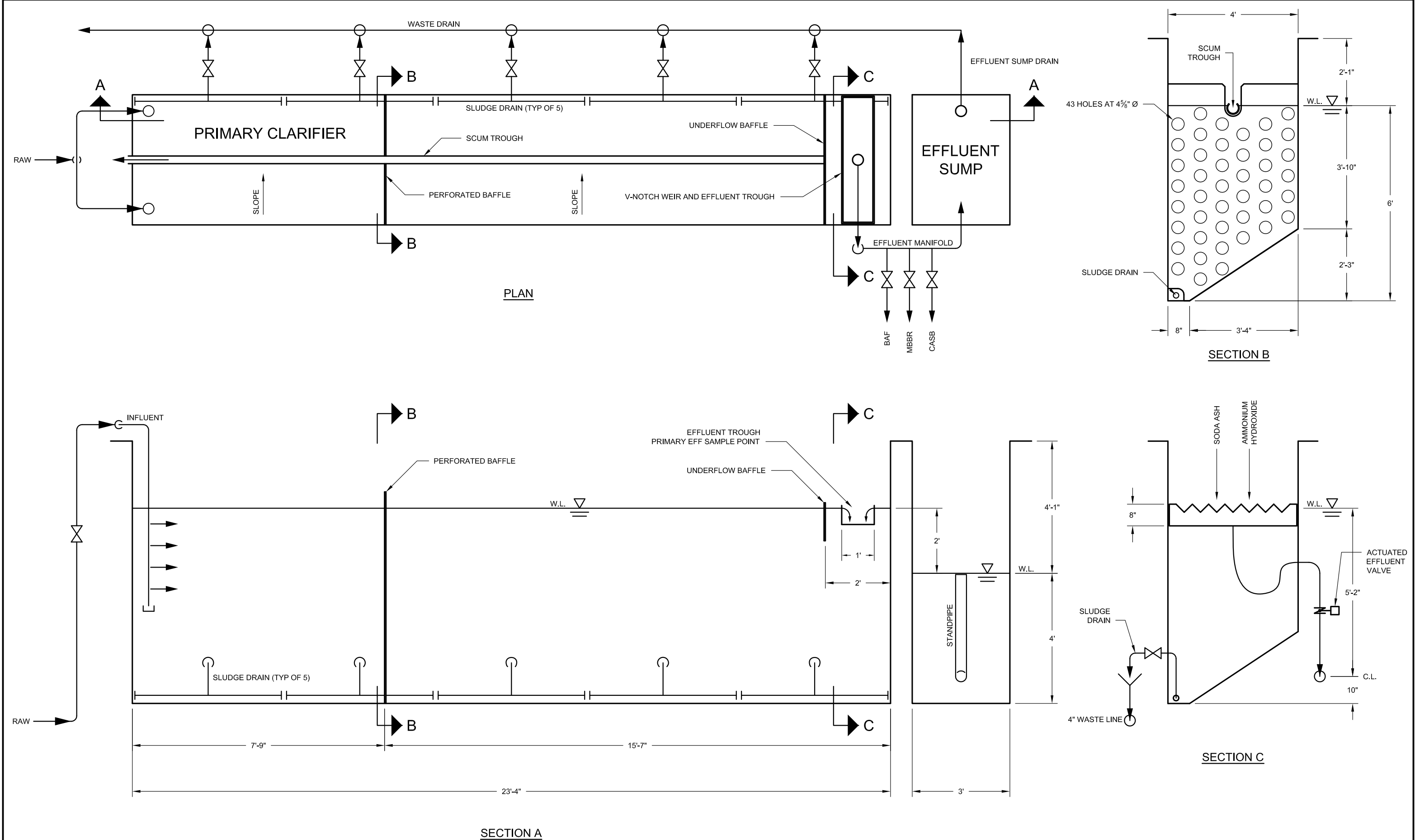
Figure 2.1-03 shows a scaled plan and sections of the primary clarifier, showing details of its configuration and function.

Primary clarification was not piloted for design purposes, but rather to produce non-CEPT primary effluent for the secondary processes being piloted. The full-scale WWTF produced only CEPT effluent. The objective was for the pilot primary clarifier to produce effluent representative of full-scale performance without the use of coagulant for enhanced primary treatment. There was no corresponding non-CEPT water quality data from the full-scale WWTF to attempt to duplicate at the pilot scale. Instead, the pilot primary clarifier was sized to operate at surface hydraulic loading rates similar to the full-scale WWTF clarifiers with both primary clarifiers in service.

Raw water influent was supplied from the raw water pump. A continuously logged magnetic flow meter was installed upstream of the clarifier. The feed line was reduced from 4" PVC to 3" PVC, and the influent flow rate was controlled by a 3" PVC ball valve.

The inlet structure was immediately downstream from the 3" ball valve. The inlet structure consisted of two parallel 3" diameter pipes that extended vertically below the water surface of the clarifier. Each influent pipe was capped at the bottom, and had a series of 1.5" holes that dispersed flow below the surface.

The primary clarifier measured 4' wide x 8' deep x 26' long. There was 2' of freeboard above the water surface. The floor of the clarifier was sloped across the width (the 4' dimension) to cause settled sludge to flow toward sludge drains installed along the length of the clarifier. The water depth was 6' at the low side of the sloped floor (deepest point), and 3'-10" at the high side. The water volume of the clarifier was 3950 gallons (528 cubic feet).



SCALE: 3/8" = 1'-0"

Figure 2.1-03: Primary Clarifier Plan and Sections

There were a series of 5 sludge drains along the low side of the sloped floor. Each drain consisted of a 5 ft long slotted 2" diameter pipe running along the floor of the clarifier at the deepest point, 6 ft below the surface. The sludge drain pipes were arranged end-to-end along the length of the clarifier. The ends of each slotted sludge drain pipe were capped. Each had a tee at the midpoint with a 2" branch that penetrated the sidewall of the clarifier via a 2" bulkhead fitting. On the outside of the clarifier, each sludge drain was controlled by a 2" PVC ball valve, and there was a length of clear 2" PVC downstream of each valve to serve as a sight glass to observe flow. Each 2" drain emptied into an open-top 4" standpipe, and the standpipe was connected to a tee in a 4" waste line. The waste line returned to the WWTF grit chamber.

Clarified effluent exited the primary clarifier at the surface over a v-notch weir. There was an underflow baffle immediately upstream of the effluent weir, to block floating materials. The underflow baffle extended across the width of the clarifier to a depth of 12".

The effluent passed over the v-notch weir into an effluent trough, which measured 4 ft wide x 1 ft long x 8" deep. The effluent trough extended across the width of the clarifier, and had v-notches along both 4-ft lengths. The total length of the weir was 8 ft, and effluent flowed into the trough from both sides. The elevation of the weir was adjustable. The weir elevation controlled the water level in the clarifier. Effluent flowed out of the weir through a 4" diameter flexible pipe, to a 4" bulkhead fitting that penetrated the side wall of the clarifier, and dropped to a 4" diameter manifold for distribution.

There was a 4" diameter actuated butterfly valve on the effluent line that was controlled by a timer panel. The timer panel had two timers, one to control the "open valve" time, and one to control the "closed valve" time. The purpose was to allow for automated scum removal cycles, by periodically closing the effluent valve for short periods, which would cause the primary clarifier water level to rise and overflow the scum trough. In practice, the valve was not used for automated scum removal. The timer panel had a "HAND/OPEN/OFF" switch that was typically set to HAND (open).

The effluent manifold had four branches: primary effluent sump; MBBR feed pump; CASB feed pump; and BAF feed pump. Each of the three secondary feed pump branches had a PVC ball valve to shut off flow as necessary. The primary effluent manifold was horizontal, and the centerline was approximately 10" above the floor of the primary clarifier and primary effluent sump. There was approximately 5 ft of head above the manifold centerline during normal operating conditions with forward flow through the primary clarifier. When the flow of effluent from the primary clarifier was shut off (for example, during sludge draining) the primary effluent sump supplied flow to the manifold.

The primary effluent sump stored a volume of approximately 360 gallons. Approximately 300 gallons was available to the secondary process feed pumps, and the remainder was below the invert of the primary effluent manifold. Inflow entered the sump through a 4" diameter bulkhead fitting with an invert 8" above the sump floor. Effluent flowed out of the sump through a 4" diameter vertical standpipe. The standpipe maintained the water depth at 4 ft, which was 2 ft below the level of the primary clarifier.

Outflow from the sump, and from the primary clarifier sludge drains, ran into a 4" PVC gravity drain pipe that ran the length of the gallery between the primary clarifier/sump and the MBBR tanks. The 4" drain flowed into a 6" pilot drain pipe that returned to the WWTF grit chamber.

The primary clarifier operated at a flow rate greater than the combined flow rates of the secondary processes. The excess flow maintained a continuous flow through the effluent sump, so there was constant turnover of the stored volume. The water level in the sump (defined by the top of the drain pipe) was 2 ft lower than the primary clarifier water level. The 2 ft head was enough to maintain an overflow condition at the v-notch weir for flows up to 95 gpm, which was the maximum flow rate for the raw water supply pump.

Table 2.1-01 summarizes the dimensions of the pilot primary clarifier.

Table 2.1-01: Primary Clarifier Dimensions

Width	4 ft
Depth	6.0 ft - 3.8 ft (5.1 ft avg. depth)
Length	26 ft
Surface Area	104 ft ²
Volume	3950 gal

2.1.4.1 Operations and Maintenance of the Primary Clarifier

The primary clarifier typically operated at flow rates of 25 gpm to 50 gpm. The flow rate was controlled by a 3" PVC ball valve immediately upstream of the primary clarifier inlet distribution structure. The flow rate was monitored by a magnetic flow meter with continuous data logging.

Surface scum removal was typically a daily maintenance procedure. A fraction of the primary clarifier flow drained continuously into the scum trough to remove surface scum and floating objects. When accumulations of surface scum were present, they were manually removed by sweeping into the scum scupper. If necessary, the primary effluent actuated valve was put in the OFF (closed) position while sweeping, to increase the clarifier water level and aid scum removal.

Settled Sludge removal was a daily maintenance procedure. The sludge drain valves were opened in succession to remove settled solids. Each drain was usually opened 5-15 minutes, and the entire process usually took 30-60 minutes. While the sludge was being drained, the sloped floor of the clarifier was swept using a 16" squeegee with a 12 ft telescoping handle, in order to push settled solids toward the drains. Draining lowered the water level of the clarifier below the effluent weir, which prevented solids stirred up by sweeping from fouling the effluent, but also shut off the effluent flow for the duration of draining. The primary effluent sump stored 360 gallons provided approximately 360 gallons of stored effluent to the secondary processes

2.1.4.2 Modifications to Primary Clarifier

There was initially an influent screen to prevent larger objects from entering the primary clarifier. The screens typically clogged within hours, and were removed after the first week of pilot operations. The speed with which clogging occurred made it infeasible to install basket strainers or other screening methods.

Scum removal was initially intended to operate on a timer. The effluent valve would close at timed intervals, the clarifier water level would rise, surface scum would overflow into the scum trough, and then flow by gravity to the WWTF grit chamber via the pilot waste drain. However, the surface scum layer was often too thick to effectively flow into the scum trough. It proved more effective to maintain a small continuous overflow into the scum trough, and to perform daily scum removals by manually sweeping scum into the trough.

A baffle was installed in the primary clarifier on Feb 24, 2012. The baffle was intended to prevent channeling. It was installed one third of the distance from inlet to outlet, or approximately 8 ft from the inlet end of the clarifier. The baffle was constructed of ½" thick polyethylene, extending the full depth and width of the clarifier, perpendicular to the direction of flow. There were 43 holes through the baffle below the waterline, each hole measuring 4.625" diameter, with a combined open area of approximately 5 square feet. The open area of the holes was approximately 25% of the total submerged area of the baffle, which was 20.3 ft².

2.2 PILOT EQUIPMENT DESCRIPTION, BIOLOGICAL AERATED FILTER

Upflow biological filters are attached growth processes, which act in a similar manner to packed filter beds. In these systems the media provides a surface for the organisms to attach. The wastewater flows upward through the media. The media is retained in the filter by a screen structure, while the treated effluent is discharged. The upward flow passing through the packed media provides filtration for solids removal, eliminating the need for further solids separation.

The BAF filter media bed accumulates solids during forward flow operations. Head losses increase as filtration continues. The accumulated solids are removed periodically by backwashing. During backwash, the filter is operated in reverse flow using stored BAF effluent. Reverse flow expands the filter bed and releases the collected solids. After backwashing, the BAF is returned to forward flow. There is typically a period of high turbidity or TSS when filtration begins after backwashing.

2.2.1 Full Scale BAF Systems

Kruger was selected by AECOM for piloting. Kruger's BIOSTYR process uses high-density polystyrene beads as the filter media. The beads float, and there is a ceiling plate with nozzles to retain the media. Backwashing is completed with air scour and a downward flow of filtered water. Kruger proposes that the BAF filter sizes are independent of the TN goal, and that only the supplemental carbon dose would be increased to reduce TN in the effluent. The full-scale system would use methanol for supplemental carbon. The pilot system used MicroC 1000.

Kruger provided two alternative designs: one with 3 separate filter stages for BOD removal, nitrification, and denitrification; the other with a 2 stages, the first stage for both BOD removal and nitrification, the second stage for denitrification. The 2 stage design was piloted based on pilot unit availability. The filter sizes for both the 2 stage and 3 stage designs are shown in Table 2.1-02.

Table 2.1-02: Proposed Full-Scale BAF Design Parameters

Design	Filter Function	Number of Filters	Surface Area per Filter (sf)	Total Surface Area (sf)	FSLR Max Month All filters in operation (gpm/sf)	FSLR Peak Day (1 filter out of service) (gpm/sf)
3 stage	BOD	8	468	3,744	1.11	1.62
	N	6	468	2,808	1.48	2.26
	DN	5	304	1,520	2.74	4.35
2 stage	BOD/N	8	468	3,744	1.11	1.62
	DN	4	304	1,216	3.42	5.80
	DN	4	274	1,096	3.80	6.44

BOD = BOD removal, N = nitrification, DN = denitrification, FSLR = filter surface loading rate (hydraulic)

2.2.2 Pilot Scale BAF System

Kruger provided two BAF pilot systems for piloting: a 36" diameter unit for Stage 1, and a 25.5" diameter unit for Stage 2. Kruger provided two BAF pilot systems for piloting: a 36" diameter unit for Stage 1 (BOD/N, BOD removal and nitrification), and a 25.5" diameter unit for Stage 2 (DF, denitrification). Table 2.1-03 summarizes the pilot scale operating parameters proposed by Kruger prior to the pilot study.

Table 2.1-03: Proposed Pilot-Scale BAF Operating Parameters

Filter Function (Stage)	Diameter (in)	Surface Area (sf)	Max Month		Peak Day	
			Flow Rate (gpm)	FSLR (gpm/sf)	Flow Rate (gpm)	FSLR (gpm/sf)
BOD/N (BAF 1)	36	7.07	7.9	1.11	11.4	1.62
DN (BAF 2)	25.5	3.55	12.1* 7.9†	3.42 2.23	20.6* 11.4†	5.80 3.21

* BAF 2 flow at design loading rate exceeds flow produced by upstream BAF 1

† Maximum BAF 2 flow rate allowed by BAF 1 flow.

The BAF 2 flow rate would exceed the production of BAF 1 if both stages were operated at the design flow rates. This was because of the respective sizes of the two units. BAF 2 is limited to operating at same flow as BAF 1, or somewhat less. Because of this, the DN filter would have to operate at flows and filter loading rates lower than the proposed design rates during some of the pilot testing.

BAF 1 and BAF 2 were controlled by a SCADA housed in the BAF control shed. The SCADA allowed for AUTO, SEMI-AUTO, and MANUAL control.

The BAF Stage 1 unit was connected to the primary clarifier effluent manifold via 2" diameter PVC. Ports were installed on the influent feed line for chemical feed, and also for seed flow for nitrifying bacteria. The seed flow was mixed liquor from MBBR Nitrification Reactor 2.

BAF 1 had a lower air manifold and an upper air manifold. A recycle line allowed a fraction of BAF 1 effluent to be directly returned to be blended with the influent. Effluent could be recycled into BAF 1 influent, and the lower air manifold could be shut off, to operate the lower section of BAF 1 as a pre-anoxic zone. Alternatively, BAF 1 could operate with both the upper and lower air manifolds, and no recycle flow, to oxygenate the entire BAF 1 column for BOD removal and nitrification.

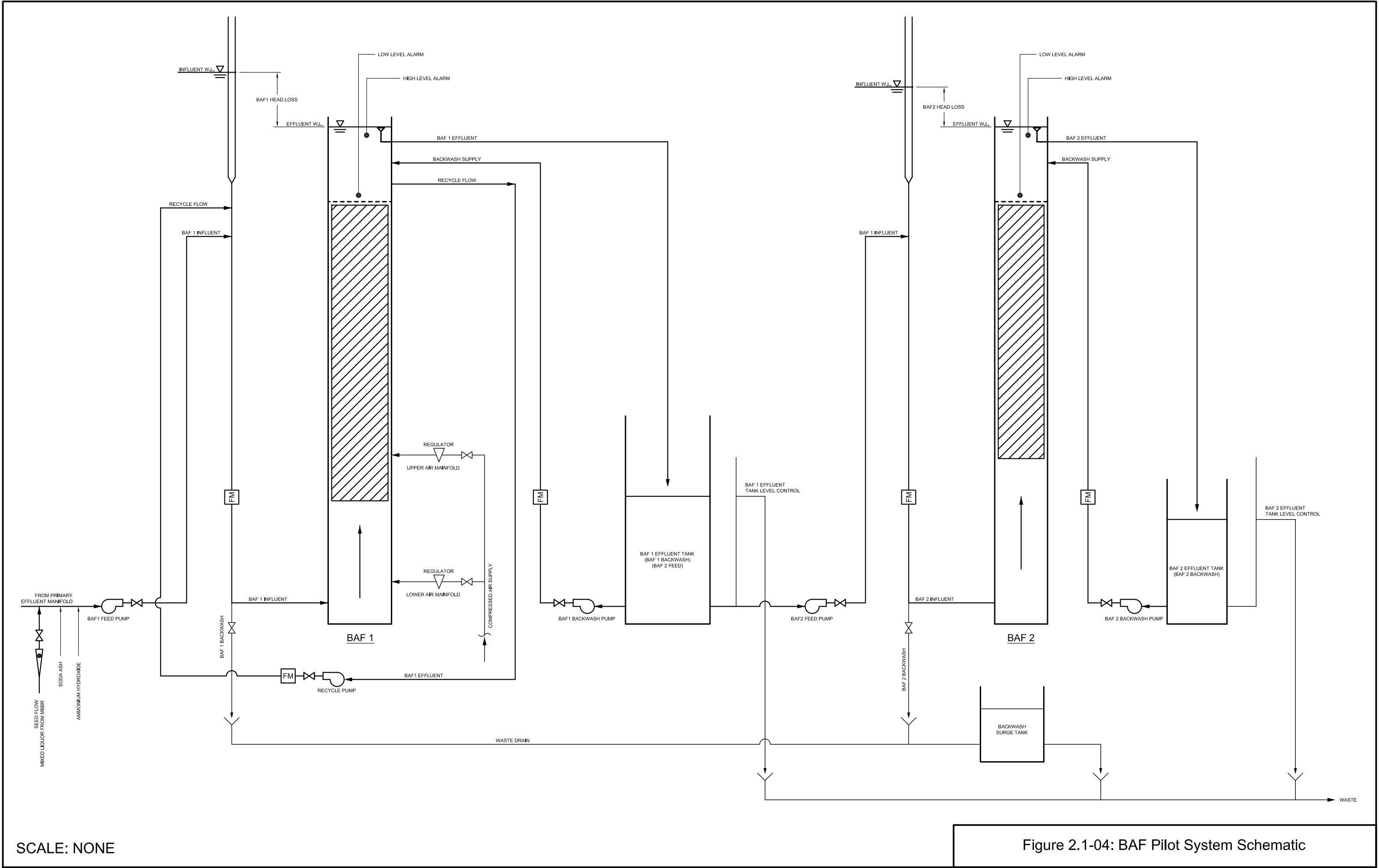
Stage 1 effluent was collected in the BAF 1 Effluent Tank. The effluent tank water level and volume were controlled by an overflow invert that drained to waste. The stored volume in the effluent tank provided feed water to BAF 2, and also provided backwash water for BAF 1. The stored volume that was required for backwashing was large (1000-1500 gallons) in comparison to the through-flow rates

(influent from BAF 1, feed to BAF 2). This resulted in long detention times on the order of many hours. There were several potential effects:

- Delayed response of BAF 2 to changes in water quality from BAF 1.
- Attenuation of water quality variations due to mixing in storage.
- Settling and retention of solids in the effluent tank.
- Biological activity in settled solids affecting water quality.

BAF 1 effluent samples were collected upstream of the effluent tank, and were unaffected by the factors listed above. However, BAF 2 performance was potentially affected by all of these factors. The delayed response of BAF 2 was especially apparent during hydraulic stress tests, when short-duration spikes in BAF 1 effluent water quality parameters were not reflected in BAF 2 water quality. It also occurred at times during the pilot study that BAF 2 influent had greater total nitrogen than BAF 1 effluent, suggesting that there might be nitrification of solids that had settled in the effluent tank.

These potential effects were minimized by (1) reducing the effluent tank volume as much as possible while maintaining sufficient volume for backwashing, and (2) installing a submersible pump to circulate water in the effluent tank to prevent settling.



SCALE: NONE

Figure 2.1-04: BAF Pilot System Schematic

2.3 PILOT EQUIPMENT DESCRIPTION, CONVENTIONAL ACTIVATED SLUDGE WITH BIOMAG

CASB uses the conventional activated sludge process, with the addition of an inert iron mineral (magnetite) as ballast in the aeration tank and clarifiers to increase secondary settling rates. This allows plants to operate with higher mixed liquor suspended solids concentrations in the aeration tanks. Magnetite has a specific gravity of 5.2, and when combined with biological floc it significantly increases settling rates.

CASB uses conventional rectangular or circular secondary sedimentation tanks for clarification. The high settling rates achieved by the ballasted flow would allow the system to operate at surface overflow rates and solid loading rates that would be greater than those used for conventional secondary sedimentation tanks.

At full-scale, waste activated sludge (WAS) would be sent through a magnetite recovery process before being wasted. The recovery process would include a shear mixer to split the ballast from the floc, and a magnetic recovery drum to separate the magnetite from the biosolids. The magnetite recovered from the WAS would be returned to the bioreactor. Some fraction of the magnetite would be lost in the recovery process and wasted. Virgin magnetite would be added to the recovered magnetite to replace the amount wasted with the WAS. The recovered and virgin magnetite would be returned to the aeration tank via RAS flow.

2.3.1 Proposed Full-Scale CASB Design

Siemens Industry, Inc. (Siemens) submitted two proposed designs for the full scale CASB treatment system. The 30/30 tank sizing is from the first proposal, and represents a smaller tank volume. All other bioreactor tank volumes and all clarifier designs are from the Siemens Revision 2. Tank dimensions and volumes are shown in Table 2.1-04.

Table 2.1-04: CASB (BioMag) Bioreactor Design Parameters

Treatment Scenario	Tank Purpose	Dimensions	Volume (gallons)
30/30	Activated Sludge	1 @ 134'Lx30'Wx30'D	903,000
TN<8	Aeration	2 @ 81'Lx30'Wx30'D	764,400
	Anoxic		327,600
TN<3	Pre Anoxic	2 @ 81'Lx30'Wx30'D 1 @ 52'Lx30'Wx30'D	327,600
	Aeration		764,400
	Post Anoxic 1		175,000
	Post Anoxic 2		175,000

For nitrogen removal, an internal recycle system would be required to recycle approximately 24 MGD of aeration tank effluent (high NO_x and low DO) back to the anoxic zone.

Chemical feed systems would include:

1. Alkalinity. To be added at the beginning of the bioreactor, according to the demands for nitrification, the form of alkalinity to be chosen by the Engineer.
2. Polymer. To be added to the bioreactor effluent, prior to the clarifier.
3. Magnetite. To be recovered from the WAS, and both recovered magnetite and virgin magnetite returned into the RAS line.

Siemens proposed that rectangular clarifiers be used downstream of the CASB bioreactors. The clarifier dimensions and design parameters are shown in Table 2.1-05.

Table 2.1-05: CASB Secondary Clarifier Design Parameters

Treatment Scenario	Dimensions	Flow Rate (MGD)	Surface Overflow Rate (gpd/sf)	Solids Loading Rate (lb/day-sf)
30/30 and TN<8	4 @ 74'Lx14'Wx15'D 4,144 sf	4.30	1,038	45
		5.99	1,444	71
		7.62	1,835	115
TN<3	4 @ 74'Lx14'Wx15'D 2 @ 74'Lx30'Wx15'D 8,580 sf	4.30	504	36
		5.99	704	70
		7.62	894	88

2.3.2 Pilot-Scale CASB Design

The CASB bioreactor and post-secondary clarifiers were constructed onsite. The bioreactor was 26 ft long x 4 ft wide, with a sidewall depth of 8'. The water depth in the tank was maintained at approximately 6.7 ft (6'-8") with approximately 1.5 ft (18") freeboard. The bioreactor was divided into several smaller tanks as follows:

- Pre-Anoxic Tank
- Aeration Tank
- Post-Anoxic Tank
- Post-Arohic Tank

2.3.2.1 Mixed Liquor Wasting

Mixed liquor from the CASB was wasted on a regular basis to control the sludge age. Wasting was typically performed daily, based upon the VSS concentration. The magnetite concentration of the mixed liquor would be determined by direct analysis of the relative fractions of VSS and inert solids, before wasting was performed. After wasting, the appropriate mass of virgin magnetite would be added to the bioreactor, in order to make up the mass that was wasted with the mixed liquor. The mass of magnetite added would be adjusted as necessary to maintain the desired ratio of magnetite to VSS.

Initially, wasting was accomplished by discharging a known volume of mixed liquor from the aeration zone to waste. Mixed liquor was typically wasted directly from the 3" diameter pipes that conveyed the mixed liquor from the bioreactor to CASB clarifiers.

The procedure for wasting mixed liquor from the general water column was replaced by surface wasting after an occurrence of filamentous growth. Surface wasting allowed for targeted removal of undesirable growth that caused foam in the aeration zone and poor settling in the clarifiers. It also allowed control of sludge age by disposing of a known fraction of the mixed liquor on a daily basis.

A surface wasting device was installed in the aeration zone, constructed and installed by Siemens. The original device was eventually replaced by a second, improved device, also constructed and installed by Siemens. Both surface wasting installations consisted of a sump with an adjustable floating weir. Mixed liquor consisting largely of surface foam overflowed the weir into the sump. There was a submersible pump with level switch that pumped the collected liquids and solids to waste.

2.3.2.2 Magnetite Addition

A full-scale BioMag system would include the magnetite recovery process to separate magnetite from the Waste Activated Sludge. Sufficient virgin magnetite would be added to replace the unrecovered fraction. In contrast, the pilot system did not have magnetite recovery. A large fraction of the magnetite in the CASB was wasted on a regular basis with the WAS.

It was necessary to make up the fraction of lost magnetite with virgin magnetite. Initially magnetite was pre-mixed with primary effluent in a magnetite mixing tank and added to the aeration tank incrementally over time. This was per instruction from Siemens. The mixed virgin magnetite was fed into the impregnation tank in the aeration zone. The impregnation tank mixed the virgin magnetite, RAS, and CASB influent to better combine magnetite particles with biomass.

This procedure was later replaced by surface broadcasting, per Siemens. Virgin magnetite was sprinkled across the surface of the aeration zone. The mixing provided by aeration and the tank mixer maintained the virgin magnetite in suspension. The original impregnation tank was removed.

The addition of a large mass of virgin magnetite on a daily basis might potentially have had some effect upon clarifier effluent TSS. Virgin magnetite has some small fraction of fines, largely silica. With a magnetite recovery process, the fines would normally be wasted and the recovered magnetite would be free of fines; there would be only a minor addition of fines from makeup magnetite. Without a magnetite recovery process, the pilot CASB had a potentially large daily addition of fines from virgin magnetite. To minimize this effect, magnetite addition was typically performed late in the day after water quality sampling had been completed.

2.3.2.3 Pre-Anoxic Tank

The pre-anoxic tank was separated from the aeration tank by a bulkhead wall. The pre-anoxic tank was equipped with a mixer to both provide mixing, and to prevent settling of the ballasted solids. Inflow to the pre-anoxic tank included:

1. Influent (primary clarifier effluent).
2. RAS from the active secondary clarifier.
3. Internal Recycle (IR) from the post-anoxic zone.

In addition, there was an alkalinity feed for soda ash. The three inflows and the chemical feed line all entered into a drum suspended in the pre-anoxic tank, and overflowed to the larger tank. Originally water was conveyed from the pre-anoxic zone to the aeration zone through 3" diameter PVC piping that penetrated the sidewalls of both tanks below the waterline. The function of the 3" piping was replaced by a notch that was installed through the bulkhead separating the pre-anoxic and aeration tanks, to allow water to flow through at the surface. A weir was installed across the notch to maintain the water level of the pre-anoxic tank slightly above the aeration tank, to prevent backflow of aerated water into the pre-anoxic zone.

2.3.2.4 Aeration Tank

The aeration tank was separated from the post-anoxic tank by a bulkhead wall. Originally water was conveyed from the aeration zone to the post-anoxic zone through 3" diameter PVC piping that penetrated the sidewalls of both tanks below the waterline. The function of the 3" piping was replaced by a notch that was installed through the bulkhead separating the aeration and post-anoxic tanks, to allow water to flow through at the surface. Prior to installation of the notch, the 3" piping tended to clog with settled magnetite, and had to be periodically purged with a mixture of pressurized air and water.

There was an underflow baffle angled across the aeration tank outlet notch to direct surface foam toward a surface wasting sump. Surface wasting was introduced after a prolonged occurrence of filamentous growth that negatively affected settling and secondary clarifier effluent water quality. There were two different surface wasting sumps, with the second sump replacing and improving upon the first. Each was designed to allow surface foam to flow in a low rate over an adjustable weir, in order to waste the filamentous organisms that floated at the surface.

The foam collected in the surface wasting sump was pumped to waste by a submersible pump with a level switch. The volume of surface waste was quantified by first discharging into the unused clarifier (only one clarifier was in use for secondary clarification at any given time, leaving the other available for wasting), and then draining to waste by gravity. The clarifier used for wasting was allowed to fill to a pre-determined level corresponding to the desired daily waste volume. A high level switch was placed at the desired level to shut off the surface wasting pump, and thereby limit the waste volume.

The aeration tank had a series of 1" diameter PVC air laterals installed across the floor, to inject air bubbles for aeration, and also to aid in mixing and in keeping the magnetite ballast suspended. The air laterals injected air across only one-half of the width of the tank, to produce a rolling circulation pattern along the length of the aeration tank. A mixer was installed in the aeration tank near the outlet end.

2.3.2.5 Post-Anoxic

The post-anoxic tank also had air laterals installed across the floor, so that it could function as either an anoxic zone or a post-aeration zone. The air laterals were installed in the same manner as in the aeration tank. A mixer was installed in the post-anoxic zone at the center of the tank.

During the TN<8 treatment experiments, the post-anoxic zone had a length of 75". The IR pump was installed at the downstream end of the post-anoxic zone.

During the TN<3 treatment condition, the post-anoxic zone was shortened to 57" by installation of a baffle wall. The baffle wall divided the original tank to create a post-aerobic tank at the downstream end of the post-anoxic tank. The IR pump was installed at the downstream end of the post-anoxic zone, upstream from the baffle wall.

2.3.2.6 Post-Aerobic

The post-aerobic zone was used only during the TN<3 treatment experiments. The post-aerobic tank had a length of 18", and was divided from the upstream post-anoxic zone by a removable baffle wall. The baffle wall restricted flow to a small surface weir. Water flowed in through the baffle weir from the post-anoxic tank, and out through the 3" diameter piping to the CASB clarifier. The IR pump was moved to the upstream side of the baffle wall, to the post-anoxic zone.

2.3.2.7 CASB Secondary Clarifiers

Effluent from the bioreactor flowed to either one of two clarifiers, CASB Clarifier 1 or CASB Clarifier 2. The clarifiers were constructed onsite. Each clarifier was 4 ft x 4 ft square, with a sidewall depth of 8 ft. The water depth was 7.25 ft (7'-3") at the deepest point. The floor elevation of the clarifiers was 1 ft lower than the bioreactor. The clarifier water surface was approximately 5" lower than the bioreactor. Clarifier flow was provided by static head.

Water was conveyed from the bioreactor to the clarifiers via 3" diameter piping. There was dedicated piping for each clarifier. The two clarifiers were never used simultaneously. Features of each clarifier included:

- The process water from the bioreactor entered into a 14" diameter x 48" high stilling well in the center of the clarifier, through a 3" diameter opening directed upward at a depth of 6" below the water surface.
- The flow path was downward and out of the bottom of the stilling well, and then upward to the overflow weir.
- There was a continuous v-notch weir with 2-inch deep 90° notches around the perimeter of the clarifier.
- There was a continuous baffle beneath the v-notch angled 45° downward and extending 6" from the clarifier wall, to prevent suspended particles from channeling upward along the wall.
- Clarified water collected in the weir trough flowed out through two 2" diameter outlets at opposite corners of the clarifier, into a common effluent pipe that flowed to waste.
- Composite samples were collected from the effluent pipe.

- The lower portion of the clarifier sidewall sloped inward at an angle of 59° with respect to horizontal, to a 1 ft x 1 ft square by 6" deep sump to collect sludge.
- The sludge sump had two 2" diameter outlets connected to a RAS pump, to pump return activated sludge to the bioreactor. There were additional outlets on the sludge line to allow wasting.

The ballasted floc formed a dense settled sludge layer, and the majority of the settled sludge was returned from the clarifiers to the bioreactor. The return activated sludge (RAS) flow rate was controlled to maintain a settled sludge depth of typically 2 ft - 4 ft. Sludge depth was measured using a sludge judge, usually on a daily basis. Sludge depth varied widely over the course of the pilot study and the RAS rate had to be adjusted frequently.

RAS flow was returned to the aeration tank during the 30/30 experiments. During the TN<8 and TN<3 experiments the RAS flow returned to the pre-anoxic tank.

2.3.2.8 CASB Bioreactor and Clarifier Configurations

Table 2.1-06 shows the proposed configurations for the full-scale and pilot-scale Conventional Activated Sludge with BioMag bioreactor. Siemens departed from some of the pilot design parameters while the study was ongoing. During the TN<3 treatment experiments the treatment sequence was: pre-anoxic, aeration, post-anoxic, post-aerobic. This was different than the two post-anoxic zones indicated in Table 2.1-06.

Table 2.1-07 shows the configurations for the full-scale and pilot-scale CASB post-secondary clarifiers.

Table 2.1-06: CASB Proposed Pilot-Scale Bioreactor Design Parameters

Treatment Condition	Zone	Proposed Full-Scale			Pilot-Scale			
		Volume (ga)	Q (MGD)	Dt (hrs)	L (ft)	Volume (ga)	Dt (hours)	Q (gpm)
30/30	Aeration	1,090,730	4.30	5.04	13.8	2477.7	5.04	8.2
			5.99	3.62			3.62	11.4
			7.62	2.84			2.84	14.5
TN<8	Anoxic	327,600	4.30	1.83	5.9	1059.3	1.83	9.7
	Aeration	764,400		4.27	13.8	2477.7	4.27	
	Anoxic	327,600	5.99	1.31	5.9	1059.3	1.31	13.5
	Aeration	764,400		3.06	13.8	2477.7	3.06	
	Anoxic	327,600	7.62	1.03	5.9	1059.3	1.03	17.1
	Aeration	764,400		2.41	13.8	2477.7	2.41	
TN<3	Anoxic	327,600	4.30	1.83	5.9	1060.5	1.83	9.7
	Aeration	764,400		4.27	13.8	2474.6	4.27	
	Post Anoxic 1	175,000		0.98	3.2	566.5	0.98	
	Post Anoxic 2	175,000		0.98	3.2	566.5	0.98	
	Anoxic	327,600	5.99	1.31	5.9	1060.5	1.31	13.5
	Aeration	764,400		3.06	13.8	2474.6	3.06	
	Post Anoxic 1	175,000		0.70	3.2	566.5	0.70	
	Post Anoxic 2	175,000		0.70	3.2	566.5	0.70	
	Anoxic	327,600	7.62	1.03	5.9	1060.5	1.03	17.1
	Aeration	764,400		2.41	13.8	2474.6	2.41	
	Post Anoxic 1	175,000		0.55	3.2	566.5	0.55	
	Post Anoxic 2	175,000		0.55	3.2	566.5	0.55	

Table 2.1-07: CASB Proposed Pilot-Scale Clarifier Design Parameters

Treatment Condition	Full Scale Design			Pilot Scale Design	
	Surface Area (sf)	Plant Flow (MGD)	Surface Overflow Rate (gpd/sf)	Flow (gpm)	Surface Overflow Rate (all bioreactor flow to one Pilot Clarifier)
30/30 and TN<8	4,144	4.3	1,038	8.2	737
		5.99	1,445	11.4	1,027
		7.62	1,839	14.5	1,307
TN<3	8,580	4.3	504	9.7	870
		5.99	704	13.5	1,212
		7.62	894	17.1	1,542

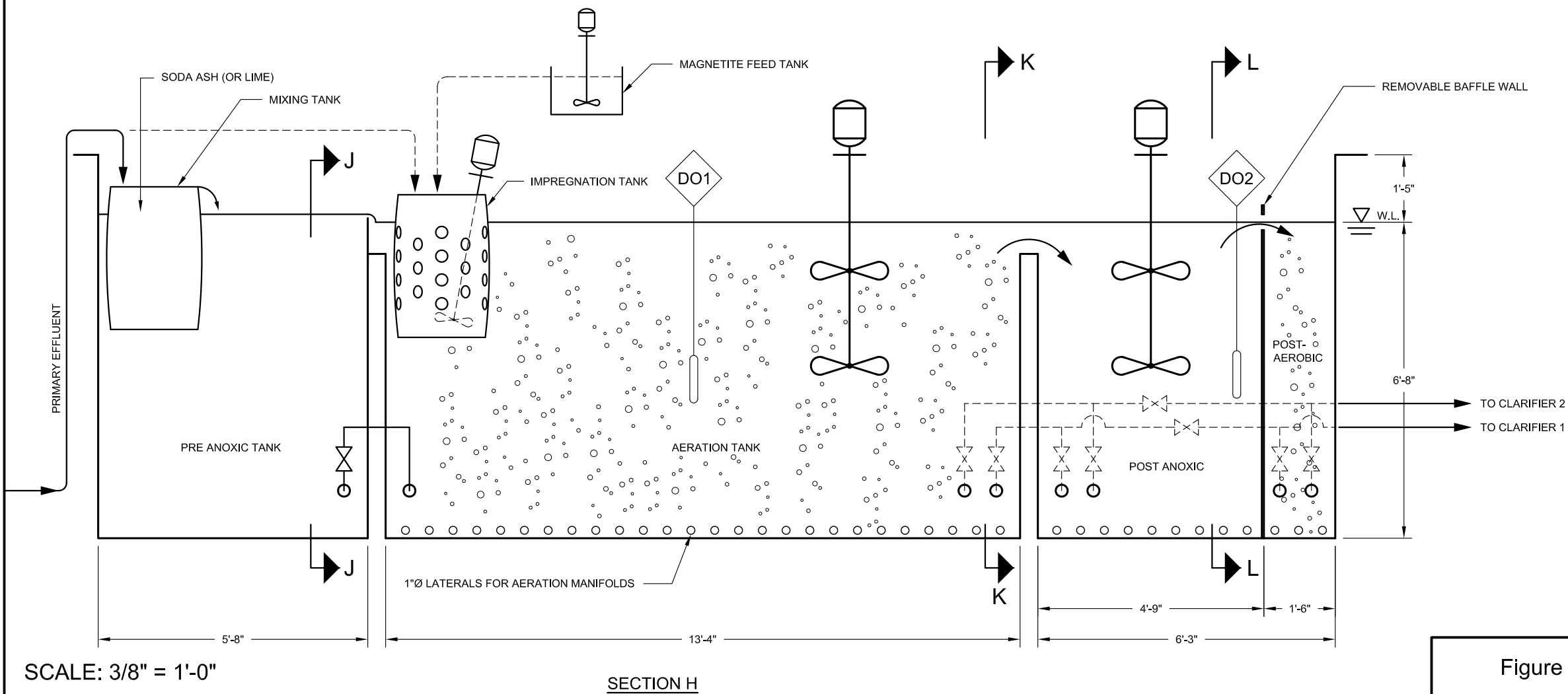
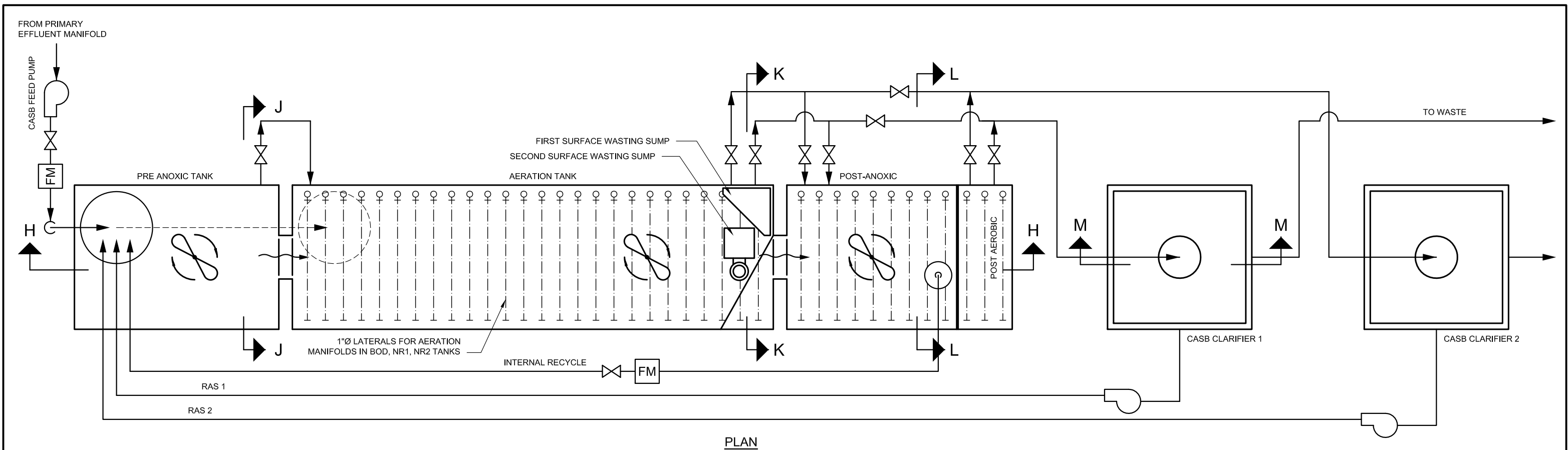
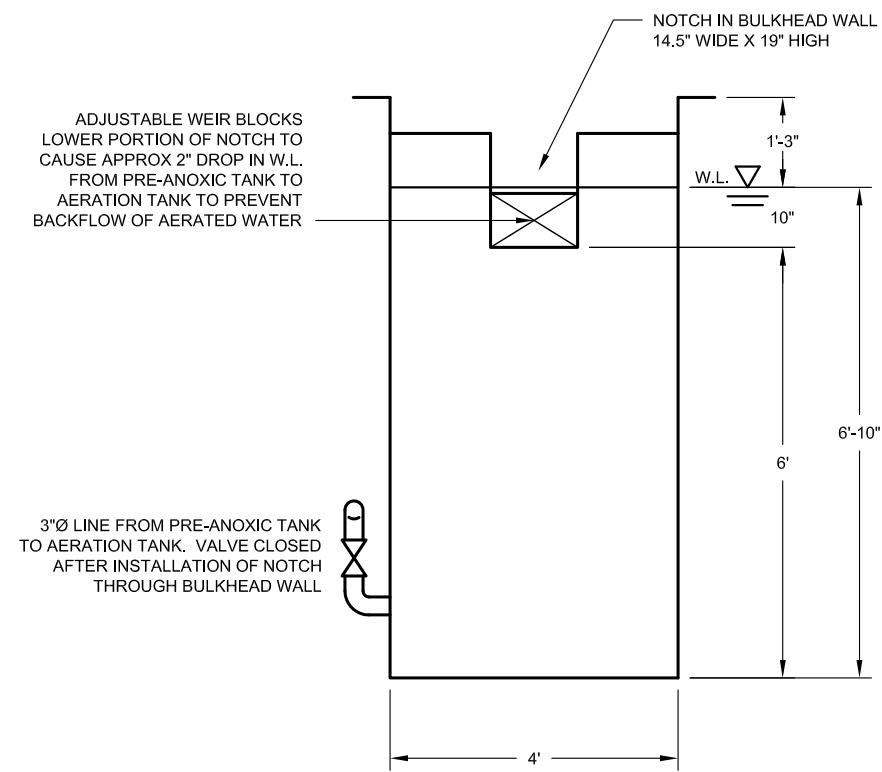
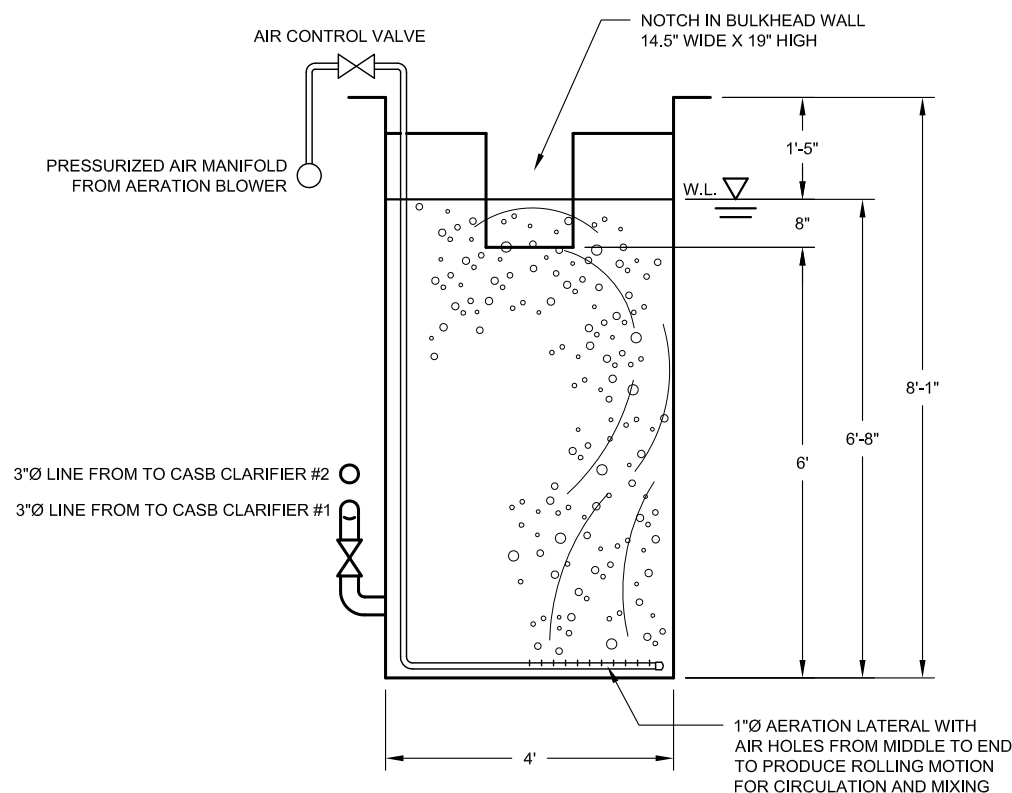


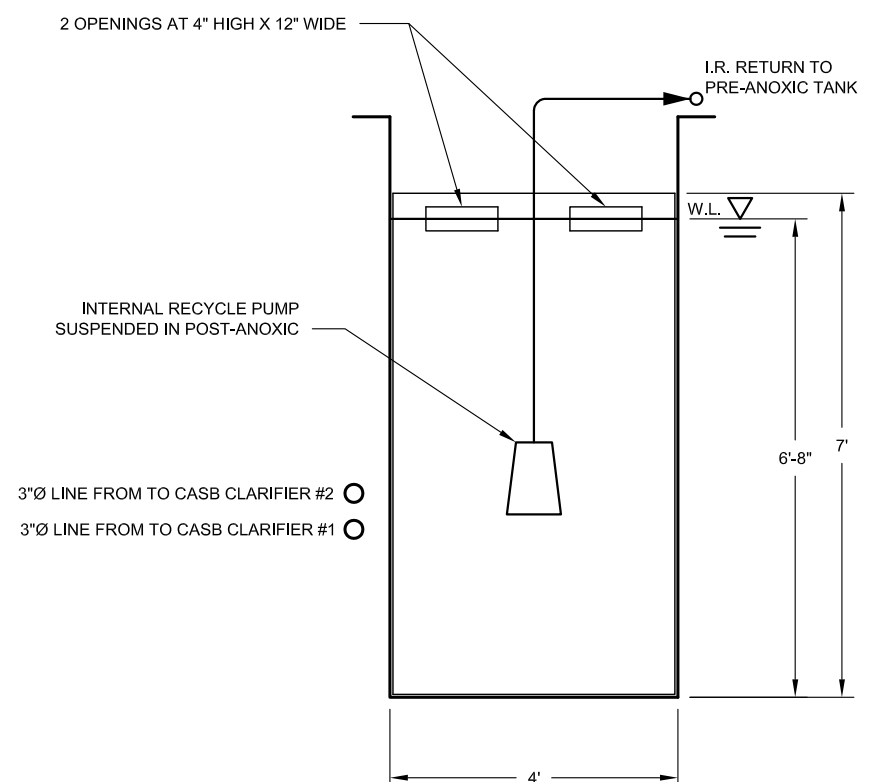
Figure 2.1-05: CASB Bioreactor Plan and Sections



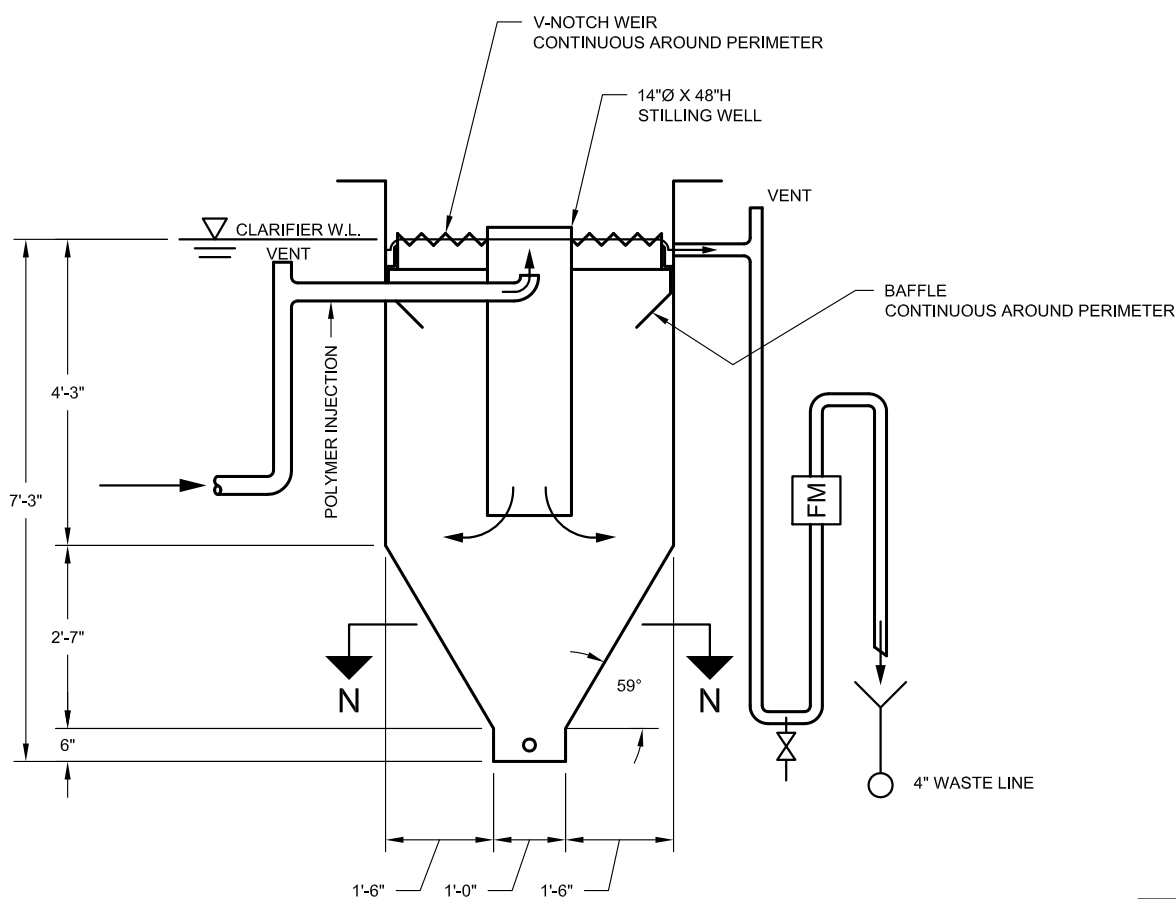
SECTION J



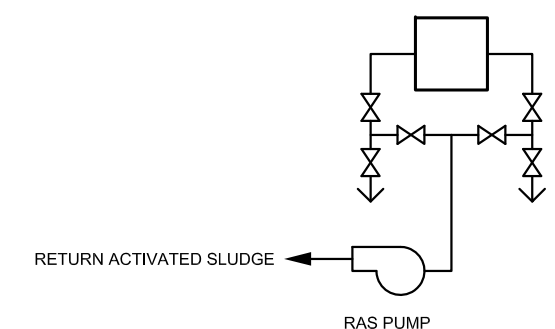
SECTION K



SECTION L



SECTION M



SECTION N

SCALE: 3/8" = 1'-0"

Figure 2.1-06: CASB Bioreactor and Clarifier Sections

2.4 PILOT EQUIPMENT DESCRIPTION, MBBR AND DAF

World Water Works (WWW) was the vendor selected to provide the MBBR and DAF for piloting. The pilot scale MBBR was constructed onsite per the design parameters provided by WWW. The pilot scale DAF was a portable unit provided by WWW.

2.4.1 MBBR

Moving Bed Biological Reactors use suspended media with a high specific surface area in the aeration basin. This increased surface area allows organisms fixed sites for attachment and thus results in reducing the footprint of tanks or increasing the capacity of existing tanks. The biomass that treats the wastewater is attached to the media and is retained in the reactor with no return sludge. The media is continuously agitated by a medium bubble aeration system, which also supports biomass growth and treatment.

The suspended media is kept in the aeration tanks by retention screens at the outlets of the tanks. Biomass continuously sloughs off the media to be replaced by new growth. A separation or clarification step is required following the MBBR to remove the biomass that comes off the media, and other solids that pass through the system. The level of treatment provided in an MBBR can be modified by the percentage of media in the reactor. The media does not require cleaning or backwashing.

2.4.1.1 Full Scale MBBR Design Parameters from World Water Works

Three vendors supplied proposed designs for the full scale MBBR process. The design provided by World Water Works was chosen for piloting. The designs for the various treatment conditions are summarized in Tables 2.1-08 through 2.1-10. The pilot study included treatment options for: 30/30; TN<8; TN<3. Detention times are included in the tables in order to compare the full-scale tank volumes with the pilot-scale volumes.

Table 2.1-08: MBBR Design Parameters per World Water Works, for 30/30 Treatment Option

Process	Parameter	World Water Works Full Scale Design
BOD Removal	Tank Quantity and Dimensions	4 @ 30'L x 16'W x 17'D
	Tank Volume (gallons)	244,180
	Media Volume (ft ³)	19,915
	Media Fill (percent of total volume)	61%
	Total Media Effective Surface Area (ft ²)	3,946,050
Detention Times	at 4.30 MGD	1.36 hours
	at 5.99 MGD	0.98 hour
	at 7.62 MGD	0.77 hour

Table 2.1-09: MBBR Design Parameters per World Water Works, for TN<8 Treatment Option

Process	Parameter	World Water Works Full Scale Design
BOD Reactor	Tank Quantity and Dimensions Tank Volume (gallons) Media Volume (ft ³) Media Fill (percent of total volume)	8 @ 19'Lx16'Wx17'D 309,294 26,870 62.5%
Nitrification 1	Tank Quantity and Dimensions Tank Volume (gallons) Media Volume (ft ³) Media Fill (percent of total volume)	8 @ 30'Lx16'Wx17'D 488,360 42,427 62.0%
Nitrification 2	Tank Quantity and Dimensions Tank Volume (gallons) Media Volume (ft ³) Media Fill (percent of total volume)	8 @ 9'Lx16'Wx17'D 146,508 12,728 62.0%
Post Denitrification	Tank Quantity and Dimensions Tank Volume (gallons) Media Volume (ft ³) Media Fill (percent of total volume)	3 @ 25'Lx30'Wx18'D 302,981 18,997 48.0%
Totals (all tanks combined)	Total Tank Volume (gallons) Media Fill (ft ³) Media Fill (percent of total volume) Total Media Effective Surface Area (ft ²)	1,247,143 101,022 60.6% 20,017,106
Detention Times (all tanks combined)	at 4.30 MGD at 5.99 MGD at 7.62 MGD	6.96 hours 5.00 hours 3.93 hours

Table 2.1-10: MBBR Design Parameters per World Water Works, for TN<3 Treatment Option

Process	Parameter	World Water Works Full Scale Design
BOD Reactor	Tank Qty and Size	8 @ 19'Lx16'Wx17'D
	Tank Volume (gal)	309,294
	Media Fill (cf)	26,870
	Media Fill (%)	62.5%
Nitrification 1	Tank Qty and Size	8 @ 30'Lx16'Wx17'D
	Tank Volume (gal)	488,360
	Media Fill (cf)	42,427
	Media Fill (%)	62.0%
Nitrification 2	Tank Qty and Size	8 @ 9'Lx16'Wx17'D
	Tank Volume (gal)	146,508
	Media Fill (cf)	12,728
	Media Fill (%)	62.0%
Post Denitrification 1	Tank Qty and Size	3 @ 25'Lx30'Wx18'D
	Tank Volume (gal)	302,981
	Media Fill (cf)	19,440
	Media Fill (%)	48.0%
Post Denitrification 2	Tank Qty and Size	3 @ 15'Lx30'Wx18'D
	Tank Volume (gal)	181,788
	Media Fill (cf)	11,664
	Media Fill (%)	48.0%
Totals (all tanks combined)	Total Tank Volume (gal)	1,428,931
	Total Media Fill (cf)	113,129
	Total Media Fill (%)	59.2%
	Total Media Effective Surface Area (sf)	21,899,176
Detention Times (all tanks combined)	at 4.30 MGD	7.98 hours
	at 5.99 MGD	5.73 hours
	at 7.62 MGD	4.50 hours

2.4.1.2 Pilot Scale MBBR Design

There were several pilot scale MBBR systems available, but each operated at approximately 5 gpm when treating to secondary standards, and at less than 1 gpm when treating to meet stringent TN limits. AECOM and the City of Portsmouth wished to operate the pilot system at flow rates between 10 and 20 gpm to provide operating conditions more closely representative of full scale systems.

The World Water Works MBBR design parameters were selected for initial piloting. The operating conditions for the 12 design conditions are listed in Tables 2.1-11 through 2.1-13. Columns 1-6 in the

tables show the design parameters from the World Water Works full-scale proposal. Detention time is calculated based on the empty tank water volume (no media fill) and the design flow rate. Media migration velocity is calculated from the cross-sectional area of the tank (height x width) and the design flow rate.

Columns 7-13 in the tables show the design parameters for the pilot MBBR. The pilot scale MBBR was constructed onsite with an overall length of 26 ft long x 4 ft wide, with a sidewall depth of 8 ft. The water depth in the tank was maintained at approximately 6 ft to provide 2 ft of freeboard. The number and function of tanks in use, tank lengths and volumes, volume of media fill, pilot flow rates, and other parameters were set to mimic the operation of the proposed MBBR systems. Tank identifiers and functions are listed below.

<u>Tank ID</u>	<u>Function</u>
BOD	BOD Reactor
NR1	Nitrification Reactor 1
NR2	Nitrification Reactor 2
DN1	Post Denitrification Reactor 1
DN2	Post Denitrification Reactor 2

During the 30/30 treatment condition only the BOD tank was used, and the other tanks were bypassed. The effluent from the BOD tank was fed directly to the DAF.

During the TN<8 treatment condition the tanks in use included: BOD, NR1, NR2 and DN1. The DN2 tank was bypassed, and DN1 effluent was fed to the DAF.

During the TN<3 treatment condition all of the tanks were used, including: BOD, NR1, NR2, DN1 and DN2. Effluent from DN2 was fed to the DAF.

2.4.1.2.1 BOD Reactor

The BOD reactor was separated from the downstream tanks by a solid bulkhead wall, with piping that allowed for downstream reactors to be bypassed if necessary. Influent to the BOD reactor entered at the surface at the upstream end. Outflow was from BOD reactor flowed through two parallel slotted screens. The BOD reactor was only 5.4 ft long, and the distance between inflow and outflow points was less than 5 ft, compared to a width of 4 ft. There was likely some short-circuiting, especially since the tank was continuously mixed by aeration.

The BOD reactor had a series of 1" diameter PVC air laterals installed across the floor, to inject air bubbles for aeration, and also to continuously mix the media (media migration). The air laterals injected air across the full width of the tank, which caused a circulation pattern similar to uniform boiling throughout the reactor.

2.4.1.2.2 NR1 and NR2 Reactors

The NR1/NR2/DN1 reactors were subdivisions of a larger tank with flow-through baffle walls as dividers. The NR1, NR2 and DN1 reactors were bypassed during the 30/30 treatment experiments, but were brought online for the TN<8 treatment condition.

The NR1 and NR2 reactors had a series of 1" diameter PVC air laterals installed across the floor, to inject air bubbles for aeration, and continuously mix the media. The air laterals injected air across the full width of the tanks, as with the BOD reactor. The air flow rates were not quantified. Air flow was adjusted as necessary to maintain the desired DO. There were two DO/temperature probes that were continuously logged. These were typically installed at mid-depth in NR1 and NR2, although they were sometimes moved to other locations when necessary.

The screened openings in the baffle wall dividers between NR1/NR2 and NR2/DN1 were eventually determined to be too large, which allowed mixing of waters and poor control of DO. In particular, it was difficult to prevent high DO water from passing from NR1, through NR2 (which was only 33" long) and into DN1, where high DO would inhibit nitrification. Portions of the screened openings were eventually blocked to limit circulation and provide better DO control.

NR1 was mixed entirely by air. NR2 had a mixer installed at the center of the tank. Media tended to remain static at the corners of NR2. The air laterals were modified to promote mixing and circulation in the corners, while the paddle mixer maintained mixing in the main part of the tank.

2.4.1.2.3 DN1 and DN2 Reactors

DN1 had a mixer installed at the center of the tank. Media tended to remain static at the corners of DN1. No air was used in DN1 (there were air laterals provided at the corners to agitate the water and prevent freezing during winter, but these were not used during the TN<8 or TN<3 experiments). Eventually there were jet pumps installed to promote mixing in the corners and thereby use the full volume of DN1 for denitrification. There was an ORP probe installed in DN1 to help maintain the proper environment for nitrification. The target for ORP was less than -80 mV, to ensure anoxic conditions suitable for nitrification. MicroC 1000 was fed into DN1 to provide supplemental carbon to aid deoxygenation. The MicroC was fed into the tank near the shaft of the mixer to be dispersed throughout DN1.

The DN2 reactor was used only for the TN<3 treatment condition. The DN2 reactor was separated from the upstream tank, DN1, by a solid bulkhead wall, with piping that allowed DN2 to be either bypassed, or put in service. No air was used in DN2 while it was in use for TN<3 experiments, although two air laterals were provided for freeze prevention during winter. DN2 had a mixer installed at the center of the tank. Media tended to remain static at the corners. Eventually there were jet pumps installed to promote mixing in the corners and thereby use the full volume of DN2 for denitrification.

2.4.1.3 Pilot Flow Rates

The initial target flow rates for the pilot system were based upon projected full-scale hydraulic loading rates. The pilot system target flow rates were initially expected to be 9.8 gpm to mimic average daily

flow, 13.6 gpm to mimic max month flow, and 17.3 gpm to mimic max day flow. Pilot system reactors were sized on these projections.

It became necessary to change the target flow rates while the pilot was ongoing because the raw water BOD and TSS were greater than anticipated. This resulted in solids loading rates that exceeded the projected loading rates that WWW used as the basis for full-scale design, and which were subsequently used for pilot-scale design. However, the reactor sizes remained unchanged.

The pilot scale media migration velocities were lower than those projected for the full-scale process. Media migration was mainly a concern for the hydraulics of the system. Since hydraulics were not evaluated by the pilot study, the differences in media migration velocities were not expected to affect the results of the pilot study with respect to water quality.

Another difference between the full-scale and pilot scale processes was the water depth. The full-scale reactors were 17-18 ft deep, while the pilot-scale reactors were approximately 6 ft deep throughout. The comparatively short side water depth was expected to reduce the oxygen transfer efficiency of the medium bubble diffusers, which would have had the effect of requiring more air flow to maintain the target dissolved oxygen concentration. The pilot study did not attempt to predict full scale air use.

2.4.1.4 Media Conditioning

Time was required for the appropriate biological growth to develop on the media, referred to as media conditioning. The growth required for BOD removal usually develops quickly, but the growth required for nitrification/denitrification typically takes weeks to develop.

The media in the NR1/NR2/DN1 tanks was conditioned while the initial experiments for the 30/30 treatment condition were ongoing, during which only the BOD tank was needed for active experimentation. The NR1/NR2/DN1 tanks were subdivisions of a larger continuous tank, with flow-through baffle walls as dividers. The NR1/NR2/DN1 tanks were bypassed during the day, but fed with BOD tank effluent by night.

This procedure did not affect operation or effluent water quality of the upstream BOD tank, but it did affect water quality through the downstream DAF. The NR1/NR2/DN1 tanks would be returned to bypass when the pilot plant operators arrived in the morning, while the 30/30 experiments were ongoing. Adequate time was allowed for the DAF to readjust to BOD tank effluent after the bypass was restored. The DAF was a small unit with a theoretical detention time less than 60 minutes at typical pilot flow rates. A minimum of 2 hours was generally allowed for the DAF to readjust before water quality samples representative of 30/30 operating conditions were collected.

Table 2.1-11: MBBR Pilot System Dimensions and Flow Rates for 30/30 Treatment Option

Proposed Full-Scale Design						Pilot System Parameters						
Q (MGD)	Tank	Volume (gal)	Media Fill (%)	Detention Time (hours)	Media Migration Velocity (M/Hr)	Length (ft)	Volume (gal)	Media Fill (%)	Media Volume (cf)	Detention Time (hours)	Flow Rate (gpm)	Media Migration Velocity (M/Hr)
4.30	BOD	244,180	61.0%	1.36	6.7	5.42	992.8	61.0%	81.0	1.36	12.2	1.2
5.99				0.98	9.3					0.98	16.9	1.7
7.62				0.77	11.9					0.77	21.5	2.1

Table 2.1-12: MBBR Pilot System Dimensions and Flow Rates for TN<8 Treatment Option

Proposed Full-Scale Design						Pilot System Parameters						
Q (MGD)	Tank	Volume (gal)	Media Fill (%)	Detention Time (hours)	Media Migration Velocity (M/Hr)	Length (ft)	Volume (gal)	Media Fill (%)	Media Fill (cf)	Detention Time (hours)	Flow Rate (gpm)	Media Migration Velocity (M/Hr)
4.3	BOD	309,294	62.5%	1.73	3.4	5.42	992.8	62.5%	82.9	1.73	9.8	1.0
	NR1	488,360	62.0%	2.73	3.4	8.75	1603.7	62.0%	132.9	2.73		
	NR2	146,508	62.0%	0.82	3.4	2.63	481.1	62.0%	39.9	0.82		
	DN1	302,981	48.0%	1.69	4.5	5.42	992.8	48.0%	63.7	1.69		
5.99	BOD	309,294	62.5%	1.24	4.7	5.42	992.8	62.5%	82.9	1.24	13.6	1.4
	NR1	488,360	62.0%	1.96	4.7	8.75	1603.7	62.0%	132.9	1.96		
	NR2	146,508	62.0%	0.59	4.7	2.63	481.1	62.0%	39.9	0.59		
	DN1	302,981	48.0%	1.21	6.3	5.42	992.8	48.0%	63.7	1.21		
7.62	BOD	309,294	62.5%	0.97	5.9	5.42	992.8	62.5%	82.9	0.97	17.4	1.7
	NR1	488,360	62.0%	1.54	5.9	8.75	1603.7	62.0%	132.9	1.54		
	NR2	146,508	62.0%	0.46	5.9	2.63	481.1	62.0%	39.9	0.46		
	DN1	302,981	48.0%	0.95	8.0	5.42	992.8	48.0%	63.7	0.95		

Table 2.1-13: MBBR Pilot System Dimensions and Flow Rates for TN<3 Treatment Option

Proposed Full-Scale Design						Pilot System Parameters						
Q (MGD)	Tank	Volume (gal)	Media Fill (%)	Detention Time (hours)	Media Migration Velocity (M/Hr)	Length (ft)	Volume (gal)	Media Fill (%)	Media Fill (cf)	Detention Time (hours)	Flow Rate (gpm)	Media Migration Velocity (M/Hr)
4.3	BOD	309,294	62.5%	1.73	3.4	5.42	992.8	62.5%	82.9	1.73	9.8	1.0
	NR1	488,360	62.0%	2.73	3.4	8.75	1603.7	62.0%	132.9	2.73		
	NR2	146,508	62.0%	0.82	3.4	2.63	481.1	62.0%	39.9	0.82		
	DN1	302,981	48.0%	1.69	4.5	5.42	992.8	48.0%	63.7	1.69		
	DN2	181,788	48.0%	1.01	4.5	3.17	580.4	48.0%	37.2	1.01		
5.99	BOD	309,294	62.5%	1.24	4.7	5.42	992.8	62.5%	82.9	1.24	13.6	1.4
	NR1	488,360	62.0%	1.96	4.7	8.75	1603.7	62.0%	132.9	1.96		
	NR2	146,508	62.0%	0.59	4.7	2.63	481.1	62.0%	39.9	0.59		
	DN1	302,981	48.0%	1.21	6.3	5.42	992.8	48.0%	63.7	1.21		
	DN2	181,788	48.0%	0.73	6.3	3.17	580.4	48.0%	37.2	0.73		
7.62	BOD	309,294	62.5%	0.97	5.9	5.42	992.8	62.5%	82.9	0.97	17.4	1.7
	NR1	488,360	62.0%	1.54	5.9	8.75	1603.7	62.0%	132.9	1.54		
	NR2	146,508	62.0%	0.46	5.9	2.63	481.1	62.0%	39.9	0.46		
	DN1	302,981	48.0%	0.95	8.0	5.42	992.8	48.0%	63.7	0.95		
	DN2	181,788	48.0%	0.57	8.0	3.17	580.4	48.0%	37.2	0.57		

2.4.2 DAF

DAF systems use microbubbles to float floc formations to the water surface for wasting. A typical system includes two stages of floc formation and in-line mixing upstream of the dissolved air section. The general DAF process is described below:

1. A stream of clarified DAF effluent is pressurized and saturated with dissolved air;
2. The pressurized water is injected into flocculated process water under free surface pressure;
3. Depressurization causes the dissolved air to boil out of solution and form microbubbles;
4. The microbubbles attach to floc and buoy the particles to the surface where they form a cohesive raft or blanket;
5. The sludge blanket is wasted on a periodic basis;
6. The clarified water from under the sludge blanket collects in an effluent tank or trough, a portion of which is recycled through the air saturation system.

DAF can effectively remove solid particulates, but only if the particulates are amenable to bubble attachment and floatation. Effective flocculation is necessary for good performance. Polymers or chemical coagulants can be used to form agglomerations of floc and microbubbles that are sufficiently buoyant for floatation.

2.4.2.1 Full-Scale DAF Design Parameters from World Water Works

The World Water Works DAF process parameters were selected by AECOM for the technology evaluation. The WWW design parameters for the full scale treatment system are listed in Table 2.1-14.

Table 2.1-14: DAF Full Scale Design Parameters per World Water Works

Air-to-Solids Ratio	0.0378
Hydraulic Loading Rate	1.56 - 2.49 gpm/ft ²
Solids Loading Rate	0.10 - 0.16 lb/hr/ft ²

WWW pre-manufactures DAF clarifiers with internal components and an in-line mixing system for polymer addition. The air pumps are provided loose and are typically located adjacent to the units. The proposed system consists of 2 DAF units, with each unit capable of treating one-half of the peak flow. The proposed process flow path includes piping directly from the MBBR effluent channel to the DAF influent connection. Each pre-manufactured tank would be approximately 20 feet by 12 feet and 15 feet high.

2.4.2.2 Pilot-Scale DAF System

WWW provided a DAF unit for the pilot with appurtenant equipment including:

1. PLC for automated or manual control.
2. Chemical feed pumps (2).

3. Sludge blanket rake.
4. Solids pump (pneumatic) for sludge wasting.
5. Nikuni pump skid for air saturation and injection.

The main DAF components occupied a footprint approximately 4 ft x 8 ft, including the appurtenant pumps. Other equipment not provided by WWW included a day tank for polymer, a waste tank for residuals, a pressurized air supply for operation of the solids pump, and drain systems for effluent and residuals.

The DAF was provided with MBBR effluent via a 1" diameter feed line. The DAF feed line branched off the 3" diameter MBBR effluent line at a low point that was under constant elevation head from the water level in the MBBR. The DAF flow was provided by the elevation difference between the MBBR and DAF water surface elevations, which was approximately 4 ft. The MBBR effluent was not re-pumped since that would have sheared the floc.

The flow rate was monitored and continuously logged by a Signet flow meter installed in the 1" feed line. The MBBR operated at a flow rate greater than the DAF in order to maintain a constant water level, and the excess MBBR flow was wasted. The DAF flow rate was controlled by a 2" PVC globe valve. There was a 2" PVC influent structure on the DAF that included the flow control valve, a 1½" x 12" long flanged spool section with injection ports for air and chemicals, and influent ports both upstream and downstream from the injection ports.

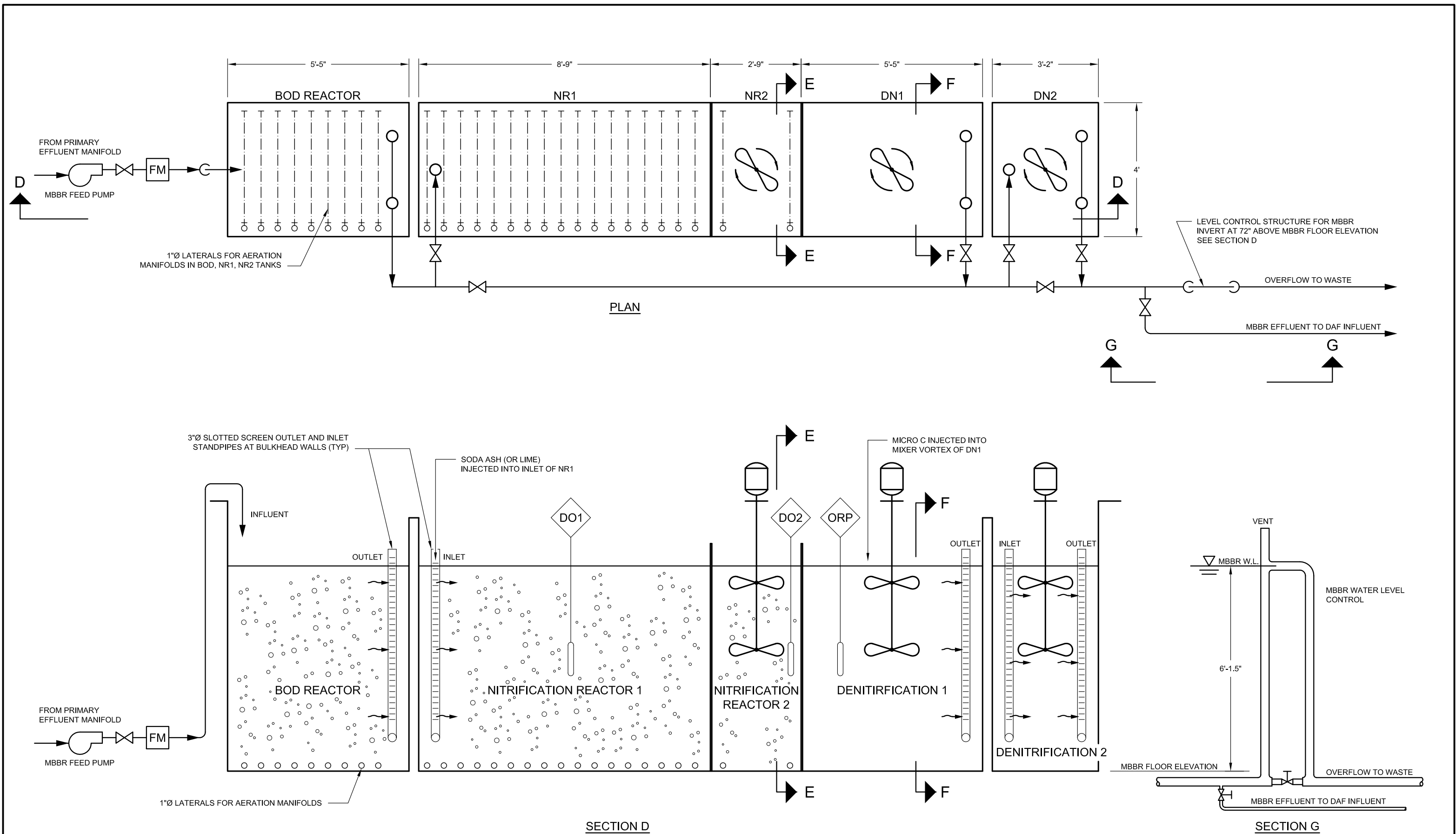
The DAF influent was pretreated with polymer, and injected with air-saturated recycled effluent. Microbubbles formed at the point of air injection, and attached to floc particles. The pretreated DAF influent entered the DAF aeration tank, and the buoyant floc particles floated to the surface to form a sludge blanket.

The DAF was divided into an aeration tank and an effluent tank. The tanks were separated by a common wall that was penetrated by two parallel laterals of 2" diameter PVC. The laterals were located approximately 4" above the floor of the DAF. Each lateral had a series of holes on the bottom side within the aeration tank for clarified water to enter, and a 2" diameter opening in the effluent tank for clarified water to exit. The feed line for the air-saturation skid was directly connected to one of the two laterals. The DAF water level was controlled by a 2" diameter vertical standpipe in the effluent tank.

The air-saturation skid included a Nikuni pump that entrained air into a stream of recycled DAF effluent, an air rotameter with needle valve for controlling air flow rates, and a pressure tank for air/water contact. The Nikuni pump was fed with DAF effluent. The pressure tank had 4 ports to feed air-saturated water to the DAF injection ports, plus a bleed line for excess water and air to escape back to the DAF effluent trough. Control parameters for the Nikuni skid included the air flow rate, the vacuum gauge pressure at the pump inlet, and the positive gauge pressure in the air/water contact tank.

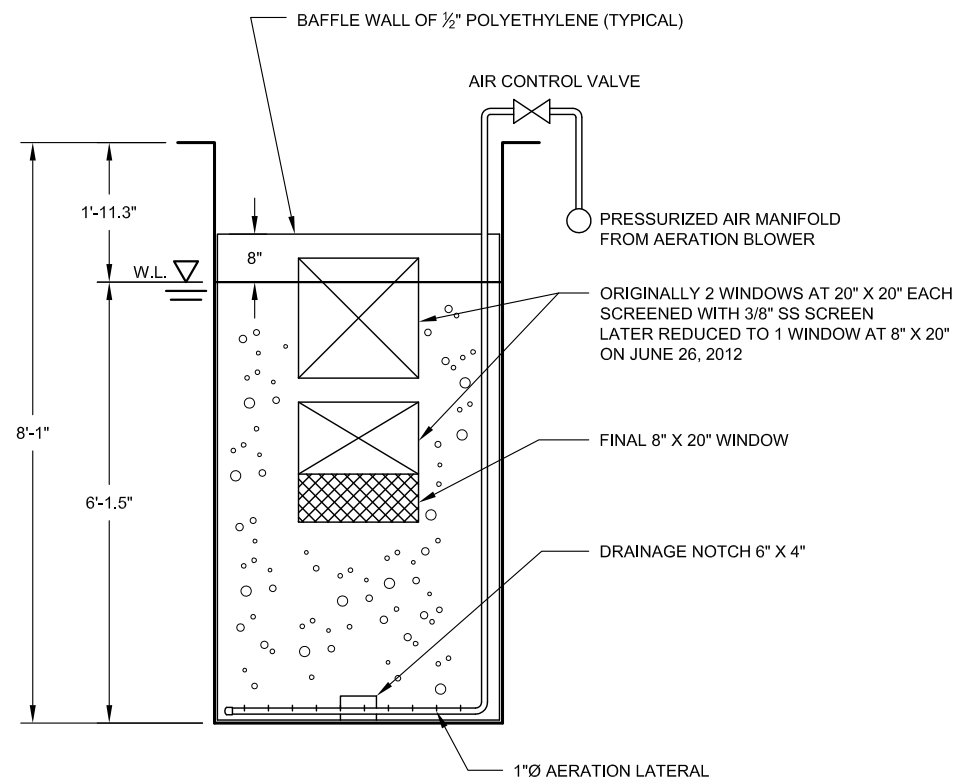
Other operating parameters for the DAF system included the influent flow rate, the sludge rake frequency and duration, and the polymer injection parameters (polymer type and dose).

The PLC had HAND/AUTO/OFF switches for the Nikuni pump, sludge rake, and solids pump. In AUTO, the sludge rake operated according to two programmable timers in the PLC. One timer set the rake interval, typically 20-30 minutes. The other timer set the rake duration, typically 30-60 seconds. Also in AUTO, the solids pump operated whenever the sludge rake operated, to pump solids from the DAF sludge trough to the residuals tank.

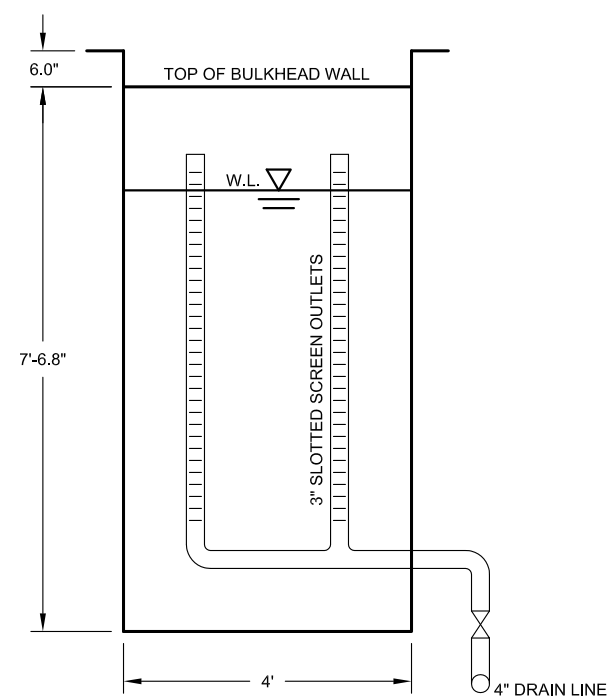


SCALE: 3/8" = 1'-0"

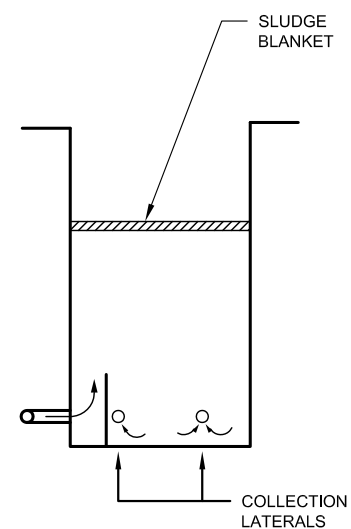
Figure 2.1-07: MBBR Plan and Section



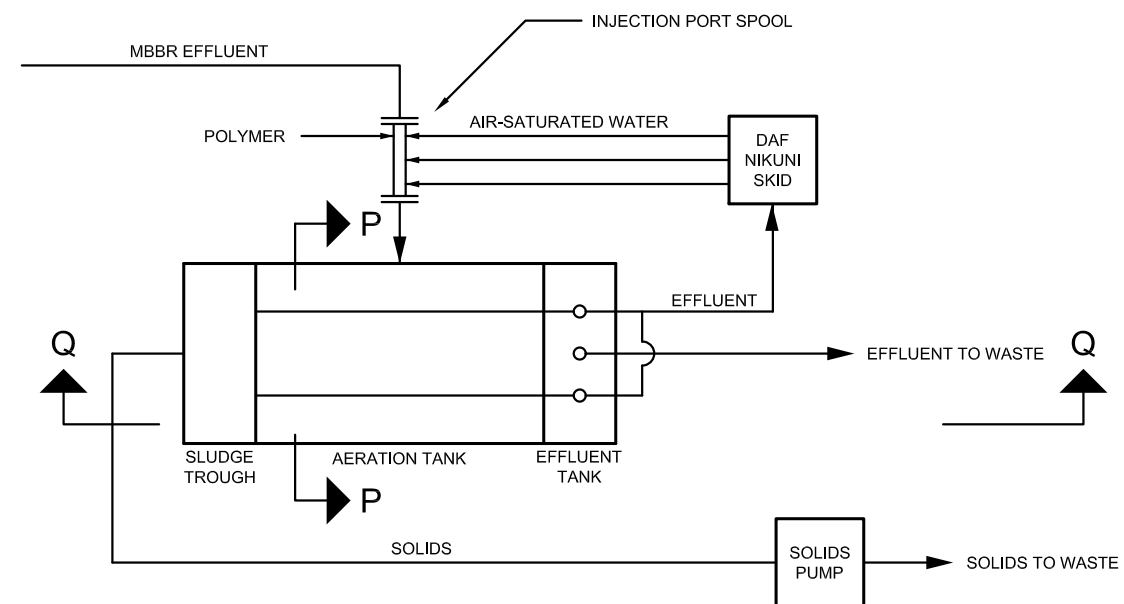
SECTION E



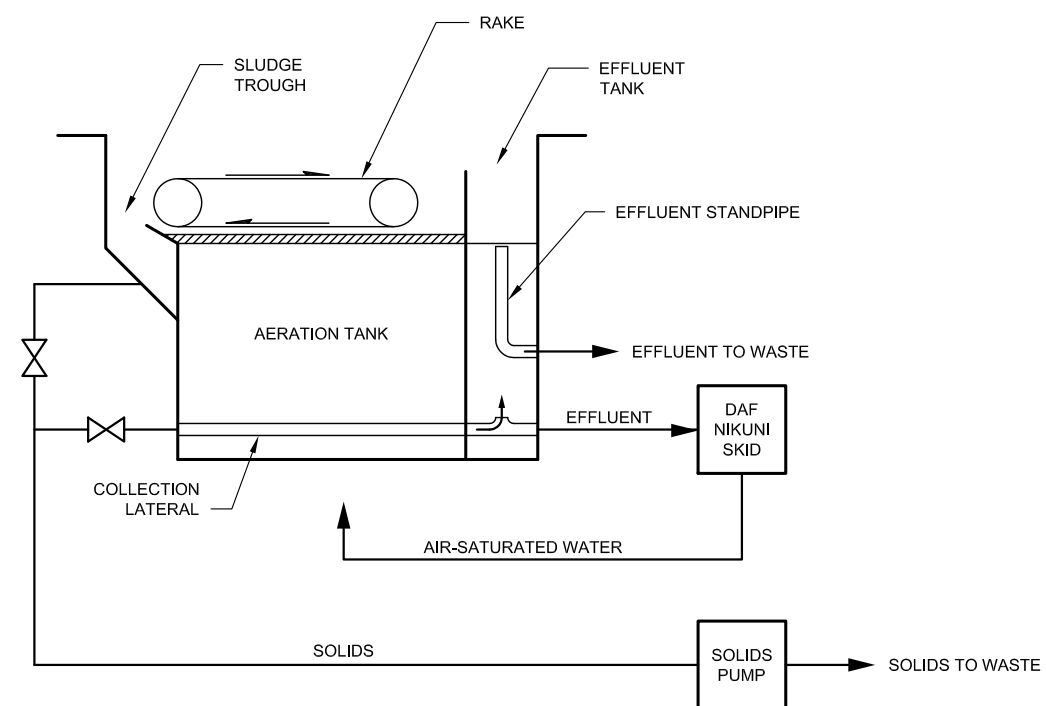
SECTION F



SECTION P



DAF PLAN



SECTION Q

SCALE: 3/8" = 1'-0"

Figure 2.1-08: MBBR Sections, DAF Plan and Sections

2.5 CHEMICAL ADDITION

Chemicals were added at various points throughout the pilot system for process control. All chemicals were added as liquid solutions, or in the case of lime as liquid slurry. Table 2.1-15 summarizes the chemicals used. Dose information is provided in the appropriate sub-sections of Section 3 Results, pertaining to the various experiments.

Table 2.1-15: Summary of Chemical Feed Systems

Process	Point of Chemical Addition	Chemical Name	Formula or Brand Name	Dose Units	Purpose
Primary	Effluent trough	Soda Ash	Na ₂ CO ₃	mg/L as CaCO ₃	Add alkalinity to aid secondary nitrification
	Effluent trough	Ammonium Hydroxide	NH ₄ -OH	mg/L as NH ₃ -N	Add ammonia for high ammonia stress tests
BAF	BAF 1Influent	Lime	CaO	mg/L as CaCO ₃	Add alkalinity to aid BAF 1 nitrification
	BAF 1Influent	Soda Ash	Na ₂ CO ₃	mg/L as CaCO ₃	Add alkalinity to aid BAF 1 nitrification
	BAF 1Influent	Ammonium Hydroxide	NH ₄ -OH	mg/L as NH ₃ -N	Add ammonia for high ammonia stress tests
	BAF 2Influent	MicroC 1000	EOS MC1000	mg/L as COD	Add carbon to deoxygenate and aid nitrification
CASB	Aeration Influent	Lime	CaO	mg/L as CaCO ₃	Add alkalinity to aid nitrification
	Pre-Anox Influent	Lime	CaO	mg/L as CaCO ₃	Add alkalinity to aid nitrification
	Pre-Anox Influent	Soda Ash	Na ₂ CO ₃	mg/L as CaCO ₃	Add alkalinity to aid nitrification
	Aeration Tank	Defoamer	N/A	volumetric ppm	Mitigate foaming from filamentous growth
	RAS	Sodium Hypochlorite	NaOCl	mg/L as Cl ₂	Kill filamentous organisms
	Post-Anoxic 1	MicroC 1000	EOS MC1000	mg/L as COD	Add carbon to deoxygenate and aid nitrification
	Clarifier Influent	Polymer	PHI-8450	mg/L dry basis	Promote flocculation and settling
	Clarifier Influent	Polymer	Aries 26614	mg/L dry basis	Promote flocculation and settling
MBBR/DAF	NR1 Influent	Soda Ash	Na ₂ CO ₃	mg/L as CaCO ₃	Add alkalinity to aid NR1, NR2 nitrification
	DN1	MicroC 1000	EOS MC1000	mg/L as COD	Add carbon to deoxygenate and aid nitrification
	DAF Influent	Polymer	PHI-8450	mg/L dry basis	Promote flocculation and settling
	DAF Influent	Polymer	PHI-4622	mg/L dry basis	Promote flocculation and settling
	DAF Influent	Polymer	Aries 26614	mg/L dry basis	Promote flocculation and settling

2.6 STATISTICAL METHODS

The following statistical analyses are routinely used by Blueleaf for evaluation of accumulated pilot study data.

Analysis Of Variance (ANOVA)

When appropriate, Minitab software was used to perform an Analysis Of Variance (ANOVA) to compare the effects of two or more factors upon a specific response. For example, an ANOVA might be used to compare effluent TSS concentrations (the response) at different surface loading rates (the factor). The following explanation was adapted from the software documentation.

An ANOVA tests the hypothesis that the means of two or more populations are equal. The procedure uses variances to determine whether the means are different, by comparing the variance between group means versus the variance within groups. In this way the ANOVA determines whether the different groups are all part of one larger population, or can be statistically distinguished as separate populations with different characteristics. An ANOVA requires data from normally distributed populations with roughly equal variances between factor levels.

An example of the output from an ANOVA is shown below. The ANOVA tested a data set to determine whether the Factor had a statistically significant affect upon the Response. The Factor had two levels. Level 1 included 22 data, and Level 2 included 10 data.

Example of One-way ANOVA: Response versus Factor with Two Levels

Source	DF	SS	MS	F	P
Trial	1	0.071783	0.071783	234.91	0.000
Error	30	0.009167	0.000306		
Total	31	0.080950			

S = 0.01748 R-Sq = 88.68% R-Sq(adj) = 88.30%

Level	N	Mean	StDev
1	22	0.12318	0.02009
2	10	0.02100	0.00876

Individual 90% CIs For Mean Based on Pooled StDev

0.030 0.060 0.090 0.120

Pooled StDev = 0.01748

The most important aspects of the ANOVA are described below.

Null Hypothesis

The ANOVA determines whether the null hypothesis should be accepted or rejected. For all ANOVAs herein, the null hypothesis and its alternative hypothesis were as follows:

- The Null Hypothesis states that all population means are equal.
- The Alternative Hypothesis states that at least one population mean is different.

If the null hypothesis is rejected, it indicates that the population means were different, and it follows that the Factor had a statistically significant affect upon the Response. If the null hypothesis is accepted, then it follows that the factor did not have a significant effect upon the response.

Probability Value

The probability value (p-value) reports the probability that the null hypothesis can be accepted. The p-value is tested against an alpha value (α), often called the level of significance. Alpha was chosen to be 0.100 (10%) for all ANOVAs herein. If the p-value is greater than alpha ($p > 0.01$) then there was greater than 10% probability that the population means were the same (or alternatively less than 90% probability that the means were different) and the null hypothesis cannot be rejected. If the p-value is less than alpha ($p < \alpha$), then the null hypothesis can be rejected, and it can be concluded that at least one mean is different than the others to a certainty of >90%.

In the example above, the p-value was 0.000, which indicates <0.1% probability that the null hypothesis is correct, or conversely >99.9% probability that the null hypothesis can confidently be rejected.

Confidence Intervals

A confidence level of 90% was chosen for all ANOVAs herein. The ANOVA output includes a plot of the 90% confidence intervals. For each data set (Levels 1 and 2) the asterisk (*) indicates the mean value, and 9 out of 10 data fall within the 90% confidence interval indicated between the parentheses.

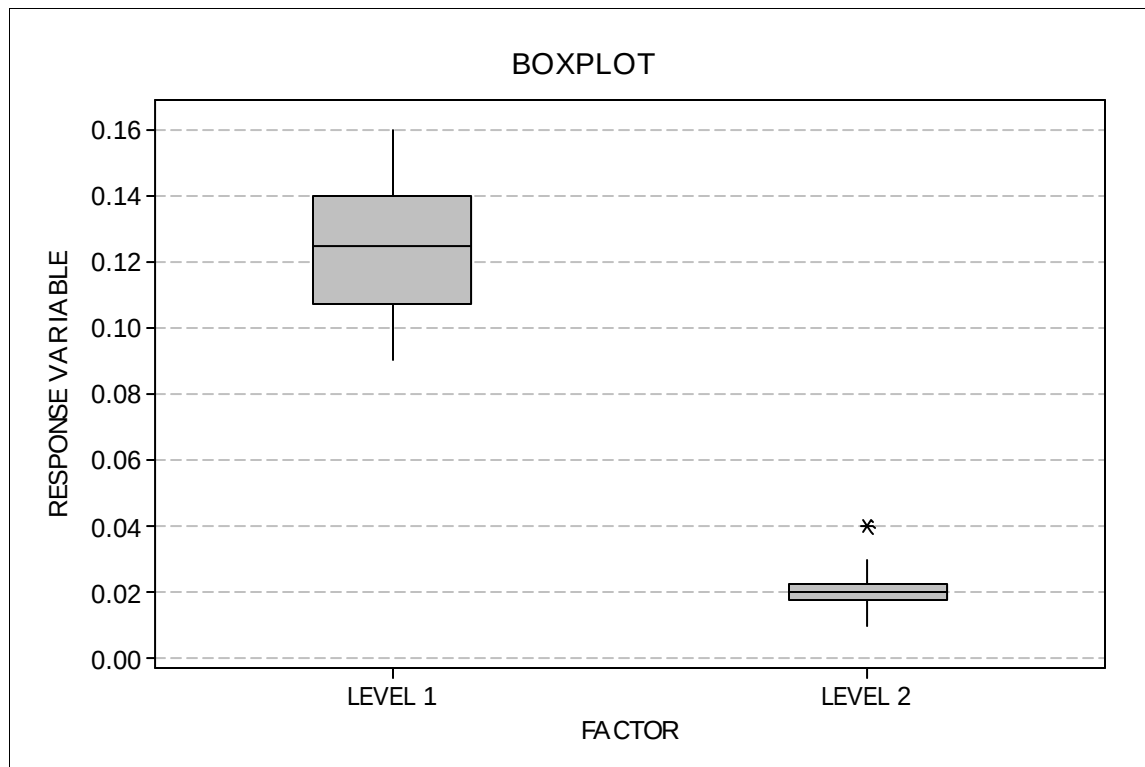
In the example above, there is no overlap of the confidence intervals. The data sets corresponding to Level 1 and Level 2 are clearly different. This indicates that the Factor at Levels 1 and 2 had a significant effect upon the response.

Mean and Standard Deviation

The ANOVA reports the mean, standard deviation, and sample count (N) for each data set. In the example above, Level 1 had a mean of 0.123 and a standard deviation of 0.020, while Level 2 had a mean of 0.021 and a standard deviation of 0.009. Level 2 had a lower mean and a smaller standard deviation than Level 1.

Boxplots

Boxplots are used to provide a graphical summary of the distribution of a sample. Minitab can include a boxplot as part of the output of an ANOVA. A boxplot shows the shape, central tendency, and variability of the sample. The boxplot shown below was from the same data used for the ANOVA example, above. One factor was tested at two levels. The boxplot shown here suggests that Level 2 resulted in a lower median response than Level 1, and also had a narrower range of variation than Level 1.



The important aspects of the boxplot are described below:

1. The upper whisker extends to the maximum data point within 1.5 box heights from the top of the box.
2. The interquartile range box contains the middle 50% of the data.
 - a. The top line indicates the third quartile (Q3). 75% of the data are less than or equal to this value.

- b. The middle line indicates the median (Q2). 50% of the data are less than or equal to this value, and 50% of the data are greater than this value.
 - c. The bottom line indicates the first quartile (Q1). 25% of the data are less than or equal to this value.
- 3. The lower whisker extends to the minimum data point within 1.5 box heights from the bottom of the box.
 - 4. An asterisk (*) denotes an outlier, an observation that is beyond the upper or lower whisker.

2.7 ANALYTICAL METHODS

2.7.1 Field Analytical Methods

2.7.1.1 Total Ammonia – Low Range

Total ammonia samples for low range sources, such as effluents, were analyzed in accordance with the Hach (Loveland CO) USEPA Nessler Method #8038. 25.0 ml of sample was added to a mixing graduated cylinder. Similarly, 25 mL of deionized water was added to a separate graduated cylinder for blank preparation. Three drops of Mineral Stabilizer, Polyvinyl Alcohol Dispersing Agent, and 1.0 mL of Nessler reagent were added to both the sample and the blank. Both graduated cylinders were stoppered and shaken and then allowed to set for a one minute reaction time. 10 mL of the blank was placed in a square sample cell and used to zero the instrument. 10 ml of the prepared samples was then placed in a square sample cell and the reading was taken and recorded. Samples were analyzed using a Hach DR5000 or DR3800 colorimeter.

2.7.1.2 Total Ammonia – High Range

Total ammonia samples for high range sources were analyzed in accordance with the Hach (Loveland CO) Salicylate Method #10205 using the HACH TNT plus 831 test kits. 0.5 ml of sample was added to a Test in Tube (TNT) vial using a fixed volume auto pipette. The vial was then capped with a DosiCap containing a reagent and shaken. 15 minutes were allowed for reaction. The sample was then read using a Hach DR5000 or 3800 colorimeter.

2.7.1.3 Total Nitrogen

Total nitrogen samples were analyzed in accordance with the Hach (Loveland CO) Persulfate Digestion Method 10208 using the HACH TNT plus 826 test kits. 1.3 mL of sample was combined with 1.3 mL of reagent solution A and reagent tablet B in a 20 mL reaction tube. The reaction tubes were then heated in a HACH digester block at 100°C for 60 minutes. After digestion one reagent Micro Cap C was added to the tube and shaken. 0.5 mL of the digested sample from the reaction tube was then added to a TNT test vial using a fixed volume auto pipette. In addition, 0.2 mL of reagent solution D was added to the tube and then capped and shaken. The sample was allowed 15 minutes for reaction. The sample was then read using a Hach DR5000 or DR3800 colorimeter.

2.7.1.4 Total Kjeldahl Nitrogen (TKN)

Total Kjeldahl Nitrogen (TKN) samples were analyzed in accordance with the Hach (Loveland CO) s-TKN Method 10242 using the HACH TNT plus 880 test kits. 1.3 mL of sample was combined with 1.3 mL of reagent solution A and reagent tablet B in a 20 mL reaction tube. The reaction tubes were then heated in a HACH digester block at 100°C for 60 minutes. After digestion one reagent Micro Cap C was added to the tube and shaken. 0.5 mL of the digested sample from the reaction tube was then added to TNT Test Vial 1 using a fixed volume auto pipet. 0.2 mL of reagent solution D was also added to Test Vial 1 and the tube then capped and shaken. In addition, 1.0 mL of undigested sample was added to TNT Test Vial 2. Similarly, 0.2 mL of reagent solution D was added to Test Vial 2 and the tube then capped and shaken. The samples were allowed 15 minutes for reaction. Both TNT Test Vials 1 and 2 were then read using a Hach DR5000 or DR3800 colorimeter.

2.7.1.5 Nitrate

Nitrate samples were analyzed in accordance with the Hach (Loveland CO) Dimethylphenol Method #10206 using the HACH TNT plus 835 test kits. 1.0 ml of sample was added to a Test in Tube (TNT) vial followed by the addition of 0.2 mL of reagent solution A using a fixed volume auto pipet. The sample was capped and mixed and 15 minutes allowed for reaction. The sample was then read using a Hach DR5000 or DR3800 colorimeter.

2.7.1.6 Nitrite

Nitrite samples were analyzed in accordance with the Hach (Loveland CO) USEPA Diazotization Method 10207 using the HACH TNT plus 839 test kits. 2.0 ml of sample was added to a Test in Tube (TNT) vial using a fixed volume auto pipet. The vial was then capped with a DosiCap containing a reagent and shaken and 10 minutes allowed for reaction. The sample was then read using a Hach DR5000 or 3800 colorimeter.

2.7.1.7 Alkalinity

Alkalinity was analyzed in accordance with the Standard Methods 2320 Titration Method. Either 50 ml or 100 mL samples were titrated using 0.020N H₂SO₄. The endpoint of the titration was a pH of 4.5. The volume of sulfuric acid standard used to obtain the endpoint pH was proportional to the alkalinity. For 100 ml samples, the titrant volume was multiplied by a factor of 10, and for 50 ml samples the factor was 20. Results were be expressed as mg/L of calcium carbonate per liter (mg CaCO₃/L).

2.7.1.8 pH Measurements

pH measurements were be made in accordance with Standard Methods 4500-H+B using an Orion glass pH Triode with temperature compensation, and an Orion 3-Star pH meter. A three-point calibration was performed using standard buffer solutions of 4.00, 7.00 and 10.00. Calibration was performed several times each day of the pilot study.

2.7.1.9 BOD

Five day BOD samples were analyzed in accordance with Standard Methods 5210. Samples were diluted into the BOD incubation bottles within 2 hours of sample collection. Sample dilution was initially based on estimated BOD concentrations and there were four or five dilutions over a wide range to obtain valid results. After a few rounds of BOD analyses had been completed, the pilot operators developed a relationship between COD concentration and dilution. COD analyses would be completed before the BOD dilutions were prepared, and the COD results were used to determine the range of dilutions to be used. Between three and five dilutions were prepared for each sample. Two Blanks and two QAQC standards were analyzed with each set of BOD analyses.

Samples were diluted with lab grade water from the Pease WWTF lab. A Hach nutrient Buffer was added to 3 L of the lab grade water and stored in the BOD incubator for 1 to 3 hours prior to setting the BOD dilutions. None of the samples were from chlorinated sites, so no seed was used. Immediately after sample dilution, the dissolved oxygen concentration and temperature was measured in each diluted BOD incubation bottle using a Hach IntelliCAL LBOD101 standard luminescent Dissolved Oxygen (LBOD) probe with integral stirrer and a Hach HQ40D digital meter. The BOD probe and meter were

purchased new at the beginning of the project, and the probe was calibrated weekly during BOD sampling and analysis.

The BOD incubation bottles were stored at 20 °C in the dark in a BOD incubator. Measurements for dissolved oxygen concentration and temperature were taken after five days, and the BOD was calculated in accordance with Standard Methods 5210.

2.7.1.10 COD

COD samples were analyzed in accordance with the Hach (Loveland CO) USEPA Reactor Digestion Method 8000 using the HACH TNT plus 821 (low range) or 822 (high range) test kits. 2.0 ml of homogenized sample was added to a Test in Tube (TNT) vial using a fixed volume auto pipet. The vial was then capped, shaken and heated in a HACH digester block at 150°C for 120 minutes. 10 minutes allowed for reaction. Samples were allowed to cool for 20 minutes. The samples were then again shaken and allowed to cool to room temperature before reading using a Hach DR5000 or 3800 colorimeter.

2.7.1.11 TSS

TSS was determined by pouring a carefully measured volume of sample through a pre-weighed filter of a specified pore size. The sample was then placed in a constant temperature oven at 104 degrees Celsius for at least one hour to remove all moisture. The sample was placed in a dessicator, to cool and balance temperature, and then weighed. The sample volume was variable depending on the solids density of the sample. Filters for TSS measurements were composed of glass fibers. The gain in weight was the dry weight measure of the solids present in the sample expressed in units derived or calculated from the volume of sample filtered (typically milligrams per liter).

2.7.1.12 VSS

VSS was determined by following the TSS procedure above and then placing the sample in a 500 degree Celsius furnace to ignite the residual dried organics on the filter. The sample was again placed in a dessicator, to cool and balance temperature, and then weighed. The gain in weight versus the original blank weight is a dry weight measure of the inert solids present in the sample. The difference in the previously determined TSS weight and the inert solids weight is a dry weight measure of the volatile solids present in the sample, expressed in units derived or calculated from the volume of sample filtered (typically milligrams per liter).

2.7.1.13 Magnetite

Magnetite concentration was determined by calculating the inert portion of the residual solids established during TSS and VSS analyses. The total volatile solids are subtracted from the total solids in order to establish the inert component. Because 15% of organic solids are generally accepted to be residual organics (bug bodies, etc.) this must be accounted for in determining the magnetite content of a sample. Therefore the magnetite content is calculated as follows:

$$\text{Total Inert Solids} - 15\% \text{ of Volatile Solids} = \text{Magnetite}$$

2.7.1.14 Sludge Volume Index (SVI)

The SVI was determined by settling a 1 liter suspended sample for 30 minutes. The SVI was calculated as:

$$SVI = \text{Settled Sludge Volume after 30 min (mL/L)} \times 1,000 / VSS \text{ (mg/L)}$$

2.7.2 Laboratory Methods

Table 2.7-01 lists the laboratory methods and detection limits for all of the parameters analyzed by certified laboratories as part of the pilot study.

Table 2.7-01: Parameters Analyzed by Certified Laboratory

Parameter	Detection Limit	Method
TSS	5 mg/L	2540D
BOD	6 mg/L	5210B
Nitrate/Nitrite-N	0.5 mg/L	353.2
Ammonia-N	0.05 mg/L	4500NH3D
Total Kjeldahl Nitrogen	0.5 mg/L	4500NorgC
Total Nitrogen	0.5 mg/L	4500NorgC
COD	10 mg/L	H8000
Oil and Grease	5 mg/L	1664A

2.7.3 Quality Assurance/Quality Control

Quality Assurance and Quality Control procedures were used during the field work to ensure that the field results had sufficient precision and accuracy to be used for process control and interim results. The total number of field analyses completed was 11,008, of which 5,007 were completed for field QAQC. QAQC procedures included comparison of the field results with duplicates, standards, spikes of known additions and laboratory analyses as described below.

2.7.3.1 Field duplicates

Field duplicates were completed for TSS, BOD, and COD with each sample collected. Results that differed by more than 25% were not used, or were repeated, unless the difference in results was due to very low concentrations that were expected to be below the detection limit.

2.7.3.2 Standards

Generally, standards were completed for at least one analyte on a daily basis. Results that differed from the standard by more than 25% were not used, or were repeated in the field. The standards used during this project are listed in Table 2.7-02.

Table 2.7-02: QAQC Standard

Analyte	Concentration	Source
TSS	100 mg/L	NCL
	0 (Blanks)	Lab grade water
BOD	198, 300	HACH (loveland CO)
	0 (Blanks)	Lab grade water
COD	20, 30, 40, 50, 80, 100, 200, 300	Dilutions made from HACH 1000 mg/L Standard Solution (Loveland CO)
	0 (Blanks)	Lab grade water
TN	10 mg/L NO_3^- -N	Dilutions made from 500 mg/L NO_3^- -N stock
Nitrate	2, 5, 10, 20, 30, 50	
Mixed Parameters	15 mg/L mg/L NH_3 10 mg/L mg/L NO_3^- 10 mg/L mg/L PO_4 500 mg/L COD 400 mg/L SO_4 161 mg/L TOC	Wastewater Influent Inorganics Solution from HACH (Loveland CO), product # 2833149

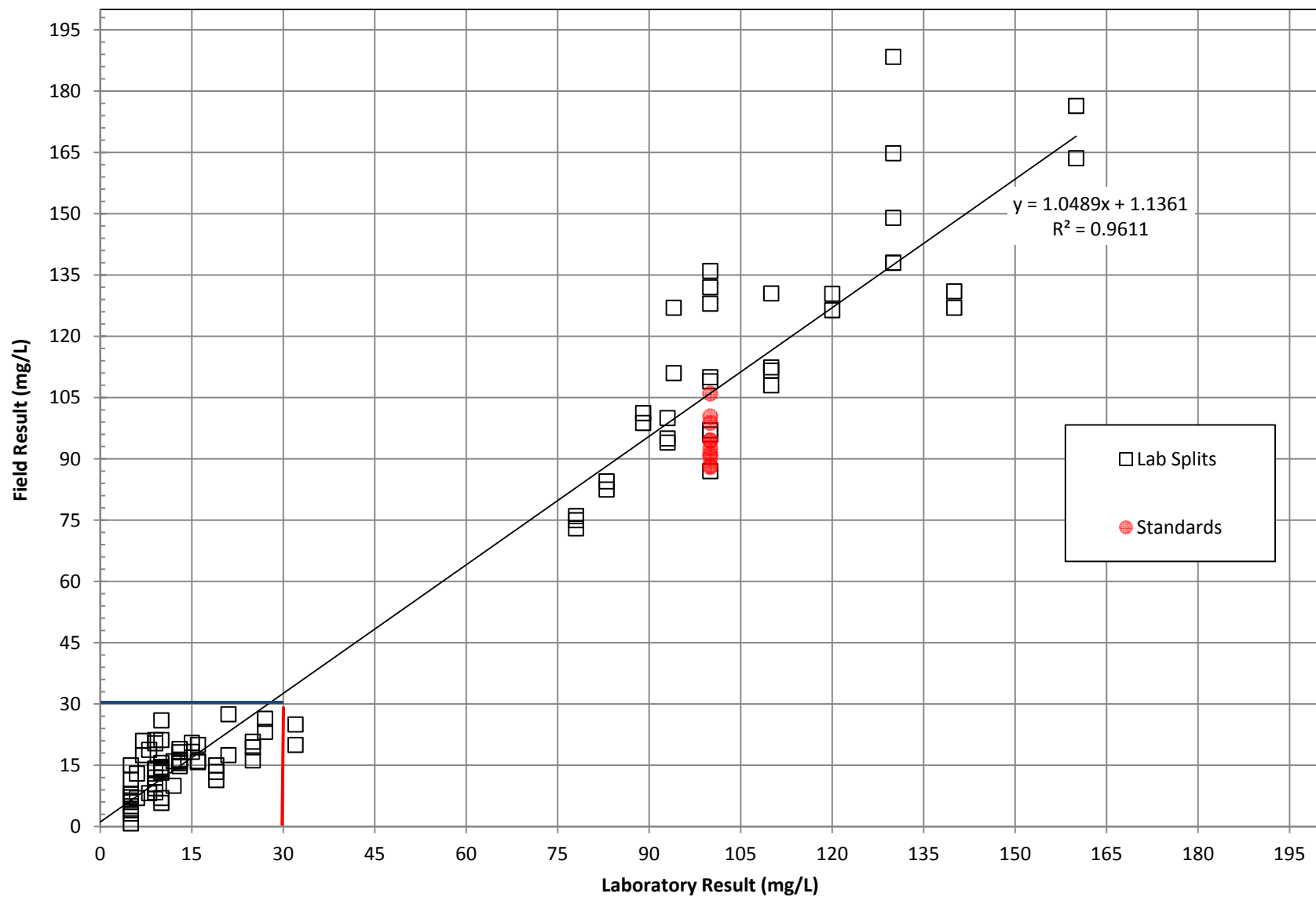
2.7.3.3 Comparison with Laboratory Results

Data from duplicate samples which were analyzed by a certified laboratory were used to evaluate the accuracy of the field data. Samples taken at the same time and from the same location were sent to a lab as well as measured in the field. The lab and field samples were plotted and a line of best fit was calculated using the method of least squares. The slope and intercept of the regression line provided an indication of the accuracy of the field method, and the R^2 value, and the visual assessment of the data provided an indication of the precision of the field method.

2.7.3.4 Precision and Accuracy of Field TSS Measurements

A comparison of the lab and field results is shown in Figure 2.7-01. The formula of the regression line is $Y = 1.05 X + 1.14$, indicating that, on average, the field TSS measurements were approximately 5% higher than lab sample measurements. The R^2 value is 0.9611, indicating that the regression line accounts for most of the variability of the field measurements. The cluster of data at the lower left corner of the figure are effluent water samples, and it appears that most samples that met the regulatory goal of 30 mg/L using the field measurement (indicated by the blue line), also met the goal using the laboratory measurement (indicated by the red line). The precision and accuracy of the field measurements for TSS were acceptable for use on the pilot study.

Figure 2.7-01: Comparison of Lab and Field Analyses for TSS



2.7.3.5 Precision and Accuracy of Field BOD Measurements

A comparison of the lab and field results is shown in Figure 2.7-02. The formula of the regression line is $Y = 1.00 X + 9.4$, indicating that, on average, the field TSS measurements were equal to the laboratory measurements. The R^2 value is 0.8871, indicating that the regression line accounts for most of the variability of the field measurements. The cluster of data at the lower left corner of the figure are effluent water samples, and it appears that most samples that met the regulatory goal of 30 mg/L using the field measurement (indicated by the blue line), also met the goal using the laboratory measurement (indicated by the red line), though for two samples, the field measurement resulted in a higher concentration than the laboratory concentrations. Note that the data in the lower corner is shortened somewhat, as the laboratory concentrations that were reported as <6 were entered into the figure as 5.99 mg/L, while field results were entered in as actual measurements. There are, therefore, a number of data sets, with field concentrations between 1 and 6 mg/L, all with the same estimate for laboratory concentrations of 5.99 mg/L.

Two samples were collected on April 12 for split analyses by four analysts. A Raw water sample and a pilot-scale primary clarifier sample were analyzed by (1) Blueleaf field methods, (2) the operator at the Pease WWTF, (3) Eastern Analytical Labs, and (4) Alpha Analytical Laboratories. Two replicate analyses were completed by Blueleaf and Pease WWTF, while both analytical labs reported only their average result. The results are shown in Table 2.7-03.

Table 2.7-03: Results of four-way split of BOD Samples on April 12, 2012

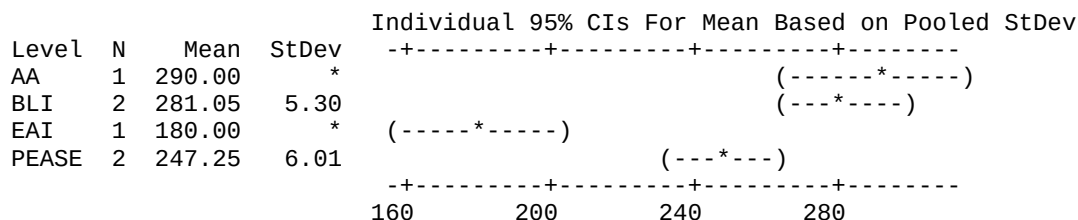
Analyst/Lab	Concentration (mg/L)	
	Raw Water Sample	Primary Effluent Sample
Blueleaf Field	284.8	259.2
	277.3	277.3
Pease WWTF	243	256.6
	251.5	234
Eastern Analytical	180	220
Alpha Analytical	290	280

A one-way ANOVA was performed on the results from each of the samples. The low p value indicates that there was a significant difference among the analysts, and the chart of confidence intervals suggested that the result from Eastern Analytical (EAI) was significantly lower than the other results. The Tukey test was used to look at differences between individual pairs of analysts, and it showed that the result from Eastern Analytical was significantly different than the other results on the raw water analysis. The ANOVA results are presented below:

One-way ANOVA: Raw Water BOD versus Analyst

Source	DF	SS	MS	F	P
Analyst	3	8325.4	2775.1	86.39	0.011
Error	2	64.3	32.1		
Total	5	8389.7			

S = 5.668 R-Sq = 99.23% R-Sq(adj) = 98.09%



Pooled StDev = 5.67

Grouping Information Using Tukey Method

Analyst	N	Mean	Grouping
AA	1	290.00	A
BLI	2	281.05	A
PEASE	2	247.25	A
EAI	1	180.00	B

Means that do not share a letter are significantly different.

The ANOVA result for the primary effluent analysis showed that none of the raw results were statistically significantly different.

The precision and accuracy of the Blueleaf field measurements for BOD were acceptable for use on the pilot study.

2.7.3.6 Precision and Accuracy of Field Ammonia Measurements

A comparison of the lab and field results is shown in Figure 2.7-03. The formula of the regression line is $Y = 0.91X + 0.5$, indicating that, on average, the field ammonia measurements were approximately 10% lower than the laboratory measurements. The R^2 value is 0.9385, indicating that the regression line accounts for most of the variability of the field measurements. The range for the field method was 0 to 2 mg/L $\text{NH}_3\text{-N}$, and concentrations higher than 2 mg/L were measured by diluting the sample with lab grade water. It is likely that the sample dilution contributed to the variability in results higher than 2 mg/L. The precision and accuracy of the field measurements for ammonia were acceptable for use on the pilot study, but field samples are slightly lower than laboratory samples.

Figure 2.7-02: Comparison of Field and Lab BOD Results

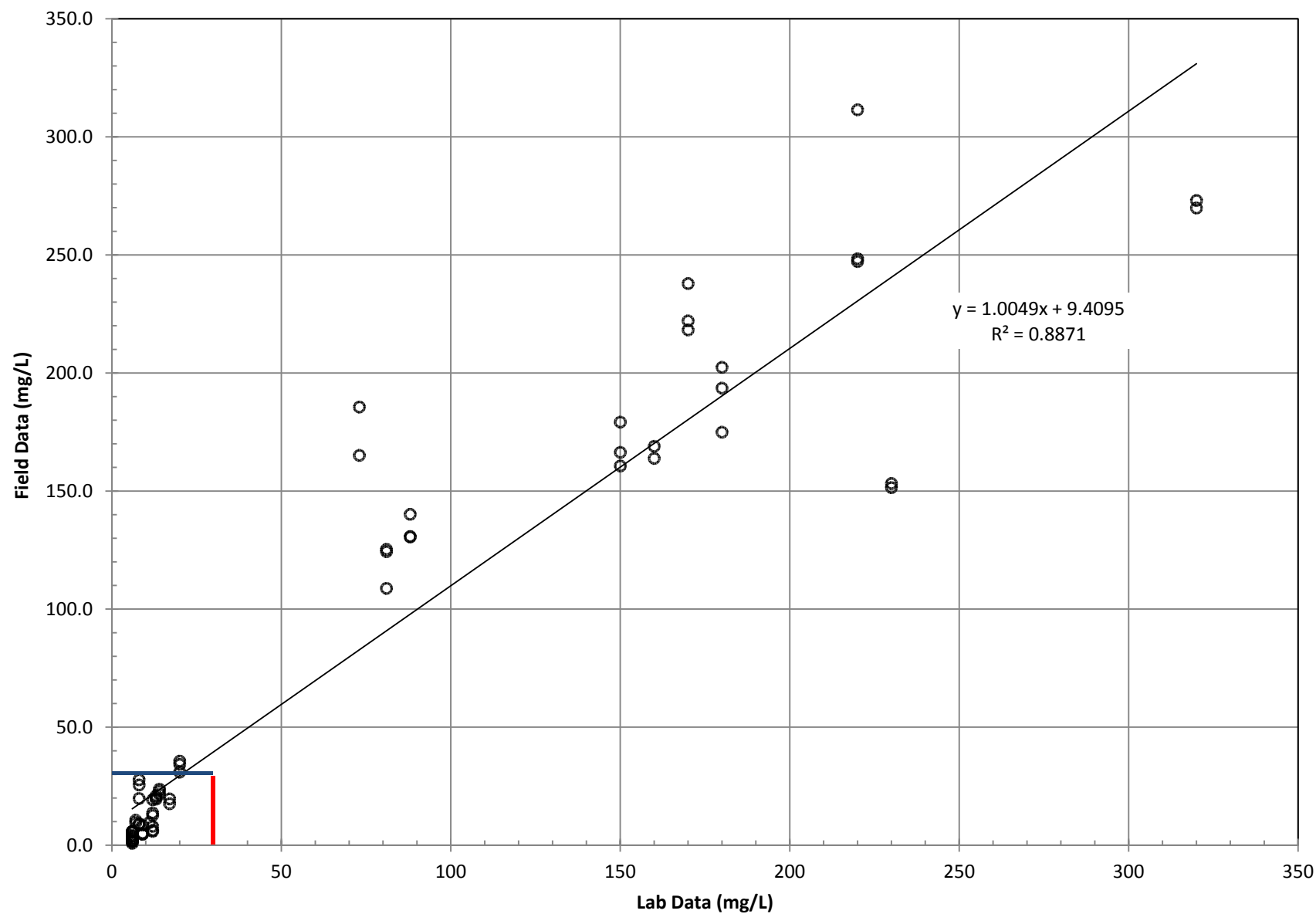
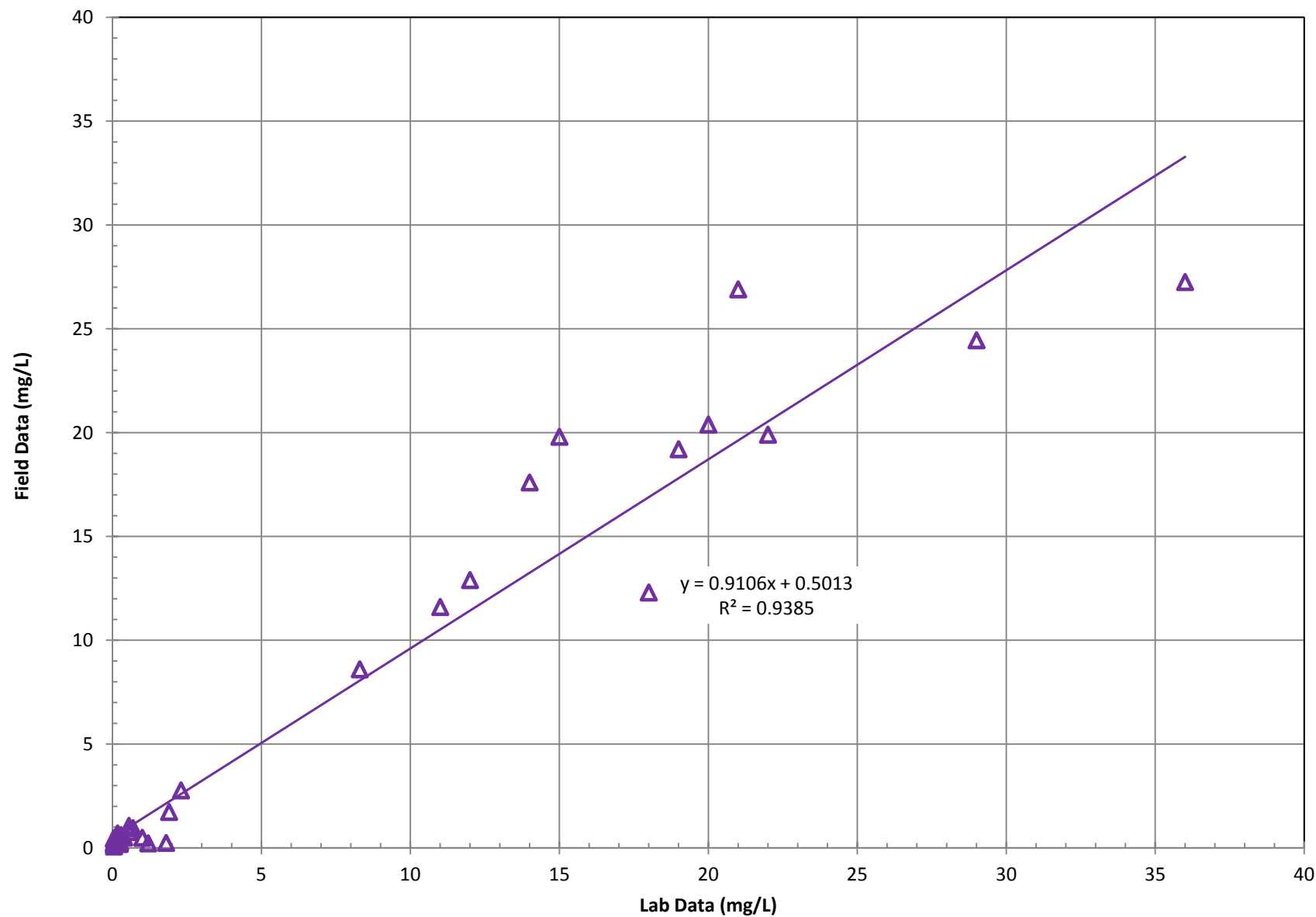


Figure 2.7-03: Comparison of Field and Lab Ammonia Results



2.7.3.7 Precision and Accuracy of Field Total Nitrogen Measurements

A comparison of the lab and field results is shown in Figure 2.7-04. The formula of the regression line is $Y = 0.98 X + 1.02$, indicating that, on average, the field TN measurements were approximately equal to laboratory measurements. The R^2 value is 0.95, indicating that the regression line accounts for most of the variability of the field measurements. The high R^2 value and good correlation is likely due, in part, to the standard concentrations that were analyzed at 45 mg/L. Samples with a field concentration of 10 mg/L TN-N, however, had laboratory measurements that ranged from 7 mg/L to 23 mg/L, though the variability in sample results was lower at lower concentrations. The precision and accuracy of the field measurements for TN is likely not suitable for determining regulatory compliance or success with meeting the pilot goals, but was used as an indicator of pilot performance, and a guide on scheduling laboratory sampling.

2.7.3.8 Precision and Accuracy of Field Nitrate Measurements

Nitrate measurements were evaluated using field standards, and the formula of the regression line is $Y = 0.877 X + 0.91$, indicating that, on average, the field nitrate measurements were approximately 13% below laboratory measurements. The R^2 value is 0.90, indicating that the regression line accounts for most of the variability of the field measurements. In many of the field samples collected from the nitrification reactors, where ammonia had been reduced, the field measurement for nitrates showed a very low concentration of nitrate, and the field method was suspected of under-reporting nitrate.

A sample was collected on May 15 to determine if there was an interference with the nitrate measurement. The field sample result was 0.5 mg/L NO_3^- , and the result from a split sample that had 10 mg/L NO_3^- spiked into it was 10.2, or a recovery of 97%. Despite that fact that the standards, and methods of known additions were acceptable, the field measurement for nitrate was not suitable for determining regulatory compliance or success with meeting the pilot goals, but was used as an indicator of pilot performance, and a guide on scheduling laboratory sampling.

Figure 2.7-04: Comparison of Field and Lab Total Nitrogen Results

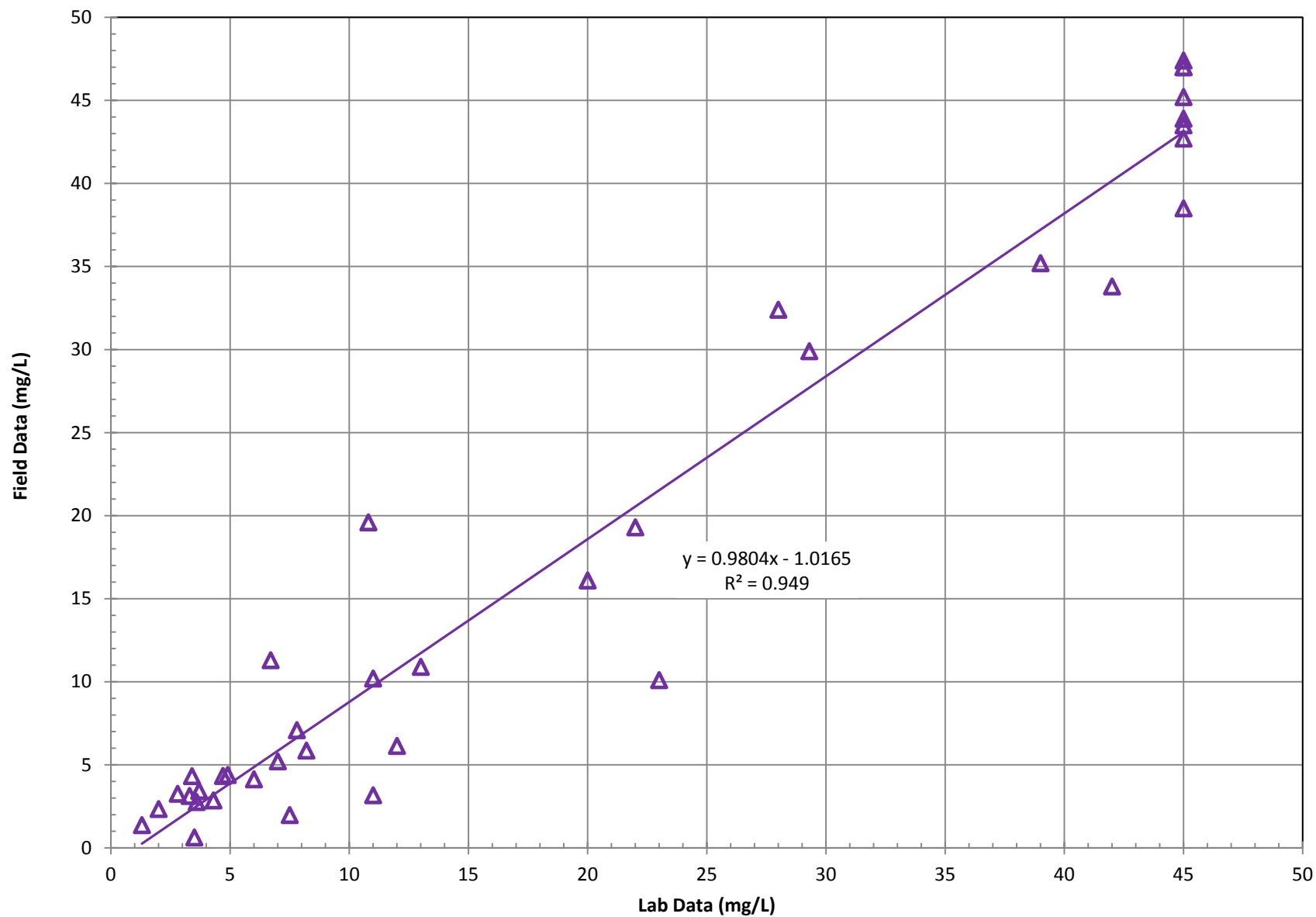
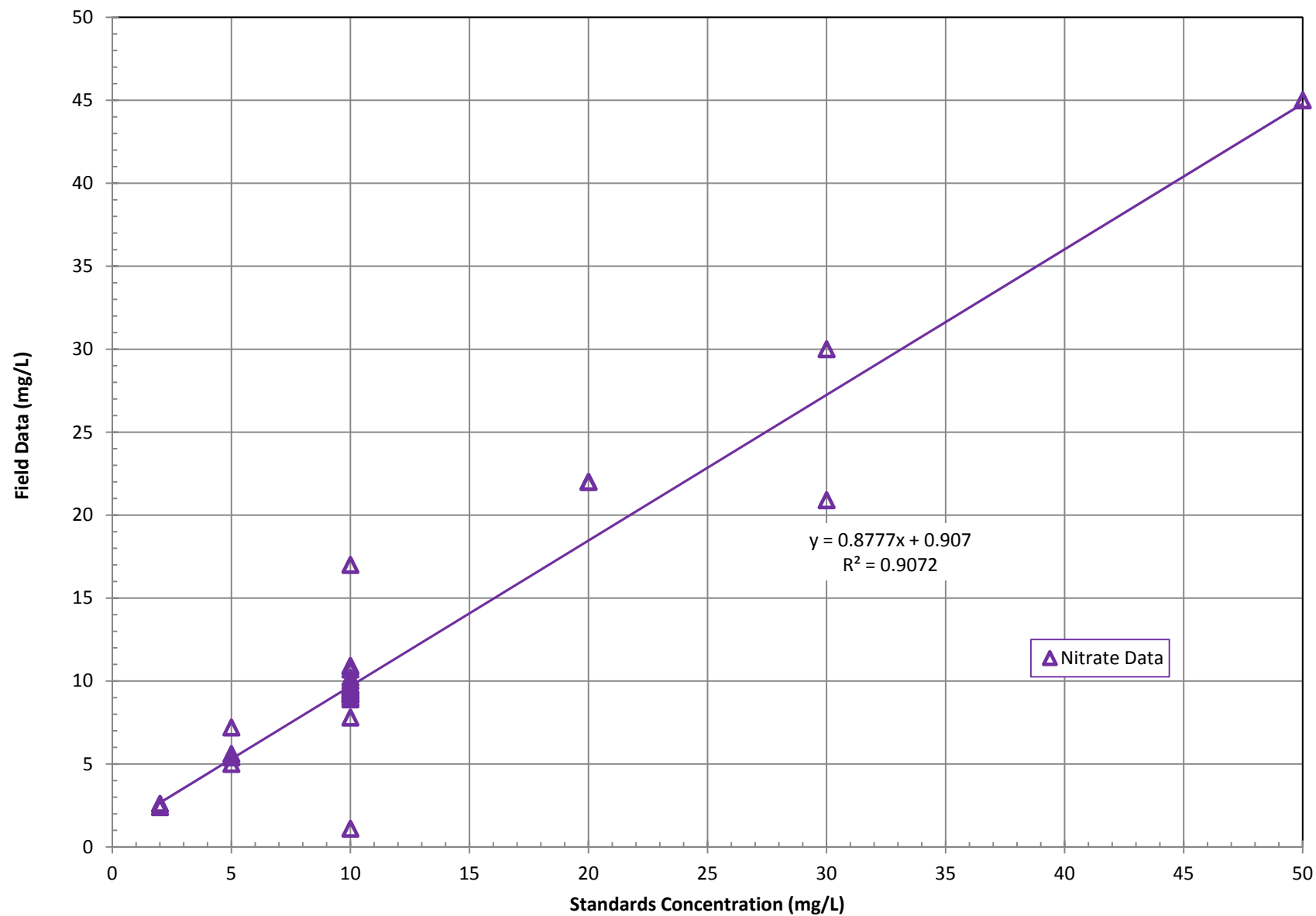


Figure 2.7-05: Analysis of Nitrate Standards by Field Methods



2.8 EXPERIMENTAL PLANS

A series of Experimental Plans were developed by Blueleaf and AECOM to evaluate different operating parameters and treatment goals. The focus of Experimental Plans was initially meeting the Secondary Treatment goals of 30 mg/L TSS and BOD₅, and Experimental Plans 01 and 02 evaluated each process for TSS and BOD₅ removal. As the project progressed, additional information indicated that the next NPDES permit renewal would include a limit on TN, and the focus was changed to TN removal. Experimental Plans 03 through 05 evaluated each process for TN removal to a level of less than 8 mg/L, and Experimental Plan 06 evaluated each process for TN removal to a level of less than 3 mg/L. Both Experimental Plans 05 and 06 were completed with a supplemental ammonia source to increase the ammonia load on the processes. Table 2.8-01 details the Experimental Plans that were completed.

The goal of each Experimental Plan was to establish effective treatment under stable operating conditions, and to collect at least three sets of laboratory samples during a period which represented proposed full-scale operating conditions. In practice, many of the Experimental Plans were interrupted by mechanical upsets, and changing influent concentrations. When the cause of the upset could be identified, the effluent water quality data was not included in the evaluation of the Experimental Plan results. If the specific cause could not be identified, the data was included in the evaluation.

During the start up of the processes, it was determined that each process was likely limited by the organic removal capacity, and that since the influent BOD concentration was higher than estimated, the processes would not meet the BOD effluent goals at the planned flow rates. The flow rate for most of the Experimental Plans was adjusted daily to target a design organic loading rate for the process. The pilot system operators used daily COD measurements to predict the influent BOD concentration for the next 24 hours, and calculated a pilot flow rate required to achieve the target organic loading rate. The organic loading rate continued to be highly variable because there was large variability in the influent organic concentrations. Experimental Plan 05 and 06 for the BAF system used a different approach, setting the flow rate constant at a rate that, on average, should meet the organic loading rate goal.

Samples continued to be collected between Experimental Plans, to assess acclimation, monitor operation, and prepare for the next Experimental Plan. The data from these periods is evaluated in this pilot study report to evaluate the removal rates at a variety of loading rates, determine likely acclimation durations, and draw conclusions regarding the process stability and operation.

Table 2.8-01: List of Experimental Plans and Completion Dates

Experimental Plan	Date(s) Completed		
	BAF	CASB	MBBR
Experimental Plan 01 – Treating Primary Effluent to BOD/TSS 30/30 mg/l Standards at Average Day Load	N/C* ¹	1/29 – 2/08	3/10 – 3/20
Experimental Plan 02 – Treating Primary Effluent to BOD/TSS 30/30 mg/l Standards at Maximum Month Load	3/12 - 3/21	4/27 – 5/03	3/22 – 4/03
Experimental Plan 03 – Treating Primary Effluent to TN<8 mg/l at Maximum Month Load	N/C* ²	5/14 – 5/24	5/15 – 5/30
Experimental Plan 04 - Hydraulic Stress Tests			
Full Strength, Medium Flow, Short Duration (FMS)	7/24	6/01	5/30
Full Strength, Peak Flow, Short Duration (FPS)	7/25	6/05	6/03
Full Strength, Peak Flow, Medium Duration (FPM)	7/26	6/07	6/14
Diluted Strength, Peak Flow, Extended Duration (DPE)	7/27 – 7/28	6/13 – 6/14	6/19 – 6/21
Full Strength, High Peak Flow, Medium Duration (FXM)	7/30	N/C* ³	N/C* ³
Full Strength, High Peak Flow, Extended Duration (FXE)	7/31 – 8/01		
Experimental Plan 05 – Treating Primary Effluent to TN<8 mg/l at Maximum Month Flow with Supplemental Ammonia	7/01 – 7/21* ⁴	6/14 – 7/02	6/26 – 7/03
Experimental Plan 06 – Treating Primary Effluent to TN<3 mg/l at Maximum Month Flow with Supplemental Ammonia		7/07 – 7/14	7/09 – 7/17

*1 – Experimental Plan 01 was not completed for the BAF process since each individual full scale filter will operate under a maximum month condition.

*2 – Experimental Plan 03 was not completed for the BAF system because the system was not completed acclimation. TN removal was evaluated on the basis of the results from Experimental Plan 05 and 06.

*3 – The High Peak Flow Experiments FXM and FXE were designed for a special case of the BAF design, and were not required for the CASB and MBBR processes

*4 – Experimental Plan 05 and 06 were completed simultaneously since there was no difference in the configuration of the two-stage BAF system when treating to a TN<8 mg/L condition, or to a TN<3 condition. The CASB and MBBR processes required different Experimental Plans because they were operated in different configurations in Experimental Plans 05 and 06.

3 RESULTS

3.1 RAW WATER QUALITY

3.1.1 Raw Water Quality Field Data

All of the raw water data reviewed in this section were from field analyses. There were only two raw water samples submitted to the laboratory and analyzed as part of the pilot study. These two samples were analyzed to validate BOD results obtained by field analyses, and are discussed in Section 2.7.3 Quality Assurance/Quality Control.

3.1.1.1 Sample Collection

The location ID for raw water sampling was:

01 RAW. Raw water samples were collected as either grabs or composites. Composite samples were preferred, but it was sometimes necessary to collect grab samples instead.

- Grab samples were collected directly from the influent channel, adjacent to the submersible grinder pump that supplied the pilot plant.
- Composite samples were collected by the existing Peirce Island WWTF ISCO autosampler. The autosampler was programmed to collect samples on a flow-based schedule to produce a representative composite typically over a 24 hour period. The autosampler collected sample from a point downstream from the pilot plant grinder pump.

3.1.1.2 Tabulated Raw Water Quality Data by Field Methods

Table 3.1-01 summarizes raw water field data for each day of operations for the pilot study, from 21 December 2011 through 3 August 2012. The table presents statistics for each field parameter, for each day of field operations. The format for each entry is Median (minimum - maximum) [number of data]. The table indicates when there were no data collected for a given parameter on a particular day.

Line No.	Date	(01) RAW Temperature C°	(01) RAW TSS (mg/L)	(01) RAW pH (SU)	(01) RAW Alkalinity (mg/L)	(01) RAW COD(t) (mg/L)	(01) RAW COD(s) (mg/L)	(01) RAW BOD(t) (mg/L)	(01) RAW BOD(s) (mg/L)	(01) RAW Nitrate (NO3-N) (mg/L)	(01) RAW Ammonia (NH3-N) (mg/L)	(01) RAW Total Nitrogen (mg/L) (TN)	(01) RAW TKN (mg/L)
4	12/21/11	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
5	12/22/11	11 (11-11) [158]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
6	12/23/11	9 (8-11) [719]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
7	12/24/11	7 (7-8) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
8	12/25/11	6 (6-7) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
9	12/26/11	6 (6-6) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
10	12/27/11	7 (6-8) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
11	12/28/11	9 (4-10) [718]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
12	12/29/11	8 (6-9) [719]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
13	12/30/11	10 (5-11) [720]	No Data [0]	6.6-6.9 [2]	No Data [0]	692 (668-988) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
14	12/31/11	10 (9-11) [720]	No Data [0]	7.1-7.3 [2]	No Data [0]	641 (610-653) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
15	01/01/12	10 (9-11) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
16	01/02/12	11 (10-11) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
17	01/03/12	9 (8-10) [720]	189 (165-288) [3]	No Data [0]	No Data [0]	801 (758-817) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
18	01/04/12	8 (6-9) [718]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
19	01/05/12	9 (8-10) [719]	152 (140-160) [3]	No Data [0]	No Data [0]	589 (578-595) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
20	01/06/12	10 (9-10) [719]	57 (35-68) [3]	No Data [0]	No Data [0]	263 (262-267) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
21	01/07/12	10 (9-11) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
22	01/08/12	10 (10-11) [345]	145 (140-149) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
23	01/09/12	No Data [0]	170 (165-190) [3]	6.6 (6.6-6.7) [3]	No Data [0]	558 (540-574) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
24	01/10/12	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
25	01/11/12	No Data [0]	110 (107-121) [3]	7.3 (6.7-7.4) [3]	No Data [0]	364 (359-369) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
26	01/12/12	No Data [0]	118 (97-132) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
27	01/13/12	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
28	01/14/12	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
29	01/15/12	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
30	01/16/12	No Data [0]	123 (78-126) [3]	7.7 (7.2-7.8) [3]	No Data [0]	186 (184-209) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
31	01/17/12	No Data [0]	372 (350-386) [3]	7.5 (7.5-7.5) [3]	No Data [0]	612 (607-617) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
32	01/18/12	No Data [0]	93 (69-194) [3]	7.7 (7.4-7.8) [3]	No Data [0]	431 (394-437) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
33	01/19/12	No Data [0]	218 (210-225) [3]	No Data [0]	No Data [0]	420 (386-455) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
34	01/20/12	No Data [0]	178 (174-186) [3]	No Data [0]	No Data [0]	486 (462-492) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
35	01/21/12	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
36	01/22/12	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
37	01/23/12	No Data [0]	293 (270-311) [3]	7.6 (7.6-7.6) [3]	No Data [0]	573 (561-598) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
38	01/24/12	No Data [0]	141 (128-144) [3]	No Data [0]	No Data [0]	485 (423-518) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
39	01/25/12	11 (11-11) [233]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
40	01/26/12	11 (11-12) [720]	173 (163-183) [6]	7.3 (7.2-7.4) [3]	No Data [0]	433-436 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
41	01/27/12	9 (8-12) [720]	262 (251-265) [3]	7.3 (7.0-7.3) [3]	No Data [0]	536-652 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
42	01/28/12	10 (7-11) [719]	180 (179-184) [3]	No Data [0]	No Data [0]	456-481 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
43	01/29/12	9 (9-9) [720]	100 (89-105) [3]	No Data [0]	No Data [0]	276-292 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
44	01/30/12	9 (6-11) [720]	129 (97-134) [3]	No Data [0]	No Data [0]	358 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
45	01/31/12	11 (10-11) [718]	137 (135-144) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
46	02/01/12	11 (2-11) [719]	138 (138-142) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
47	02/02/12	11 (6-11) [719]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
48	02/03/12	11 (10-11) [720]	144 (140-148) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
49	02/04/12	11 (10-11) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
50	02/05/12	10 (10-11) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
51	02/06/12	10 (10-11) [719]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
52	02/07/12	11 (11-11) [720]	313 (306-329) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
53	02/08/12	11 (5-11) [718]	129 (126-143) [3]	7.6 (7.4-7.7) [3]	No Data [0]	460-461 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
54	02/09/12	11 (11-11) [720]	69 (67-87) [3]	No Data [0]	No Data [0]	397-415 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
55	02/10/12	11 (10-11) [719]	157 (156-158) [3]	7.6 (7.4-7.7) [3]	No Data [0]	512-523 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

Line No.	Date	(01) RAW Temperature C°	(01) RAW TSS (mg/L)	(01) RAW pH (SU)	(01) RAW Alkalinity (mg/L)	(01) RAW COD(t) (mg/L)	(01) RAW COD(s) (mg/L)	(01) RAW BOD(t) (mg/L)	(01) RAW BOD(s) (mg/L)	(01) RAW Nitrate (NO3-N) (mg/L)	(01) RAW Ammonia (NH3-N) (mg/L)	(01) RAW Total Nitrogen (mg/L) (TN)	(01) RAW TKN (mg/L)
56	02/11/12	11 (10-11) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
57	02/12/12	10 (9-11) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
58	02/13/12	10 (9-10) [720]	102 (95-108) [3]	6.8 (6.8-7.1) [3]	No Data [0]	409-426 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
59	02/14/12	10 (9-11) [720]	131 (115-171) [3]	No Data [0]	No Data [0]	455-458 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
60	02/15/12	11 (4-12) [717]	164 (159-189) [3]	6.7 (6.6-6.9) [3]	No Data [0]	599-642 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
61	02/16/12	11 (11-12) [718]	138 (121-139) [3]	No Data [0]	No Data [0]	435-448 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
62	02/17/12	11 (11-12) [720]	124 (120-135) [3]	No Data [0]	No Data [0]	355-357 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
63	02/18/12	11 (10-11) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
64	02/19/12	11 (11-11) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
65	02/20/12	11 (9-11) [719]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
66	02/21/12	11 (11-11) [720]	276 (266-315) [3]	7.7 (7.4-7.8) [3]	No Data [0]	800-801 [2]	No Data [0]	510 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
67	02/22/12	11 (5-12) [718]	167 (166-176) [3]	No Data [0]	No Data [0]	534-537 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
68	02/23/12	11 (11-11) [720]	272 (264-283) [3]	6.3 (6.1-6.4) [3]	No Data [0]	1,130-1,181 [2]	No Data [0]	694-730 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
69	02/24/12	11 (10-11) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
70	02/25/12	10 (9-10) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
71	02/26/12	10 (10-11) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
72	02/27/12	11 (10-11) [719]	105 (101-106) [3]	No Data [0]	No Data [0]	358-393 [2]	No Data [0]	124-186 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
73	02/28/12	11 (8-11) [720]	140 (123-167) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
74	02/29/12	10 (2-11) [718]	162 (145-185) [6]	No Data [0]	No Data [0]	513 (452-550) [4]	No Data [0]	290 (260-322) [8]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
75	03/01/12	5 (2-5) [720]	233 (232-251) [3]	7.2 (7.0-7.3) [3]	No Data [0]	673-678 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
76	03/02/12	5 (5-6) [719]	218 (197-222) [3]	No Data [0]	No Data [0]	489-551 [2]	No Data [0]	282-313 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
77	03/03/12	6 (4-7) [720]	235 (231-236) [3]	No Data [0]	No Data [0]	397-423 [2]	181-182 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
78	03/04/12	7 (7-8) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
79	03/05/12	7 (-8-8) [719]	107 (106-113) [3]	7.1 (6.9-7.2) [3]	No Data [0]	538-575 [2]	No Data [0]	181-183 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
80	03/06/12	7 (7-8) [720]	75 (69-90) [3]	No Data [0]	No Data [0]	233-245 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
81	03/07/12	8 (7-9) [718]	129 (125-137) [3]	No Data [0]	No Data [0]	366-386 [2]	No Data [0]	221 (216-222) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
82	03/08/12	8 (8-11) [719]	91 (86-106) [3]	7.5 (7.2-7.5) [3]	No Data [0]	286-298 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
83	03/09/12	8 (5-10) [720]	93 (91-100) [3]	No Data [0]	No Data [0]	290-290 [2]	No Data [0]	180 (176-189) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
84	03/10/12	8 (7-8) [720]	12 (12-15) [3]	No Data [0]	No Data [0]	69-86 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
85	03/11/12	8 (7-9) [720]	44 (40-48) [3]	No Data [0]	No Data [0]	151-154 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
86	03/12/12	9 (8-10) [719]	109 (103-113) [3]	6.9 (6.8-7.1) [3]	No Data [0]	259-271 [2]	No Data [0]	111-123 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
87	03/13/12	9 (8-9) [720]	101 (95-122) [3]	No Data [0]	No Data [0]	339-371 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
88	03/14/12	10 (0-10) [718]	122 (118-145) [3]	No Data [0]	No Data [0]	370-374 [2]	No Data [0]	176-184 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
89	03/15/12	10 (9-10) [720]	148 (147-160) [3]	7.1 (7.0-7.3) [3]	No Data [0]	364-372 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
90	03/16/12	10 (9-10) [720]	134 (134-137) [3]	No Data [0]	No Data [0]	328-332 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
91	03/17/12	10 (10-11) [688]	269 (259-269) [3]	No Data [0]	No Data [0]	454-459 [2]	No Data [0]	260 (230-275) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
92	03/18/12	10 (10-11) [720]	132 (98-134) [3]	No Data [0]	No Data [0]	351-367 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
93	03/19/12	11 (10-12) [718]	107 (104-118) [3]	6.8 (6.7-7.0) [3]	No Data [0]	268-270 [2]	No Data [0]	163 (150-166) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
94	03/20/12	11 (11-12) [720]	57 (53-59) [3]	No Data [0]	No Data [0]	223-228 [2]	No Data [0]	127 (125-138) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
95	03/21/12	12 (8-13) [718]	135 (134-135) [3]	7.0 (6.7-7.0) [3]	155 [1]	370-374 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
96	03/22/12	12 (12-13) [720]	154 (150-157) [3]	No Data [0]	No Data [0]	447-523 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
97	03/23/12	12 (12-12) [720]	147 (145-147) [3]	No Data [0]	No Data [0]	448-466 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
98	03/24/12	11 (11-12) [720]	202 (192-210) [3]	No Data [0]	No Data [0]	490-494 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
99	03/25/12	11 (11-12) [720]	192 (176-193) [3]	No Data [0]	No Data [0]	446-1,036 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
100	03/26/12	11 (11-12) [720]	166 (157-192) [3]	No Data [0]	No Data [0]	345-360 [2]	No Data [0]	188 (178-194) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
101	03/27/12	11 (9-12) [720]	182 (175-198) [3]	No Data [0]	No Data [0]	470-477 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
102	03/28/12	11 (8-12) [718]	131 (129-142) [3]	No Data [0]	No Data [0]	422-426 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
103	03/29/12	11 (9-12) [720]	216 (210-220) [3]	No Data [0]	No Data [0]	409-422 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
104	03/30/12	11 (8-11) [720]	201 (198-215) [3]	No Data [0]	No Data [0]	426-426 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
105	03/31/12	11 (10-12) [720]	238 (231-243) [3]	6.9 (6.8-7.0) [3]	180 [1]	510-530 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
106	04/01/12	11 (8-11) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
107	04/02/12	11 (8-12) [720]	205 (200-206) [3]	No Data [0]	No Data [0]	414-465 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

Table 3.1-01 Summary of Raw Water Quality Data by Field Methods, Page 3 of 5

Line No.	Date	(01) RAW Temperature C°	(01) RAW TSS (mg/L)	(01) RAW pH (SU)	(01) RAW Alkalinity (mg/L)	(01) RAW COD(t) (mg/L)	(01) RAW COD(s) (mg/L)	(01) RAW BOD(t) (mg/L)	(01) RAW BOD(s) (mg/L)	(01) RAW Nitrate (NO3-N) (mg/L)	(01) RAW Ammonia (NH3-N) (mg/L)	(01) RAW Total Nitrogen (mg/L) (TN)	(01) RAW TKN (mg/L)
108	04/03/12	12 (10-14) [719]	188 (182-193) [3]	No Data [0]	No Data [0]	635-636 [2]	259-265 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
109	04/04/12	12 (0-14) [719]	229 (209-233) [3]	7.4 [1]	160 [1]	511-527 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
110	04/05/12	12 (11-12) [720]	288 (286-316) [3]	No Data [0]	No Data [0]	521-538 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
111	04/06/12	12 (11-12) [720]	242 (236-256) [3]	No Data [0]	No Data [0]	543-549 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
112	04/07/12	12 (11-12) [720]	106 (101-114) [3]	No Data [0]	No Data [0]	265-277 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
113	04/08/12	12 (11-12) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
114	04/09/12	12 (11-12) [720]	187-193 [2]	7.5 [1]	180 [1]	516-525 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
115	04/10/12	12 (11-17) [720]	248-274 [2]	No Data [0]	No Data [0]	574-585 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
116	04/11/12	13 (9-15) [716]	240-263 [2]	No Data [0]	No Data [0]	551-558 [2]	No Data [0]	269 (207-302) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
117	04/12/12	13 (12-13) [719]	291-302 [2]	No Data [0]	No Data [0]	641-674 [2]	No Data [0]	285 (277-294) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
118	04/13/12	13 (12-13) [720]	238-308 [2]	No Data [0]	No Data [0]	604-624 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
119	04/14/12	13 (12-13) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
120	04/15/12	13 (13-14) [720]	209-229 [2]	No Data [0]	No Data [0]	511-566 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
121	04/16/12	14 (13-15) [720]	201-218 [2]	No Data [0]	No Data [0]	520-586 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
122	04/17/12	14 (13-15) [720]	252-275 [2]	7.1 [1]	No Data [0]	605-639 [2]	No Data [0]	301 (300-310) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
123	04/18/12	14 (0-15) [719]	243-248 [2]	No Data [0]	No Data [0]	523-536 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
124	04/19/12	13 (13-14) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
125	04/20/12	14 (13-15) [719]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
126	04/21/12	14 (13-14) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
127	04/22/12	13 (13-14) [720]	194-236 [2]	6.8 [1]	144 [1]	617-694 [2]	No Data [0]	320 (281-323) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
128	04/23/12	11 (10-13) [720]	476-528 [2]	No Data [0]	No Data [0]	602-661 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
129	04/24/12	12 (10-13) [718]	142-147 [2]	No Data [0]	No Data [0]	329-423 [2]	No Data [0]	126 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
130	04/25/12	13 (10-13) [718]	110-148 [2]	No Data [0]	No Data [0]	271-322 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
131	04/26/12	13 (12-13) [720]	130-132 [2]	No Data [0]	No Data [0]	293-311 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
132	04/27/12	13 (12-13) [720]	124-128 [2]	No Data [0]	No Data [0]	321-335 [2]	No Data [0]	220 (200-255) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
133	04/28/12	12 (11-13) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
134	04/29/12	13 (12-13) [720]	137-146 [2]	No Data [0]	No Data [0]	270-281 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
135	04/30/12	13 (12-13) [720]	138-141 [2]	7.3 [1]	135 [1]	337-340 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
136	05/01/12	13 (12-13) [720]	157-158 [2]	No Data [0]	No Data [0]	428-428 [2]	No Data [0]	258 (247-264) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
137	05/02/12	13 (10-14) [717]	183-206 [2]	7.4 [1]	No Data [0]	379-408 [2]	No Data [0]	204-205 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
138	05/03/12	15 (13-15) [720]	147-149 [2]	No Data [0]	No Data [0]	384-392 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
139	05/04/12	15 (11-15) [719]	189-197 [2]	No Data [0]	No Data [0]	375-396 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
140	05/05/12	15 (15-16) [719]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
141	05/06/12	15 (15-16) [720]	69-74 [2]	No Data [0]	No Data [0]	161-179 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
142	05/07/12	16 (15-17) [720]	177-202 [2]	7.2 [1]	139 [1]	315-327 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
143	05/08/12	16 (15-16) [719]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
144	05/09/12	15 (0-16) [718]	299-310 [2]	No Data [0]	No Data [0]	463-496 [2]	No Data [0]	288 (258-301) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
145	05/10/12	16 (15-16) [720]	256-266 [2]	No Data [0]	No Data [0]	426-457 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
146	05/11/12	15 (14-15) [720]	180-204 [2]	7.1 [1]	102 [1]	386-435 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
147	05/12/12	15 (14-16) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
148	05/13/12	16 (15-16) [720]	97-106 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
149	05/14/12	16 (15-16) [720]	166-189 [2]	No Data [0]	No Data [0]	333-363 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
150	05/15/12	16 (15-17) [719]	164-186 [2]	No Data [0]	No Data [0]	416-461 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
151	05/16/12	16 (13-16) [718]	270-291 [2]	7.4 [1]	130 [1]	551-730 [2]	No Data [0]	246 (235-303) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
152	05/17/12	16 (16-17) [720]	132-140 [2]	7.3 [1]	152 [1]	400-401 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
153	05/18/12	16 (15-20) [720]	165-188 [2]	7.1 [1]	156 [1]	440-456 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
154	05/19/12	16 (15-17) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
155	05/20/12	17 (16-17) [720]	137-153 [2]	7.8 [1]	No Data [0]	488-587 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
156	05/21/12	17 (16-17) [718]	153-165 [2]	7.3 [1]	154 [1]	363-375 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
157	05/22/12	17 (17-18) [719]	193-198 [2]	7.4 [1]	168 [1]	524-577 [2]	No Data [0]	274 (261-299) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
158	05/23/12	17 (6-18) [718]	193-276 [2]	No Data [0]	No Data [0]	527-592 [2]	No Data [0]	279 (278-302) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
159	05/24/12	17 (17-18) [719]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

Line No.	Date	(01) RAW Temperature C°	(01) RAW TSS (mg/L)	(01) RAW pH (SU)	(01) RAW Alkalinity (mg/L)	(01) RAW COD(t) (mg/L)	(01) RAW COD(s) (mg/L)	(01) RAW BOD(t) (mg/L)	(01) RAW BOD(s) (mg/L)	(01) RAW Nitrate (NO3-N) (mg/L)	(01) RAW Ammonia (NH3-N) (mg/L)	(01) RAW Total Nitrogen (mg/L) (TN)	(01) RAW TKN (mg/L)
160	05/25/12	18 (17-18) [719]	168-187 [2]	7.1 [1]	162 [1]	440-495 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
161	05/26/12	18 (18-19) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
162	05/27/12	18 (18-19) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
163	05/28/12	18 (17-19) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
164	05/29/12	18 (18-18) [720]	189-202 [2]	7.2 [1]	146 [1]	486-504 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
165	05/30/12	18 (18-19) [718]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
166	05/31/12	19 (18-20) [719]	161-170 [2]	7.3 [1]	166 [1]	415-421 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
167	06/01/12	19 (18-19) [719]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
168	06/02/12	18 (18-19) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
169	06/03/12	17 (17-18) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
170	06/04/12	16 (16-17) [720]	65-78 [2]	7.1 [1]	No Data [0]	210-288 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
171	06/05/12	16 (16-17) [719]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
172	06/06/12	17 (6-18) [718]	189-246 [2]	7.0 [1]	No Data [0]	402-486 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
173	06/07/12	17 (16-18) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
174	06/08/12	18 (16-24) [720]	152-158 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
175	06/09/12	18 (18-20) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
176	06/10/12	18 (17-19) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
177	06/11/12	18 (17-19) [720]	142-155 [2]	7.2 [1]	No Data [0]	315-324 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
178	06/12/12	18 (17-19) [719]	184-188 [2]	7.3 [1]	No Data [0]	479-512 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
179	06/13/12	18 (7-18) [717]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
180	06/14/12	18 (18-19) [720]	196-197 [2]	7.0 [1]	No Data [0]	552-571 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
181	06/15/12	18 (17-19) [719]	161-178 [2]	7.4 [1]	No Data [0]	394-427 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
182	06/16/12	18 (17-18) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
183	06/17/12	18 (17-19) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
184	06/18/12	18 (17-19) [719]	283-284 [2]	6.8-7.4 [2]	122 [1]	313 (81-591) [4]	No Data [0]	No Data [0]	No Data [0]	1.5 [1]	6.0 [1]	No Data [0]	No Data [0]
185	06/19/12	19 (18-20) [719]	351-360 [2]	7.2 [1]	No Data [0]	738-747 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
186	06/20/12	20 (6-21) [718]	267-271 [2]	7.3 [1]	No Data [0]	661-690 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
187	06/21/12	20 (18-21) [719]	312-352 [2]	7.2 [1]	No Data [0]	648-680 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
188	06/22/12	20 (19-21) [719]	283-302 [2]	7.3 [1]	No Data [0]	597-878 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
189	06/23/12	21 (20-21) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
190	06/24/12	20 (19-21) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
191	06/25/12	20 (20-21) [720]	467-467 [2]	7.0 [1]	No Data [0]	735-961 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
192	06/26/12	20 (19-20) [720]	485-508 [2]	7.3 [1]	No Data [0]	707-818 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
193	06/27/12	20 (18-20) [717]	361-361 [2]	7.6 [1]	No Data [0]	588-598 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
194	06/28/12	20 (19-21) [720]	202-212 [2]	7.3 [1]	No Data [0]	476-565 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
195	06/29/12	21 (20-22) [719]	191-211 [2]	7.3 [1]	No Data [0]	481-506 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
196	06/30/12	22 (22-24) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
197	07/01/12	23 (22-24) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
198	07/02/12	22 (21-23) [717]	58-61 [2]	7.5 [1]	No Data [0]	647 (198-1,115) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	27.6 [1]	No Data [0]	No Data [0]
199	07/03/12	22 (21-24) [719]	268-271 [2]	7.0 [1]	100 [1]	781-782 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
200	07/04/12	22 (21-23) [718]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
201	07/05/12	21 (21-22) [718]	215-241 [2]	7.3 [1]	No Data [0]	600-1,034 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
202	07/06/12	22 (20-22) [719]	247 (201-274) [3]	7.3-7.3 [2]	No Data [0]	557 (496-607) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	20.0 [1]	No Data [0]	No Data [0]
203	07/07/12	21 (21-22) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
204	07/08/12	21 (20-22) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
205	07/09/12	21 (21-22) [718]	205 [1]	No Data [0]	No Data [0]	435 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
206	07/10/12	22 (21-24) [719]	327-360 [2]	No Data [0]	No Data [0]	785-928 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	18.0 [1]	No Data [0]
207	07/11/12	23 (0-25) [717]	282-286 [2]	7.3 [1]	No Data [0]	839-866 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	20.2 [1]	No Data [0]	No Data [0]
208	07/12/12	23 (22-24) [719]	264-266 [2]	7.2 [1]	No Data [0]	700-767 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	19.4 [1]	No Data [0]	No Data [0]
209	07/13/12	23 (22-24) [719]	307-330 [2]	7.3 [1]	No Data [0]	850-1,002 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	20.6 [1]	No Data [0]	No Data [0]
210	07/14/12	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
211	07/15/12	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

[illegible]

3.1.1.3 Plot of Raw Water Quality Data by Field Methods

Figure 3.1- 1 shows the parameters listed below, for the duration of pilot operations from December 21, 2011 to August 3, 2012:

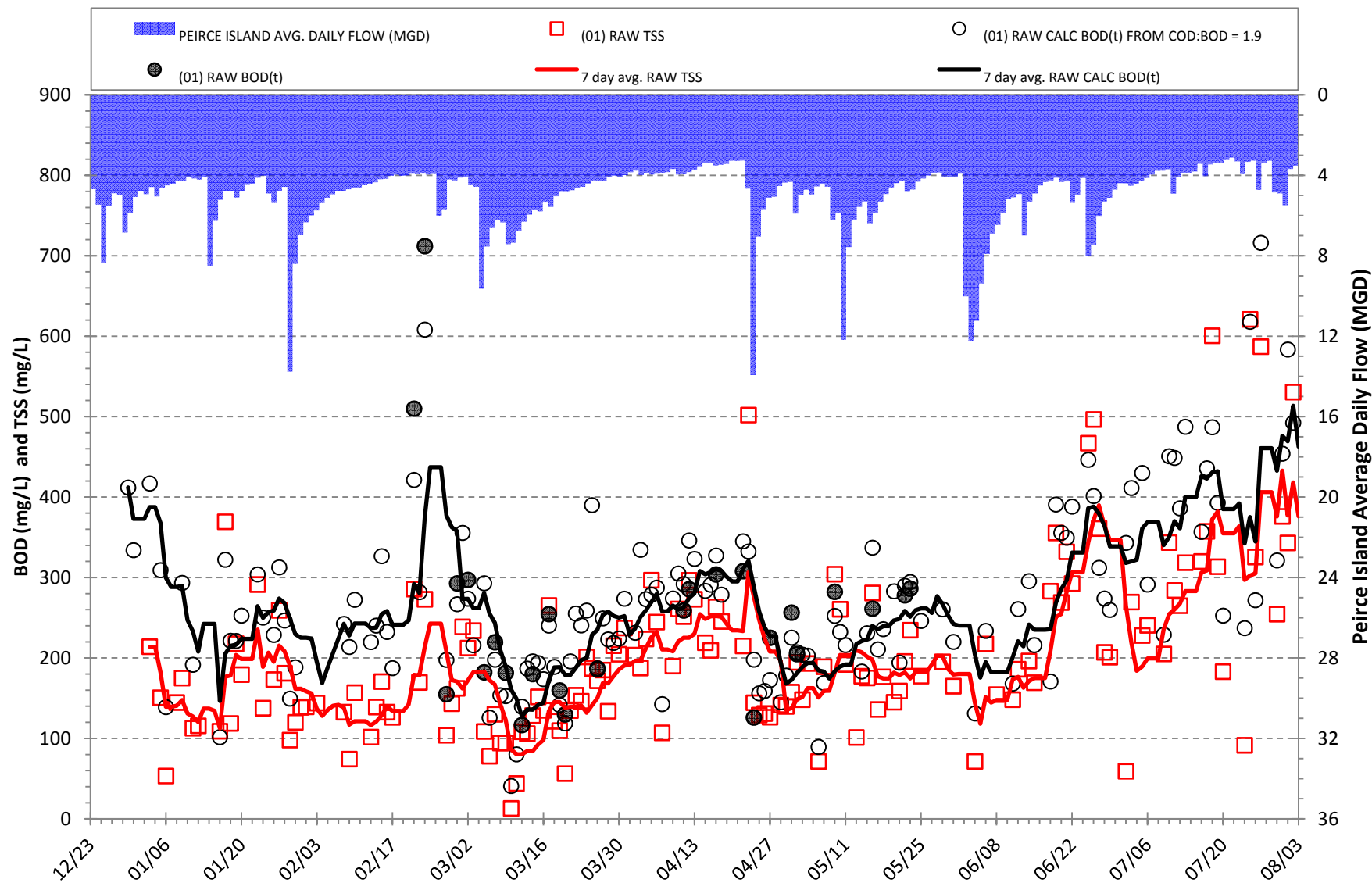
1. TSS data by Field Methods.
2. 5-day Total BOD data by Field Methods. Directly analyzed 5-day BOD(t) data covered approximately 3 months of the 8 month operations phase of the pilot study.
3. Calculated Total BOD data, calculated from Total COD data. The COD data were by Field Methods. COD data covered the entire 8-month operation of the pilot plant. The method of calculating BOD from COD is described in Section 3.4.
4. The 7-day moving average TSS, in order to indicate trending in TSS data.
5. The 7-day moving average BOD, in order to indicate trending in BOD data. This was based on the Calculated BOD data, not the directly analyzed BOD data.
6. The average daily flow for the Peirce Island WWTF from the Monthly Operating Report. The magnitude of flow is shown in reverse order on the right vertical axis.

5-day BOD(t) values ranged from 117 mg/L to 712 mg/L, with most of the data between approximately 100-300 mg/L.

Calculated BOD(t) values (from COD data) ranged from 41 mg/L to 716 mg/L, with most of the data ranging between approximately 100-500 mg/L.

TSS and BOD tended to increase with decreasing influent daily flows. The Peirce Island WWTF influent included storm flows. Sharp peaks in daily flows indicated rain events, which generally caused decreased TSS and BOD owing to greater dilution of sewage with storm water. Periods of steadily decreasing daily flows indicated dry weather, which generally caused increased BOD and TSS owing to lesser dilution.

Figure 3.1-01 Raw Water Quality Field Data for TSS and Total BOD



3.1.1.4 Statistics of Raw Water Quality Data

Table 3.1-02 summarizes the statistics of the raw water data, including the median, minimum-maximum, and number of samples (N). The mean and standard deviation are shown on the histograms.

Table 3.1-02: Raw Water Quality Statistics of Field Parameters

Parameter	Units	Median	Minimum	Maximum	N
pH	standard	7.24	6.08	7.80	128
Alkalinity (as CaCO ₃)	mg/L	153	100	180	28
TSS	mg/L	176	12	623	386
COD, total	mg/L	486	69	1444	312
COD, soluble	mg/L	221	181	265	4
BOD, total (5-day)	mg/L	252	96	730	89
BOD, total (calculated)	mg/L	256	37	760	312
NH ₃ -N	mg/L	20	6	28	21

3.1.1.5 Comparison of Raw Water 5-Day BODs to Calculated BODs

Direct analysis of BOD per Standard Methods required 5 days of incubation at 20°C, plus substantial time for preparation, dilutions, DO readings, bottle washing, etc. By comparison, CODs were analyzed in the field using disposable Hach kits, and required only 2 hours of digestion and 2 ml of sample. COD analysis allowed for multiple sets of same-day results, which was necessary during pilot operations. For that reason, COD analyses were preferred for daily field analyses.

There were 89 directly analyzed total BOD data by field methods for raw water samples, spanning approximately 3 months of the pilot study. By contrast, there were 312 total COD data by field methods for raw water samples, spanning the entire 8 months of active pilot operations. BOD is typically proportional to COD. The ratio of COD to BOD for raw water samples was determined to be approximately 1.9, as described in Section 3.4. BOD was calculated from COD as:

$$\text{Calculated BOD} = \text{COD} \div 1.9$$

There were 26 raw water samples that were analyzed in the field for both total BOD and total COD. Each of these 26 samples had both (1) a directly analyzed BOD value, and (2) a calculated BOD value based on COD. These 26 BOD data pairs were compared by a paired t-test using a 90% confidence level. The results are shown below. Directly analyzed BODs are identified as 5DAY BOD, and those calculated from CODs are identified as CALC BOD.

Differences were calculated as CALC BOD - 5DAY BOD.

Paired T-Test: CALC BOD versus 5DAY BOD (Raw Water Samples)

Paired T for CALC BOD - 5DAY BOD

	N	Mean	StDev	SE Mean
CALC BOD	26	258.4	103.9	20.4
5DAY BOD	26	255.9	123.5	24.2
Difference	26	2.51	48.54	9.52

90% CI for mean difference: (-13.75, 18.77)

T-Test of mean difference = 0 (vs not = 0): T-Value = 0.26 P-Value = 0.794

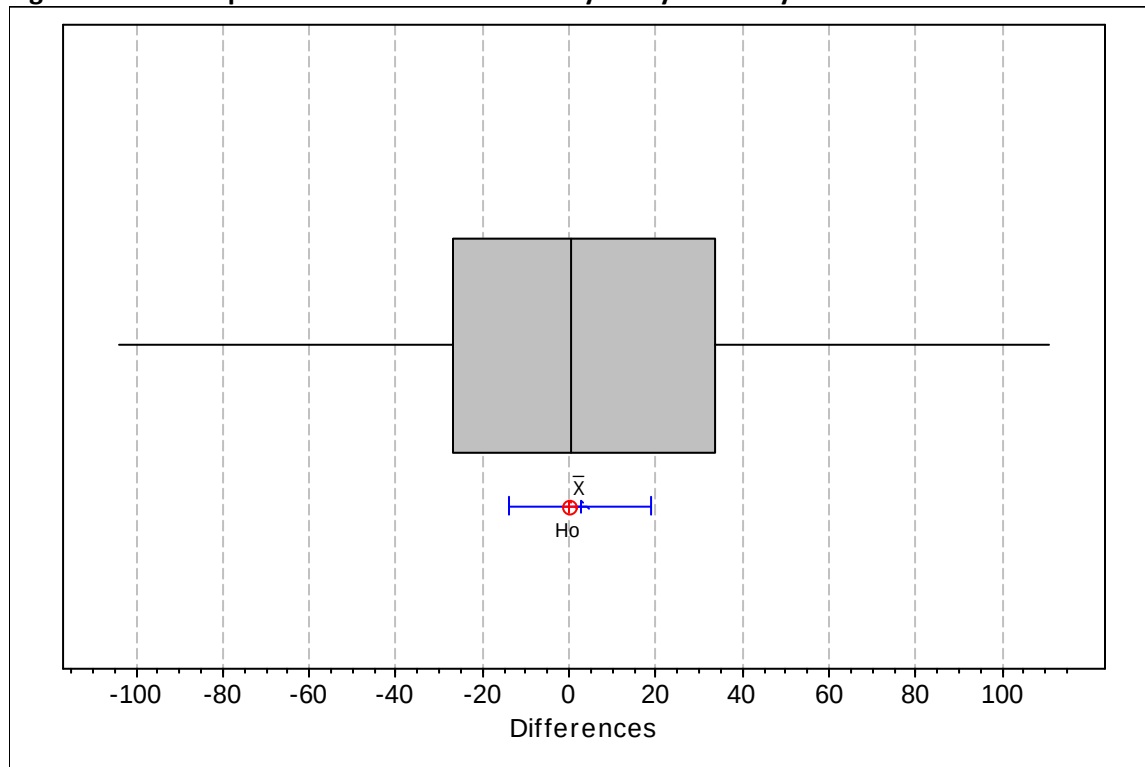
The null hypothesis (H_0) for the t-test was that the difference between the means of the two data sets (5DAY BOD and CALC BOD) were equal. Equivalently, the difference of the means would be zero ($\mu_d = 0$). For this to be true, the 90% confidence interval would have to include zero. The probability value (P-value) would be compared to an alpha of 10% ($\alpha=0.100$). Alpha represents the maximum acceptable probability for erroneously determining that the null hypothesis is false, when in fact it is true (a type I error). The value of alpha was selected to be 0.10 (10%). P would have to be greater than alpha in order to accept the null hypothesis that the means of the data sets were equal. In this case, P was greater than α ($0.794 > 0.100$). This indicates that the null hypothesis can be confidently accepted, i.e. the means of the two data sets were equal within a 90% confidence interval.

The mean of the differences was positive (+) 2.51, indicating that the CALC BOD values were typically greater than the 5DAY BOD values by 2.51 mg/L. The 90% confidence interval was -13.8 mg/L to +18.8 mg/L, therefore the confidence interval included zero.

The methods of data statistical analysis are more fully explained in Section 2.6 Statistical Methods.

A boxplot of the differences is shown in Figure 3.1-02. The mean and 90% C.I. are indicated by the blue bar, and the null hypothesis (H_0) is indicated by the red center mark. The value of zero is very near the mean of the distribution.

Figure 3.1-02: Boxplot of Differences for Directly Analyzed 5-Day BODs vs. Calculated BODs



3.1.1.6 Effects of Belt Filter Press Filtrate upon Raw Water Quality

Daily operational notes indicate the occurrence of “black water” in composite samples from the pilot primary clarifier as early as April 4, 2012. 24-hour composite samples were frequently observed to be dark grey or black, in contrast to grab samples that were typically yellowish to pale grey. Beginning in early June, occurrences of black water were frequently observed in the primary clarifier itself. Incidences of black water occurred suddenly. There was often a leading or trailing front to the black water, with a relatively distinct interface with the lighter colored water that was more typical.

The Peirce Island WWTF reported that the black water was likely caused by discharge of filtrate from the WWTF belt filter presses to the head of the plant. The point at which belt filter press filtrate discharged into the influent raw water stream was very near the point where the pilot plant grinder pump was installed. As a result, the belt filter press filtrate might have had an exaggerated effect upon influent to pilot plant, compared to the effect it had upon the full scale WWTF. However, the black water was also observed in the two WWTF full scale primary clarifiers, as well as the pilot scale primary clarifier.

3.1.2 Pilot Raw Water Quality Data vs. MOR Data for January-August 2012

Raw water data from the Pilot were compared to Monthly Operating Report (MOR) data for the period of January 2012 through July 2012.

The MOR data were from flow composite samples collected from the WWTF autosampler. The Pilot samples included both flow composite samples from the WWTF autosampler, and grab samples from the influent raw water channel.

Raw water TSS and total BOD were compared. The purpose was to determine whether the Blueleaf pilot field laboratory provided results similar to those of the MOR, on a monthly basis from the same raw water sample source.

Note that the data being compared here were not necessarily from split samples. The MOR data typically included 2 samples per week, normally collected from Tuesday morning through Wednesday morning, and from Wednesday morning through Thursday morning. The pilot data usually included 1 sample per day when the pilot was staffed, and there was sometimes more than one raw water sample analyzed per day.

Figure 3.1-03 shows boxplots for monthly TSS data by (1) Pilot field laboratory analyses, and (2) MOR analyses. The figure indicates that the pilot field laboratory typically obtained results similar to the MOR. There was generally substantial overlap of the 2nd to 3rd quartiles of the monthly data sets, with the exception of February. The overlap suggests that the TSS data collected during the pilot operation was roughly equivalent to the TSS data collected by the Peirce Island WWTF operators.

Figure 3.1-03: Comparison of Pilot Data to MOR Data Jan-Aug 2012, for Raw Water TSS

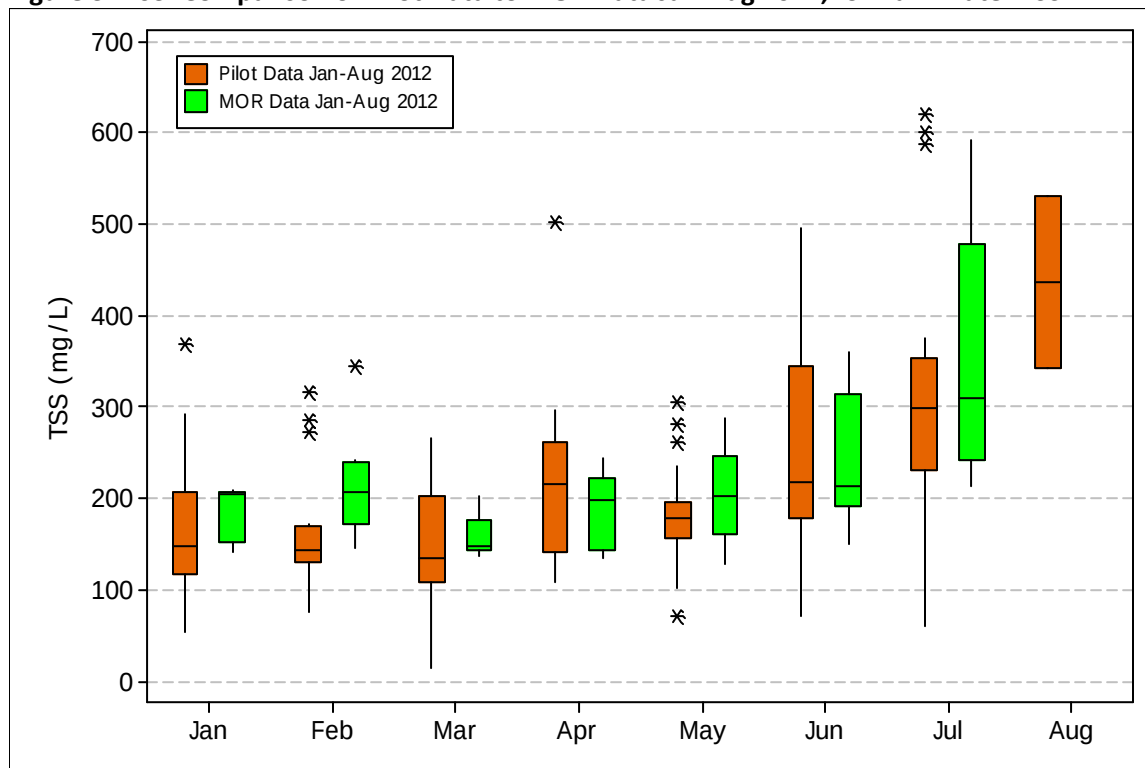
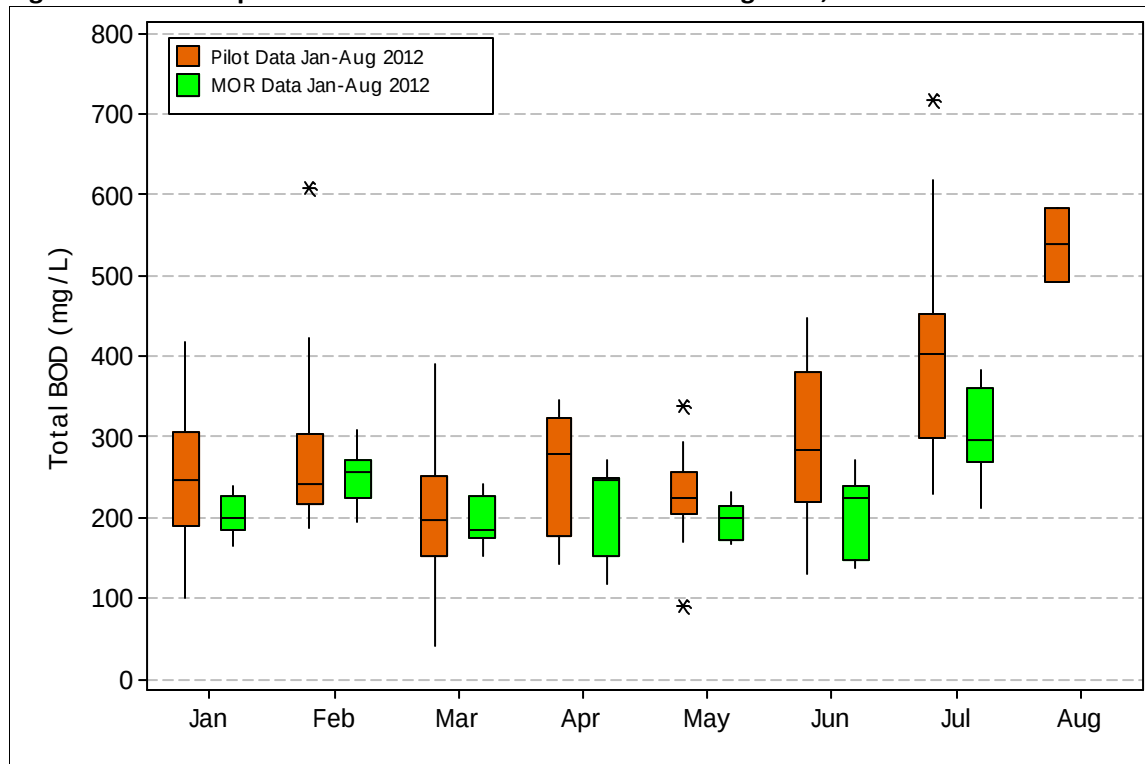


Figure 3.1-04 shows boxplots for monthly total BOD data by (1) Pilot field laboratory analyses, and (2) MOR analyses. The pilot data are BODs calculated from COD data. The figure indicates that the Pilot and the MOR had similar median BOD values from January through May, but the data appeared to diverge through June and July. The median BOD by pilot analyses was 61 mg/L greater than MOR analyses in June (285 mg/L vs. 224 mg/L), and 107 mg/L greater in July (402 mg/L vs. 295 mg/L).

Figure 3.1-04: Comparison of Pilot Data to MOR Data Jan-Aug 2012, for Raw Water Total BOD



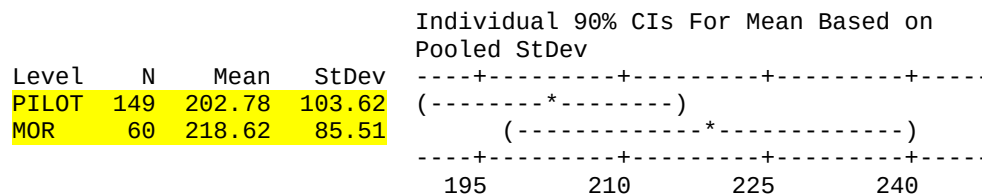
3.1.2.1 Statistical Comparison of Pilot and MOR Data for 2012

The TSS and total BOD data for the months of January 2012 through July 2012 were compared by an Analysis of Variance (ANOVA) with a 90% confidence interval (data from August 2012 were not included).

One-way ANOVA: RAW TSS versus SOURCE (PILOT or MOR)

Source	DF	SS	MS	F	P
SOURCE ID	1	10730	10730	1.10	0.296
Error	207	2020638	9762		
Total	208	2031368			

S = 98.80 R-Sq = 0.53% R-Sq(adj) = 0.05%



Pooled StDev = 98.80

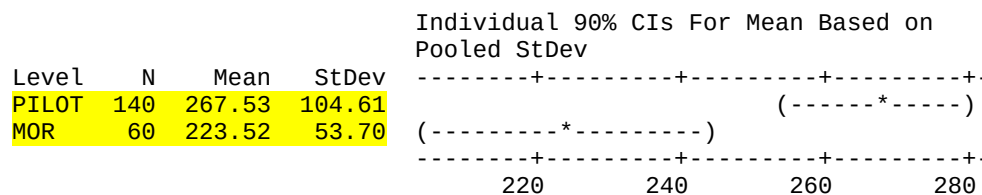
The results of the ANOVA for TSS are shown above. The probability value (P, highlighted) was 0.296. The P-value was compared to a criterion (α) of 10%, equal to the converse of the confidence interval (90%). Since $P > \alpha$ (29.6% > 10%) the two data sets were not significantly different within a 90% confidence interval.

The plot indicates that the 90% confidence intervals of the two data sets substantially overlapped, and the mean of the pilot data was within the 90% C.I. for the MOR data. The mean TSS of the MOR data was 219 mg/L, and the mean TSS of the Pilot data was 203 mg/L.

One-way ANOVA: RAW TOTAL BOD versus SOURCE (PILOT or MOR)

Source	DF	SS	MS	F	P
SOURCE ID	1	81345	81345	9.52	0.002
Error	198	1691165	8541		
Total	199	1772510			

S = 92.42 R-Sq = 4.59% R-Sq(adj) = 4.11%



Pooled StDev = 92.42

The results of the ANOVA for total BOD are shown above. P was 0.002, indicating only a 0.2% probability that the means of the two data sets were the same. Since $P < \alpha$ (0.2% < 10%) the two data sets were significantly different within a 90% confidence interval. The plot indicates that the 90% confidence intervals did not overlap.

The mean BOD of the MOR data was 224 mg/L, and the mean BOD of the Pilot data was 268 mg/L. The mean of the Pilot data was 44 mg/L greater than the mean of the MOR data.

The total BOD of the raw water was not an issue for compliance, but rather for field operations. It was necessary for the BOD field method to provide a good estimate for calculating loading and removal rates. Section 2.7.3.5 showed that the field method for BOD was satisfactory.

3.1.3 Comparison of MOR Raw Water Quality Data for 2012 vs. 2008-2011

TSS and Total BOD data were compared for 2012, versus the preceding 4 years of 2008-2011. Only data from the Monthly Operating Reports were used, to avoid bias from differences in analytical methods and results. The MOR data was grouped as follows:

1. Jan 2008 - Dec 2011, the 4-year period preceding pilot operations.
2. Jan 2012 - Jul 2012, the 7-month period coinciding with pilot operations.

Table 3.1-03 shows the monthly mean and sample count [N] for each period, 2012 versus 2008-2011. For each month, the difference in means was calculated as:

$$\Delta\text{TSS} = (\text{Mean TSS})_{2012} - (\text{Mean TSS})_{2008-2011}$$

$$\Delta\text{BOD} = (\text{Mean BOD})_{2012} - (\text{Mean BOD})_{2008-2011}$$

Table 3.1-03: MOR Raw Water Quality Data for 2012 vs. 2008-2011 for TSS and Total BOD

Month	TSS (mg/L)			Total BOD (mg/L)		
	2012 Mean [N]	2008-2011 Mean [N]	Difference ΔTSS	2012 Mean [N]	2008-2011 Mean [N]	Difference ΔBOD
Jan	183 [9]	170 [34]	13	205 [9]	181 [34]	24
Feb	217 [9]	177 [32]	40	251 [9]	155 [32]	97
Mar	159 [8]	121 [37]	38	194 [8]	105 [36]	88
Apr	189 [8]	135 [35]	54	217 [8]	126 [33]	92
May	206 [10]	191 [33]	15	196 [10]	184 [33]	12
Jun	237 [8]	193 [36]	44	205 [8]	201 [36]	3
Jul	349 [8]	207 [35]	142	303 [8]	201 [35]	102
Aug		212 [35]			210 [35]	
Sep		193 [36]			211 [36]	
Oct		191 [33]			189 [33]	
Nov		187 [35]			186 [34]	
Dec		173 [37]			161 [37]	

All of the differences were positive, indicating that the mean TSS and BOD(t) were greater in every month of 2012 versus the 2008-2011 period. Figure 3.1-05 shows boxplots of the TSS data. Figure 3.1-06 shows boxplots of the Total BOD data.

These results suggest that BOD and TSS loads were significantly greater during the period of the pilot study than they were in the 4 years before the pilot study.

Figure 3.1-05: Raw Water TSS for 2012 vs. 2008-2011 from MOR Data

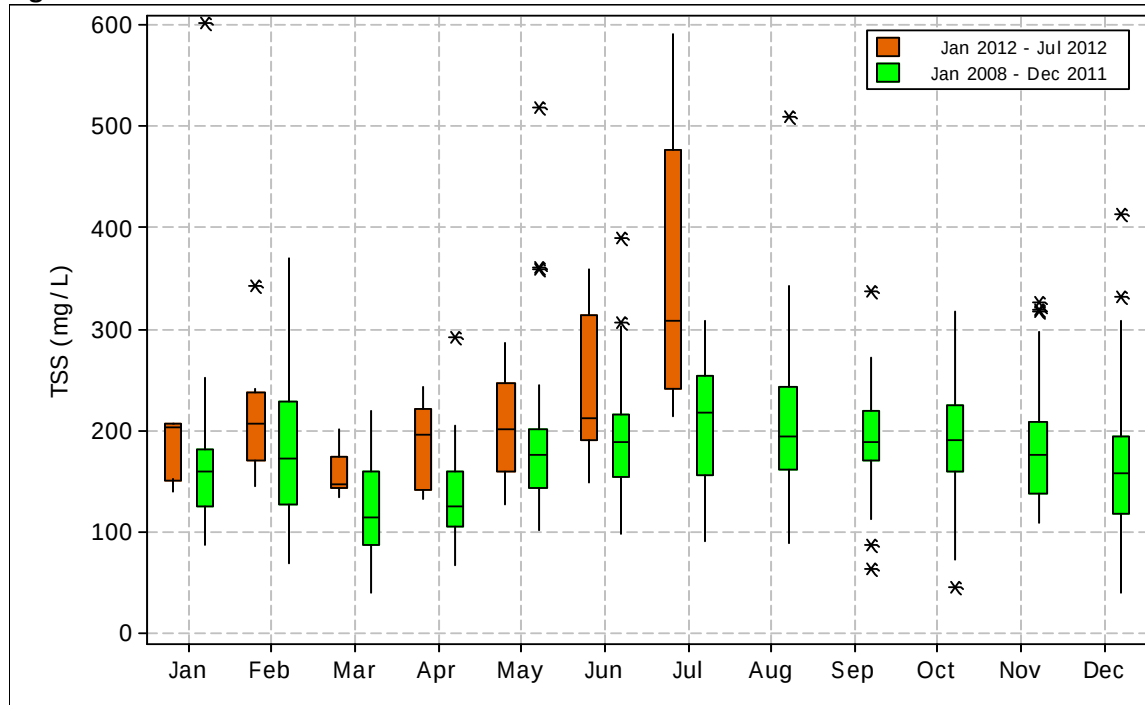
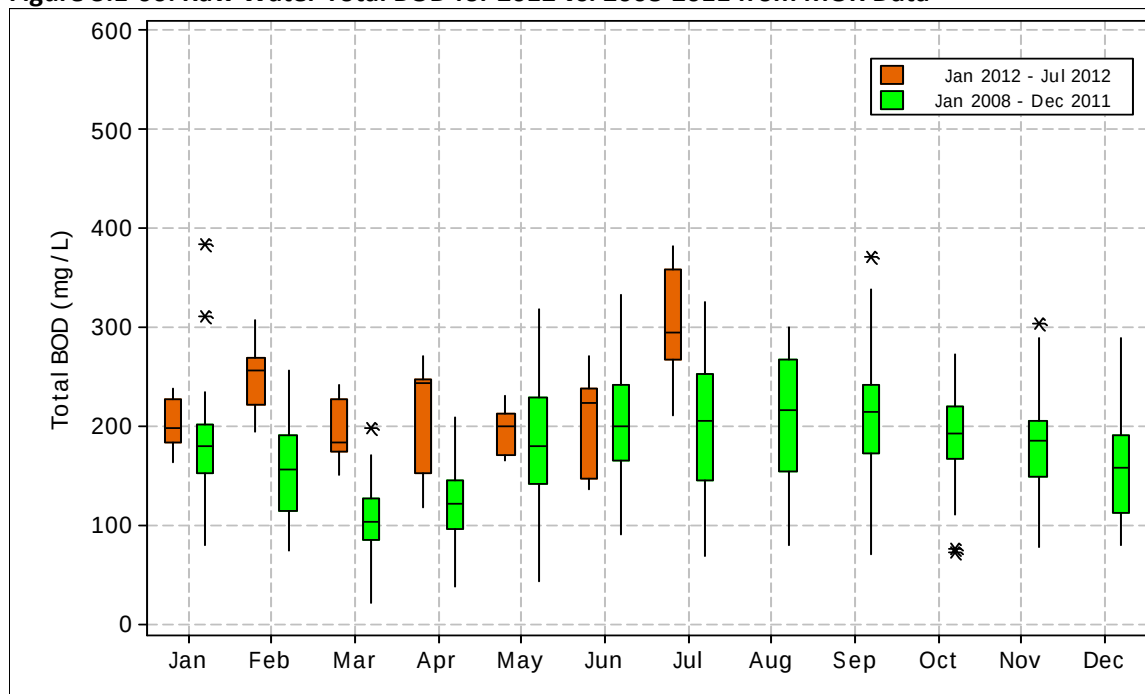


Figure 3.1-06: Raw Water Total BOD for 2012 vs. 2008-2011 from MOR Data



3.2 CHEMICAL FEED RATES FOR ALKALINITY ADJUSTMENT

Soda ash (sodium carbonate, Na_2CO_3) was added to the pilot primary effluent to increase the alkalinity for downstream secondary processes. Sufficient alkalinity was needed for full nitrification. Soda ash also increased the pH, but pH control was not the main objective since the primary effluent was usually near neutral.

At various times during the pilot study, either soda ash or lime were fed directly to individual secondary processes to increase alkalinity and pH, but this section covers only the primary effluent.

Soda ash was added to the primary clarifier effluent trough, immediately downstream of the v-notch weir, and upstream of the feed pumps for secondary processes. $\text{NH}_4\text{-OH}$ was also added to the primary effluent, to supplement the naturally occurring ammonia for high-ammonia testing. Ammonium hydroxide is caustic, and consequently it added hydroxide as well as ammonia. This was in addition to the carbonate added by soda ash. Both the hydroxide and carbonate increased pH and alkalinity.

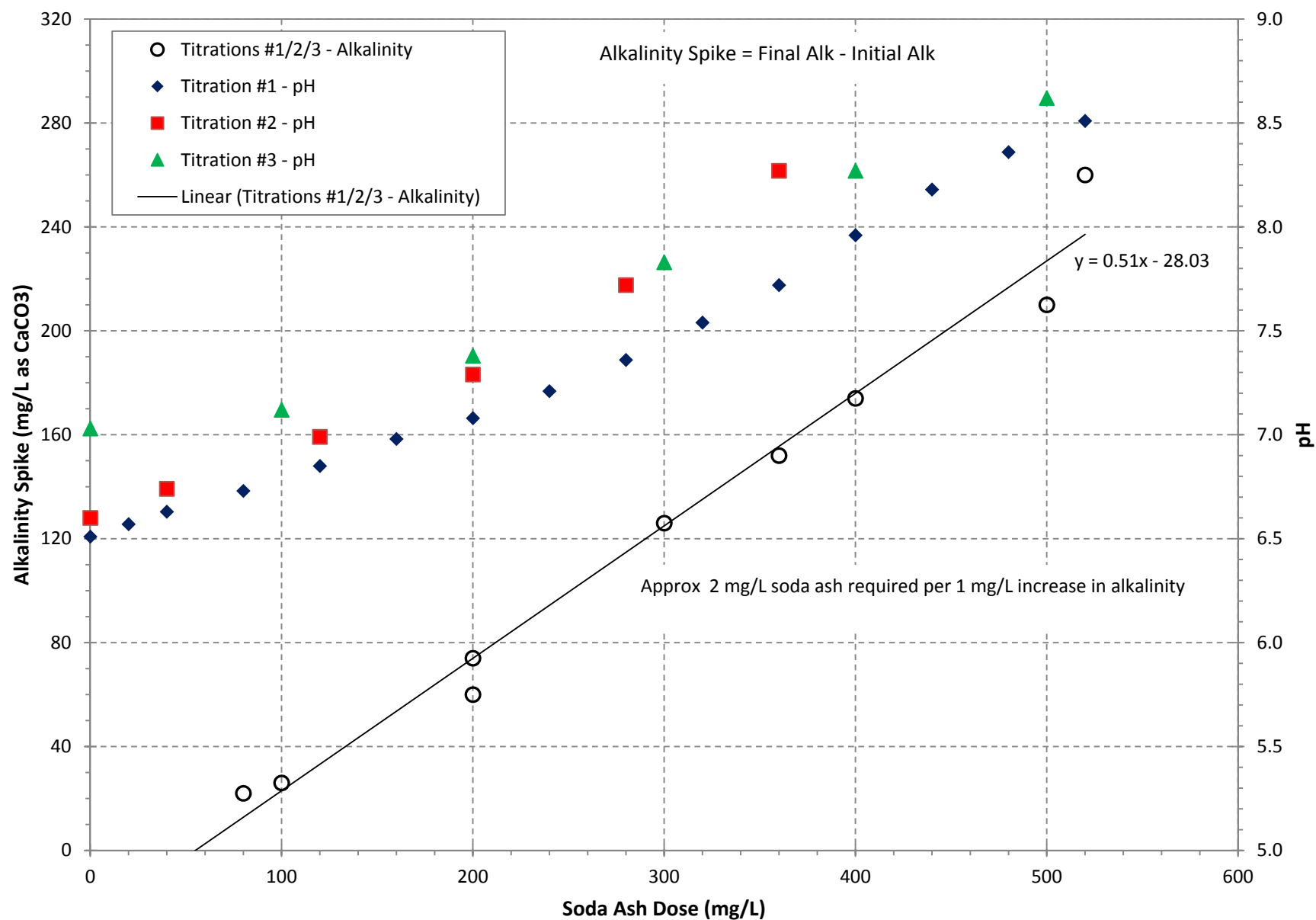
Because of the additive effect of soda ash and ammonium hydroxide, the pilot scale soda ash usage data could not be used to determine the relationship between soda ash dose and alkalinity. Instead, the relationship between soda ash dose and pH/alkalinity was determined by bench scale titrations, using primary effluent samples collected without addition of ammonium hydroxide.

Figure 3.2-1 shows results of three bench scale titrations of soda ash into primary effluent samples, performed to determine the approximate feed rates that would be required for pH and alkalinity control. The titrations were conducted on two different days, and the initial pH and alkalinity were slightly different on each day. The alkalinity “spike” was calculated as:

$$\text{Alkalinity Spike} = \text{Final Alkalinity} - \text{Initial Alkalinity}$$

A linear regression was performed on the alkalinity spike data. The slope of the regression line was 0.51, which indicated that 0.51 mg/L of alkalinity were added (as CaCO_3) for every 1 mg/L of soda ash. Conversely, approximately 2 mg/L of soda ash were needed per 1 mg/L of added alkalinity.

Figure 3.2-01 Soda Ash Titrations for Primary Effluent Alkalinity Control



3.3 PRIMARY CLARIFIER WATER QUALITY AND REMOVAL RATES

Primary clarifier effluent water data reviewed in this section were from both field and laboratory analyses. Data from Field versus Laboratory analyses were used for different purposes:

- Field methods were used to characterize primary effluent water quality. Primary effluent samples were typically collected and analyzed daily when the pilot plant was staffed, except during periods when no experiments or operations were ongoing.
- Laboratory methods were intended mainly to validate the field data. There were exceptions, when the number of analyses required during certain experiments made it difficult to perform all analyses in the field, in which case the laboratory data were used to characterize primary effluent water quality.

In general, the following sections use field data for water quality characterization, and laboratory data to compare and validate field data.

Removal rates were calculated based upon field data, by comparing primary effluent data to corresponding raw water quality data.

3.3.1 Primary Effluent Water Quality Data

There were two separate IDs for primary effluent samples:

02 PRIMARY EFF: These were collected from overflow of the v-notch weir into the effluent trough of the primary clarifier, prior to any chemical pretreatment.

03 PRIMARY EFF WITH SPIKE: These were collected after addition of soda ash, ammonia, or both.

Both grab samples and composite samples were collected. Grab samples were collected by hand from the appropriate location. Time-based composite samples were collected using an ISCO autosampler, typically 400 ml increments at 1 hour intervals, over 24 hours.

3.3.1.1 Field Data, Tabulated

Table 3.3-1 summarizes primary effluent water quality field data (02 PRIMARY EFF) for each day of operations for the pilot study, from 21 December 2011 through 3 August 2012. The table presents the data for each field parameter, for each day of field operations. The format for each entry is Median (minimum - maximum) [number of data]. The table indicates when there were no data collected for a given parameter on a particular day.

Line No.	Date	(02) PRIMARY CLARIFIER FLOW RATE (gpm)	(02) PRIMARY EFFLUENT SAMPLE ID	(02) PRIMARY EFFLUENT TSS (mg/L)	(02) PRIMARY EFFLUENT pH (SU)	(02) PRIMARY EFFLUENT Alkalinity (mg/L)	(02) PRIMARY EFFLUENT COD(t) (mg/L)	(02) PRIMARY EFFLUENT COD(s) (mg/L)	(02) PRIMARY EFFLUENT BOD(t) (mg/L)	(02) PRIMARY EFFLUENT BOD(s) (mg/L)	(02) PRIMARY EFFLUENT Nitrate (NO3-N) (mg/L)	(02) PRIMARY EFFLUENT Ammonia (NH3-N) (mg/L)	(02) PRIMARY EFFLUENT Total Nitrogen (mg/L) (TN)	(02) PRIMARY EFFLUENT NOx-N (mg/L)	(02) PRIMARY EFFLUENT TKN (mg/L)
4	12/21/11	38 (30-40) [164]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
5	12/22/11	38 (0-43) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
6	12/23/11	38 (36-41) [719]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
7	12/24/11	38 (35-40) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
8	12/25/11	37 (34-39) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
9	12/26/11	36 (33-38) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
10	12/27/11	36 (33-38) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
11	12/28/11	36 (0-39) [718]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
12	12/29/11	36 (33-39) [719]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
13	12/30/11	37 (0-40) [720]	2-2 [3]	No Data [0]	6.9-7.0 [2]	No Data [0]	493 (459-528) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
14	12/31/11	37 (34-40) [720]	4-4 [3]	No Data [0]	7.3-7.5 [2]	120 [1]	269 (243-360) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
15	01/01/12	35 (28-37) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
16	01/02/12	33 (29-37) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
17	01/03/12	31 (0-37) [720]	8-8 [3]	149 (68-182) [3]	No Data [0]	No Data [0]	731 (724-737) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
18	01/04/12	36 (0-39) [718]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
19	01/05/12	35 (0-37) [719]	14-14 [3]	161 (144-179) [3]	7.2 (7.0-7.3) [3]	163 [1]	365 (364-404) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
20	01/06/12	34 (32-36) [719]	21-21 [3]	106 (103-118) [3]	7.2 (7.2-7.4) [3]	128 [1]	323 (310-396) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
21	01/07/12	29 (20-37) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
22	01/08/12	23 (0-36) [346]	28 [1]	95 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
23	01/09/12	36 (33-37) [313]	28-32 [5]	172 (111-177) [5]	7.1 (6.8-7.2) [3]	170 [1]	509 (476-524) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
24	01/10/12	36 (34-39) [717]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
25	01/11/12	37 (0-38) [716]	41-41 [3]	117 (117-139) [3]	7.1 (6.7-7.3) [3]	200 [1]	459 (457-505) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
26	01/12/12	36 (30-38) [719]	41-47 [5]	178 (117-183) [5]	6.7-7.1 [2]	No Data [0]	459-505 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
27	01/13/12	37 (0-38) [719]	52-52 [2]	172-174 [2]	7.2-7.3 [2]	No Data [0]	306-413 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
28	01/14/12	37 (35-39) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
29	01/15/12	36 (34-37) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
30	01/16/12	35 (33-36) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
31	01/17/12	34 (0-35) [717]	137-137 [3]	122 (117-134) [3]	7.5 (7.2-7.8) [3]	No Data [0]	212 (209-213) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
32	01/18/12	34 (0-35) [718]	66-66 [3]	201 (199-205) [3]	7.1 (7.1-7.1) [3]	No Data [0]	466 (458-466) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
33	01/19/12	33 (31-34) [720]	73-73 [3]	198 (78-200) [3]	7.0 (6.8-7.0) [3]	No Data [0]	647 (647-660) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
34	01/20/12	34 (0-37) [720]	79-79 [3]	213 (198-219) [3]	No Data [0]	No Data [0]	452 (452-456) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
35	01/21/12	35 (32-37) [719]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
36	01/22/12	35 (32-36) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
37	01/23/12	34 (-25-71) [720]	87-87 [3]	159 (153-160) [3]	No Data [0]	No Data [0]	439-458 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
38	01/24/12	35 (0-37) [720]	107-107 [3]	179 (174-186) [3]	7.3 (7.2-7.3) [3]	No Data [0]	531 (525-539) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	26.4 (26.2-26.4) [3]	No Data [0]	No Data [0]	No Data [0]
39	01/25/12	35 (0-37) [716]	115-126 [6]	153 (135-171) [6]	No Data [0]	No Data [0]	657 (493-700) [3]	288 (286-297) [3]	No Data [0]	No Data [0]	No Data [0]	13.0 (12.9-13.1) [3]	No Data [0]	No Data [0]	No Data [0]
40	01/26/12	35 (33-36) [720]	129-129 [3]	125 (122-127) [3]	7.0 (7.0-7.1) [3]	No Data [0]	378-379 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	16.1 (15.9-16.1) [3]	No Data [0]	No Data [0]	No Data [0]
41	01/27/12	35 (0-37) [720]	142-142 [3]	90 (66-103) [3]	7.3 (6.9-7.3) [3]	No Data [0]	204-208 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	6.5 (6.5-6.5) [3]	No Data [0]	No Data [0]	No Data [0]
42	01/28/12	32 (30-35) [719]	150-150 [3]	90 (80-101) [3]	No Data [0]	No Data [0]	162-176 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
43	01/29/12	29 (27-31) [720]	156-156 [3]	69 (66-72) [3]	No Data [0]	No Data [0]	223-226 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
44	01/30/12	27 (26-29) [720]	161-161 [3]	129 (123-132) [3]	No Data [0]	No Data [0]	397 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	12.5-12.6 [2]	No Data [0]	No Data [0]	No Data [0]
45	01/31/12	27 (0-46) [718]	168-168 [3]	87 (79-95) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	11.5-11.7 [2]	No Data [0]	No Data [0]	No Data [0]
46	02/01/12	33 (31-35) [718]	178-178 [4]	135 (133-137) [3]	7.1 (7.0-7.2) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	12.9 (10.7-13.3) [4]	No Data [0]	No Data [0]	No Data [0]
47	02/02/12	32 (28-34) [719]	186-186 [3]	132 (128-136) [3]	No Data [0]	No Data [0]	152 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
48	02/03/12	32 (30-33) [720]	194-194 [4]	143 (143-151) [3]	No Data [0]	No Data [0]	338-371 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	13.0 (11.7-14.1) [4]	No Data [0]	No Data [0]	No Data [0]
49	02/04/12	32 (29-33) [720]	204-204 [3]	75 (65-89) [3]	No Data [0]	No Data [0]	276 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
50	02/05/12	32 (29-33) [720]	209-209 [3]	82 (72-89) [3]	No Data [0]	No Data [0]	340 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
51	02/06/12	35 (31-36) [719]	223 [1]	No Data [0]	No Data [0]	No Data [0]	406 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
52	02/07/12	36 (33-37) [720]	225-225 [4]	65 (62-66) [3]	No Data [0]	No Data [0]	320-334 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	10.4 (9.3-11.5) [4]	No Data [0]	No Data [0]	No Data [0]
53	02/08/12	36 (35-37) [718]	235-235 [3]	138 (138-149) [3]	7.2 (7.1-7.4) [3]	No Data [0]	434-441 [2]	No Data [0]	270-273 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
54	02/09/12	35 (32-37) [720]	243-243 [3]	109 (89-116) [3]	No Data [0]	No Data [0]	413-437 [2]	No Data [0]	210-215 [2]	No Data [0]	No Data [0]	16.2 (15.4-16.3) [3]	No Data [0]	No Data [0]	No Data [0]
55	02/10/12	35 (33-36) [719]	260-260 [3]	103 (93-118) [3]	6.9 (6.7-7.0) [3]	No Data [0]	412-418 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

Line No.	Date	(02) PRIMARY CLARIFIER FLOW RATE (gpm)	(02) PRIMARY EFFLUENT SAMPLE ID	(02) PRIMARY EFFLUENT TSS (mg/L)	(02) PRIMARY EFFLUENT pH (SU)	(02) PRIMARY EFFLUENT Alkalinity (mg/L)	(02) PRIMARY EFFLUENT COD(t) (mg/L)	(02) PRIMARY EFFLUENT COD(s) (mg/L)	(02) PRIMARY EFFLUENT BOD(t) (mg/L)	(02) PRIMARY EFFLUENT BOD(s) (mg/L)	(02) PRIMARY EFFLUENT Nitrate (NO3-N) (mg/L)	(02) PRIMARY EFFLUENT Ammonia (NH3-N) (mg/L)	(02) PRIMARY EFFLUENT Nitrogen (mg/L) (TN)	(02) PRIMARY EFFLUENT NOx-N (mg/L)	(02) PRIMARY EFFLUENT TKN (mg/L)
108	04/03/12	44 (40-81) [719]	705-705 [3]	166 (160-171) [3]	No Data [0]	No Data [0]	580-665 [2]	301-330 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
109	04/04/12	43 (37-83) [718]	709-715 [6]	169 (142-217) [6]	6.6-6.9 [2]	150-160 [2]	593 (583-612) [4]	293 (256-329) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
110	04/05/12	43 (38-84) [720]	723-723 [3]	199 (196-203) [3]	No Data [0]	No Data [0]	512-551 [2]	273-284 [2]	No Data [0]	No Data [0]	0.2-0.2 [2]	20.7-20.8 [2]	No Data [0]	No Data [0]	No Data [0]
111	04/06/12	39 (0-82) [708]	732-732 [3]	186 (175-198) [3]	No Data [0]	No Data [0]	510-546 [2]	252-257 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
112	04/07/12	39 (33-42) [720]	739-739 [3]	167 (165-169) [3]	No Data [0]	No Data [0]	466-468 [2]	266-266 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
113	04/08/12	40 (37-42) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
114	04/09/12	40 (36-79) [720]	745-745 [2]	225-251 [2]	6.9 [1]	160 [1]	529-537 [2]	292-293 [2]	No Data [0]	No Data [0]	0.1-0.1 [2]	18.7-18.8 [2]	No Data [0]	No Data [0]	No Data [0]
115	04/10/12	41 (37-81) [720]	754-754 [2]	213-237 [2]	No Data [0]	No Data [0]	587-603 [2]	349-353 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
116	04/11/12	37 (34-39) [715]	764-764 [3]	174-187 [2]	No Data [0]	No Data [0]	527-534 [2]	320-336 [2]	235 (230-243) [3]	146 (143-146) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
117	04/12/12	37 (34-83) [719]	773-773 [3]	211-225 [2]	No Data [0]	No Data [0]	626-704 [2]	No Data [0]	277 (259-291) [3]	156 (150-177) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
118	04/13/12	41 (35-42) [720]	786-786 [2]	280-300 [2]	No Data [0]	No Data [0]	778-785 [2]	325-327 [2]	No Data [0]	No Data [0]	0.1-0.8 [2]	28.9-30.3 [2]	40.4 [1]	0.6 [1]	39.8 [1]
119	04/14/12	40 (37-42) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
120	04/15/12	39 (36-41) [720]	794-794 [2]	144-148 [2]	No Data [0]	No Data [0]	481-572 [2]	233-234 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
121	04/16/12	40 (32-81) [720]	801-801 [2]	151-168 [2]	No Data [0]	No Data [0]	425-427 [2]	193-197 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
122	04/17/12	40 (36-74) [720]	808-808 [3]	178-185 [2]	6.8 [1]	No Data [0]	558-561 [2]	279-280 [2]	290 (284-292) [3]	159 (153-161) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
123	04/18/12	41 (36-43) [718]	817-817 [2]	193-193 [2]	No Data [0]	No Data [0]	571-587 [2]	277-278 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	34.5-34.6 [2]	0.4-0.5 [2]	34.1-34.1 [2]
124	04/19/12	39 (35-75) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
125	04/20/12	43 (35-83) [719]	825-825 [2]	No Data [0]	No Data [0]	210 [1]	607-622 [2]	No Data [0]	No Data [0]	No Data [0]	0.8 [1]	33.9-34.5 [2]	37.8 [1]	0.7 [1]	37.0 [1]
126	04/21/12	40 (36-42) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
127	04/22/12	39 (5-41) [720]	830-830 [3]	157-174 [2]	7.4 [1]	178 [1]	544-579 [2]	185-276 [2]	246 (244-269) [3]	96 [1]	0.2-0.2 [2]	No Data [0]	25.6-33.1 [2]	0.2-0.4 [2]	25.4-32.7 [2]
128	04/23/12	30 (10-76) [715]	839-839 [2]	164-172 [2]	7.4 [1]	96 [1]	354-359 [2]	124-127 [2]	No Data [0]	No Data [0]	No Data [0]	12.1-12.6 [2]	19.1 [1]	0.5 [1]	18.5 [1]
129	04/24/12	39 (27-74) [718]	847-847 [2]	90-103 [2]	7.6 [1]	94 [1]	206-220 [2]	91-92 [2]	98 [1]	No Data [0]	No Data [0]	6.0 [1]	6.7-10.9 [2]	0.2-0.2 [2]	6.5-10.8 [2]
130	04/25/12	38 (32-68) [718]	857-857 [2]	123-126 [2]	No Data [0]	No Data [0]	343-345 [2]	163-165 [2]	No Data [0]	No Data [0]	No Data [0]	11.3 [1]	14.6 [1]	0.3 [1]	14.3 [1]
131	04/26/12	42 (31-63) [720]	865-865 [2]	118-120 [2]	No Data [0]	No Data [0]	329-338 [2]	152-153 [2]	No Data [0]	No Data [0]	No Data [0]	13.2 [1]	20.8 [1]	0.3 [1]	20.4 [1]
132	04/27/12	42 (35-67) [720]	872-872 [2]	108-114 [2]	7.1 [1]	144 [1]	333-340 [2]	170-177 [2]	180-187 [2]	88-91 [2]	No Data [0]	14.8 [1]	22.0 [1]	0.0 [1]	21.4 [1]
133	04/28/12	38 (33-41) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
134	04/29/12	40 (33-61) [720]	882-882 [2]	104-107 [2]	No Data [0]	No Data [0]	323-323 [2]	154-157 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
135	04/30/12	43 (37-75) [720]	889-889 [3]	99-101 [2]	6.9 [1]	140 [1]	320-330 [2]	148-150 [2]	166 (161-179) [3]	49 [1]	0.6 [1]	17.7 [1]	22.1 [1]	0.3 [1]	21.8 [1]
136	05/01/12	40 (33-43) [720]	899-899 [3]	126-130 [2]	7.0 [1]	138 [1]	420-438 [2]	221-222 [2]	217 (207-227) [3]	112-119 [2]	No Data [0]	17.4 [1]	24.7 [1]	0.4 [1]	24.3 [1]
137	05/02/12	39 (36-72) [717]	912-912 [2]	112-112 [2]	7.1 [1]	116 [1]	305-309 [2]	144-145 [2]	164-169 [2]	72-75 [2]	No Data [0]	12.9 [1]	19.3 [1]	0.5 [1]	18.8 [1]
138	05/03/12	44 (40-46) [720]	924-924 [2]	121-122 [2]	7.3 [1]	152 [1]	387-393 [2]	214-215 [2]	No Data [0]	No Data [0]	No Data [0]	18.0 [1]	22.4 [1]	0.5 [1]	21.9 [1]
139	05/04/12	44 (39-72) [719]	934-934 [2]	308-314 [2]	7.1 [1]	190 [1]	854-882 [2]	336-339 [2]	No Data [0]	No Data [0]	No Data [0]	26.9 [1]	39.6 [1]	0.7 [1]	39.0 [1]
140	05/05/12	46 (42-48) [719]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
141	05/06/12	50 (39-74) [720]	942-942 [2]	113-117 [2]	7.4 [1]	No Data [0]	210-211 [2]	118-120 [2]	No Data [0]	No Data [0]	No Data [0]	19.6 [1]	18.8 [1]	0.3 [1]	18.5 [1]
142	05/07/12	44 (38-78) [720]	950-950 [2]	141-147 [2]	7.2 [1]	143 [1]	330-342 [2]	121-122 [2]	No Data [0]	No Data [0]	No Data [0]	17.3 [1]	20.9 [1]	0.4 [1]	20.5 [1]
143	05/08/12	43 (1-79) [714]	961-961 [3]	193-196 [2]	7.4 [1]	164 [1]	433-437 [2]	185-187 [2]	269 (264-270) [3]	127 (125-143) [3]	No Data [0]	21.1 [1]	27.7 [1]	0.5 [1]	27.2 [1]
144	05/09/12	41 (3-95) [718]	973-973 [3]	174-189 [2]	7.3 [1]	140 [1]	469-470 [2]	217-219 [2]	234 (228-267) [3]	117 (113-126) [3]	No Data [0]	17.2 [1]	23.2 [1]	0.5 [1]	22.7 [1]
145	05/10/12	37 (1-65) [709]	986-986 [2]	158-170 [2]	7.1 [1]	136 [1]	391-406 [2]	176-188 [2]	No Data [0]	No Data [0]	No Data [0]	16.5 [1]	12.3 [1]	0.3 [1]	12.0 [1]
146	05/11/12	36 (31-75) [720]	998-998 [2]	100-108 [2]	7.0 [1]	108 [1]	181-189 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	5.5 [1]	1.0 [1]	0.1 [1]	0.9 [1]
147	05/12/12	29 (26-33) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
148	05/13/12	36 (26-76) [720]	1,008-1,008 [2]	87-94 [2]	No Data [0]	No Data [0]	259-264 [2]	107-111 [2]	No Data [0]	No Data [0]	No Data [0]	12.5 [1]	12.3 [1]	0.3 [1]	12.0 [1]
149	05/14/12	36 (28-75) [720]	1,017-1,017 [2]	78-96 [2]	7.3 [1]	140 [1]	267-276 [2]	118-118 [2]	No Data [0]	No Data [0]	No Data [0]	13.2 [1]	20.2 [1]	0.3 [1]	19.9 [1]
150	05/15/12	42 (31-74) [719]	1,029-1,029 [2]	110-117 [2]	7.0 [1]	150 [1]	370-376 [2]	195-206 [2]	No Data [0]	No Data [0]	No Data [0]	17.7 [1]	22.6 [1]	0.3 [1]	22.2 [1]
151	05/16/12	41 (38-83) [718]	1,045-1,045 [3]	153-157 [2]	7.7 [1]	142 [1]	394-397 [2]	177-178 [2]	196 (193-221) [3]	90 (89-91) [3]	No Data [0]	17.2 [1]	13.7 [1]	0.4 [1]	13.3 [1]
152	05/17/12	42 (34-85) [720]	1,059-1,059 [3]	118-120 [2]	7.4 [1]	154 [1]	356-389 [2]	185-189 [2]	No Data [0]	No Data [0]	No Data [0]	15.9 [1]	23.5 [1]	0.4 [1]	23.0 [1]
153	05/18/12	42 (38-44) [720]	1,073-1,073 [3]	138 [1]	7.2 [1]	152 [1]	328-346 [2]	148-150 [2]	131 (131-140) [3]	No Data [0]	No Data [0]	17.6 [1]	10.1 [1]	0.4 [1]	9.6 [1]
154	05/19/12	40 (38-42) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
155	05/20/12	40 (37-80) [720]	1,088-1,088 [2]	122-137 [2]	7.3 [1]	No Data [0]	316-317 [2]	140-143 [2]	No Data [0]	No Data [0]	No Data [0]	19.9 [1]	24.4 [1]	0.4 [1]	24.0 [1]
156	05/21/12	39 (30-80) [718]	1,103-1,103 [3]	118-130 [2]	7.2 [1]	160 [1]	337-341 [2]	153-155 [2]	152 (151-153) [3]	74 (72-90) [3]	No Data [0]	19.8 [1]	7.6 [1]	0.3 [1]	7.3 [1]
157	05/22/12	40 (15-46) [719]	1,120-1,120 [3]	180-182 [2]	7.3 [1]	184 [1]	584-615 [2]	316-320 [2]	349 (340-355) [3]	172 (161-180) [3]	No Data [0]	26.9 [1]	33.8 [1]	0.6 [1]	33.2 [1]
158	05/23/12	41 (0-79) [713]	1,134-1,134 [3]	164-176 [2]	7.1 [1]	180 [1]	490-497 [2]	240-242 [2]	248 (247-311) [3]	136 (129-141) [3]	No Data [0]	20.4 [1]	No Data [0]	No Data [0]	No Data [0]
159	05/24/12	42 (0-90) [603]	1,149-1,149 [3]	108-131 [2]	No Data [0]	No Data [0]	373-379 [2]	191-202 [2]	194 (175-202) [3]	94 (92-96) [3]	No Data [0]	19.2 [1]	32.4 [1]	0.3 [1]	32.1 [1]

Line No.	Date	(02) PRIMARY CLARIFIER FLOW RATE (gpm)	(02) PRIMARY EFFLUENT SAMPLE ID	(02) PRIMARY EFFLUENT TSS (mg/L)	(02) PRIMARY EFFLUENT pH (SU)	(02) PRIMARY EFFLUENT Alkalinity (mg/L)	(02) PRIMARY EFFLUENT COD(t) (mg/L)	(02) PRIMARY EFFLUENT COD(s) (mg/L)	(02) PRIMARY EFFLUENT BOD(t) (mg/L)	(02) PRIMARY EFFLUENT BOD(s) (mg/L)	(02) PRIMARY EFFLUENT Nitrate (NO3-N) (mg/L)	(02) PRIMARY EFFLUENT Ammonia (NH3-N) (mg/L)	(02) PRIMARY EFFLUENT Nitrogen (mg/L) (TN)	(02) PRIMARY EFFLUENT NOx-N (mg/L)	(02) PRIMARY EFFLUENT TKN (mg/L)
160	05/25/12	40 (36-86) [719]	1,165-1,165 [2]	204-205 [2]	7.5 [1]	182 [1]	460-548 [2]	168-170 [2]	No Data [0]	No Data [0]	No Data [0]	18.0 [1]	23.4 [1]	0.6 [1]	22.8 [1]
161	05/26/12	44 (41-46) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
162	05/27/12	56 (43-58) [720]	1,170-1,170 [2]	No Data [0]	No Data [0]	No Data [0]	221-241 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	15.3 [1]	No Data [0]	No Data [0]	No Data [0]
163	05/28/12	41 (38-59) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
164	05/29/12	41 (36-94) [720]	1,173-1,173 [2]	131-156 [2]	7.5 [1]	172 [1]	371-373 [2]	146-151 [2]	No Data [0]	No Data [0]	No Data [0]	19.7 [1]	19.8 [1]	0.5 [1]	19.3 [1]
165	05/30/12	43 (39-98) [718]	1,187-1,187 [2]	193-202 [2]	7.2 [1]	216 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	31.4 [1]	11.6 [1]	0.6 [1]	11.0 [1]
166	05/31/12	41 (37-86) [719]	1,201-1,240 [6]	149 (124-161) [4]	7.0 [1]	176 [1]	626 (606-802) [6]	399-401 [2]	No Data [0]	No Data [0]	No Data [0]	18.7 [1]	12.0 [1]	0.5 [1]	11.5 [1]
167	06/01/12	44 (23-80) [719]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
168	06/02/12	23 (2-50) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
169	06/03/12	26 (2-88) [656]	1,246-1,246 [2]	No Data [0]	No Data [0]	No Data [0]	127-130 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	14.4 [1]	1.4 [1]	13.0 [1]
170	06/04/12	42 (0-84) [653]	1,256-1,256 [2]	46-54 [2]	7.2 [1]	98 [1]	129-147 [2]	87-89 [2]	No Data [0]	No Data [0]	No Data [0]	5.1 [1]	4.1 [1]	0.3 [1]	3.8 [1]
171	06/05/12	44 (18-86) [719]	1,296-1,310 [4]	No Data [0]	No Data [0]	No Data [0]	309-320 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
172	06/06/12	44 (41-82) [718]	1,318-1,318 [2]	93-94 [2]	7.2 [1]	120 [1]	249-291 [2]	129-131 [2]	No Data [0]	No Data [0]	No Data [0]	8.0 [1]	6.2 [1]	0.2 [1]	6.0 [1]
173	06/07/12	43 (40-83) [720]	1,348-1,348 [2]	No Data [0]	No Data [0]	No Data [0]	353-375 [2]	194-196 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	24.8 [1]	0.2 [1]	25.6 [1]
174	06/08/12	43 (40-86) [720]	1,354-1,354 [2]	93-93 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
175	06/09/12	11 (2-84) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
176	06/10/12	50 (48-83) [720]	1,362-1,362 [2]	No Data [0]	No Data [0]	No Data [0]	238-258 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	16.8 [1]	No Data [0]	No Data [0]	No Data [0]
177	06/11/12	52 (0-87) [692]	1,368-1,368 [2]	80-85 [2]	7.5 [1]	150 [1]	244-262 [2]	128-137 [2]	No Data [0]	No Data [0]	No Data [0]	13.0 [1]	No Data [0]	No Data [0]	No Data [0]
178	06/12/12	51 (45-88) [719]	1,378-1,378 [2]	104-106 [2]	7.4 [1]	166 [1]	346-364 [2]	185-188 [2]	No Data [0]	No Data [0]	No Data [0]	15.8 [1]	20.2 [1]	0.3 [1]	20.0 [1]
179	06/13/12	47 (6-50) [717]	1,414-1,415 [4]	No Data [0]	No Data [0]	No Data [0]	475-521 [2]	250-251 [2]	No Data [0]	No Data [0]	0.3 [1]	20.0 [1]	25.2 [1]	0.3 [1]	24.9 [1]
180	06/14/12	41 (22-49) [720]	1,421-1,456 [4]	83-85 [2]	7.1 [1]	126 [1]	349 (251-443) [4]	142-143 [2]	No Data [0]	No Data [0]	0.3 [1]	11.6 [1]	16.1 [1]	0.2 [1]	16.0 [1]
181	06/15/12	40 (36-87) [719]	1,472-1,472 [2]	87-97 [2]	7.4 [1]	No Data [0]	338-347 [2]	181-183 [2]	No Data [0]	No Data [0]	0.5 [1]	12.3 [1]	17.0 [1]	0.2 [1]	16.9 [1]
182	06/16/12	42 (39-46) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
183	06/17/12	43 (38-84) [720]	1,481-1,481 [2]	98-99 [2]	No Data [0]	No Data [0]	328-332 [2]	157-159 [2]	No Data [0]	No Data [0]	No Data [0]	14.6 [1]	23.8 [1]	0.3 [1]	23.5 [1]
184	06/18/12	44 (40-83) [719]	1,490-1,495 [4]	91-102 [2]	6.8-7.4 [2]	154-159 [2]	209 (106-306) [4]	151-152 [2]	No Data [0]	No Data [0]	0.1-0.3 [2]	5.7-19.0 [2]	20.7 [1]	0.3 [1]	20.5 [1]
185	06/19/12	43 (7-82) [719]	1,509-1,509 [2]	124-133 [2]	7.2 [1]	166 [1]	460-461 [2]	258-260 [2]	No Data [0]	No Data [0]	0.3 [1]	18.1 [1]	18.9 [1]	0.3 [1]	18.6 [1]
186	06/20/12	37 (33-40) [718]	1,521-1,521 [2]	115-126 [2]	7.2 [1]	166 [1]	400-410 [2]	212-215 [2]	No Data [0]	No Data [0]	0.3 [1]	25.3 [1]	13.5 [1]	0.3 [1]	13.3 [1]
187	06/21/12	36 (35-40) [719]	1,546-1,561 [4]	111-127 [2]	7.2 [1]	166 [1]	399 (391-411) [4]	215-219 [2]	No Data [0]	No Data [0]	0.4 [1]	19.9 [1]	15.3 [1]	0.3 [1]	15.0 [1]
188	06/22/12	37 (9-81) [719]	1,572-1,572 [2]	125-146 [2]	7.3 [1]	170 [1]	367-377 [2]	189-189 [2]	No Data [0]	No Data [0]	0.2 [1]	19.8 [1]	No Data [0]	No Data [0]	No Data [0]
189	06/23/12	42 (21-51) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
190	06/24/12	33 (24-91) [720]	1,585-1,592 [3]	105-107 [2]	No Data [0]	No Data [0]	347-347 [2]	250-262 [2]	No Data [0]	No Data [0]	No Data [0]	23.4-23.4 [2]	25.5 [1]	0.5 [1]	25.0 [1]
191	06/25/12	34 (3-84) [717]	1,602-1,602 [2]	117-119 [2]	7.8 [1]	190 [1]	373-385 [2]	No Data [0]	No Data [0]	No Data [0]	0.2 [1]	19.5 [1]	No Data [0]	No Data [0]	No Data [0]
192	06/26/12	36 (31-76) [720]	1,608-1,625 [4]	144-146 [2]	7.0-7.4 [2]	155-158 [2]	444-461 [2]	239-244 [2]	No Data [0]	No Data [0]	No Data [0]	6.0-9.2 [2]	No Data [0]	No Data [0]	No Data [0]
193	06/27/12	36 (30-69) [717]	1,627-1,635 [4]	92-96 [2]	6.9-7.6 [2]	124-158 [2]	266-269 [2]	134-136 [2]	No Data [0]	No Data [0]	0.2 [1]	17.4 (15.4-25.5) [3]	27.3 [1]	0.2 [1]	27.0 [1]
194	06/28/12	32 (28-74) [720]	1,644-1,659 [2]	No Data [0]	6.8-7.1 [2]	126-174 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	11.1-23.4 [2]	No Data [0]	No Data [0]	No Data [0]
195	06/29/12	32 (30-73) [719]	1,667 [1]	No Data [0]	6.9 [1]	124 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	10.4 [1]	No Data [0]	No Data [0]	No Data [0]
196	06/30/12	33 (31-34) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
197	07/01/12	33 (18-75) [720]	1,686 [1]	No Data [0]	7.1 [1]	140 [1]	241 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	18.2 [1]	No Data [0]	No Data [0]	No Data [0]
198	07/02/12	31 (29-75) [717]	1,694-1,718 [4]	No Data [0]	7.0 (6.6-7.3) [3]	164 (160-218) [3]	923-931 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	11.9-27.6 [2]	No Data [0]	No Data [0]	No Data [0]
199	07/03/12	32 (29-76) [719]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
200	07/04/12	32 (0-36) [717]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
201	07/05/12	33 (30-76) [718]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
202	07/06/12	34 (31-78) [719]	1,740-1,746 [2]	No Data [0]	6.4 [1]	188 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	9.7-23.9 [2]	11.1 [1]	0.2 [1]	10.9 [1]
203	07/07/12	34 (0-36) [651]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
204	07/08/12	34 (32-36) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
205	07/09/12	32 (29-76) [718]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
206	07/10/12	30 (0-66) [718]	1,825 [1]	No Data [0]	6.6 [1]	154 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	18.1 [1]	No Data [0]	No Data [0]	No Data [0]
207	07/11/12	30 (0-54) [717]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
208	07/12/12	30 (24-46) [719]	1,888 [1]	No Data [0]	7.0 [1]	182 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	27.4 [1]	No Data [0]	No Data [0]	No Data [0]
209	07/13/12	34 (28-53) [719]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
210	07/14/12	30 (17-51) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
211	07/15/12	34 (16-37) [720]	1,964 [1]	No Data [0]	7.0 [1]	206 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	26.0 [1]	No Data [0]	No Data [0]	No Data [0]

[illegible]

3.3.1.2 Laboratory Data, Tabulated

Table 3.3-01 shows results from all primary effluent samples submitted for laboratory analysis.

3.3.1.3 Field and Laboratory Data, Plotted

Figure 3.3-1 plots primary effluent TSS and Total BOD data for the entire duration of the pilot study. Both laboratory and field data are shown. The figure includes the following:

1. Field TSS data.
2. Field 5-day Total BOD data, analyzed per Standard Methods.
3. Field calculated Total BOD data, determined indirectly from Total COD analyses.
4. Field Ammonia-Nitrogen (NH₃-N) data.
5. Laboratory TSS data.
6. Laboratory Total BOD data.
7. Laboratory Ammonia-Nitrogen data.
8. The 7-day moving average TSS.
9. The 7-day moving average Calculated BOD, based upon Field Calculated BODs.
10. The 7-day moving average NH₃-N.

The 7-day average lines showed that the three parameters (TSS, BOD(t) and NH₃-N) all had similar peaks and valleys. All three parameters generally increased and decreased together.

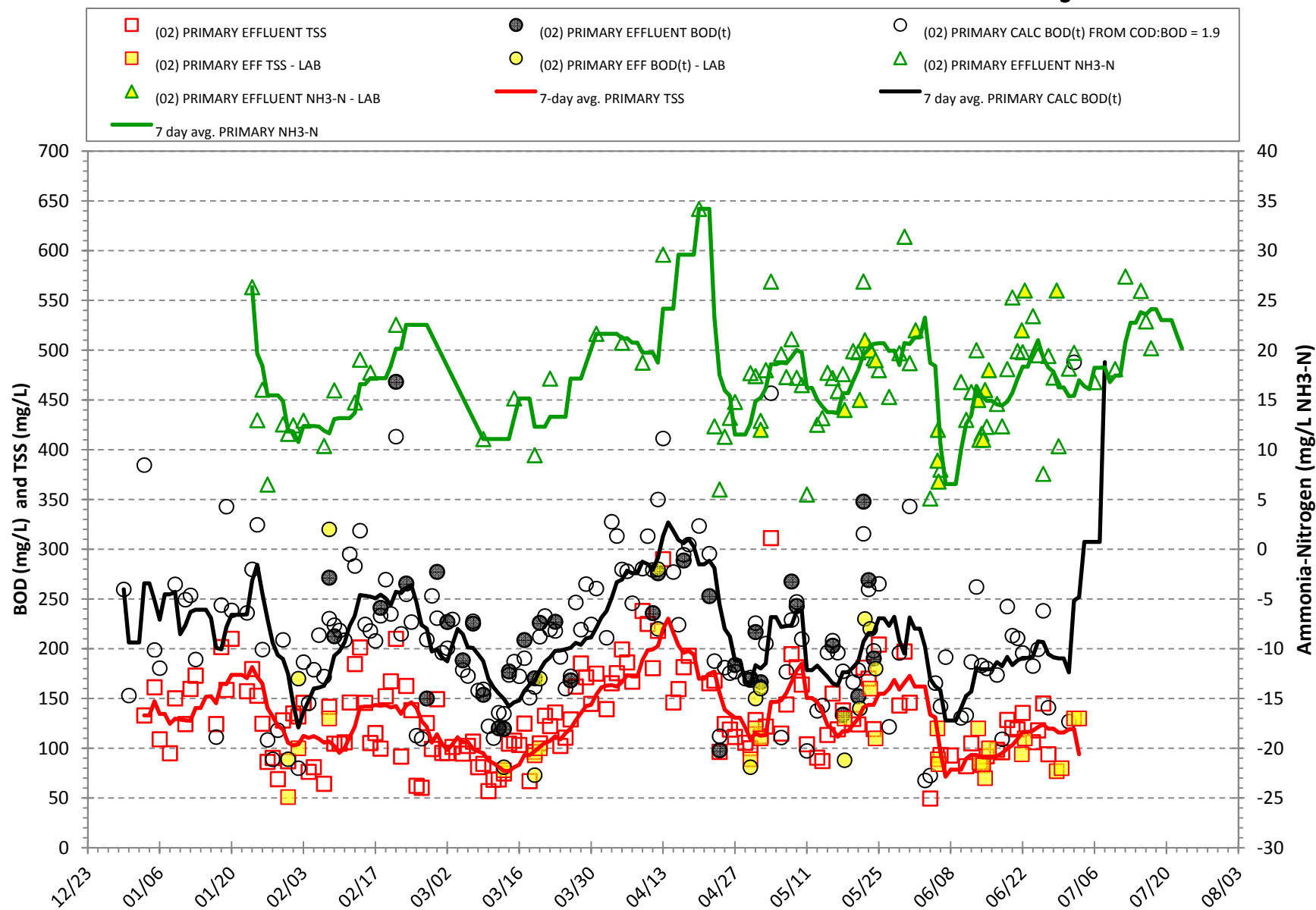
TSS generally varied from 50 mg/L to 250 mg/L. Total BOD generally varied from 100 mg/L to 300 mg/L. Ammonia-Nitrogen generally varied from 5 mg/L to 35 mg/L.

Table 3.3-02 Primary Effluent Water Quality Data by Laboratory Methods

Peirce Island Pilot Study Report
September 2012

Sample Location	Date	TSS (mg/L)	Total BOD (mg/L)	Total COD (mg/L)	NO ₂ /NO ₃ NO _x -N (mg/L)	Nitrite NO ₂ -N (mg/L)	Nitrate NO ₃ -N (mg/L)	Ammonia NH ₃ -N (mg/L)	TKN (mg/L)	TN (mg/L)	Fat, Oil & Grease (mg/L)
(02) PRIMARY EFF	01/31/2012	51	89								
(02) PRIMARY EFF	02/02/2012	100	170								
(02) PRIMARY EFF	02/08/2012	130	320								
(02) PRIMARY EFF	03/13/2012	78	81								
(02) PRIMARY EFF	03/19/2012	93	73								
(02) PRIMARY EFF	03/20/2012	100	170								
(02) PRIMARY EFF	04/12/2012		280								
(02) PRIMARY EFF	04/12/2012		220								
(02) PRIMARY EFF	04/30/2012	89	81								
(02) PRIMARY EFF	05/01/2012	120	150								
(02) PRIMARY EFF	05/02/2012	110	160	200		<0.5	<0.5	12	22	22	24
(02) PRIMARY EFF	05/18/2012	130	88	200	<0.5			14	23	23	
(02) PRIMARY EFF	05/21/2012		140	280	<0.5			15	28	28	
(02) PRIMARY EFF	05/22/2012		230	310	<0.5			21	42	42	
(02) PRIMARY EFF	05/23/2012	160	220	130	<0.5			20	34	34	
(02) PRIMARY EFF	05/24/2012	110	180	290	<0.5			19	28	28	
(02) PRIMARY EFF	06/01/2012			360	<0.5			22	34	34	
(02) PRIMARY EFF	06/05/2012	120		220	<0.5			8.9	23	23	
(02) PRIMARY EFF	06/05/2012	89		270	<0.5			12	27	27	
(02) PRIMARY EFF	06/05/2012	84		330	<0.5			6.8	19	19	
(02) PRIMARY EFF	06/13/2012	120		370	<0.5			15	30	30	
(02) PRIMARY EFF	06/13/2012	86		230	<0.5			11	21	21	
(02) PRIMARY EFF	06/14/2012	83		250	<0.5			11	20	20	
(02) PRIMARY EFF	06/14/2012	70		180	<0.5			16	32	32	
(02) PRIMARY EFF	06/15/2012	100		320	<0.5			18	34	34	
(02) PRIMARY EFF	06/21/2012	94		240	<0.5			22	37	37	
(02) PRIMARY EFF	06/22/2012	110		240	<0.5			26	44	44	
(02) PRIMARY EFF	06/28/2012	77		180	<0.05			26	36	36	
(02) PRIMARY EFF	06/29/2012	80		150	<0.05			31	40	40	
(02) PRIMARY EFF	07/02/2012	130		220	<0.5			36	47	47	
(02) PRIMARY EFF	07/03/2012	130		380	<0.5			39	46	46	
(03) PRIMARY WITH SPIKE	07/10/2012	140		340	<0.5			29	39	39	
(03) PRIMARY WITH SPIKE	07/11/2012	140		400	<0.5			39	69	69	
(03) PRIMARY WITH SPIKE	07/12/2012	150		340	<0.5			44	56	56	
(03) PRIMARY WITH SPIKE	07/13/2012	120		260	<0.5			36	54	54	
(03) PRIMARY WITH SPIKE	07/14/2012	140		440	<0.5			41	61	61	
(03) PRIMARY WITH SPIKE	07/17/2012	100		410	<0.5			47	69	69	

Figure 3.3-01 Primary Effluent TSS, Total BOD and NH₃-N



3.3.2 Primary Clarifier Performance

The performance of the pilot primary clarifier was compared to the CEPT. Pilot data were from Blueleaf field laboratory results. CEPT data were from the MOR.

3.3.2.1 Pilot Primary Clarifier Removal Rates for TSS and Total BOD

Table 3.3-03 summarizes the mean monthly values of TSS and Total BOD, for the pilot primary clarifier influent (raw water) and primary effluent. The table also shows the calculated removal rates for TSS and BOD(t) for each month.

Removal rates were calculated as:

$$Removal = \frac{(C_{INF} - C_{EFF})}{C_{INF}} \times 100\%$$

Where: C_{INF} = Mean monthly influent concentration (TSS or BOD in mg/L)

C_{EFF} = Mean monthly effluent concentration (TSS or BOD in mg/L)

Table 3.3-03: TSS and BOD Removal Rates for Pilot Primary Clarifier

Month	Primary Influent Mean [N]		Primary Effluent Mean [N]		Percent Removal	
	TSS	BOD(t)	TSS	BOD(t)	TSS	BOD(t)
Dec-2011	[0]	373 [6]	[0]	206 [6]	N/A	45%
Jan-2012	168 [66]	246 [48]	140 [66]	229 [47]	17%	7%
Feb-2012	163 [54]	284 [28]	123 [87]	221 [54]	25%	22%
Mar-2012	147 [90]	206 [60]	109 [93]	188 [62]	26%	9%
Apr-2012	217 [52]	259 [46]	169 [55]	260 [50]	22%	0%
May-2012	183 [44]	228 [42]	148 [51]	219 [54]	19%	4%
Jun-2012	259 [34]	284 [34]	101 [38]	172 [52]	61%	39%
Jul-2012	313 [40]	400 [42]	120 [22]	277 [51]	62%	31%

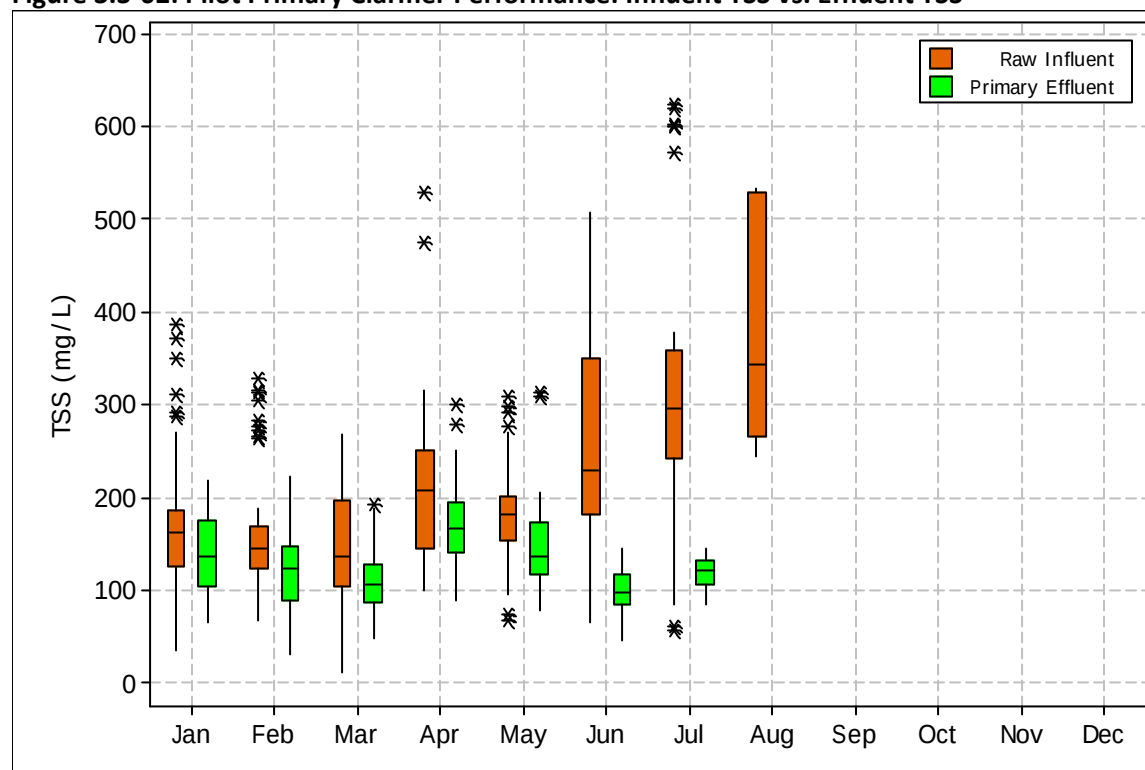
Total BOD calculated from total COD data.

TSS removal for the pilot primary clarifier varied from 17% to 62%. The greatest removal rates for the pilot primary clarifier occurred in June and July, when the influent TSS concentrations were highest. These were the only two months when pilot removal rates for TSS approached CEPT removal rates.

Total BOD removal for the pilot primary clarifier varied from 0% to 45%. The greatest removal rate was immediately after pilot startup in December 2011, but that value was based on only 6 influent/effluent data in the last week of December. The lowest removal rates occurred from January through May of 2012, after which removals substantially increased in June and July.

Figure 3.3-02 shows boxplots for Primary Influent (raw water) and Primary Effluent TSS. Figure 3.3-03 shows boxplots for Primary Influent and Effluent BOD(t). The figures show there was comparatively little difference between Primary Influent and Effluent data through the early months of 2012, indicating low removal rates. The difference between influent and effluent TSS and BOD(t) increased from June 2012 onward, as influent concentrations increased through the summer months. This indicated improved removal rates.

Figure 3.3-02: Pilot Primary Clarifier Performance: Influent TSS vs. Effluent TSS

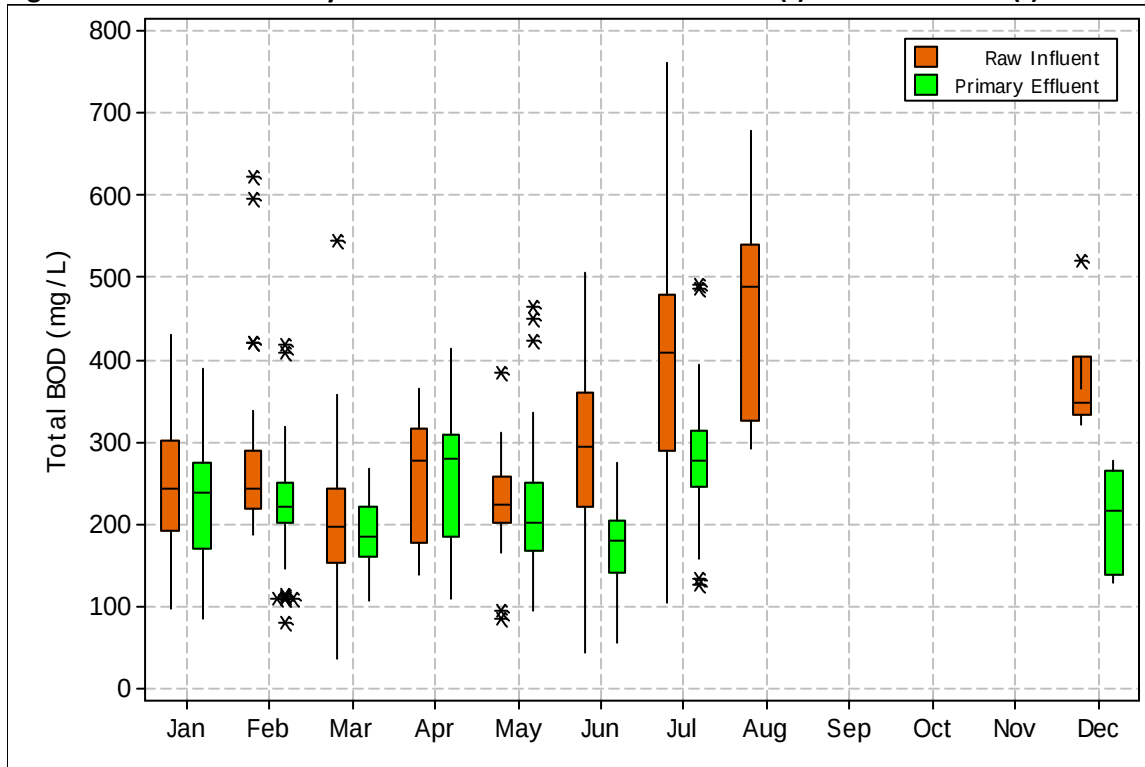


There were no significant operational changes to the primary clarifier that would have caused improved TSS removal in June and July 2012, versus the preceding months. The boxplot of TSS indicates that median monthly raw water TSS concentrations increased through June, July and August, while median monthly primary effluent TSS concentrations remained relatively consistent throughout the year, varying only between approximately 100 mg/L (June) and 170 mg/L (April).

Possible reasons for improved TSS removal are speculative. The higher influent TSS concentrations might have resulted in more effective particle growth, even in the absence of coagulants or flocculants. It is also possible that the composition of TSS might have been somewhat different in June-July than it had been in January-May; larger or denser particulates would generally be more effectively removed by settling. Other seasonal factors such as temperature and viscosity could also have affected settling.

There was a baffle installed in the primary clarifier in late February to reduce channeling, but there did not appear to be a concurrent improvement in median effluent TSS or BOD that might be attributed to the baffle.

Figure 3.3-03: Pilot Primary Clarifier Performance: Influent BOD(t) vs. Effluent BOD(t)



3.3.2.2 CEPT Removal Rates for TSS and Total BOD

Table 3.3-04 summarizes the mean monthly values of TSS and Total BOD, for the CEPT influent (raw water) and CEPT effluent. The table also shows the calculated removal rates for TSS and BOD(t) for each month. The period was the 8 months from Dec 2011 through Jul 2012.

Table 3.3-04: TSS and BOD Removal Rates for CEPT

MONTH	CEPT Influent Mean [N]		CEPT Effluent Mean [N]		Percent Removal	
	TSS	BOD(t)	TSS	BOD(t)	TSS	BOD(t)
Dec-2011	218 [5]	200 [5]	53 [5]	123 [5]	76%	39%
Jan-2012	197 [13]	198 [13]	54 [13]	123 [13]	73%	38%
Feb-2012	205 [13]	235 [13]	58 [13]	141 [13]	72%	40%
Mar-2012	162 [9]	194 [9]	55 [9]	138 [9]	66%	29%
Apr-2012	189 [8]	217 [8]	47 [8]	161 [8]	75%	26%
May-2012	206 [10]	196 [10]	50 [11]	132 [11]	76%	33%
Jun-2012	237 [8]	205 [8]	54 [8]	114 [8]	77%	44%
Jul-2012	349 [8]	303 [8]	63 [8]	158 [8]	82%	48%
Average	217 [74]	218 [74]	54 [75]	136 [75]	75%	37%

TSS removal for CEPT varied from 66% to 82%. TSS removal was more consistent month-to-month for the CEPT than for the pilot primary clarifier. Total BOD removal for the CEPT varied from 26% to 48%.

Figure 3.3-04 shows boxplots for CEPT Influent (raw water) and CEPT Effluent TSS. Figure 3.3-05 shows boxplots for CEPT Influent and Effluent BOD(t). All data were from the period corresponding to pilot plant operations.

The figures show the median CEPT Effluent TSS remained between approximately 40 mg/L and 70 mg/L regardless of influent concentrations. Median CEPT Effluent BOD(t) remained between approximately 100 mg/L and 180 mg/L regardless of influent concentrations. Removal rates for TSS and BOD increased as influent raw water concentrations increased.

TSS and BOD removal rates were more consistent month-to-month for the CEPT than for the pilot primary clarifier. The use of ferric chloride for coagulation/flocculation aided particulate removal in the CEPT, and the full-scale WWTF clarifiers might have provided better hydraulic settling conditions than the pilot primary clarifier.

Figure 3.3-04: CEPT Influent TSS vs. CEPT Effluent TSS

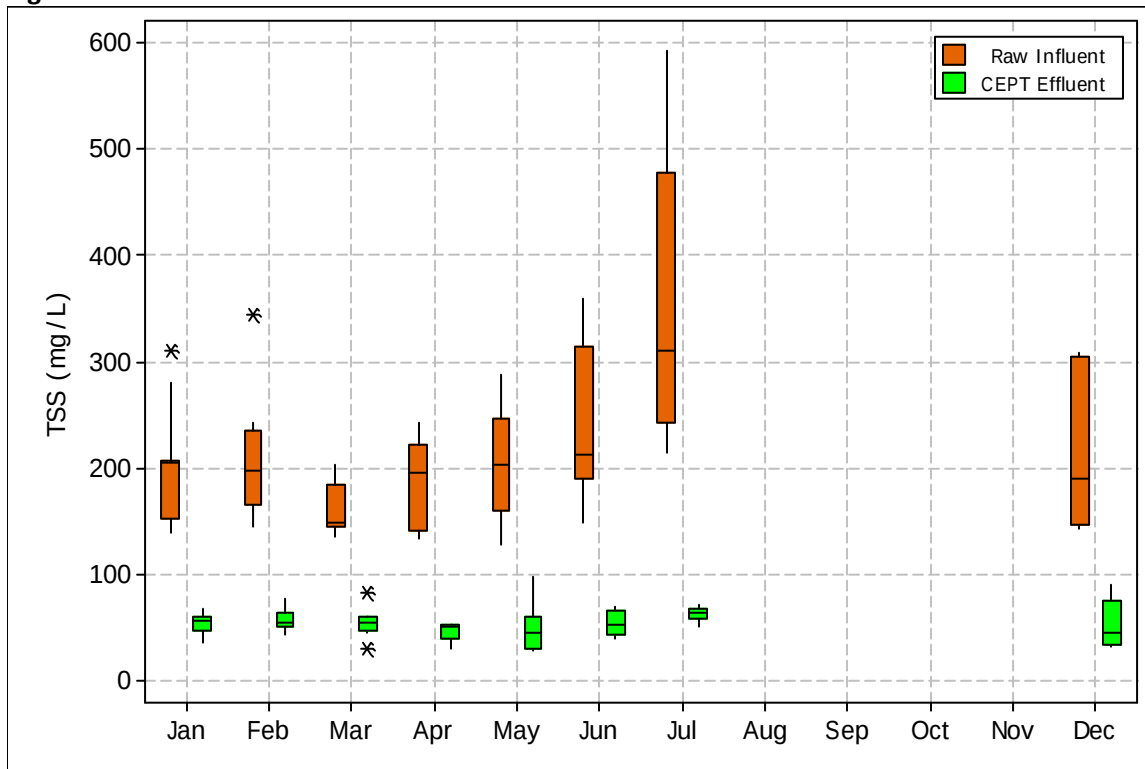
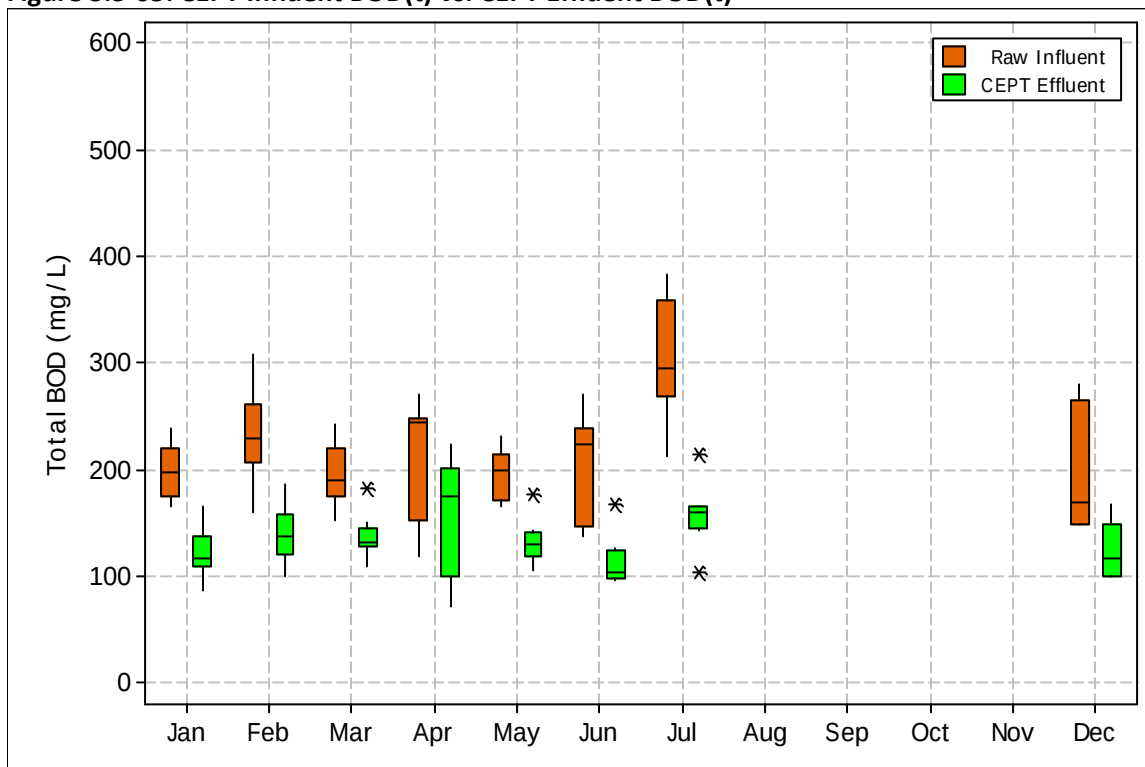


Figure 3.3-05: CEPT Influent BOD(t) vs. CEPT Effluent BOD(t)



3.3.2.3 Pilot Primary Clarifier Effluent versus Historical CEPT Effluent

Pilot Primary Clarifier Effluent was compared to CEPT Effluent data from 2008 through 2012. Data for these comparisons came from the following sources:

- Field Data (Blueleaf field laboratory) for pilot primary influent (raw) and effluent samples;
- Monthly Operating Report (MOR) data from January 2008 through July 2012;
- Wastewater Characterization (WWC) Data from May 2011 through February 2012.

Figure 3.3-06 compares monthly TSS data for Pilot Primary Effluent to historical TSS data for CEPT Effluent, from both the MOR and the WWC. Figure 3.3-07 compares monthly BOD(t) data for Primary Effluent to historical BOD(t) data for CEPT.

The figure shows that the CEPT Effluent has historically had median concentrations of both TSS and BOD that were well below those of the Pilot Primary Effluent.

Figure 3.3-06: Pilot Primary Effluent vs. Historical CEPT Effluent for TSS

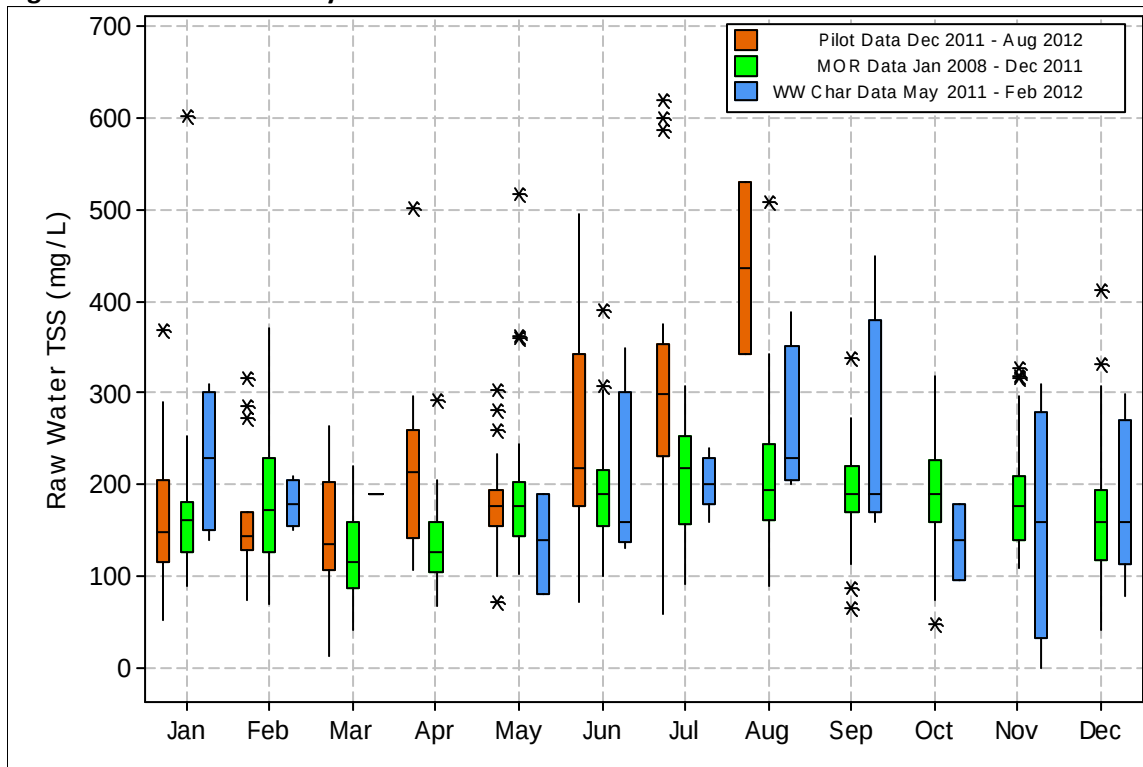
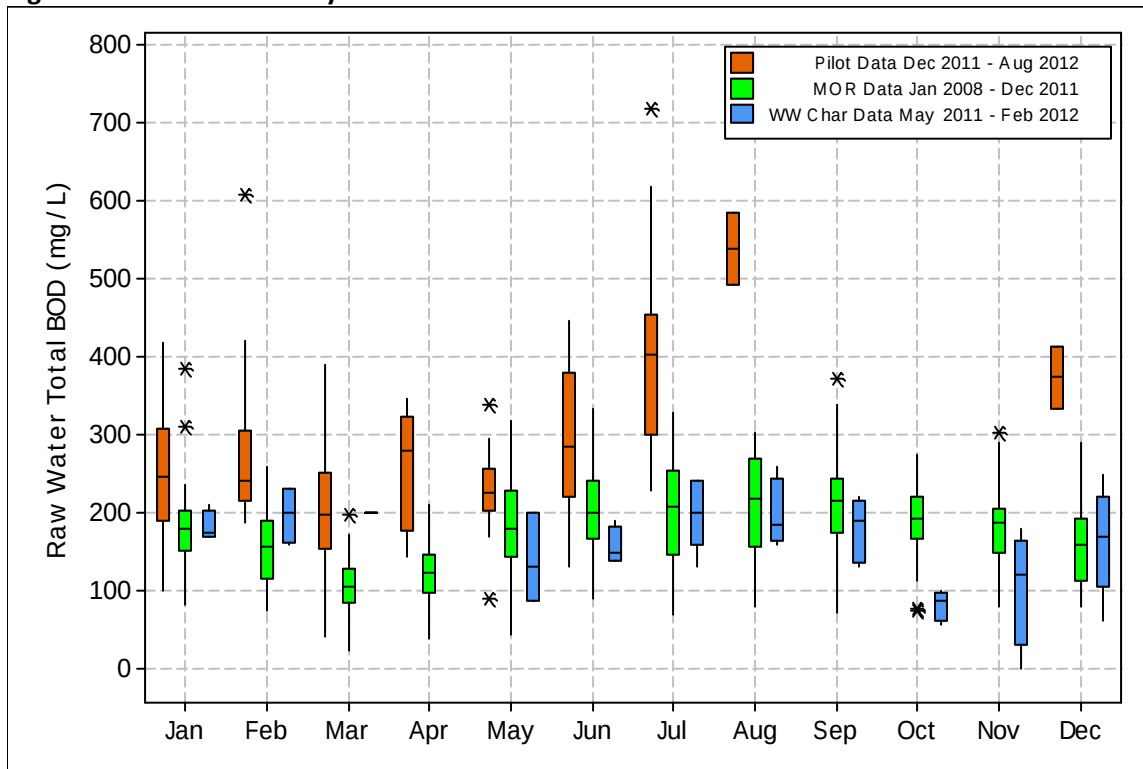


Figure 3.3-07: Pilot Primary Effluent vs. Historical CEPT Effluent for Total BOD



3.4 WATER QUALITY COD:BOD RATIOS

There were two distinct types of Total BOD data:

1. 5-day BOD data from samples that were directly analyzed for BOD per Standard Methods.
2. Calculated BOD data that was calculated indirectly from samples that were analyzed for COD per the Hach field method.

There were more COD data than BOD data, and COD results spanned the entire 8 months of pilot operations, compared to only 3 months of BOD analyses (February 21 to May 22, 2012). This was because COD was a simpler and quicker analysis than BOD. COD results were available within 3 hours, versus 5 days for BOD results. It was typically necessary to have same-day results during pilot operations (for example, to maintain target loading rates, or to identify process performance problems).

BOD values were estimated from COD results based ratios specific to the sample site or process. The COD:BOD ratios are shown in Table 3.4-1. The following sections describe the method for determining COD:BOD ratios.

Table 3.4-01: COD:BOD Ratios for Calculating BOD from COD Data

Sample Site	Number of COD:BOD Data Pairs [N]	Slope of Regression
01 RAW	48	1.9
02 PRIMARY	69	1.9

3.4.1 Raw Water (Pilot Plant Influent) COD:BOD Ratio

The ratio of BOD to COD (total) was found to be approximately 1.9 based on results for raw water samples that were analyzed for both parameters. A linear regression was performed upon paired data for total BOD and total COD, with the intercept forced to zero. The regression was based upon 50 data pairs. The slope of the regression line was 1.9. This value was used to calculate approximate BOD values from COD data:

$$\text{Raw BOD}(t) = \text{Raw COD}(t) \div 1.9$$

3.4.2 Pilot Plant Primary Effluent COD:BOD Ratio

The ratio of BOD to COD (total) was found to be approximately 1.9 based on results for primary effluent samples that were analyzed for both parameters. A linear regression was performed upon paired data for total BOD and total COD, with the intercept forced to zero. The regression was based upon 69 data pairs. The slope of the regression line was 1.9. This value was used to calculate approximate BOD values from COD data:

$$\text{Primary Effluent BOD}(t) = \text{Primary Effluent COD}(t) \div 1.9$$

Figure 3.4-01 Raw Water COD(t) versus BOD(t)

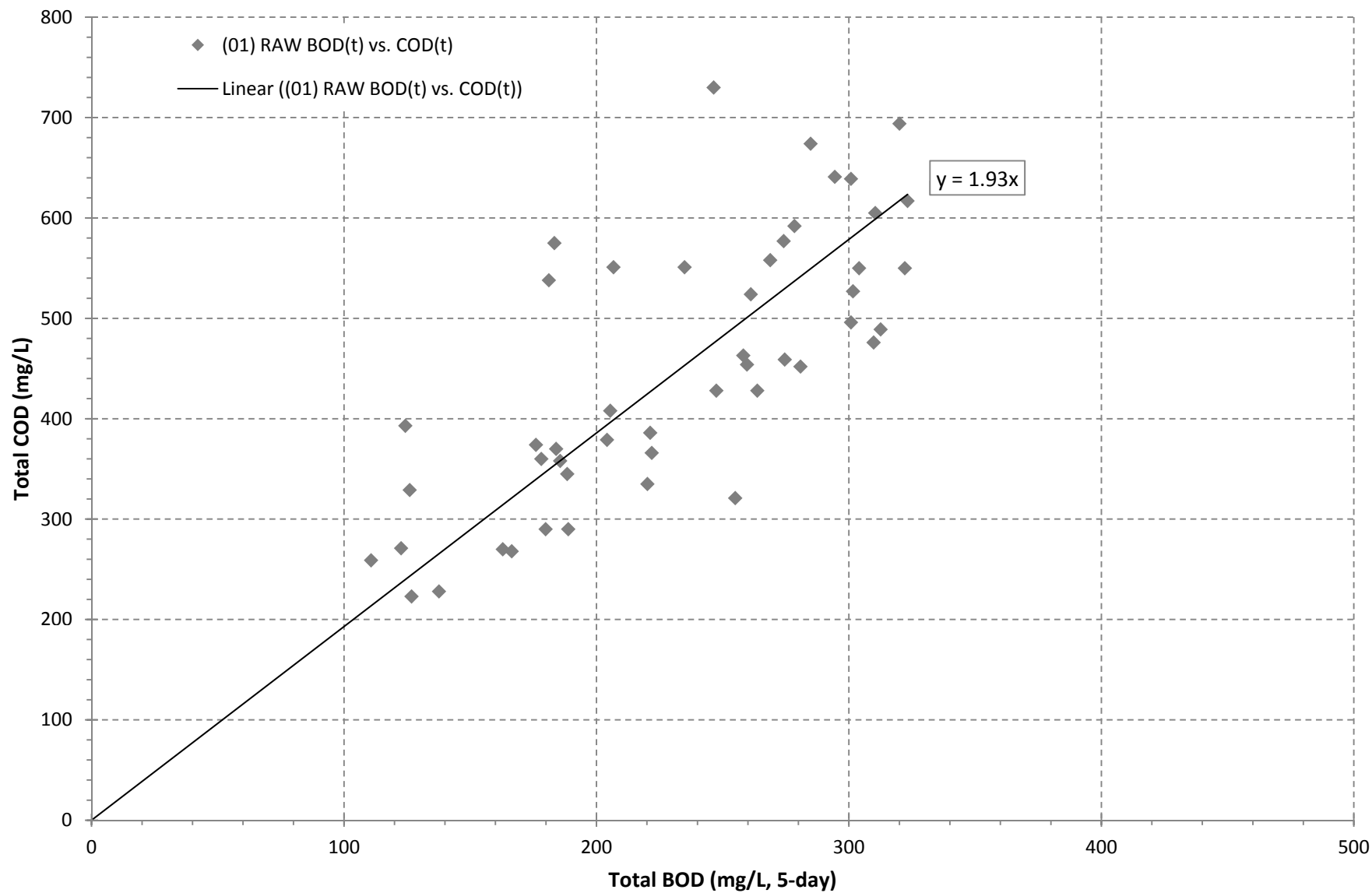
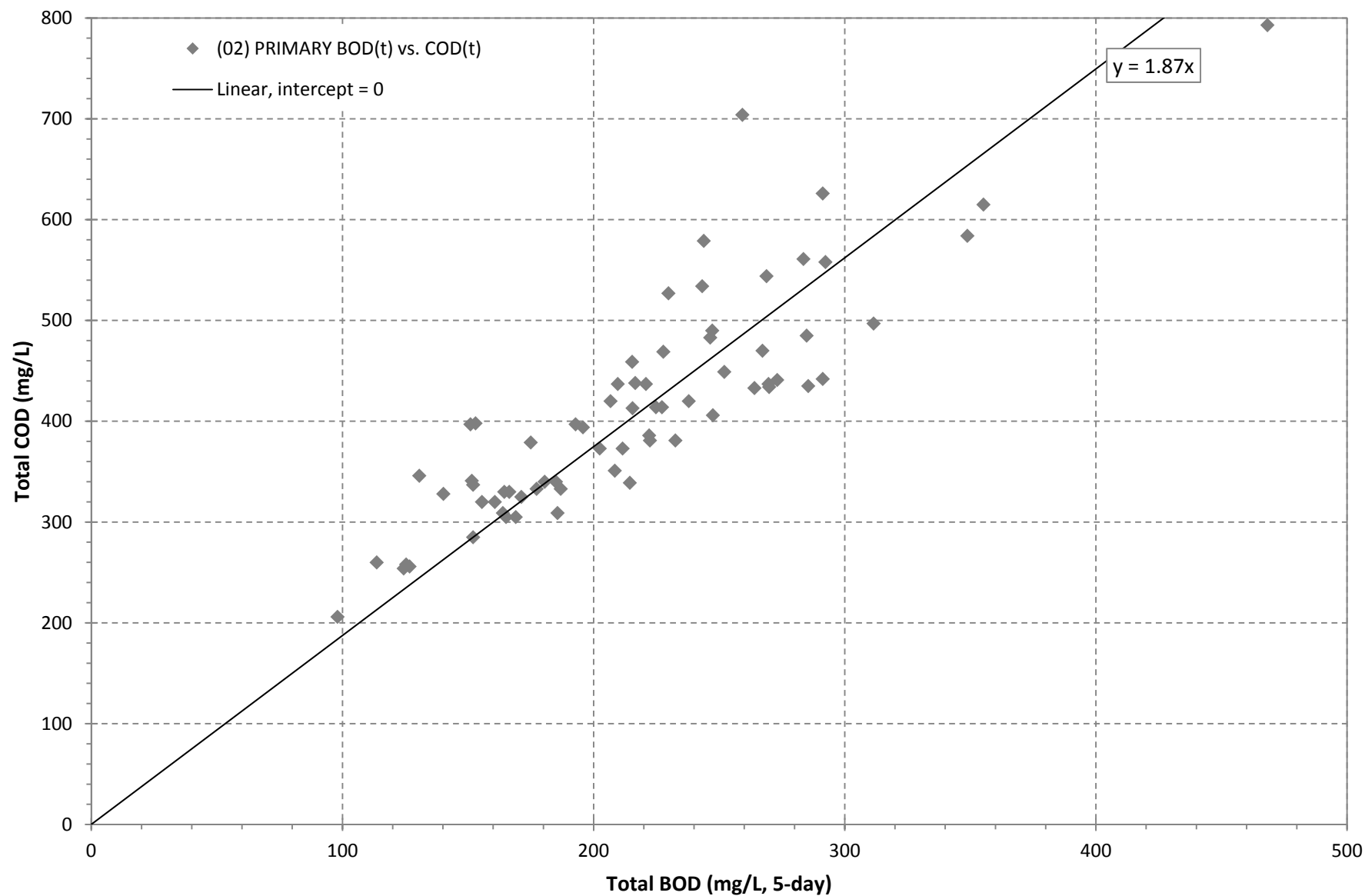


Figure 3.4-02 Primary Effluent COD(t) versus BOD(t)



3.5 BIOLOGICAL AERATED FILTER RESULTS

3.5.1 Schedule of BAF Experiments

The pilot-scale Biologically Aerated Filter (BAF) system was operated to complete a series of Experimental Plans designed by AECOM to assess the performance of the process under a variety of flow and permit scenarios. The different phases of operation of the system are detailed in Table 3.5-01, and described below.

Table 3.5-01: BAF Trial Schedule

Phase	Dates	Description
1	1/29/12	Fill BAF pilots and start flow at 8 gpm
	2/01/12	Reduce flow rate to 7 gpm, add media and begin acclimation
	2/15/12	Begin 2 gpm seed from MBBR BOD tank
2	3/05/12	Reduce flow to 6.2 gpm, end seed flow
	3/12 to 3/21	EXPERIMENTAL PLAN 02 – Max Month for TSS, BOD<30
3	3/21/12	Increase flow rate to 8.2 gpm to test higher loading rates
4	4/18/12	Convert system to MLE
	4/19/12	Convert system to C/N + DN Mode, flow rate = 3 gpm
	4/23/12	Increase flow rate to 9 gpm
	4/25/12	Decrease flow rate to 4 gpm
	5/09/12	Add 2 gpm seed from MBBR NR2 reactor
	5/22/12	Perform 3 backwashes to scour heterotrophs from Stage #1 Add NH3 to influent
	5/31/12	Discontinue seed flow from MBBR NR1
	6/13/12	Shut off NH3 feed to BAF Reduced flow rate to 2 gpm
	6/14/12	Reduced volume of BAF #1 effluent storage tank to 2000 gallons
	6/20/12	Increased flow rate to 3 gpm
	6/21/12	Increased flow rate to 4 gpm Began addition of NH3 to primary effluent (target 35 TKN)
5	6/26/12	Increased NH3 feed to primary clarifier (target 45 TKN) Reduced flow rate to 3 gpm
	7/01 to 7/21	EXPERIMENTAL PLAN 05&06 – Supplemental Ammonia, TN < 8, 3
6	7/24	EXPERIMENTAL PLAN 04 – 2 hour, 7.1 gpm stress test
	7/25	EXPERIMENTAL PLAN 04 – 2 hour, 9.2 gpm stress test
	7/26	EXPERIMENTAL PLAN 04 – 6 hour, 9.2 gpm stress test
	7/27 to 7/28	EXPERIMENTAL PLAN 04 – 24 hour, 9.2 gpm stress test, diluted
	7/30	EXPERIMENTAL PLAN 04 – 24 hour, 18.5 gpm stress test
	7/31 to 8/01	EXPERIMENTAL PLAN 04 – 24 hour, 18.5 gpm stress test
7	8/03	Shut down pilot system

Phase 1 – The two BAF pilot filters were loaded with media on January 26, and February 1, and effluent from the pilot-scale primary clarifier was added to the BAF system starting on January 26. The flow rate was initially set high, to promote growth on the media. The Vendor adjusted the filter backwash with increased rinse cycles as the acclimation process progressed. A sump pump was installed in the MBBR

BOD reactor, and 2 gpm of heterotrophic seed was pumped to the inlet side of the BAF 1 feed pump. The BOD loading on the system was typically over 200 lbs BOD/1,000cf·day.

Phase 2 – The BAF system operated at a flow rate of 6.2 gpm to mimic the maximum month organic load into the reactor. The design average daily loading was estimated to be 153 lb/1000 cf·day. During the trial, the average loading into the system was 166 lb BOD/1000cf·day. Field and laboratory samples were collected to assess performance.

Phase 3 – The flow rate into the BAF system was increased to 8.2 to assess the performance of the system at increased organic loading rates. During this phase, the average loading into the system was 276 lb BOD/1000cf·day. The flow rate was varied over the course of the trial, and the trial was terminated when algae was discovered in the tanks.

Phase 4 – The BAF system was converted to nitrify in the first stage. On the first day, the first stage was placed into an MLE mode, with a recirculation flow from the top (outlet) of the filter to the bottom (inlet) of the filter. After discussion between AECOM and the BAF Vendor, the first stage was converted to operate as carbon and nitrification removal (C/N). The flow rate was varied to adjust the BOD load into the reactor, and seed from the MBBR NR2 tank was added.

A supplemental carbon source was added just upstream of the BAF 2 inlet pump. The supplemental carbon feed rate was adjusted based on the dissolved oxygen concentration and the nitrate concentration in the BAF 1 effluent. The C/N startup was continued until BAF 1 reliably reduced ammonia concentrations below 1 mg/L.

Phase 5 - The BAF system was operated with a constant flow of 3 gpm, with an additional concentration of ammonia added to the primary clarifier effluent to increase the BAF 1 influent TKN to approximately 45 mg/L-N. Experimental Plans 05 and 06 were completed simultaneously during this period, since the only modification required to achieve an effluent TN concentration less than 3 mg/L was the dose of supplemental carbon. The average organic loading during this phase was 120 lb BOD/1,000 cf·day, and field and laboratory samples were collected as part of Experimental Plans 05 and 06.

Phase 6 – Experimental Plan 04 included six separate periods of high flow, intended to mimic different storm events. The six experiments conducted on the BAF system included:

Full-strength, Mid flow, short duration (FMS) Trial – The flow rate was increased from a baseline flow of 3 to 7.2 gpm for 2 hours.

Full-strength, Peak flow, short duration (FPS) Trial – The flow rate was increased from a baseline flow of 3 to 9.1 gpm for 2 hours.

Full-strength, Peak flow, Medium duration (FPM) Trial – The flow rate was increased from a baseline flow of 3 to 9.1 gpm for 6 hours.

Diluted Strength, Peak Flow, Extended Duration (DPE) Trial – The flow rate was increased from a baseline flow of 3 to 9.1 gpm for 28 hours. The primary effluent was diluted with potable water in a 1:1 ratio.

Full-strength, High-Peak flow, Medium duration (FXM) Trial – The flow rate was increased from a baseline flow of 3 to 18.4 gpm for 6 hours to mimic the anticipated high flow through a proposed single-stage carbon-only BAF.

Full-strength, Peak Flow, Extended Duration (FXE) Trial – The flow rate was increased from a baseline flow of 3 to 18.4 gpm for 28 hours. The intention of the Trial was to operate with diluted primary effluent, but the connection failed, and the trial was conducted with full-strength primary effluent.

For each trial, two laboratory samples were collected prior to the increase in flow to establish the background performance of the BAF, three laboratory samples were collected during the increased flow period, and at least three laboratory samples were collected after the flow rate was reduced to monitor the recovery period. There were numerous field analyses in addition to the laboratory samples. The flow increase was made over the course of 15 to 30 minutes using the PID controller. There were no changes made to the air flow into the BOD or nitrification reactors, mixing speed, or supplemental carbon dose.

3.5.2 Results

Table 3.7-02 includes the field data from all pilot testing. The water quality data is presented in the format:

Median (minimum – maximum) [number of samples]

A description of the data contained in each column is described below.

Columns E and F – “Start” and “End” delineate the date and time that the online data is summarized. The water quality data was normally collected from the composite samplers programmed to start sampling at 8:00 am for 24 hours, so water quality samples represent conditions which were in effect between the start and end times.

Column G – “Phase” represents the testing phase described in Section 3.5.1.

Column M – “Notes” includes notes and comments concerning the daily operations

Column N – “Influent Flow to BAF 1 (gpm)” summarizes the data collected by the flow meter installed between the BAF 1 influent feed pump and the BAF filter.

Columns J, K, L – “Slope”, Intercept, and “R-SQ” show the slope (inches per day), y-intercept (inches), and R^2 value (unitless) of the line of best fit between the filter runtime and headloss. Filter headloss was calculated using an online pressure transmitter on the bottom of the BAF 1 filter, assuming that the static elevation was 184”. Values are omitted from these columns if the filter backwashed more than one time in a 24-hour period, or if the relationship between run time and headloss was poor.

Column M – “Influent Flow to BAF 2 (gpm)” summarizes the data collected by the flow meter installed between the BAF 2 influent feed pump and the BAF filter.

Column N – “DO Probe (ppm)” summarizes the data provided by the HACH online Dissolved Oxygen Probes installed at the effluent of the BAF 1 reactor.

Columns O, AJ, AZ – “...Sample ID” identifies the sample ID number, or range of ID numbers used. A unique ID number was assigned to each field sample when it was collected, and the Sample ID is used to track field samples.

Columns X through EM – summarize water quality results from field analyses collected and analyzed in accordance with the methods described in Section 2.7.1. The sample locations are as follows:

“(02,03) PRIMARY EFFLUENT” samples were collected at the effluent weir of the pilot-scale primary clarifier before June 25, or collected at the influent of the MBBR reactor after June 25. Soda Ash and aqueous ammonia were added to the pilot-scale primary clarifier on June 25, but several parameters were not affected, and water quality results for TSS, COD, and BOD columns with headers “(02,03) PRIMARY EFFLUENT” represent pilot-scale primary effluent regardless of the spiked feed.

“(03,35) BAF INFLUENT” samples represent pilot-scale primary clarifier effluent with the addition of soda ash and supplemental ammonia. The sample location was either the entrance to the MBBR if soda ash and lime were added to the primary clarifier effluent trough (when the MBBR and BAF received identically pretreated influent), or a sample tap immediately downstream of the BAF feed pump (when the BAF influent was pretreated differently than the MBBR or CASB).

“(32) BAF FILTER 1 EFFLUENT” samples were collected from the top of the BAF Filter #1.

“(34) BAF FILTER 2 EFFLUENT” samples were collected from the top of the BAF Filter #2.

	E	F	G	H	I	J	K	L	M	N
1	Start	End	Phase	Notes	Influent Flow BAF #1 (gpm)	Slope of Runtime VS Headloss (in/day)	Intercept of Runtime VS Headloss (in)	R-SQ of Runtime VS Headloss	Influent Flow BAF #2 (gpm)	DO Probe (ppm)
2	01/26/12 15:32	05/28/12 00:00			6.2 (0.0-16.1) [12604]				0.1 (0.0-15.0) [12604]	6.3 (0.0-15.5) [12604]
4	12/31/11 00:00	01/26/12 15:27			No Data [0]				No Data [0]	No Data [0]
5	01/26/12 15:36	01/27/12 07:59	1	Started System	8.0 (0.0-10.1) [74]				5.5 (0.0-14.2) [74]	0.0 (0.0-0.0) [74]
6	01/27/12 08:13	01/28/12 07:59	1		8.0 (0.0-8.0) [104]				5.5 (5.5-5.5) [104]	0.0 (0.0-0.0) [104]
7	01/28/12 08:13	01/29/12 07:57	1		8.2 (0.0-8.2) [126]				5.5 (5.5-5.5) [126]	0.0 (0.0-0.0) [126]
8	01/29/12 08:07	01/30/12 07:57	1		8.2 (0.0-8.2) [136]				5.5 (5.5-5.5) [136]	0.0 (0.0-0.0) [136]
9	01/30/12 08:07	01/31/12 07:57	1		7.9 (0.0-7.9) [136]				5.5 (5.5-5.5) [136]	0.0 (0.0-0.0) [136]
10	01/31/12 08:07	02/01/12 07:57	1		8.2 (0.0-9.3) [136]				6.1 (0.2-9.4) [136]	0.0 (0.0-0.0) [136]
11	02/01/12 08:07	02/02/12 07:57	1	Add media to Stage #1	7.4 (0.0-9.0) [136]				0.1 (0.0-15.0) [136]	9.5 (0.0-9.9) [136]
12	02/02/12 08:07	02/03/12 07:57	1		7.1 (0.0-7.5) [136]				0.1 (0.1-0.1) [136]	9.1 (5.0-12.1) [136]
13	02/03/12 08:07	02/04/12 07:57	1	Start BAF Stage #2	6.9 (0.0-7.1) [136]				0.1 (0.0-6.5) [136]	6.3 (0.0-9.1) [136]
14	02/04/12 08:07	02/05/12 07:57	1		6.9 (0.1-6.9) [136]	12.57	18.39	0.994	0.1 (0.1-0.1) [136]	2.9 (0.0-5.7) [136]
15	02/05/12 08:07	02/06/12 07:57	1		7.0 (0.1-7.1) [136]	23.97	-1.74	0.988	0.1 (0.1-0.1) [136]	0.9 (0.2-4.5) [136]
16	02/06/12 08:07	02/07/12 07:57	1	Valve failure prevented backwashing, backwash in manual	7.0 (0.0-7.1) [136]	15.47	16.49	0.754	5.1 (0.1-6.5) [136]	5.7 (0.1-7.6) [136]
17	02/07/12 08:07	02/08/12 07:56	1		7.0 (0.0-7.0) [136]	4.36	21.06	0.527	5.0 (0.0-5.1) [136]	6.2 (0.0-8.2) [136]
18	02/08/12 08:08	02/09/12 07:56	1		7.0 (0.1-7.0) [136]	6.87	21.37	0.563	5.0 (0.1-5.0) [136]	6.2 (2.7-7.6) [136]
19	02/09/12 08:08	02/10/12 07:56	1		7.0 (0.1-7.0) [136]	9.79	21.83	0.699	5.0 (0.1-5.0) [136]	7.2 (4.2-8.8) [136]
20	02/10/12 08:08	02/11/12 07:56	1		7.1 (0.1-7.1) [136]	12.73	22.21	0.790	5.0 (0.1-5.0) [136]	6.9 (3.7-8.4) [136]
21	02/11/12 08:08	02/12/12 07:56	1		7.0 (0.0-7.1) [136]	11.32	22.91	0.514	5.0 (0.1-5.0) [136]	7.3 (4.8-9.1) [136]
22	02/12/12 08:08	02/13/12 07:56	1		6.9 (0.1-7.1) [136]	10.00	23.58	0.434	5.0 (0.1-5.0) [136]	6.9 (3.8-8.1) [136]
23	02/13/12 08:08	02/14/12 07:56	1	found check valve frozen, repaired	7.0 (0.1-7.0) [136]	14.93	20.35	0.909	4.9 (0.1-10.1) [136]	1.5 (0.1-7.9) [136]
24	02/14/12 08:08	02/15/12 07:56	1	Add connections for seeding	7.1 (0.0-7.1) [136]	10.48	22.35	0.968	5.0 (0.1-5.0) [136]	0.5 (0.1-5.1) [136]
25	02/15/12 08:08	02/16/12 07:58	1		7.0 (0.0-7.1) [104]	12.36	21.10	0.977	4.9 (0.1-5.0) [104]	0.2 (0.1-4.1) [104]
26	02/16/12 08:13	02/17/12 07:58	1		7.0 (0.0-7.0) [96]	10.77	23.81	0.874	5.0 (0.1-5.0) [96]	6.5 (0.1-6.7) [96]
27	02/17/12 08:13	02/18/12 07:58	1		7.0 (0.0-7.0) [96]	37.40	5.71	0.995	5.0 (0.1-5.0) [96]	2.7 (0.5-6.1) [96]
28	02/18/12 08:13	02/19/12 07:58	1	Found BAF in Failure Mode	0.0 (0.0-7.1) [96]				0.1 (0.1-5.0) [96]	0.2 (0.0-4.1) [96]
29	02/19/12 08:13	02/20/12 07:58	1	Limit switch failed	0.0 (0.0-14.2) [96]				0.1 (0.1-0.1) [96]	0.2 (0.0-6.1) [96]
30	02/20/12 08:13	02/21/12 07:55	1	fixed limit switch on valve	7.0 (0.0-7.0) [97]	5.54	20.17	0.905	5.0 (0.1-5.0) [97]	9.0 (0.1-10.5) [97]
31	02/21/12 08:10	02/22/12 07:55	1		7.0 (0.0-7.0) [96]	6.54	22.97	0.807	5.1 (0.0-5.1) [96]	7.1 (4.3-9.5) [96]
32	02/22/12 08:10	02/23/12 07:55	1		6.9 (0.0-7.0) [96]	12.70	22.78	0.955	5.0 (0.0-5.1) [96]	1.4 (0.1-7.4) [96]
33	02/23/12 08:10	02/24/12 07:55	1		7.1 (0.1-7.1) [96]	18.79	19.69	0.793	5.0 (0.1-5.0) [96]	5.7 (0.0-7.1) [96]
34	02/24/12 08:10	02/25/12 07:55	1		7.0 (0.0-7.1) [96]	11.78	20.64	0.935	4.9 (0.1-5.0) [96]	9.5 (5.0-10.9) [96]
35	02/25/12 08:10	02/26/12 07:55	1		7.0 (0.1-7.0) [96]	8.90	20.12	0.830	4.9 (0.1-4.9) [96]	10.2 (8.0-11.0) [96]
36	02/26/12 08:10	02/27/12 07:55	1		6.9 (0.1-7.0) [96]	6.32	20.86	0.938	4.9 (0.1-5.0) [96]	10.2 (8.6-11.3) [96]
37	02/27/12 08:10	02/28/12 07:58	1		7.0 (0.0-7.0) [96]	6.78	21.11	0.956	5.0 (0.1-5.0) [96]	8.1 (6.7-11.0) [96]
38	02/28/12 08:13	02/29/12 07:46	1	Low Tank level shut off	7.0 (0.0-7.0) [95]	6.82	21.02	0.896	0.1 (0.1-5.0) [95]	8.2 (2.2-13.6) [95]
39	02/29/12 08:01	03/01/12 07:48	1		7.1 (0.0-7.1) [96]	4.89	21.54	0.967	5.0 (0.1-5.1) [96]	8.6 (0.0-12.7) [96]
40	03/01/12 08:03	03/02/12 07:51	1		6.9 (0.0-7.1) [96]	5.74	21.08	0.845	0.0 (0.0-5.0) [96]	10.4 (7.3-12.2) [96]
41	03/02/12 08:06	03/03/12 07:56	1		7.0 (0.0-7.1) [96]	4.07	22.40	0.862	3.0 (0.0-5.0) [96]	9.6 (6.7-11.9) [96]
42	03/03/12 08:11	03/04/12 07:56	1		7.0 (0.0-7.0) [96]	4.62	23.20	0.792	0.1 (0.1-3.0) [96]	10.2 (8.4-11.5) [96]
43	03/04/12 08:11	03/05/12 07:56	1		7.0 (0.1-7.0) [96]	4.15	22.80	0.227	0.1 (0.1-0.1) [96]	10.3 (9.4-11.3) [96]

	E	F	G	H	I	J	K	L	M	N
1	Start	End	Phase	Notes	Influent Flow BAF #1 (gpm)	Slope of Runtime VS Headloss (in/day)	Intercept of Runtime VS Headloss (in)	R-SQ of Runtime VS Headloss	Influent Flow BAF #2 (gpm)	DO Probe (ppm)
44	03/05/12 08:11	03/06/12 07:56	2		6.2 (0.0-7.0) [96]	4.83	21.72	0.240	3.0 (0.1-7.8) [96]	10.5 (6.2-10.9) [96]
45	03/06/12 08:11	03/07/12 07:57	2		6.2 (0.2-6.2) [97]	2.40	23.12	0.088	0.1 (0.1-3.0) [97]	9.1 (8.3-10.7) [97]
46	03/07/12 08:12	03/08/12 07:57	2		6.2 (0.0-6.2) [96]	3.42	24.37	0.238	3.0 (0.1-3.0) [96]	4.8 (3.2-9.4) [96]
47	03/08/12 08:12	03/09/12 07:57	2		6.2 (0.1-6.2) [96]	4.39	24.29	0.312	0.1 (0.1-3.0) [96]	5.0 (3.8-8.3) [96]
48	03/09/12 08:12	03/10/12 07:57	2		6.2 (0.1-6.2) [96]	0.53	25.21	0.005	0.1 (0.1-3.0) [96]	7.0 (2.0-8.4) [96]
49	03/10/12 08:12	03/11/12 07:57	2		6.2 (0.0-6.2) [96]	5.47	23.90	0.448	0.1 (0.1-3.0) [96]	8.5 (7.7-10.3) [96]
50	03/11/12 08:12	03/12/12 07:57	2		6.3 (0.0-6.3) [96]	3.02	24.38	0.111	3.0 (0.1-3.1) [96]	0.9 (0.1-10.0) [96]
51	03/12/12 08:12	03/13/12 07:58	2	Adjusted air regulator in Stage #1, Start EXP 02?	6.2 (0.0-6.3) [97]	2.94	24.83	0.117	0.1 (0.1-3.0) [97]	5.5 (0.1-10.3) [97]
52	03/13/12 08:13	03/14/12 07:58	2		6.2 (0.0-6.2) [96]	6.04	20.72	0.203	0.1 (0.1-0.1) [96]	11.0 (5.3-11.4) [96]
53	03/14/12 08:13	03/15/12 07:58	2		6.3 (0.0-6.3) [96]	5.92	20.43	0.546	0.1 (0.1-0.1) [96]	11.5 (9.2-11.7) [96]
54	03/15/12 08:13	03/16/12 07:58	2		6.2 (0.1-6.3) [96]	4.74	21.91	0.462	0.1 (0.1-0.1) [96]	11.1 (9.6-11.7) [96]
55	03/16/12 08:13	03/17/12 07:58	2		6.2 (0.1-6.3) [96]	5.02	23.04	0.493	0.1 (0.1-0.1) [96]	10.8 (9.9-11.8) [96]
56	03/17/12 08:13	03/18/12 07:58	2		6.3 (0.1-6.3) [96]	5.43	24.56	0.427	0.1 (0.1-0.1) [96]	9.2 (9.1-10.8) [96]
57	03/18/12 08:13	03/19/12 07:58	2		6.2 (0.0-6.3) [96]	6.23	25.36	0.494	0.1 (0.1-0.1) [96]	6.6 (5.6-9.7) [96]
58	03/19/12 08:13	03/20/12 07:58	2		6.2 (0.1-6.2) [97]	10.04	21.47	0.514	0.1 (0.1-0.1) [97]	1.8 (0.0-6.2) [97]
59	03/20/12 08:13	03/21/12 07:58	2	cleaned DO probe, End Exp 02	6.2 (0.0-6.3) [96]	2.81	25.78	0.133	0.1 (0.1-0.1) [96]	4.4 (0.0-10.2) [96]
60	03/21/12 08:13	03/22/12 07:58	3	Increase Q to 8 gpm	7.9 (0.1-7.9) [96]	2.30	30.00	0.039	0.1 (0.1-0.1) [96]	2.1 (0.0-8.2) [96]
61	03/22/12 08:13	03/23/12 07:43	3		7.9 (0.1-8.1) [95]	11.62	25.72	0.687	0.1 (0.1-0.1) [95]	8.4 (0.7-9.6) [95]
62	03/23/12 07:58	03/24/12 07:58	3		8.1 (0.1-8.1) [97]	9.98	26.44	0.837	0.1 (0.1-0.1) [97]	8.4 (4.0-9.8) [97]
63	03/24/12 08:13	03/25/12 07:58	3		8.0 (0.1-8.1) [96]	15.11	24.34	0.944	0.1 (0.1-0.1) [96]	9.3 (8.4-10.3) [96]
64	03/25/12 08:13	03/26/12 07:58	3	noted algae in BAF effluent	8.2 (0.1-8.2) [96]	14.78	23.87	0.966	0.1 (0.1-0.1) [96]	9.2 (7.6-10.4) [96]
65	03/26/12 08:13	03/27/12 07:45	3	shut off for high tank level, adjust air	0.2 (0.1-8.3) [97]	17.72	22.88	0.777	0.1 (0.1-0.1) [97]	13.1 (5.8-15.5) [97]
66	03/27/12 08:00	03/28/12 07:45	3	covered tanks to prevent sunlight	8.2 (0.0-8.3) [96]	7.09	25.64	0.593	0.1 (0.1-0.1) [96]	4.5 (0.1-11.5) [96]
67	03/28/12 08:00	03/29/12 07:45	3	chlorinate BAF backwash supply	8.2 (0.1-8.3) [96]	9.76	26.85	0.653	0.1 (0.1-0.1) [96]	0.1 (0.0-9.1) [96]
68	03/29/12 08:00	03/30/12 07:45	3	cleaned DO probe	8.2 (0.1-8.2) [96]	19.34	21.97	0.974	0.1 (0.1-0.1) [96]	3.4 (1.6-7.0) [96]
69	03/30/12 08:00	03/31/12 07:45	3	first bw since 3/27	8.1 (0.1-8.3) [96]	16.35	23.56	0.936	0.1 (0.1-0.1) [96]	2.8 (0.0-10.3) [96]
70	03/31/12 08:00	04/01/12 08:45	3		8.2 (0.1-8.3) [96]	10.54	25.26	0.561	0.1 (0.1-0.1) [96]	0.2 (0.1-8.3) [96]
71	04/01/12 09:00	04/02/12 07:45	3		0.1 (0.1-8.2) [92]	24.63	14.55	0.993	0.1 (0.1-0.1) [92]	11.3 (0.1-12.6) [92]
72	04/02/12 08:00	04/03/12 07:45	3	BAF offline	8.2 (0.1-8.2) [96]	6.15	23.81	0.700	0.1 (0.1-0.1) [96]	5.0 (0.1-12.6) [96]
73	04/03/12 08:00	04/04/12 07:56	3		8.1 (0.1-8.2) [96]	8.18	24.42	0.975	0.1 (0.1-0.1) [96]	0.2 (0.1-4.6) [96]
74	04/04/12 08:11	04/05/12 07:56	3		8.1 (0.1-8.3) [96]	10.06	24.11	0.964	0.1 (0.1-0.1) [96]	3.6 (0.1-5.6) [96]
75	04/05/12 08:11	04/06/12 07:56	3		7.0 (0.1-8.1) [96]	11.07	22.82	0.964	0.1 (0.1-0.1) [96]	0.9 (0.0-4.9) [96]
76	04/06/12 08:11	04/07/12 07:56	3		7.0 (0.1-7.1) [96]	8.70	23.35	0.981	0.1 (0.1-0.1) [96]	4.2 (0.0-8.7) [96]
77	04/07/12 08:11	04/08/12 07:56	3		6.9 (0.1-7.0) [96]	10.24	23.14	0.984	0.1 (0.1-0.1) [96]	4.8 (0.0-7.3) [96]
78	04/08/12 08:11	04/09/12 07:56	3		6.9 (0.1-6.9) [96]	11.53	22.68	0.969	0.1 (0.1-0.1) [96]	3.8 (0.1-7.2) [96]
79	04/09/12 08:11	04/10/12 07:56	3		7.0 (0.1-7.0) [96]	11.38	23.36	0.978	0.1 (0.1-0.1) [96]	3.7 (0.0-9.0) [96]
80	04/10/12 08:11	04/11/12 07:41	3	algae detected on TSS filters	5.9 (0.1-7.0) [95]	12.03	21.42	0.755	0.1 (0.1-0.1) [95]	4.8 (0.0-8.9) [95]
81	04/11/12 07:56	04/12/12 07:46	3		5.9 (0.1-6.1) [97]	6.91	22.79	0.971	0.1 (0.1-0.1) [97]	2.0 (0.2-6.0) [97]
82	04/12/12 08:01	04/13/12 07:46	3		6.0 (0.1-6.0) [96]	8.05	22.76	0.964	0.1 (0.1-0.1) [96]	0.2 (0.0-4.8) [96]
83	04/13/12 08:01	04/14/12 07:46	3		0.1 (0.1-6.0) [96]	13.97	18.37	0.970	0.1 (0.1-0.1) [96]	10.3 (0.1-11.7) [96]
84	04/14/12 08:01	04/15/12 07:46	3		0.1 (0.1-0.1) [96]				0.1 (0.1-0.1) [96]	9.9 (7.1-10.9) [96]
85	04/15/12 08:01	04/16/12 07:46	3		5.9 (0.1-6.0) [96]	6.83	22.18	0.912	0.1 (0.1-0.1) [96]	1.9 (0.1-10.1) [96]

	E	F	G	H	I	J	K	L	M	N
1	Start	End	Phase	Notes	Influent Flow BAF #1 (gpm)	Slope of Runtime VS Headloss (in/day)	Intercept of Runtime VS Headloss (in)	R-SQ of Runtime VS Headloss	Influent Flow BAF #2 (gpm)	DO Probe (ppm)
86	04/16/12 08:01	04/17/12 07:46	3		6.0 (0.1-6.1) [96]	3.18	22.91	0.457	0.1 (0.1-0.1) [96]	2.1 (0.2-8.6) [96]
87	04/17/12 08:01	04/18/12 07:46	3		5.9 (0.1-6.1) [96]	6.63	22.24	0.519	0.1 (0.1-0.1) [96]	0.0 (0.0-8.6) [96]
88	04/18/12 08:01	04/19/12 07:46	4	convert system to TN<8 mode (MLE)	3.0 (0.1-6.1) [96]	7.23	20.23	0.929	0.1 (0.1-0.1) [96]	9.3 (0.0-10.3) [96]
89	04/19/12 08:01	04/20/12 07:46	4	shut off MLE, flow through C+N only	2.9 (0.1-3.0) [96]				0.1 (0.1-0.1) [96]	0.1 (0.1-10.3) [96]
90	04/20/12 08:01	04/21/12 07:46	4		2.9 (2.9-2.9) [96]				0.1 (0.1-0.1) [96]	0.1 (0.1-0.1) [96]
91	04/21/12 08:01	04/22/12 07:46	4		2.9 (2.9-2.9) [96]				0.1 (0.1-0.1) [96]	0.1 (0.1-0.1) [96]
92	04/22/12 08:01	04/23/12 07:46	4	not backwashing due to float issue	0.1 (0.1-3.0) [96]				0.1 (0.1-0.1) [96]	0.1 (0.1-1.7) [96]
93	04/23/12 08:01	04/24/12 07:46	4		8.9 (0.0-9.1) [96]	14.15	14.44	0.792	0.1 (0.1-0.1) [96]	4.7 (0.1-10.4) [96]
94	04/24/12 08:01	04/25/12 07:53	4		8.1 (0.0-9.0) [97]				0.1 (0.1-15.0) [97]	3.4 (0.0-9.9) [97]
95	04/25/12 08:08	04/26/12 07:53	4		4.0 (0.0-7.9) [96]				0.1 (0.1-15.0) [96]	0.1 (0.1-3.0) [96]
96	04/26/12 08:08	04/27/12 07:53	4	Repaired BAF#2 BW pump	4.0 (0.0-4.1) [96]	2.85	18.53	0.961	0.1 (0.1-3.0) [96]	0.2 (0.2-1.8) [96]
97	04/27/12 08:08	04/28/12 07:53	4		3.9 (3.9-4.1) [96]	2.68	18.06	0.732	0.1 (0.1-3.1) [96]	6.8 (0.2-7.8) [96]
98	04/28/12 08:08	04/29/12 07:53	4		0.1 (0.1-4.1) [96]	3.00	17.55	0.735	0.1 (0.1-0.1) [96]	6.6 (0.1-7.8) [96]
99	04/29/12 08:08	04/30/12 07:53	4	bw valve stuck - will not backwash	3.9 (0.1-4.1) [96]				3.1 (0.1-3.1) [96]	2.7 (0.2-9.0) [96]
100	04/30/12 08:08	05/01/12 07:53	4		4.0 (0.1-4.1) [96]	2.69	16.83	0.924	2.9 (2.9-3.1) [96]	4.6 (0.1-6.4) [96]
101	05/01/12 08:08	05/02/12 07:51	4		4.0 (0.1-4.1) [96]	1.23	19.57	0.530	3.0 (2.9-3.1) [96]	1.9 (0.1-4.8) [96]
102	05/02/12 08:06	05/03/12 07:49	4		3.9 (0.1-4.1) [96]	1.73	18.89	0.990	3.0 (0.1-3.1) [96]	4.6 (0.0-9.3) [96]
103	05/03/12 08:04	05/04/12 07:48	4		0.1 (0.1-4.1) [96]				0.1 (0.1-3.1) [96]	11.2 (1.5-11.4) [96]
104	05/04/12 08:03	05/05/12 07:46	4	BW problems	4.0 (0.1-14.0) [96]				2.5 (0.1-13.9) [96]	10.2 (0.0-10.8) [96]
105	05/05/12 08:01	05/06/12 07:59	4		4.0 (3.8-4.1) [97]	3.70	16.46	0.897	2.5 (2.5-2.5) [97]	10.4 (10.4-11.0) [97]
106	05/06/12 08:14	05/07/12 07:57	4		4.0 (0.1-4.2) [96]	3.35	17.05	0.882	2.6 (0.1-2.6) [96]	10.4 (9.1-11.0) [96]
107	05/07/12 08:12	05/08/12 07:45	4		4.0 (0.1-4.2) [96]	6.11	15.40	0.842	2.4 (0.1-2.6) [96]	10.3 (9.0-10.8) [96]
108	05/08/12 08:00	05/09/12 07:45	4		4.0 (0.1-4.1) [96]	2.85	17.63	0.896	2.5 (0.1-2.5) [96]	10.4 (7.2-10.5) [96]
109	05/09/12 08:00	05/10/12 07:45	4	seed BAF#1 from MBBR NR2 (2 gpm)	4.0 (0.1-4.1) [96]	3.21	18.58	0.891	2.4 (0.1-2.5) [96]	9.7 (8.1-10.4) [96]
110	05/10/12 08:00	05/11/12 07:45	4		4.0 (0.1-4.6) [96]	4.01	17.40	0.653	2.4 (0.1-2.5) [96]	10.1 (8.1-10.7) [96]
111	05/11/12 08:00	05/12/12 07:45	4		4.0 (0.1-4.2) [96]	2.34	17.67	0.764	2.4 (0.1-2.4) [96]	10.4 (8.2-11.0) [96]
112	05/12/12 08:00	05/13/12 07:45	4		4.0 (0.1-4.2) [96]	2.42	18.01	0.813	2.5 (0.1-2.5) [96]	10.3 (8.5-11.0) [96]
113	05/13/12 08:00	05/14/12 07:45	4		3.9 (0.1-4.2) [96]	1.90	17.54	0.160	2.4 (0.1-2.5) [96]	10.2 (8.4-10.7) [96]
114	05/14/12 08:00	05/15/12 07:00	4		4.0 (0.1-4.2) [93]	3.52	15.62	0.447	2.5 (0.1-2.5) [93]	10.2 (8.5-10.6) [93]
115	05/15/12 12:47	05/16/12 07:47	4	Seed flow @ 100%	4.0 (0.1-4.2) [77]	3.94	15.91	0.619	2.4 (0.1-2.5) [77]	10.1 (7.9-10.1) [77]
116	05/16/12 08:02	05/17/12 07:47	4	Seed flow @ 100%	4.0 (0.0-4.2) [96]	3.41	16.26	0.662	2.4 (0.0-2.5) [96]	9.5 (0.0-10.1) [96]
117	05/17/12 08:02	05/18/12 07:47	4		4.0 (0.1-4.2) [96]	6.03	15.73	0.908	2.5 (0.1-2.5) [96]	9.6 (7.4-10.2) [96]
118	05/18/12 08:02	05/19/12 07:47	4		4.0 (0.1-4.5) [96]	6.60	15.83	0.888	2.4 (0.1-2.5) [96]	9.3 (6.8-10.2) [96]
119	05/19/12 08:02	05/20/12 07:47	4		4.0 (0.1-4.2) [96]	7.18	16.29	0.941	2.4 (0.1-2.5) [96]	8.9 (6.5-9.9) [96]
120	05/20/12 08:02	05/21/12 07:47	4		4.0 (0.1-4.3) [96]	8.56	15.53	0.916	2.4 (0.1-2.5) [96]	8.9 (6.6-9.4) [96]
121	05/21/12 08:02	05/22/12 07:48	4	backwashx3 to scour heterotrophs, set up ammonia feed	4.0 (0.0-16.1) [104]	4.09	18.22	0.089	2.4 (0.1-2.4) [104]	6.7 (3.5-9.3) [104]
122	05/22/12 08:00	05/23/12 07:48	4		4.0 (0.0-4.3) [120]	3.66	18.53	0.373	2.4 (0.1-2.4) [120]	5.5 (4.7-7.5) [120]
123	05/23/12 08:00	05/24/12 07:48	4		4.0 (0.0-4.1) [120]	1.79	21.05	0.091	2.4 (0.0-2.4) [120]	2.9 (0.0-6.2) [120]
124	05/24/12 08:00	05/25/12 07:48	4		4.0 (0.1-4.1) [120]	5.51	19.64	0.847	2.4 (0.1-2.5) [120]	8.4 (1.3-8.8) [120]
125	05/25/12 08:00	05/26/12 07:48	4		4.0 (0.0-4.1) [120]	7.65	19.69	0.972	2.5 (0.1-2.5) [120]	8.3 (7.3-9.3) [120]
126	05/26/12 08:00	05/27/12 07:48	4		4.1 (0.1-4.1) [120]	9.58	18.30	0.781	2.5 (0.1-2.5) [120]	8.4 (7.4-9.1) [120]
127	05/27/12 08:00	05/28/12 07:48	4		4.0 (0.1-5.4) [120]	8.98	18.34	0.786	2.4 (0.1-2.5) [120]	8.4 (7.0-9.0) [120]

	E	F	G	H	I	J	K	L	M	N
1	Start	End	Phase	Notes	Influent Flow BAF #1 (gpm)	Slope of Runtime VS Headloss (in/day)	Intercept of Runtime VS Headloss (in)	R-SQ of Runtime VS Headloss	Influent Flow BAF #2 (gpm)	DO Probe (ppm)
128	05/28/12 08:00	05/29/12 07:48	4		4.0 (0.1-6.4) [120]	8.88	18.27	0.796	2.3 (0.1-2.4) [120]	7.6 (6.8-8.6) [120]
129	05/29/12 08:00	05/30/12 07:48	4	re-adjusted seed flow from MBBR to 2.5 gpm	3.9 (0.1-4.1) [120]	7.44	19.49	0.683	2.5 (0.1-2.5) [120]	7.4 (6.0-8.4) [120]
130	05/30/12 08:00	05/31/12 07:48	4		4.0 (0.0-4.1) [120]	7.02	21.11	0.935	2.4 (0.0-2.5) [120]	5.7 (0.0-7.9) [120]
131	05/31/12 08:00	06/01/12 07:48	4	shut off seed , reduce flow	4.1 (0.1-4.1) [120]	8.20	21.51	0.969	2.5 (0.1-2.5) [120]	5.3 (4.0-7.1) [120]
132	06/01/12 08:00	06/02/12 07:48	4		1.9 (0.0-4.1) [120]	11.14	15.26	0.560	0.1 (0.1-2.5) [120]	7.6 (5.7-8.4) [120]
133	06/02/12 08:00	06/03/12 07:48	4		2.0 (0.1-2.1) [120]	2.27	17.02	0.494	0.1 (0.1-0.1) [120]	8.6 (6.4-9.2) [120]
134	06/03/12 08:00	06/04/12 07:48	4		2.0 (0.0-2.1) [120]	2.02	16.22	0.221	0.1 (0.1-1.2) [120]	9.0 (3.9-9.6) [120]
135	06/04/12 08:00	06/05/12 07:48	4		2.0 (0.1-2.1) [120]	1.29	16.27	0.068	0.1 (0.1-1.1) [120]	9.2 (7.0-9.7) [120]
136	06/05/12 08:00	06/06/12 07:48	4		2.0 (0.1-2.1) [120]				1.4 (0.1-2.0) [120]	8.7 (6.3-9.2) [120]
137	06/06/12 08:00	06/07/12 07:48	4	added microC to BAF#2	0.2 (0.0-2.1) [120]	2.29	15.73	0.287	1.4 (0.1-1.5) [120]	5.2 (0.0-9.1) [120]
138	06/07/12 08:00	06/08/12 07:48	4	problems with SCADA system	1.9 (0.1-2.1) [120]	1.31	16.22	0.137	0.6 (0.1-1.4) [120]	7.8 (3.0-8.6) [120]
139	06/08/12 08:00	06/09/12 07:48	4	Restart BAF system, but overflowed	0.1 (0.1-2.1) [120]	1.97	16.16	0.227	0.6 (0.0-1.0) [120]	5.2 (2.8-8.6) [120]
140	06/09/12 08:00	06/10/12 07:48	4	Attempted to call Kruger, could not restart	0.1 (0.1-0.1) [120]				0.9 (0.0-1.0) [120]	0.2 (0.2-3.2) [120]
141	06/10/12 08:00	06/11/12 07:48	4		2.0 (0.0-2.1) [120]				0.9 (0.0-1.1) [120]	7.4 (1.6-8.3) [120]
142	06/11/12 08:00	06/12/12 07:48	4		2.0 (0.1-2.0) [120]				0.9 (0.0-1.1) [120]	7.7 (4.5-8.3) [120]
143	06/12/12 08:00	06/13/12 07:48	4		2.0 (0.1-2.0) [120]				0.9 (0.0-1.1) [120]	7.3 (6.1-8.1) [120]
144	06/13/12 08:00	06/14/12 07:48	4	shut off ammonia feed to BAF	2.0 (0.0-2.1) [120]				0.8 (0.0-1.0) [120]	6.4 (0.0-7.9) [120]
145	06/14/12 08:00	06/15/12 07:48	4	reduced BAF Tank #1 volume to 2000 gallons	2.0 (0.1-2.0) [120]				0.8 (0.0-1.0) [120]	6.4 (5.3-6.8) [120]
146	06/15/12 08:00	06/16/12 07:48	4		2.0 (0.1-2.0) [120]				0.8 (0.0-1.0) [120]	5.1 (2.2-7.1) [120]
147	06/16/12 08:00	06/17/12 07:48	4		2.0 (2.0-2.0) [120]	1.23	10.08	0.855	0.9 (0.0-1.1) [120]	4.4 (3.8-5.6) [120]
148	06/17/12 08:00	06/18/12 07:48	4		2.0 (2.0-2.0) [120]	1.81	6.43	0.883	0.9 (0.0-1.1) [120]	3.0 (2.4-4.6) [120]
149	06/18/12 08:00	06/19/12 07:48	4		2.0 (0.1-2.3) [120]				0.8 (0.0-1.0) [120]	6.3 (0.9-8.7) [120]
150	06/19/12 08:00	06/20/12 07:48	4		2.0 (0.1-2.1) [120]				0.9 (0.0-1.0) [120]	6.3 (2.2-8.0) [120]
151	06/20/12 08:00	06/21/12 07:48	4		3.0 (0.0-3.1) [120]				1.9 (0.0-1.9) [120]	4.1 (0.0-7.7) [120]
152	06/21/12 08:00	06/22/12 07:48	4	increased BAF flow rate 3->4 gpm, started NH3 feed to PE	3.0 (0.0-3.1) [120]				2.0 (0.0-2.0) [120]	3.9 (2.6-9.2) [120]
153	06/22/12 08:00	06/23/12 07:48	4		4.0 (0.0-4.2) [120]				2.9 (0.0-3.0) [120]	8.9 (3.9-9.5) [120]
154	06/23/12 08:00	06/24/12 07:48	4		4.0 (0.1-4.2) [120]				2.9 (0.0-2.9) [120]	9.2 (6.7-9.5) [120]
155	06/24/12 08:00	06/25/12 07:48	4		3.9 (0.1-4.3) [120]				3.0 (0.0-3.0) [120]	8.7 (6.6-9.4) [120]
156	06/25/12 08:00	06/26/12 07:48	4		4.0 (0.1-4.0) [120]				3.0 (0.1-3.0) [120]	9.2 (6.2-9.6) [120]

	E	F	G	H	I	J	K	L	M	N
1	Start	End	Phase	Notes	Influent Flow BAF #1 (gpm)	Slope of Runtime VS Headloss (in/day)	Intercept of Runtime VS Headloss (in)	R-SQ of Runtime VS Headloss	Influent Flow BAF #2 (gpm)	DO Probe (ppm)
157	06/26/12 08:00	06/27/12 07:48	5	Increased NH3 feed to PE	4.1 (0.1-4.1) [120]				3.0 (0.0-3.0) [120]	8.8 (6.8-9.6) [120]
158	06/27/12 08:00	06/28/12 07:48	5		3.3 (0.1-4.1) [120]				1.9 (0.0-3.0) [120]	8.6 (0.0-9.6) [120]
159	06/28/12 08:00	06/29/12 07:48	5		3.1 (0.1-3.3) [120]				2.0 (0.0-2.0) [120]	7.9 (5.9-9.2) [120]
160	06/29/12 08:00	06/30/12 07:48	5		3.1 (0.1-3.3) [120]				2.0 (0.0-2.0) [120]	7.1 (5.2-8.5) [120]
161	06/30/12 08:00	07/01/12 07:48	5		3.3 (0.1-3.3) [120]				2.0 (0.0-2.0) [120]	7.2 (4.3-8.1) [120]
162	07/01/12 08:00	07/02/12 07:48	5	Start ET 05-06	3.3 (0.1-3.3) [120]				1.9 (0.0-2.0) [120]	7.2 (3.8-8.1) [120]
163	07/02/12 08:00	07/03/12 07:45	5		3.2 (0.1-3.3) [112]				2.0 (0.0-2.0) [112]	7.3 (4.9-8.5) [112]
164	07/03/12 08:00	07/04/12 07:45	5		3.3 (0.1-3.3) [96]				2.0 (0.1-2.0) [96]	8.8 (6.3-9.4) [96]
165	07/04/12 08:00	07/05/12 07:45	5		3.3 (0.1-3.3) [96]				2.1 (0.1-2.1) [96]	8.9 (6.5-9.4) [96]
166	07/05/12 08:00	07/06/12 07:45	5	begin hourly discreet sampling of BAF#1 NH3	3.1 (0.0-3.3) [96]	0.28	14.53	0.928	2.0 (0.1-2.2) [96]	8.7 (6.1-9.3) [96]
167	07/06/12 08:00	07/07/12 07:45	5		2.9 (0.0-3.3) [96]	0.38	13.40	0.888	1.9 (0.1-2.0) [96]	8.9 (6.3-9.3) [96]
168	07/07/12 08:00	07/08/12 07:45	5		3.1 (0.0-3.3) [96]	0.33	12.67	0.729	2.0 (0.1-2.1) [96]	9.0 (7.2-9.4) [96]
169	07/08/12 08:00	07/09/12 07:45	5		3.1 (0.0-3.1) [96]	0.23	13.19	0.747	2.0 (0.1-2.0) [96]	9.1 (6.5-9.6) [96]
170	07/09/12 08:00	07/10/12 07:45	5		3.0 (0.1-3.1) [96]	0.27	13.51	0.749	2.1 (0.1-2.1) [96]	9.0 (7.5-9.6) [96]
171	07/10/12 08:00	07/11/12 07:55	5		3.0 (0.1-3.1) [97]	0.32	13.74	0.816	2.0 (0.0-2.1) [97]	8.9 (7.5-9.5) [97]
172	07/11/12 08:10	07/12/12 07:55	5		3.0 (0.1-3.1) [96]	0.36	14.76	0.852	1.9 (0.1-2.0) [96]	8.5 (7.5-9.3) [96]
173	07/12/12 08:10	07/13/12 07:55	5		2.9 (0.1-3.1) [96]	0.42	14.11	0.887	2.0 (0.1-2.2) [96]	8.5 (6.4-8.9) [96]
174	07/13/12 08:10	07/14/12 07:55	5		2.9 (0.1-3.1) [96]	0.40	13.92	0.925	2.0 (0.0-2.0) [96]	8.4 (6.3-8.9) [96]
175	07/14/12 08:10	07/15/12 07:57	5	BAF alarm for low tank level	0.1 (0.1-3.1) [129]	0.40	14.82	0.970	0.0 (0.0-2.0) [129]	8.9 (7.6-9.1) [129]
176	07/15/12 08:08	07/16/12 07:50	5	BAF offline	0.1 (0.1-0.1) [133]				0.0 (0.0-0.0) [133]	8.5 (7.5-8.9) [133]
177	07/16/12 08:00	07/17/12 07:53	5	Restart BAF system, but overflowed	3.0 (0.1-3.1) [134]				1.9 (0.0-1.9) [134]	8.0 (4.4-8.7) [134]
178	07/17/12 08:04	07/18/12 07:56	5		3.0 (0.0-3.7) [134]				1.9 (0.0-2.1) [134]	8.1 (5.2-8.4) [134]
179	07/18/12 08:07	07/19/12 07:59	5		3.0 (0.0-3.2) [134]	0.08	16.09	0.527	2.0 (0.1-2.1) [134]	0.0 (0.0-8.0) [134]
180	07/19/12 08:10	07/20/12 07:51	5		2.9 (0.0-3.1) [133]	0.06	16.40	0.245	2.1 (0.1-2.1) [133]	8.4 (0.0-9.0) [133]
181	07/20/12 08:02	07/21/12 07:55	5	End ET 05-06	3.0 (0.1-3.1) [134]	0.12	15.73	0.568	2.0 (0.1-2.1) [134]	8.8 (8.0-9.0) [134]
182	07/21/12 08:05	07/22/12 07:58	5		3.0 (0.1-3.1) [134]	0.23	14.84	0.871	1.9 (0.1-2.1) [134]	8.6 (7.8-9.0) [134]
183	07/22/12 08:08	07/23/12 07:50	5		3.0 (0.1-4.1) [133]	0.39	13.48	0.854	2.0 (0.1-2.1) [133]	8.6 (7.6-9.0) [133]
184	07/23/12 08:01	07/24/12 07:54	5		3.0 (0.0-3.1) [140]	0.55	15.43	0.913	2.0 (0.0-2.1) [140]	8.4 (0.0-9.0) [140]
185	07/24/12 08:04	07/25/12 07:54	6	EXP 04 - FMS Test	3.0 (0.1-7.3) [144]	0.75	15.75	0.881	2.1 (0.1-6.1) [144]	8.3 (6.8-8.7) [144]
186	07/25/12 08:04	07/26/12 07:54	6	EXP 04 - FPS Test	3.0 (0.1-9.2) [144]	0.81	15.91	0.868	2.0 (0.1-8.1) [144]	8.3 (7.3-8.7) [144]
187	07/26/12 08:04	07/27/12 07:54	6	EXP 04 - FPM Test	3.0 (0.1-9.1) [144]	0.79	18.09	0.628	2.0 (0.1-8.2) [144]	8.3 (7.0-8.9) [144]
188	07/27/12 08:04	07/28/12 07:54	6	EXP 04 - Start DPE Test at 11:00	9.2 (0.0-9.2) [144]	2.51	6.86	0.975	8.2 (0.1-8.2) [144]	8.2 (7.8-9.4) [144]
189	07/28/12 08:04	07/29/12 07:54	6	EXP 04 - End DPE Test at 15:30	3.0 (0.0-9.4) [144]	0.23	23.96	0.182	2.1 (0.1-8.2) [144]	8.3 (7.3-9.4) [144]
190	07/29/12 08:04	07/30/12 07:54	6		3.1 (0.1-3.2) [144]	0.74	14.84	0.919	2.1 (0.1-2.1) [144]	8.5 (8.3-8.9) [144]
191	07/30/12 08:04	07/31/12 07:54	6	EXP 04 - FXM Test 12:00 to 18:00	3.0 (0.0-18.6) [144]	0.19	27.17	0.021	2.1 (0.1-15.1) [144]	8.2 (1.0-8.9) [144]
192	07/31/12 08:04	08/01/12 07:54	6	EXP 04 - Start DXE Test at 12:00	18.4 (3.0-18.6) [144]	3.35	11.64	0.984	15.1 (0.1-15.1) [144]	4.7 (0.1-8.4) [144]
193	08/01/12 08:04	08/02/12 07:54	6	EXP 04 - End DXE Test at 12:00	3.0 (0.0-18.5) [144]	-0.66	34.02	0.232	1.9 (0.0-15.1) [144]	7.9 (0.1-8.4) [144]
194	08/02/12 08:04	08/03/12 10:20	7	Shut down and chlorinate	3.0 (0.1-3.1) [53]	0.39	16.47	0.408	2.0 (0.1-2.0) [53]	7.9 (3.8-8.4) [53]

	F	O	P	S	U	V	W	X	Y	Z	AB
1	End	(02) PRIMARY EFFLUENT SAMPLE ID	(02) PRIMARY EFFLUENT TSS (mg/L)	(02) PRIMARY EFFLUENT pH (mg/L)	(02) PRIMARY EFFLUENT COD(t) (mg/L)	(02) PRIMARY EFFLUENT COD(s) (mg/L)	(02) PRIMARY EFFLUENT BOD(t) (mg/L)	(02) PRIMARY EFFLUENT BOD(s) (mg/L)	(02) PRIMARY EFFLUENT Nitrate (NO3-N) (mg/L)	(02) PRIMARY EFFLUENT Ammonia (NH3-N) (mg/L)	(02) PRIMARY EFFLUENT Total Nitrogen (mg/L) (TN)
2	05/28/12 00:00	2-1,935 [653]	124 (31-1,555) [517]	7.14 (6.34-216.00) [229]	407 (106-931) [438]	194 (87-401) [240]	209 (98-468) [104]	106 (48-180) [75]	0.3 (0.1-2.4) [36]	17.4 (5.1-56.0) [201]	22.5 (1.0-50.3) [68]
4	01/26/12 15:27	2-137 [114]	161 (68-219) [102]	7.17 (6.67-7.80) [68]	458 (209-737) [92]	288 (286-297) [6]	No Data [0]	No Data [0]	No Data [0]	16.1 (12.9-26.4) [18]	No Data [0]
5	01/27/12 07:59	142-142 [6]	90 (66-103) [6]	7.25 (6.93-7.28) [6]	206 (204-208) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	6.5 (6.5-6.5) [6]	No Data [0]
6	01/28/12 07:59	150-150 [6]	90 (80-101) [6]	No Data [0]	169 (162-176) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
7	01/29/12 07:57	156-156 [6]	69 (66-72) [6]	No Data [0]	225 (223-226) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
8	01/30/12 07:57	161-161 [6]	129 (123-132) [6]	No Data [0]	397-397 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	12.6 (12.5-12.6) [4]	No Data [0]
9	01/31/12 07:57	168-168 [6]	87 (79-95) [6]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	11.6 (11.5-11.7) [4]	No Data [0]
10	02/01/12 07:57	178-178 [8]	135 (133-137) [6]	7.10 (7.02-7.21) [6]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	12.9 (10.7-13.3) [8]	No Data [0]
11	02/02/12 07:57	186-186 [6]	132 (128-136) [6]	No Data [0]	152-152 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
12	02/03/12 07:57	194-194 [8]	143 (143-151) [6]	No Data [0]	355 (338-371) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	13.0 (11.7-14.1) [8]	No Data [0]
13	02/04/12 07:57	204-204 [6]	75 (65-89) [6]	No Data [0]	276-276 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
14	02/05/12 07:57	209-209 [6]	82 (72-89) [6]	No Data [0]	340-340 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
15	02/06/12 07:57	223-223 [2]	No Data [0]	No Data [0]	406-406 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
16	02/07/12 07:57	225-225 [8]	65 (62-66) [6]	No Data [0]	327 (320-334) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	10.4 (9.3-11.5) [8]	No Data [0]
17	02/08/12 07:56	235-235 [6]	138 (138-149) [6]	7.24 (7.12-7.36) [6]	438 (434-441) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
18	02/09/12 07:56	243-243 [6]	109 (89-116) [6]	No Data [0]	425 (413-437) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	16.2 (15.4-16.3) [6]	No Data [0]
19	02/10/12 07:56	260-260 [6]	103 (93-118) [6]	6.87 (6.74-6.98) [6]	415 (412-418) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
20	02/11/12 07:56	267-267 [6]	114 (86-118) [6]	No Data [0]	397 (396-397) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
21	02/12/12 07:56	275-275 [6]	147 (135-156) [6]	No Data [0]	561 (550-571) [4]	245 (245-245) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
22	02/13/12 07:56	282-282 [6]	195 (160-199) [6]	6.60 (6.59-6.82) [6]	538 (537-539) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	14.8 (14.4-15.1) [4]	No Data [0]
23	02/14/12 07:56	295-295 [6]	202 (198-204) [6]	No Data [0]	606 (605-606) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	19.1 (19.0-19.1) [4]	No Data [0]
24	02/15/12 07:56	306-306 [6]	134 (120-183) [6]	6.94 (6.85-7.15) [6]	427 (418-435) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
25	02/16/12 07:58	318-318 [6]	105 (95-116) [6]	No Data [0]	414 (404-424) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	17.8 (17.6-17.9) [4]	No Data [0]
26	02/17/12 07:58	329-329 [3]	116 (107-123) [3]	No Data [0]	390-400 [2]	186-186 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
27	02/18/12 07:58	336-336 [3]	101 (92-106) [3]	No Data [0]	437-449 [2]	271-272 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
28	02/19/12 07:58	339-339 [3]	135 (133-189) [3]	No Data [0]	475-549 [2]	192-197 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
29	02/20/12 07:58	342-342 [3]	158 (147-197) [3]	No Data [0]	445-448 [2]	223-229 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
30	02/21/12 07:55	348-348 [3]	205 (201-224) [3]	7.56 (7.27-7.70) [3]	777-793 [2]	356-361 [2]	468 [1]	No Data [0]	No Data [0]	22.5-22.6 [2]	No Data [0]
31	02/22/12 07:55	359-359 [3]	88 (85-102) [3]	No Data [0]	407-410 [2]	236-236 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
32	02/23/12 07:55	369-369 [3]	151 (137-200) [3]	6.99 (6.78-7.04) [3]	483-485 [2]	229-237 [2]	246-285 [2]	121 [1]	No Data [0]	No Data [0]	No Data [0]
33	02/24/12 07:55	379-379 [3]	143 (119-153) [3]	No Data [0]	422-440 [2]	216-217 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
34	02/25/12 07:55	384-384 [3]	62 (58-67) [3]	No Data [0]	212-216 [2]	109-109 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
35	02/26/12 07:55	390-395 [6]	66 (31-84) [6]	No Data [0]	208 (208-209) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
36	02/27/12 07:55	398-398 [4]	125 (124-127) [3]	No Data [0]	397-398 [2]	160-161 [2]	150 (146-153) [4]	79 (76-83) [4]	No Data [0]	No Data [0]	No Data [0]
37	02/28/12 07:58	410-410 [3]	97 (94-106) [3]	No Data [0]	476-486 [2]	283-290 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
38	02/29/12 07:46	415-415 [4]	153 (140-155) [3]	No Data [0]	435-442 [2]	211-215 [2]	280 (257-291) [4]	124 (120-132) [4]	No Data [0]	No Data [0]	No Data [0]
39	03/01/12 07:48	425-425 [3]	91 (90-105) [3]	6.91 (6.62-7.02) [3]	372-373 [2]	194-198 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
40	03/02/12 07:51	434-434 [4]	104 (76-106) [3]	No Data [0]	381-381 [2]	206-208 [2]	226 (222-233) [3]	129 (124-141) [4]	No Data [0]	No Data [0]	No Data [0]
41	03/03/12 07:56	443-443 [3]	107 (87-110) [3]	No Data [0]	427-445 [2]	248-251 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
42	03/04/12 07:56	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
43	03/05/12 07:56	449-449 [4]	96 (91-97) [3]	7.17 (7.10-7.22) [3]	339-340 [2]	168-178 [2]	182 (176-214) [4]	86-93 [2]	No Data [0]	No Data [0]	No Data [0]

	F	O	P	S	U	V	W	X	Y	Z	AB
1	End	(02) PRIMARY EFFLUENT SAMPLE ID	(02) PRIMARY EFFLUENT TSS (mg/L)	(02) PRIMARY EFFLUENT pH (mg/L)	(02) PRIMARY EFFLUENT COD(t) (mg/L)	(02) PRIMARY EFFLUENT COD(s) (mg/L)	(02) PRIMARY EFFLUENT BOD(t) (mg/L)	(02) PRIMARY EFFLUENT BOD(s) (mg/L)	(02) PRIMARY EFFLUENT Nitrate (NO3-N) (mg/L)	(02) PRIMARY EFFLUENT Ammonia (NH3-N) (mg/L)	(02) PRIMARY EFFLUENT Total Nitrogen (mg/L) (TN)
44	03/06/12 07:56	459-459 [3]	100 (100-108) [3]	No Data [0]	310-346 [2]	153-172 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
45	03/07/12 07:57	464-464 [3]	106 (102-113) [3]	No Data [0]	406-459 [2]	213-275 [2]	215 (213-247) [3]	101 (97-105) [3]	No Data [0]	No Data [0]	No Data [0]
46	03/08/12 07:57	474-475 [6]	78 (50-114) [6]	7.04 (6.82-7.10) [6]	300 (262-340) [4]	135 (125-140) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
47	03/09/12 07:57	487-487 [3]	86 (81-86) [3]	No Data [0]	285-320 [2]	107-125 [2]	152-156 [2]	No Data [0]	2.1 [1]	11.1 [1]	No Data [0]
48	03/10/12 07:57	494-494 [3]	58 (49-64) [3]	No Data [0]	229-235 [2]	116-122 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
49	03/11/12 07:57	504-504 [3]	62 (60-83) [3]	No Data [0]	204-215 [2]	91-97 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
50	03/12/12 07:57	512-512 [3]	69 (58-79) [3]	6.88 (6.78-7.00) [3]	256-260 [2]	114-115 [2]	114-127 [2]	48-49 [2]	No Data [0]	No Data [0]	No Data [0]
51	03/13/12 07:58	520-520 [3]	75 (73-76) [3]	No Data [0]	254-258 [2]	129-132 [2]	124 (109-125) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
52	03/14/12 07:58	535-535 [3]	106 (102-106) [3]	No Data [0]	327-333 [2]	169-172 [2]	177-177 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
53	03/15/12 07:58	546-546 [3]	106 (106-111) [3]	6.74 (6.34-6.75) [3]	355-356 [2]	170-172 [2]	No Data [0]	No Data [0]	0.4-0.5 [2]	15.1-15.2 [2]	No Data [0]
54	03/16/12 07:58	554-554 [3]	104 (100-106) [3]	No Data [0]	327-328 [2]	149-153 [2]	180 (172-181) [3]	88 (87-90) [3]	No Data [0]	No Data [0]	No Data [0]
55	03/17/12 07:58	568-568 [3]	124 (123-129) [3]	No Data [0]	351-373 [2]	151-155 [2]	208 (206-212) [3]	110 (98-124) [3]	No Data [0]	No Data [0]	No Data [0]
56	03/18/12 07:58	575-575 [3]	65 (64-72) [3]	No Data [0]	285-288 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
57	03/19/12 07:58	580-580 [3]	95 (94-100) [3]	6.95 (6.82-9.94) [3]	305-309 [2]	127-129 [2]	165 (160-186) [3]	No Data [0]	No Data [0]	9.4-9.5 [2]	No Data [0]
58	03/20/12 07:58	592-592 [3]	109 (96-110) [3]	No Data [0]	386-420 [2]	181-185 [2]	222 (218-238) [3]	106 (103-108) [3]	No Data [0]	No Data [0]	No Data [0]
59	03/21/12 07:58	601-601 [3]	132 (132-134) [3]	6.84 (6.79-6.91) [3]	435-450 [2]	186-195 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
60	03/22/12 07:58	610-610 [3]	121 (119-127) [3]	No Data [0]	412-422 [2]	194-198 [2]	No Data [0]	No Data [0]	No Data [0]	17.1-17.2 [2]	No Data [0]
61	03/23/12 07:43	620-620 [3]	135 (133-140) [3]	No Data [0]	414-414 [2]	178-178 [2]	227 (225-229) [3]	104-108 [2]	No Data [0]	No Data [0]	No Data [0]
62	03/24/12 07:58	630-630 [3]	106 (91-110) [3]	No Data [0]	364-365 [2]	168-168 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
63	03/25/12 07:58	635-635 [3]	111 (108-113) [3]	No Data [0]	300-308 [2]	162-165 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
64	03/26/12 07:58	642-642 [3]	129 (120-138) [3]	6.85 (6.62-6.99) [3]	325-330 [2]	158-162 [2]	169 (164-171) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
65	03/27/12 07:45	655-655 [3]	159 (158-169) [3]	No Data [0]	468-469 [2]	244-250 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
66	03/28/12 07:45	661-661 [3]	182 (180-194) [3]	No Data [0]	407-426 [2]	226-231 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
67	03/29/12 07:45	669-669 [3]	172 (168-174) [3]	No Data [0]	500-507 [2]	263-266 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
68	03/30/12 07:45	677-677 [3]	145 (143-146) [3]	No Data [0]	426-427 [2]	200-202 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
69	03/31/12 07:45	681-681 [3]	172 (164-189) [3]	6.89 (6.63-6.94) [3]	494-496 [2]	233-234 [2]	No Data [0]	No Data [0]	0.7-0.8 [2]	21.6-21.7 [2]	No Data [0]
70	04/01/12 08:45	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
71	04/02/12 07:45	694-694 [3]	148 (119-151) [3]	No Data [0]	397-405 [2]	193-194 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
72	04/03/12 07:45	705-705 [3]	166 (160-171) [3]	No Data [0]	580-665 [2]	301-330 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
73	04/04/12 07:56	709-715 [6]	188 (142-1,555) [6]	6.59-6.94 [2]	593 (583-612) [4]	293 (256-329) [4]	324 (321-348) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
74	04/05/12 07:56	723-723 [3]	199 (196-203) [3]	No Data [0]	512-551 [2]	273-284 [2]	No Data [0]	No Data [0]	0.2-0.2 [2]	20.7-20.8 [2]	No Data [0]
75	04/06/12 07:56	732-732 [3]	186 (175-198) [3]	No Data [0]	510-546 [2]	252-257 [2]	275 (268-282) [3]	127 (120-133) [3]	No Data [0]	No Data [0]	No Data [0]
76	04/07/12 07:56	739-739 [3]	167 (165-169) [3]	No Data [0]	466-468 [2]	266-266 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
77	04/08/12 07:56	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
78	04/09/12 07:56	745-745 [2]	225-251 [2]	6.94 [1]	529-537 [2]	292-293 [2]	No Data [0]	No Data [0]	0.1-0.1 [2]	18.7-18.8 [2]	No Data [0]
79	04/10/12 07:56	754-754 [2]	213-237 [2]	No Data [0]	587-603 [2]	349-353 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
80	04/11/12 07:41	764-764 [2]	174-187 [2]	No Data [0]	527-534 [2]	320-336 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
81	04/12/12 07:46	773-773 [3]	211-225 [2]	No Data [0]	626-704 [2]	No Data [0]	277 (259-291) [3]	156 (150-177) [3]	No Data [0]	No Data [0]	No Data [0]
82	04/13/12 07:46	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
83	04/14/12 07:46	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
84	04/15/12 07:46	794-794 [2]	144-148 [2]	No Data [0]	481-572 [2]	233-234 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
85	04/16/12 07:46	801-801 [2]	151-168 [2]	No Data [0]	425-427 [2]	193-197 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

Table 3.5-02: BAF Stage #1 and BAF Stage #2 Field Data Report, Part 8 of 25

	F	O	P	S	U	V	W	X	Y	Z	AB
1	End	(02) PRIMARY EFFLUENT SAMPLE ID	(02) PRIMARY EFFLUENT TSS (mg/L)	(02) PRIMARY EFFLUENT pH (mg/L)	(02) PRIMARY EFFLUENT COD(t) (mg/L)	(02) PRIMARY EFFLUENT COD(s) (mg/L)	(02) PRIMARY EFFLUENT BOD(t) (mg/L)	(02) PRIMARY EFFLUENT BOD(s) (mg/L)	(02) PRIMARY EFFLUENT Nitrate (NO3-N) (mg/L)	(02) PRIMARY EFFLUENT Ammonia (NH3-N) (mg/L)	(02) PRIMARY EFFLUENT Total Nitrogen (mg/L) (TN)
86	04/17/12 07:46	808-808 [3]	178-185 [2]	6.80 [1]	558-561 [2]	279-280 [2]	290 (284-292) [3]	159 (153-161) [3]	No Data [0]	No Data [0]	No Data [0]
87	04/18/12 07:46	817-817 [2]	193-193 [2]	No Data [0]	571-587 [2]	277-278 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	34.5-34.6 [2]
88	04/19/12 07:46	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
89	04/20/12 07:46	825-825 [2]	No Data [0]	No Data [0]	607-622 [2]	No Data [0]	No Data [0]	No Data [0]	0.8 [1]	33.9-34.5 [2]	37.8 [1]
90	04/21/12 07:46	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
91	04/22/12 07:46	830-830 [3]	157-174 [2]	7.38 [1]	544-579 [2]	185-276 [2]	246 (244-269) [3]	96 [1]	0.2-0.2 [2]	No Data [0]	25.6-33.1 [2]
92	04/23/12 07:46	839-839 [2]	164-172 [2]	7.41 [1]	354-359 [2]	124-127 [2]	No Data [0]	No Data [0]	No Data [0]	12.1-12.6 [2]	19.1 [1]
93	04/24/12 07:46	847-847 [2]	90-103 [2]	7.57 [1]	206-220 [2]	91-92 [2]	98 [1]	No Data [0]	No Data [0]	6.0 [1]	6.7-10.9 [2]
94	04/25/12 07:53	857-857 [2]	123-126 [2]	No Data [0]	343-345 [2]	163-165 [2]	No Data [0]	No Data [0]	No Data [0]	11.3 [1]	14.6 [1]
95	04/26/12 07:53	865-865 [2]	118-120 [2]	No Data [0]	329-338 [2]	152-153 [2]	No Data [0]	No Data [0]	No Data [0]	13.2 [1]	20.8 [1]
96	04/27/12 07:53	872-872 [2]	108-114 [2]	7.09 [1]	333-340 [2]	170-177 [2]	180-187 [2]	88-91 [2]	No Data [0]	14.8 [1]	22.0 [1]
97	04/28/12 07:53	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
98	04/29/12 07:53	882-882 [2]	104-107 [2]	No Data [0]	323-323 [2]	154-157 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
99	04/30/12 07:53	889-889 [3]	99-101 [2]	6.89 [1]	320-330 [2]	148-150 [2]	166 (161-179) [3]	49 [1]	0.6 [1]	17.7 [1]	22.1 [1]
100	05/01/12 07:53	899-899 [3]	126-130 [2]	6.96 [1]	420-438 [2]	221-222 [2]	217 (207-227) [3]	112-119 [2]	No Data [0]	17.4 [1]	24.7 [1]
101	05/02/12 07:51	912-912 [2]	112-112 [2]	7.10 [1]	305-309 [2]	144-145 [2]	164-169 [2]	72-75 [2]	No Data [0]	12.9 [1]	19.3 [1]
102	05/03/12 07:49	924-924 [2]	121-122 [2]	7.27 [1]	387-393 [2]	214-215 [2]	No Data [0]	No Data [0]	No Data [0]	18.0 [1]	22.4 [1]
103	05/04/12 07:48	934-934 [2]	308-314 [2]	7.13 [1]	854-882 [2]	336-339 [2]	No Data [0]	No Data [0]	No Data [0]	26.9 [1]	39.6 [1]
104	05/05/12 07:46	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
105	05/06/12 07:59	942-942 [2]	113-117 [2]	7.39 [1]	210-211 [2]	118-120 [2]	No Data [0]	No Data [0]	No Data [0]	19.6 [1]	18.8 [1]
106	05/07/12 07:57	950-950 [2]	141-147 [2]	7.20 [1]	330-342 [2]	121-122 [2]	No Data [0]	No Data [0]	No Data [0]	17.3 [1]	20.9 [1]
107	05/08/12 07:45	961-961 [3]	193-196 [2]	7.37 [1]	433-437 [2]	185-187 [2]	269 (264-270) [3]	127 (125-143) [3]	No Data [0]	21.1 [1]	27.7 [1]
108	05/09/12 07:45	973-973 [3]	174-189 [2]	7.33 [1]	469-470 [2]	217-219 [2]	234 (228-267) [3]	117 (113-126) [3]	No Data [0]	17.2 [1]	23.2 [1]
109	05/10/12 07:45	986-986 [3]	158-170 [2]	7.13 [1]	391-406 [2]	176-188 [2]	207 (207-210) [3]	89 (89-95) [3]	No Data [0]	16.5 [1]	12.3 [1]
110	05/11/12 07:45	998-998 [2]	100-108 [2]	7.03 [1]	181-189 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	5.5 [1]	1.0 [1]
111	05/12/12 07:45	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
112	05/13/12 07:45	1,008-1,008 [2]	87-94 [2]	No Data [0]	259-264 [2]	107-111 [2]	No Data [0]	No Data [0]	No Data [0]	12.5 [1]	12.3 [1]
113	05/14/12 07:45	1,017-1,017 [2]	78-96 [2]	7.30 [1]	267-276 [2]	118-118 [2]	No Data [0]	No Data [0]	No Data [0]	13.2 [1]	20.2 [1]
114	05/15/12 07:00	1,029-1,029 [3]	110-117 [2]	7.01 [1]	370-376 [2]	195-206 [2]	190 (180-196) [3]	101 (100-106) [3]	No Data [0]	17.7 [1]	22.6 [1]
115	05/16/12 07:47	1,045-1,045 [3]	153-157 [2]	7.67 [1]	394-397 [2]	177-178 [2]	196 (193-221) [3]	90 (89-91) [3]	No Data [0]	17.2 [1]	13.7 [1]
116	05/17/12 07:47	1,059-1,059 [3]	118-120 [2]	7.38 [1]	356-389 [2]	185-189 [2]	No Data [0]	No Data [0]	No Data [0]	15.9 [1]	23.5 [1]
117	05/18/12 07:47	1,073-1,073 [3]	138 [1]	7.23 [1]	328-346 [2]	148-150 [2]	131 (131-140) [3]	No Data [0]	No Data [0]	17.6 [1]	10.1 [1]
118	05/19/12 07:47	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
119	05/20/12 07:47	1,088-1,088 [2]	122-137 [2]	7.26 [1]	316-317 [2]	140-143 [2]	No Data [0]	No Data [0]	No Data [0]	19.9 [1]	24.4 [1]
120	05/21/12 07:47	1,103-1,103 [3]	118-130 [2]	7.21 [1]	337-341 [2]	153-155 [2]	152 (151-153) [3]	74 (72-90) [3]	No Data [0]	19.8 [1]	7.6 [1]
121	05/22/12 07:48	1,120-1,120 [3]	180-182 [2]	7.26 [1]	584-615 [2]	316-320 [2]	349 (340-355) [3]	172 (161-180) [3]	No Data [0]	26.9 [1]	33.8 [1]
122	05/23/12 07:48	1,134-1,134 [3]	164-176 [2]	7.08 [1]	490-497 [2]	240-242 [2]	248 (247-311) [3]	136 (129-141) [3]	No Data [0]	20.4 [1]	No Data [0]
123	05/24/12 07:48	1,149-1,149 [3]	108-131 [2]	No Data [0]	373-379 [2]	191-202 [2]	194 (175-202) [3]	94 (92-96) [3]	No Data [0]	19.2 [1]	32.4 [1]
124	05/25/12 07:48	1,165-1,165 [2]	204-205 [2]	7.50 [1]	460-548 [2]	168-170 [2]	No Data [0]	No Data [0]	No Data [0]	18.0 [1]	23.4 [1]
125	05/26/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
126	05/27/12 07:48	1,170-1,170 [2]	No Data [0]	No Data [0]	221-241 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	15.3 [1]	No Data [0]
127	05/28/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

	F	O	P	S	U	V	W	X	Y	Z	AB
1	End	(02) PRIMARY EFFLUENT SAMPLE ID	(02) PRIMARY EFFLUENT TSS (mg/L)	(02) PRIMARY EFFLUENT pH (mg/L)	(02) PRIMARY EFFLUENT COD(t) (mg/L)	(02) PRIMARY EFFLUENT COD(s) (mg/L)	(02) PRIMARY EFFLUENT BOD(t) (mg/L)	(02) PRIMARY EFFLUENT BOD(s) (mg/L)	(02) PRIMARY EFFLUENT Nitrate (NO3-N) (mg/L)	(02) PRIMARY EFFLUENT Ammonia (NH3-N) (mg/L)	(02) PRIMARY EFFLUENT Total Nitrogen (mg/L) (TN)
128	05/29/12 07:48	1,173-1,173 [2]	131-156 [2]	7.53 [1]	371-373 [2]	146-151 [2]	No Data [0]	No Data [0]	No Data [0]	19.7 [1]	19.8 [1]
129	05/30/12 07:48	1,187-1,187 [2]	193-202 [2]	7.19 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	31.4 [1]	11.6 [1]
130	05/31/12 07:48	1,201-1,240 [6]	149 (124-161) [4]	6.96 [1]	626 (606-802) [6]	399-401 [2]	No Data [0]	No Data [0]	No Data [0]	18.7 [1]	12.0 [1]
131	06/01/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
132	06/02/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
133	06/03/12 07:48	1,246-1,246 [2]	No Data [0]	No Data [0]	127-130 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	14.4 [1]
134	06/04/12 07:48	1,256-1,256 [2]	46-54 [2]	7.20 [1]	129-147 [2]	87-89 [2]	No Data [0]	No Data [0]	No Data [0]	5.1 [1]	4.1 [1]
135	06/05/12 07:48	1,296-1,310 [4]	No Data [0]	No Data [0]	309-320 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
136	06/06/12 07:48	1,318-1,318 [2]	93-94 [2]	7.24 [1]	249-291 [2]	129-131 [2]	No Data [0]	No Data [0]	No Data [0]	8.0 [1]	6.2 [1]
137	06/07/12 07:48	1,348-1,348 [2]	No Data [0]	No Data [0]	353-375 [2]	194-196 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	24.8 [1]
138	06/08/12 07:48	1,354-1,354 [2]	93-93 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
139	06/09/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
140	06/10/12 07:48	1,362-1,362 [2]	No Data [0]	No Data [0]	238-258 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	16.8 [1]	No Data [0]
141	06/11/12 07:48	1,368-1,368 [2]	80-85 [2]	7.51 [1]	244-262 [2]	128-137 [2]	No Data [0]	No Data [0]	No Data [0]	13.0 [1]	No Data [0]
142	06/12/12 07:48	1,378-1,378 [2]	104-106 [2]	7.37 [1]	346-364 [2]	185-188 [2]	No Data [0]	No Data [0]	No Data [0]	15.8 [1]	20.2 [1]
143	06/13/12 07:48	1,414-1,415 [4]	No Data [0]	No Data [0]	475-521 [2]	250-251 [2]	No Data [0]	No Data [0]	0.3 [1]	20.0 [1]	25.2 [1]
144	06/14/12 07:48	1,421-1,456 [4]	83-85 [2]	7.14 [1]	349 (251-443) [4]	142-143 [2]	No Data [0]	No Data [0]	0.3 [1]	11.6 [1]	16.1 [1]
145	06/15/12 07:48	1,472-1,472 [2]	87-97 [2]	7.36 [1]	338-347 [2]	181-183 [2]	No Data [0]	No Data [0]	0.5 [1]	12.3 [1]	17.0 [1]
146	06/16/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
147	06/17/12 07:48	1,481-1,481 [2]	98-99 [2]	No Data [0]	328-332 [2]	157-159 [2]	No Data [0]	No Data [0]	No Data [0]	14.6 [1]	23.8 [1]
148	06/18/12 07:48	1,490-1,495 [4]	91-102 [2]	6.82-7.44 [2]	209 (106-306) [4]	151-152 [2]	No Data [0]	No Data [0]	0.1-0.3 [2]	5.7-19.0 [2]	20.7 [1]
149	06/19/12 07:48	1,509-1,509 [2]	124-133 [2]	7.21 [1]	460-461 [2]	258-260 [2]	No Data [0]	No Data [0]	0.3 [1]	18.1 [1]	18.9 [1]
150	06/20/12 07:48	1,521-1,521 [2]	115-126 [2]	7.21 [1]	400-410 [2]	212-215 [2]	No Data [0]	No Data [0]	0.3 [1]	25.3 [1]	13.5 [1]
151	06/21/12 07:48	1,546-1,561 [4]	111-127 [2]	7.24 [1]	399 (391-411) [4]	215-219 [2]	No Data [0]	No Data [0]	0.4 [1]	19.9 [1]	15.3 [1]
152	06/22/12 07:48	1,572-1,572 [2]	125-146 [2]	7.32 [1]	367-377 [2]	189-189 [2]	No Data [0]	No Data [0]	0.2 [1]	19.8 [1]	No Data [0]
153	06/23/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
154	06/24/12 07:48	1,585-1,601 [7]	105-107 [2]	No Data [0]	347-347 [2]	250-262 [2]	No Data [0]	No Data [0]	No Data [0]	23.4 (23.4-23.4) [3]	25.5 [1]
155	06/25/12 07:48	1,602-1,610 [3]	117-119 [2]	7.82 [1]	373-385 [2]	No Data [0]	No Data [0]	No Data [0]	0.2 [1]	19.5-30.9 [2]	No Data [0]
156	06/26/12 07:48	1,608-1,625 [8]	144-146 [2]	7.38 (7.04-8.00) [3]	444-461 [2]	239-244 [2]	No Data [0]	No Data [0]	0.4-0.4 [2]	9.2 (6.0-29.9) [5]	39.7-42.7 [2]

Table 3.5-02: BAF Stage #1 and BAF Stage #2 Field Data Report, Part 10 of 25 Peirce Island Pilot Study Report
September 2012

	F	O	P	S	U	V	W	X	Y	Z	AB
1	End	(02) PRIMARY EFFLUENT SAMPLE ID	(02) PRIMARY EFFLUENT TSS (mg/L)	(02) PRIMARY EFFLUENT pH (mg/L)	(02) PRIMARY EFFLUENT COD(t) (mg/L)	(02) PRIMARY EFFLUENT COD(s) (mg/L)	(02) PRIMARY EFFLUENT BOD(t) (mg/L)	(02) PRIMARY EFFLUENT BOD(s) (mg/L)	(02) PRIMARY EFFLUENT Nitrate (NO3-N) (mg/L)	(02) PRIMARY EFFLUENT Ammonia (NH3-N) (mg/L)	(02) PRIMARY EFFLUENT Total Nitrogen (mg/L) (TN)
157	06/27/12 07:48	1,627-1,637 [8]	92-96 [2]	7.62 (6.88-8.89) [4]	266-269 [2]	134-136 [2]	No Data [0]	No Data [0]	0.2 [1]	26.8 (15.4-56.0) [7]	27.3 [1]
158	06/28/12 07:48	1,644-1,660 [7]	70-71 [2]	7.57 (6.84-8.04) [6]	302-303 [2]	163-165 [2]	No Data [0]	No Data [0]	0.3 [1]	21.1 (11.1-40.5) [6]	19.7 [1]
159	06/29/12 07:48	1,665-1,674 [5]	82-86 [2]	7.94 (6.88-8.47) [3]	340-342 [2]	188-190 [2]	No Data [0]	No Data [0]	0.2-0.3 [2]	22.0 (10.4-29.5) [4]	34.0-36.1 [2]
160	06/30/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
161	07/01/12 07:48	1,685-1,687 [4]	No Data [0]	8.00 (7.10-8.68) [3]	295 (241-337) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	35.1 (18.2-36.2) [3]	43.8 [1]
162	07/02/12 07:48	1,694-1,718 [10]	86-88 [2]	7.82 (6.61-216.00) [8]	630 (336-931) [4]	189-193 [2]	No Data [0]	No Data [0]	0.2 [1]	27.4 (11.9-28.7) [4]	No Data [0]
163	07/03/12 07:45	1,720-1,720 [2]	134-142 [2]	7.90 [1]	527-531 [2]	282-286 [2]	No Data [0]	No Data [0]	0.3 [1]	29.5 [1]	40.6 [1]
164	07/04/12 07:45	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
165	07/05/12 07:45	1,731-1,731 [2]	95-121 [2]	8.19 [1]	412-741 [2]	243-369 [2]	No Data [0]	No Data [0]	0.2 [1]	45.9 [1]	46.1 [1]
166	07/06/12 07:45	1,740-1,765 [10]	130-145 [2]	7.42 (6.42-8.65) [4]	542 (531-613) [3]	301-307 [2]	No Data [0]	No Data [0]	0.3 [1]	23.9 (9.7-35.6) [5]	19.3 (11.1-38.8) [3]
167	07/07/12 07:45	1,782-1,782 [2]	No Data [0]	7.63 [1]	635-710 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	31.8 [1]	35.1 [1]
168	07/08/12 07:45	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
169	07/09/12 07:45	1,819-1,822 [6]	107-113 [2]	7.87 [1]	412-415 [2]	233-234 [2]	No Data [0]	No Data [0]	No Data [0]	31.5 (26.0-31.5) [3]	33.9 [1]
170	07/10/12 07:45	1,825-1,859 [10]	125 (119-131) [4]	8.05 (6.61-8.57) [5]	573 (523-594) [4]	342 (291-388) [4]	No Data [0]	No Data [0]	0.4 [1]	29.7 (18.1-47.3) [8]	35.2-50.3 [2]
171	07/11/12 07:55	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
172	07/12/12 07:55	1,877-1,921 [12]	120-131 [2]	8.41 (7.04-8.98) [3]	498 (299-551) [10]	281-284 [2]	No Data [0]	No Data [0]	2.4 [1]	39.7 (27.4-49.0) [8]	44.5 [1]
173	07/13/12 07:55	1,917-1,935 [5]	98-105 [2]	8.50 [1]	475 (427-505) [5]	272-277 [2]	No Data [0]	No Data [0]	0.3 [1]	36.9-37.8 [2]	43.4 [1]
174	07/14/12 07:55	1,949-1,964 [3]	143-145 [2]	7.02-8.53 [2]	641-645 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	26.0-47.6 [2]	51.1 [1]
175	07/15/12 07:57	1,964-1,966 [3]	No Data [0]	7.02 (6.63-8.72) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	26.0 (20.8-39.4) [3]	No Data [0]
176	07/16/12 07:50	1,966-2,013 [12]	No Data [0]	6.75 (6.63-8.55) [3]	608 (550-750) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	32.6 (20.8-58.0) [8]	No Data [0]
177	07/17/12 07:53	2,000-2,019 [10]	117-127 [2]	8.59 (6.30-8.76) [3]	538 (466-604) [8]	353-360 [2]	No Data [0]	No Data [0]	0.4 [1]	45.9 (20.2-50.5) [3]	54.8 [1]
178	07/18/12 07:56	No Data [0]	No Data [0]	No Data [0]	537 (387-660) [10]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
179	07/19/12 07:59	No Data [0]	No Data [0]	No Data [0]	554 (524-631) [7]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
180	07/20/12 07:51	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
181	07/21/12 07:55	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
182	07/22/12 07:58	No Data [0]	No Data [0]	No Data [0]	499 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
183	07/23/12 07:50	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
184	07/24/12 07:54	No Data [0]	No Data [0]	No Data [0]	496-578 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
185	07/25/12 07:54	No Data [0]	No Data [0]	No Data [0]	485-500 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
186	07/26/12 07:54	No Data [0]	No Data [0]	No Data [0]	530-531 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
187	07/27/12 07:54	No Data [0]	No Data [0]	No Data [0]	625-631 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
188	07/28/12 07:54	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
189	07/29/12 07:54	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
190	07/30/12 07:54	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
191	07/31/12 07:54	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
192	08/01/12 07:54	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
193	08/02/12 07:54	2,229 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	30.5 [1]	No Data [0]
194	08/03/12 10:20	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

	F	AC	AD	AE	AF	AG	AH	AI	AJ	AK
1	End	(02) PRIMARY EFFLUENT Nox (mg/L)	(02) PRIMARY EFFLUENT TKN (mg/L)	(03, 35) BAF INFLUENT Nitrate (NO3-N) (mg/L)	(03, 35) BAF INFLUENT NH3 (mg/L)	(03, 35) BAF INFLUENT Total Nitrogen (mg/L) (TN)	(03, 35) BAF INFLUENT Nox (mg/L)	(03, 35) BAF INFLUENT TKN (mg/L)	(32) BAF FILTER 1 EFFLUENT SAMPLE ID	(32) BAF FILTER 1 EFFLUENT TSS (mg/L)
2	05/28/12 00:00	0.3 (0.0-1.4) [68]	21.9 (0.9-49.9) [67]	0.42 (0.10-2.38) [29]	29.7 (6.1-56.0) [62]	37.5 (19.3-46.1) [12]	0.3 (0.1-0.4) [12]	35.9 (19.1-45.9) [11]	159-1,943 [460]	27.6 (0.0-190.0) [301]
4	01/26/12 15:27	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
5	01/27/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
6	01/28/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
7	01/29/12 07:57	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	159-159 [3]	23.0 (23.0-26.0) [3]
8	01/30/12 07:57	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	165-165 [3]	27.0 (24.8-27.4) [3]
9	01/31/12 07:57	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
10	02/01/12 07:57	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	184-184 [3]	26.6 (25.2-29.2) [3]
11	02/02/12 07:57	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	192-192 [3]	21.0 (18.8-22.2) [3]
12	02/03/12 07:57	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	200-200 [3]	20.8 (19.4-23.2) [3]
13	02/04/12 07:57	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	206-209 [6]	22.8 (19.8-23.6) [6]
14	02/05/12 07:57	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	212-212 [3]	21.0 (18.0-25.0) [3]
15	02/06/12 07:57	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	221-221 [3]	139.0 (127.0-168.0) [3]
16	02/07/12 07:57	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	227-227 [3]	20.6 (20.4-21.0) [3]
17	02/08/12 07:56	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	241-241 [3]	28.0 (27.8-29.8) [3]
18	02/09/12 07:56	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	249-249 [3]	15.0 (13.4-15.0) [3]
19	02/10/12 07:56	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	263-263 [3]	17.0 (13.2-17.8) [3]
20	02/11/12 07:56	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	270-270 [3]	18.2 (15.8-19.2) [3]
21	02/12/12 07:56	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	278-278 [3]	30.4-41.6 [2]
22	02/13/12 07:56	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	286-286 [3]	37.0 (36.6-37.4) [3]
23	02/14/12 07:56	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	299-299 [3]	47.4 (46.8-48.6) [3]
24	02/15/12 07:56	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	310-310 [3]	35.8 (32.4-37.0) [3]
25	02/16/12 07:58	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	322-322 [6]	25.4 (24.0-31.0) [6]
26	02/17/12 07:58	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	333-333 [3]	77.8 (76.6-85.2) [3]
27	02/18/12 07:58	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	338-338 [3]	36.3 (30.8-40.0) [3]
28	02/19/12 07:58	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
29	02/20/12 07:58	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	344-344 [3]	71.5 (60.7-75.3) [3]
30	02/21/12 07:55	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	351-351 [3]	42.4 (38.0-44.4) [3]
31	02/22/12 07:55	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	362-362 [3]	15.8 (15.6-17.8) [3]
32	02/23/12 07:55	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	373-373 [3]	40.0 (39.2-41.2) [3]
33	02/24/12 07:55	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	382-382 [3]	36.8 (33.6-38.0) [3]
34	02/25/12 07:55	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	389-389 [3]	9.6 (5.2-12.4) [3]
35	02/26/12 07:55	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	394-394 [3]	24.0 (16.0-29.0) [3]
36	02/27/12 07:55	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	401-401 [4]	24.4 (23.8-30.6) [3]
37	02/28/12 07:58	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	412-412 [3]	21.0 (17.0-21.8) [3]
38	02/29/12 07:46	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	418-418 [4]	41.0 (39.8-41.0) [3]
39	03/01/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	428-428 [3]	29.8 (28.8-37.6) [3]
40	03/02/12 07:51	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	437-437 [4]	27.2 (24.6-27.4) [3]
41	03/03/12 07:56	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	445-445 [3]	26.0 (23.6-27.0) [3]
42	03/04/12 07:56	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
43	03/05/12 07:56	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	456-456 [3]	28.4 (27.6-28.6) [3]

	F	AC	AD	AE	AF	AG	AH	AI	AJ	AK
1	End	(02) PRIMARY EFFLUENT Nox (mg/L)	(02) PRIMARY EFFLUENT TKN (mg/L)	(03, 35) BAF INFLUENT Nitrate (NO3-N) (mg/L)	(03, 35) BAF INFLUENT NH3 (mg/L)	(03, 35) BAF INFLUENT Total Nitrogen (mg/L) (TN)	(03, 35) BAF INFLUENT Nox (mg/L)	(03, 35) BAF INFLUENT TKN (mg/L)	(32) BAF FILTER 1 EFFLUENT SAMPLE ID	(32) BAF FILTER 1 EFFLUENT TSS (mg/L)
44	03/06/12 07:56	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	461-461 [3]	20.0 (19.2-20.4) [3]
45	03/07/12 07:57	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	466-466 [3]	21.8 (21.4-22.4) [3]
46	03/08/12 07:57	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	479-479 [3]	15.8 (15.8-16.4) [3]
47	03/09/12 07:57	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	488-488 [3]	12.2 (12.0-12.6) [3]
48	03/10/12 07:57	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	498-498 [3]	12.4 (12.0-12.6) [3]
49	03/11/12 07:57	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	508-508 [3]	13.2 (12.0-17.4) [3]
50	03/12/12 07:57	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	516-516 [3]	15.0 (14.6-15.6) [3]
51	03/13/12 07:58	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	522-522 [3]	19.4 (16.2-20.8) [3]
52	03/14/12 07:58	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	538-538 [3]	19.4 (17.6-23.4) [3]
53	03/15/12 07:58	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	549-549 [3]	12.4 (10.2-14.2) [3]
54	03/16/12 07:58	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	558-558 [3]	15.2 (12.2-17.4) [3]
55	03/17/12 07:58	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	570-570 [3]	13.0-18.4 [2]
56	03/18/12 07:58	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	578-578 [3]	0.8 (0.0-1.6) [3]
57	03/19/12 07:58	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	584-584 [3]	0.8 (0.0-3.2) [3]
58	03/20/12 07:58	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	594-594 [3]	18.2 (16.2-19.0) [3]
59	03/21/12 07:58	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	605-605 [3]	33.4 (32.8-33.8) [3]
60	03/22/12 07:58	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	614-614 [3]	37.0 (36.0-37.7) [3]
61	03/23/12 07:43	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	624-624 [3]	33.6 (33.2-35.6) [3]
62	03/24/12 07:58	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	633-633 [3]	24.8 (24.0-29.6) [3]
63	03/25/12 07:58	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	639-639 [3]	26.6 (20.8-28.8) [3]
64	03/26/12 07:58	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	645-645 [3]	49.6 (49.6-50.8) [3]
65	03/27/12 07:45	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	658-658 [3]	50.0 (49.6-51.0) [3]
66	03/28/12 07:45	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	662-662 [3]	61.0 (60.8-61.4) [3]
67	03/29/12 07:45	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	672-672 [3]	47.8 (47.2-49.0) [3]
68	03/30/12 07:45	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	679-679 [3]	42.2 (39.4-42.4) [3]
69	03/31/12 07:45	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	686-686 [3]	43.2 (24.4-45.0) [3]
70	04/01/12 08:45	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
71	04/02/12 07:45	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	696-696 [3]	85.6 (83.4-86.0) [3]
72	04/03/12 07:45	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	706-706 [3]	51.0 (50.6-51.2) [3]
73	04/04/12 07:56	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	712-712 [3]	41.0 (39.4-43.4) [3]
74	04/05/12 07:56	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	728-728 [3]	58.2-63.2 [2]
75	04/06/12 07:56	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
76	04/07/12 07:56	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	743-743 [3]	57.2 (56.4-58.4) [3]
77	04/08/12 07:56	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
78	04/09/12 07:56	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	749-749 [2]	44.6-48.8 [2]
79	04/10/12 07:56	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	759-759 [2]	50.8-55.6 [2]
80	04/11/12 07:41	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	768-768 [2]	72.8-83.8 [2]
81	04/12/12 07:46	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	777-777 [2]	54.6-59.0 [2]
82	04/13/12 07:46	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	791-791 [2]	54.4-62.8 [2]
83	04/14/12 07:46	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
84	04/15/12 07:46	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
85	04/16/12 07:46	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	805-805 [2]	66.4-72.4 [2]

Table 3.5-02: BAF Stage #1 and BAF Stage #2 Field Data Report, Part 13 of 25

[illegible]

	F	AC	AD	AE	AF	AG	AH	AI	AJ	AK
1	End	(02) PRIMARY EFFLUENT Nox (mg/L)	(02) PRIMARY EFFLUENT TKN (mg/L)	(03, 35) BAF INFLUENT Nitrate (NO3-N) (mg/L)	(03, 35) BAF INFLUENT NH3 (mg/L)	(03, 35) BAF INFLUENT Total Nitrogen (mg/L) (TN)	(03, 35) BAF INFLUENT Nox (mg/L)	(03, 35) BAF INFLUENT TKN (mg/L)	(32) BAF FILTER 1 EFFLUENT SAMPLE ID	(32) BAF FILTER 1 EFFLUENT TSS (mg/L)
128	05/29/12 07:48	0.5 [1]	19.3 [1]	0.90 [1]	42.4 [1]	No Data [0]	No Data [0]	No Data [0]	1,180-1,180 [2]	15.0-21.5 [2]
129	05/30/12 07:48	0.6 [1]	11.0 [1]	0.80 [1]	29.2 [1]	No Data [0]	No Data [0]	No Data [0]	1,193-1,193 [2]	14.5-17.5 [2]
130	05/31/12 07:48	0.5 [1]	11.5 [1]	1.00 [1]	20.8 [1]	No Data [0]	No Data [0]	No Data [0]	1,206-1,206 [2]	22.5-29.0 [2]
131	06/01/12 07:48	No Data [0]	No Data [0]	1.85 [1]	39.0 [1]	No Data [0]	No Data [0]	No Data [0]	1,245 [1]	No Data [0]
132	06/02/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
133	06/03/12 07:48	1.4 [1]	13.0 [1]	1.35 [1]	19.1 [1]	No Data [0]	No Data [0]	No Data [0]	1,254-1,254 [2]	8.4-10.4 [2]
134	06/04/12 07:48	0.3 [1]	3.8 [1]	0.40 [1]	13.6 [1]	No Data [0]	No Data [0]	No Data [0]	1,263-1,263 [2]	32.0-44.0 [2]
135	06/05/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,312 [1]	No Data [0]
136	06/06/12 07:48	0.2 [1]	6.0 [1]	0.30 [1]	24.6 [1]	No Data [0]	No Data [0]	No Data [0]	1,325-1,325 [2]	No Data [0]
137	06/07/12 07:48	0.2 [1]	25.6 [1]	0.10 [1]	32.6 [1]	No Data [0]	No Data [0]	No Data [0]	1,350 [1]	No Data [0]
138	06/08/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,355-1,355 [2]	29.0-34.0 [2]
139	06/09/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
140	06/10/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,364 [1]	No Data [0]
141	06/11/12 07:48	No Data [0]	No Data [0]	0.17 [1]	20.6 [1]	No Data [0]	No Data [0]	No Data [0]	1,370-1,370 [2]	6.5-10.0 [2]
142	06/12/12 07:48	0.3 [1]	20.0 [1]	0.29 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,385-1,385 [2]	50.0-53.0 [2]
143	06/13/12 07:48	0.3 [1]	24.9 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,402-1,402 [2]	No Data [0]
144	06/14/12 07:48	0.2 [1]	16.0 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,424-1,441 [8]	26.0 (8.0-53.0) [6]
145	06/15/12 07:48	0.2 [1]	16.9 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,464-1,464 [2]	No Data [0]
146	06/16/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
147	06/17/12 07:48	0.3 [1]	23.5 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,487-1,487 [2]	No Data [0]
148	06/18/12 07:48	0.3 [1]	20.5 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
149	06/19/12 07:48	0.3 [1]	18.6 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,510-1,510 [2]	No Data [0]
150	06/20/12 07:48	0.3 [1]	13.3 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,522-1,522 [2]	No Data [0]
151	06/21/12 07:48	0.3 [1]	15.0 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,547-1,547 [2]	31.0-40.0 [2]
152	06/22/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,573-1,573 [2]	33.0-39.0 [2]
153	06/23/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
154	06/24/12 07:48	0.5 [1]	25.0 [1]	No Data [0]	23.4 [1]	No Data [0]	No Data [0]	No Data [0]	1,586-1,586 [2]	27.4-28.4 [2]
155	06/25/12 07:48	No Data [0]	No Data [0]	No Data [0]	30.9 [1]	No Data [0]	No Data [0]	No Data [0]	1,603-1,603 [2]	37.0-48.0 [2]
156	06/26/12 07:48	0.4-0.4 [2]	42.3 [1]	0.42-0.44 [2]	20.2 (6.1-29.9) [3]	39.7-42.7 [2]	0.4-0.4 [2]	42.3 [1]	1,618-1,618 [2]	21.0-23.0 [2]

	F	AC	AD	AE	AF	AG	AH	AI	AJ	AK
1	End	(02) PRIMARY EFFLUENT Nox (mg/L)	(02) PRIMARY EFFLUENT TKN (mg/L)	(03, 35) BAF INFLUENT Nitrate (NO3-N) (mg/L)	(03, 35) BAF INFLUENT NH3 (mg/L)	(03, 35) BAF INFLUENT Total Nitrogen (mg/L) (TN)	(03, 35) BAF INFLUENT Nox (mg/L)	(03, 35) BAF INFLUENT TKN (mg/L)	(32) BAF FILTER 1 EFFLUENT SAMPLE ID	(32) BAF FILTER 1 EFFLUENT TSS (mg/L)
157	06/27/12 07:48	0.2 [1]	27.0 [1]	No Data [0]	33.9 (26.8-56.0) [4]	No Data [0]	No Data [0]	No Data [0]	1,628-1,628 [2]	19.0-20.0 [2]
158	06/28/12 07:48	0.2 [1]	19.4 [1]	0.28 [1]	24.9 (17.8-40.5) [4]	19.7 [1]	0.2 [1]	19.4 [1]	1,655-1,655 [2]	1.0-2.5 [2]
159	06/29/12 07:48	0.2-0.3 [2]	33.8-35.9 [2]	0.23-0.28 [2]	26.1 (17.9-29.5) [3]	34.0-36.1 [2]	0.2-0.3 [2]	33.8-35.9 [2]	1,682-1,682 [2]	2.0-5.0 [2]
160	06/30/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
161	07/01/12 07:48	0.1 [1]	43.7 [1]	No Data [0]	35.1-36.2 [2]	43.8 [1]	0.1 [1]	43.7 [1]	1,692-1,692 [2]	1.6 [1]
162	07/02/12 07:48	No Data [0]	No Data [0]	0.23 [1]	27.3-28.7 [2]	No Data [0]	No Data [0]	No Data [0]	1,705-1,715 [5]	8.2-18.8 [2]
163	07/03/12 07:45	0.4 [1]	40.3 [1]	0.33 [1]	29.5 [1]	40.6 [1]	0.4 [1]	40.3 [1]	1,728-1,728 [2]	10.0-16.0 [2]
164	07/04/12 07:45	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
165	07/05/12 07:45	0.2 [1]	45.9 [1]	0.25 [1]	45.9 [1]	46.1 [1]	0.2 [1]	45.9 [1]	1,732-1,752 [7]	10.0-16.0 [2]
166	07/06/12 07:45	0.2 (0.2-0.3) [3]	19.1 (10.9-38.5) [3]	0.33 [1]	31.5 (19.0-35.6) [3]	19.3-38.8 [2]	0.2-0.3 [2]	19.1-38.5 [2]	1,743-1,789 [25]	17.2-21.8 [2]
167	07/07/12 07:45	0.3 [1]	34.8 [1]	No Data [0]	31.8 [1]	35.1 [1]	0.3 [1]	34.8 [1]	1,783-1,797 [15]	No Data [0]
168	07/08/12 07:45	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,789-1,800 [12]	No Data [0]
169	07/09/12 07:45	0.2 [1]	33.6 [1]	No Data [0]	31.5 (26.0-31.5) [3]	33.9 [1]	0.2 [1]	33.6 [1]	1,801-1,830 [14]	13.8-14.2 [2]
170	07/10/12 07:45	0.3-0.4 [2]	34.9-49.9 [2]	0.42 [1]	31.1 (24.5-47.3) [7]	No Data [0]	No Data [0]	(INDEX(WQ_Data!AV\$2	1,831-1,872 [19]	13.3 (11.5-16.3) [3]
171	07/11/12 07:55	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	(INDEX(WQ_Data!AV\$2	1,861-1,895 [9]	24.5 [1]
172	07/12/12 07:55	0.3 [1]	44.2 [1]	2.38 [1]	41.6 (32.4-49.0) [7]	No Data [0]	No Data [0]	(INDEX(WQ_Data!AV\$2	1,885-1,908 [14]	9.5-10.0 [2]
173	07/13/12 07:55	0.3 [1]	43.1 [1]	0.32 [1]	36.9-37.8 [2]	No Data [0]	No Data [0]	(INDEX(WQ_Data!AV\$2	1,909-1,943 [15]	9.4-15.0 [2]
174	07/14/12 07:55	0.5 [1]	50.6 [1]	No Data [0]	47.6 [1]	No Data [0]	No Data [0]	(INDEX(WQ_Data!AV\$2	1,931-1,957 [5]	12.0-29.6 [2]
175	07/15/12 07:57	No Data [0]	No Data [0]	No Data [0]	39.4 [1]	No Data [0]	No Data [0]	(INDEX(WQ_Data!AV\$2	No Data [0]	No Data [0]
176	07/16/12 07:50	No Data [0]	No Data [0]	No Data [0]	43.7 (21.8-58.0) [6]	No Data [0]	No Data [0]	(INDEX(WQ_Data!AV\$2	1,981-1,990 [10]	No Data [0]
177	07/17/12 07:53	0.4 [1]	54.4 [1]	0.39 [1]	50.5 (45.9-77.0) [3]	No Data [0]	No Data [0]	(INDEX(WQ_Data!AV\$2	1,990-2,023 [12]	45.3 (30.5-48.3) [3]
178	07/18/12 07:56	No Data [0]	No Data [0]	0.47 [1]	49.1 (38.1-63.0) [7]	No Data [0]	No Data [0]	(INDEX(WQ_Data!AV\$2	2,023-2,136 [11]	30.5 (5.0-34.0) [3]
179	07/19/12 07:59	No Data [0]	No Data [0]	No Data [0]	58.5 (39.8-71.0) [5]	No Data [0]	No Data [0]	(INDEX(WQ_Data!AV\$2	2,032-2,083 [14]	13.0-18.0 [2]
180	07/20/12 07:51	No Data [0]	No Data [0]	No Data [0]	45.1 (32.4-58.5) [5]	No Data [0]	No Data [0]	(INDEX(WQ_Data!AV\$2	2,076-2,110 [10]	No Data [0]
181	07/21/12 07:55	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	(INDEX(WQ_Data!AV\$2	2,110-2,116 [7]	No Data [0]
182	07/22/12 07:58	No Data [0]	No Data [0]	0.39 [1]	32.6-42.9 [2]	No Data [0]	No Data [0]	(INDEX(WQ_Data!AV\$2	2,107-2,131 [6]	2.4-2.8 [2]
183	07/23/12 07:50	No Data [0]	No Data [0]	No Data [0]	33.0 (28.0-46.5) [5]	No Data [0]	No Data [0]	(INDEX(WQ_Data!AV\$2	2,131-2,145 [4]	8.4 [1]
184	07/24/12 07:54	No Data [0]	No Data [0]	No Data [0]	21.9 (19.0-47.5) [4]	No Data [0]	No Data [0]	(INDEX(WQ_Data!AV\$2	2,145-2,279 [20]	8.4-8.8 [2]
185	07/25/12 07:54	No Data [0]	No Data [0]	No Data [0]	33.7 (20.0-37.5) [9]	No Data [0]	No Data [0]	(INDEX(WQ_Data!AV\$2	2,279-2,312 [16]	No Data [0]
186	07/26/12 07:54	No Data [0]	No Data [0]	No Data [0]	24.8 (19.4-39.1) [9]	No Data [0]	No Data [0]	(INDEX(WQ_Data!AV\$2	2,312-2,348 [14]	No Data [0]
187	07/27/12 07:54	No Data [0]	No Data [0]	No Data [0]	19.5 (12.5-26.8) [7]	No Data [0]	No Data [0]	(INDEX(WQ_Data!AV\$2	2,348-2,360 [5]	No Data [0]
188	07/28/12 07:54	No Data [0]	No Data [0]	No Data [0]	17.3 (12.8-26.6) [6]	No Data [0]	No Data [0]	(INDEX(WQ_Data!AV\$2	2,364-2,378 [6]	No Data [0]
189	07/29/12 07:54	No Data [0]	No Data [0]	No Data [0]	21.1 (15.1-24.8) [4]	No Data [0]	No Data [0]	(INDEX(WQ_Data!AV\$2	2,378-2,391 [6]	No Data [0]
190	07/30/12 07:54	No Data [0]	No Data [0]	No Data [0]	29.3 (17.0-31.5) [7]	No Data [0]	No Data [0]	(INDEX(WQ_Data!AV\$2	2,160-2,394 [15]	80.5 (20.0-118.4) [7]
191	07/31/12 07:54	No Data [0]	No Data [0]	No Data [0]	28.5 (18.0-38.0) [7]	No Data [0]	No Data [0]	(INDEX(WQ_Data!AV\$2	2,175-2,187 [17]	47.0 (34.5-150.5) [7]
192	08/01/12 07:54	No Data [0]	No Data [0]	No Data [0]	19.8 (11.3-33.2) [7]	No Data [0]	No Data [0]	(INDEX(WQ_Data!AV\$2	2,187-2,204 [22]	27.0 (11.0-110.5) [8]
193	08/02/12 07:54	No Data [0]	No Data [0]	No Data [0]	25.8 (23.3-29.0) [4]	No Data [0]	No Data [0]	(INDEX(WQ_Data!AV\$2	2,204-2,214 [18]	20.0 (6.0-110.5) [9]
194	08/03/12 10:20	No Data [0]	No Data [0]	No Data [0]	15.6-23.8 [2]	No Data [0]	No Data [0]	(INDEX(WQ_Data!AV\$2	2,214-2,225 [7]	29.2 (7.6-58.2) [7]

	F	AN	AP	AQ	AR	AS	AT	AU	AV	AW
1	End	(32) BAF FILTER 1 EFFLUENT pH (SU)	(32) BAF FILTER 1 EFFLUENT COD(t) (mg/L)	(32) BAF FILTER 1 EFFLUENT COD(s) (mg/L)	(32) BAF FILTER 1 EFFLUENT BOD(t) (mg/L)	(32) BAF FILTER 1 EFFLUENT BOD(s) (mg/L)	(32) BAF FILTER 1 EFFLUENT Nitrate (NO3-N) (mg/L)	(32) BAF FILTER 1 EFFLUENT Ammonia (NH3-N) (mg/L)	(32) BAF FILTER 1 EFFLUENT Nitrite (mg/L) (NO2--N)	(32) BAF FILTER 1 EFFLUENT Total Nitrogen (mg/L) (TN)
2	05/28/12 00:00	7.11 (6.37-7.87) [95]	86.3 (22.1-211.0) [206]	53 (27-141) [60]	24 (9-85) [63]	14 (8-43) [19]	1.9 (0.1-18.8) [59]	0.9 (0.2-28.8) [156]	1.56 (0.25-2.00) [3]	13.6 (4.6-29.9) [12]
4	01/26/12 15:27	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
5	01/27/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
6	01/28/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
7	01/29/12 07:57	No Data [0]	89.0-91.6 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
8	01/30/12 07:57	No Data [0]	114.0-115.0 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
9	01/31/12 07:57	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
10	02/01/12 07:57	7.12 (7.10-7.27) [3]	87.6-89.0 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
11	02/02/12 07:57	No Data [0]	60.5-60.7 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
12	02/03/12 07:57	No Data [0]	77.0-78.0 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
13	02/04/12 07:57	No Data [0]	74.0-74.0 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
14	02/05/12 07:57	No Data [0]	100.0 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
15	02/06/12 07:57	7.24 (7.10-7.33) [3]	184.0 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
16	02/07/12 07:57	No Data [0]	55.0 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
17	02/08/12 07:56	7.26 (7.16-7.33) [3]	77.0-80.0 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
18	02/09/12 07:56	No Data [0]	No Data [0]	39-39 [2]	9 (9-10) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
19	02/10/12 07:56	6.92 (6.61-7.00) [3]	No Data [0]	53-53 [2]	24 (22-29) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
20	02/11/12 07:56	No Data [0]	No Data [0]	49-51 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
21	02/12/12 07:56	No Data [0]	No Data [0]	55-62 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
22	02/13/12 07:56	6.76 (6.54-6.83) [3]	No Data [0]	60-63 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
23	02/14/12 07:56	No Data [0]	No Data [0]	79-88 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
24	02/15/12 07:56	6.92 (6.92-6.93) [3]	No Data [0]	64-66 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
25	02/16/12 07:58	No Data [0]	No Data [0]	53 (50-55) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
26	02/17/12 07:58	No Data [0]	162.0-163.0 [2]	68-71 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
27	02/18/12 07:58	No Data [0]	106.0-120.0 [2]	70-71 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
28	02/19/12 07:58	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
29	02/20/12 07:58	No Data [0]	124.0-125.0 [2]	59-62 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
30	02/21/12 07:55	7.18 (7.00-7.40) [3]	130.0-134.0 [2]	70-75 [2]	68 [1]	24-25 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
31	02/22/12 07:55	No Data [0]	71.0-71.5 [2]	47-49 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
32	02/23/12 07:55	7.24 (7.14-7.40) [3]	109.0-111.0 [2]	65-66 [2]	50 [1]	19-19 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
33	02/24/12 07:55	No Data [0]	108.0-110.0 [2]	61-64 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
34	02/25/12 07:55	No Data [0]	46.1-47.6 [2]	27-29 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
35	02/26/12 07:55	No Data [0]	84.7-90.2 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
36	02/27/12 07:55	No Data [0]	75.1-77.6 [2]	38-40 [2]	33 (30-40) [4]	13 (12-14) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
37	02/28/12 07:58	No Data [0]	73.1-79.2 [2]	46-50 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
38	02/29/12 07:46	No Data [0]	119.0-124.0 [2]	63-66 [2]	62 (52-68) [4]	31-43 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
39	03/01/12 07:48	6.92 (6.79-7.01) [3]	84.7-86.4 [2]	51-55 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
40	03/02/12 07:51	No Data [0]	87.5-94.0 [2]	52-53 [2]	34-37 [2]	14 (14-14) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
41	03/03/12 07:56	No Data [0]	82.9-87.8 [2]	45-52 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
42	03/04/12 07:56	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
43	03/05/12 07:56	7.14 (7.11-7.18) [3]	74.7-77.9 [2]	43-43 [2]	23 (20-29) [3]	8 (8-8) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

Peirce Island Pilot Study Report
September 2012[illegible]

Peirce Island Pilot Study Report
September 2012

	F	AN	AP	AQ	AR	AS	AT	AU	AV	AW
1	End	(32) BAF FILTER 1 EFFLUENT pH (SU)	(32) BAF FILTER 1 EFFLUENT COD(t) (mg/L)	(32) BAF FILTER 1 EFFLUENT COD(s) (mg/L)	(32) BAF FILTER 1 EFFLUENT BOD(t) (mg/L)	(32) BAF FILTER 1 EFFLUENT BOD(s) (mg/L)	(32) BAF FILTER 1 EFFLUENT Nitrate (NO3-N) (mg/L)	(32) BAF FILTER 1 EFFLUENT Ammonia (NH3-N) (mg/L)	(32) BAF FILTER 1 EFFLUENT Nitrite (mg/L) (NO2--N)	(32) BAF FILTER 1 EFFLUENT Total Nitrogen (mg/L) (TN)
86	04/17/12 07:46	6.74 [1]	122.0-127.0 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
87	04/18/12 07:46	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
88	04/19/12 07:46	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
89	04/20/12 07:46	No Data [0]	209.0-210.0 [2]	No Data [0]	No Data [0]	No Data [0]	0.6 [1]	19.9-19.9 [2]	No Data [0]	25.0 [1]
90	04/21/12 07:46	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
91	04/22/12 07:46	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
92	04/23/12 07:46	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
93	04/24/12 07:46	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
94	04/25/12 07:53	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.6 [1]	No Data [0]	No Data [0]	No Data [0]
95	04/26/12 07:53	No Data [0]	89.7-90.3 [2]	No Data [0]	No Data [0]	No Data [0]	0.5 [1]	No Data [0]	No Data [0]	No Data [0]
96	04/27/12 07:53	No Data [0]	71.2-92.6 [2]	No Data [0]	29-31 [2]	No Data [0]	0.6 [1]	No Data [0]	No Data [0]	No Data [0]
97	04/28/12 07:53	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
98	04/29/12 07:53	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
99	04/30/12 07:53	7.44 [1]	117.0-123.0 [2]	No Data [0]	No Data [0]	No Data [0]	0.4 [1]	No Data [0]	No Data [0]	No Data [0]
100	05/01/12 07:53	No Data [0]	151.0-159.0 [2]	No Data [0]	No Data [0]	No Data [0]	0.6 [1]	No Data [0]	No Data [0]	No Data [0]
101	05/02/12 07:51	No Data [0]	152.0-161.0 [2]	No Data [0]	No Data [0]	No Data [0]	0.3 [1]	No Data [0]	No Data [0]	No Data [0]
102	05/03/12 07:49	No Data [0]	149.0-152.0 [2]	No Data [0]	No Data [0]	No Data [0]	0.5 [1]	No Data [0]	No Data [0]	No Data [0]
103	05/04/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
104	05/05/12 07:46	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
105	05/06/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
106	05/07/12 07:57	7.34 [1]	68.7-70.0 [2]	No Data [0]	No Data [0]	No Data [0]	0.3 [1]	No Data [0]	No Data [0]	No Data [0]
107	05/08/12 07:45	No Data [0]	86.6-96.7 [2]	No Data [0]	26 (21-34) [3]	No Data [0]	0.4 [1]	No Data [0]	No Data [0]	No Data [0]
108	05/09/12 07:45	No Data [0]	111.0-113.0 [2]	No Data [0]	No Data [0]	No Data [0]	0.2 [1]	No Data [0]	No Data [0]	No Data [0]
109	05/10/12 07:45	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.2 [1]	No Data [0]	No Data [0]	No Data [0]
110	05/11/12 07:45	7.45 [1]	90.9-92.2 [2]	No Data [0]	No Data [0]	No Data [0]	0.6 [1]	2.5 [1]	No Data [0]	No Data [0]
111	05/12/12 07:45	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
112	05/13/12 07:45	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.6 [1]	No Data [0]	No Data [0]	No Data [0]
113	05/14/12 07:45	No Data [0]	65.0-69.9 [2]	No Data [0]	No Data [0]	No Data [0]	0.4 [1]	No Data [0]	No Data [0]	No Data [0]
114	05/15/12 07:00	No Data [0]	86.2-105.0 [2]	No Data [0]	22 (18-26) [3]	No Data [0]	0.1 [1]	5.8 [1]	No Data [0]	No Data [0]
115	05/16/12 07:47	7.54 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.5-0.7 [2]	7.0-7.8 [2]	No Data [0]	7.1-7.4 [2]
116	05/17/12 07:47	7.78 [1]	94.8-110.0 [2]	No Data [0]	32 (29-49) [3]	No Data [0]	0.5 [1]	6.9 [1]	No Data [0]	13.6 [1]
117	05/18/12 07:47	7.60 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	5.3 [1]
118	05/19/12 07:47	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
119	05/20/12 07:47	7.10 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1.5 [1]	15.4 [1]	No Data [0]	No Data [0]
120	05/21/12 07:47	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1.6 [1]	4.7 [1]	No Data [0]	No Data [0]
121	05/22/12 07:48	No Data [0]	119.0-126.0 [2]	No Data [0]	No Data [0]	No Data [0]	0.7 [1]	18.0 [1]	No Data [0]	No Data [0]
122	05/23/12 07:48	7.47 [1]	136.0-136.0 [2]	No Data [0]	No Data [0]	No Data [0]	1.5 [1]	16.9 [1]	No Data [0]	No Data [0]
123	05/24/12 07:48	7.36 [1]	59.6-123.0 [2]	No Data [0]	No Data [0]	No Data [0]	1.4 [1]	16.7 [1]	No Data [0]	No Data [0]
124	05/25/12 07:48	7.11 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1.6 [1]	6.1 [1]	No Data [0]	No Data [0]
125	05/26/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
126	05/27/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
127	05/28/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

	F	AN	AP	AQ	AR	AS	AT	AU	AV	AW
1	End	(32) BAF FILTER 1 EFFLUENT pH (SU)	(32) BAF FILTER 1 EFFLUENT COD(t) (mg/L)	(32) BAF FILTER 1 EFFLUENT COD(s) (mg/L)	(32) BAF FILTER 1 EFFLUENT BOD(t) (mg/L)	(32) BAF FILTER 1 EFFLUENT BOD(s) (mg/L)	(32) BAF FILTER 1 EFFLUENT Nitrate (NO3-N) (mg/L)	(32) BAF FILTER 1 EFFLUENT Ammonia (NH3-N) (mg/L)	(32) BAF FILTER 1 EFFLUENT Nitrite (mg/L) (NO2--N)	(32) BAF FILTER 1 EFFLUENT Total Nitrogen (mg/L) (TN)
128	05/29/12 07:48	7.58 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	3.4 [1]	18.4 [1]	No Data [0]	No Data [0]
129	05/30/12 07:48	7.48 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	3.0 [1]	17.6 [1]	No Data [0]	No Data [0]
130	05/31/12 07:48	7.27 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1.1-1.9 [2]	18.0 [1]	2.00 [1]	13.6 [1]
131	06/01/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1.7 [1]	28.8 [1]	No Data [0]	No Data [0]
132	06/02/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
133	06/03/12 07:48	No Data [0]	22.1-23.9 [2]	No Data [0]	No Data [0]	No Data [0]	11.0 [1]	12.9 [1]	No Data [0]	23.1 [1]
134	06/04/12 07:48	6.95 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	12.8 [1]	8.3 [1]	No Data [0]	4.6 [1]
135	06/05/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
136	06/06/12 07:48	7.12 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	9.9 [1]	2.0 [1]	No Data [0]	No Data [0]
137	06/07/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	9.5 [1]	27.0 [1]	No Data [0]	No Data [0]
138	06/08/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
139	06/09/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
140	06/10/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	8.7 [1]	5.1 [1]	No Data [0]	No Data [0]
141	06/11/12 07:48	7.23 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	6.3 [1]	12.4 [1]	0.25 [1]	No Data [0]
142	06/12/12 07:48	7.39 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	5.1 [1]	No Data [0]	1.56 [1]	No Data [0]
143	06/13/12 07:48	7.15 [1]	77.2-78.9 [2]	No Data [0]	No Data [0]	No Data [0]	3.6 [1]	6.7 [1]	No Data [0]	No Data [0]
144	06/14/12 07:48	6.88 [1]	72.3-76.9 [2]	No Data [0]	No Data [0]	No Data [0]	2.3 [1]	4.4 [1]	No Data [0]	No Data [0]
145	06/15/12 07:48	No Data [0]	51.1-77.5 [2]	No Data [0]	No Data [0]	No Data [0]	2.6 [1]	2.6 [1]	No Data [0]	No Data [0]
146	06/16/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
147	06/17/12 07:48	No Data [0]	34.9-37.0 [2]	No Data [0]	No Data [0]	No Data [0]	6.0 [1]	4.7 [1]	No Data [0]	No Data [0]
148	06/18/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
149	06/19/12 07:48	6.72 [1]	72.5-87.4 [2]	No Data [0]	No Data [0]	No Data [0]	2.2 [1]	0.4 [1]	No Data [0]	No Data [0]
150	06/20/12 07:48	7.10 [1]	77.6-78.5 [2]	No Data [0]	No Data [0]	No Data [0]	7.7 [1]	1.6 [1]	No Data [0]	No Data [0]
151	06/21/12 07:48	7.20 [1]	57.7-69.2 [2]	No Data [0]	No Data [0]	No Data [0]	4.1 [1]	0.8 [1]	No Data [0]	No Data [0]
152	06/22/12 07:48	7.18 [1]	88.3-95.6 [2]	No Data [0]	No Data [0]	No Data [0]	1.8 [1]	10.1 [1]	No Data [0]	No Data [0]
153	06/23/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
154	06/24/12 07:48	No Data [0]	61.0-68.8 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1.9 [1]	No Data [0]	13.4 [1]
155	06/25/12 07:48	7.47 [1]	113.0-115.0 [2]	No Data [0]	No Data [0]	No Data [0]	2.5 [1]	3.9 [1]	No Data [0]	No Data [0]
156	06/26/12 07:48	7.34 [1]	44.1-58.0 [2]	37-39 [2]	No Data [0]	No Data [0]	6.5 [1]	2.5 [1]	No Data [0]	No Data [0]

	F	AN	AP	AQ	AR	AS	AT	AU	AV	AW
1	End	(32) BAF FILTER 1 EFFLUENT pH (SU)	(32) BAF FILTER 1 EFFLUENT COD(t) (mg/L)	(32) BAF FILTER 1 EFFLUENT COD(s) (mg/L)	(32) BAF FILTER 1 EFFLUENT BOD(t) (mg/L)	(32) BAF FILTER 1 EFFLUENT BOD(s) (mg/L)	(32) BAF FILTER 1 EFFLUENT Nitrate (NO3-N) (mg/L)	(32) BAF FILTER 1 EFFLUENT Ammonia (NH3-N) (mg/L)	(32) BAF FILTER 1 EFFLUENT Nitrite (mg/L) (NO2--N)	(32) BAF FILTER 1 EFFLUENT Total Nitrogen (mg/L) (TN)
157	06/27/12 07:48	7.21 [1]	41.5-41.6 [2]	No Data [0]	No Data [0]	No Data [0]	11.0 [1]	4.2 [1]	No Data [0]	No Data [0]
158	06/28/12 07:48	7.24 [1]	40.4-40.7 [2]	No Data [0]	No Data [0]	No Data [0]	12.7 [1]	2.4 [1]	No Data [0]	No Data [0]
159	06/29/12 07:48	No Data [0]	42.6-53.1 [2]	No Data [0]	No Data [0]	No Data [0]	17.5 [1]	2.9 [1]	No Data [0]	No Data [0]
160	06/30/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
161	07/01/12 07:48	6.92 [1]	47.6 [1]	No Data [0]	No Data [0]	No Data [0]	18.8 [1]	1.9 [1]	No Data [0]	No Data [0]
162	07/02/12 07:48	6.85 (6.58-6.96) [3]	34.4-45.2 [2]	No Data [0]	No Data [0]	No Data [0]	13.9 [1]	2.8 [1]	No Data [0]	29.9 [1]
163	07/03/12 07:45	7.16 [1]	74.5-81.0 [2]	No Data [0]	No Data [0]	No Data [0]	12.9 [1]	1.0 [1]	No Data [0]	No Data [0]
164	07/04/12 07:45	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
165	07/05/12 07:45	6.80 [1]	46.3-52.9 [2]	No Data [0]	No Data [0]	No Data [0]	5.3 [1]	1.7 (0.3-3.0) [6]	No Data [0]	No Data [0]
166	07/06/12 07:45	7.03 (6.65-7.32) [3]	97.2-103.0 [2]	No Data [0]	No Data [0]	No Data [0]	11.9 [1]	0.8 (0.2-2.5) [23]	No Data [0]	24.9 [1]
167	07/07/12 07:45	7.22 [1]	123.0-132.0 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.4 (0.3-17.0) [15]	No Data [0]	23.8 [1]
168	07/08/12 07:45	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.4 (0.3-0.8) [12]	No Data [0]	No Data [0]
169	07/09/12 07:45	7.38 [1]	75.4-76.3 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.3 (0.2-0.6) [13]	No Data [0]	No Data [0]
170	07/10/12 07:45	7.87 [1]	71.1 (69.1-96.8) [3]	No Data [0]	No Data [0]	No Data [0]	13.3 [1]	0.5 (0.2-1.1) [18]	No Data [0]	No Data [0]
171	07/11/12 07:55	No Data [0]	84.6 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1.4 (0.4-6.9) [8]	No Data [0]	No Data [0]
172	07/12/12 07:55	7.68 [1]	49.8-53.5 [2]	No Data [0]	No Data [0]	No Data [0]	15.6 [1]	2.0 (0.5-5.8) [13]	No Data [0]	No Data [0]
173	07/13/12 07:55	7.60 [1]	42.1-48.1 [2]	No Data [0]	No Data [0]	No Data [0]	16.0 [1]	0.7 (0.2-2.0) [14]	No Data [0]	No Data [0]
174	07/14/12 07:55	No Data [0]	70.0-72.7 [2]	No Data [0]	No Data [0]	No Data [0]	22.9 [1]	1.1 (0.7-1.2) [4]	No Data [0]	No Data [0]
175	07/15/12 07:57	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
176	07/16/12 07:50	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	4.9 (4.4-5.5) [4]	No Data [0]	No Data [0]
177	07/17/12 07:53	7.65-8.04 [2]	93.8 (77.1-103.0) [3]	No Data [0]	No Data [0]	No Data [0]	16.6-17.3 [2]	4.1 (1.3-4.6) [11]	No Data [0]	No Data [0]
178	07/18/12 07:56	8.04-8.08 [2]	93.8 (83.9-96.7) [3]	No Data [0]	No Data [0]	No Data [0]	27.6 (17.3-38.2) [3]	1.9 (0.4-4.8) [10]	No Data [0]	No Data [0]
179	07/19/12 07:59	7.49-7.84 [2]	84.3 (63.3-87.1) [3]	No Data [0]	No Data [0]	No Data [0]	28.5-36.0 [2]	2.1 (0.4-5.6) [13]	No Data [0]	No Data [0]
180	07/20/12 07:51	7.04 (6.94-7.09) [3]	108.0 [1]	No Data [0]	No Data [0]	No Data [0]	20.9-27.8 [2]	0.4 (0.3-1.3) [10]	No Data [0]	No Data [0]
181	07/21/12 07:55	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.4 (0.3-1.0) [7]	No Data [0]	No Data [0]
182	07/22/12 07:58	6.97 (6.31-7.10) [3]	57.7 [1]	No Data [0]	No Data [0]	No Data [0]	18.7 [1]	0.5 (0.0-1.0) [5]	No Data [0]	No Data [0]
183	07/23/12 07:50	7.10-7.46 [2]	64.4 [1]	No Data [0]	No Data [0]	No Data [0]	9.8 [1]	0.4 (0.4-0.6) [4]	No Data [0]	No Data [0]
184	07/24/12 07:54	7.46-7.74 [2]	59.6-64.4 [2]	No Data [0]	No Data [0]	No Data [0]	9.8 [1]	0.7 (0.4-20.2) [19]	No Data [0]	No Data [0]
185	07/25/12 07:54	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1.0 (0.4-19.0) [16]	No Data [0]	No Data [0]
186	07/26/12 07:54	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1.2 (0.4-41.1) [14]	No Data [0]	No Data [0]
187	07/27/12 07:54	7.36-7.37 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1.6 (0.9-2.9) [4]	No Data [0]	No Data [0]
188	07/28/12 07:54	7.64-7.74 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1.6 (0.3-8.3) [6]	No Data [0]	No Data [0]
189	07/29/12 07:54	7.39 (5.99-7.74) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.3 (0.1-2.9) [6]	No Data [0]	No Data [0]
190	07/30/12 07:54	5.52 [1]	209.0 (74.5-454.0) [7]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	4.3 (0.3-20.8) [8]	No Data [0]	No Data [0]
191	07/31/12 07:54	7.70 (7.53-7.72) [3]	203.0 (74.5-276.0) [11]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1.0 (0.4-20.9) [8]	No Data [0]	No Data [0]
192	08/01/12 07:54	7.69 (7.38-7.70) [3]	96.5 (70.3-282.0) [15]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	4.3 (1.0-19.3) [7]	No Data [0]	No Data [0]
193	08/02/12 07:54	7.78-7.81 [2]	81.3 (51.0-175.0) [15]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1.0 (0.6-5.9) [8]	No Data [0]	No Data [0]
194	08/03/12 10:20	No Data [0]	74.3 (49.1-119.0) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.5-0.6 [2]	No Data [0]	No Data [0]

Table 3.5-02: BAF Stage #1 and BAF Stage #2 Field Data Report, Part 21 of 25

[illegible]

Table 3.5-02: BAF Stage #1 and BAF Stage #2 Field Data Report, Part 22 of 25

[illegible]

Table 3.5-02: BAF Stage #1 and BAF Stage #2 Field Data Report, Part 23 of 25

[illegible]

	F	AX	AY	AZ	BD	BE	BF	BG	BJ	BK
1	End	(32) BAF FILTER 1 EFFLUENT NOx (mg/L)	(32) BAF FILTER 1 EFFLUENT TKN (mg/L)	(34) BAF FILTER 2 EFFLUENT SAMPLE ID	(34) BAF FILTER 2 EFFLUENT pH (SU)	(34) BAF FILTER 2 EFFLUENT Alkalinity (mg/L)	(34) BAF FILTER 2 EFFLUENT COD(t) (mg/L)	(34) BAF FILTER 2 EFFLUENT COD(s) (mg/L)	(34) BAF FILTER 2 EFFLUENT Nitrate (NO3-N) (mg/L)	(34) BAF FILTER 2 EFFLUENT Ammonia (NH3-N) (mg/L)
128	05/29/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
129	05/30/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
130	05/31/12 07:48	0.9 [1]	12.8 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
131	06/01/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
132	06/02/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
133	06/03/12 07:48	10.6 [1]	12.5 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
134	06/04/12 07:48	2.5 [1]	2.1 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
135	06/05/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
136	06/06/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
137	06/07/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
138	06/08/12 07:48	No Data [0]	No Data [0]	1,356 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
139	06/09/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
140	06/10/12 07:48	No Data [0]	No Data [0]	1,365 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	5.3 [1]	9.2 [1]
141	06/11/12 07:48	No Data [0]	No Data [0]	1,371-1,371 [2]	7.25 [1]	136.0 [1]	36.8-38.9 [2]	No Data [0]	4.5 [1]	10.9 [1]
142	06/12/12 07:48	No Data [0]	No Data [0]	1,386-1,386 [2]	7.26 [1]	128.0 [1]	73.8-76.4 [2]	No Data [0]	3.5 [1]	No Data [0]
143	06/13/12 07:48	No Data [0]	No Data [0]	1,403-1,403 [2]	6.92 [1]	No Data [0]	96.7-100.0 [2]	No Data [0]	0.9 [1]	10.7 [1]
144	06/14/12 07:48	No Data [0]	No Data [0]	1,425-1,425 [2]	6.87 [1]	140.0 [1]	119.0-121.0 [2]	No Data [0]	0.1 [1]	8.1 [1]
145	06/15/12 07:48	No Data [0]	No Data [0]	1,465-1,465 [2]	No Data [0]	No Data [0]	76.5-77.8 [2]	No Data [0]	0.2 [1]	7.7 [1]
146	06/16/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
147	06/17/12 07:48	No Data [0]	No Data [0]	1,488-1,488 [2]	No Data [0]	No Data [0]	139.0-141.0 [2]	No Data [0]	0.2 [1]	5.7 [1]
148	06/18/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
149	06/19/12 07:48	No Data [0]	No Data [0]	1,511-1,511 [2]	6.90 [1]	148.0 [1]	101.0-102.0 [2]	No Data [0]	0.2 [1]	6.1 [1]
150	06/20/12 07:48	No Data [0]	No Data [0]	1,523-1,523 [2]	7.01 [1]	130.0 [1]	83.3-83.8 [2]	No Data [0]	0.2 [1]	5.1 [1]
151	06/21/12 07:48	No Data [0]	No Data [0]	1,548-1,548 [2]	No Data [0]	No Data [0]	43.7-47.5 [2]	No Data [0]	5.6 [1]	1.3 [1]
152	06/22/12 07:48	No Data [0]	No Data [0]	1,574-1,574 [2]	7.12 [1]	152.0 [1]	64.3-66.4 [2]	No Data [0]	0.5 [1]	6.8 [1]
153	06/23/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
154	06/24/12 07:48	8.0 [1]	5.5 [1]	1,587-1,587 [2]	No Data [0]	No Data [0]	42.2-43.1 [2]	No Data [0]	No Data [0]	0.0 [1]
155	06/25/12 07:48	No Data [0]	No Data [0]	1,604-1,604 [2]	7.34 [1]	73.0 [1]	59.6-63.8 [2]	No Data [0]	2.6 [1]	4.0 [1]
156	06/26/12 07:48	No Data [0]	No Data [0]	1,619-1,619 [2]	7.24 [1]	81.0 [1]	31.0-31.7 [2]	36.4-37.3 [2]	6.9 [1]	3.2 [1]

	F	AX	AY	AZ	BD	BE	BF	BG	BJ	BK
1	End	(32) BAF FILTER 1 EFFLUENT NOx (mg/L)	(32) BAF FILTER 1 EFFLUENT TKN (mg/L)	(34) BAF FILTER 2 EFFLUENT SAMPLE ID	(34) BAF FILTER 2 EFFLUENT pH (SU)	(34) BAF FILTER 2 EFFLUENT Alkalinity (mg/L)	(34) BAF FILTER 2 EFFLUENT COD(t) (mg/L)	(34) BAF FILTER 2 EFFLUENT COD(s) (mg/L)	(34) BAF FILTER 2 EFFLUENT Nitrate (NO3-N) (mg/L)	(34) BAF FILTER 2 EFFLUENT Ammonia (NH3-N) (mg/L)
157	06/27/12 07:48	No Data [0]	No Data [0]	1,629-1,629 [2]	7.15 [1]	68.0 [1]	33.5-37.2 [2]	No Data [0]	8.8 [1]	1.2 [1]
158	06/28/12 07:48	No Data [0]	No Data [0]	1,656-1,656 [2]	7.29 [1]	98.0 [1]	30.8-31.9 [2]	No Data [0]	2.8 [1]	0.4 [1]
159	06/29/12 07:48	No Data [0]	No Data [0]	1,683-1,683 [2]	No Data [0]	No Data [0]	26.5-30.7 [2]	No Data [0]	3.8 [1]	0.4 [1]
160	06/30/12 07:48	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
161	07/01/12 07:48	No Data [0]	No Data [0]	1,693-1,693 [2]	7.18 [1]	No Data [0]	53.8 [1]	No Data [0]	3.7 [1]	1.1 [1]
162	07/02/12 07:48	16.3 [1]	13.6 [1]	1,706-1,706 [2]	7.39 [1]	96.0 [1]	28.2-34.2 [2]	No Data [0]	2.9 [1]	1.7 [1]
163	07/03/12 07:45	No Data [0]	No Data [0]	1,729-1,729 [2]	7.02 [1]	114.0 [1]	49.8-56.6 [2]	No Data [0]	1.3 [1]	0.8 [1]
164	07/04/12 07:45	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
165	07/05/12 07:45	No Data [0]	No Data [0]	1,733-1,733 [2]	7.36 [1]	146.0 [1]	65.3-65.9 [2]	No Data [0]	0.1 [1]	0.1 [1]
166	07/06/12 07:45	12.1 [1]	12.8 [1]	1,757-1,774 [3]	7.34 [1]	138.0 [1]	119.0-122.0 [2]	No Data [0]	0.0 [1]	0.0-1.4 [2]
167	07/07/12 07:45	14.5 [1]	9.3 [1]	1,784-1,784 [2]	No Data [0]	No Data [0]	115.0-138.0 [2]	No Data [0]	No Data [0]	No Data [0]
168	07/08/12 07:45	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
169	07/09/12 07:45	No Data [0]	No Data [0]	1,821-1,821 [2]	7.57 [1]	190.0 [1]	104.0-106.0 [2]	No Data [0]	No Data [0]	1.4 [1]
170	07/10/12 07:45	No Data [0]	No Data [0]	1,832-1,832 [2]	No Data [0]	No Data [0]	126.0-129.0 [2]	No Data [0]	No Data [0]	0.6 [1]
171	07/11/12 07:55	No Data [0]	No Data [0]	1,862-1,862 [2]	7.60 [1]	218.0 [1]	116.0-118.0 [2]	No Data [0]	0.1 [1]	0.6 [1]
172	07/12/12 07:55	No Data [0]	No Data [0]	1,886-1,886 [2]	7.55 [1]	260.0 [1]	112.0-112.0 [2]	No Data [0]	0.1 [1]	0.9 [1]
173	07/13/12 07:55	No Data [0]	No Data [0]	1,944-1,947 [3]	7.72 [1]	266.0 [1]	75.4-77.8 [2]	No Data [0]	0.1-0.1 [2]	1.5-2.6 [2]
174	07/14/12 07:55	No Data [0]	No Data [0]	1,958-1,958 [2]	No Data [0]	No Data [0]	161.0-179.0 [2]	No Data [0]	0.1 [1]	0.2 [1]
175	07/15/12 07:57	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
176	07/16/12 07:50	No Data [0]	No Data [0]	1,980-1,980 [2]	7.30 [1]	296.0 [1]	151.0-155.0 [2]	No Data [0]	0.1 [1]	7.4 [1]
177	07/17/12 07:53	No Data [0]	No Data [0]	2,002-2,002 [2]	6.50 [1]	176.0 [1]	209.0-210.0 [2]	No Data [0]	0.2 [1]	2.5 [1]
178	07/18/12 07:56	No Data [0]	No Data [0]	2,024-2,053 [11]	7.38-7.54 [2]	250.0-416.0 [2]	234.0 (163.0-249.0) [3]	No Data [0]	0.1 (0.1-0.3) [10]	2.2 (0.3-3.8) [10]
179	07/19/12 07:59	No Data [0]	No Data [0]	2,033-2,092 [15]	7.87-7.92 [2]	310.0-448.0 [2]	114.0 (105.0-114.0) [3]	No Data [0]	0.1 (0.1-7.8) [12]	1.8 (1.0-3.1) [12]
180	07/20/12 07:51	No Data [0]	No Data [0]	2,077-2,119 [9]	7.33-7.79 [2]	180.0-265.0 [2]	69.6 [1]	No Data [0]	7.6 (0.6-8.5) [9]	1.2 (0.9-2.1) [9]
181	07/21/12 07:55	No Data [0]	No Data [0]	2,120-2,125 [6]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.1 (0.0-0.2) [6]	1.2 (0.9-2.1) [6]
182	07/22/12 07:58	No Data [0]	No Data [0]	2,108-2,128 [5]	7.25 [1]	236.0 [1]	99.2 [1]	No Data [0]	0.1 (0.0-0.1) [4]	1.3 (0.8-1.4) [4]
183	07/23/12 07:50	No Data [0]	No Data [0]	2,132-2,139 [3]	6.92 [1]	152.0 [1]	No Data [0]	No Data [0]	0.1 [1]	1.7 (1.1-2.5) [3]
184	07/24/12 07:54	No Data [0]	No Data [0]	2,146-2,278 [9]	6.95-6.98 [2]	214.0-264.0 [2]	141.0-141.0 [2]	No Data [0]	0.1 (0.1-0.2) [5]	2.0 (1.0-7.5) [8]
185	07/25/12 07:54	No Data [0]	No Data [0]	2,281-2,311 [13]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.1 (0.1-0.1) [4]	4.1 (1.6-7.2) [13]
186	07/26/12 07:54	No Data [0]	No Data [0]	2,313-2,346 [14]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.1 (0.1-0.2) [4]	8.5 (1.4-17.3) [13]
187	07/27/12 07:54	No Data [0]	No Data [0]	2,349-2,361 [5]	6.82-8.45 [2]	202.0-220.0 [2]	No Data [0]	No Data [0]	0.2 [1]	1.5 (0.7-14.7) [5]
188	07/28/12 07:54	No Data [0]	No Data [0]	2,365-2,377 [5]	6.94 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1.5 (0.1-4.1) [5]
189	07/29/12 07:54	No Data [0]	No Data [0]	2,379-2,392 [6]	5.84 (5.70-7.38) [3]	134.0 (115.0-168.0) [3]	No Data [0]	No Data [0]	No Data [0]	3.6 (1.3-5.8) [6]
190	07/30/12 07:54	No Data [0]	No Data [0]	2,164-2,395 [11]	7.40 [1]	145.0 [1]	No Data [0]	No Data [0]	No Data [0]	1.2 (0.5-1.8) [4]
191	07/31/12 07:54	No Data [0]	No Data [0]	2,182-2,189 [11]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
192	08/01/12 07:54	No Data [0]	No Data [0]	2,190-2,202 [13]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.2 (0.1-0.2) [4]	No Data [0]
193	08/02/12 07:54	No Data [0]	No Data [0]	2,207-2,219 [8]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.1 [1]	No Data [0]
194	08/03/12 10:20	No Data [0]	No Data [0]	2,220-2,221 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

3.5.3 Experimental Plan Results

3.5.3.1 Experimental Plan 01

EXPERIMENTAL PLAN 01 did not apply to the BAF process, as each filter cell will operate at a filter surface loading rate equal to the maximum month. The first Experimental Trial for the BAF was Experimental Trial 02.

3.5.3.2 Experimental Plan 02

EXPERIMENTAL PLAN 02 was conducted from March 12 through March 21, 2012 to evaluate the treatment performance of each process at a flow rate equivalent to the maximum month average daily flow for treating to a treatment goal of 30 mg/L BOD and 30 mg/L TSS.

Composite samples were collected daily March 12 through March 21. Lab samples were collected on March 13, March 19, and March 20 and results were provided by Eastern Analytical under lab reports #108372, #108514, and #108547, respectively. Results are summarized in Table 3.5-03

Figure 3.5-01 shows the data collected during Experimental Trial 02 on the BAF. The low air concentrations prior to the beginning of the trial were caused by adjustments to the air regulator. It was suspected that the very low effluent TSS concentrations on March 18 and March 19 were a result of lowering the air flow into the BAF 1 filter, but the conditions could not be duplicated, and there was not sufficient control to maintain lower air flow rates (the air regulators did not provide fine control). The headloss during this period climbed approximately 9 inches over a 24 hour period. All measured concentrations of TSS and BOD were below the target of 30 mg/L.

Table 3.5-03: Results for BAF Experimental Trial 02

Parameter	Results	Goal
Influent Flow Rate (gpm)	6.2	N/A
Influent Hydraulic Loading Rate (gpm/sf)	0.88	N/A
BOD Loading Rate(lbs BOD/1000 cf · day)	166 (124 – 215) [9]	153
Effluent BOD (Field)	19.2 (14.3 – 27.7) [17]	30
Effluent BOD (Laboratory)	13, 8, 14	
Effluent BOD (Calculated from COD)	18.7 (12 – 23.4) [18]	
Effluent TSS (Field)	12.9 (0 – 23.4) [26]	30
Effluent TSS (Laboratory)	25, 5, 13	

Figure 3.5-02 shows a boxplot of the TSS and BOD results compared to a reference line for the 30/30 permit limit. The method “Calculated” applies only to BODs that were calculated from field COD results, and has no meaning with regard to TSS.

Figure 3.5-01: Results from Experimental Trial 02 - BAF Stage 1

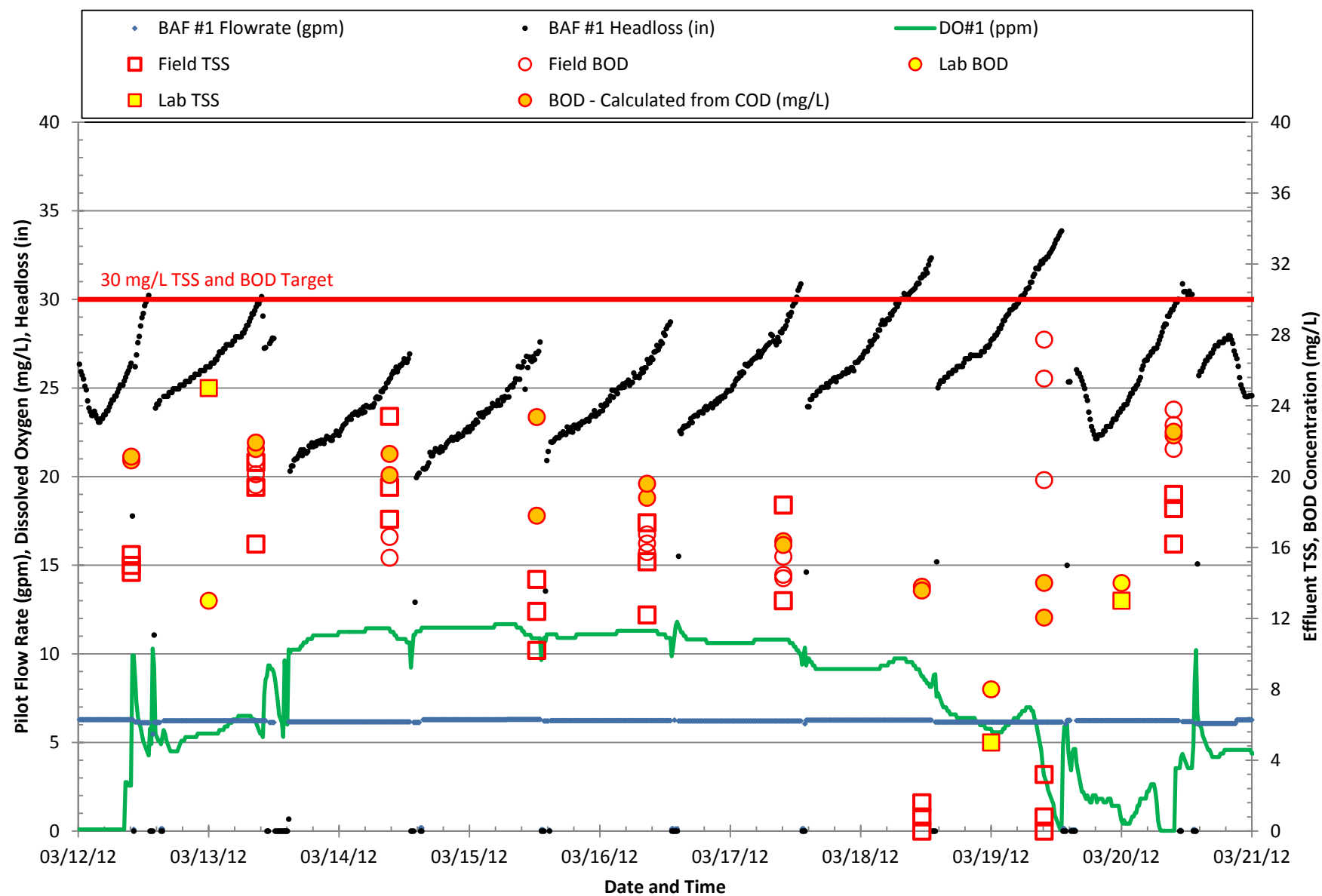
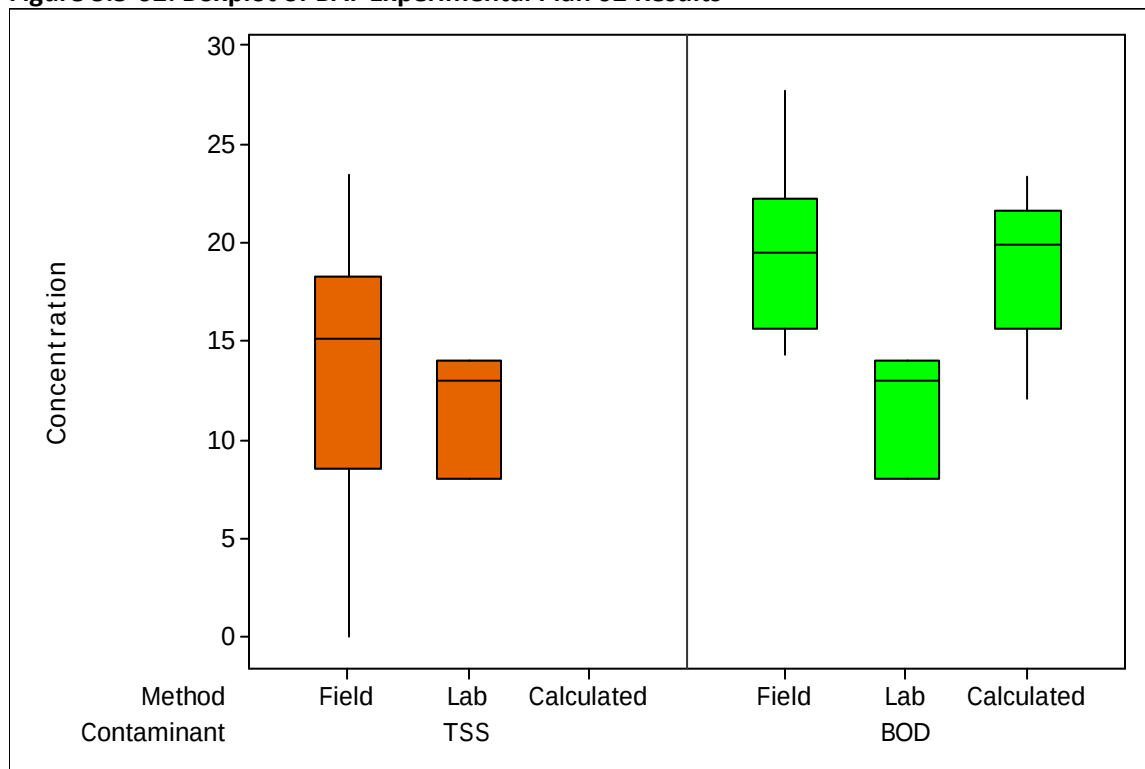


Figure 3.5-02: Boxplot of BAF Experimental Plan 02 Results



3.5.3.3 Experimental Plan 03

EXPERIMENTAL PLAN 03 was not completed for the BAF process due to schedule constraints. Experimental Trial 03 evaluated the treatment performance of each process for a treatment goal of 30 mg/L BOD, 30 mg/L TSS, and 8 mg/L total nitrogen with existing concentrations of ammonia. Experimental Trial 05 evaluated the processes under an increased load of ammonia, with the same performance goals, so Experimental Trial 05 and replaced Experimental Trial 03.

3.5.3.4 Experimental Plan 04

EXPERIMENTAL PLAN 04 is described in Section 3.5.4

3.5.3.5 Experimental Plans 05 and 06

EXPERIMENTAL PLANS 05 and 06 were conducted simultaneously from July 1, 2012 through July 21, 2012 to evaluate the performance of the BAF process for TN removal.

Aqueous ammonia was added to the primary effluent to increase the influent TKN into BAF 1 to approximately 45 mg/L. Soda ash was added to the primary effluent to increase the primary effluent total alkalinity to approximately 150 mg/L as CaCO₃. BAF Stage #1 was operated at 3 gpm without recycle, and Stage #2 was operated at 2 gpm. MicroC 1000 was added to the influent to the BAF 2 reactor, and the dose was adjusted based on the nitrate and DO concentration entering BAF 2.

Figure 3.5-03 shows the data collected during BAF Experimental Trial 05/06 for BAF 1. Note that the BAF 1 effluent TSS was below the TSS goal of 30 mg/L in all lab samples, and all but one field sample, even though TSS compliance is based on BAF 2 effluent, not BAF 1. The frequency of monitoring BAF 1

effluent ammonia was increased on July 5 to evaluate whether the system was able to reduce ammonia concentrations below 1 mg/L in the first stage. The concentrations of ammonia that were greater than 3 mg/L can be attributed to mechanical failures, mainly when the primary flow was reduced and resulted in very high concentrations of influent ammonia (the ammonium hydroxide feed pump was not flow-paced, so the feed rate remained constant while the flow decreased).

Figure 3.5-04 shows the data collected during BAF Experimental Trial 05/06 for BAF 2. There was a control error that occurred during the backwash on Saturday, July 14 that was not detected and corrected until Monday July 16, keeping BAF 2 offline for 44 hours. The system was restarted in semi-auto mode in order to prevent the control problem for an additional day. With the exception of the period July 14 to July 16, all TSS and TN concentrations were below the targets of 30 mg/L TSS and 8 mg/L TN, but the system did not achieve TN less than 3 mg/L. Note that the sum of the effluent ammonia and nitrate was used as a surrogate for total nitrogen on Figure 3.5-04. These two analyses were used as a surrogate for total nitrogen because results could be obtained rapidly.

Figure 3.5-03: Results from Experimental Trials 05/06 - BAF Stage#1

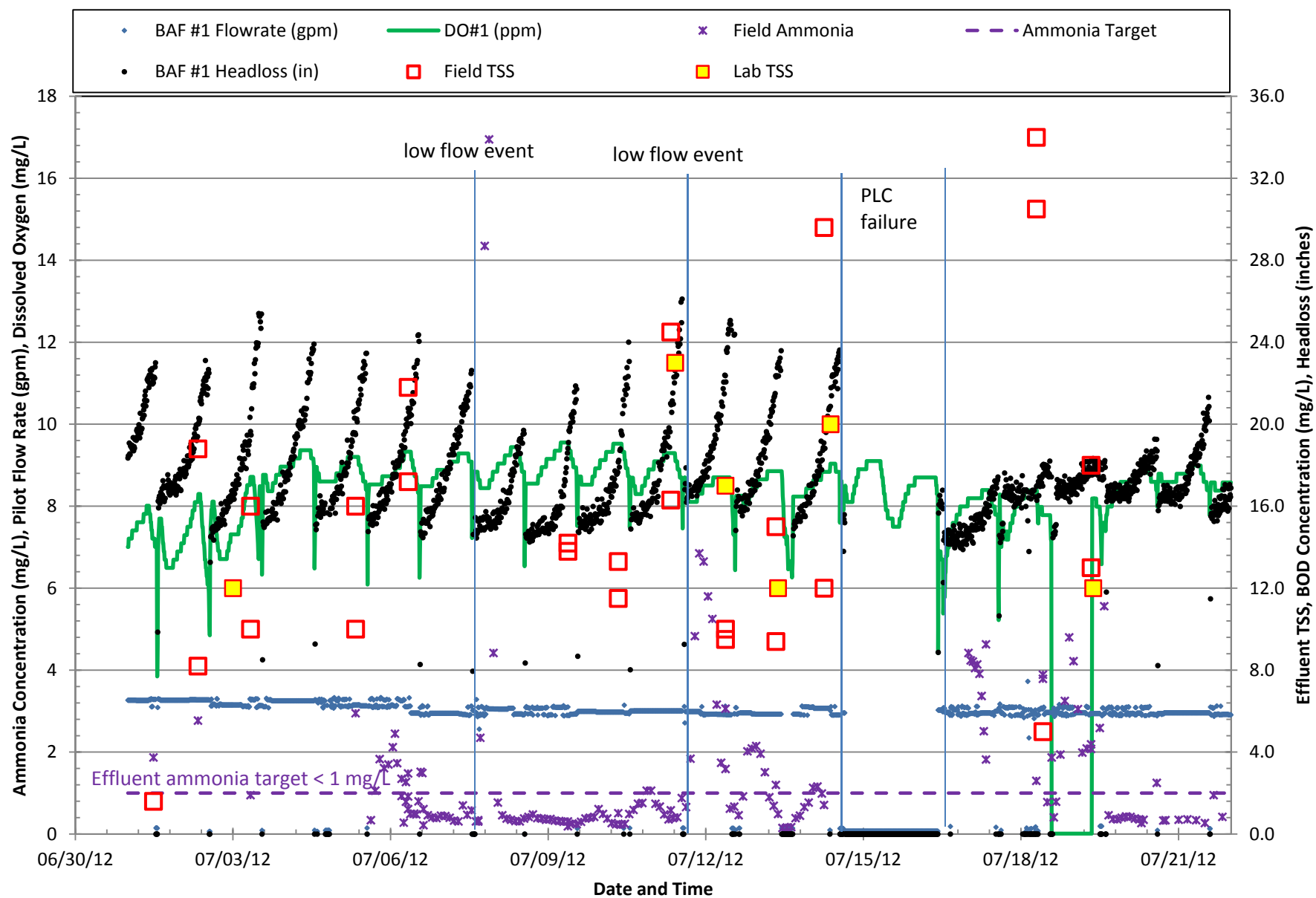
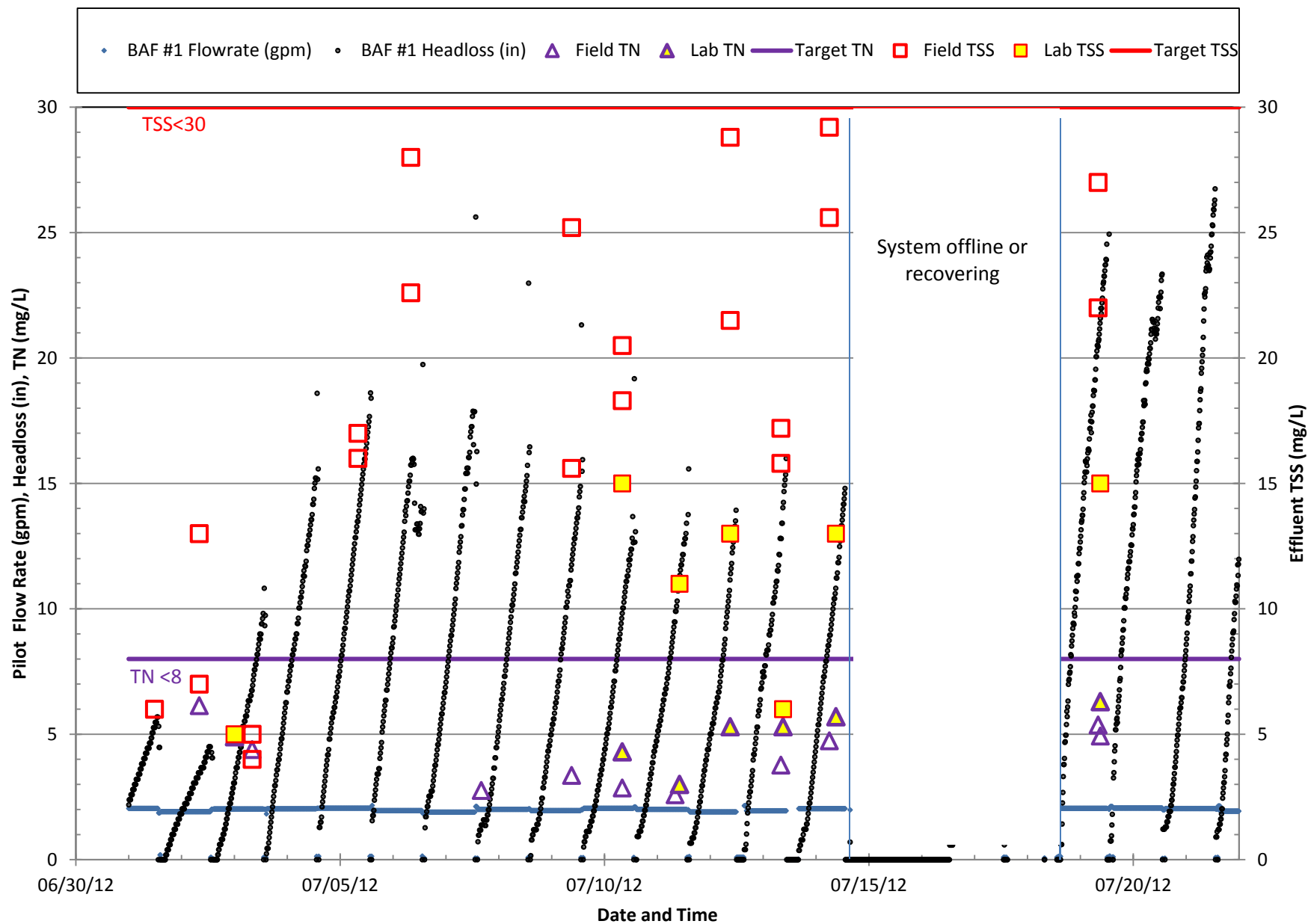


Figure 3.5-04: Results from Experimental Trials 05/06 - BAF Stage#2



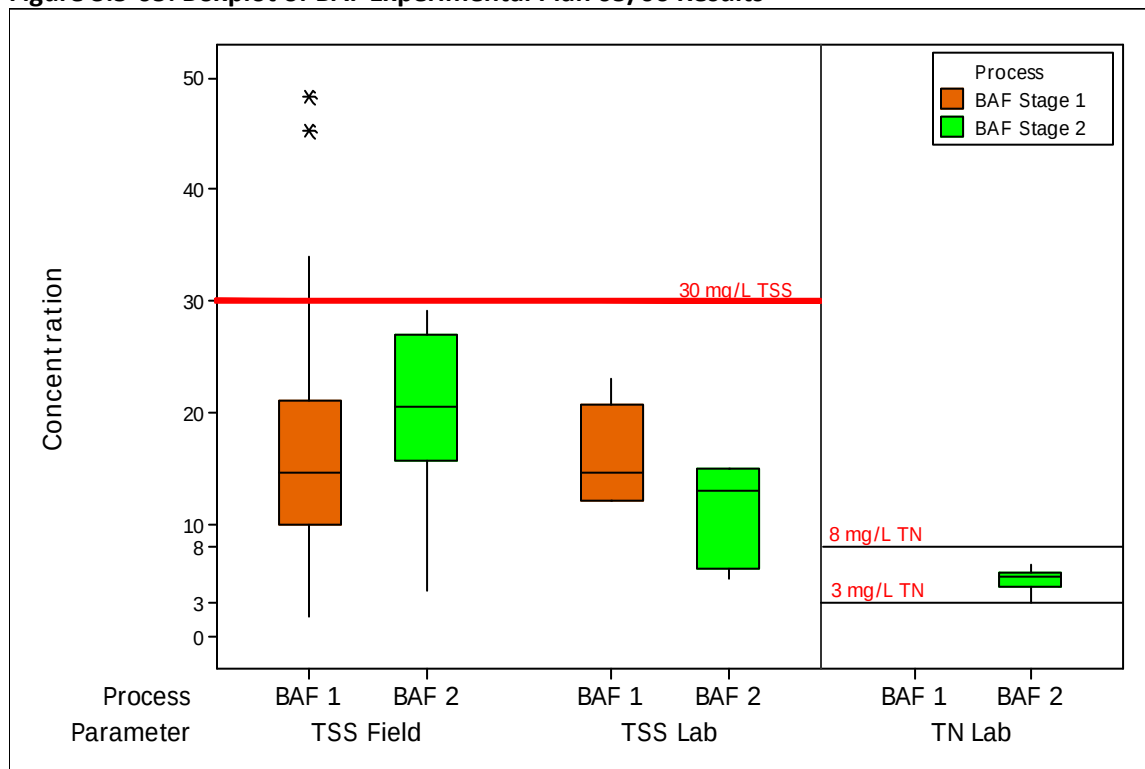
Composite samples were collected on July 11, 12, 13, 14, and 19 and results were provided by Eastern Analytical under lab reports #112088, #112277, #112390, #112223, #111809. Results are summarized in Table 3.5-04

Table 3.5-04: Results for BAF Experimental Trial 05/06

Parameter	Results	Goal
Influent Flow Rate (gpm)	3	N/A
Influent BOD (mg/L)	293	
Influent Ammonia (mg/L)	40	
Influent TKN (mg/L)	45	
BOD Loading Rate(grams BOD/1000 cf · day)	122	153
TKN Loading Rate(grams TKN/1000 cf · day)	18.4	20.6
BAF 1 Effluent TSS (Field)	17.6 (5 - 48.3) [28]	N/A
BAF 1 Effluent TSS (Lab)	16 (12 - 23) [6]	
BAF 2 Effluent TSS (Field)	19.2 (4 – 29.2) [23]	30
BAF 2 Effluent TSS (Lab)	11.1 (<5 – 15) [7]	
BAF 2 Effluent TN (Lab)	4.9 (3 – 6.3) [7]	3 - 8

Figure 3.5-05 shows a boxplot of the TSS, BOD, and TN results compared to a reference line for the 30/30 and for the two total nitrogen goals of TN<8 and TN<3.

Figure 3.5-05: Boxplot of BAF Experimental Plan 05/06 Results



3.5.4 Hydraulic Stress Results, BAF Experimental Plan 04

The operators suspected that the TSS from the BAF 1 filter was high in TSS immediately after a backwash because solids were visible in the bottom of the autosampler containers associated with the period after a backwash event. A figure showing the concentration of TSS versus run time for BAF 1 effluent was prepared on August 2 and August 3, and is shown as Figure 3.5-06. Time zero (0 hrs) corresponds to the time the filter returned to forward flow after backwashing. This TSS profile has been superimposed on each of the BAF 1 stress test figures to aid in visually identifying the effect of the high flows on effluent TSS concentrations.

3.5.4.1 Full Strength, Mid flow, Short duration (FMS) Hydraulic Stress Test

Results from the Full-strength, Mid flow, Short duration (FMS) Trial are shown graphically in Figure 3.5-07 for BAF 1. The flow rate was increased from 3 gpm to 8.2 gpm over a 15 minute period starting at 12:00 AM on July 24. The BAF 1 effluent ammonia had remained below 1 mg/L in 44 samples dating back 60 hours prior to the start of the test, and the effluent TSS had averaged 6.3 in the 24-hour composite collected on the previous two days. The TSS concentration from a grab sample collected at 10 am on the morning of July 24 was 51 mg/L, however, likely due to the backwash that had occurred at 5:20 am.

Figure 3.5 - 06: Effect of BAF Stage #1 Runtime on Effluent TSS

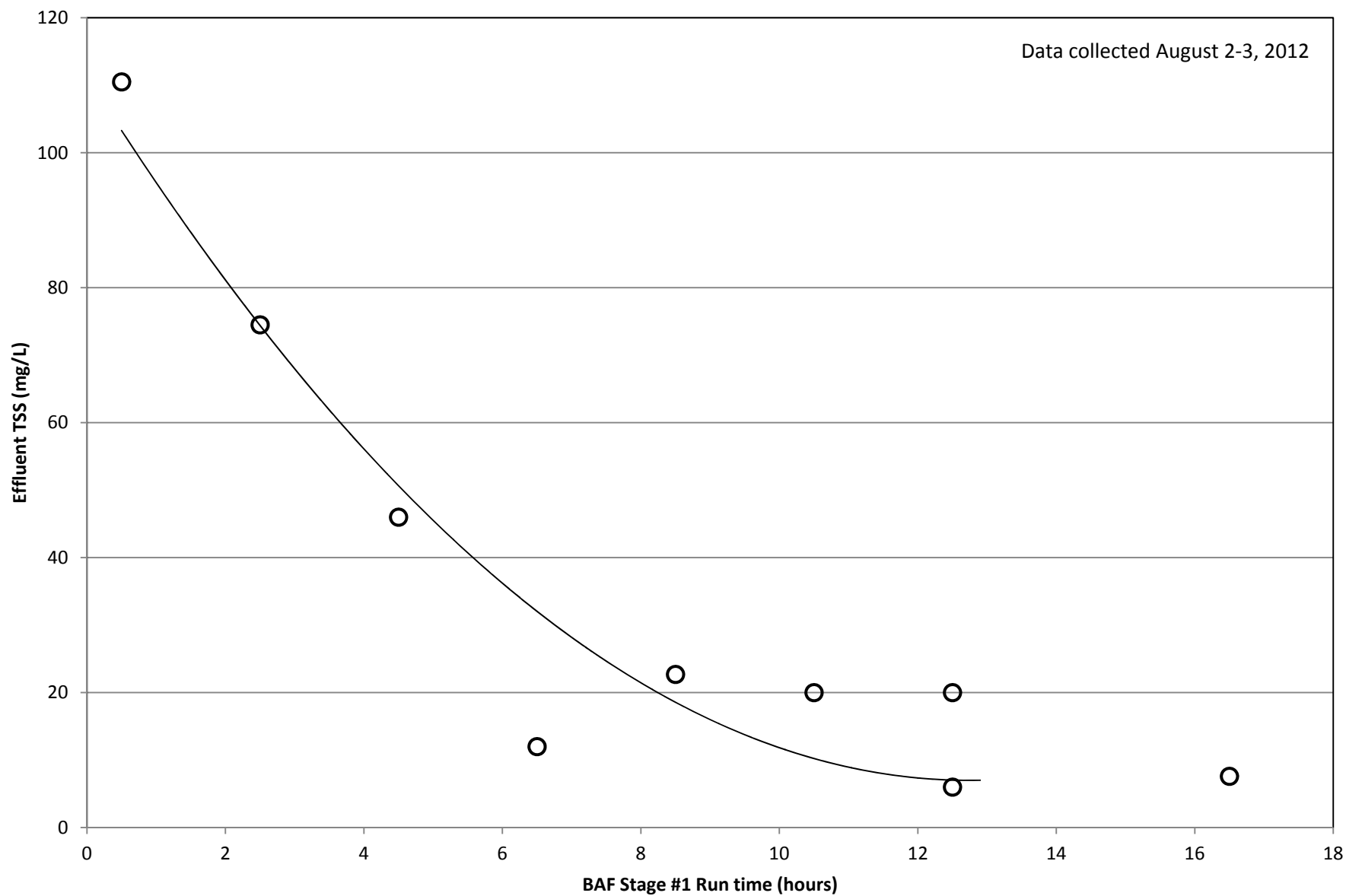
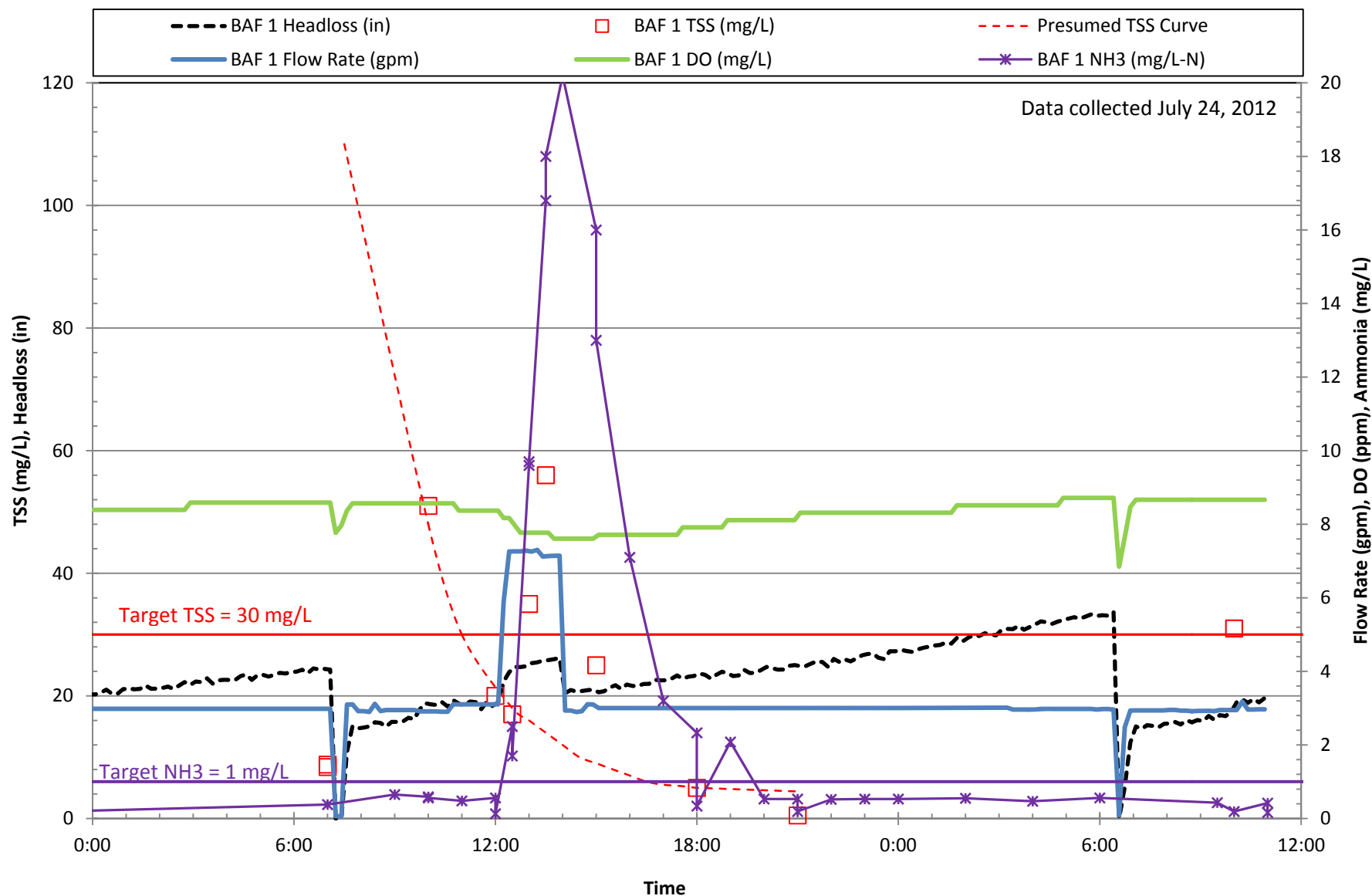


Figure 3.5-07: BAF#1 FMS | 2-hour, Medium Flow Stress Test



The increase in flow decreased the dissolved oxygen slightly during the high flow period. The “Presumed TSS Curve” indicates that TSS was likely somewhat elevated at the start of the peak flow as a result of the backwash that ended at approximately 07:30 (the headloss and flow rate curves provide a convenient reference for backwash events). Both the TSS and ammonia were increased as a result of the increased flow rate. The ammonia increased to a concentration of one-half of the influent ammonia concentration for a short period of time, then returned to the goal of $<1 \text{ mg/L NH}_3\text{-N}$ within 6 hours of the end of the high flow period. TSS also increased slightly during this period, with the concentration increasing to 56 during the high flow period, then declining to less than 30 mg/L within 1 hour of the end of the high flow period. Ammonia and TSS concentrations for the remainder of the filter run were below the respective goals of 1 mg/L $\text{NH}_3\text{-N}$ and 30 mg/L TSS.

Figure 3.5-08 shows the results for BAF 2. The flow rate was increased from 2 gpm to 6.2 gpm over a 15 minute period starting at 12:00 AM on July 24. The BAF 2 effluent TSS, ammonia and TN had been below the standards for several days. The increase in flow did not appear to impact the TSS or TN concentrations during or immediately after the increased flow event, but both TN and ammonia began to increase 6 hours after the flow increase was stopped.

Note that the influent for BAF 2 was pumped from the 2,000-gallon BAF 1 effluent storage tank, and it is believed that the increase of TN and ammonia is a result of the high ammonia effluent from BAF 1. The BAF 1 ammonia spike (Figure 3.4-07) would have mixed with the stored water in the effluent tank. The BAF 1 effluent tank was likely still at a comparatively low level when the peak flow began at 12:00, because much of the stored water would have been consumed by the BAF 1 backwash at 07:30, and the tank would have refilled at a net flow of only 1 gpm after BAF 1 returned to forward flow (3 gpm inflow from BAF 1 minus 2 gpm outflow to feed BAF 2). As a result, the entire volume stored in the BAF 1 effluent tank (BAF 2 influent feed water) would have had an elevated ammonia concentration, and that volume of water would have been very slow to turn over. The tank volume might not have fully turned over until the subsequent BAF 1 backwash again consumed much of the stored volume.

Samples were also analyzed for COD, TN, NOX, and TKN, but are not shown on the figures for clarity purposes. The complete data set is shown in Table 3.5-05.

Figure 3.5-08: BAF#2 FMS | 2-hour, Medium Flow Stress Test

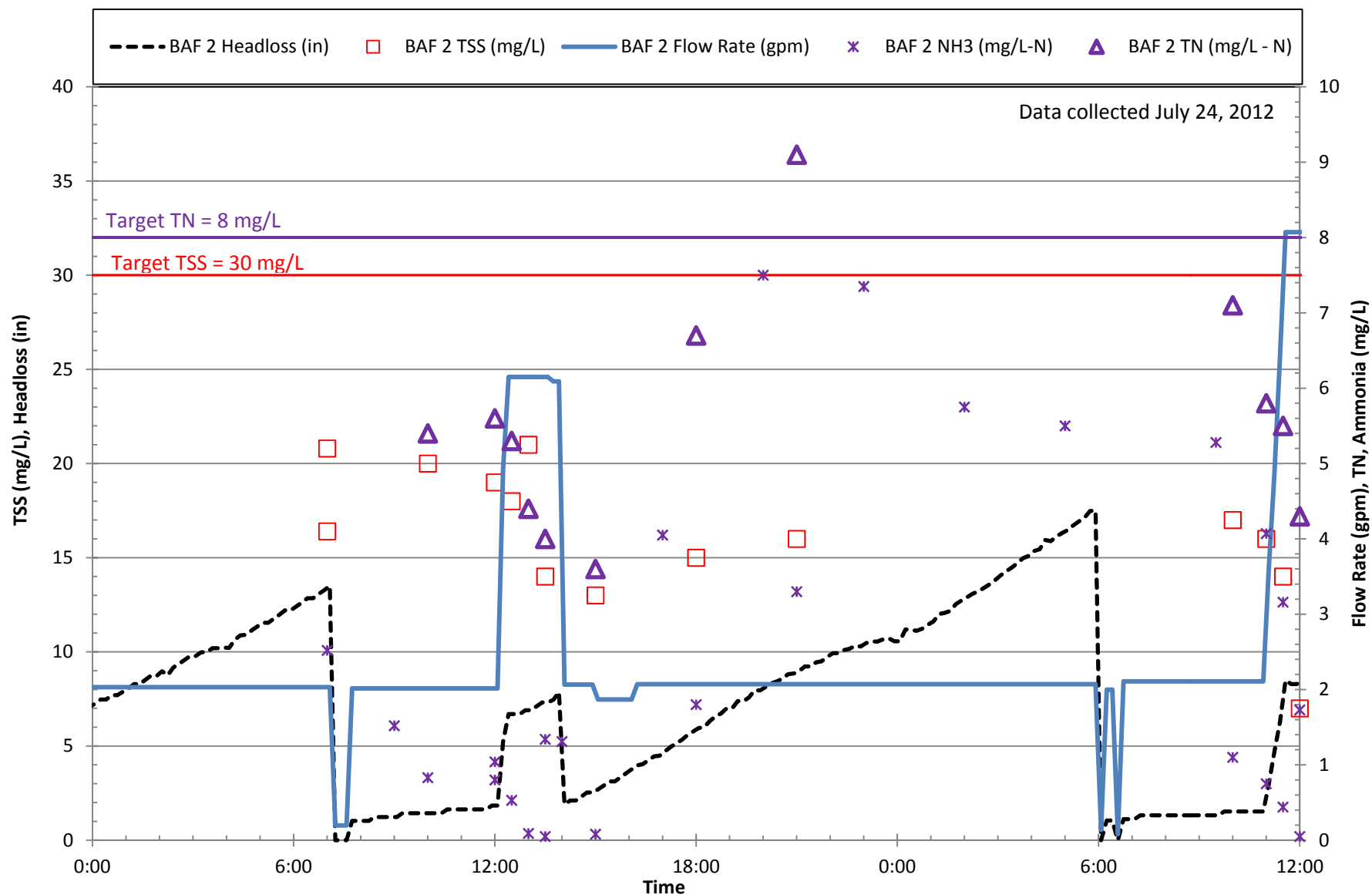


Table 3.5-05a: Water Quality Results for BAF Experimental Plan 04 FMS

Date and Time	Location	Type	Step	TSS	COD	Ammonia	TN	NOx	TKN
07/21 00:00	32 BAF #1 EFF	F	Pre			0.35			
07/21 00:00	34 BAF #2 EFF	F				1.3			
07/21 04:00	32 BAF #1 EFF	F				0.36			
07/21 04:00	34 BAF #2 EFF	F				0.97			
07/21 08:00	32 BAF #1 EFF	F				0.34			
07/21 08:00	34 BAF #2 EFF	F				0.93			
07/21 12:00	32 BAF #1 EFF	F				0.27			
07/21 12:00	34 BAF #2 EFF	F				1.11			
07/21 16:00	32 BAF #1 EFF	F				0.95			
07/21 16:00	34 BAF #2 EFF	F				1.73			
07/21 20:00	32 BAF #1 EFF	F				0.42			
07/21 20:00	34 BAF #2 EFF	F				2.1			
07/22 00:00	32 BAF #1 EFF	F				0.58			
07/22 00:00	34 BAF #2 EFF	F				1.3			
07/22 04:00	32 BAF #1 EFF	F				1.04			
07/22 04:00	34 BAF #2 EFF	F				1.24			
07/22 08:00	32 BAF #1 EFF	F				0.51			
07/22 08:00	34 BAF #2 EFF	F				1.37			
07/22 08:00	35 BAF #1 INFLUENT	F				32.6			
07/22 09:15	32 BAF #1 EFF	F		2.4	57.7	0.039	37.9		
07/22 09:15	32 BAF #1 EFF	F		2.8					
07/22 09:15	34 BAF #2 EFF	F		9.6	99.2	0.751	2.16		
07/22 09:15	34 BAF #2 EFF	F		8					
07/22 09:15	35 BAF #1 INFLUENT	F		118	499	42.9	51.5		
07/22 09:15	35 BAF #1 INFLUENT	F		120					
07/22 11:00	32 BAF #1 EFF	L		9	38	0.17	39.2	38	1.2
07/22 11:00	34 BAF #2 EFF	L		6	51	1.1	4	<0.5	4
07/22 11:00	35 BAF #1 INFLUENT	L		120	260	43	44	<0.5	55
07/23 07:30	32 BAF #1 EFF	F				0.51			

* Sample Type: F = Field, L = Laboratory

Table 3.5-05b: Water Quality Results for BAF Experimental Plan 04 FMS

Date and Time	Location	Type	Step	TSS	COD	Ammonia	TN	NOx	TKN
07/23 07:30	34 BAF #2 EFF	F	Pre			1.68	4.34		
07/23 07:30	35 BAF #1 INFLUENT	F				35.5	36.1		
07/23 08:15	35 BAF #1 INFLUENT	F							
07/23 08:45	32 BAF #1 EFF	F				0.38			
07/23 11:15	32 BAF #1 EFF	F				0.58			
07/23 11:15	34 BAF #2 EFF	F				2.46			
07/23 11:15	35 BAF #1 INFLUENT	F				46.5			
07/23 13:30	35 BAF #1 INFLUENT	F				33			
07/23 14:10	35 BAF #1 INFLUENT	F				30			
07/23 14:50	35 BAF #1 INFLUENT	F				28			
07/24 07:00	32 BAF #1 EFF	F		8.4	64.4	0.38			
07/24 07:00	32 BAF #1 EFF	F		8.8	59.6				
07/24 07:00	34 BAF #2 EFF	F		16.4	141	2.52	2.6		
07/24 07:00	34 BAF #2 EFF	F		20.8	141				
07/24 07:00	35 BAF #1 INFLUENT	F		147	496	19	19.6	0.386	19.2
07/24 07:00	35 BAF #1 INFLUENT	F		160	578				
07/24 09:00	32 BAF #1 EFF	F				0.65			
07/24 09:00	34 BAF #2 EFF	F				1.52			
07/24 10:00	32 BAF #1 EFF	F				0.59			
07/24 10:00	32 BAF #1 EFF	L		51	60	0.56	12.7	11	1.7
07/24 10:00	34 BAF #2 EFF	L		20	130	0.83	5.4	<0.5	5.4
07/24 10:00	35 BAF #1 INFLUENT	L		210	220	28	45	<0.5	45
07/24 11:00	32 BAF #1 EFF	F				0.48			
07/24 11:00	35 BAF #1 INFLUENT	F				21.8			
07/24 12:00	32 BAF #1 EFF	F				0.56			
07/24 12:00	34 BAF #2 EFF	F				1.04			
07/24 12:00	32 BAF #1 EFF	L		20	69	0.13	18.8	17	1.8
07/24 12:00	34 BAF #2 EFF	L		19	140	0.8	5.6	<0.5	5.6
07/24 12:00	35 BAF #1 INFLUENT	L		160	530	34	50	<0.5	50
07/24 12:30	32 BAF #1 EFF	F	MID			2.5			

Table 3.5-05c: Water Quality Results for BAF Experimental Plan 04 FMS

Date and Time	Location	Type	Step	TSS	COD	Ammonia	TN	NOx	TKN
07/24 12:30	32 BAF #1 EFF	L	Mid Level Flowrate	17	62	1.7	21.2	19	2.2
07/24 12:30	34 BAF #2 EFF	L		18	140	0.53	5.3	<0.5	5.3
07/24 12:30	35 BAF #1 INFLUENT	L		180	540	39	58	<0.5	58
07/24 13:00	32 BAF #1 EFF	F				9.6			
07/24 13:00	32 BAF #1 EFF	L		35	90	9.7	23.7	14	7.4
07/24 13:00	34 BAF #2 EFF	L		21	130	0.09	4.4	<0.5	4.4
07/24 13:00	35 BAF #1 INFLUENT	L		200	620	41	63	<0.5	63
07/24 13:30	32 BAF #1 EFF	F				16.8			
07/24 13:30	34 BAF #2 EFF	F				1.34			
07/24 13:30	35 BAF #1 INFLUENT	F				47.5			
07/24 13:30	32 BAF #1 EFF	L		56	190	18	31	13	12
07/24 13:30	34 BAF #2 EFF	L		14	130	<0.05	4	<0.5	4
07/24 13:30	35 BAF #1 INFLUENT	L		230	690	42	70	<0.5	70
07/24 14:00	32 BAF #1 EFF	F	Recovery			20.2			
07/24 14:00	34 BAF #2 EFF	F				1.31			
07/24 15:00	32 BAF #1 EFF	F				16			
07/24 15:00	32 BAF #1 EFF	L		25	100	13	19	<0.5	19
07/24 15:00	34 BAF #2 EFF	L		13	130	0.08	3.6	<0.5	3.6
07/24 15:00	35 BAF #1 INFLUENT	L		260	330	27	47	<0.5	47
07/24 16:00	32 BAF #1 EFF	F				7.1			
07/24 16:00	35 BAF #1 INFLUENT	F				22			
07/24 17:00	32 BAF #1 EFF	F				3.2			
07/24 17:00	34 BAF #2 EFF	F				4.05			
07/24 18:00	32 BAF #1 EFF	F				2.33			
07/24 18:00	32 BAF #1 EFF	L		5	27	0.34	15.1	14	1.1
07/24 18:00	34 BAF #2 EFF	L		15	170	1.8	6.7	<0.5	6.7
07/24 18:00	35 BAF #1 INFLUENT	L		120	270	19	35	<0.5	35
07/24 19:00	32 BAF #1 EFF	F				2.08			
07/24 20:00	32 BAF #1 EFF	F				0.53			

Table 3.5-05d: Water Quality Results for BAF Experimental Plan 04 FMS

Date and Time	Location	Type	Step	TSS	COD	Ammonia	TN	NOx	TKN
07/24 20:00	34 BAF #2 EFF	F	Recovery			7.5			
07/24 21:00	32 BAF #1 EFF	F				0.53			
07/24 21:00	32 BAF #1 EFF	L		<5	48	0.19	15.6	14	1.6
07/24 21:00	34 BAF #2 EFF	L		16	200	3.3	9.1	<0.5	9.1
07/24 21:00	35 BAF #1 INFLUENT	L		110	250	23	33	<0.5	33
07/24 22:00	32 BAF #1 EFF	F				0.52			
07/24 23:00	32 BAF #1 EFF	F				0.53			
07/24 23:00	34 BAF #2 EFF	F				7.35			
07/25 00:00	32 BAF #1 EFF	F				0.53			
07/25 02:00	32 BAF #1 EFF	F				0.55			
07/25 02:00	34 BAF #2 EFF	F				5.75			
07/25 04:00	32 BAF #1 EFF	F				0.47			
07/25 05:00	34 BAF #2 EFF	F				5.5			
07/25 06:00	32 BAF #1 EFF	F				0.56			

A series of one-way ANOVAs were completed on each parameter to determine if there was an effect attributable to the flow increase (see Section 2.6 for an explanation of the statistical methods used). Each ANOVA compared three data sets: Pre-peak, Mid-peak, and Recovery. For example, the BAF 1 TN data were grouped into sets for Pre, Mid and Recovery. The ANOVA then tested the hypothesis that the means of the three data sets were equal within a 90% level of confidence (the null hypothesis). The probability (p) was 0.468, which indicates there was a 46.8% probability that the means were equal for BAF 1 TN data before, during and after the hydraulic peak. The p-value was tested against a level of significance (α) that was selected to be 0.100, which is the minimum allowable probability to accept the null hypothesis as true. In this example p is greater than α ($0.468 > 0.100$) so the null hypothesis is accepted: there was no statistically significant difference in BAF 1 TN before, during, or after the peak.

The p-values from the ANOVAs are shown in Table 3.5-06. The probability values for ammonia-nitrogen for BAF 1 and BAF 2 were 0.000 for both stages, meaning there was a less than 0.1% probability that the Pre, Mid and Recovery ammonia were the same, i.e. the hydraulic peak had a significant effect upon BAF 1 and BAF 2 effluent ammonia concentrations.

Note that the ANOVA test does not show that the TSS concentrations were statistically different because there were high TSS values prior to the flow increase that can be attributed to the filter ripening period after a backwash (the “Presumed TSS Curve”) and there was a high effluent TSS concentration immediately after the flow was restored to a lower flow rate prior to full recovery.

Table 3.5-06 BAF Experimental Plan 04 FMS – Summary of ANOVA Results

Parameter	p -value	
	BAF Stage #1	BAF Stage #2
TSS	0.166	0.630
COD	0.134	0.142
Ammonia-N	0.000	0.000
TN	0.468	0.418
NOx-N	0.341	All data BDL
TKN	0.513	0.418

Box plots of the same parameters are shown in Figures 3.5-09 and 3.5-10. The boxplots show that the median TSS and COD for BAF 1 effluent both increased during the peak, but there was also overlap of the data. The p values for BAF 1 TSS and COD were 0.166 and 0.134 respectively, both slightly greater than 0.100 (α). Although it appeared that TSS and COD were elevated during the hydraulic peak, the ANOVAs indicate that the differences were not statistically significant.

Figure 3.5-09: BoxPlots BAF FMS Stress Test, TSS and COD

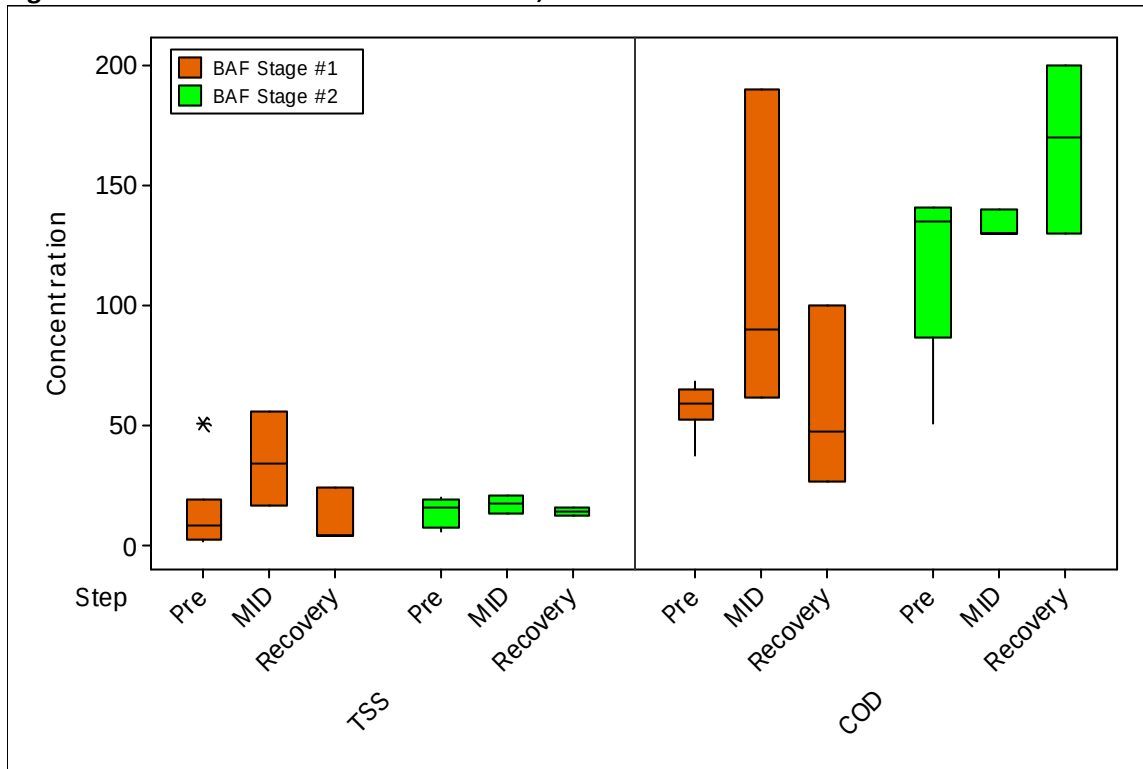
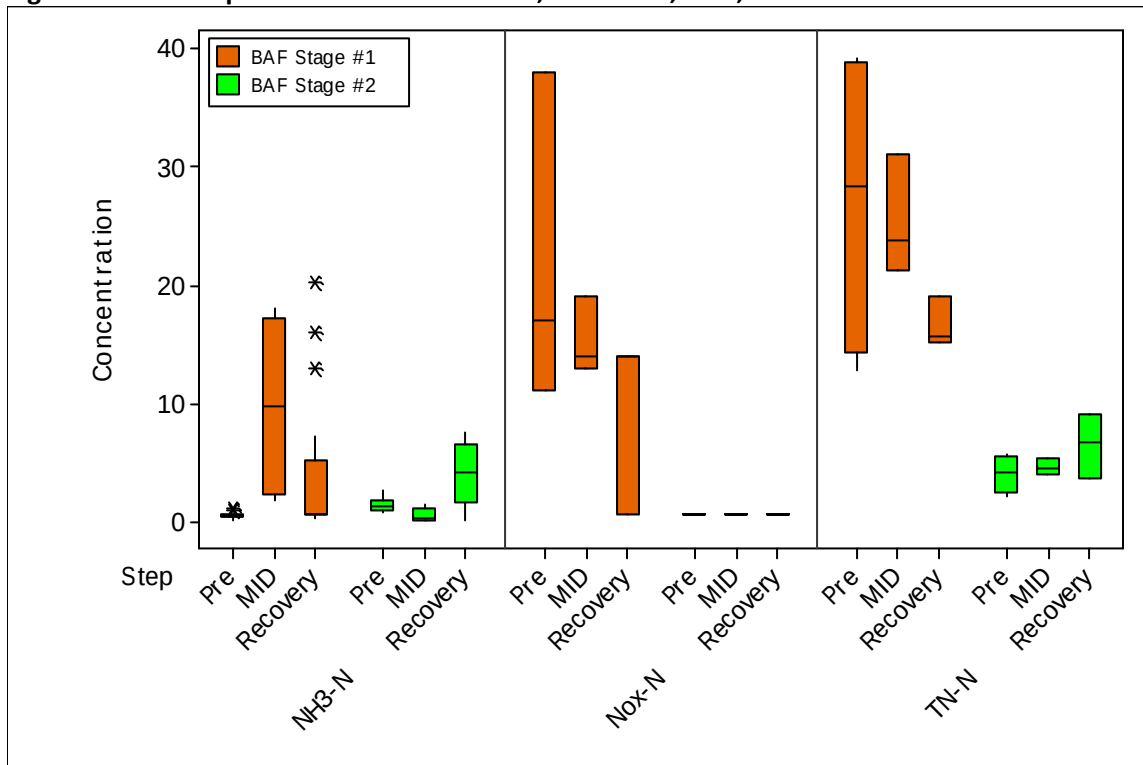


Figure 3.5-10: Boxplots BAF FMS Stress Test, Ammonia, NOx, and TN



3.5.4.2 Full-strength, Peak flow, Short duration (FPS) Hydraulic Stress Test

Results from the Full-strength, Peak flow, Short duration (FPS) Trial are shown graphically in Figure 3.5-11 for BAF 1. The flow rate was increased from 3 gpm to 9.2 gpm over a 15 minute period starting at 11:00 AM on July 25. The BAF 1 effluent ammonia had recovered from the FMS trial on the previous day, and was consistently below 1 mg/L as N. The TSS in the two grab samples collected in the morning were consistent with the typical performance of BAF 1 after a backwash.

The increase in flow decreased the dissolved oxygen very slightly during the high flow period, with the DO decreased from 8.6 to 7.6 mg/L. Both the TSS and ammonia were increased as a result of the increased flow rate. The ammonia increased to a concentration of one-half of the influent ammonia concentration for a short period of time, then returned to the goal of <1 mg/L NH₃-N within 4 hours of the end of the high flow period. TSS also increased slightly during this period, but did not exceed 30 mg/L.

Figure 3.5-12 shows the results for BAF 2. The flow rate was increased from 2 gpm to 7.2 gpm over a 15 minute period starting at 11:00 AM on July 54. The BAF 2 effluent TSS and TN were below their respective goals in samples collected prior to the increase in flow, but the concentration of ammonia was still approximately 5 mg/L, despite the fact that the ammonia concentration from the BAF 1 was less than 1 mg/L. The source of the elevated ammonia in BAF 2 influent was from the 2,000-gallon storage tank located between the two stages. Effluent TN concentrations were typically 1 to 1.5 mg/L higher than the influent concentrations, and laboratory results showed that the concentration of NO_x in the BAF 2 effluent was below detection limits.

Samples were also analyzed for COD, TN, NO_x, and TKN, but are not shown on the figures for clarity purposes. A series of one-way ANOVAs were completed on each parameter to determine if the flow increase had an effect upon effluent water quality parameters. The p-values from the ANOVAs are shown in Table 3.5-07. The complete data set is shown in Table 3.5-08.

The ANOVA results for BAF 1 showed that ammonia, TN and NO_x concentrations were all affected by the flow increase, which is also apparent from Figure 3.5-11. The results also show that TSS and COD were both affected by the flow increase in BAF 2. The boxplots in Figure 3.5-13 show that BAF 2 TSS and COD actually decreased during the flow increase. It is likely that the decrease in COD was due to the dilution of supplemental carbon that occurred when the flow was increased, since the supplemental carbon dose (MicroC) was not adjusted during the high flow period.

Table 3.5-07: BAF 1&2 Experimental Plan 04 FMS – Summary of ANOVA Results

Parameter	p -value	
	BAF Stage #1	BAF Stage #2
TSS	0.103	0.035
COD	0.262	0.001
Ammonia	0.060	0.207
TN	0.034	0.294
NO _x	0.027	All data BDL
TKN	0.141	0.294

Figure 3.5-11: BAF#1 FPS | 2-hour, Peak Flow Stress Test

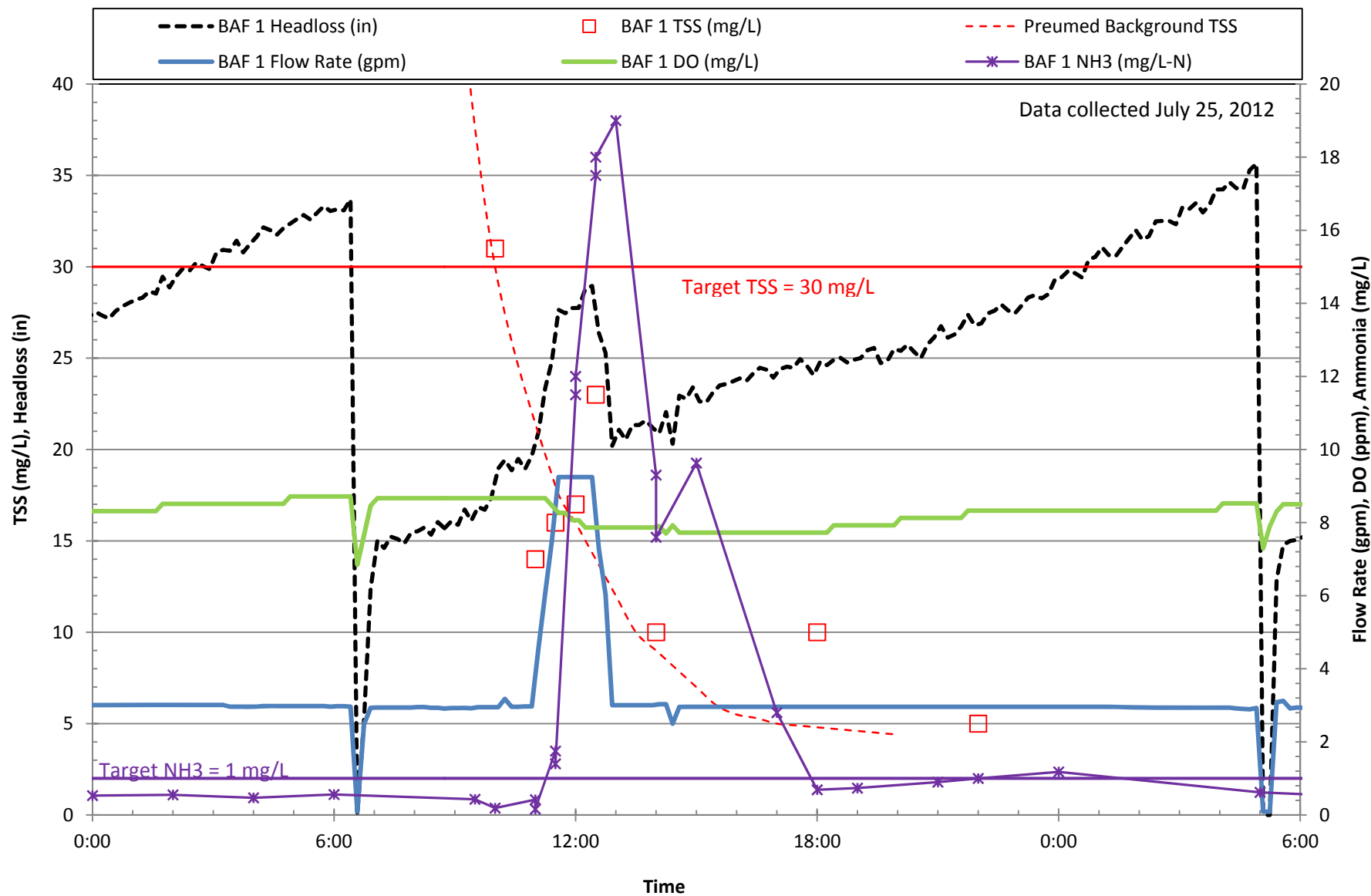


Figure 3.5-12: BAF#2 FPS | 2-hour, Peak Flow Stress Test

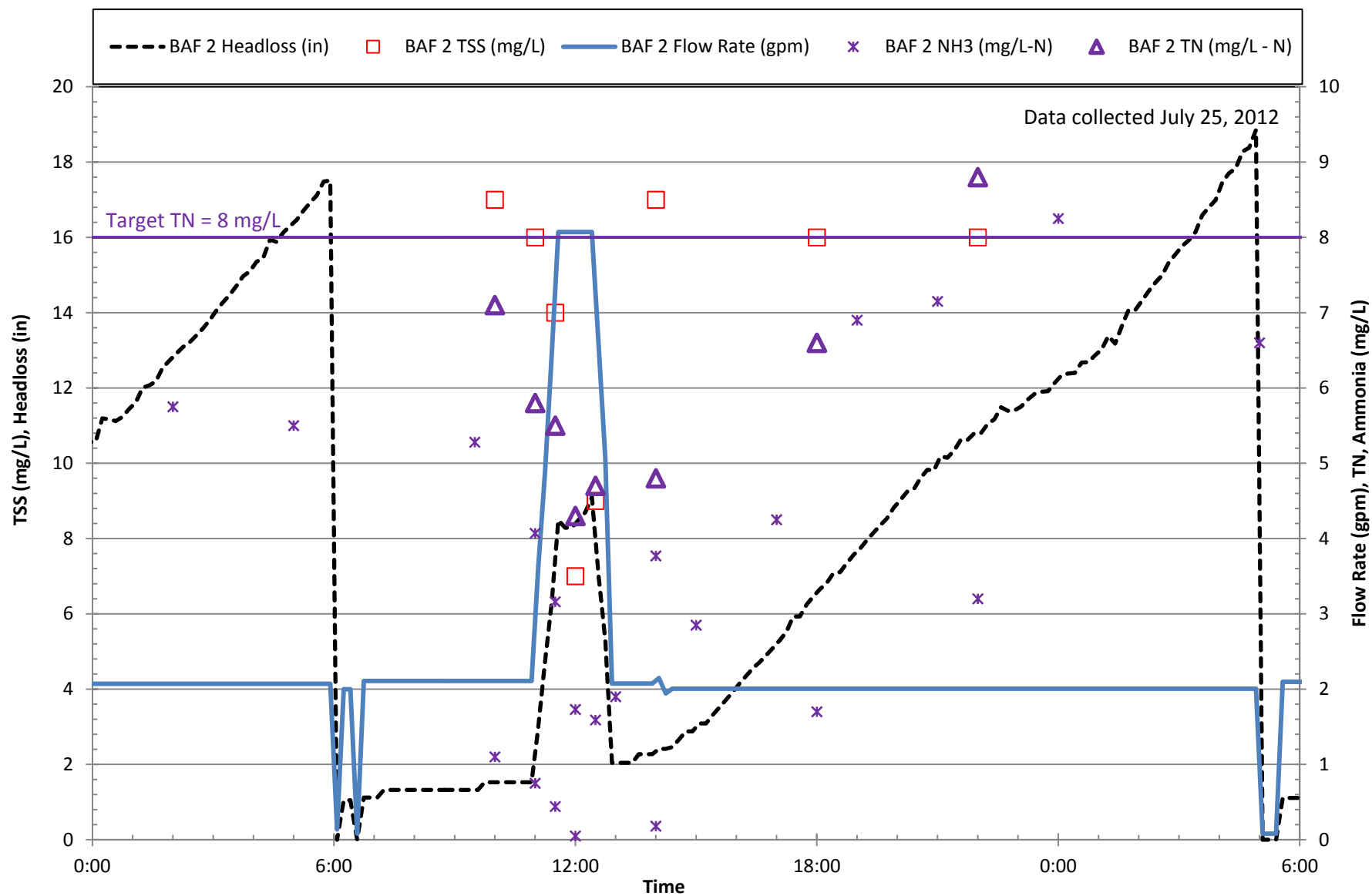


Figure 3.5-13: Boxplots for BAF FPS Stress Test, TSS and COD

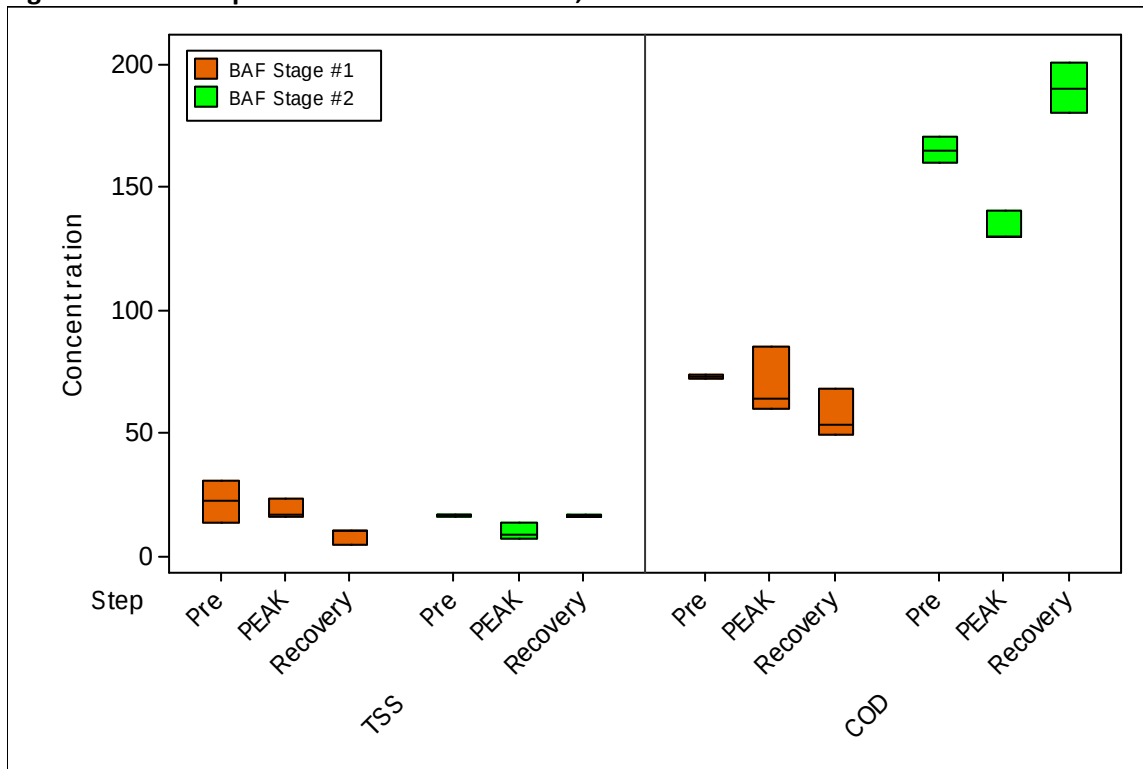


Figure 3.5-14: Boxplots for BAF FPS Stress Test, Ammonia, NOx, and TN

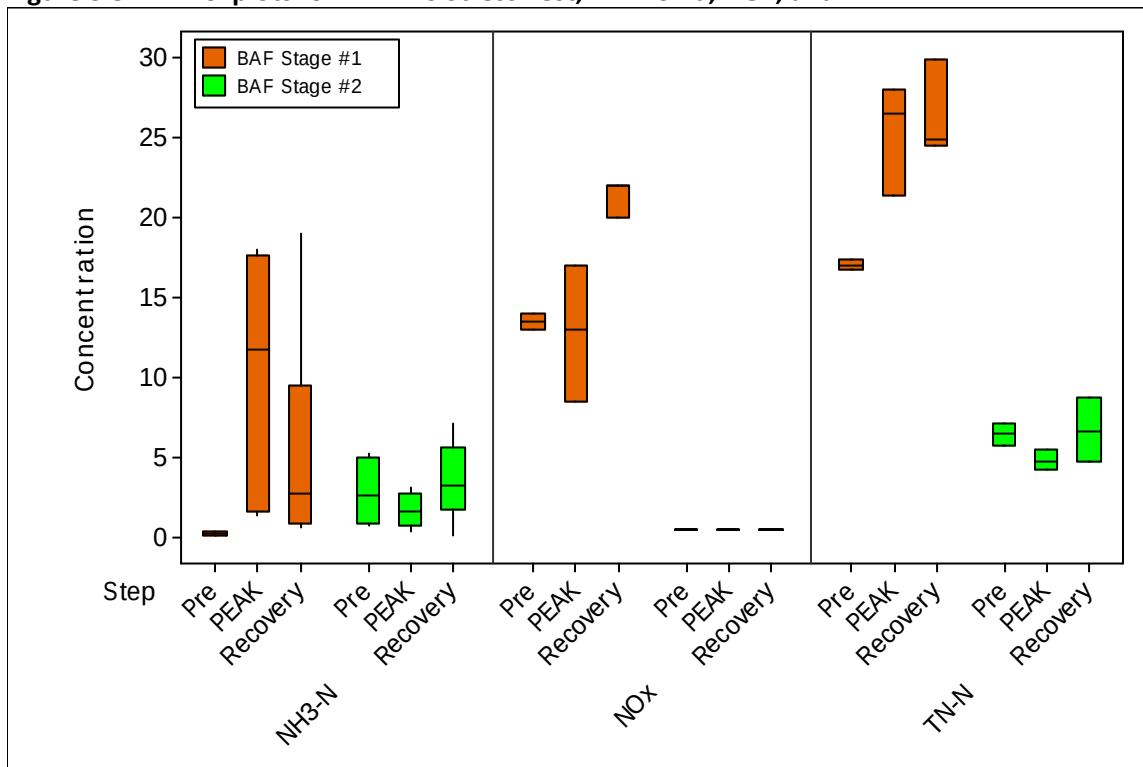


Table 3.5-08a: Water Quality Results for BAF Experimental Plan 04 FPS

Date and Time	Location	Type	Step	TSS	COD	Ammonia	TN	NOx	TKN
07/25 08:00	35 BAF #1 INFLUENT	F	Pre	120	485	20	29.6	0.307	29.3
07/25 08:00	35 BAF #1 INFLUENT	F		121	500				
07/25 09:30	32 BAF #1 EFF	F				0.43			
07/25 09:30	34 BAF #2 EFF	F				5.28			
07/25 10:00	32 BAF #1 EFF	L		31	74	0.19	17.3	13	4.3
07/25 10:00	34 BAF #2 EFF	L		17	170	1.1	7.1	<0.5	7.1
07/25 10:00	35 BAF #1 INFLUENT	L		90	240	26	37	<0.5	37
07/25 10:30	35 BAF #1 INFLUENT	F				27.75			
07/25 11:00	32 BAF #1 EFF	F				0.42			
07/25 11:00	34 BAF #2 EFF	F				4.07			
07/25 11:00	32 BAF #1 EFF	L		14	72	0.16	16.7	14	2.7
07/25 11:00	34 BAF #2 EFF	L		16	160	0.75	5.8	<0.5	5.8
07/25 11:00	35 BAF #1 INFLUENT	L		80	320	31	45	<0.5	45
07/25 11:30	32 BAF #1 EFF	F	PEAK			1.75			
07/25 11:30	34 BAF #2 EFF	F				3.16			
07/25 11:30	32 BAF #1 EFF	L		16	64	1.4	21.4	17	4.4
07/25 11:30	34 BAF #2 EFF	L		14	140	0.44	5.5	<0.5	5.5
07/25 11:30	35 BAF #1 INFLUENT	L		150	420	35	52	<0.5	52
07/25 12:00	32 BAF #1 EFF	F				11.5			
07/25 12:00	34 BAF #2 EFF	F				1.73			
07/25 12:00	35 BAF #1 INFLUENT	F				37.5			
07/25 12:00	35 BAF #1 INFLUENT	F				37.5			
07/25 12:00	32 BAF #1 EFF	L		17	60	12	28	13	15
07/25 12:00	34 BAF #2 EFF	L		7	130	<0.05	4.3	<0.5	4.3
07/25 12:00	35 BAF #1 INFLUENT	L		140	530	37	56	<0.5	56
07/25 12:30	32 BAF #1 EFF	F				17.5			
07/25 12:30	34 BAF #2 EFF	F				1.59			
07/25 12:30	35 BAF #1 INFLUENT	F				36.6			
07/25 12:30	32 BAF #1 EFF	L		23	85	18	26.5	8.5	18

* Sample Type: F = Field, L = Laboratory

Table 3.5-08b: Water Quality Results for BAF Experimental Plan 04 FPS

Date and Time	Location	Type	Step	TSS	COD	Ammonia	TN	NOx	TKN
07/25 12:30	34 BAF #2 EFF	L	PEAK	9	130		4.7	<0.5	4.7
07/25 12:30	35 BAF #1 INFLUENT	L	PEAK	130	420	37	57	<0.5	57
07/25 13:00	32 BAF #1 EFF	F	Recovery			19			
07/25 13:00	34 BAF #2 EFF	F				1.9			
07/25 14:00	32 BAF #1 EFF	F				9.3			
07/25 14:00	34 BAF #2 EFF	F				3.77			
07/25 14:00	35 BAF #1 INFLUENT	F				34.7			
07/25 14:00	32 BAF #1 EFF	L		10	53	7.6	29.8	20	7.6
07/25 14:00	34 BAF #2 EFF	L		17	180	0.18	4.8	<0.5	4.8
07/25 14:00	35 BAF #1 INFLUENT	L		240	570	36	56	<0.5	56
07/25 15:00	32 BAF #1 EFF	F				9.63			
07/25 15:00	34 BAF #2 EFF	F				2.85			
07/25 15:00	35 BAF #1 INFLUENT	F				33.7			
07/25 17:00	32 BAF #1 EFF	F				2.8			
07/25 17:00	34 BAF #2 EFF	F				4.25			
07/25 17:00	35 BAF #1 INFLUENT	F				23.3			
07/25 18:00	32 BAF #1 EFF	L		10	49	0.69	24.5	22	0.69
07/25 18:00	34 BAF #2 EFF	L		16	200	1.7	6.6	<0.5	6.6
07/25 18:00	35 BAF #1 INFLUENT	L		90	280	29	40	<0.5	40
07/25 19:00	32 BAF #1 EFF	F				0.735			
07/25 19:00	34 BAF #2 EFF	F				6.9			
07/25 21:00	32 BAF #1 EFF	F				0.9			
07/25 21:00	34 BAF #2 EFF	F				7.15			
07/25 21:00	35 BAF #1 INFLUENT	F				21.2			
07/25 22:00	32 BAF #1 EFF	L		5	68	1	24.9	22	1
07/25 22:00	34 BAF #2 EFF	L		16	190	3.2	8.8	<0.5	8.8
07/25 22:00	35 BAF #1 INFLUENT	L		110	330	27	40	<0.5	40

3.5.4.3 Full-strength, Peak flow, Medium duration (FPM) Hydraulic Stress Test

Results from the Full-strength, Peak flow, Medium duration (FPM) Trial are shown graphically in Figure 3.5-15 for BAF 1. The flow rate was increased from 3 gpm to 9.2 gpm over a 15 minute period starting at 10:00 AM on July 26. BAF 1 effluent ammonia had recovered from the FPS trial on the previous day, and was consistently below 1 mg/L as N. The TSS in the two grab samples collected in the morning were consistent with the typical performance of BAF 1 after a backwash.

The increase in flow decreased the dissolved oxygen very slightly during the high flow period, with the DO decreased from 8.7 to 7.5 mg/L. Both the TSS and ammonia were increased as a result of the increased flow rate. The effluent ammonia concentrations increased to above 40 mg/L, which was approximately equal to the influent concentration for a short period of time. The effluent ammonia concentration returned to the goal of <1 mg/L $\text{NH}_3\text{-N}$ within 2 hours of the end of the high flow period. TSS also increased slightly during this period, and exceeded 30 mg/L for one sample collected immediately after the flow rate was decreased. Effluent TSS was less than 20 mg/L within 2 hours after the flow rate had been reduced.

Figure 3.5-16 shows the results for BAF 2. The flow rate was increased from 2 gpm to 7.2 gpm over a 15 minute period starting at 10:00 AM on July 26. The BAF 2 effluent TSS and TN were below their respective goals in samples collected prior to the increase in flow, but the concentration of ammonia was between 7 and 8 mg/L, despite the fact that the ammonia concentration from the first stage less than 1 mg/L. The source of the elevated ammonia in the Stage 2 influent was from the 2,000-gallon storage tank located between the two stages. Effluent TN concentrations were typically 1 to 1.5 mg/L higher than the influent concentrations, and laboratory results showed that the concentration of NOx in the Stage #2 effluent was below detection limits.

Samples were also analyzed for COD, TN, NOx, and TKN, but are not shown on the figures for clarity purposes. A series of one-way ANOVAs were completed on each parameter to determine if there was an effect of the flow increase. The p-values from the ANOVAs are shown in Table 3.5-09. The ANOVA results showed that ammonia, TN and NOx concentrations were all affected by the flow increase, which is also apparent from Figures 3.5-15 and Figure 3.5-16. The full data set is shown in Table 3.5-10.

Table 3.5-09: BAF Experimental Plan 04 FPM – Summary of ANOVA Results

Parameter	p -value	
	BAF Stage #1	BAF Stage #2
TSS	0.134	0.613
COD	0.127	0.013
Ammonia	0.000	0.001
TN	0.073	0.171
NOx	0.079	All data BDL
TKN	0.006	0.171

Figure 3.5-16: BAF#2 FPM | 6-hour, Peak Flow Stress Test

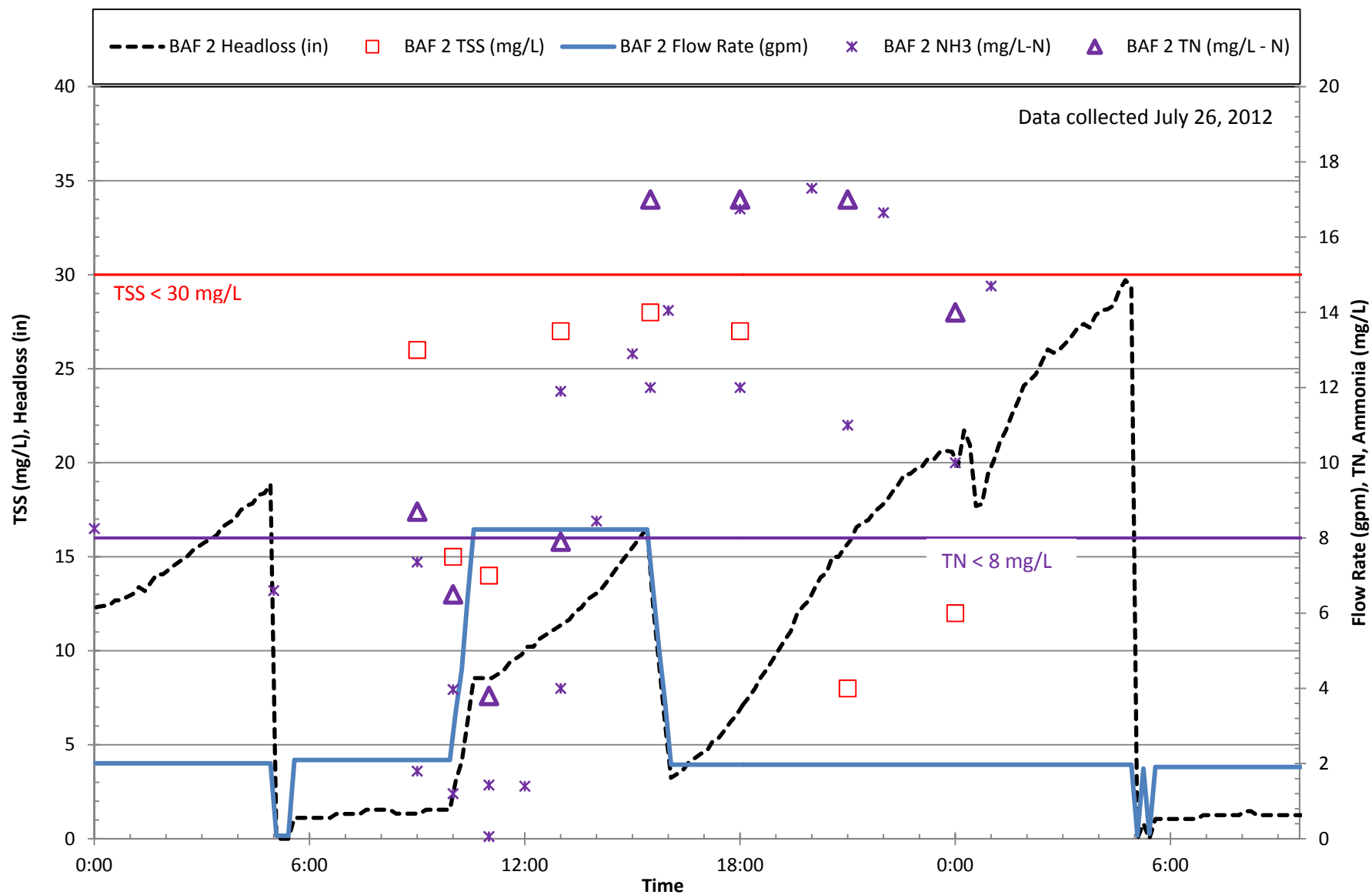


Figure 3.5-15: BAF#1 FPM | 6-hour, Peak Flow Stress Test

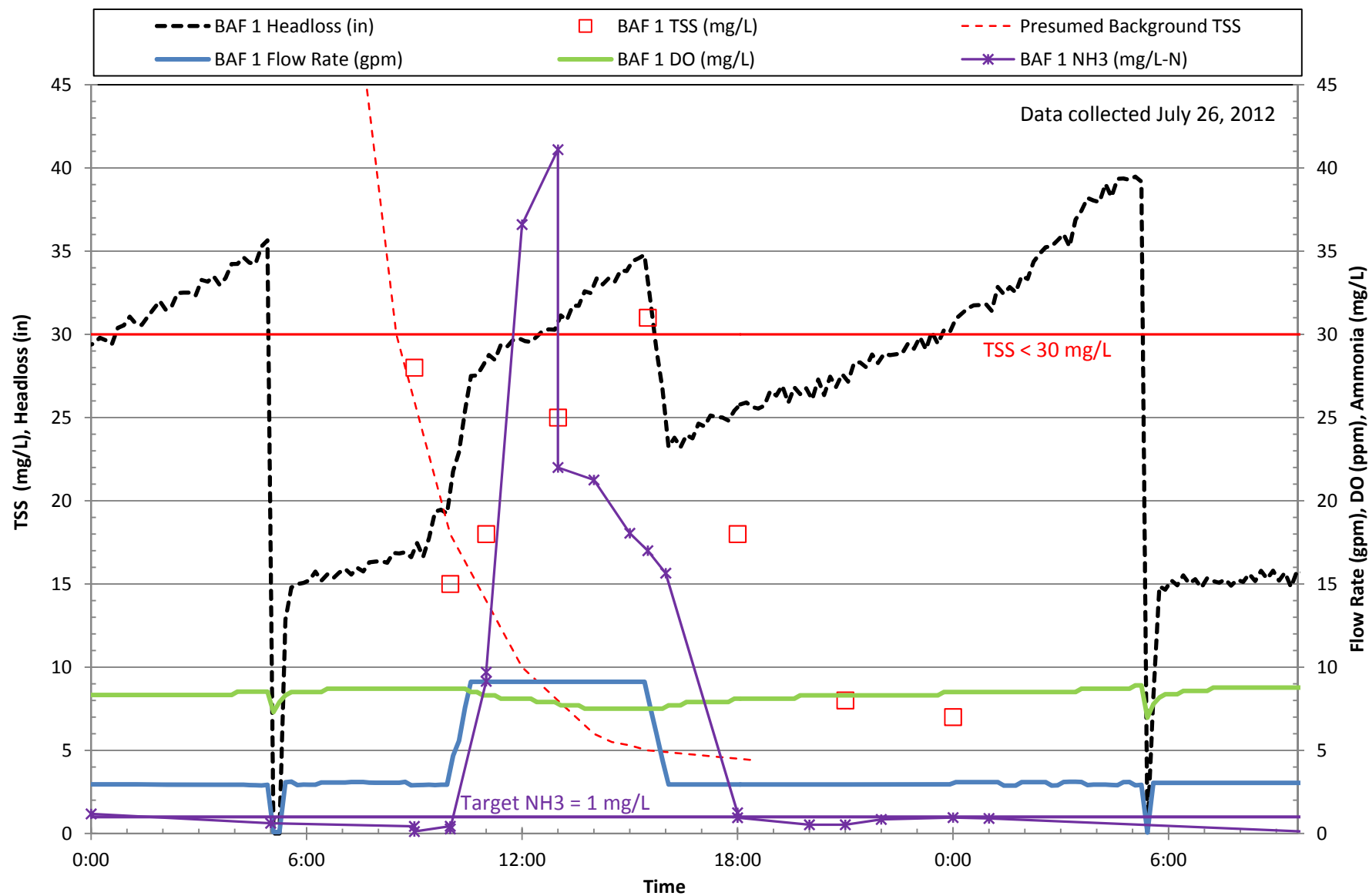


Figure 3.5-17: Boxplots for BAF FPM Stress Test, TSS and COD

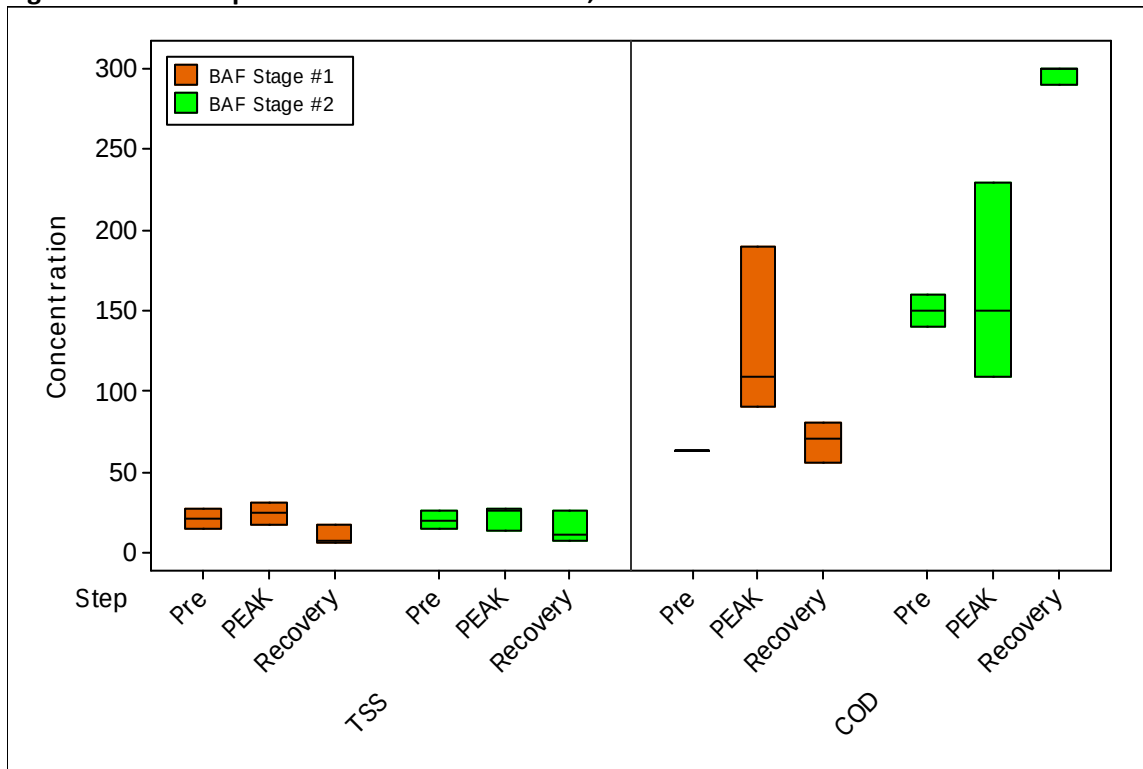


Figure 3.5-18: Boxplots for BAF FPM Stress Test,

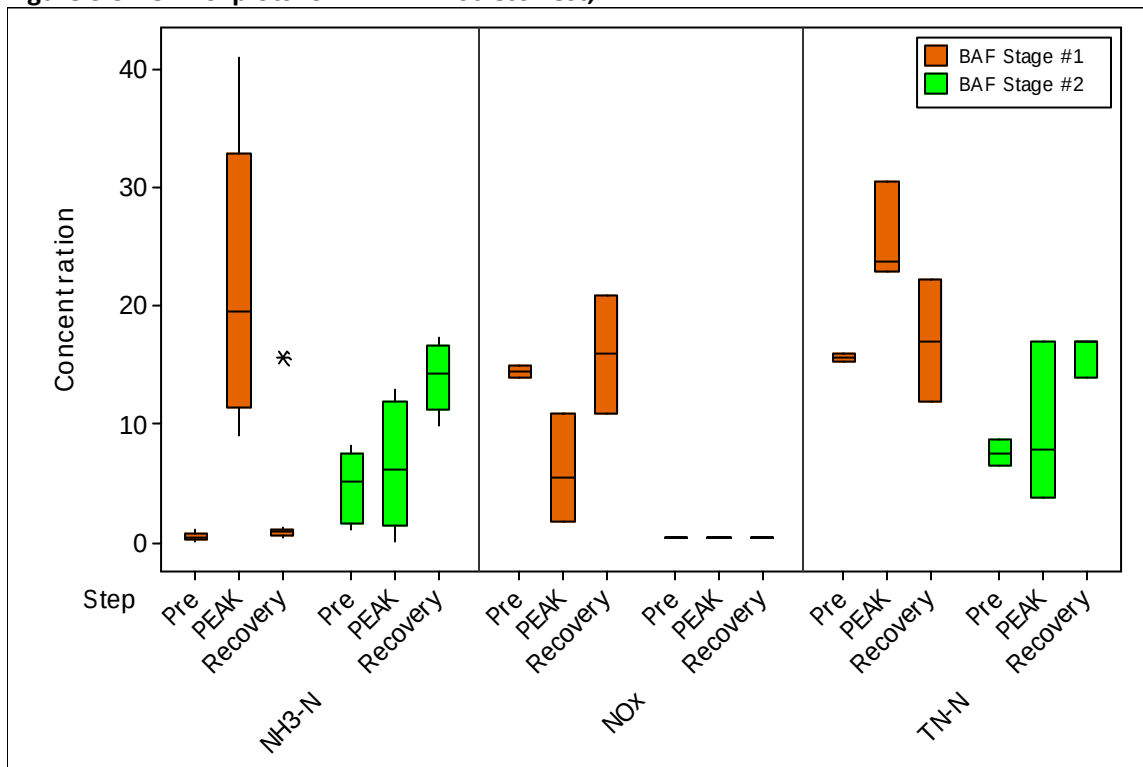


Table 3.5-10a: Water Quality Results for BAF Experimental Plan 04 FPM

Date and Time	Location	Type	Step	TSS	COD	Ammonia	TN	NOx	TKN
07/26 00:00	32 BAF #1 EFF	F	Pre			1.18			
07/26 00:00	34 BAF #2 EFF	F				8.25			
07/26 01:00	35 BAF #1 INFLUENT	F				21.2			
07/26 05:00	32 BAF #1 EFF	F				0.62			
07/26 05:00	34 BAF #2 EFF	F				6.6			
07/26 05:00	35 BAF #1 INFLUENT	F				19.4			
07/26 08:00	35 BAF #1 INFLUENT	F		131	531	22.7	35.9	0.312	35.5
07/26 08:00	35 BAF #1 INFLUENT	F		133	530				
07/26 09:00	32 BAF #1 EFF	F				0.43			
07/26 09:00	34 BAF #2 EFF	F				7.36			
07/26 09:00	32 BAF #1 EFF	L		28	64	0.12	15.4	14	1.4
07/26 09:00	34 BAF #2 EFF	L		26	160	1.8	8.7	<0.5	8.7
07/26 09:00	35 BAF #1 INFLUENT	L		120	360	25	37	<5	37
07/26 09:30	34 BAF #2 EFF	F							
07/26 10:00	32 BAF #1 EFF	F				0.44			
07/26 10:00	34 BAF #2 EFF	F				3.97			
07/26 10:00	35 BAF #1 INFLUENT	F				24.8			
07/26 10:00	32 BAF #1 EFF	L		15	64	0.28	16	15	1
07/26 10:00	34 BAF #2 EFF	L		15	140	1.2	6.5	<0.5	6.5
07/26 10:00	35 BAF #1 INFLUENT	L		75	440	29	43	<5	43
07/26 11:00	32 BAF #1 EFF	F	PEAK			9.15			
07/26 11:00	34 BAF #2 EFF	F				1.43			
07/26 11:00	35 BAF #1 INFLUENT	F				26.9			
07/26 11:00	32 BAF #1 EFF	L		18	91	9.7	23	11	12
07/26 11:00	34 BAF #2 EFF	L		14	110	0.06	3.8	<0.5	3.8
07/26 11:00	35 BAF #1 INFLUENT	L		130	470	33	48	<5	48
07/26 12:00	32 BAF #1 EFF	F				36.6			
07/26 12:00	34 BAF #2 EFF	F				1.4			
07/26 13:00	32 BAF #1 EFF	F				41.1			

* Sample Type: F = Field, L = Laboratory

Table 3.5-10b: Water Quality Results for BAF Experimental Plan 04 FPM

Date and Time	Location	Type	Step	TSS	COD	Ammonia	TN	NOx	TKN
07/26 13:00	34 BAF #2 EFF	F	PEAK			11.9			
07/26 13:00	35 BAF #1 INFLUENT	F				39.05			
07/26 13:00	32 BAF #1 EFF	L		25	110	22	30.6	5.6	25
07/26 13:00	34 BAF #2 EFF	L		27	150	4	7.9	<0.5	7.9
07/26 13:00	35 BAF #1 INFLUENT	L		190	590	38	60	<5	60
07/26 14:00	32 BAF #1 EFF	F				21.25			
07/26 14:00	34 BAF #2 EFF	F				8.45			
07/26 15:00	32 BAF #1 EFF	F				18.05			
07/26 15:00	34 BAF #2 EFF	F				12.9			
07/26 15:00	35 BAF #1 INFLUENT	F				26.5			
07/26 15:30	32 BAF #1 EFF	L		31	190	17	23.8	1.8	22
07/26 15:30	34 BAF #2 EFF	L		28	230	12	17	<0.5	17
07/26 15:30	35 BAF #1 INFLUENT	L		120	530	32	46	<5	46
07/26 16:00	32 BAF #1 EFF	F	Recovery			15.65			
07/26 16:00	34 BAF #2 EFF	F				14.05			
07/26 18:00	32 BAF #1 EFF	F				1.25			
07/26 18:00	34 BAF #2 EFF	F				16.75			
07/26 18:00	35 BAF #1 INFLUENT	F				26.45			
07/26 18:00	32 BAF #1 EFF	L		18	56	0.95	12	11	0.6
07/26 18:00	34 BAF #2 EFF	L		27	300	12	17	<0.5	17
07/26 18:00	35 BAF #1 INFLUENT	L		92	470	29	41	<5	41
07/26 20:00	32 BAF #1 EFF	F				0.53			
07/26 20:00	34 BAF #2 EFF	F				17.3			
07/26 21:00	35 BAF #1 INFLUENT	F				23.85			
07/26 21:00	32 BAF #1 EFF	L		8	81	0.53	17	16	1
07/26 21:00	34 BAF #2 EFF	L		8	300	11	17	<0.5	17
07/26 21:00	35 BAF #1 INFLUENT	L		92	340	31	38	<5	38
07/26 22:00	32 BAF #1 EFF	F				0.85			
07/26 22:00	34 BAF #2 EFF	F				16.65			
07/27 00:00	32 BAF #1 EFF	L		7	71	0.96	22.3	21	1.3

Table 3.5-10b: Water Quality Results for BAF Experimental Plan 04 FPM

Date and Time	Location	Type	Step	TSS	COD	Ammonia	TN	NO _x	TKN
07/27 00:00	34 BAF #2 EFF	L	Recovery	12	290	10	14	<0.5	14
07/27 00:00	35 BAF #1 INFLUENT	L		230	350	29	42	<5	42
07/27 01:00	32 BAF #1 EFF	F				0.91			
07/27 01:00	34 BAF #2 EFF	F				14.7			

3.5.4.4 Diluted-strength, Peak flow, Extended duration (DPE) Hydraulic Stress Test

Results from the Diluted-strength, Peak flow, Extended duration (DPE) Trial are shown graphically in Figure 3.5-19 for BAF Stage #1. The flow rate was increased from 3 gpm to 9.2 gpm over a 30 minute period starting at 11:00 AM on July 27. The primary effluent was diluted by 50% by adding 20 gpm of potable water to 20 gpm of raw water. The BAF 1 effluent ammonia had recovered from the FPM trial on the previous day, with concentrations that were below 1 mg/L as N. The TSS in the two grab samples collected in the morning were consistent with the typical performance of the BAF Stage #1 after a backwash, and both were lower than 30 mg/L.

The increase in flow decreased the dissolved oxygen very slightly during the high flow period, with the DO decreased from 9.0 to 7.7 mg/L. The ammonia concentration increased immediately after the flow rate was increased, but recovered to a concentration less than 1 mg/L while the peak flow was still in use. The ammonia peaked again after the backwash, and recovered again prior to the end of the high flow test.

The fact that the ammonia concentration decreased while the flow rate was high suggests that the ammonia was stressed more by the high organic loading than from the increased velocities. It appeared that the BAF 1 filter was initially unable to efficiently nitrify the suddenly increased influent ammonia load at the start of the hydraulic peak. But ammonia removal improved with time even as the peak flow continued, suggesting that biological activity increased in response to the increased food available.

TSS did not appear to be affected by the increased flow rate. A scheduled backwash occurred approximately 18 hours after the peak flow started, and the filter did not restart in automatic due to an alarm, leaving the filter in idle for three hours, until the alarm was reset.

Figure 3.5-20 shows the results for BAF Stage #2. The flow rate was increased from 2 gpm to 7.2 gpm over a 30 minute period starting at 11:00 AM on July 27. The BAF 2 effluent TSS was below its goal in samples collected prior to the increase in flow, but the concentration of ammonia and TN had not recovered from earlier trials, and it is likely that the storage tank still had a high concentration of ammonia.

Samples were also analyzed for COD, TN, NO_x, and TKN, but are not shown on the figures for clarity purposes. A series of one-way ANOVAs were completed on each parameter to determine if there was an effect of the flow increase. The p-values from the ANOVAs are shown in Table 3.5-11. The ANOVA results showed that ammonia, TN and NO_x concentrations were all affected by the flow increase, which is also apparent from Figure 3.5-19 and 3.5-20. The Stage #2 filter continued to denitrify, however, removing all NO_x. The very high COD in the Stage #2 filter during recovery (Figure 3.5-21) was a result of a timer malfunction, resulting in an overfeed of supplemental carbon. The complete data set is shown in Table 3.5-12.

Table 3.5-11: BAF Experimental Plan 04 DPE – Summary of ANOVA Results

Parameter	p -value	
	BAF Stage #1	BAF Stage #2
TSS	0.336	0.285
COD	0.311	0.160
Ammonia	0.014	0.075
TN	0.079	0.010
NOx	0.001	All data BDL
TKN	0.085	0.010

Figure 3.5-20: BAF#2 DPE | 24-hour, Peak Flow Stress Test, Diluted

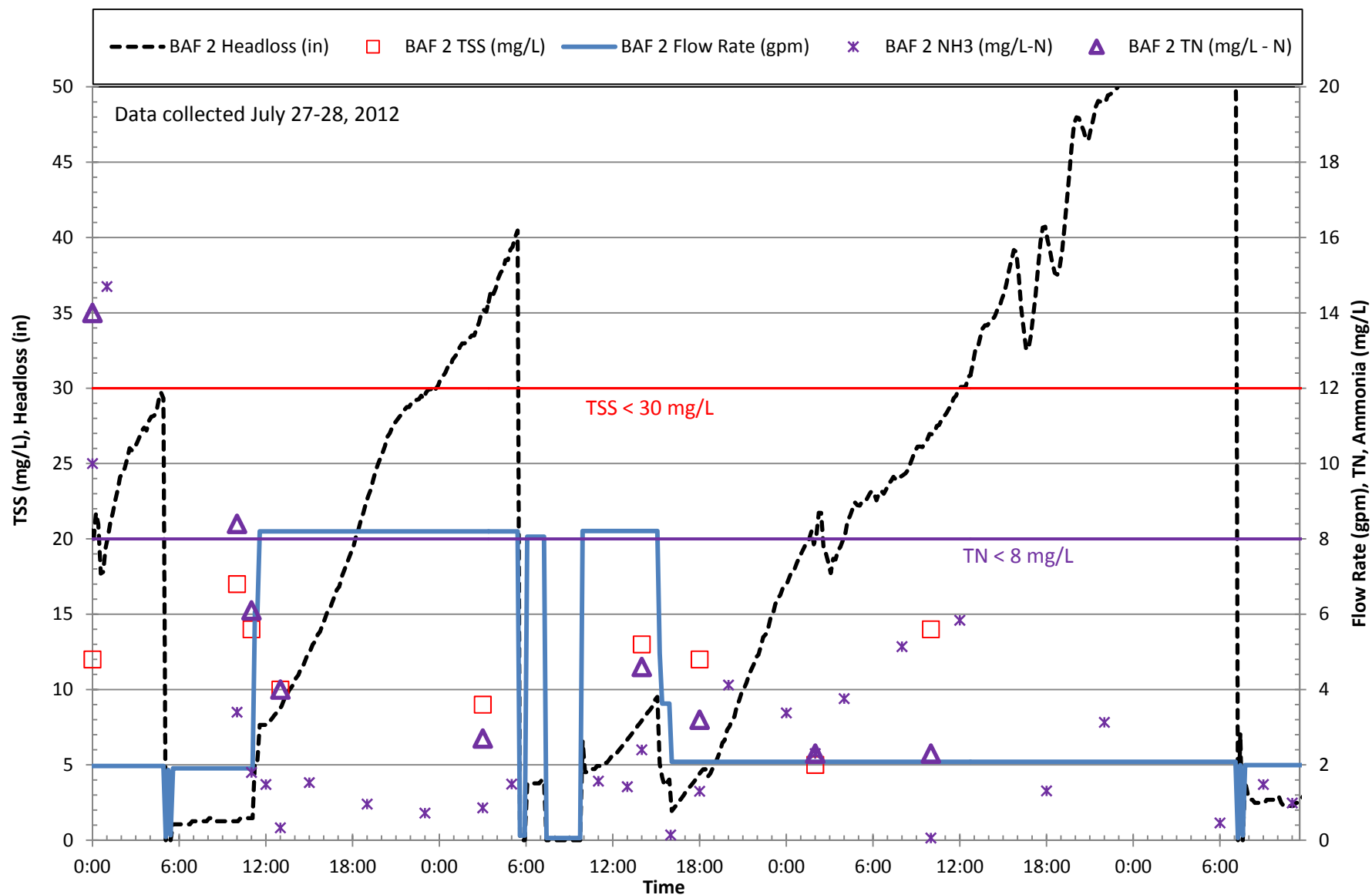


Figure 3.5-19: BAF#1 DPE | 24-hour, Diluted Peak Flow Stress Test

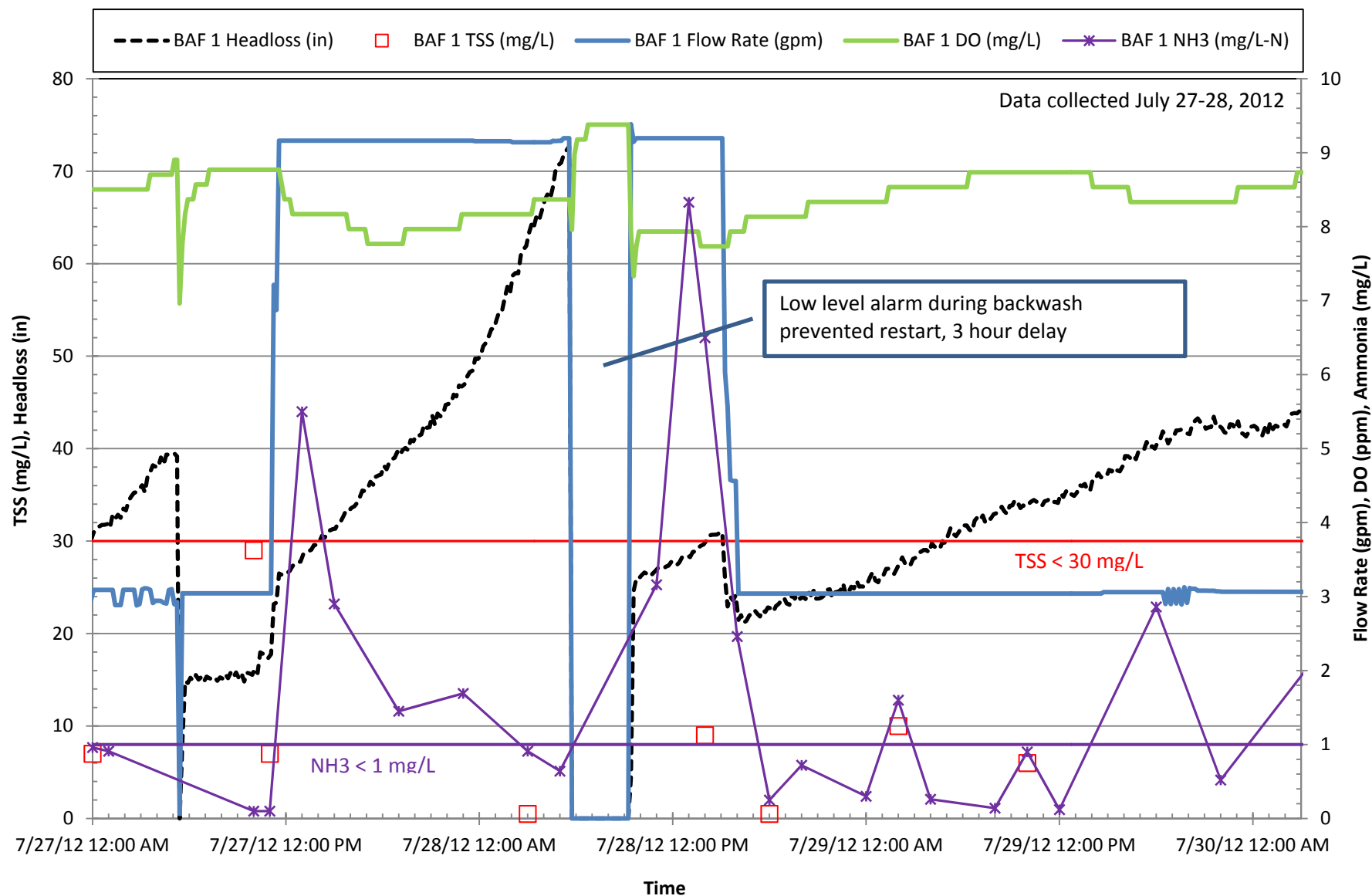


Figure 3.5-21: Boxplots for BAF DPE Stress Test, TSS and COD

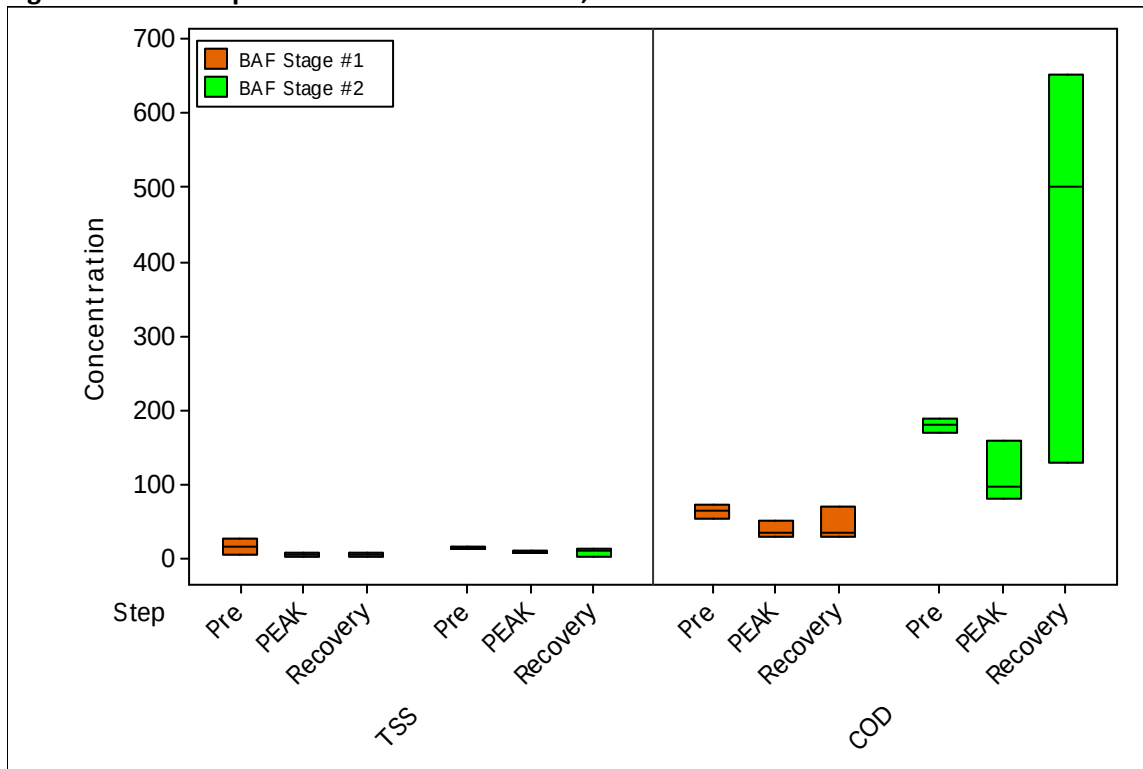


Figure 3.5-22: Boxplots for BAF FPS Stress Test, Ammonia, NOx, and TN

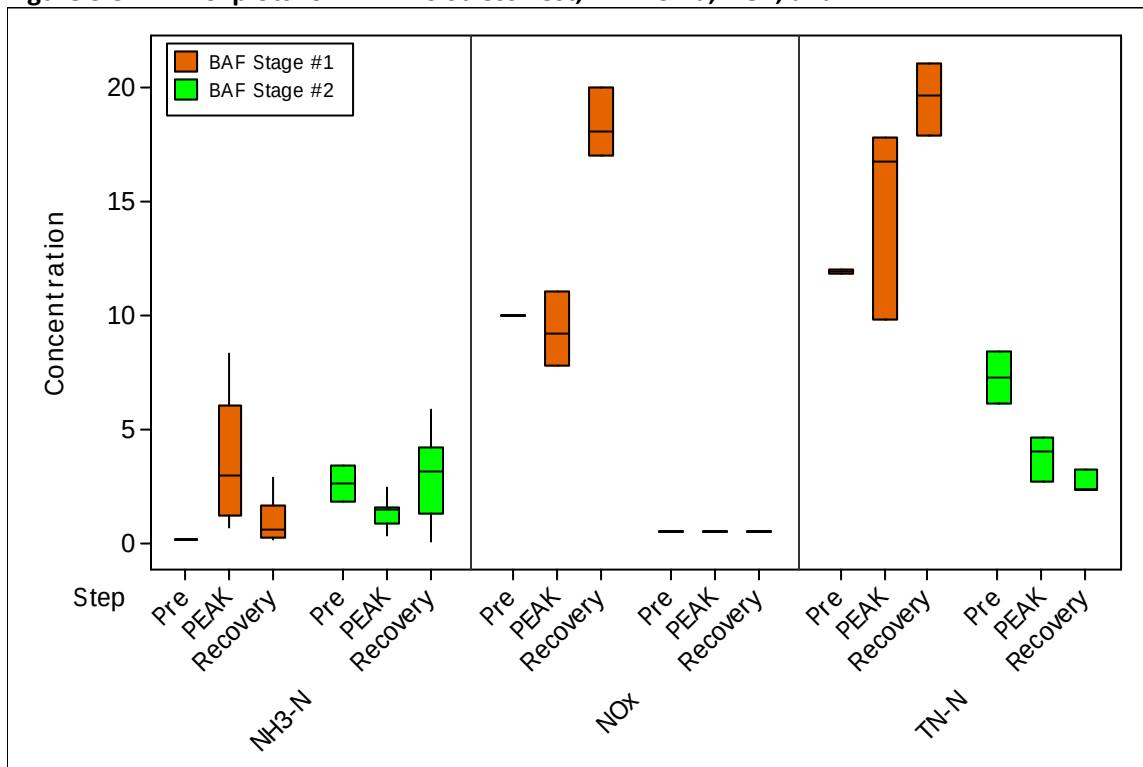


Table 3.5-12a: Water Quality Results for BAF Experimental Plan 04 DPE

Date and Time	Location	Type	Step	TSS	COD	Ammonia	TN	NOx	TKN
07/27 01:00	35 BAF #1 INFLUENT	F	Pre			26.75			
07/27 08:00	35 BAF #1 INFLUENT	F		134	625	26.1	39.8	0.641	39.1
07/27 08:00	35 BAF #1 INFLUENT	F		148	631				
07/27 10:00	35 BAF #1 INFLUENT	F				20.95			
07/27 10:00	32 BAF #1 EFF	L		29	56	0.1	11.8	10	1.8
07/27 10:00	34 BAF #2 EFF	L		17	170	3.4	8.4	<0.5	8.4
07/27 10:00	35 BAF #1 INFLUENT	L		240	530	24	39	<0.5	39
07/27 11:00	32 BAF #1 EFF	L		7	74	0.1	12	10	1.8
07/27 11:00	34 BAF #2 EFF	L		14	190	1.8	6.1	<0.5	6.1
07/27 11:00	35 BAF #1 INFLUENT	L		220	530	28	43	<0.5	43
07/27 12:00	32 BAF #1 EFF	F	PEAK						
07/27 12:00	34 BAF #2 EFF	F				1.48			
07/27 12:00	35 BAF #1 INFLUENT	F				16.1			
07/27 13:00	32 BAF #1 EFF	L			53	5.5	17.8	11	6.8
07/27 13:00	34 BAF #2 EFF	L		10	160	0.33	4	<0.5	4
07/27 13:00	35 BAF #1 INFLUENT	L		87	220	18	26	<0.5	26
07/27 15:00	32 BAF #1 EFF	F				2.9			
07/27 15:00	34 BAF #2 EFF	F				1.53			
07/27 15:00	35 BAF #1 INFLUENT	F				12.45			
07/27 19:00	32 BAF #1 EFF	F				1.45			
07/27 19:00	34 BAF #2 EFF	F				0.96			
07/27 21:00	35 BAF #1 INFLUENT	F				19.45			
07/27 23:00	32 BAF #1 EFF	F				1.69			
07/27 23:00	34 BAF #2 EFF	F				0.72			
07/28 01:00	35 BAF #1 INFLUENT	F				15.1			
07/28 03:00	32 BAF #1 EFF	L		<5	30	0.91	9.8	7.8	2
07/28 03:00	34 BAF #2 EFF	L		9	99	0.86	2.7	<0.5	2.7
07/28 03:00	35 BAF #1 INFLUENT	L		42	200	11	15	<0.5	15
07/28 05:00	32 BAF #1 EFF	F				0.64			

* Sample Type: F = Field, L = Laboratory

Table 3.5-12b: Water Quality Results for BAF Experimental Plan 04 DPE

Date and Time	Location	Type	Step	TSS	COD	Ammonia	TN	NOx	TKN
07/28 05:00	34 BAF #2 EFF	F	PEAK			1.49			
07/28 05:00	35 BAF #1 INFLUENT	F				13.65			
07/28 11:00	32 BAF #1 EFF	F				3.16			
07/28 11:00	34 BAF #2 EFF	F				1.57			
07/28 11:00	35 BAF #1 INFLUENT	F				12.8			
07/28 13:00	32 BAF #1 EFF	F				8.33			
07/28 13:00	34 BAF #2 EFF	F				1.42			
07/28 13:00	35 BAF #1 INFLUENT	F				19.68			
07/28 14:00	32 BAF #1 EFF	L		9	35	6.5	16.7	9.2	7.5
07/28 14:00	34 BAF #2 EFF	L		13	82	2.4	4.6	<0.5	4.6
07/28 14:00	35 BAF #1 INFLUENT	L		80	190	18	24	<0.5	24
07/28 15:00	35 BAF #1 INFLUENT	F				19.53			
07/28 16:00	32 BAF #1 EFF	F	Recovery			2.46			
07/28 16:00	34 BAF #2 EFF	F				0.14			
07/28 16:00	35 BAF #1 INFLUENT	F				26.6			
07/28 18:00	32 BAF #1 EFF	L		<5	37	0.25	21	20	1
07/28 18:00	34 BAF #2 EFF	L		12	130	1.3	3.2	<0.5	3.2
07/28 18:00	35 BAF #1 INFLUENT	L		87	300	29	36	<0.5	36
07/28 20:00	32 BAF #1 EFF	F				0.72			
07/28 20:00	34 BAF #2 EFF	F				4.12			
07/29 00:00	32 BAF #1 EFF	F				0.3			
07/29 00:00	34 BAF #2 EFF	F				3.38			
07/29 02:00	32 BAF #1 EFF	L		10	71	1.6	19.6	18	1.6
07/29 02:00	34 BAF #2 EFF	L		<5	500	2.3	2.3	<0.5	2.3
07/29 02:00	35 BAF #1 INFLUENT	L		110	410	20	26	<0.5	26
07/29 04:00	32 BAF #1 EFF	F				0.26			
07/29 04:00	34 BAF #2 EFF	F				3.76			
07/29 06:00	35 BAF #1 INFLUENT	F				15.1			
07/29 08:00	32 BAF #1 EFF	F				0.14			
07/29 08:00	34 BAF #2 EFF	F				5.14			

Table 3.5-12b: Water Quality Results for BAF Experimental Plan 04 DPE

Date and Time	Location	Type	Step	TSS	COD	Ammonia	TN	NOx	TKN
07/29 10:00	32 BAF #1 EFF	L	Recovery	6	32	0.9	17.9	17	0.9
07/29 10:00	34 BAF #2 EFF	L		14	650	0.06	2.3	<0.5	2.3
07/29 10:00	35 BAF #1 INFLUENT	L		73	330	26	2.6	<0.5	26
07/29 12:00	32 BAF #1 EFF	F				0.12			
07/29 12:00	34 BAF #2 EFF	F				5.84			
07/29 12:00	35 BAF #1 INFLUENT	F				24.8			
07/29 18:00	32 BAF #1 EFF	F				2.86			
07/29 18:00	34 BAF #2 EFF	F				1.31			
07/29 18:00	35 BAF #1 INFLUENT	F				23.1			
07/29 22:00	32 BAF #1 EFF	F				0.52			
07/29 22:00	34 BAF #2 EFF	F				3.13			

3.5.4.5 Full-strength, High Peak flow, Medium (FXM) Hydraulic Stress Test

Results from the Full-strength, High Peak flow, Medium duration (FXM) Trial are shown graphically in Figure 3.5-23 for BAF Stage #1. The flow rate was increased from 3 gpm to 18.6 gpm over a 30 minute period starting at 12:00 PM on July 30. The Stage #1 effluent ammonia may have partially recovered from the FPM trial on the previous day, with two samples having effluent concentrations below 1 mg/L as N, and one sample at 2.77 mg/L as N. The TSS in the two grab samples collected in the morning were consistent with the typical performance of the BAF Stage #1 after a backwash, and both were above the goal of 30 mg/L

The increase in flow decreased the dissolved oxygen during the high flow period, with the DO decreased from 8.9 to 5.1 mg/L. The ammonia concentration increased immediately after the flow rate was increased, but recovered to a concentration less than 1 mg/L shortly after the high peak flow ended, likely within 3 hours. Effluent TSS concentrations were also increased as a result of the increased flow rate, with TSS concentrations as high as 120 mg/L.

Figure 3.5-24 shows the results for BAF Stage #2. The flow rate was increased from 2 gpm to 15.1 gpm over a 30 minute period starting at 12:00 PM on July 30. BAF 2 effluent TSS was well above the 30 mg/L goal in samples collected prior to the increase in flow. The TSS did not increase as a result of the flow increase.

Samples were also analyzed for COD, TN, NOX, and TKN, but are not shown on the figures for clarity purposes. A series of one-way ANOVAs were completed on each parameter to determine if there was an effect of the flow increase. The p-values from the ANOVAs are shown in Table 3.5-13. The ANOVA results showed that ammonia in BAF 1, and TSS in BAF 2, were affected by the flow increase. The full data set is shown in Table 3.5-14.

Table 3.5-13: BAF Experimental Plan 04 FXM – Summary of ANOVA Results

Parameter	p -value	
	BAF Stage #1	BAF Stage #2
TSS	0.139	0.011
COD	0.194	No Data
Ammonia	0.000	0.310
TN	No Data	No Data
NOx	No Data	All data BDL
TKN	No Data	No Data

Figure 3.5-24: BAF#2 FXM | 6-hour, High Peak Flow Stress Test

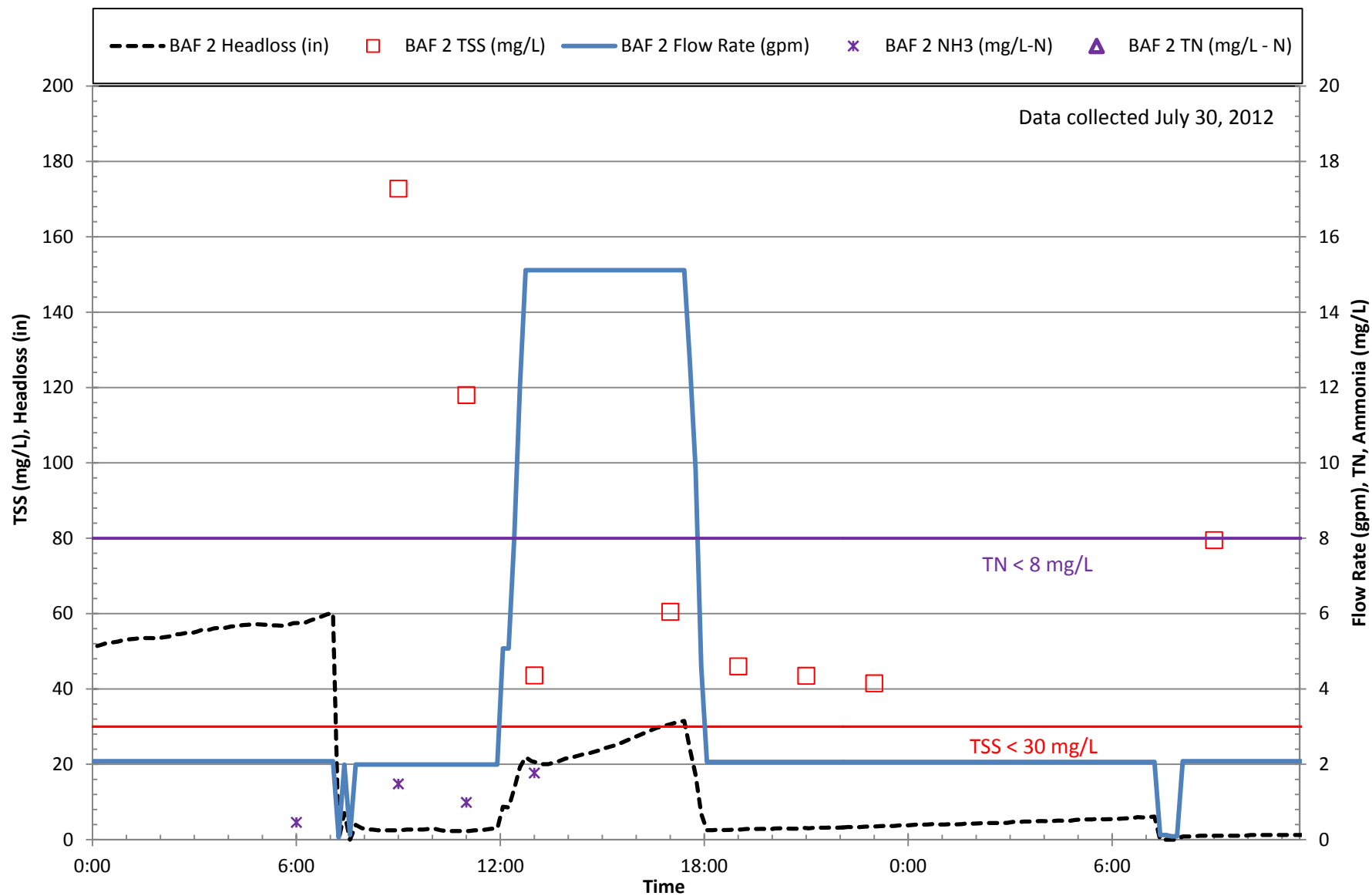


Figure 3.5-23: BAF#1 FXM | 6-hour, High Peak Flow Stress Test

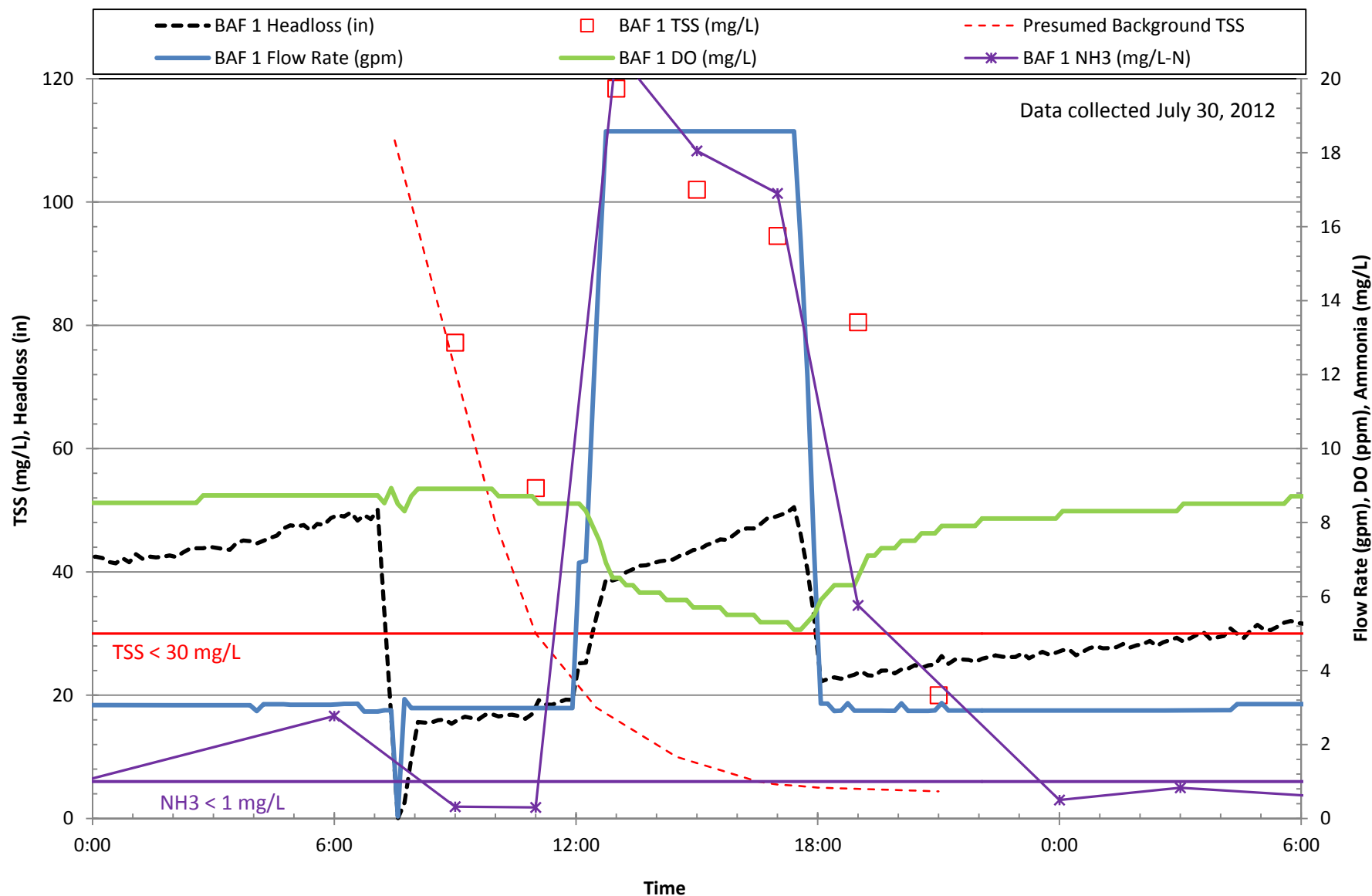


Figure 3.5-25: Boxplots for BAF FXM Stress Test, TSS and COD

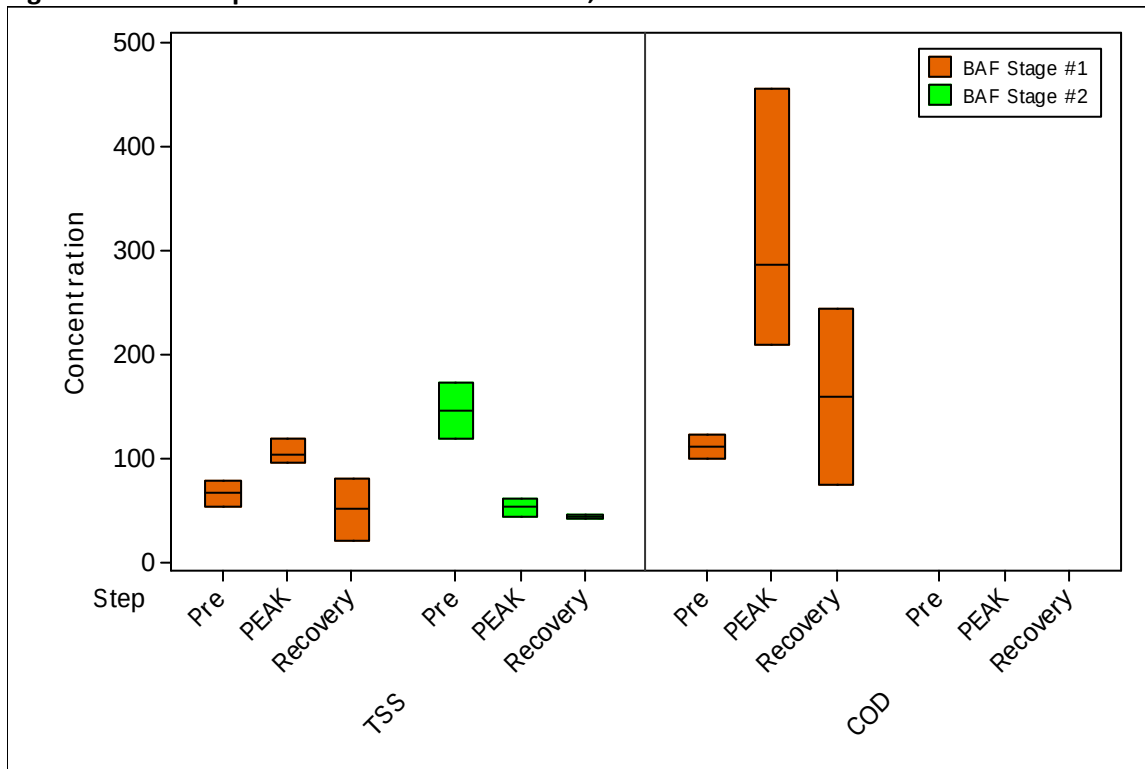


Figure 3.5-26: Boxplots for BAF FXM Stress Test, Ammonia

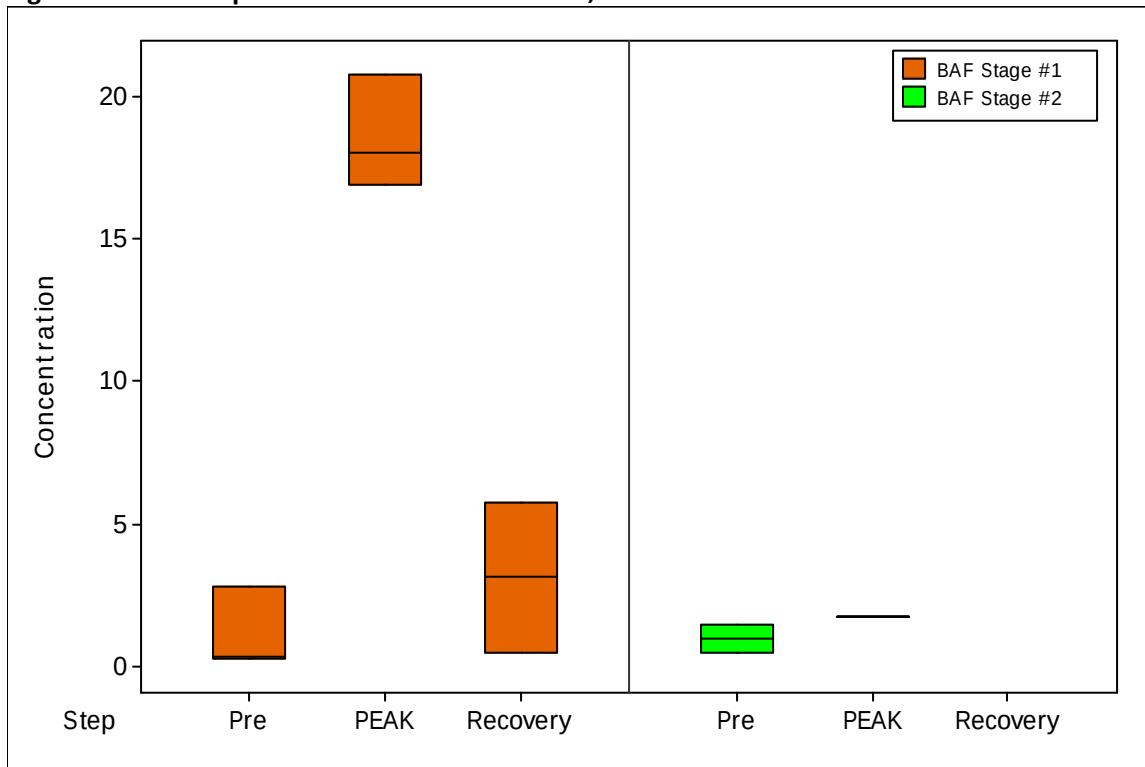


Table 3.5-14a: Water Quality Results for BAF Experimental Plan 04 FXM

Date and Time	Location	Type	Step	TSS	COD	Ammonia	TN	NOx	TKN
07/30 00:00	35 BAF #1 INFLUENT	F	Pre			19.15			
07/30 06:00	32 BAF #1 EFF	F				2.77			
07/30 06:00	34 BAF #2 EFF	F				0.46			
07/30 06:00	35 BAF #1 INFLUENT	F				16.95			
07/30 09:00	32 BAF #1 EFF	F		77.2					
07/30 09:00	32 BAF #1 EFF	F			122	0.32			
07/30 09:00	34 BAF #2 EFF	F				1.48			
07/30 09:00	34 BAF #2 EFF	F		172.8					
07/30 09:00	35 BAF #1 INFLUENT	F				29.5			
07/30 09:00	34 BAF #2 EFF	L						<0.5	
07/30 09:00	35 BAF #1 INFLUENT	L		160	420	23	38	<0.5	38
07/30 11:00	32 BAF #1 EFF	F		53.6					
07/30 11:00	32 BAF #1 EFF	F			98.7	0.3			
07/30 11:00	34 BAF #2 EFF	F				0.99			
07/30 11:00	34 BAF #2 EFF	F		118					
07/30 12:00	35 BAF #1 INFLUENT	F				29.3			
07/30 12:00	34 BAF #2 EFF	L						<0.5	
07/30 12:00	35 BAF #1 INFLUENT	L		170	420	30	43	<0.5	43
07/30 13:00	32 BAF #1 EFF	F	PEAK	118.4					
07/30 13:00	32 BAF #1 EFF	F			209	20.75			
07/30 13:00	34 BAF #2 EFF	F				1.77			
07/30 13:00	34 BAF #2 EFF	F		43.6					
07/30 13:00	35 BAF #1 INFLUENT	F				29.8			
07/30 13:00	34 BAF #2 EFF	L						<0.5	
07/30 13:00	35 BAF #1 INFLUENT	L		380	490	30	54	<0.5	54
07/30 15:00	32 BAF #1 EFF	F		102					
07/30 15:00	32 BAF #1 EFF	F			285	18.05			
07/30 15:00	35 BAF #1 INFLUENT	F				31.5			
07/30 15:00	34 BAF #2 EFF	L						<0.5	

* Sample Type: F = Field, L = Laboratory

Table 3.5-14b: Water Quality Results for BAF Experimental Plan 04 FXM

Date and Time	Location	Type	Step	TSS	COD	Ammonia	TN	NOx	TKN
07/30 15:00	35 BAF #1 INFLUENT	L	PEAK	130	540	29	47	<0.5	47
07/30 17:00	32 BAF #1 EFF	F		94.5					
07/30 17:00	32 BAF #1 EFF	F			454	16.9			
07/30 17:00	34 BAF #2 EFF	F		60.5					
07/30 17:00	35 BAF #1 INFLUENT	F				28.8			
07/30 17:00	34 BAF #2 EFF	L						<0.5	
07/30 17:00	35 BAF #1 INFLUENT	L		140	460	28	43	<0.5	43
07/30 19:00	32 BAF #1 EFF	F	Recovery	80.5					
07/30 19:00	32 BAF #1 EFF	F			244	5.76			
07/30 19:00	34 BAF #2 EFF	F		46					
07/30 19:00	34 BAF #2 EFF	L						<0.5	
07/30 19:00	35 BAF #1 INFLUENT	L		98	320	26	38	<0.5	38
07/30 21:00	32 BAF #1 EFF	F		20					
07/30 21:00	34 BAF #2 EFF	F		43.5					
07/30 21:00	34 BAF #2 EFF	L						<0.5	
07/30 23:00	34 BAF #2 EFF	F		41.5					
07/30 23:00	34 BAF #2 EFF	L						<0.5	

3.5.4.6 Full-strength, High Peak flow, Extended duration (FXE) Hydraulic Stress Test

Results from the Full-strength, High Peak flow, Extended duration (FXE) Trial are shown graphically in Figure 3.5-27 for BAF Stage #1. The flow rate was increased from 3 gpm to 18.6 gpm over a 30 minute period starting at 12:00 PM on July 31. The BAF 1 effluent ammonia had recovered from the FXM trial on the previous day, with five consecutive samples having effluent concentrations below 1 mg/L as N. The TSS in the three grab samples collected in the morning were all above the TSS goal of 30 mg/L, but appeared consistent with the performance of the BAF Stage #1 after a backwash.

The increase in flow likely decreased the dissolved oxygen concentration during the high flow period, and the DO decreased from 8.3 to 0 mg/L over a 10 hour period. The ammonia concentration increased immediately after the flow rate was increased, but began to recover even with the low DO and high flow rate. The low DO might have been the result of false readings caused by a fouled DO probe. The DO was near zero at 12:00 (on day 2 of stress test) but vigorous aeration in BAF 1 was confirmed by observation. The DO probe was cleaned, and DO readings quickly recovered to 8 mg/L without any adjustments to air flow.

The spike in ammonia concentration at 11:00 was likely caused by the BAF 1 backwash at 08:00. A period of time is often required after backwashing to reestablish effective treatment (filter “ripening”), especially when the filter is being stressed. The ammonia concentration increased rapidly after the backwash, and recovered to a concentration less than 1 mg/L approximately 6 hours after the flow rate was restored.

Eight hours after the beginning of the recovery phase, the BAF process started and stopped repeatedly for an 8 hour period due to low flow in the primary clarifier. The disruption was corrected shortly before backwashing at 08:00 on day 3 of the stress test. There was high effluent ammonia for one sample following backwash, but the BAF 1 filter recovered much more quickly at the 3 gpm recovery flow rate than it had at the peak flow following backwash.

Effluent TSS concentrations were elevated throughout the testing, but appeared to match the presumed TSS concentrations following backwash events. During the high peak flow, the TSS was between 48 and 80 mg/L, but it did recover to below 30 mg/L after each successive backwash once the flow was restored.

Figure 3.5-28 shows the results for BAF Stage #2. The flow rate was increased from 2 gpm to 15.1 gpm over a 30 minute period starting at 12:00 PM on July 30. When compared to the presumed background TSS, the Stage #2 effluent TSS appears to have been elevated.

Samples were also analyzed for COD, TN, NOX, and TKN, but are not shown on the figures for clarity purposes. A series of one-way ANOVAs were completed on each parameter to determine if there was an effect of the flow increase. The p-values from the ANOVAs are shown in Table 3.5-15. The ANOVA results showed that ammonia in Stage #1 and TSS in Stage #2 were all affected by the flow increase. The full data set is shown in Table 3.5-16.

Figure 3.5-28: BAF#2 FXE | 24-hour, Peak Flow Stress Test

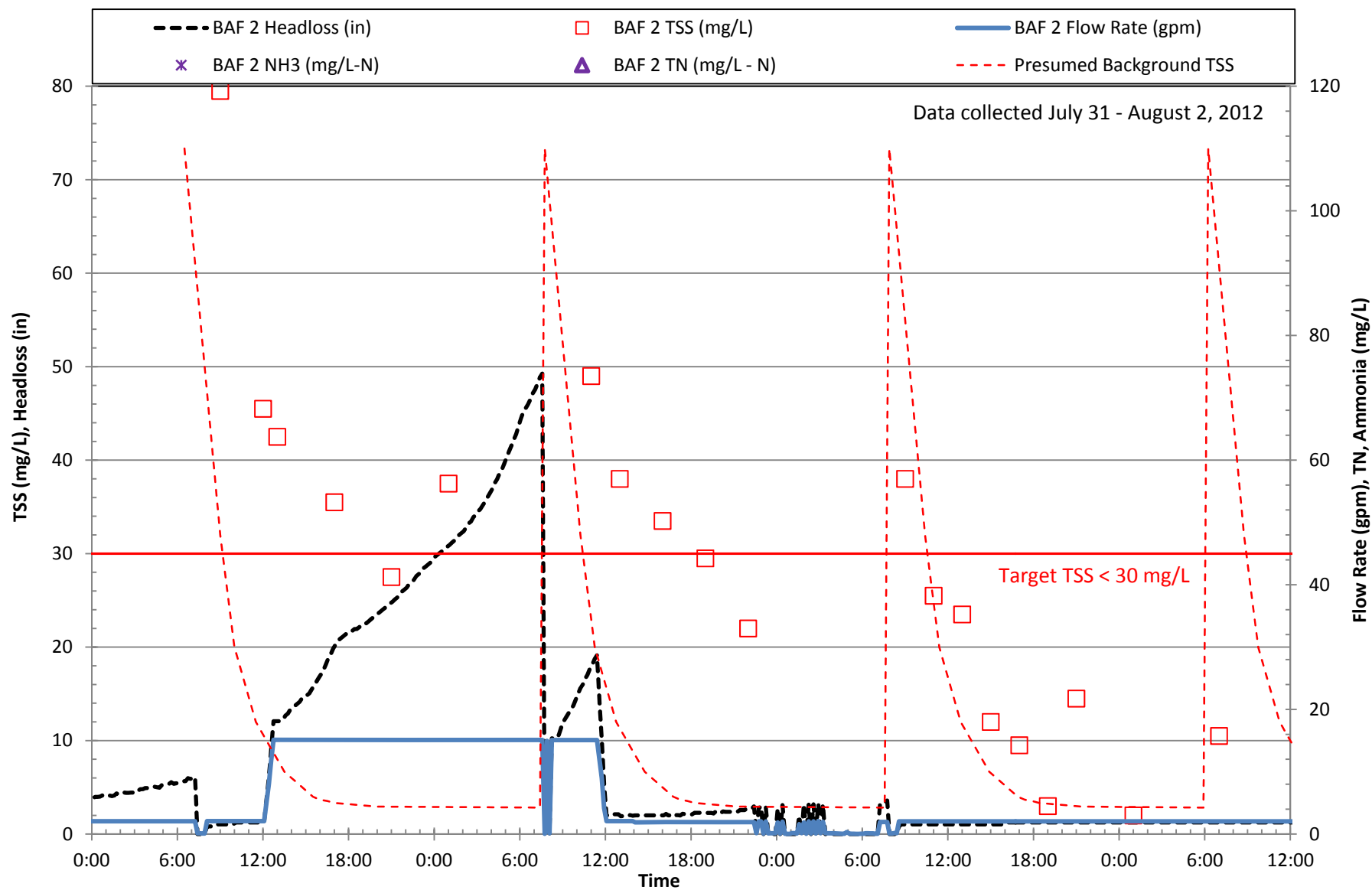


Figure 3.5-27: BAF#1 FXE | 24-hour, High Peak Flow Stress Test

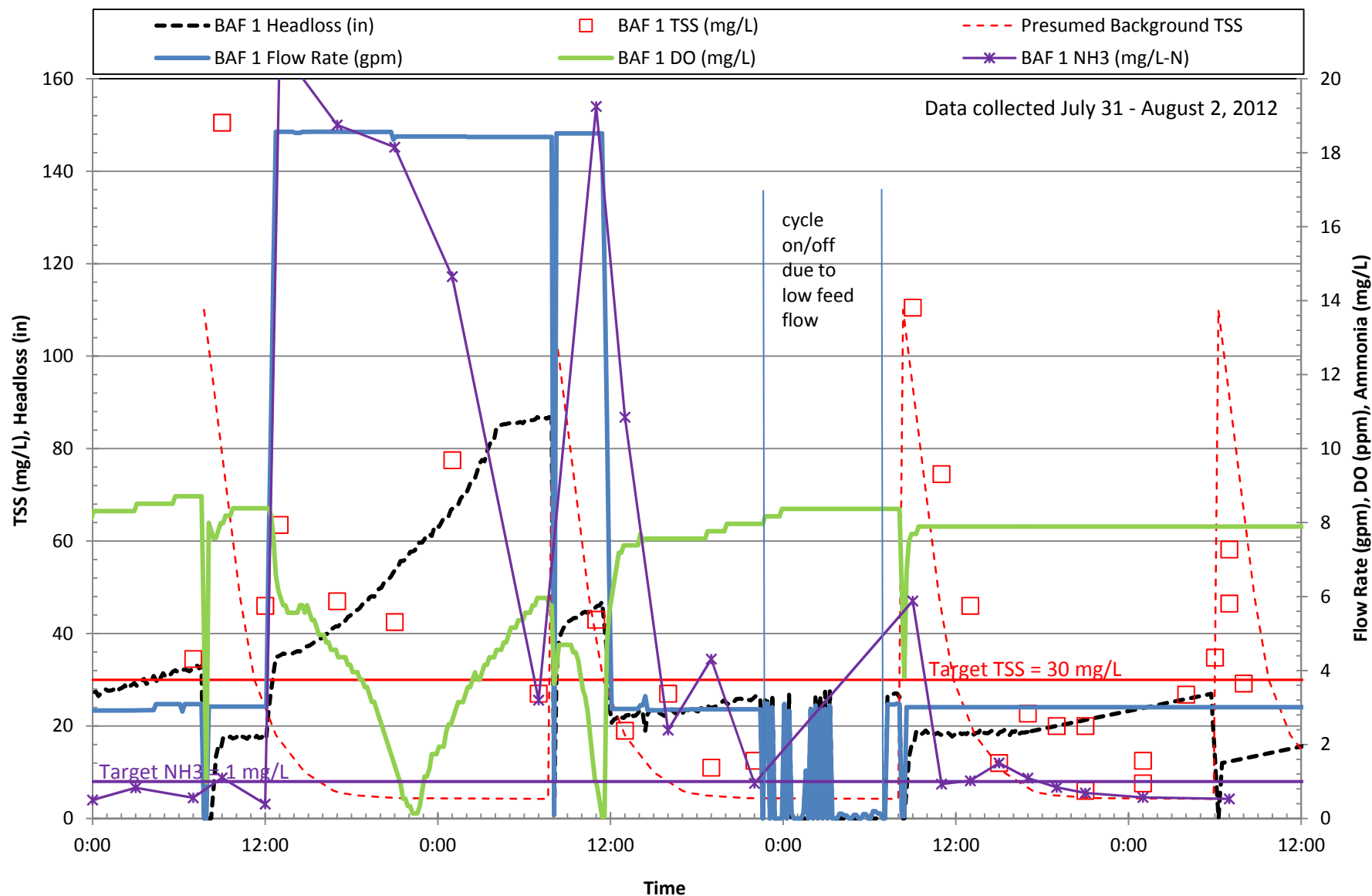


Table 3.5-15: BAF Experimental Plan 04 FXE – Summary of ANOVA Results

Parameter	p -value	
	BAF Stage #1	BAF Stage #2
TSS	0.048	0.001
COD	0.000	No Data
Ammonia	0.000	No Data
TN	No Data	No Data
NOx	No Data	0.422
TKN	No Data	No Data

Figure 3.5-29: Boxplots for BAF FXE Stress Test, TSS and COD

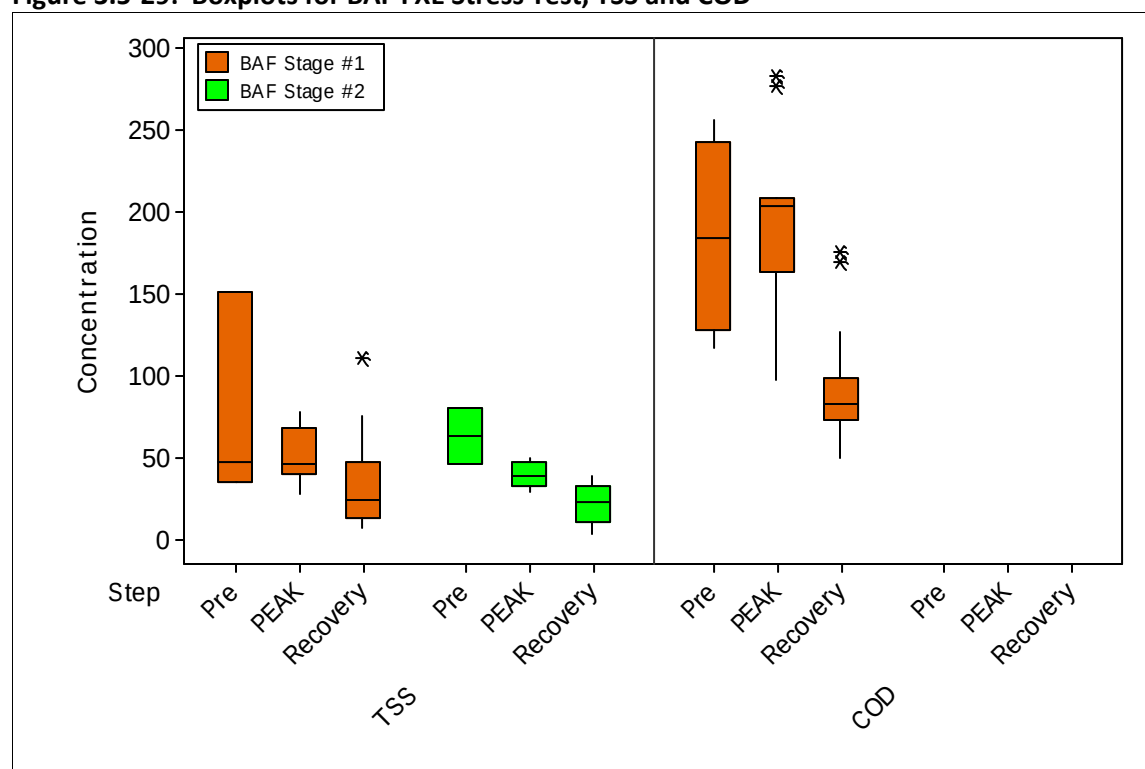


Table 3.5-16a: Water Quality Results for BAF Experimental Plan 04 FXE

Date and Time	Location	Type	Step	TSS	COD	Ammonia	TN	NOx	TKN
07/31 00:00	32 BAF #1 EFF	F	Pre		74.5	0.5			
07/31 00:00	35 BAF #1 INFLUENT	F				21.3			
07/31 00:00	35 BAF #1 INFLUENT	L		84	380	21	32	<0.5	32
07/31 03:00	32 BAF #1 EFF	F			205	0.83			
07/31 06:00	35 BAF #1 INFLUENT	F				18			
07/31 07:00	32 BAF #1 EFF	F		34.5					
07/31 07:00	32 BAF #1 EFF	F			161	0.56			
07/31 07:00	35 BAF #1 INFLUENT	L		92	200	17	25	<0.5	25
07/31 09:00	32 BAF #1 EFF	F		150.5					
07/31 09:00	32 BAF #1 EFF	F			255	1.1			
07/31 09:00	34 BAF #2 EFF	F							
07/31 09:00	34 BAF #2 EFF	F		79.5					
07/31 09:00	35 BAF #1 INFLUENT	F				23.8			
07/31 09:00	34 BAF #2 EFF	L						<0.5	
07/31 09:00	35 BAF #1 INFLUENT	L		130	290	24	36	<0.5	36
07/31 12:00	32 BAF #1 EFF	F		46					
07/31 12:00	32 BAF #1 EFF	F			116	0.39			
07/31 12:00	34 BAF #2 EFF	F							
07/31 12:00	34 BAF #2 EFF	F		45.5					
07/31 12:00	35 BAF #1 INFLUENT	F				38			
07/31 12:00	34 BAF #2 EFF	L						<0.5	
07/31 12:00	35 BAF #1 INFLUENT	L		160	560	37	59	<0.5	59
07/31 13:00	32 BAF #1 EFF	F	PEAK	63.5					
07/31 13:00	32 BAF #1 EFF	F			196	20.85			
07/31 13:00	34 BAF #2 EFF	F							
07/31 13:00	34 BAF #2 EFF	F		42.5					
07/31 13:00	35 BAF #1 INFLUENT	F				35			
07/31 13:00	34 BAF #2 EFF	L						<0.5	
07/31 13:00	35 BAF #1 INFLUENT	L		160	360	34	52	<0.5	52

* Sample Type: F = Field, L = Laboratory

Table 3.5-16b: Water Quality Results for BAF Experimental Plan 04 FXE

Date and Time	Location	Type	Step	TSS	COD	Ammonia	TN	NOx	TKN
07/31 17:00	32 BAF #1 EFF	F	PEAK	47	203				
07/31 17:00	32 BAF #1 EFF	F			203				
07/31 17:00	32 BAF #1 EFF	F				18.75			
07/31 17:00	34 BAF #2 EFF	F							
07/31 17:00	34 BAF #2 EFF	F		35.5					
07/31 17:00	34 BAF #2 EFF	F							
07/31 17:00	35 BAF #1 INFLUENT	F				30.3			
07/31 17:00	34 BAF #2 EFF	L						<0.5	
07/31 21:00	32 BAF #1 EFF	F		42.5	203				
07/31 21:00	32 BAF #1 EFF	F			208				
07/31 21:00	32 BAF #1 EFF	F				18.15			
07/31 21:00	34 BAF #2 EFF	F		27.5					
07/31 21:00	34 BAF #2 EFF	F							
07/31 21:00	35 BAF #1 INFLUENT	F				28.5			
07/31 21:00	34 BAF #2 EFF	L						<0.5	
07/31 21:00	35 BAF #1 INFLUENT	L		130	440	29	46	<0.5	46
08/01 01:00	32 BAF #1 EFF	F		77.5	276				
08/01 01:00	32 BAF #1 EFF	F			282				
08/01 01:00	32 BAF #1 EFF	F				14.65			
08/01 01:00	34 BAF #2 EFF	F							
08/01 01:00	34 BAF #2 EFF	F		37.5					
08/01 01:00	34 BAF #2 EFF	F							
08/01 01:00	35 BAF #1 INFLUENT	F				19.8			
08/01 01:00	34 BAF #2 EFF	L						<0.5	
08/01 07:00	32 BAF #1 EFF	F		27	96.5				
08/01 07:00	32 BAF #1 EFF	F			99.4				
08/01 07:00	32 BAF #1 EFF	F				3.2			
08/01 07:00	35 BAF #1 INFLUENT	F				13.9			
08/01 07:00	35 BAF #1 INFLUENT	L		86	290	15	23	<0.5	15
08/01 11:00	32 BAF #1 EFF	F		43	163				

Table 3.5-16c: Water Quality Results for BAF Experimental Plan 04 FXE

Date and Time	Location	Type	Step	TSS	COD	Ammonia	TN	NOx	TKN
08/01 11:00	32 BAF #1 EFF	F	PEAK		172				
08/01 11:00	32 BAF #1 EFF	F				19.25			
08/01 11:00	34 BAF #2 EFF	F							
08/01 11:00	34 BAF #2 EFF	F		49					
08/01 11:00	35 BAF #1 INFLUENT	F				27.1			
08/01 13:00	32 BAF #1 EFF	F	Recovery	19	90.8				
08/01 13:00	32 BAF #1 EFF	F			97.4				
08/01 13:00	32 BAF #1 EFF	F				10.85			
08/01 13:00	34 BAF #2 EFF	F							
08/01 13:00	34 BAF #2 EFF	F		38					
08/01 13:00	35 BAF #1 INFLUENT	F				33.2			
08/01 13:00	34 BAF #2 EFF	L						<0.5	
08/01 13:00	35 BAF #1 INFLUENT	L		160	490	35	51	<0.5	51
08/01 16:00	32 BAF #1 EFF	F		27	82.9				
08/01 16:00	32 BAF #1 EFF	F			81.6				
08/01 16:00	32 BAF #1 EFF	F				2.39			
08/01 16:00	34 BAF #2 EFF	F							
08/01 16:00	34 BAF #2 EFF	F		33.5					
08/01 16:00	35 BAF #1 INFLUENT	F				24.25			
08/01 19:00	32 BAF #1 EFF	F		11	70.3				
08/01 19:00	32 BAF #1 EFF	F			75				
08/01 19:00	32 BAF #1 EFF	F				4.31			
08/01 19:00	34 BAF #2 EFF	F							
08/01 19:00	34 BAF #2 EFF	F		29.5					
08/01 19:00	35 BAF #1 INFLUENT	F				11.25			
08/01 22:00	32 BAF #1 EFF	F		12.5	74.8				
08/01 22:00	32 BAF #1 EFF	F			86.3				
08/01 22:00	32 BAF #1 EFF	F				0.95			
08/01 22:00	34 BAF #2 EFF	F							
08/01 22:00	34 BAF #2 EFF	F		22					

Table 3.5-16d: Water Quality Results for BAF Experimental Plan 04 FXE

Date and Time	Location	Type	Step	TSS	COD	Ammonia	TN	NOx	TKN
08/01 22:00	35 BAF #1 INFLUENT	F	Recovery			14.3			
08/01 22:00	34 BAF #2 EFF	L						<0.5	
08/01 22:00	35 BAF #1 INFLUENT	L		74	290	16	24	<0.5	24
08/02 09:00	32 BAF #1 EFF	F		110.5	175				
08/02 09:00	32 BAF #1 EFF	F			169				
08/02 09:00	32 BAF #1 EFF	F				5.88			
08/02 09:00	34 BAF #2 EFF	F		38					
08/02 09:00	35 BAF #1 INFLUENT	F		85		23.25			
08/02 09:00	35 BAF #1 INFLUENT	F		85					
08/02 11:00	35 BAF #1 INFLUENT	F				30.5			
08/02 11:00	32 BAF #1 EFF	F		74.5	126				
08/02 11:00	32 BAF #1 EFF	F			122				
08/02 11:00	32 BAF #1 EFF	F				0.93			
08/02 11:00	34 BAF #2 EFF	F		25.5					
08/02 13:00	32 BAF #1 EFF	F		46	85.9				
08/02 13:00	32 BAF #1 EFF	F			86				
08/02 13:00	32 BAF #1 EFF	F				1.02			
08/02 13:00	34 BAF #2 EFF	F		23.5					
08/02 13:00	35 BAF #1 INFLUENT	F		103		29			
08/02 13:00	35 BAF #1 INFLUENT	F		103					
08/02 15:00	32 BAF #1 EFF	F		12	72.2	1.5			
08/02 15:00	32 BAF #1 EFF	F			84.7				
08/02 15:00	34 BAF #2 EFF	F							
08/02 15:00	34 BAF #2 EFF	F		12					
08/02 15:00	35 BAF #1 INFLUENT	F							
08/02 17:00	32 BAF #1 EFF	F		22.7	77.5	1.09			
08/02 17:00	32 BAF #1 EFF	F			81.3				
08/02 17:00	34 BAF #2 EFF	F		9.5					
08/02 17:00	35 BAF #1 INFLUENT	F		160		24.85			
08/02 17:00	35 BAF #1 INFLUENT	L		150	480	26	41	<0.5	41

Table 3.5-16e: Water Quality Results for BAF Experimental Plan 04 FXE

Date and Time	Location	Type	Step	TSS	COD	Ammonia	TN	NOx	TKN
08/02 19:00	32 BAF #1 EFF	F	Recovery	20	72.5	0.84			
08/02 19:00	32 BAF #1 EFF	F			73				
08/02 19:00	34 BAF #2 EFF	F		3					
08/02 21:00	32 BAF #1 EFF	F		6	57.6	0.69			
08/02 21:00	32 BAF #1 EFF	F		20	58.4				
08/02 21:00	34 BAF #2 EFF	F		14.5					
08/02 21:00	35 BAF #1 INFLUENT	F		103		26.75			
08/02 21:00	35 BAF #1 INFLUENT	F		103					
08/03 01:00	32 BAF #1 EFF	F		12.5	51	0.57			
08/03 01:00	32 BAF #1 EFF	F		7.6	49.1				
08/03 01:00	34 BAF #2 EFF	F		2					
08/03 01:00	35 BAF #1 INFLUENT	F		107					
08/03 01:00	35 BAF #1 INFLUENT	F				23.83			
08/03 01:00	34 BAF #2 EFF	L						2.6	
08/03 03:00	35 BAF #1 INFLUENT	F		160					
08/03 04:00	32 BAF #1 EFF	F		26.8					
08/03 06:00	32 BAF #1 EFF	F		34.8					
08/03 07:00	32 BAF #1 EFF	F		46.5	97.5	0.53			
08/03 07:00	32 BAF #1 EFF	F		58.2	119				
08/03 07:00	34 BAF #2 EFF	F		10.5					
08/03 07:00	35 BAF #1 INFLUENT	F		147					
08/03 07:00	35 BAF #1 INFLUENT	F				15.58			
08/03 08:00	32 BAF #1 EFF	F		29.2					

3.5.5 BOD Removal Rates

Since the influent organic concentration was constantly changing, the BOD loading rate into BAF 1 varied from 20 to 420 lb BOD/1000 cf·day. Figure 3.5-30 shows the flow rates, loading rates, and effluent concentrations measured during the pilot study. It appears that the effluent BOD concentration generally met the target of 30 mg/L if the loading rate was below 153 lb BOD/1000 cf·day.

To evaluate the performance of the BAF process for BOD removal, the data from all phases and trials were combined to evaluate the removal capacity over a broad range of flow rates and organic loading rates. Figure 3.7-31 was produced from the following data:

- All data between January 26 and August 3, inclusive of the stress tests, were included in the analysis.
- Influent BOD was estimated from the Primary Effluent COD using the ratio of 1.9 COD: 1 BOD
- The SALR was calculated for the BOD reactor (with 81 cf of media) as follows (the equation uses data from January 26)

$$\frac{\left(\frac{109 \text{ mg BOD}}{\text{L}}\right) \cdot \left(\frac{8 \text{ ga}}{\text{min}}\right) \cdot \left(\frac{1440 \text{ min}}{\text{day}}\right) \cdot \left(\frac{3.785 \text{ L}}{\text{ga}}\right) \cdot \left(\frac{\text{lb}}{453,592 \text{ mg}}\right)}{(81 \text{ cf})} = 129 \frac{\text{lb BOD}}{1000 \text{ cf} \cdot \text{day}}$$

- Effluent BOD was estimated from the effluent COD using the ratio 3.27:1 BOD
- The temperature correction factor was $1.035^{(10-T)}$
- The design SARR was provided by the Vendor

Figure 3.7-31 shows that the removal rate is consistently 85% of the influent BOD.

3.5.6 Ammonia Removal Capacity

To evaluate the performance of the BAF process for ammonia removal, the removal capacity was calculated based on the surface area of the media. Nitrification was drastically improved in BAF 1 on June 15, when the ammonia feed to the BAF influent was discontinued, and the volume of the BAF effluent storage tank was reduced. Prior to June 15, the effluent ammonia concentration was rarely below the target of 1 mg/L, while it was consistently below 1 mg/L after June 15. Figure 3.7-32 used data after June 15, and before the commencement of the hydraulic stress tests on July 24.

3.5.7 Nitrate Removal Capacity

To evaluate the performance of the BAF process for denitrification, the removal capacity was calculated based on the surface area of the media. Figure 3.7-33 used the entire duration of the pilot study when there was a measurement of Stage #1 and Stage #2 effluent nitrate.

Figure 3.5-30: BAF Stage #1 Operation at Peirce Island Pilot Study

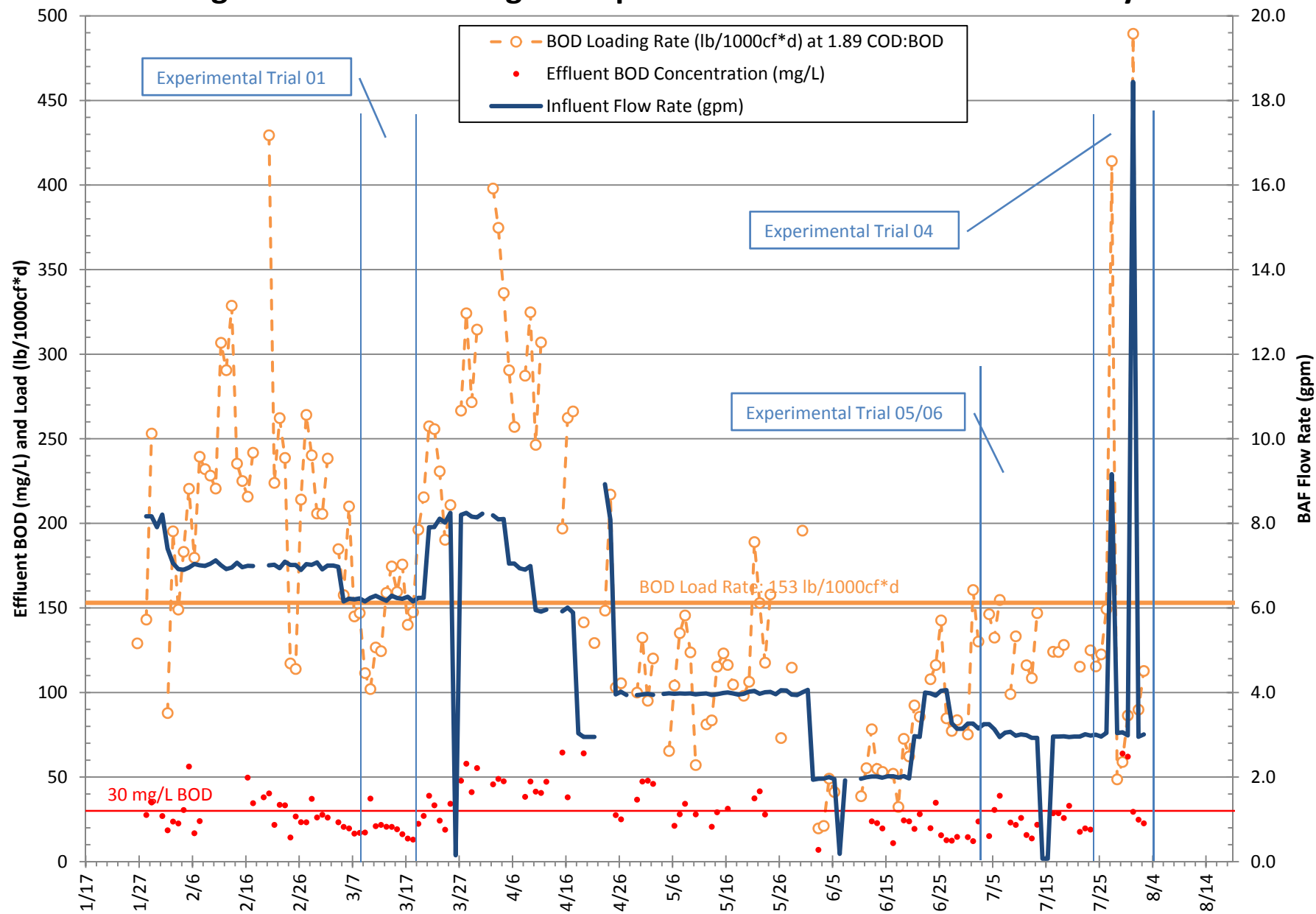


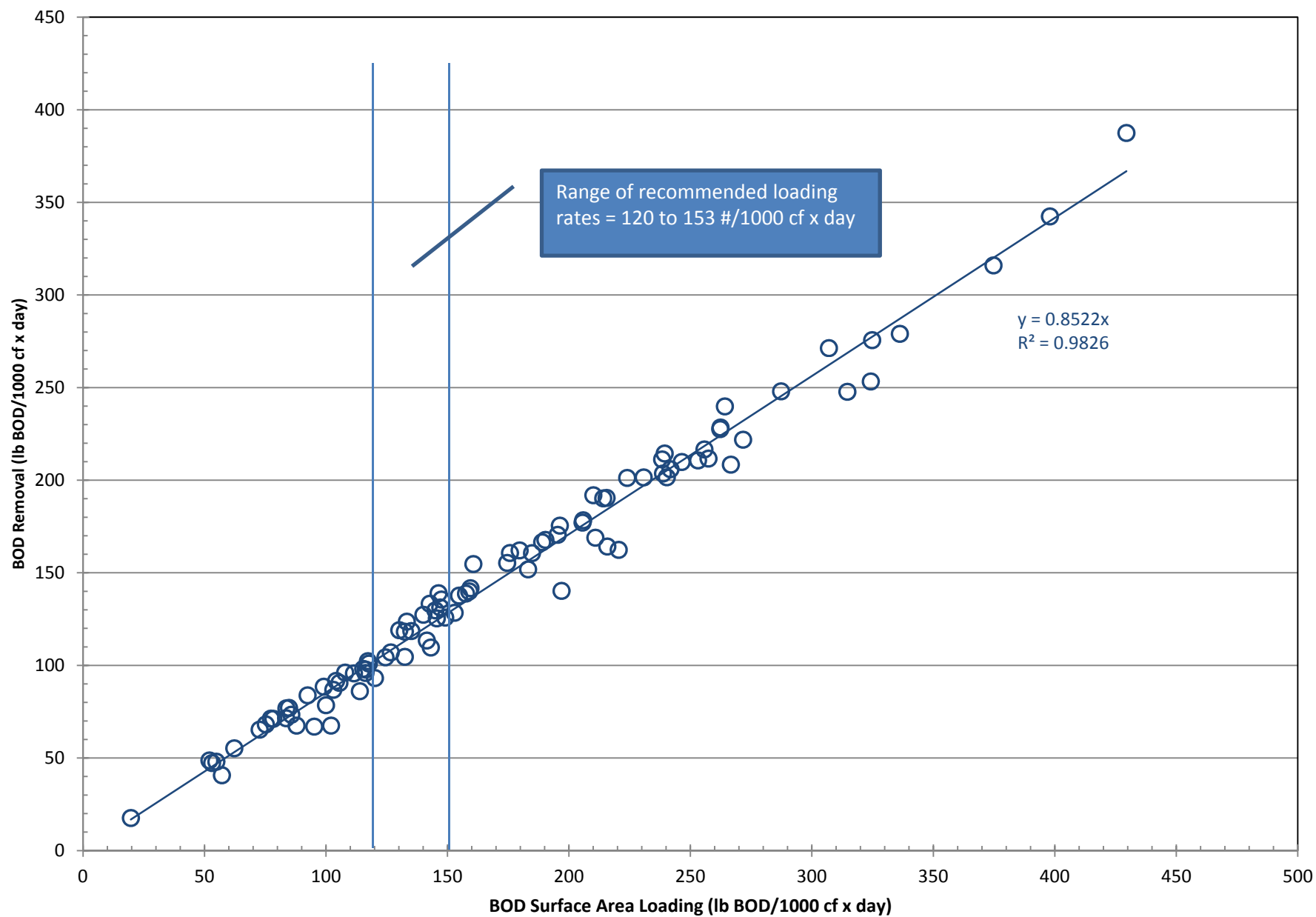
Figure 3.5-31: BOD Loading Rates and Removal through BAF Stage #1

Figure 3.5-32: Ammonia Loading and Removal through BAF Stage #1

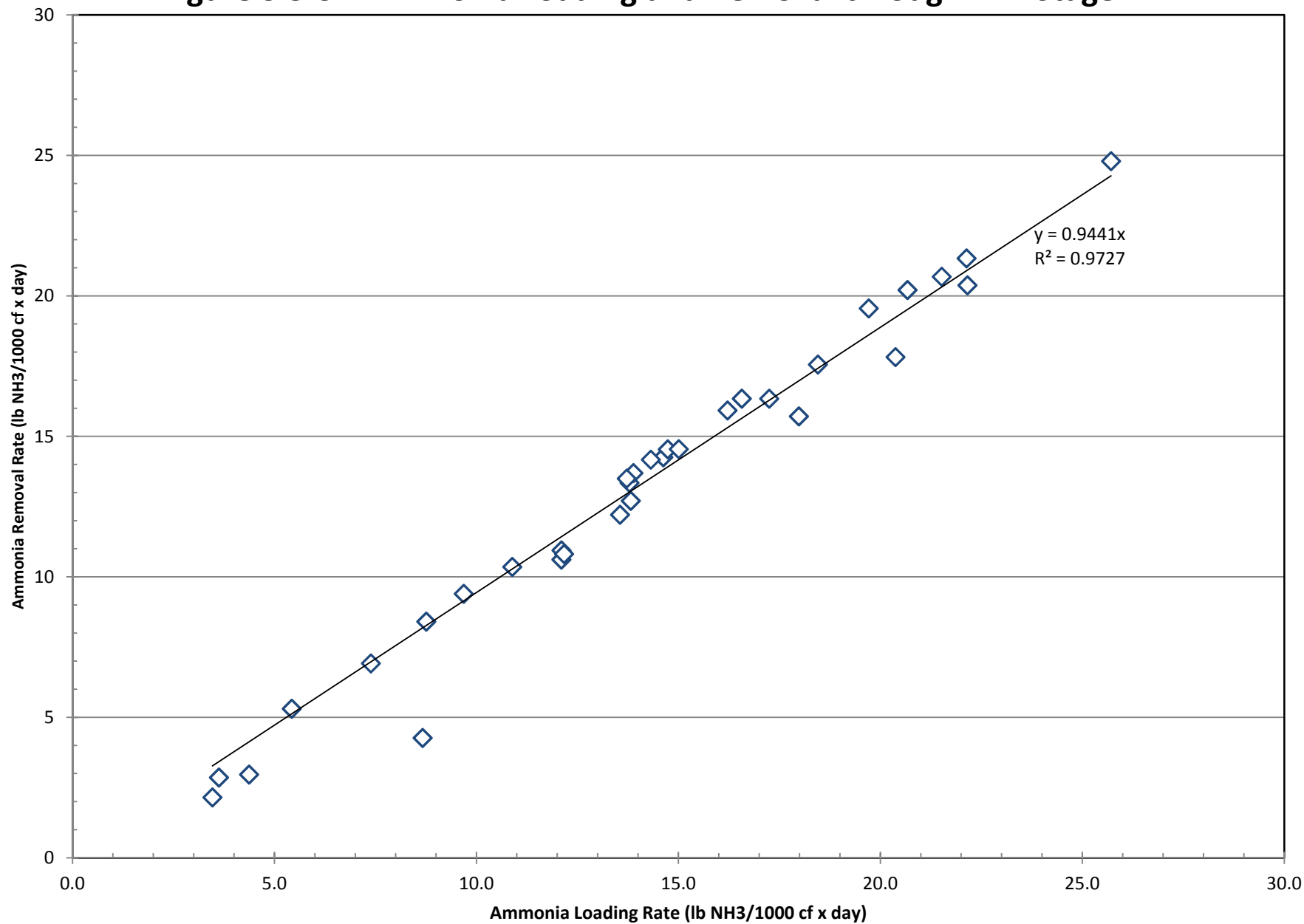
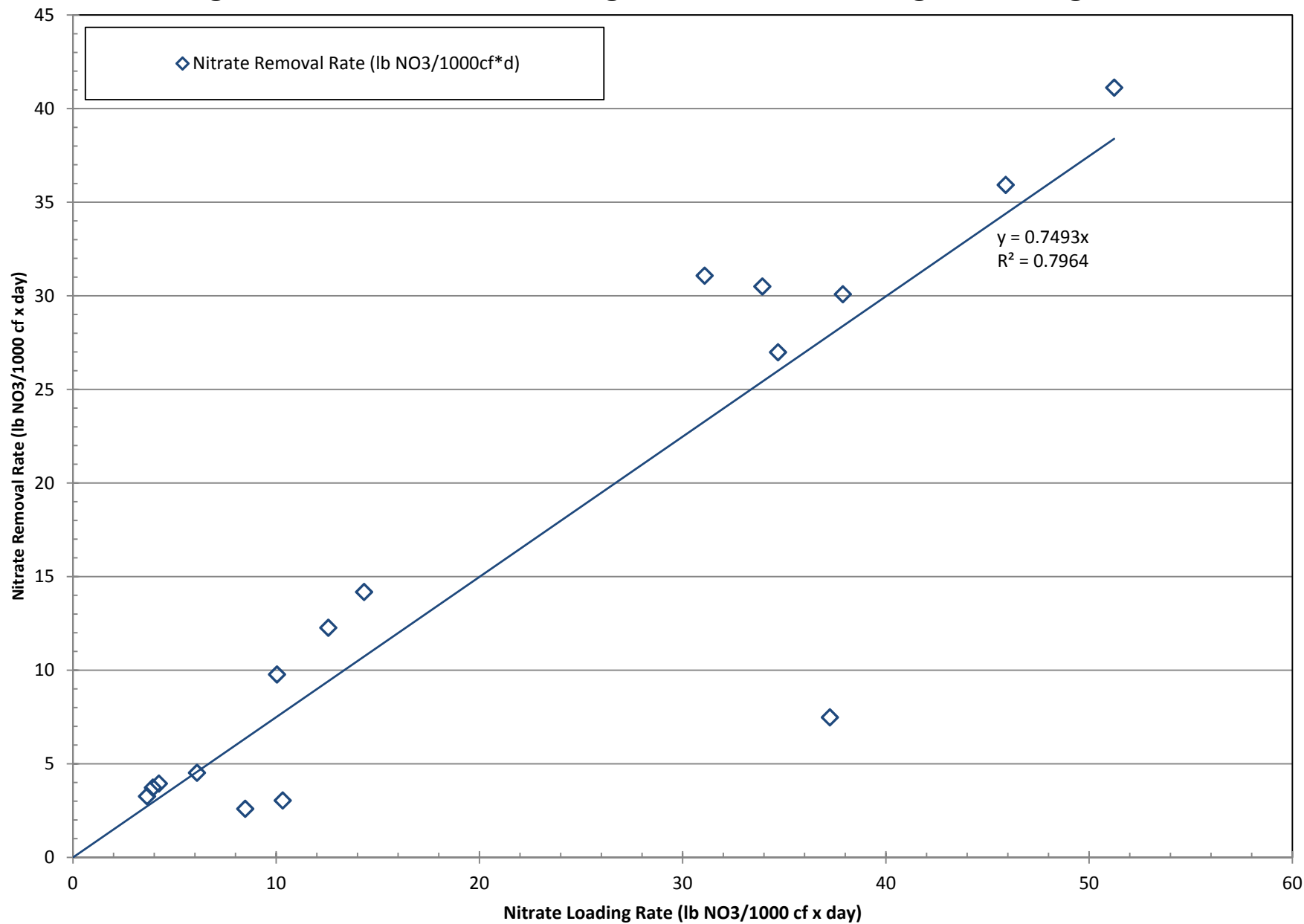


Figure 3.5-33: Nitrate Loading and Removal through BAF Stage #2



3.6 CONVENTIONAL ACTIVATED SLUDGE WITH BIOMAG

3.6.1 Schedule of Conventional Activated Sludge with BioMag (CASB) Experiments

The pilot-scale Conventional Activated Sludge with BioMag (CASB) system was operated to complete a series of Experimental Plans designed by AECOM to assess the performance of the process under a variety of flow and permit scenarios. The different phases of operation of the system are detailed in Table 3.6-01, and described below.

Table 3.6-01: CASB Trial Schedule

Phase	Dates	Description
1	12/28/11	System filled with mixed liquor from Hampton NH Add polymer and begin wasting
	1/26/12	End polymer addition
2	1/29 to 2/08	EXPERIMENTAL PLAN 01 – Avg Day Flow, BOD & TSS<30
3	2/09 to 2/20	Increase flow and convert system to Max Month
	2/20	Lost Biomass through faulty valve
	2/12	Increase volume of aeration basin to meet Clarifier Loading rates
	2/20 to 3/09	Foam and Filaments observed in aeration tank
	3/09	Refill with mixed liquor from Hampton NH
	3/02 to 4/07	Add defoaming agent to aeration tank
	3/19 to 4/18	Add chlorine to control filaments
	4/31 to 4/01	Add polymer
	4/03	Install notch in bulkhead wall between aeration and post-anoxic tanks
	4/05	Install surface wasting skimmer in aeration tank
	4/09	Add supplemental mixer to aeration tank
	4/11	Add Coagulant
4	4/27 to 5/03	Start EXPERIMENTAL PLAN 02 – Max Month Flow, BOD & TSS <30
5	5/3 to 5/14	Convert system to MLE, add nitrifiers from Sturbridge MA
6	5/14 to 5/21	EXPERIMENTAL PLAN 03a – Max Month Load, TN<8
	5/21	Modify weirs, DO control
	5/21 to 5/24	EXPERIMENTAL PLAN 03b – Max Month Load, TN<8
7	6/01	EXPERIMENTAL PLAN 04 – 2 hour, 7.1 gpm stress test
	6/05	EXPERIMENTAL PLAN 04 – 2 hour, 9.2 gpm stress test
	6/07	EXPERIMENTAL PLAN 04 – 6 hour, 9.2 gpm stress test
	6/13 to 6/14	EXPERIMENTAL PLAN 04 – 24 hour, 9.2 gpm stress test, diluted
8	6/14 to 7/02	EXPERIMENTAL PLAN 05 - Max Month Load, TN<8, with high influent TKN
9	7/03 to 7/07	Convert System to 4-stage, repair mixer, skimmer, and IR pump
10	7/07 to 7/14	EXPERIMENTAL PLAN 06 - Max Month Load, TN<3, with high influent TKN

Phase 1 – The aeration tank was filled with 3,000 gallons of mixed liquor from the Hampton NH wastewater treatment facility. The system was started with 10 gpm of pilot-scale primary clarifier effluent, a RAS rate of 50%, and aeration sufficient to maintain a DO greater than 4 ppm. 122 pounds of magnetite were added over a 5 day period.

Phase 2 –Experimental Plan 01. The CASB system was operated at 7 gpm to mimic the average daily organic load into the reactor. During the trial, the average loading into the system was 37 lb BOD/1000 cf·day. The clarifier was operated at 630 gpd/sf .

Phase 3 – The aeration tank volume was increased at the beginning of this phase in an effort to increase the aeration tank volume, so the bioreactor flow rate would more closely match the design loading rate of the clarifier. This was achieved by using the post-anoxic tank as an additional aeration tank, but the opening between the two tanks was very small, meaning that the two tanks were in series. The volume of the first tank remained at 2681 gallons, and the volume of the extended aeration tank was 1227 gallons.

Much of the biomass was lost when a valve was left open on February 20, and the attempt to increase solids in the aeration tank created an environment with a high F:M ratio, promoting the growth of filamentous organisms. Efforts were made to decrease the organisms without good results until March 9, when the entire CASB system was drained, and refilled with mixed liquor obtained from the Hampton NH WWTF. Foam and filaments returned. Chlorine was added to the RAS, and defoamer was added to the aeration zone, to control the filamentous organisms. Various strategies were used to improve the mixing, DO control, surface wasting, and polymer dilution during this period.

Phase 4 – Experimental Plan 02. The CASB system was operated at 5.9 gpm of primary effluent. During the trial, the average loading into the system was 26 lb BOD/1000 cf·day. An additional 11 gpm of potable water was added to the center stilling well of the clarifier to increase the surface overflow rate of the clarifier to 1521 gpd/sf. Field and laboratory samples were collected to evaluate TSS and BOD removal.

Phase 5 – The magnetite impregnation tank was relocated to the pre-anoxic tank. The IR pump was started to recycle mixed liquor from the end of the two-stage aeration tank to the inlet end of the pre-anoxic zone. The vendor for the CASB system (Siemens Industry Inc., Portland ME) added nitrifiers to the aeration tank on at least four occasions in an effort to shorten the acclimation period for nitrification. All nitrifying stock was obtained from the WWTF in the Town of Sturbridge MA.

Phase 6 - Experimental Plan 03. The CASB system was operated in MLE configuration to achieve a TN removal to 8 mg/L TN. The average flow rate into the system was 10.9 gpm of primary effluent. During the Trial, the average loading into the system was 62 lb BOD/1000 cf·day. An additional 4 gpm of potable water was added to the center stilling well of the clarifier to increase the surface overflow rate of the clarifier to 1593 gpd/sf.

Initially, the system was operated with the aeration tank in a declining DO mode, with the target DO of 6 mg/L at the upstream end of the tank of 6, and a target DO of less than 1 mg/L and at downstream end of the tank.

The Vendor for the CASB system made changes to the process over the weekend in the middle of the laboratory sampling effort, and an additional set of lab samples was collected to confirm that the changes did not impact the results of the test. The changes to the system included the addition of a

notch to allow flow through the common bulkhead wall that separated the original aeration tank, and the extended aeration tank. No air was diffused into the second tank, so it effectively functioned as a de-oxygenation zone. This allowed the main aeration tank to operate at a higher dissolved oxygen concentration, while maintaining low DO in the internal recycle from the end of the de-oxygenation zone..

Phase 7 – Experimental Plan 04 included four separate periods of high flow, intended to mimic different storm events. The four experiments conducted on the CASB system included:

Full-strength, Mid flow, Short duration (FMS) Trial – The flow rate was increased from a baseline flow of 11 to 22 gpm for 2 hours. Samples were collected and initially analyzed in the field. However, the large number of field analyses eventually became too difficult and time consuming to process in the field, and samples for subsequent stress tests were delivered to Eastern Analytical for laboratory analysis.

Full-strength, Peak flow, Short duration (FPS) Trial – The flow rate was increased from a baseline flow of 13.5 to 28 gpm for 2 hours.

Full-strength, Peak flow, Medium duration (FPM) Trial – The flow rate was increased from a baseline flow of 13.5 to 28 gpm for 6 hours.

Diluted Strength, Peak Flow, Extended Duration (DPE) Trial - – The flow rate was increased from a baseline flow of 13.5 to 28 gpm for 28 hours. The primary effluent was diluted with potable water in a 1:1 ratio.

For each trial, two samples were collected prior to the increase in flow to establish the background performance of the process, three samples were collected during the increased flow period, and at least three samples were collected after the flow rate was reduced to monitor the recovery period. The flow increase was instantaneous, and the air flow and recycle rate were adjusted to compensate.

Phase 8 - Experimental Plan 05. The CASB system was operated in MLE configuration to achieve a TN removal to 8 mg/L TN under a high influent TKN loading condition. The average flow rate into the system was 8.8 gpm of primary effluent. During the Trial, the average loading into the system was 24.2 lb BOD/1000 cf·day. No additional potable water was added to the center stilling well of the clarifier to increase the surface overflow rate of the clarifier, which was 792 gpd/sf. Field and laboratory samples were collected under steady state conditions for Experimental Plan 05.

Phase 9 – The system was converted to a four stage reactor, with the pre-anoxic zone, aeration zone, post-anoxic denitrification zone, and post aerobic zone. The tank that had previously functioned as the de-oxygenation zone was divided by a baffle to create the post-anoxic and post aerobic zones. A supplemental carbon feed was added to the inlet end of the post-anoxic tank, and the IR pump was relocated to the outlet end of the aeration tank. Supplemental ammonia was added to the effluent of the primary clarifier, which increased the ammonia concentration of the CASB influent.

Phase 10 - Experimental Plan 06. The CASB system was operated in MLE configuration with the addition of post-anoxic and post aerobic zones to achieve a TN removal to 3 mg/L TN under a high influent TKN

loading condition. The average flow rate into the system was 8.5 gpm of primary effluent. During the Trial, the average loading into the system was 73 lb BOD/1000 cf-day. No additional potable water was added to the center stilling well of the clarifier to increase the surface overflow rate of the clarifier, which was 792 gpd/sf. Field and laboratory samples were collected while the CASB system was operated under steady state conditions for Experimental Plan 06.

3.6.2 Results

Table 3.6-02 includes the field data from all pilot testing. The water quality data are presented in the format:

Median (minimum – maximum) [number of samples]

A description of the data contained in each column is described below.

Columns E and F – “Start” and “End” delineate the date and time that the online data is summarized. The water quality data was normally collected from composite samplers that were programmed to start sampling at 8:00 am and collect samples for 24 hours, so water quality samples represent conditions which were in effect between the start and end times.

Column G – “Phase” represents the testing phase described in Section 3.6.1.

Column M – “Notes” includes notes and comments concerning the daily operations

Column N – “Influent Flow to Reactor (gpm)” summarizes the data collected by the flow meter installed between the primary clarifier and the inlet to the CASB reactor.

Columns R, S, T – “Probe #1 Location”, “DO Probe #1 (ppm)”, and “Temperature Probe #1 (°C)” summarize the data provided by one of the HACH online Dissolved Oxygen Probes installed in the CASB tank. The probes were installed by hanging into the tanks, and were sometimes removed from a tank for cleaning or calibration, or relocated from one tank to another. The “location” column identifies the location of the probe, recorded manually in the pilot notes. The “DO” and “Temperature” data was recorded every two minutes on a data recording device, and is summarized in the respective columns. Data that represents periods when the probe was calibrated or suspended above the liquid during testing (due to low tank level, maintenance on the system, or cleaning) were removed from the analysis, and are not included in the summary of the data.

Columns U, V, W - “Probe #2 Location”, “DO Probe #2 (ppm)”, and “Temperature Probe #2 (°C)” contain the information provided by the second HACH online DO as described above.

Columns X, AS, BW, CI, CP – “...Sample ID” identifies the sample ID number, or range of ID numbers used. A unique ID number was assigned to each field sample when it was collected, and the Sample ID is used to track field samples.

Columns X through DE – summarize water quality results from field analyses collected and analyzed in accordance with the methods described in Section 2.7.1. The sample locations are as follows:

“(02,03) PRIMARY EFFLUENT” samples were collected at the effluent weir of the pilot-scale primary clarifier before June 25, or collected at the influent of the MBBR reactor after June 25 (the MBBR influent was a convenient location to collect primary effluent that had been pretreated, and the MBBR and CASB received identically pretreated influent, so the samples were also representative of CASB influent). Soda Ash and aqueous ammonia were added to the pilot-scale primary clarifier on June 25, but several parameters were not affected, and water quality results for TSS, COD, and BOD columns with headers “(02,03) PRIMARY EFFLUENT” represent pilot-scale primary effluent regardless of the spiked feed.

“(02) UNSPIKED PRIMARY EFFLUENT” samples were collected at the effluent weir of the pilot-scale primary clarifier upstream of the soda ash and aqueous ammonia feed location, and represent pilot-scale primary clarifier pH and alkalinity without the addition of soda ash, and concentrations of ammonia, nitrate, total nitrogen, and TKN without supplemental ammonia. The site was often used to control the supplemental soda ash and aqueous ammonia feed rate.

“(03) SPIKED PRIMARY EFFLUENT” samples were collected at the influent of the MBBR reactor after June 25 and represent pilot-scale primary clarifier pH and alkalinity with the addition of soda ash, and concentrations of ammonia, nitrate, total nitrogen, and TKN with supplemental ammonia.

“(22) CASB AERATION MIXED LIQUOR” samples were collected from the main aeration tank.

“(25) CASB POST AERATION MIXED LIQUOR” samples were collected from the post aeration tank.

“(27) CASB RAS#2” samples were collected from the end of the RAS line, where it discharged into the impregnation tank.

“CASB CLA” samples were collected from the effluent of either clarifier.

	E	F	G	H	I	R	S	T	U
1	Start	End	Phase	Notes	Influent Flow to Reactor (gpm)	Probe #1 Location	Probe #1 Dissolved Oxygen (ppm)	Probe #1 Temperature (°C)	Probe #2 Location
2	12/28/11 18:56	07/14/12 08:17			9.0 (0.0-40.0) [142954]		5.6 (0.0-12.0) [131136]	13.4 (0.0-24.5) [134600]	
3									
4	12/28/11 18:56	12/29/11 08:02	1	Filled with Hampton ML	2.3 (0.0-9.3) [394]	Aeration Tank, Beg.	7.7 (3.3-9.9) [393]	10.9 (10.0-11.7) [393]	Aeration Tank, End
5	12/29/11 08:04	12/30/11 08:02	1		8.4 (0.0-10.3) [720]	Aeration Tank, Beg.	3.2 (0.0-6.8) [470]	11.4 (10.1-11.8) [720]	Aeration Tank, End
6	12/30/11 08:04	12/31/11 08:02	1		8.4 (0.0-33.5) [720]	Aeration Tank, Beg.	0.0 (0.0-12.0) [720]	11.9 (4.8-12.2) [720]	Aeration Tank, End
7	12/31/11 08:04	01/01/12 08:02	1		4.9 (0.0-12.5) [720]	Aeration Tank, Beg.	5.6 (0.0-7.7) [720]	12.1 (11.8-12.3) [720]	Aeration Tank, End
8	01/01/12 08:04	01/02/12 08:02	1	Magnetite feed tank plugged	0.0 (0.0-4.0) [720]	Aeration Tank, Beg.	8.2 (7.7-8.9) [720]	12.2 (11.8-12.3) [720]	Aeration Tank, End
9	01/02/12 08:04	01/03/12 08:02	1		8.4 (0.0-14.6) [720]	Aeration Tank, Beg.	6.9 (6.0-9.0) [720]	11.9 (11.3-12.1) [720]	Aeration Tank, End
10	01/03/12 08:04	01/04/12 08:02	1		10.4 (0.0-12.3) [720]	Aeration Tank, Beg.	7.1 (5.4-9.6) [720]	11.0 (10.6-11.3) [720]	Aeration Tank, End
11	01/04/12 08:04	01/05/12 08:02	1		7.8 (0.0-13.6) [720]	Aeration Tank, Beg.	4.4 (0.0-9.2) [713]	11.5 (8.7-11.8) [718]	Aeration Tank, End
12	01/05/12 08:04	01/06/12 08:02	1		6.2 (0.0-8.1) [720]	Aeration Tank, Beg.	0.2 (0.0-6.4) [719]	11.8 (11.4-12.1) [719]	Aeration Tank, End
13	01/06/12 08:04	01/07/12 08:02	1		7.1 (0.0-9.6) [720]	Aeration Tank, Beg.	4.0 (0.0-7.4) [719]	12.1 (11.6-12.2) [719]	Aeration Tank, End
14	01/07/12 08:04	01/08/12 08:02	1		4.9 (4.2-6.7) [720]	Aeration Tank, Beg.	4.8 (4.4-6.1) [720]	12.4 (11.8-12.6) [720]	Aeration Tank, End
15	01/08/12 08:04	01/09/12 08:02	1		0.0 (0.0-8.6) [720]	Aeration Tank, Beg.	5.0 (4.5-5.3) [105]	12.1 (12.0-12.2) [105]	Aeration Tank, End
16	01/09/12 08:04	01/10/12 08:02	1		4.7 (0.0-7.0) [720]	Aeration Tank, Beg.	7.2 (5.8-8.7) [554]	11.8 (11.6-11.9) [554]	Aeration Tank, End
17	01/10/12 08:04	01/11/12 08:02	1		9.8 (0.0-11.4) [720]	Aeration Tank, Beg.	7.4 (5.7-8.4) [717]	12.2 (11.7-12.4) [717]	Aeration Tank, End
18	01/11/12 08:04	01/12/12 08:02	1	All flow through CLA#2	9.6 (0.0-11.3) [720]	Aeration Tank, Beg.	7.2 (3.9-8.4) [716]	12.1 (9.9-12.3) [716]	Aeration Tank, End
19	01/12/12 08:04	01/13/12 08:02	1	Increase RAS rate	4.3 (0.0-11.8) [720]	Aeration Tank, Beg.	10.6 (7.6-10.9) [719]	9.4 (8.7-11.8) [719]	Aeration Tank, End
20	01/13/12 08:04	01/14/12 08:02	1	Added pipe to act as static mixer	6.6 (0.0-8.6) [720]	Aeration Tank, Beg.	9.8 (0.2-10.7) [719]	10.6 (9.7-10.8) [719]	Aeration Tank, End
21	01/14/12 08:04	01/15/12 08:02	1		6.8 (0.0-9.9) [720]	Aeration Tank, Beg.	9.9 (9.0-11.4) [720]	10.4 (9.0-10.7) [720]	Aeration Tank, End
22	01/15/12 08:04	01/16/12 08:02	1		8.3 (0.0-11.8) [720]	Aeration Tank, Beg.	10.8 (10.2-11.7) [720]	9.5 (8.8-9.7) [720]	Aeration Tank, End
23	01/16/12 08:04	01/17/12 08:02	1		7.5 (0.0-8.5) [720]	Aeration Tank, Beg.	10.2 (9.5-11.7) [720]	10.6 (9.2-11.0) [720]	Aeration Tank, End
24	01/17/12 08:04	01/18/12 08:02	1	RAS Rate = 4.3 gpm	6.7 (0.0-8.8) [720]	Aeration Tank, Beg.	8.2 (6.4-11.1) [717]	11.5 (10.8-11.7) [717]	Aeration Tank, End
25	01/18/12 08:04	01/19/12 08:02	1		5.6 (0.0-8.1) [720]	Aeration Tank, Beg.	10.4 (3.3-11.7) [718]	10.8 (4.6-11.3) [718]	Aeration Tank, End
26	01/19/12 08:04	01/20/12 08:02	1		5.5 (0.0-12.3) [720]	Aeration Tank, Beg.	9.3 (7.4-11.2) [720]	11.0 (9.9-11.1) [720]	Aeration Tank, End
27	01/20/12 08:04	01/21/12 08:02	1	END WAS Wasting	6.5 (0.0-12.6) [720]	Aeration Tank, Beg.	0.9 (0.4-6.7) [720]	10.4 (10.1-10.9) [720]	Aeration Tank, End
28	01/21/12 08:04	01/22/12 08:02	1	START ML Wasting	9.1 (0.0-11.0) [720]	Aeration Tank, Beg.	3.1 (0.5-11.1) [719]	10.3 (3.8-10.6) [719]	Aeration Tank, End
29	01/22/12 08:04	01/23/12 08:02	1		5.6 (0.0-8.8) [720]	Aeration Tank, Beg.	5.7 (5.0-8.7) [720]	10.5 (9.6-10.6) [720]	Aeration Tank, End
30	01/23/12 08:04	01/24/12 08:02	1		6.9 (0.0-24.2) [720]	Aeration Tank, Beg.	3.8 (0.1-6.2) [720]	10.8 (10.5-11.4) [720]	Aeration Tank, End
31	01/24/12 08:04	01/25/12 08:02	1		7.2 (0.0-10.4) [720]	Aeration Tank, Beg.	5.2 (3.5-6.4) [720]	11.6 (10.7-11.8) [720]	Aeration Tank, End
32	01/25/12 08:04	01/26/12 08:02	1		6.5 (0.0-9.0) [720]	Aeration Tank, Beg.	5.4 (2.8-9.8) [716]	11.1 (4.5-11.3) [716]	Aeration Tank, End
33	01/26/12 08:04	01/27/12 08:02	1		9.1 (6.0-10.3) [720]	Aeration Tank, Beg.	4.1 (2.2-8.4) [720]	11.5 (8.9-11.7) [720]	Aeration Tank, End
34	01/27/12 08:04	01/28/12 08:02	1		8.5 (0.0-11.8) [720]	Aeration Tank, Beg.	7.8 (6.1-8.8) [720]	9.1 (8.3-9.5) [720]	Aeration Tank, End
35	01/28/12 08:04	01/29/12 08:02	2		8.9 (0.0-11.8) [720]	Aeration Tank, Beg.	4.7 (0.9-7.8) [719]	10.4 (9.5-10.5) [719]	Aeration Tank, End
36	01/29/12 08:04	01/30/12 08:02	2		10.6 (0.0-11.7) [720]	Aeration Tank, Beg.	5.0 (3.6-8.5) [720]	10.2 (9.7-10.4) [720]	Aeration Tank, End
37	01/30/12 08:04	01/31/12 08:02	2	Comp A/S installed on CLA#2	2.3 (0.0-11.5) [720]	Aeration Tank, Beg.	4.0 (0.3-8.6) [720]	10.1 (9.9-10.2) [720]	Aeration Tank, End
38	01/31/12 08:04	02/01/12 08:02	2	Collect AD BOD Sample 1	10.2 (0.0-11.1) [720]	Aeration Tank, Beg.	3.1 (0.0-5.8) [718]	10.7 (9.9-10.8) [718]	Aeration Tank, End
39	02/01/12 08:04	02/02/12 08:02	2		9.0 (0.0-10.7) [720]	Aeration Tank, Beg.	3.0 (0.5-6.0) [718]	11.2 (1.7-11.3) [718]	Aeration Tank, End
40	02/02/12 08:04	02/03/12 08:02	2	Collect AD BOD Sample 2	8.3 (0.0-10.0) [720]	Aeration Tank, Beg.	3.2 (0.0-6.7) [719]	10.9 (10.4-11.0) [719]	Aeration Tank, End
41	02/03/12 08:04	02/04/12 08:02	2		8.0 (0.0-20.8) [720]	Aeration Tank, Beg.	3.8 (1.7-5.7) [720]	10.7 (10.3-10.8) [720]	Aeration Tank, End
42	02/04/12 08:04	02/05/12 08:02	2		5.8 (0.0-9.8) [720]	Aeration Tank, Beg.	5.3 (3.4-8.0) [720]	10.5 (10.0-10.7) [720]	Aeration Tank, End
43	02/05/12 08:04	02/06/12 08:02	2	RAS Offline - poor results?	4.8 (0.0-9.9) [720]	Aeration Tank, Beg.	8.4 (4.4-10.9) [720]	10.1 (9.6-10.5) [720]	Aeration Tank, End

	E	F	G	H	I	R	S	T	U
1	Start	End	Phase	Notes	Influent Flow to Reactor (gpm)	Probe #1 Location	Probe #1 Dissolved Oxygen (ppm)	Probe #1 Temperature (°C)	Probe #2 Location
44	02/06/12 08:04	02/07/12 08:02	2		8.5 (0.0-15.5) [720]	Aeration Tank, Beg.	6.3 (0.6-10.2) [719]	11.0 (9.6-11.2) [719]	Aeration Tank, End
45	02/07/12 08:04	02/08/12 08:02	2	Purge magnetite from lines	7.0 (0.0-11.4) [720]	Aeration Tank, Beg.	7.6 (5.8-10.3) [719]	10.9 (10.1-11.1) [719]	Aeration Tank, End
46	02/08/12 08:04	02/09/12 08:02	2	Collect AD BOD Sample 3	5.3 (0.0-40.0) [720]	Aeration Tank, Beg.	8.5 (3.7-9.6) [718]	10.7 (5.4-10.8) [718]	Aeration Tank, End
47	02/09/12 08:04	02/10/12 08:02	3	Increased flow to MM target (11 gpm)	13.2 (11.1-15.0) [720]	Aeration Tank, Beg.	6.0 (4.6-8.2) [720]	11.1 (10.4-11.2) [720]	Aeration Tank, End
48	02/10/12 08:04	02/11/12 08:02	3		13.7 (0.0-15.9) [720]	Aeration Tank, Beg.	4.8 (2.2-7.7) [719]	11.1 (10.4-11.4) [719]	Aeration Tank, End
49	02/11/12 08:04	02/12/12 08:02	3	Replaced RAS Pump #2	9.1 (0.0-13.8) [720]	Aeration Tank, Beg.	5.5 (4.0-6.9) [720]	10.8 (9.4-10.9) [720]	Aeration Tank, End
50	02/12/12 08:04	02/13/12 08:02	3	Increased Aeration Volume	13.5 (0.0-18.5) [720]	Aeration Tank, Beg.	4.2 (3.5-6.4) [720]	9.6 (9.2-9.7) [720]	Aeration Tank, End
51	02/13/12 08:04	02/14/12 08:02	3		0.0 (0.0-15.2) [720]	Aeration Tank, Beg.	9.1 (3.3-10.6) [720]	9.3 (8.7-9.7) [720]	PDN Tank, Mid
52	02/14/12 08:04	02/15/12 08:02	3		12.6 (0.0-14.9) [720]	Aeration Tank, Beg.	3.1 (1.5-10.5) [719]	10.9 (8.8-11.2) [719]	PDN Tank, Mid
53	02/15/12 08:04	02/16/12 08:02	3	Purged magnetite from lines	12.9 (0.0-20.3) [720]	Aeration Tank, Beg.	3.8 (0.1-5.7) [718]	11.5 (4.2-11.6) [718]	PDN Tank, Mid
54	02/16/12 08:04	02/17/12 08:02	3	Increased flow to target 17.1	11.8 (0.0-20.1) [720]	Aeration Tank, Beg.	5.7 (1.8-9.1) [718]	11.3 (11.0-11.4) [718]	PDN Tank, Mid
55	02/17/12 08:04	02/18/12 08:02	3	flow blocked with plugged magnetite	12.2 (0.0-19.9) [720]	Aeration Tank, Beg.	5.5 (2.1-9.3) [720]	11.2 (10.8-11.6) [720]	PDN Tank, Mid
56	02/18/12 08:04	02/19/12 08:02	3	Drain Post-Anox tank and remove 90's	16.4 (0.0-18.9) [720]	Aeration Tank, Beg.	4.0 (2.7-10.5) [720]	11.1 (10.6-11.4) [720]	PDN Tank, Mid
57	02/19/12 08:04	02/20/12 08:02	3		11.7 (0.0-20.2) [720]	Aeration Tank, Beg.	4.4 (3.7-8.4) [720]	10.8 (10.3-11.2) [720]	PDN Tank, Mid
58	02/20/12 08:04	02/21/12 08:02	3	Lost Biomass through faulty valve	10.6 (0.0-20.1) [720]	Aeration Tank, Beg.	6.8 (0.1-9.5) [719]	10.8 (10.2-11.1) [719]	PDN Tank, Mid
59	02/21/12 08:04	02/22/12 08:02	3		9.5 (0.0-23.1) [720]	Aeration Tank, Beg.	4.2 (0.9-9.0) [720]	10.8 (10.2-11.2) [720]	PDN Tank, Mid
60	02/22/12 08:04	02/23/12 08:02	3	Lost biomass with loose RAS line	5.9 (0.0-9.7) [720]	Aeration Tank, Beg.	6.9 (0.0-8.9) [636]	11.5 (4.5-12.5) [718]	PDN Tank, Mid
61	02/23/12 08:04	02/24/12 08:02	3		9.6 (2.9-10.9) [720]	Aeration Tank, Beg.	4.8 (2.3-7.6) [720]	11.3 (10.7-11.8) [720]	PDN Tank, Mid
62	02/24/12 08:04	02/25/12 08:02	3	Install new RAS #2 Pump, Baffle on PC	12.3 (0.0-14.3) [720]	Aeration Tank, Beg.	5.2 (0.8-9.1) [720]	10.8 (8.7-11.3) [720]	PDN Tank, Mid
63	02/25/12 08:04	02/26/12 08:02	3	foam apparent	8.4 (0.0-25.3) [720]	Aeration Tank, Beg.	6.4 (5.5-9.1) [720]	9.8 (8.7-10.1) [720]	PDN Tank, Mid
64	02/26/12 08:04	02/27/12 08:02	3	foaming on surface of reactor	15.8 (3.7-18.6) [720]	Aeration Tank, Beg.	4.4 (1.6-9.3) [720]	10.2 (9.1-10.5) [720]	PDN Tank, Mid
65	02/27/12 08:04	02/28/12 08:02	3	Reduce flow to decrease F:M	6.5 (0.0-18.4) [720]	Aeration Tank, Beg.	10.1 (1.4-10.1) [719]	10.9 (9.9-10.9) [719]	PDN Tank, Mid
66	02/28/12 08:04	02/29/12 08:02	3	defoam surface by hand	8.1 (0.0-9.1) [720]	Aeration Tank, Beg.	10.1 (10.1-10.1) [720]	10.9 (10.9-10.9) [720]	PDN Tank, Mid
67	02/29/12 08:04	03/01/12 08:02	3	meeting, plan to increase flow	7.3 (0.0-8.7) [720]	Aeration Tank, Beg.	10.1 (10.1-10.1) [180]	10.9 (10.9-10.9) [180]	PDN Tank, Mid
68	03/01/12 08:04	03/02/12 08:02	3	little foam observed	7.2 (0.0-11.0) [720]	Aeration Tank, Beg.	No Data [0]	No Data [0]	PDN Tank, Mid
69	03/02/12 08:04	03/03/12 08:01	3	adding defoamer	11.6 (0.0-12.6) [720]	Aeration Tank, Beg.	12.0 (12.0-12.0) [570]	1.5 (0.0-4.2) [341]	PDN Tank, Mid
70	03/03/12 08:03	03/04/12 08:01	3		8.4 (0.0-11.7) [720]	Aeration Tank, Beg.	4.0 (0.1-12.0) [720]	8.7 (4.2-8.9) [720]	PDN Tank, Mid
71	03/04/12 08:03	03/05/12 08:01	3		7.3 (5.0-8.2) [720]	Aeration Tank, Beg.	4.9 (4.4-6.9) [720]	9.5 (8.8-9.8) [720]	PDN Tank, Mid
72	03/05/12 08:03	03/06/12 08:01	3	leak in RAS line - lost unknow V ML	8.7 (0.0-22.4) [720]	Aeration Tank, Beg.	3.6 (1.5-6.5) [710]	9.3 (6.7-9.8) [710]	PDN Tank, Mid
73	03/06/12 08:03	03/07/12 08:04	3		8.3 (5.9-10.5) [720]	Aeration Tank, Beg.	0.7 (0.0-4.1) [680]	9.9 (8.8-10.1) [720]	PDN Tank, Mid
74	03/07/12 08:06	03/08/12 08:04	3	Filaments confirmed	10.0 (0.0-39.2) [720]	Aeration Tank, Beg.	2.8 (0.0-11.8) [718]	10.8 (9.6-11.1) [718]	PDN Tank, Mid
75	03/08/12 08:06	03/09/12 08:04	3	Summary of FEB-MAR Filaments	0.0 (0.0-9.6) [720]	Aeration Tank, Beg.	11.0 (3.3-12.0) [719]	11.6 (5.0-17.4) [719]	PDN Tank, Mid
76	03/09/12 08:06	03/10/12 08:04	3	Refill with Hampton ML	7.4 (0.0-25.1) [720]	Aeration Tank, Beg.	2.4 (0.0-12.0) [708]	10.4 (4.5-10.7) [720]	PDN Tank, Mid
77	03/10/12 08:06	03/11/12 08:04	3		9.3 (0.0-10.5) [720]	Aeration Tank, Beg.	4.2 (2.8-7.1) [720]	10.1 (9.5-10.2) [720]	PDN Tank, Mid
78	03/11/12 08:06	03/12/12 08:04	3	Foam on aeration tank, defoamer	0.0 (0.0-10.0) [720]	Aeration Tank, Beg.	4.7 (0.5-8.2) [720]	10.7 (9.6-10.9) [720]	PDN Tank, Mid
79	03/12/12 08:06	03/13/12 08:04	3	defoamer	7.9 (0.0-36.3) [720]	Aeration Tank, Beg.	0.1 (0.0-0.6) [719]	11.4 (10.4-11.7) [719]	PDN Tank, Mid
80	03/13/12 08:06	03/14/12 08:04	3	defoamer	6.0 (0.0-36.2) [720]	Aeration Tank, Beg.	2.6 (0.2-4.2) [720]	11.6 (10.7-12.3) [720]	PDN Tank, Mid
81	03/14/12 08:06	03/15/12 08:04	3	defoamer	7.5 (0.0-13.2) [720]	Aeration Tank, Beg.	3.4 (0.5-9.0) [717]	11.1 (10.7-11.3) [717]	PDN Tank, Mid
82	03/15/12 08:06	03/16/12 08:04	3	defoamer, high head loss, scour pipes	10.3 (0.0-15.6) [720]	Aeration Tank, Beg.	5.3 (3.6-8.8) [720]	11.0 (10.6-11.3) [720]	PDN Tank, Mid
83	03/16/12 08:06	03/17/12 08:04	3	defoamer off	10.5 (0.0-13.7) [720]	Aeration Tank, Beg.	4.0 (2.1-5.8) [720]	11.3 (10.6-11.4) [720]	PDN Tank, Mid
84	03/17/12 08:06	03/18/12 08:03	3	defoamer on again	11.6 (0.0-13.3) [720]	Aeration Tank, Beg.	3.2 (1.6-5.8) [689]	11.6 (10.9-11.9) [689]	PDN Tank, Mid
85	03/18/12 08:05	03/19/12 08:03	3		11.9 (0.0-12.6) [720]	Aeration Tank, Beg.	3.6 (2.5-5.7) [720]	12.0 (10.9-12.4) [720]	PDN Tank, Mid

	E	F	G	H	I	R	S	T	U
1	Start	End	Phase	Notes	Influent Flow to Reactor (gpm)	Probe #1 Location	Probe #1 Dissolved Oxygen (ppm)	Probe #1 Temperature (°C)	Probe #2 Location
86	03/19/12 08:05	03/20/12 08:03	3	Started Chlorine Feed	5.8 (0.0-16.1) [720]	Aeration Tank, Beg.	4.6 (0.6-7.4) [718]	12.5 (11.4-13.1) [718]	PDN Tank, Mid
87	03/20/12 08:05	03/21/12 08:03	3		8.4 (0.0-12.4) [720]	Aeration Tank, Beg.	4.9 (3.4-6.3) [720]	13.0 (12.1-13.3) [720]	PDN Tank, Mid
88	03/21/12 08:05	03/22/12 08:03	3	Increased Cl2 feed	6.2 (0.0-10.7) [720]	Aeration Tank, Beg.	3.4 (1.0-6.5) [718]	13.9 (9.0-14.3) [718]	PDN Tank, Mid
89	03/22/12 08:05	03/23/12 08:03	3		7.3 (0.0-9.2) [720]	Aeration Tank, Beg.	3.5 (1.8-7.7) [720]	14.1 (13.3-14.7) [720]	PDN Tank, Mid
90	03/23/12 08:05	03/24/12 08:03	3		9.6 (0.0-13.1) [720]	Aeration Tank, Beg.	3.8 (2.7-6.3) [720]	13.4 (12.2-14.2) [720]	PDN Tank, Mid
91	03/24/12 08:05	03/25/12 08:03	3		11.0 (9.6-13.3) [720]	Aeration Tank, Beg.	4.3 (2.7-6.7) [720]	12.5 (12.0-12.8) [720]	PDN Tank, Mid
92	03/25/12 08:05	03/26/12 08:03	3		14.7 (8.7-17.3) [720]	Aeration Tank, Beg.	3.3 (1.8-5.8) [720]	12.3 (11.8-12.6) [720]	PDN Tank, Mid
93	03/26/12 08:05	03/27/12 08:05	3	Reduced Cl2 Dose, still have foam	14.1 (0.0-15.7) [720]	Aeration Tank, Beg.	1.6 (0.1-3.3) [719]	11.9 (11.3-12.5) [719]	PDN Tank, Mid
94	03/27/12 08:07	03/28/12 08:05	3	Purge magnetite from lines	0.0 (0.0-14.2) [720]	Aeration Tank, Beg.	6.7 (0.4-10.0) [720]	12.1 (9.9-12.8) [720]	PDN Tank, Mid
95	03/28/12 08:07	03/29/12 08:05	3	defoamer still on	11.0 (0.0-18.2) [720]	Aeration Tank, Beg.	4.2 (1.1-5.9) [718]	12.8 (8.4-13.0) [718]	PDN Tank, Mid
96	03/29/12 08:07	03/30/12 08:05	3		0.0 (0.0-14.3) [720]	Aeration Tank, Beg.	4.6 (0.0-7.4) [529]	12.4 (11.4-12.7) [720]	PDN Tank, Mid
97	03/30/12 08:07	03/31/12 08:05	3	Started polymer, stopped Cl2	7.7 (0.0-15.2) [720]	Aeration Tank, Beg.	7.7 (2.5-9.6) [720]	12.2 (11.4-12.5) [720]	PDN Tank, Mid
98	03/31/12 08:07	04/01/12 08:05	3	Used Polymer for tour	0.0 (0.0-8.4) [720]	Aeration Tank, Beg.	7.9 (5.5-10.2) [720]	12.2 (11.4-12.7) [720]	PDN Tank, Mid
99	04/01/12 08:07	04/02/12 08:05	3		0.0 (0.0-7.3) [720]	Aeration Tank, Beg.	8.2 (1.5-10.7) [720]	12.0 (11.4-12.5) [720]	PDN Tank, Mid
100	04/02/12 08:07	04/03/12 08:05	3		6.6 (0.0-36.3) [720]	Aeration Tank, Beg.	7.8 (1.7-9.0) [720]	12.7 (11.7-13.1) [720]	PDN Tank, Mid
101	04/03/12 08:07	04/04/12 08:05	3	installed weir in wall	11.1 (0.0-13.3) [720]	Aeration Tank, Beg.	10.5 (7.1-11.1) [220]	12.2 (12.0-12.9) [220]	PDN Tank, Mid
102	04/04/12 08:07	04/05/12 08:05	3		23.9 (0.0-25.0) [720]	Aeration Tank, Beg.	No Data [0]	No Data [0]	PDN Tank, Mid
103	04/05/12 08:07	04/06/12 08:05	3	Installed surface skimmer	9.2 (0.0-15.1) [720]	Aeration Tank, Beg.	No Data [0]	No Data [0]	PDN Tank, Mid
104	04/06/12 08:07	04/07/12 08:05	3	Shut off defoamer	13.5 (0.0-14.4) [720]	Aeration Tank, Beg.	No Data [0]	No Data [0]	PDN Tank, Mid
105	04/07/12 08:07	04/08/12 08:05	3		8.3 (5.6-15.1) [720]	Aeration Tank, Beg.	No Data [0]	No Data [0]	PDN Tank, Mid
106	04/08/12 08:07	04/09/12 08:05	3		8.3 (5.1-33.6) [720]	Aeration Tank, Beg.	No Data [0]	No Data [0]	PDN Tank, Mid
107	04/09/12 08:07	04/10/12 08:05	3	Mixers started	11.3 (0.0-24.2) [720]	Aeration Tank, Beg.	No Data [0]	No Data [0]	PDN Tank, Mid
108	04/10/12 08:07	04/11/12 08:05	3	no magnetite addition - resuspended	13.4 (0.0-18.0) [720]	Aeration Tank, Beg.	No Data [0]	No Data [0]	PDN Tank, Mid
109	04/11/12 08:07	04/12/12 08:05	3	Add EPIC 58 Coagulant	15.2 (0.0-23.6) [720]	Aeration Tank, Beg.	6.1 (3.7-8.4) [494]	14.1 (13.3-14.7) [494]	PDN Tank, Mid
110	04/12/12 08:07	04/13/12 08:05	3		16.3 (0.0-22.4) [720]	Aeration Tank, Beg.	4.1 (0.2-9.5) [719]	14.1 (13.2-14.4) [719]	PDN Tank, Mid
111	04/13/12 08:07	04/14/12 08:05	3		11.4 (0.0-18.6) [720]	Aeration Tank, Beg.	5.7 (2.6-8.8) [720]	14.4 (13.3-14.7) [720]	PDN Tank, Mid
112	04/14/12 08:07	04/15/12 08:05	3		9.8 (0.0-11.2) [720]	Aeration Tank, Beg.	7.5 (6.8-10.0) [720]	14.6 (13.7-15.0) [720]	PDN Tank, Mid
113	04/15/12 08:07	04/16/12 08:05	3		10.3 (0.0-12.4) [720]	Aeration Tank, Beg.	8.5 (7.3-10.1) [720]	15.3 (14.4-15.8) [720]	PDN Tank, Mid
114	04/16/12 08:07	04/17/12 08:05	3	Purge magnetite from lines	12.8 (0.0-18.6) [720]	Aeration Tank, Beg.	7.1 (3.9-9.9) [720]	15.7 (15.0-16.3) [720]	PDN Tank, Mid
115	04/17/12 08:07	04/18/12 08:05	3		10.4 (0.0-12.0) [720]	Aeration Tank, Beg.	8.5 (7.7-10.2) [720]	16.0 (15.0-16.9) [720]	PDN Tank, Mid
116	04/18/12 08:07	04/19/12 08:05	3	Stared Chlorine, New RAS pump	11.4 (0.0-12.7) [720]	Aeration Tank, Beg.	7.6 (0.0-9.5) [710]	15.1 (11.4-15.7) [718]	PDN Tank, Mid
117	04/19/12 08:07	04/20/12 08:05	3	Dilution water to BM at 1:1 ratio	9.7 (0.0-10.9) [720]	Aeration Tank, Beg.	6.7 (0.0-8.6) [716]	15.4 (14.4-15.8) [720]	PDN Tank, Mid
118	04/20/12 08:07	04/21/12 08:05	3		10.6 (0.0-11.5) [720]	Aeration Tank, Beg.	5.1 (0.0-7.9) [715]	15.9 (14.9-16.4) [719]	PDN Tank, Mid
119	04/21/12 08:07	04/22/12 08:05	3		8.9 (7.0-10.1) [720]	Aeration Tank, Beg.	5.8 (4.8-8.1) [720]	16.0 (14.9-16.1) [720]	PDN Tank, Mid
120	04/22/12 08:07	04/23/12 08:05	3		6.7 (0.0-9.3) [720]	Aeration Tank, Beg.	8.3 (7.0-10.7) [720]	14.7 (11.5-15.2) [720]	PDN Tank, Mid
121	04/23/12 08:07	04/24/12 08:05	3	Increased chlorine	7.8 (0.0-9.3) [720]	Aeration Tank, Beg.	5.8 (1.0-10.8) [720]	13.0 (11.4-13.4) [720]	PDN Tank, Mid
122	04/24/12 08:07	04/25/12 08:05	3	Shut off Chlorine, start polymer	8.6 (0.0-11.0) [720]	Aeration Tank, Beg.	3.7 (0.0-5.7) [679]	13.7 (11.7-14.1) [718]	PDN Tank, Mid
123	04/25/12 08:07	04/26/12 08:05	3	CLA#1, dilution water, end polymer	6.9 (0.0-9.4) [720]	Aeration Tank, Beg.	4.7 (0.0-8.5) [710]	13.9 (10.9-14.6) [718]	PDN Tank, Mid
124	04/26/12 08:07	04/27/12 08:05	3	dilution water at 10-11 gpm	7.3 (0.0-8.6) [720]	Aeration Tank, Beg.	6.1 (4.3-8.5) [720]	13.9 (13.2-14.5) [720]	PDN Tank, Mid
125	04/27/12 08:07	04/28/12 08:05	4	Start EXP #2 (Max Month),dilution water at 10-11 gpm	5.0 (0.0-7.6) [720]	Aeration Tank, Beg.	7.2 (3.9-9.1) [720]	13.6 (12.4-14.4) [720]	PDN Tank, Mid
126	04/28/12 08:07	04/29/12 08:05	4	dilution water at 10-11 gpm	4.0 (3.3-5.1) [720]	Aeration Tank, Beg.	7.4 (6.1-9.2) [720]	13.7 (12.4-14.1) [720]	PDN Tank, Mid
127	04/29/12 08:07	04/30/12 08:05	4	dilution water at 10-11 gpm	6.6 (0.0-8.3) [720]	Aeration Tank, Beg.	6.3 (5.5-9.0) [720]	13.7 (13.2-14.4) [720]	PDN Tank, Mid

	E	F	G	H	I	R	S	T	U
1	Start	End	Phase	Notes	Influent Flow to Reactor (gpm)	Probe #1 Location	Probe #1 Dissolved Oxygen (ppm)	Probe #1 Temperature (°C)	Probe #2 Location
128	04/30/12 08:07	05/01/12 08:05	4	dilution water at 10-11 gpm	7.1 (0.0-10.6) [720]	Aeration Tank, Beg.	4.6 (3.3-6.3) [720]	14.1 (13.3-14.6) [720]	PDN Tank, Mid
129	05/01/12 08:07	05/02/12 08:05	4	dilution water at 10-11 gpm	7.3 (0.0-10.8) [720]	Aeration Tank, Beg.	6.5 (4.5-8.2) [719]	13.7 (13.5-13.8) [719]	PDN Tank, Mid
130	05/02/12 08:07	05/03/12 08:05	4	End Max Month, Add N'fers	5.0 (0.0-8.7) [720]	Aeration Tank, Beg.	6.5 (0.9-7.8) [718]	14.7 (10.9-15.0) [718]	PDN Tank, Mid
131	05/03/12 08:07	05/04/12 08:05	5	Cut wall in PA tank, Add N'fers	2.3 (0.0-19.9) [720]	Aeration Tank, Beg.	7.5 (1.2-8.7) [719]	14.7 (14.5-14.9) [719]	PDN Tank, Mid
132	05/04/12 08:07	05/05/12 08:05	5	Add N'fers, open PA tank	3.0 (0.0-8.7) [720]	Aeration Tank, Beg.	8.7 (5.0-9.5) [720]	15.5 (0.2-15.6) [720]	PDN Tank, Mid
133	05/05/12 08:07	05/06/12 08:05	5		5.3 (0.0-11.9) [720]	Aeration Tank, Beg.	8.9 (8.2-9.6) [719]	16.1 (15.5-16.5) [719]	PDN Tank, Mid
134	05/06/12 08:07	05/07/12 08:05	5		2.9 (0.0-8.2) [720]	Aeration Tank, Beg.	9.1 (8.9-9.6) [720]	15.8 (15.3-16.1) [720]	PDN Tank, Mid
135	05/07/12 08:07	05/08/12 08:05	5	Add N'fers from Sturbridge, foaming	2.4 (0.0-5.8) [720]	Aeration Tank, Beg.	8.7 (6.4-9.3) [720]	16.3 (15.4-16.8) [720]	PDN Tank, Mid
136	05/08/12 08:07	05/09/12 08:05	5	Add lime to inlet, N'fers from Sturbridge	5.0 (0.0-7.3) [720]	Aeration Tank, Beg.	6.1 (3.4-8.6) [719]	15.3 (15.1-16.0) [719]	PDN Tank, Mid
137	05/09/12 08:07	05/10/12 08:05	5		6.8 (0.0-9.1) [720]	Aeration Tank, Beg.	6.2 (0.0-8.9) [716]	15.6 (12.0-15.7) [717]	PDN Tank, Mid
138	05/10/12 08:07	05/11/12 08:05	5		5.9 (0.0-10.5) [720]	Aeration Tank, Beg.	6.5 (4.3-9.1) [720]	15.3 (14.3-15.6) [720]	PDN Tank, Mid
139	05/11/12 08:07	05/12/12 08:05	5		12.5 (0.0-14.0) [720]	Aeration Tank, Beg.	3.8 (0.0-7.2) [710]	14.8 (14.1-15.2) [720]	PDN Tank, Mid
140	05/12/12 08:07	05/13/12 08:05	5		11.0 (9.0-12.1) [720]	Aeration Tank, Beg.	3.0 (2.3-6.7) [720]	15.5 (14.1-15.9) [720]	PDN Tank, Mid
141	05/13/12 08:07	05/14/12 08:05	5	Start Anoxic recycle	9.8 (0.0-11.4) [720]	Aeration Tank, Beg.	2.2 (0.0-6.0) [714]	15.8 (14.9-16.2) [720]	PDN Tank, Mid
142	05/14/12 08:07	05/15/12 08:05	6		9.1 (0.0-22.6) [720]	Aeration Tank, Beg.	4.5 (0.0-6.3) [704]	15.9 (15.4-16.0) [720]	PDN Tank, Mid
143	05/15/12 08:07	05/16/12 08:17	6		13.9 (0.0-16.3) [720]	Aeration Tank, Beg.	4.6 (2.3-6.9) [719]	16.3 (15.8-16.8) [719]	PDN Tank, Mid
144	05/16/12 08:19	05/17/12 08:17	6		14.0 (0.0-15.5) [720]	Aeration Tank, Beg.	4.7 (3.5-6.9) [718]	16.4 (13.3-16.6) [718]	PDN Tank, Mid
145	05/17/12 08:19	05/18/12 08:17	6		13.9 (10.8-16.2) [720]	Aeration Tank, Beg.	5.0 (4.2-7.0) [720]	16.2 (15.3-17.1) [720]	PDN Tank, Mid
146	05/18/12 08:19	05/19/12 08:17	6		11.8 (0.0-17.3) [720]	Aeration Tank, Beg.	6.6 (3.3-8.7) [720]	16.2 (15.3-17.1) [720]	PDN Tank, Mid
147	05/19/12 08:19	05/20/12 08:17	6		5.5 (4.2-11.2) [720]	Aeration Tank, Beg.	7.7 (7.3-8.7) [720]	16.7 (15.6-17.4) [720]	PDN Tank, Mid
148	05/20/12 08:19	05/21/12 08:17	6		10.3 (0.0-14.3) [720]	Aeration Tank, Beg.	6.3 (5.3-8.6) [720]	16.6 (15.9-17.5) [720]	PDN Tank, Mid
149	05/21/12 08:19	05/22/12 08:17	6	CWT Changed process - wiers, DO probe, etc	11.4 (0.0-15.5) [720]	Pre_anoxic	6.7 (0.0-9.8) [540]	17.1 (16.0-17.4) [718]	PDN Tank, Mid
150	05/22/12 08:19	05/23/12 08:18	6		11.7 (0.0-13.9) [720]	Pre_anoxic	No Data [0]	17.1 (16.6-17.3) [719]	PDN Tank, Mid
151	05/23/12 08:20	05/24/12 08:18	6		11.1 (0.0-16.8) [720]	Pre_anoxic	No Data [0]	17.2 (5.5-18.0) [718]	PDN Tank, Mid
152	05/24/12 08:20	05/25/12 08:18	7	Install new wier plate on CLA#2	6.4 (0.0-10.8) [720]	Pre_anoxic	0.3 (0.0-0.7) [63]	17.9 (16.6-18.1) [719]	PDN Tank, Mid
153	05/25/12 08:20	05/26/12 08:18	7		6.2 (0.0-10.6) [720]	Aeration Tank, Beg.	7.3 (2.4-8.1) [460]	18.1 (17.4-18.2) [719]	PDN Tank, Mid
154	05/26/12 08:20	05/27/12 08:18	7		3.5 (2.1-5.8) [720]	Aeration Tank, Beg.	7.4 (7.2-8.4) [720]	19.6 (18.1-19.9) [720]	PDN Tank, Mid
155	05/27/12 08:20	05/28/12 08:18	7	Foam on surface	11.2 (3.0-30.4) [720]	Aeration Tank, Beg.	7.0 (6.7-8.4) [720]	18.8 (18.0-19.3) [720]	PDN Tank, Mid
156	05/28/12 08:20	05/29/12 08:18	7		9.2 (8.1-10.4) [720]	Aeration Tank, Beg.	6.9 (5.7-8.1) [720]	18.6 (18.0-19.2) [720]	PDN Tank, Mid
157	05/29/12 08:20	05/30/12 08:18	7	Foam on surface	8.1 (0.0-30.9) [720]	Aeration Tank, Beg.	6.9 (4.4-8.3) [720]	17.9 (17.6-18.1) [720]	PDN Tank, Mid
158	05/30/12 08:20	05/31/12 08:18	7		11.5 (0.0-21.3) [720]	Aeration Tank, Beg.	6.6 (0.2-8.0) [718]	18.3 (17.7-18.5) [718]	PDN Tank, Mid
159	05/31/12 08:20	06/01/12 08:18	7		15.6 (0.0-24.0) [720]	Aeration Tank, Beg.	5.4 (2.8-7.3) [719]	19.3 (18.1-19.9) [719]	PDN Tank, Mid
160	06/01/12 08:20	06/02/12 08:18	7	2 hr, mid level stress test	10.8 (0.0-22.6) [720]	Aeration Tank, Beg.	6.1 (2.3-7.7) [719]	19.0 (18.4-19.6) [719]	PDN Tank, Mid
161	06/02/12 08:20	06/03/12 08:18	7		8.0 (0.0-31.2) [720]	Aeration Tank, Beg.	8.3 (7.4-8.8) [720]	18.1 (17.7-18.4) [720]	PDN Tank, Mid
162	06/03/12 08:20	06/04/12 08:18	7	thick foam on surface	9.3 (0.0-18.6) [720]	Aeration Tank, Beg.	8.4 (7.6-9.1) [720]	17.7 (16.9-17.9) [720]	PDN Tank, Mid
163	06/04/12 08:20	06/05/12 08:18	7		18.1 (0.0-40.0) [720]	Aeration Tank, Beg.	5.0 (2.1-8.3) [720]	16.5 (16.1-16.9) [720]	PDN Tank, Mid
164	06/05/12 08:20	06/06/12 08:18	7	2 hr, peak level stress test	12.2 (0.0-29.3) [720]	Aeration Tank, Beg.	4.6 (2.2-6.8) [719]	16.7 (16.1-16.9) [719]	PDN Tank, Mid
165	06/06/12 08:20	06/07/12 08:18	7		12.7 (0.0-18.5) [720]	Aeration Tank, Beg.	6.3 (1.1-7.6) [718]	17.3 (6.5-17.7) [718]	PDN Tank, Mid
166	06/07/12 08:20	06/08/12 08:18	7	6 hr, peak level stress test	13.9 (0.0-16.1) [720]	Aeration Tank, Beg.	6.6 (3.0-8.2) [720]	17.7 (17.0-18.1) [720]	PDN Tank, Mid
167	06/08/12 08:20	06/09/12 08:18	7		11.6 (0.0-13.2) [720]	Aeration Tank, Beg.	6.7 (1.1-8.8) [720]	18.2 (17.2-18.6) [720]	PDN Tank, Mid
168	06/09/12 08:20	06/10/12 08:18	7		9.7 (0.0-13.7) [720]	Aeration Tank, Beg.	8.1 (6.6-8.8) [720]	19.4 (17.9-20.7) [720]	PDN Tank, Mid
169	06/10/12 08:20	06/11/12 08:18	7		18.9 (9.1-20.1) [720]	Aeration Tank, Beg.	6.0 (5.7-8.5) [720]	17.9 (17.2-18.9) [720]	PDN Tank, Mid

	E	F	G	H	I	R	S	T	U
1	Start	End	Phase	Notes	Influent Flow to Reactor (gpm)	Probe #1 Location	Probe #1 Dissolved Oxygen (ppm)	Probe #1 Temperature (°C)	Probe #2 Location
170	06/11/12 08:20	06/12/12 08:18	7	KMnO4 leak into primary tank	17.5 (0.0-19.6) [720]	Aeration Tank, Beg.	2.5 (1.2-8.1) [720]	18.0 (17.2-18.4) [720]	PDN Tank, Mid
171	06/12/12 08:20	06/13/12 08:18	7		16.4 (0.0-32.4) [720]	Aeration Tank, Beg.	5.1 (1.3-7.1) [719]	18.6 (17.6-19.0) [719]	PDN Tank, Mid
172	06/13/12 08:20	06/14/12 08:18	7	24 hr, peak level stress test	15.4 (0.0-28.5) [720]	Aeration Tank, Beg.	6.5 (1.7-7.8) [717]	18.4 (7.0-18.5) [717]	PDN Tank, Mid
173	06/14/12 08:20	06/15/12 08:18	7	End 24 hour stress flow at 10:50 am	13.7 (0.0-19.9) [720]	Aeration Tank, Beg.	4.4 (2.1-6.9) [719]	17.8 (16.7-18.7) [719]	PDN Tank, Mid
174	06/15/12 08:20	06/16/12 08:18	7		17.5 (0.0-18.7) [720]	Aeration Tank, Beg.	2.3 (1.1-7.0) [720]	18.4 (16.8-19.1) [720]	PDN Tank, Mid
175	06/16/12 08:20	06/17/12 08:18	7		15.4 (9.2-17.7) [720]	Aeration Tank, Beg.	3.4 (1.8-6.2) [720]	18.0 (17.4-18.3) [720]	PDN Tank, Mid
176	06/17/12 08:20	06/18/12 08:18	7		18.5 (0.0-20.6) [720]	Aeration Tank, Beg.	2.9 (1.7-6.6) [720]	18.2 (17.4-18.9) [720]	PDN Tank, Mid
177	06/18/12 08:20	06/19/12 08:18	7		15.7 (0.0-18.0) [720]	Aeration Tank, Beg.	3.0 (1.0-7.5) [719]	18.7 (17.7-19.3) [719]	PDN Tank, Mid
178	06/19/12 08:20	06/20/12 08:18	7		12.7 (0.0-15.2) [720]	Aeration Tank, Beg.	4.7 (1.7-7.7) [719]	19.6 (18.1-19.7) [719]	PDN Tank, Mid
179	06/20/12 08:20	06/21/12 08:18	8	began NH4-OH feed to BM inlet	13.3 (0.0-14.6) [720]	Aeration Tank, Beg.	3.8 (1.5-6.4) [718]	20.7 (6.4-21.4) [718]	PDN Tank, Mid
180	06/21/12 08:20	06/22/12 08:18	8		13.2 (0.0-15.3) [720]	Aeration Tank, Beg.	2.9 (1.8-4.7) [718]	20.8 (18.5-21.8) [718]	PDN Tank, Mid
181	06/22/12 08:20	06/23/12 08:18	8	began NH4-OH feed to primary effluent	19.6 (0.0-22.9) [720]	Aeration Tank, Beg.	3.1 (1.1-5.7) [720]	20.9 (19.9-21.6) [720]	PDN Tank, Mid
182	06/23/12 08:20	06/24/12 08:18	8		19.4 (0.0-24.8) [720]	Aeration Tank, Beg.	3.9 (1.6-6.5) [720]	20.4 (19.4-20.9) [720]	PDN Tank, Mid
183	06/24/12 08:20	06/25/12 08:18	8		10.0 (6.0-23.5) [720]	Aeration Tank, Beg.	5.3 (4.7-6.5) [720]	20.7 (19.4-21.2) [720]	PDN Tank, Mid
184	06/25/12 08:20	06/26/12 08:18	8		10.5 (0.0-16.1) [720]	Aeration Tank, Beg.	1.9 (0.0-8.2) [720]	20.2 (19.6-20.6) [720]	PDN Tank, Mid
185	06/26/12 08:20	06/27/12 08:17	8		14.9 (0.0-16.4) [720]	Aeration Tank, Beg.	5.3 (2.9-7.2) [718]	19.7 (19.0-20.1) [718]	PDN Tank, Mid
186	06/27/12 08:19	06/28/12 08:17	8	Start TN<8 at elevated influent NH3	8.3 (0.0-15.4) [720]	Aeration Tank, Beg.	5.2 (0.0-6.5) [703]	20.3 (18.9-20.5) [717]	PDN Tank, Mid
187	06/28/12 08:19	06/29/12 08:17	8		10.1 (0.0-17.9) [720]	Aeration Tank, Beg.	2.7 (0.1-8.6) [720]	20.9 (20.2-21.5) [720]	PDN Tank, Mid
188	06/29/12 08:19	06/30/12 08:17	8		6.2 (0.0-15.1) [720]	Aeration Tank, Beg.	5.1 (3.2-6.5) [719]	21.9 (20.2-22.0) [719]	PDN Tank, Mid
189	06/30/12 08:19	07/01/12 08:17	8		1.7 (0.0-3.3) [720]	Aeration Tank, Beg.	6.1 (5.7-6.6) [720]	24.2 (22.0-24.4) [720]	PDN Tank, Mid
190	07/01/12 08:19	07/02/12 08:17	8		10.3 (0.0-20.5) [720]	Aeration Tank, Beg.	4.3 (0.6-6.6) [720]	23.5 (21.5-24.5) [720]	PDN Tank, Mid
191	07/02/12 08:19	07/03/12 08:17	8		10.8 (0.0-12.9) [720]	Aeration Tank, Beg.	3.8 (1.6-6.6) [717]	22.0 (21.0-22.9) [717]	PDN Tank, Mid
192	07/03/12 08:19	07/04/12 08:17	9	Convert system to 4-stage	10.6 (0.0-16.4) [720]	Aeration Tank, Beg.	5.5 (1.8-8.5) [719]	22.1 (21.1-22.8) [719]	PDN Tank, Mid
193	07/04/12 08:19	07/05/12 08:17	9	Mixer damages surface skimmer, IR pump	8.1 (0.0-13.3) [720]	Aeration Tank, Beg.	6.1 (0.0-8.4) [482]	22.1 (20.9-23.2) [717]	PDN Tank, Mid
194	07/05/12 08:19	07/06/12 08:17	9		12.6 (0.0-16.5) [720]	Aeration Tank, Beg.	5.9 (3.8-7.9) [719]	21.6 (20.8-22.2) [719]	PDN Tank, Mid
195	07/06/12 08:19	07/07/12 08:17	9	CWT replaces surface skimmer and IR pump	15.0 (0.0-16.3) [720]	Aeration Tank, Beg.	4.7 (3.5-9.2) [719]	21.8 (20.9-22.6) [719]	PDN Tank, Mid
196	07/07/12 08:19	07/08/12 08:17	10		12.9 (0.0-14.9) [720]	Aeration Tank, Beg.	6.6 (4.2-8.9) [720]	21.5 (20.9-22.1) [720]	PDN Tank, Mid
197	07/08/12 08:19	07/09/12 08:17	10		10.7 (9.6-12.5) [720]	Aeration Tank, Beg.	6.4 (5.7-7.8) [720]	21.6 (20.7-22.4) [720]	PDN Tank, Mid
198	07/09/12 08:19	07/10/12 08:17	10		9.2 (0.0-11.5) [720]	Aeration Tank, Beg.	6.4 (3.3-7.6) [718]	21.7 (20.8-22.6) [718]	PDN Tank, Mid
199	07/10/12 08:19	07/11/12 08:17	10		0.5 (0.0-11.3) [720]	Aeration Tank, Beg.	2.2 (0.0-7.8) [518]	23.2 (21.0-23.3) [717]	PDN Tank, Mid
200	07/11/12 08:19	07/12/12 08:17	10		8.0 (0.0-10.4) [720]	Aeration Tank, Beg.	2.5 (0.0-4.8) [679]	23.2 (0.0-24.0) [718]	PDN Tank, Mid
201	07/12/12 08:19	07/13/12 08:17	10		8.3 (0.0-11.9) [720]	Aeration Tank, Beg.	3.1 (2.5-5.6) [719]	23.3 (22.6-24.0) [719]	PDN Tank, Mid
202	07/13/12 08:19	07/14/12 08:17	10		11.5 (0.0-15.2) [720]	Aeration Tank, Beg.	2.2 (1.1-4.9) [719]	23.4 (22.7-23.9) [719]	PDN Tank, Mid

	F	V	W	X	Y	AB	AC	AD	AE	AF	AG
1	End	Probe #2 Dissolved Oxygen (ppm)	Probe #2 Temperature (°C)	(02,03) PRIMARY EFFLUENT SAMPLE ID	(02,03) PRIMARY EFFLUENT TSS (mg/L)	(02) PRIMARY EFFLUENT pH (SU)	(02) PRIMARY EFFLUENT Alkalinity (mg/L)	(02,03) PRIMARY EFFLUENT COD(t) (mg/L)	(02,03) PRIMARY EFFLUENT COD(s) (mg/L)	(02,03) PRIMARY EFFLUENT BOD(t) (mg/L)	(02,03) PRIMARY EFFLUENT BOD(s) (mg/L)
2	07/14/12 08:17	3.0 (0.0-12.0) [113738]	13.4 (1.7-30.0) [135526]	2-1,975 [545]	123 (31-1,555) [413]	7.10 (6.34-9.94) [152]	158 (94-218) [75]	405 (106-931) [365]	194 (87-401) [237]	214 (89-468) [103]	106 (48-180) [71]
3											
4	12/29/11 08:02	7.8 (3.4-10.0) [393]	10.8 (9.9-11.7) [393]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
5	12/30/11 08:02	3.4 (0.0-8.4) [481]	11.4 (5.3-11.8) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
6	12/31/11 08:02	0.1 (0.0-11.0) [720]	11.9 (10.4-12.2) [720]	2-2 [3]	No Data [0]	6.94-7.00 [2]	No Data [0]	493 (459-528) [3]	No Data [0]	No Data [0]	No Data [0]
7	01/01/12 08:02	5.8 (0.0-7.7) [720]	12.1 (11.8-12.3) [720]	4-4 [3]	No Data [0]	7.30-7.52 [2]	120 [1]	269 (243-360) [3]	No Data [0]	No Data [0]	No Data [0]
8	01/02/12 08:02	8.1 (7.6-8.7) [720]	12.2 (11.8-12.3) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
9	01/03/12 08:02	6.8 (5.9-8.8) [720]	11.9 (11.2-12.1) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
10	01/04/12 08:02	7.3 (5.6-9.6) [720]	11.0 (10.6-11.2) [720]	8-8 [3]	149 (68-182) [3]	No Data [0]	No Data [0]	731 (724-737) [3]	No Data [0]	No Data [0]	No Data [0]
11	01/05/12 08:02	4.0 (0.0-9.6) [714]	11.5 (8.6-11.7) [718]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
12	01/06/12 08:02	0.0 (0.0-5.9) [719]	11.8 (11.4-12.1) [719]	14-14 [3]	161 (144-179) [3]	7.19 (7.01-7.27) [3]	163 [1]	365 (364-404) [3]	No Data [0]	No Data [0]	No Data [0]
13	01/07/12 08:02	3.6 (0.0-7.5) [719]	12.1 (11.6-12.2) [719]	21-21 [3]	106 (103-118) [3]	7.24 (7.16-7.38) [3]	128 [1]	323 (310-396) [3]	No Data [0]	No Data [0]	No Data [0]
14	01/08/12 08:02	4.4 (4.0-5.7) [720]	12.4 (11.8-12.6) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
15	01/09/12 08:02	4.7 (4.1-4.9) [105]	12.1 (12.0-12.2) [105]	28-28 [3]	111 (95-117) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
16	01/10/12 08:02	7.0 (5.8-8.5) [554]	11.8 (11.6-11.9) [554]	32-32 [3]	174 (172-177) [3]	7.05 (6.84-7.17) [3]	170 [1]	509 (476-524) [3]	No Data [0]	No Data [0]	No Data [0]
17	01/11/12 08:02	7.4 (5.8-8.3) [717]	12.2 (11.7-12.4) [717]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
18	01/12/12 08:02	7.0 (3.6-8.2) [716]	12.1 (9.9-12.3) [716]	41-41 [3]	117 (117-139) [3]	7.10 (6.67-7.30) [3]	200 [1]	459 (457-505) [3]	No Data [0]	No Data [0]	No Data [0]
19	01/13/12 08:02	10.4 (7.4-10.7) [719]	9.4 (8.7-11.8) [719]	47-47 [3]	181 (178-183) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
20	01/14/12 08:02	9.7 (0.2-10.6) [719]	10.6 (9.7-10.8) [719]	52-52 [3]	174 (172-174) [3]	7.28 (7.24-7.51) [3]	No Data [0]	411 (306-413) [3]	No Data [0]	No Data [0]	No Data [0]
21	01/15/12 08:02	9.8 (9.0-11.3) [720]	10.4 (8.9-10.7) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
22	01/16/12 08:02	10.7 (10.2-11.6) [720]	9.4 (8.8-9.6) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
23	01/17/12 08:02	10.2 (9.6-11.6) [720]	10.6 (9.1-11.0) [720]	137-137 [3]	122 (117-134) [3]	7.52 (7.21-7.80) [3]	No Data [0]	212 (209-213) [3]	No Data [0]	No Data [0]	No Data [0]
24	01/18/12 08:02	8.0 (6.5-11.0) [717]	11.6 (10.8-11.7) [717]	66-66 [3]	201 (199-205) [3]	7.09 (7.06-7.10) [3]	No Data [0]	466 (458-466) [3]	No Data [0]	No Data [0]	No Data [0]
25	01/19/12 08:02	10.5 (3.3-11.9) [718]	10.8 (4.6-11.3) [718]	73-73 [3]	198 (78-200) [3]	6.96 (6.81-6.99) [3]	No Data [0]	647 (647-660) [3]	No Data [0]	No Data [0]	No Data [0]
26	01/20/12 08:02	9.3 (7.5-11.8) [720]	10.9 (9.8-11.1) [720]	79-79 [3]	213 (198-219) [3]	No Data [0]	No Data [0]	452 (452-456) [3]	No Data [0]	No Data [0]	No Data [0]
27	01/21/12 08:02	0.0 (0.0-6.8) [720]	10.3 (10.1-10.9) [720]	87-87 [3]	159 (153-160) [3]	No Data [0]	No Data [0]	439-458 [2]	No Data [0]	No Data [0]	No Data [0]
28	01/22/12 08:02	2.9 (0.0-6.4) [719]	10.3 (8.2-10.6) [719]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
29	01/23/12 08:02	5.5 (4.8-8.4) [720]	10.5 (9.7-10.6) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
30	01/24/12 08:02	3.6 (0.0-5.7) [720]	10.8 (10.5-11.4) [720]	107-107 [3]	179 (174-186) [3]	7.31 (7.22-7.32) [3]	No Data [0]	531 (525-539) [3]	No Data [0]	No Data [0]	No Data [0]
31	01/25/12 08:02	4.9 (3.0-6.1) [720]	11.6 (10.7-11.8) [720]	115-115 [3]	170 (168-171) [3]	No Data [0]	No Data [0]	657 (493-700) [3]	288 (286-297) [3]	No Data [0]	No Data [0]
32	01/26/12 08:02	5.1 (2.5-9.6) [716]	11.1 (4.5-11.3) [716]	126-126 [3]	136 (135-137) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
33	01/27/12 08:02	3.8 (2.0-8.2) [720]	11.5 (8.9-11.7) [720]	129-129 [3]	125 (122-127) [3]	6.99 (6.98-7.07) [3]	No Data [0]	378-379 [2]	No Data [0]	No Data [0]	No Data [0]
34	01/28/12 08:02	7.6 (5.9-8.6) [720]	9.1 (8.3-9.5) [720]	142-142 [3]	90 (66-103) [3]	7.25 (6.93-7.28) [3]	No Data [0]	204-208 [2]	No Data [0]	No Data [0]	No Data [0]
35	01/29/12 08:02	4.4 (0.6-7.6) [719]	10.4 (9.5-10.5) [719]	150-150 [3]	90 (80-101) [3]	No Data [0]	No Data [0]	162-176 [2]	No Data [0]	No Data [0]	No Data [0]
36	01/30/12 08:02	4.6 (3.3-8.3) [720]	10.2 (9.7-10.4) [720]	156-156 [3]	69 (66-72) [3]	No Data [0]	No Data [0]	223-226 [2]	No Data [0]	No Data [0]	No Data [0]
37	01/31/12 08:02	3.6 (0.1-8.5) [720]	10.1 (9.9-10.2) [720]	161-161 [3]	129 (123-132) [3]	No Data [0]	No Data [0]	397 [1]	No Data [0]	No Data [0]	No Data [0]
38	02/01/12 08:02	2.6 (0.0-5.2) [718]	10.7 (9.9-10.8) [718]	168-168 [3]	87 (79-95) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	89 [1]	No Data [0]
39	02/02/12 08:02	2.3 (0.1-5.4) [718]	11.2 (1.7-11.3) [718]	178-178 [4]	135 (133-137) [3]	7.10 (7.02-7.21) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
40	02/03/12 08:02	2.5 (0.0-6.0) [719]	10.9 (10.4-11.0) [719]	186-186 [3]	132 (128-136) [3]	No Data [0]	No Data [0]	152 [1]	No Data [0]	No Data [0]	No Data [0]
41	02/04/12 08:02	3.0 (1.0-4.8) [720]	10.7 (10.3-10.8) [720]	194-194 [4]	143 (143-151) [3]	No Data [0]	No Data [0]	338-371 [2]	No Data [0]	No Data [0]	No Data [0]
42	02/05/12 08:02	4.3 (2.3-7.0) [720]	10.5 (10.1-10.7) [720]	204-204 [3]	75 (65-89) [3]	No Data [0]	No Data [0]	276 [1]	No Data [0]	No Data [0]	No Data [0]
43	02/06/12 08:02	7.2 (3.3-9.7) [720]	10.1 (9.6-10.5) [720]	209-209 [3]	82 (72-89) [3]	No Data [0]	No Data [0]	340 [1]	No Data [0]	No Data [0]	No Data [0]

	F	V	W	X	Y	AB	AC	AD	AE	AF	AG
1	End	Probe #2 Dissolved Oxygen (ppm)	Probe #2 Temperature (°C)	(02,03) PRIMARY EFFLUENT SAMPLE ID	(02,03) PRIMARY EFFLUENT TSS (mg/L)	(02) PRIMARY EFFLUENT pH (SU)	(02) PRIMARY EFFLUENT Alkalinity (mg/L)	(02,03) PRIMARY EFFLUENT COD(t) (mg/L)	(02,03) PRIMARY EFFLUENT COD(s) (mg/L)	(02,03) PRIMARY EFFLUENT BOD(t) (mg/L)	(02,03) PRIMARY EFFLUENT BOD(s) (mg/L)
44	02/07/12 08:02	4.6 (0.0-8.6) [719]	11.0 (9.6-11.2) [719]	217-223 [5]	123 (97-132) [3]	7.11 (6.92-7.13) [3]	No Data [0]	393-406 [2]	No Data [0]	No Data [0]	No Data [0]
45	02/08/12 08:02	5.6 (4.0-9.2) [719]	10.9 (10.1-11.1) [719]	225-225 [4]	65 (62-66) [3]	No Data [0]	No Data [0]	320-334 [2]	No Data [0]	No Data [0]	No Data [0]
46	02/09/12 08:02	6.2 (2.4-7.3) [718]	10.7 (5.4-10.8) [718]	235-235 [3]	138 (138-149) [3]	7.24 (7.12-7.36) [3]	No Data [0]	434-441 [2]	No Data [0]	270-273 [2]	No Data [0]
47	02/10/12 08:02	3.2 (2.1-5.8) [720]	11.1 (10.5-11.2) [720]	243-243 [3]	109 (89-116) [3]	No Data [0]	No Data [0]	413-437 [2]	No Data [0]	210-215 [2]	No Data [0]
48	02/11/12 08:02	1.9 (0.4-4.6) [719]	11.1 (10.4-11.4) [719]	260-260 [3]	103 (93-118) [3]	6.87 (6.74-6.98) [3]	No Data [0]	412-418 [2]	No Data [0]	No Data [0]	No Data [0]
49	02/12/12 08:02	2.1 (1.3-3.5) [720]	10.8 (9.4-10.9) [720]	267-267 [3]	114 (86-118) [3]	No Data [0]	No Data [0]	396-397 [2]	No Data [0]	No Data [0]	No Data [0]
50	02/13/12 08:02	1.3 (0.9-3.4) [720]	9.6 (9.2-9.8) [720]	275-275 [3]	147 (135-156) [3]	No Data [0]	No Data [0]	550-571 [2]	245-245 [2]	No Data [0]	No Data [0]
51	02/14/12 08:02	5.7 (0.9-8.0) [720]	9.3 (8.7-9.7) [720]	282-282 [3]	195 (160-199) [3]	6.60 (6.59-6.82) [3]	No Data [0]	537-539 [2]	No Data [0]	No Data [0]	No Data [0]
52	02/15/12 08:02	0.5 (0.0-7.5) [719]	10.8 (8.7-11.1) [719]	295-295 [3]	202 (198-204) [3]	No Data [0]	No Data [0]	605-606 [2]	No Data [0]	No Data [0]	No Data [0]
53	02/16/12 08:02	1.0 (0.0-2.1) [718]	11.4 (4.2-11.6) [718]	306-306 [3]	134 (120-183) [3]	6.94 (6.85-7.15) [3]	160 [1]	418-435 [2]	No Data [0]	No Data [0]	No Data [0]
54	02/17/12 08:02	1.9 (0.2-4.6) [718]	11.3 (11.0-11.4) [718]	318-318 [3]	105 (95-116) [3]	No Data [0]	No Data [0]	404-424 [2]	No Data [0]	No Data [0]	No Data [0]
55	02/18/12 08:02	2.1 (0.2-5.4) [720]	11.2 (10.7-11.6) [720]	329-329 [3]	116 (107-123) [3]	No Data [0]	128 [1]	390-400 [2]	186-186 [2]	No Data [0]	No Data [0]
56	02/19/12 08:02	0.4 (0.1-10.6) [717]	11.0 (6.2-11.3) [720]	336-336 [3]	101 (92-106) [3]	No Data [0]	No Data [0]	437-449 [2]	271-272 [2]	No Data [0]	No Data [0]
57	02/20/12 08:02	0.6 (0.1-2.5) [693]	10.8 (10.1-11.0) [720]	339-339 [3]	135 (133-189) [3]	No Data [0]	No Data [0]	475-549 [2]	192-197 [2]	No Data [0]	No Data [0]
58	02/21/12 08:02	0.2 (0.0-1.2) [699]	10.2 (3.9-10.7) [719]	342-342 [3]	158 (147-197) [3]	No Data [0]	No Data [0]	445-448 [2]	223-229 [2]	No Data [0]	No Data [0]
59	02/22/12 08:02	0.2 (0.0-0.4) [40]	10.7 (9.7-11.0) [720]	348-348 [3]	205 (201-224) [3]	7.56 (7.27-7.70) [3]	182 [1]	777-793 [2]	356-361 [2]	468 [1]	No Data [0]
60	02/23/12 08:02	4.1 (0.1-6.1) [570]	11.5 (4.4-11.9) [718]	359-359 [3]	88 (85-102) [3]	No Data [0]	No Data [0]	407-410 [2]	236-236 [2]	No Data [0]	No Data [0]
61	02/24/12 08:02	2.5 (1.8-4.9) [720]	11.3 (10.7-11.7) [720]	369-369 [3]	151 (137-200) [3]	6.99 (6.78-7.04) [3]	164 [1]	483-485 [2]	229-237 [2]	246-285 [2]	121 [1]
62	02/25/12 08:02	2.3 (0.0-5.7) [720]	10.7 (8.6-11.2) [720]	379-379 [3]	143 (119-153) [3]	No Data [0]	No Data [0]	422-440 [2]	216-217 [2]	No Data [0]	No Data [0]
63	02/26/12 08:02	2.8 (1.6-5.9) [720]	9.7 (8.6-10.0) [720]	384-384 [3]	62 (58-67) [3]	No Data [0]	No Data [0]	212-216 [2]	109-109 [2]	No Data [0]	No Data [0]
64	02/27/12 08:02	0.7 (0.1-5.3) [720]	10.1 (9.0-10.4) [720]	390-395 [6]	66 (31-84) [6]	No Data [0]	No Data [0]	208 (208-209) [4]	No Data [0]	No Data [0]	No Data [0]
65	02/28/12 08:02	3.0 (0.0-5.8) [719]	11.0 (9.9-11.2) [719]	398-398 [4]	125 (124-127) [3]	No Data [0]	No Data [0]	397-398 [2]	160-161 [2]	150 (146-153) [4]	79 (76-83) [4]
66	02/29/12 08:02	3.0 (2.2-11.9) [633]	10.8 (9.4-11.0) [633]	410-410 [3]	97 (94-106) [3]	No Data [0]	No Data [0]	476-486 [2]	283-290 [2]	No Data [0]	No Data [0]
67	03/01/12 08:02	2.7 (2.5-3.3) [180]	10.7 (10.3-11.2) [180]	415-415 [4]	153 (140-155) [3]	No Data [0]	No Data [0]	435-442 [2]	211-215 [2]	280 (257-291) [4]	124 (120-132) [4]
68	03/02/12 08:02	2.8 (2.4-8.8) [636]	10.2 (4.5-10.4) [636]	425-425 [3]	91 (90-105) [3]	6.91 (6.62-7.02) [3]	162 [1]	372-373 [2]	194-198 [2]	No Data [0]	No Data [0]
69	03/03/12 08:01	0.7 (0.1-9.2) [719]	10.1 (8.5-10.5) [719]	434-434 [4]	104 (76-106) [3]	No Data [0]	No Data [0]	381-381 [2]	206-208 [2]	226 (222-233) [3]	132 (124-141) [3]
70	03/04/12 08:01	4.7 (0.4-7.5) [720]	8.8 (8.3-9.9) [720]	443-443 [3]	107 (87-110) [3]	No Data [0]	No Data [0]	427-445 [2]	248-251 [2]	No Data [0]	No Data [0]
71	03/05/12 08:01	5.6 (4.9-7.7) [720]	9.4 (8.7-9.7) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
72	03/06/12 08:01	4.5 (2.1-7.3) [710]	9.2 (6.6-9.7) [710]	449-449 [4]	96 (91-97) [3]	7.17 (7.10-7.22) [3]	No Data [0]	339-340 [2]	168-178 [2]	182 (176-214) [4]	86-93 [2]
73	03/07/12 08:04	1.3 (0.0-5.0) [720]	9.9 (8.7-10.0) [720]	459-459 [3]	100 (100-108) [3]	No Data [0]	No Data [0]	310-346 [2]	153-172 [2]	No Data [0]	No Data [0]
74	03/08/12 08:04	2.2 (0.1-11.0) [718]	10.8 (9.6-14.7) [718]	464-464 [3]	106 (102-113) [3]	No Data [0]	No Data [0]	406-459 [2]	213-275 [2]	215 (213-247) [3]	101 (97-105) [3]
75	03/09/12 08:04	10.8 (2.3-12.0) [719]	12.1 (5.5-17.2) [719]	243-475 [94]	108 (31-224) [90]	6.99 (6.59-7.70) [27]	161 (128-182) [6]	416 (208-793) [60]	212 (109-361) [42]	215 (146-468) [23]	105 (76-141) [17]
76	03/10/12 08:04	4.3 (0.0-12.0) [714]	10.0 (5.7-10.5) [720]	487-487 [3]	86 (81-86) [3]	No Data [0]	No Data [0]	285-320 [2]	107-125 [2]	152-156 [2]	No Data [0]
77	03/11/12 08:04	2.2 (0.9-6.9) [720]	10.0 (9.2-10.1) [720]	494-494 [3]	58 (49-64) [3]	No Data [0]	No Data [0]	229-235 [2]	116-122 [2]	No Data [0]	No Data [0]
78	03/12/12 08:04	2.2 (0.1-12.0) [720]	10.7 (9.5-13.5) [720]	504-504 [3]	62 (60-83) [3]	No Data [0]	No Data [0]	204-215 [2]	91-97 [2]	No Data [0]	No Data [0]
79	03/13/12 08:04	0.2 (0.1-11.5) [719]	11.4 (10.4-19.0) [719]	512-512 [3]	69 (58-79) [3]	6.88 (6.78-7.00) [3]	160 [1]	256-260 [2]	114-115 [2]	114-127 [2]	48-49 [2]
80	03/14/12 08:04	0.5 (0.0-11.3) [720]	11.7 (10.9-12.9) [720]	520-520 [3]	75 (73-76) [3]	No Data [0]	No Data [0]	254-258 [2]	129-132 [2]	124 (109-125) [3]	No Data [0]
81	03/15/12 08:04	0.7 (0.3-12.0) [717]	11.1 (7.3-11.2) [717]	535-535 [3]	106 (102-106) [3]	No Data [0]	No Data [0]	327-333 [2]	169-172 [2]	177-177 [2]	No Data [0]
82	03/16/12 08:04	2.5 (1.9-12.0) [720]	11.0 (6.7-11.2) [720]	546-546 [3]	106 (106-111) [3]	6.74 (6.34-6.75) [3]	133 [1]	355-356 [2]	170-172 [2]	No Data [0]	No Data [0]
83	03/17/12 08:04	1.2 (0.6-12.0) [720]	11.3 (6.5-11.4) [720]	554-554 [3]	104 (100-106) [3]	No Data [0]	No Data [0]	327-328 [2]	149-153 [2]	No Data [0]	No Data [0]
84	03/18/12 08:03	0.7 (0.4-12.0) [689]	11.6 (9.5-11.9) [689]	568-568 [3]	124 (123-129) [3]	No Data [0]	No Data [0]	351-373 [2]	151-155 [2]	208 (206-212) [3]	110 (98-124) [3]
85	03/19/12 08:03	0.9 (0.6-11.3) [720]	12.1 (10.9-14.1) [720]	575-575 [3]	65 (64-72) [3]	No Data [0]	No Data [0]	285-288 [2]	No Data [0]	No Data [0]	No Data [0]

	F	V	W	X	Y	AB	AC	AD	AE	AF	AG
1	End	Probe #2 Dissolved Oxygen (ppm)	Probe #2 Temperature (°C)	(02,03) PRIMARY EFFLUENT SAMPLE ID	(02,03) PRIMARY EFFLUENT TSS (mg/L)	(02) PRIMARY EFFLUENT pH (SU)	(02) PRIMARY EFFLUENT Alkalinity (mg/L)	(02,03) PRIMARY EFFLUENT COD(t) (mg/L)	(02,03) PRIMARY EFFLUENT COD(s) (mg/L)	(02,03) PRIMARY EFFLUENT BOD(t) (mg/L)	(02,03) PRIMARY EFFLUENT BOD(s) (mg/L)
86	03/20/12 08:03	3.3 (0.4-11.4) [718]	12.6 (11.6-13.1) [718]	580-580 [3]	95 (94-100) [3]	6.95 (6.82-9.94) [3]	146 [1]	305-309 [2]	127-129 [2]	165 (160-186) [3]	No Data [0]
87	03/21/12 08:03	4.2 (3.4-11.3) [720]	13.1 (12.1-14.0) [720]	592-592 [3]	109 (96-110) [3]	No Data [0]	No Data [0]	386-420 [2]	181-185 [2]	222 (218-238) [3]	106 (103-108) [3]
88	03/22/12 08:03	1.7 (0.3-4.0) [718]	14.0 (9.0-14.5) [718]	601-601 [3]	132 (132-134) [3]	6.84 (6.79-6.91) [3]	140 [1]	435-450 [2]	186-195 [2]	No Data [0]	No Data [0]
89	03/23/12 08:03	2.8 (2.1-8.4) [720]	14.3 (13.5-14.8) [720]	610-610 [3]	121 (119-127) [3]	No Data [0]	No Data [0]	412-422 [2]	194-198 [2]	No Data [0]	No Data [0]
90	03/24/12 08:03	2.5 (1.0-4.6) [720]	13.6 (12.5-14.3) [720]	620-620 [3]	135 (133-140) [3]	No Data [0]	No Data [0]	414-414 [2]	178-178 [2]	227 (225-229) [3]	104-108 [2]
91	03/25/12 08:03	3.2 (1.6-5.5) [720]	12.5 (12.2-12.7) [720]	630-630 [3]	106 (91-110) [3]	No Data [0]	No Data [0]	364-365 [2]	168-168 [2]	No Data [0]	No Data [0]
92	03/26/12 08:03	2.0 (0.5-4.3) [720]	12.3 (11.9-12.6) [720]	635-635 [3]	111 (108-113) [3]	No Data [0]	No Data [0]	300-308 [2]	162-165 [2]	No Data [0]	No Data [0]
93	03/27/12 08:05	3.0 (0.2-4.9) [719]	11.9 (11.2-12.3) [719]	642-642 [3]	129 (120-138) [3]	6.85 (6.62-6.99) [3]	140 [1]	325-330 [2]	158-162 [2]	169 (164-171) [3]	No Data [0]
94	03/28/12 08:05	5.9 (1.4-12.0) [720]	12.0 (7.9-12.6) [720]	655-655 [3]	159 (158-169) [3]	No Data [0]	No Data [0]	468-469 [2]	244-250 [2]	No Data [0]	No Data [0]
95	03/29/12 08:05	4.5 (2.5-12.0) [718]	12.8 (3.8-13.0) [718]	661-661 [3]	182 (180-194) [3]	No Data [0]	No Data [0]	407-426 [2]	226-231 [2]	No Data [0]	No Data [0]
96	03/30/12 08:05	1.8 (0.0-11.8) [702]	12.1 (7.4-12.5) [720]	669-669 [3]	172 (168-174) [3]	No Data [0]	No Data [0]	500-507 [2]	263-266 [2]	No Data [0]	No Data [0]
97	03/31/12 08:05	7.4 (1.4-9.1) [720]	12.0 (11.2-12.3) [720]	677-677 [3]	145 (143-146) [3]	No Data [0]	No Data [0]	426-427 [2]	200-202 [2]	No Data [0]	No Data [0]
98	04/01/12 08:05	8.2 (5.5-10.3) [720]	11.8 (6.4-12.4) [720]	681-681 [3]	172 (164-189) [3]	6.89 (6.63-6.94) [3]	155 [1]	494-496 [2]	233-234 [2]	No Data [0]	No Data [0]
99	04/02/12 08:05	8.2 (5.2-10.3) [720]	11.9 (11.3-12.2) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
100	04/03/12 08:05	3.2 (0.5-6.4) [720]	12.5 (11.5-12.9) [720]	694-694 [3]	148 (119-151) [3]	No Data [0]	No Data [0]	397-405 [2]	193-194 [2]	No Data [0]	No Data [0]
101	04/04/12 08:05	10.8 (4.2-12.0) [220]	14.1 (8.1-23.0) [220]	705-705 [3]	166 (160-171) [3]	No Data [0]	No Data [0]	580-665 [2]	301-330 [2]	No Data [0]	No Data [0]
102	04/05/12 08:05	No Data [0]	No Data [0]	709-715 [6]	188 (142-1,555) [6]	6.59-6.94 [2]	150-160 [2]	593 (583-612) [4]	293 (256-329) [4]	324 (321-348) [3]	No Data [0]
103	04/06/12 08:05	No Data [0]	No Data [0]	723-723 [3]	199 (196-203) [3]	No Data [0]	No Data [0]	512-551 [2]	273-284 [2]	No Data [0]	No Data [0]
104	04/07/12 08:05	No Data [0]	No Data [0]	732-732 [3]	186 (175-198) [3]	No Data [0]	No Data [0]	510-546 [2]	252-257 [2]	275 (268-282) [3]	127 (120-133) [3]
105	04/08/12 08:05	No Data [0]	No Data [0]	739-739 [3]	167 (165-169) [3]	No Data [0]	No Data [0]	466-468 [2]	266-266 [2]	No Data [0]	No Data [0]
106	04/09/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
107	04/10/12 08:05	No Data [0]	No Data [0]	745-745 [2]	225-251 [2]	6.94 [1]	160 [1]	529-537 [2]	292-293 [2]	No Data [0]	No Data [0]
108	04/11/12 08:05	No Data [0]	No Data [0]	754-754 [2]	213-237 [2]	No Data [0]	No Data [0]	587-603 [2]	349-353 [2]	No Data [0]	No Data [0]
109	04/12/12 08:05	2.4 (0.8-5.1) [494]	14.1 (13.4-14.7) [494]	764-764 [2]	174-187 [2]	No Data [0]	No Data [0]	ca!AL\$2:AL\$4212,\$C95-1	AM\$2:AM\$4212,\$C95-1	No Data [0]	No Data [0]
110	04/13/12 08:05	0.6 (0.0-4.0) [712]	14.1 (13.3-14.5) [719]	773-773 [3]	211-225 [2]	No Data [0]	No Data [0]	626-704 [2]	No Data [0]	277 (259-291) [3]	156 (150-177) [3]
111	04/14/12 08:05	3.6 (0.0-7.2) [719]	14.4 (13.4-14.8) [720]	786-786 [2]	280-300 [2]	No Data [0]	No Data [0]	778-785 [2]	325-327 [2]	No Data [0]	No Data [0]
112	04/15/12 08:05	6.1 (5.2-7.9) [720]	14.6 (13.8-15.0) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
113	04/16/12 08:05	6.8 (5.8-8.0) [720]	15.4 (14.5-15.8) [720]	794-794 [2]	144-148 [2]	No Data [0]	No Data [0]	481-572 [2]	233-234 [2]	No Data [0]	No Data [0]
114	04/17/12 08:05	0.2 (0.0-8.7) [719]	15.8 (15.1-16.4) [720]	801-801 [2]	151-168 [2]	No Data [0]	No Data [0]	425-427 [2]	193-197 [2]	No Data [0]	No Data [0]
115	04/18/12 08:05	0.8 (0.0-4.2) [720]	16.1 (15.1-17.0) [720]	808-808 [3]	178-185 [2]	6.80 [1]	No Data [0]	558-561 [2]	279-280 [2]	290 (284-292) [3]	159 (153-161) [3]
116	04/19/12 08:05	0.3 (0.0-3.1) [698]	15.2 (11.4-15.8) [718]	817-817 [2]	193-193 [2]	No Data [0]	No Data [0]	571-587 [2]	277-278 [2]	No Data [0]	No Data [0]
117	04/20/12 08:05	1.3 (0.0-4.6) [712]	15.5 (14.4-15.8) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
118	04/21/12 08:05	0.3 (0.0-3.6) [716]	15.9 (15.0-16.4) [719]	825-825 [2]	No Data [0]	No Data [0]	210 [1]	607-622 [2]	No Data [0]	No Data [0]	No Data [0]
119	04/22/12 08:05	1.1 (0.1-3.8) [720]	16.1 (15.0-16.2) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
120	04/23/12 08:05	4.2 (2.7-8.4) [720]	14.8 (11.7-15.3) [720]	830-830 [3]	157-174 [2]	7.38 [1]	178 [1]	544-579 [2]	185-276 [2]	246 (244-269) [3]	96 [1]
121	04/24/12 08:05	1.1 (0.0-8.1) [693]	13.0 (11.5-13.4) [720]	839-839 [2]	164-172 [2]	7.41 [1]	96 [1]	354-359 [2]	124-127 [2]	No Data [0]	No Data [0]
122	04/25/12 08:05	1.3 (0.0-3.3) [660]	13.7 (11.7-14.1) [718]	847-847 [2]	90-103 [2]	7.57 [1]	94 [1]	206-220 [2]	91-92 [2]	98 [1]	No Data [0]
123	04/26/12 08:05	1.2 (0.0-5.7) [638]	13.9 (10.9-14.6) [718]	857-857 [2]	123-126 [2]	No Data [0]	No Data [0]	343-345 [2]	163-165 [2]	No Data [0]	No Data [0]
124	04/27/12 08:05	4.8 (3.6-7.0) [720]	13.9 (13.2-14.5) [720]	865-865 [2]	118-120 [2]	No Data [0]	No Data [0]	329-338 [2]	152-153 [2]	No Data [0]	No Data [0]
125	04/28/12 08:05	3.3 (1.3-5.7) [720]	13.6 (12.4-14.4) [720]	872-872 [2]	108-114 [2]	7.09 [1]	144 [1]	333-340 [2]	170-177 [2]	180-187 [2]	88-91 [2]
126	04/29/12 08:05	3.0 (2.1-5.9) [720]	13.6 (12.4-14.0) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
127	04/30/12 08:05	2.4 (1.3-4.6) [720]	13.7 (13.2-14.4) [720]	882-882 [2]	104-107 [2]	No Data [0]	No Data [0]	323-323 [2]	154-157 [2]	No Data [0]	No Data [0]

	F	V	W	X	Y	AB	AC	AD	AE	AF	AG
1	End	Probe #2 Dissolved Oxygen (ppm)	Probe #2 Temperature (°C)	(02,03) PRIMARY EFFLUENT SAMPLE ID	(02,03) PRIMARY EFFLUENT TSS (mg/L)	(02) PRIMARY EFFLUENT pH (SU)	(02) PRIMARY EFFLUENT Alkalinity (mg/L)	(02,03) PRIMARY EFFLUENT COD(t) (mg/L)	(02,03) PRIMARY EFFLUENT COD(s) (mg/L)	(02,03) PRIMARY EFFLUENT BOD(t) (mg/L)	(02,03) PRIMARY EFFLUENT BOD(s) (mg/L)
128	05/01/12 08:05	0.2 (0.0-2.8) [720]	14.1 (13.2-14.6) [720]	889-889 [3]	99-101 [2]	6.89 [1]	140 [1]	320-330 [2]	148-150 [2]	166 (161-179) [3]	49 [1]
129	05/02/12 08:05	1.5 (0.1-3.0) [719]	13.7 (13.5-13.8) [719]	899-899 [3]	126-130 [2]	6.96 [1]	138 [1]	420-438 [2]	221-222 [2]	217 (207-227) [3]	112-119 [2]
130	05/03/12 08:05	1.7 (0.0-3.4) [715]	14.7 (10.8-14.9) [718]	912-912 [2]	112-112 [2]	7.10 [1]	116 [1]	305-309 [2]	144-145 [2]	164-169 [2]	72-75 [2]
131	05/04/12 08:05	7.7 (0.2-9.0) [719]	14.7 (14.4-14.9) [719]	924-924 [2]	121-122 [2]	7.27 [1]	152 [1]	387-393 [2]	214-215 [2]	No Data [0]	No Data [0]
132	05/05/12 08:05	8.0 (5.1-8.7) [720]	15.5 (14.9-15.6) [720]	934-934 [2]	308-314 [2]	7.13 [1]	190 [1]	854-882 [2]	336-339 [2]	No Data [0]	No Data [0]
133	05/06/12 08:05	8.3 (7.7-8.8) [719]	16.2 (15.5-16.5) [719]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
134	05/07/12 08:05	8.6 (8.4-8.9) [720]	15.8 (15.4-16.1) [720]	942-942 [2]	113-117 [2]	7.39 [1]	No Data [0]	210-211 [2]	118-120 [2]	No Data [0]	No Data [0]
135	05/08/12 08:05	2.7 (1.2-8.7) [720]	16.3 (15.4-16.9) [720]	950-950 [2]	141-147 [2]	7.20 [1]	143 [1]	330-342 [2]	121-122 [2]	No Data [0]	No Data [0]
136	05/09/12 08:05	6.9 (1.3-8.0) [719]	15.3 (15.1-16.1) [719]	961-961 [3]	193-196 [2]	7.37 [1]	164 [1]	433-437 [2]	185-187 [2]	269 (264-270) [3]	127 (125-143) [3]
137	05/10/12 08:05	4.0 (1.5-6.8) [717]	15.6 (12.1-15.7) [717]	973-973 [3]	174-189 [2]	7.33 [1]	140 [1]	469-470 [2]	217-219 [2]	234 (228-267) [3]	117 (113-126) [3]
138	05/11/12 08:05	4.8 (1.9-6.8) [720]	15.3 (14.3-15.6) [720]	986-986 [3]	158-170 [2]	7.13 [1]	136 [1]	391-406 [2]	176-188 [2]	207 (207-210) [3]	89 (89-95) [3]
139	05/12/12 08:05	1.7 (0.6-5.2) [720]	14.8 (14.1-15.2) [720]	998-998 [2]	100-108 [2]	7.03 [1]	108 [1]	181-189 [2]	No Data [0]	No Data [0]	No Data [0]
140	05/13/12 08:05	0.3 (0.2-5.3) [720]	15.6 (14.1-15.9) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
141	05/14/12 08:05	0.2 (0.1-4.2) [720]	15.9 (14.9-16.2) [720]	1,008-1,008 [2]	87-94 [2]	No Data [0]	No Data [0]	259-264 [2]	107-111 [2]	No Data [0]	No Data [0]
142	05/15/12 08:05	2.5 (0.6-5.2) [720]	15.9 (15.4-16.0) [720]	1,017-1,017 [2]	78-96 [2]	7.30 [1]	140 [1]	267-276 [2]	118-118 [2]	No Data [0]	No Data [0]
143	05/16/12 08:17	3.3 (0.3-6.0) [719]	16.3 (15.8-16.9) [719]	1,029-1,029 [3]	110-117 [2]	7.01 [1]	150 [1]	370-376 [2]	195-206 [2]	190 (180-196) [3]	101 (100-106) [3]
144	05/17/12 08:17	2.9 (0.3-5.8) [718]	16.5 (13.3-16.7) [718]	1,045-1,045 [3]	153-157 [2]	7.67 [1]	142 [1]	394-397 [2]	177-178 [2]	196 (193-221) [3]	90 (89-91) [3]
145	05/18/12 08:17	2.5 (0.4-4.8) [720]	16.3 (15.3-17.1) [720]	1,059-1,059 [3]	118-120 [2]	7.38 [1]	154 [1]	356-389 [2]	185-189 [2]	No Data [0]	No Data [0]
146	05/19/12 08:17	3.6 (0.0-9.7) [720]	16.3 (15.3-30.0) [720]	1,073-1,073 [3]	138 [1]	7.23 [1]	152 [1]	328-346 [2]	148-150 [2]	No Data [0]	No Data [0]
147	05/20/12 08:17	5.0 (4.7-6.6) [720]	16.8 (15.6-17.4) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
148	05/21/12 08:17	2.9 (0.7-6.6) [720]	16.7 (15.9-17.5) [720]	1,088 [1]	122 [1]	7.26 [1]	No Data [0]	317 [1]	140 [1]	No Data [0]	No Data [0]
149	05/22/12 08:17	1.3 (0.0-4.2) [637]	17.1 (16.0-17.5) [718]	1,103-1,103 [3]	118-130 [2]	7.21 [1]	160 [1]	337-341 [2]	153-155 [2]	152 (151-153) [3]	74 (72-90) [3]
150	05/23/12 08:18	0.4 (0.0-3.5) [559]	17.3 (16.7-17.4) [719]	1,120-1,120 [3]	180-182 [2]	7.26 [1]	184 [1]	584-615 [2]	316-320 [2]	349 (340-355) [3]	172 (161-180) [3]
151	05/24/12 08:18	1.2 (0.0-4.0) [641]	17.4 (5.5-18.2) [718]	1,134-1,134 [3]	164-176 [2]	7.08 [1]	180 [1]	490-497 [2]	240-242 [2]	248 (247-311) [3]	136 (129-141) [3]
152	05/25/12 08:18	1.3 (0.1-5.2) [719]	18.0 (16.6-18.2) [719]	1,149-1,149 [3]	108-131 [2]	No Data [0]	No Data [0]	373-379 [2]	191-202 [2]	194 (175-202) [3]	94 (92-96) [3]
153	05/26/12 08:18	1.4 (0.0-3.2) [719]	18.1 (17.6-18.2) [719]	1,165-1,165 [2]	204-205 [2]	7.50 [1]	182 [1]	460-548 [2]	168-170 [2]	No Data [0]	No Data [0]
154	05/27/12 08:18	1.7 (1.4-3.4) [720]	19.6 (18.1-20.0) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
155	05/28/12 08:18	1.1 (0.1-3.5) [720]	18.8 (18.0-19.3) [720]	1,170-1,170 [2]	No Data [0]	No Data [0]	No Data [0]	221-241 [2]	No Data [0]	No Data [0]	No Data [0]
156	05/29/12 08:18	0.5 (0.0-3.4) [614]	18.7 (18.0-19.2) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
157	05/30/12 08:18	1.7 (0.0-3.2) [438]	18.0 (17.7-18.2) [720]	1,173-1,173 [2]	131-156 [2]	7.53 [1]	172 [1]	371-373 [2]	146-151 [2]	No Data [0]	No Data [0]
158	05/31/12 08:18	0.9 (0.0-2.6) [392]	18.4 (17.7-18.6) [718]	1,187-1,187 [2]	193-202 [2]	7.19 [1]	216 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
159	06/01/12 08:18	0.9 (0.0-1.8) [222]	19.3 (18.2-20.0) [719]	1,201-1,240 [6]	149 (124-161) [4]	6.96 [1]	176 [1]	626 (606-802) [6]	399-401 [2]	No Data [0]	No Data [0]
160	06/02/12 08:18	0.6 (0.0-2.6) [400]	19.1 (18.5-19.6) [719]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
161	06/03/12 08:18	3.8 (2.0-4.6) [720]	18.1 (17.8-18.5) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
162	06/04/12 08:18	4.2 (3.3-4.9) [720]	17.7 (17.0-17.9) [720]	1,246-1,246 [2]	No Data [0]	No Data [0]	No Data [0]	127-130 [2]	No Data [0]	No Data [0]	No Data [0]
163	06/05/12 08:18	1.7 (0.0-4.8) [688]	16.6 (16.1-17.0) [720]	1,256-1,256 [2]	46-54 [2]	7.20 [1]	98 [1]	129-147 [2]	87-89 [2]	No Data [0]	No Data [0]
164	06/06/12 08:18	0.7 (0.0-3.0) [628]	16.8 (16.2-17.0) [719]	1,296-1,310 [4]	No Data [0]	No Data [0]	No Data [0]	309-320 [2]	No Data [0]	No Data [0]	No Data [0]
165	06/07/12 08:18	1.4 (0.0-3.2) [515]	17.4 (6.5-17.8) [718]	1,318-1,318 [2]	93-94 [2]	7.24 [1]	120 [1]	249-291 [2]	129-131 [2]	No Data [0]	No Data [0]
166	06/08/12 08:18	1.4 (0.0-3.6) [695]	17.7 (17.1-18.1) [720]	1,348-1,348 [2]	No Data [0]	No Data [0]	No Data [0]	353-375 [2]	194-196 [2]	No Data [0]	No Data [0]
167	06/09/12 08:18	1.0 (0.0-4.2) [452]	18.3 (17.2-18.7) [720]	1,354-1,354 [2]	93-93 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
168	06/10/12 08:18	3.0 (1.1-4.2) [720]	19.4 (18.0-20.7) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
169	06/11/12 08:18	0.1 (0.0-4.1) [719]	18.0 (17.2-19.0) [720]	1,362-1,362 [2]	No Data [0]	No Data [0]	No Data [0]	238-258 [2]	No Data [0]	No Data [0]	No Data [0]

	F	V	W	X	Y	AB	AC	AD	AE	AF	AG
1	End	Probe #2 Dissolved Oxygen (ppm)	Probe #2 Temperature (°C)	(02,03) PRIMARY EFFLUENT SAMPLE ID	(02,03) PRIMARY EFFLUENT TSS (mg/L)	(02) PRIMARY EFFLUENT pH (SU)	(02) PRIMARY EFFLUENT Alkalinity (mg/L)	(02,03) PRIMARY EFFLUENT COD(t) (mg/L)	(02,03) PRIMARY EFFLUENT COD(s) (mg/L)	(02,03) PRIMARY EFFLUENT BOD(t) (mg/L)	(02,03) PRIMARY EFFLUENT BOD(s) (mg/L)
170	06/12/12 08:18	2.3 (0.0-3.2) [89]	18.0 (17.2-18.4) [720]	1,368-1,368 [2]	80-85 [2]	7.51 [1]	150 [1]	244-262 [2]	128-137 [2]	No Data [0]	No Data [0]
171	06/13/12 08:18	0.0 (0.0-0.2) [61]	18.7 (17.6-19.1) [719]	1,378-1,378 [2]	104-106 [2]	7.37 [1]	166 [1]	346-364 [2]	185-188 [2]	No Data [0]	No Data [0]
172	06/14/12 08:18	0.1 (0.0-1.6) [531]	18.5 (7.0-18.6) [717]	1,414-1,414 [2]	No Data [0]	No Data [0]	No Data [0]	475-521 [2]	250-251 [2]	No Data [0]	No Data [0]
173	06/15/12 08:18	1.0 (0.0-2.4) [167]	17.9 (16.8-18.8) [719]	1,421-1,456 [4]	83-85 [2]	7.14 [1]	126 [1]	349 (251-443) [4]	142-143 [2]	No Data [0]	No Data [0]
174	06/16/12 08:18	0.6 (0.0-1.1) [123]	18.4 (16.9-19.2) [720]	1,472-1,472 [2]	87-97 [2]	7.36 [1]	No Data [0]	338-347 [2]	181-183 [2]	No Data [0]	No Data [0]
175	06/17/12 08:18	0.6 (0.0-0.9) [159]	18.0 (17.5-18.4) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
176	06/18/12 08:18	0.8 (0.0-1.2) [96]	18.2 (17.5-19.0) [720]	1,481-1,481 [2]	98-99 [2]	No Data [0]	No Data [0]	328-332 [2]	157-159 [2]	No Data [0]	No Data [0]
177	06/19/12 08:18	0.0 (0.0-0.1) [12]	18.8 (17.7-19.4) [719]	1,490-1,495 [4]	91-102 [2]	6.82-7.44 [2]	154-159 [2]	209 (106-306) [4]	151-152 [2]	No Data [0]	No Data [0]
178	06/20/12 08:18	0.0 (0.0-0.2) [91]	19.6 (18.1-19.8) [719]	1,509-1,509 [2]	124-133 [2]	7.21 [1]	166 [1]	460-461 [2]	258-260 [2]	No Data [0]	No Data [0]
179	06/21/12 08:18	0.0 [1]	20.7 (6.4-21.5) [718]	1,521-1,521 [2]	115-126 [2]	7.21 [1]	166 [1]	400-410 [2]	212-215 [2]	No Data [0]	No Data [0]
180	06/22/12 08:18	0.0 (0.0-0.0) [4]	20.9 (18.6-21.9) [718]	1,546-1,561 [4]	111-127 [2]	7.24 [1]	166 [1]	399 (391-411) [4]	215-219 [2]	No Data [0]	No Data [0]
181	06/23/12 08:18	No Data [0]	21.0 (19.9-21.7) [720]	1,572-1,572 [2]	125-146 [2]	7.32 [1]	170 [1]	367-377 [2]	189-189 [2]	No Data [0]	No Data [0]
182	06/24/12 08:18	0.0 [1]	20.5 (19.5-21.0) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
183	06/25/12 08:18	No Data [0]	20.8 (19.5-21.3) [720]	1,585-1,601 [7]	105-107 [2]	No Data [0]	No Data [0]	347-347 [2]	250-262 [2]	No Data [0]	No Data [0]
184	06/26/12 08:18	0.9 (0.0-1.6) [164]	20.3 (19.7-20.7) [720]	1,602-1,610 [3]	117-119 [2]	7.82 [1]	190 [1]	373-385 [2]	No Data [0]	No Data [0]	No Data [0]
185	06/27/12 08:17	0.3 (0.0-10.2) [352]	19.8 (18.0-20.1) [718]	1,608-1,625 [8]	144-146 [2]	7.04-7.38 [2]	155-158 [2]	444-461 [2]	239-244 [2]	No Data [0]	No Data [0]
186	06/28/12 08:17	0.5 (0.0-10.3) [476]	20.4 (18.9-24.6) [717]	1,627-1,637 [8]	92-96 [2]	6.88-7.63 [2]	124-158 [2]	266-269 [2]	134-136 [2]	No Data [0]	No Data [0]
187	06/29/12 08:17	0.0 (0.0-0.1) [41]	21.0 (20.3-21.6) [720]	1,644-1,660 [7]	70-71 [2]	6.84-7.12 [2]	126-174 [2]	302-303 [2]	163-165 [2]	No Data [0]	No Data [0]
188	06/30/12 08:17	0.0 (0.0-0.1) [123]	21.9 (20.3-22.0) [719]	1,665-1,674 [5]	82-86 [2]	6.88 [1]	124 [1]	340-342 [2]	188-190 [2]	No Data [0]	No Data [0]
189	07/01/12 08:17	0.0 (0.0-0.1) [415]	24.3 (22.0-24.4) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
190	07/02/12 08:17	0.1 (0.0-0.3) [74]	23.6 (21.5-24.6) [720]	1,685-1,687 [4]	No Data [0]	7.10 [1]	140 [1]	295 (241-337) [4]	No Data [0]	No Data [0]	No Data [0]
191	07/03/12 08:17	0.0 (0.0-0.7) [104]	22.1 (21.1-22.9) [717]	1,694-1,718 [10]	86-88 [2]	7.00 (6.61-7.30) [3]	164 (160-218) [3]	630 (336-931) [4]	189-193 [2]	No Data [0]	No Data [0]
192	07/04/12 08:17	7.2 (0.0-9.7) [201]	22.2 (21.1-30.0) [719]	1,720-1,720 [2]	134-142 [2]	No Data [0]	No Data [0]	527-531 [2]	282-286 [2]	No Data [0]	No Data [0]
193	07/05/12 08:17	No Data [0]	21.8 (20.4-23.1) [717]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
194	07/06/12 08:17	2.7 (0.0-8.0) [7]	21.1 (20.3-21.7) [719]	1,731-1,731 [2]	95-121 [2]	No Data [0]	No Data [0]	412-741 [2]	243-369 [2]	No Data [0]	No Data [0]
195	07/07/12 08:17	0.0 (0.0-0.1) [10]	21.5 (20.6-22.4) [719]	1,740-1,765 [10]	130-145 [2]	6.42 [1]	188 [1]	542 (531-613) [3]	301-307 [2]	No Data [0]	No Data [0]
196	07/08/12 08:17	No Data [0]	21.3 (20.6-22.0) [720]	1,782-1,782 [2]	No Data [0]	No Data [0]	No Data [0]	635-710 [2]	No Data [0]	No Data [0]	No Data [0]
197	07/09/12 08:17	No Data [0]	21.4 (20.5-22.1) [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
198	07/10/12 08:17	5.4 (0.3-6.6) [8]	21.5 (20.6-22.3) [718]	1,819-1,822 [4]	107-113 [2]	No Data [0]	No Data [0]	412-415 [2]	233-234 [2]	No Data [0]	No Data [0]
199	07/11/12 08:17	2.5 (0.0-7.8) [351]	23.2 (20.9-23.4) [717]	1,825-1,858 [8]	127-131 [2]	6.61 [1]	154 [1]	523-553 [2]	291-295 [2]	No Data [0]	No Data [0]
200	07/12/12 08:17	1.7 (0.0-4.1) [658]	23.3 (22.6-24.0) [717]	1,877-1,921 [11]	120-131 [2]	7.04 [1]	182 [1]	507 (299-551) [9]	281-284 [2]	No Data [0]	No Data [0]
201	07/13/12 08:17	2.3 (1.6-4.8) [719]	23.3 (22.6-24.0) [719]	1,917-1,935 [5]	98-105 [2]	No Data [0]	No Data [0]	475 (427-505) [5]	272-277 [2]	No Data [0]	No Data [0]
202	07/14/12 08:17	1.5 (0.5-4.4) [719]	23.4 (22.7-23.9) [719]	1,949-1,949 [2]	143-145 [2]	No Data [0]	No Data [0]	641-645 [2]	No Data [0]	No Data [0]	No Data [0]

Table 3.6-02: Conventional Activated Sludge with BioMag (CASB) Field Data Report, Part 11 of 35

	F	AH	AI	AK	AL	AM	AN	AO	AP	AQ	AR	AS
1	End	(02,03) PRIMARY EFFLUENT Nitrate (NO3-N) (mg/L)	(02) PRIMARY EFFLUENT Ammonia (NH3-N) (mg/L)	(02) PRIMARY EFFLUENT Total Nitrogen (mg/L) (TN)	(02,03) PRIMARY EFFLUENT NOx (mg/L)	(02) PRIMARY EFFLUENT TKN (mg/L)	(03) SPIKED PRIMARY EFFLUENT pH (SU)	(03) SPIKED PRIMARY EFFLUENT Alkalinity (mg/L)	(03) SPIKED PRIMARY EFFLUENT Ammonia (NH3-N) (mg/L)	(03) SPIKED PRIMARY EFFLUENT Total Nitrogen (mg/L) (TN)	(03) SPIKED PRIMARY EFFLUENT TKN (mg/L)	(22) CASB AERATION MIXED LIQUOR SAMPLE ID
2	07/14/12 08:17	0.3 (0.1-2.4) [38]	16.7 (5.1-34.5) [132]	20.7 (1.0-40.4) [53]	0.3 (0.0-1.4) [70]	20.4 (0.9-39.8) [53]	8.05 (6.75-216.00) [33]	247 (166-384) [35]	31.5 (17.8-56.0) [46]	39.7 (19.3-51.1) [17]	39.4 (19.1-50.6) [16]	10-1,941 [384]
3												
4	12/29/11 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
5	12/30/11 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
6	12/31/11 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
7	01/01/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
8	01/02/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
9	01/03/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
10	01/04/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	10-10 [3]
11	01/05/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
12	01/06/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	15-16 [4]
13	01/07/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	22-22 [3]
14	01/08/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
15	01/09/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	29-29 [3]
16	01/10/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	33-33 [3]
17	01/11/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	38-38 [3]
18	01/12/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	42-42 [3]
19	01/13/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	48-48 [3]
20	01/14/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	53-56 [6]
21	01/15/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	58-58 [3]
22	01/16/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	63-63 [3]
23	01/17/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	138-138 [3]
24	01/18/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	67-67 [3]
25	01/19/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	74-74 [3]
26	01/20/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	80-80 [3]
27	01/21/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	83-83 [3]
28	01/22/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	93-93 [3]
29	01/23/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	104-104 [3]
30	01/24/12 08:02	No Data [0]	26.4 (26.2-26.4) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	108-108 [3]
31	01/25/12 08:02	No Data [0]	13.0 (12.9-13.1) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	116-116 [3]
32	01/26/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
33	01/27/12 08:02	No Data [0]	16.1 (15.9-16.1) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	130-130 [3]
34	01/28/12 08:02	No Data [0]	6.5 (6.5-6.5) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	143-143 [3]
35	01/29/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
36	01/30/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
37	01/31/12 08:02	No Data [0]	12.5-12.6 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	162-162 [3]
38	02/01/12 08:02	No Data [0]	11.5-11.7 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	169-169 [3]
39	02/02/12 08:02	No Data [0]	12.9 (10.7-13.3) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	180-180 [3]
40	02/03/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	187-187 [3]
41	02/04/12 08:02	No Data [0]	13.0 (11.7-14.1) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	195-195 [3]
42	02/05/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	207-207 [3]
43	02/06/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

[illegible]

Table 3.6-02: Conventional Activated Sludge with BioMag (CASB) Field Data Report, Part 13 of 35

	F	AH	AI	AK	AL	AM	AN	AO	AP	AQ	AR	AS
1	End	(02,03) PRIMARY EFFLUENT Nitrate (NO3-N) (mg/L)	(02) PRIMARY EFFLUENT Ammonia (NH3-N) (mg/L)	(02) PRIMARY EFFLUENT Total Nitrogen (mg/L) (TN)	(02,03) PRIMARY EFFLUENT NOx (mg/L)	(02) PRIMARY EFFLUENT TKN (mg/L)	(03) SPIKED PRIMARY EFFLUENT pH (SU)	(03) SPIKED PRIMARY EFFLUENT Alkalinity (mg/L)	(03) SPIKED PRIMARY EFFLUENT Ammonia (NH3-N) (mg/L)	(03) SPIKED PRIMARY EFFLUENT Total Nitrogen (mg/L) (TN)	(03) SPIKED PRIMARY EFFLUENT TKN (mg/L)	(22) CASB AERATION MIXED LIQUOR SAMPLE ID
86	03/20/12 08:03	No Data [0]	9.4-9.5 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	585-585 [3]
87	03/21/12 08:03	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	590-590 [3]
88	03/22/12 08:03	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	602-602 [3]
89	03/23/12 08:03	No Data [0]	17.1-17.2 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	615-615 [3]
90	03/24/12 08:03	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	625-625 [3]
91	03/25/12 08:03	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	634-634 [3]
92	03/26/12 08:03	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	640-640 [3]
93	03/27/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	646-646 [3]
94	03/28/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	660-660 [3]
95	03/29/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	666-666 [3]
96	03/30/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	667-667 [3]
97	03/31/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
98	04/01/12 08:05	0.7-0.8 [2]	21.6-21.7 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	689-689 [3]
99	04/02/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
100	04/03/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	692-692 [3]
101	04/04/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	701-701 [3]
102	04/05/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	714-714 [3]
103	04/06/12 08:05	0.2-0.2 [2]	20.7-20.8 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	722-722 [3]
104	04/07/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	733-733 [3]
105	04/08/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	741-741 [3]
106	04/09/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
107	04/10/12 08:05	0.1-0.1 [2]	18.7-18.8 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	747-747 [2]
108	04/11/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	756-756 [2]
109	04/12/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	765-765 [2]
110	04/13/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	774-774 [2]
111	04/14/12 08:05	0.1-0.8 [2]	28.9-30.3 [2]	40.4 [1]	0.6 [1]	39.8 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	788-788 [2]
112	04/15/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
113	04/16/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	796-796 [2]
114	04/17/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	803-803 [2]
115	04/18/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	810-810 [3]
116	04/19/12 08:05	No Data [0]	No Data [0]	34.5-34.6 [2]	0.4-0.5 [2]	34.1-34.1 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	819-819 [2]
117	04/20/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
118	04/21/12 08:05	0.8 [1]	33.9-34.5 [2]	37.8 [1]	0.7 [1]	37.0 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
119	04/22/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
120	04/23/12 08:05	0.2-0.2 [2]	No Data [0]	25.6-33.1 [2]	0.2-0.4 [2]	25.4-32.7 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	831-831 [2]
121	04/24/12 08:05	No Data [0]	12.1-12.6 [2]	19.1 [1]	0.5 [1]	18.5 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	843-843 [2]
122	04/25/12 08:05	No Data [0]	6.0 [1]	6.7-10.9 [2]	0.2-0.2 [2]	6.5-10.8 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
123	04/26/12 08:05	No Data [0]	11.3 [1]	14.6 [1]	0.3 [1]	14.3 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	861-861 [2]
124	04/27/12 08:05	No Data [0]	13.2 [1]	20.8 [1]	0.3 [1]	20.4 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	870-870 [2]
125	04/28/12 08:05	No Data [0]	14.8 [1]	22.0 [1]	0.0 [1]	21.4 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	879-879 [2]
126	04/29/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
127	04/30/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	887-887 [2]

Table 3.6-02: Conventional Activated Sludge with BioMag (CASB) Field Data Report, Part 14 of 35

	F	AH	AI	AK	AL	AM	AN	AO	AP	AQ	AR	AS
1	End	(02,03) PRIMARY EFFLUENT Nitrate (NO3-N) (mg/L)	(02) PRIMARY EFFLUENT Ammonia (NH3-N) (mg/L)	(02) PRIMARY EFFLUENT Total Nitrogen (mg/L) (TN)	(02,03) PRIMARY EFFLUENT NOx (mg/L)	(02) PRIMARY EFFLUENT TKN (mg/L)	(03) SPIKED PRIMARY EFFLUENT pH (SU)	(03) SPIKED PRIMARY EFFLUENT Alkalinity (mg/L)	(03) SPIKED PRIMARY EFFLUENT Ammonia (NH3-N) (mg/L)	(03) SPIKED PRIMARY EFFLUENT Total Nitrogen (mg/L) (TN)	(03) SPIKED PRIMARY EFFLUENT TKN (mg/L)	(22) CASB AERATION MIXED LIQUOR SAMPLE ID
128	05/01/12 08:05	0.6 [1]	17.7 [1]	22.1 [1]	0.3 [1]	21.8 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	897-897 [2]
129	05/02/12 08:05	No Data [0]	17.4 [1]	24.7 [1]	0.4 [1]	24.3 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	907-907 [2]
130	05/03/12 08:05	No Data [0]	12.9 [1]	19.3 [1]	0.5 [1]	18.8 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	920-920 [2]
131	05/04/12 08:05	No Data [0]	18.0 [1]	22.4 [1]	0.5 [1]	21.9 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	932-932 [2]
132	05/05/12 08:05	No Data [0]	26.9 [1]	39.6 [1]	0.7 [1]	39.0 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
133	05/06/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
134	05/07/12 08:05	No Data [0]	19.6 [1]	18.8 [1]	0.3 [1]	18.5 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
135	05/08/12 08:05	No Data [0]	17.3 [1]	20.9 [1]	0.4 [1]	20.5 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	957-957 [2]
136	05/09/12 08:05	No Data [0]	21.1 [1]	27.7 [1]	0.5 [1]	27.2 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	967-967 [2]
137	05/10/12 08:05	No Data [0]	17.2 [1]	23.2 [1]	0.5 [1]	22.7 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	979-979 [2]
138	05/11/12 08:05	No Data [0]	16.5 [1]	12.3 [1]	0.3 [1]	12.0 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	992-992 [2]
139	05/12/12 08:05	No Data [0]	5.5 [1]	1.0 [1]	0.1 [1]	0.9 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,004-1,004 [3]
140	05/13/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
141	05/14/12 08:05	No Data [0]	12.5 [1]	12.3 [1]	0.3 [1]	12.0 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
142	05/15/12 08:05	No Data [0]	13.2 [1]	20.2 [1]	0.3 [1]	19.9 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,022-1,023 [2]
143	05/16/12 08:17	No Data [0]	17.7 [1]	22.6 [1]	0.3 [1]	22.2 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,036-1,036 [2]
144	05/17/12 08:17	No Data [0]	17.2 [1]	13.7 [1]	0.4 [1]	13.3 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,052-1,052 [2]
145	05/18/12 08:17	No Data [0]	15.9 [1]	23.5 [1]	0.4 [1]	23.0 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,067-1,067 [2]
146	05/19/12 08:17	No Data [0]	17.6 [1]	10.1 [1]	0.4 [1]	9.6 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,081-1,081 [2]
147	05/20/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
148	05/21/12 08:17	No Data [0]	19.9 [1]	24.4 [1]	0.4 [1]	24.0 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
149	05/22/12 08:17	No Data [0]	19.8 [1]	7.6 [1]	0.3 [1]	7.3 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,111-1,111 [2]
150	05/23/12 08:18	No Data [0]	26.9 [1]	33.8 [1]	0.6 [1]	33.2 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,128-1,128 [2]
151	05/24/12 08:18	No Data [0]	20.4 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,142-1,142 [2]
152	05/25/12 08:18	No Data [0]	19.2 [1]	32.4 [1]	0.3 [1]	32.1 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,157-1,157 [2]
153	05/26/12 08:18	No Data [0]	18.0 [1]	23.4 [1]	0.6 [1]	22.8 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,172-1,172 [2]
154	05/27/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
155	05/28/12 08:18	No Data [0]	15.3 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,171-1,171 [2]
156	05/29/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
157	05/30/12 08:18	No Data [0]	19.7 [1]	19.8 [1]	0.5 [1]	19.3 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,181-1,181 [2]
158	05/31/12 08:18	No Data [0]	31.4 [1]	11.6 [1]	0.6 [1]	11.0 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,194-1,194 [2]
159	06/01/12 08:18	No Data [0]	18.7 [1]	12.0 [1]	0.5 [1]	11.5 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,207-1,242 [3]
160	06/02/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
161	06/03/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
162	06/04/12 08:18	No Data [0]	No Data [0]	14.4 [1]	1.4 [1]	13.0 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,250-1,250 [2]
163	06/05/12 08:18	No Data [0]	5.1 [1]	4.1 [1]	0.3 [1]	3.8 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,264-1,264 [2]
164	06/06/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
165	06/07/12 08:18	No Data [0]	8.0 [1]	6.2 [1]	0.2 [1]	6.0 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,326-1,326 [2]
166	06/08/12 08:18	No Data [0]	No Data [0]	24.8 [1]	0.2 [1]	25.6 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,352-1,352 [2]
167	06/09/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,357-1,357 [2]
168	06/10/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
169	06/11/12 08:18	No Data [0]	16.8 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

	F	AH	AI	AK	AL	AM	AN	AO	AP	AQ	AR	AS
1	End	(02,03) PRIMARY EFFLUENT Nitrate (NO3-N) (mg/L)	(02) PRIMARY EFFLUENT Ammonia (NH3-N) (mg/L)	(02) PRIMARY EFFLUENT Total Nitrogen (mg/L) (TN)	(02,03) PRIMARY EFFLUENT NOx (mg/L)	(02) PRIMARY EFFLUENT TKN (mg/L)	(03) SPIKED PRIMARY EFFLUENT pH (SU)	(03) SPIKED PRIMARY EFFLUENT Alkalinity (mg/L)	(03) SPIKED PRIMARY EFFLUENT Ammonia (NH3-N) (mg/L)	(03) SPIKED PRIMARY EFFLUENT Total Nitrogen (mg/L) (TN)	(03) SPIKED PRIMARY EFFLUENT TKN (mg/L)	(22) CASB AERATION MIXED LIQUOR SAMPLE ID
170	06/12/12 08:18	No Data [0]	13.0 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,372-1,372 [2]
171	06/13/12 08:18	No Data [0]	15.8 [1]	20.2 [1]	0.3 [1]	20.0 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,387-1,387 [2]
172	06/14/12 08:18	0.3 [1]	20.0 [1]	25.2 [1]	0.3 [1]	24.9 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,401-1,401 [2]
173	06/15/12 08:18	0.3 [1]	11.6 [1]	16.1 [1]	0.2 [1]	16.0 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,451-1,452 [2]
174	06/16/12 08:18	0.5 [1]	12.3 [1]	17.0 [1]	0.2 [1]	16.9 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,474-1,474 [2]
175	06/17/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
176	06/18/12 08:18	No Data [0]	14.6 [1]	23.8 [1]	0.3 [1]	23.5 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,485 [1]
177	06/19/12 08:18	0.1-0.3 [2]	5.7-19.0 [2]	20.7 [1]	0.3 [1]	20.5 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,497-1,497 [2]
178	06/20/12 08:18	0.3 [1]	18.1 [1]	18.9 [1]	0.3 [1]	18.6 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,512-1,512 [2]
179	06/21/12 08:18	0.3 [1]	25.3 [1]	13.5 [1]	0.3 [1]	13.3 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,524-1,524 [2]
180	06/22/12 08:18	0.4 [1]	19.9 [1]	15.3 [1]	0.3 [1]	15.0 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,549-1,555 [3]
181	06/23/12 08:18	0.2 [1]	19.8 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,575-1,575 [2]
182	06/24/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
183	06/25/12 08:18	No Data [0]	23.4 (23.4-23.4) [3]	25.5 [1]	0.5 [1]	25.0 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
184	06/26/12 08:18	0.2 [1]	19.5-30.9 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,605-1,605 [2]
185	06/27/12 08:17	0.4-0.4 [2]	6.1 (6.0-9.2) [3]	No Data [0]	0.4-0.4 [2]	No Data [0]	8.00 [1]	208 [1]	20.2-29.9 [2]	39.7-42.7 [2]	42.3 [1]	1,619-1,619 [2]
186	06/28/12 08:17	0.2 [1]	17.4 (15.4-25.5) [3]	27.3 [1]	0.2 [1]	27.0 [1]	7.60-8.89 [2]	206-272 [2]	33.9 (26.8-56.0) [4]	No Data [0]	No Data [0]	1,630-1,630 [2]
187	06/29/12 08:17	0.3 [1]	11.1-23.4 [2]	No Data [0]	0.2 [1]	No Data [0]	7.83 (7.48-8.04) [4]	204 (166-258) [4]	24.9 (17.8-40.5) [4]	19.7 [1]	19.4 [1]	1,653-1,653 [2]
188	06/30/12 08:17	0.2-0.3 [2]	10.4 [1]	No Data [0]	0.2-0.3 [2]	No Data [0]	7.94-8.47 [2]	200-224 [2]	26.1 (17.9-29.5) [3]	34.0-36.1 [2]	33.8-35.9 [2]	1,680-1,680 [2]
189	07/01/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
190	07/02/12 08:17	No Data [0]	18.2 [1]	No Data [0]	0.1 [1]	No Data [0]	8.00-8.68 [2]	198-202 [2]	35.1-36.2 [2]	43.8 [1]	43.7 [1]	No Data [0]
191	07/03/12 08:17	0.2 [1]	11.9-27.6 [2]	No Data [0]	No Data [0]	No Data [0]	8.60 (7.14-216.00) [5]	242 (196-298) [4]	27.3-28.7 [2]	No Data [0]	No Data [0]	1,702-1,702 [2]
192	07/04/12 08:17	0.3 [1]	No Data [0]	No Data [0]	0.4 [1]	No Data [0]	7.90 [1]	240 [1]	29.5 [1]	40.6 [1]	40.3 [1]	1,725-1,725 [2]
193	07/05/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
194	07/06/12 08:17	0.2 [1]	No Data [0]	No Data [0]	0.2 [1]	No Data [0]	8.19 [1]	226 [1]	45.9 [1]	46.1 [1]	45.9 [1]	1,734-1,734 [2]
195	07/07/12 08:17	0.3 [1]	9.7-23.9 [2]	11.1 [1]	0.2 (0.2-0.3) [3]	10.9 [1]	7.78 (7.05-8.65) [3]	249 (232-280) [6]	31.5 (19.0-35.6) [3]	19.3-38.8 [2]	19.1-38.5 [2]	1,769-1,769 [2]
196	07/08/12 08:17	No Data [0]	No Data [0]	No Data [0]	0.3 [1]	No Data [0]	7.63 [1]	255 [1]	31.8 [1]	35.1 [1]	34.8 [1]	No Data [0]
197	07/09/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
198	07/10/12 08:17	No Data [0]	No Data [0]	No Data [0]	0.2 [1]	No Data [0]	7.87 [1]	228 [1]	26.0-31.5 [2]	33.9 [1]	33.6 [1]	1,823-1,823 [2]
199	07/11/12 08:17	No Data [0]	18.1 [1]	No Data [0]	0.3 [1]	No Data [0]	8.57 (7.92-8.57) [3]	284 (276-384) [3]	29.7 (24.5-47.3) [6]	35.2 [1]	34.9 [1]	1,829-1,829 [2]
200	07/12/12 08:17	2.4 [1]	27.4 [1]	No Data [0]	0.3 [1]	No Data [0]	8.41-8.98 [2]	362-364 [2]	42.4 (32.4-49.0) [6]	44.5 [1]	44.2 [1]	1,883-1,883 [2]
201	07/13/12 08:17	0.3 [1]	No Data [0]	No Data [0]	0.3 [1]	No Data [0]	8.50 [1]	336 [1]	36.9-37.8 [2]	43.4 [1]	43.1 [1]	1,941-1,941 [2]
202	07/14/12 08:17	No Data [0]	No Data [0]	No Data [0]	0.5 [1]	No Data [0]	8.53 [1]	380 [1]	47.6 [1]	51.1 [1]	50.6 [1]	No Data [0]

	F	AT	AU	AV	AW	AX	AZ	BC	BD	BE
1	End	(22) CASB AERATION MIXED LIQUOR TSS (mg/L)	(22) CASB AERATION MIXED LIQUOR INERT SOLIDS (mg/L)	(22) CASB AERATION MIXED LIQUOR VSS (mg/L)	(22) CASB AERATION MIXED LIQUOR pH (SU)	(22) CASB AERATION MIXED LIQUOR Alkalinity (mg/L)	(22) CASB AERATION MIXED LIQUOR COD(s) (mg/L)	(22) CASB AERATION MIXED LIQUOR Nitrate (NO3-N) (mg/L)	(22) CASB AERATION MIXED LIQUOR Ammonia (NH3-N) (mg/L)	(22) CASB AERATION MIXED LIQUOR Magnetite (from Solids Wt) (mg/L)
2	07/14/12 08:17	5,762 (774-23,822) [376]	3,517 (474-12,614) [362]	2,011 (270-11,208) [362]	7.44 (6.41-8.09) [81]	156 (76-294) [27]	103.0 (78.0-450.0) [6]	0.6 (0.0-6.4) [7]	5.4 (0.0-22.4) [7]	3,114 (456-10,636) [353]
3										
4	12/29/11 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
5	12/30/11 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
6	12/31/11 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
7	01/01/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
8	01/02/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
9	01/03/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
10	01/04/12 08:02	5,303 (4,997-5,405) [3]	2,148 (2,028-2,181) [3]	3,122 (2,969-3,257) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,573 (1,504-1,630) [3]
11	01/05/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
12	01/06/12 08:02	8,766 (8,342-23,822) [4]	5,027 (4,646-12,614) [4]	3,865 (3,444-11,208) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	4,416 (3,895-10,636) [4]
13	01/07/12 08:02	7,098 (6,972-7,200) [3]	3,528 (3,372-3,578) [3]	3,600 (3,570-3,622) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,898 (2,737-2,939) [3]
14	01/08/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
15	01/09/12 08:02	6,714 (6,448-6,814) [3]	4,388 (3,304-4,436) [3]	2,378 (2,326-3,144) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	3,978 (2,749-4,016) [3]
16	01/10/12 08:02	6,090 (5,414-6,220) [3]	2,702 (2,384-2,768) [3]	3,388 (3,030-3,452) [3]	7.00 (6.85-7.12) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,104 (1,849-2,159) [3]
17	01/11/12 08:02	6,030 (6,022-6,318) [3]	2,698 (2,668-2,800) [3]	3,354 (3,332-3,518) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,110 (2,076-2,179) [3]
18	01/12/12 08:02	5,386 (4,984-5,706) [3]	2,710 (2,552-3,060) [3]	2,646 (2,274-2,834) [3]	7.23 (6.41-7.24) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,309 (2,052-2,593) [3]
19	01/13/12 08:02	7,120 (7,086-7,440) [3]	3,850 (3,822-3,984) [3]	3,270 (3,264-3,456) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	3,273 (3,246-3,374) [3]
20	01/14/12 08:02	7,872 (5,026-8,722) [6]	4,194 (3,032-5,000) [3]	2,846 (1,994-3,384) [3]	7.06 (6.93-7.73) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	3,692 (2,680-4,403) [3]
21	01/15/12 08:02	7,834 (7,444-8,030) [3]	4,906 (4,656-5,016) [3]	2,928 (2,788-3,014) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	4,389 (4,164-4,484) [3]
22	01/16/12 08:02	7,176 (6,972-7,364) [3]	5,630 (4,814-5,734) [3]	1,734 (1,442-2,158) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	5,324 (4,433-5,480) [3]
23	01/17/12 08:02	4,894 (4,882-4,904) [3]	3,100 (3,074-3,150) [3]	1,794 (1,754-1,808) [3]	7.47 (7.26-7.68) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,783 (2,755-2,840) [3]
24	01/18/12 08:02	8,428 (8,306-8,494) [3]	6,026 (5,928-6,048) [3]	2,402 (2,378-2,446) [3]	7.50 (7.33-7.55) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	5,602 (5,508-5,616) [3]
25	01/19/12 08:02	9,328 (9,308-9,624) [3]	6,274 (6,258-6,504) [3]	3,054 (3,050-3,120) [3]	7.42 (7.25-7.58) [3]	No Data [0]	No Data [0]	5.4-6.4 [2]	No Data [0]	5,735 (5,720-5,953) [3]
26	01/20/12 08:02	7,090 (6,800-7,370) [3]	5,254 (5,050-5,492) [3]	1,836 (1,750-1,878) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	4,930 (4,741-5,161) [3]
27	01/21/12 08:02	7,854 (6,606-8,376) [3]	5,590 (4,692-6,016) [3]	2,264 (1,914-2,360) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	5,190 (4,354-5,600) [3]
28	01/22/12 08:02	11,330 (10,064-11,618) [3]	7,608 (6,906-7,848) [3]	3,722 (3,158-3,770) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	6,951 (6,349-7,183) [3]
29	01/23/12 08:02	8,870 (8,818-8,888) [3]	5,644 (5,586-5,656) [3]	3,232 (3,214-3,244) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	5,072 (5,016-5,089) [3]
30	01/24/12 08:02	8,422 (8,048-8,868) [3]	5,418 (5,182-5,738) [3]	3,004 (2,866-3,130) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	4,888 (4,676-5,186) [3]
31	01/25/12 08:02	8,620 (8,566-8,684) [3]	5,334 (5,286-5,348) [3]	3,336 (3,280-3,336) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	4,707 (4,695-4,759) [3]
32	01/26/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
33	01/27/12 08:02	7,382 (7,210-7,468) [3]	4,988 (4,846-5,026) [3]	2,394 (2,364-2,442) [3]	7.31 (7.20-7.41) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	4,566 (4,429-4,595) [3]
34	01/28/12 08:02	7,036 (6,858-7,200) [3]	4,816 (4,660-4,840) [3]	2,220 (2,198-2,360) [3]	6.91 (6.48-7.16) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	4,424 (4,272-4,424) [3]
35	01/29/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
36	01/30/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
37	01/31/12 08:02	6,068 (5,966-6,184) [3]	4,314 (4,258-4,390) [3]	1,754 (1,708-1,794) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	4,004 (3,957-4,073) [3]
38	02/01/12 08:02	4,450 (4,398-4,662) [3]	2,948 (2,938-3,096) [3]	1,462 (1,450-1,566) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,730 (2,692-2,820) [3]
39	02/02/12 08:02	3,962 (3,768-3,972) [3]	2,428 (2,296-2,446) [3]	1,526 (1,472-1,534) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,157 (2,036-2,177) [3]
40	02/03/12 08:02	5,076 (5,022-5,192) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
41	02/04/12 08:02	3,786 (3,760-3,866) [3]	2,266 (2,216-2,320) [3]	1,546 (1,494-1,570) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,002 (1,939-2,047) [3]
42	02/05/12 08:02	5,064 (4,690-5,272) [3]	3,206 (2,962-3,336) [3]	1,858 (1,728-1,936) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,878 (2,657-2,994) [3]
43	02/06/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

Table 3.6-02: Conventional Activated Sludge with BioMag (CASB) Field Data Report, Part 17 of 35

	F	AT	AU	AV	AW	AX	AZ	BC	BD	BE
1	End	(22) CASB AERATION MIXED LIQUOR TSS (mg/L)	(22) CASB AERATION MIXED LIQUOR INERT SOLIDS (mg/L)	(22) CASB AERATION MIXED LIQUOR VSS (mg/L)	(22) CASB AERATION MIXED LIQUOR pH (SU)	(22) CASB AERATION MIXED LIQUOR Alkalinity (mg/L)	(22) CASB AERATION MIXED LIQUOR COD(s) (mg/L)	(22) CASB AERATION MIXED LIQUOR Nitrate (NO3-N) (mg/L)	(22) CASB AERATION MIXED LIQUOR Ammonia (NH3-N) (mg/L)	(22) CASB AERATION MIXED LIQUOR Magnetite (from Solids Wt) (mg/L)
44	02/07/12 08:02	4,762 (4,074-4,954) [3]	3,084 (2,670-3,258) [3]	1,678 (1,404-1,696) [3]	7.53 (7.17-7.65) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,788 (2,422-2,959) [3]
45	02/08/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
46	02/09/12 08:02	5,412 (5,382-5,728) [3]	3,398 (3,386-3,620) [3]	2,014 (1,996-2,108) [3]	7.63 (7.43-7.70) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	3,043 (3,034-3,248) [3]
47	02/10/12 08:02	4,820 (4,624-4,900) [3]	3,022 (2,910-3,082) [3]	1,798 (1,714-1,818) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,705 (2,608-2,761) [3]
48	02/11/12 08:02	4,710 (4,680-4,936) [3]	2,902 (2,858-3,008) [3]	1,822 (1,702-2,034) [3]	6.89 (6.76-7.44) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,543 (2,536-2,708) [3]
49	02/12/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
50	02/13/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
51	02/14/12 08:02	3,810 (3,738-3,812) [3]	1,072 (1,031-1,916) [3]	2,738 (1,822-2,781) [3]	7.12 (6.91-7.44) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	589 (540-1,594) [3]
52	02/15/12 08:02	4,908 (4,708-5,022) [3]	2,996 (2,860-3,082) [3]	1,912 (1,848-1,940) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,659 (2,534-2,740) [3]
53	02/16/12 08:02	5,354 (5,084-5,430) [3]	3,038 (2,864-3,084) [3]	2,316 (2,220-2,346) [3]	7.35 (7.22-7.55) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,629 (2,472-2,670) [3]
54	02/17/12 08:02	4,974 (4,784-5,082) [3]	2,912 (2,778-2,976) [3]	2,062 (2,006-2,106) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,548 (2,424-2,604) [3]
55	02/18/12 08:02	4,094 (3,632-4,142) [3]	2,618 (2,300-2,640) [3]	1,476 (1,332-1,502) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
56	02/19/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
57	02/20/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
58	02/21/12 08:02	3,050 (2,820-3,122) [3]	1,308 (1,172-1,388) [3]	1,662 (1,648-1,814) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	988 (881-1,095) [3]
59	02/22/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
60	02/23/12 08:02	936 (774-954) [3]	642 (474-658) [3]	294 (270-296) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	590 (456-606) [3]
61	02/24/12 08:02	1,600 (1,472-1,664) [3]	886 (748-928) [3]	724 (714-736) [3]	7.59 (7.25-7.65) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	760 (620-798) [3]
62	02/25/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
63	02/26/12 08:02	2,800 (2,788-2,820) [3]	1,432 (1,422-1,442) [3]	1,368 (1,366-1,378) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,191 (1,181-1,199) [3]
64	02/27/12 08:02	3,296 (3,258-3,454) [3]	2,066 (2,066-2,120) [3]	1,230 (1,138-1,388) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,849 (1,821-1,919) [3]
65	02/28/12 08:02	3,852 (3,838-4,164) [3]	2,362 (2,352-2,574) [3]	1,490 (1,486-1,590) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,099 (2,090-2,293) [3]
66	02/29/12 08:02	3,218 (2,912-3,348) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
67	03/01/12 08:02	3,628 (3,584-3,730) [3]	1,896 (1,872-1,980) [3]	1,732 (1,712-1,750) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,590 (1,570-1,671) [3]
68	03/02/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
69	03/03/12 08:01	2,632 (2,630-2,700) [3]	1,420 (1,416-1,470) [3]	1,216 (1,210-1,236) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,206 (1,201-1,246) [3]
70	03/04/12 08:01	3,471 (3,242-3,773) [6]	2,190 (2,056-2,590) [6]	1,191 (1,171-1,302) [6]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,967 (1,847-2,381) [6]
71	03/05/12 08:01	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
72	03/06/12 08:01	2,452 (2,421-2,469) [3]	909-1,194 [2]	1,275-1,543 [2]	7.15 (7.10-7.16) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	637-969 [2]
73	03/07/12 08:04	2,569 (2,550-2,596) [3]	1,013 (948-1,122) [3]	1,538 (1,474-1,622) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	741 (661-861) [3]
74	03/08/12 08:04	3,969 (3,805-3,991) [3]	2,611 (2,523-2,727) [3]	1,264 (1,194-1,446) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,400 (2,268-2,504) [3]
75	03/09/12 08:04	3,584 (774-5,430) [63]	2,120 (474-3,084) [59]	1,490 (270-2,781) [59]	7.22 (6.76-7.65) [15]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,848 (456-2,761) [56]
76	03/10/12 08:04	6,843 (6,633-8,615) [3]	4,243 (4,116-5,675) [3]	2,727 (958-4,372) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	3,635 (3,471-5,506) [3]
77	03/11/12 08:04	4,756 (4,652-4,892) [3]	1,668 (1,564-1,736) [3]	3,088 (3,088-3,156) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,123 (1,019-1,179) [3]
78	03/12/12 08:04	4,276 (4,082-4,308) [3]	1,748 (1,626-1,780) [3]	2,528 (2,456-2,528) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,302 (1,193-1,334) [3]
79	03/13/12 08:04	4,268 (4,144-4,444) [3]	2,042 (1,976-2,144) [3]	2,226 (2,168-2,300) [3]	7.01 (7.00-7.20) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,649 (1,593-1,738) [3]
80	03/14/12 08:04	5,284 (5,278-5,438) [3]	3,058 (3,036-3,144) [3]	2,242 (2,226-2,294) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,665 (2,640-2,739) [3]
81	03/15/12 08:04	5,554 (5,354-5,578) [3]	3,546 (3,402-3,560) [3]	2,008 (1,952-2,018) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	3,192 (3,058-3,204) [3]
82	03/16/12 08:04	5,590 (5,566-5,652) [3]	3,506 (3,470-3,552) [3]	2,096 (2,084-2,100) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	3,138 (3,100-3,181) [3]
83	03/17/12 08:04	4,792 (4,742-5,092) [3]	2,974 (2,932-3,176) [3]	1,818 (1,810-1,916) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,653 (2,613-2,838) [3]
84	03/18/12 08:03	5,859 (5,615-5,995) [3]	2,032-2,058 [2]	3,801-3,963 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,333-1,387 [2]
85	03/19/12 08:03	3,926 (3,530-4,236) [3]	2,662 (2,348-2,918) [3]	1,264 (1,182-1,318) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,439 (2,139-2,685) [3]

	F	AT	AU	AV	AW	AX	AZ	BC	BD	BE
1	End	(22) CASB AERATION MIXED LIQUOR TSS (mg/L)	(22) CASB AERATION MIXED LIQUOR INERT SOLIDS (mg/L)	(22) CASB AERATION MIXED LIQUOR VSS (mg/L)	(22) CASB AERATION MIXED LIQUOR pH (SU)	(22) CASB AERATION MIXED LIQUOR Alkalinity (mg/L)	(22) CASB AERATION MIXED LIQUOR COD(s) (mg/L)	(22) CASB AERATION MIXED LIQUOR Nitrate (NO3-N) (mg/L)	(22) CASB AERATION MIXED LIQUOR Ammonia (NH3-N) (mg/L)	(22) CASB AERATION MIXED LIQUOR Magnetite (from Solids Wt) (mg/L)
86	03/20/12 08:03	4,072 (4,068-4,240) [3]	2,390 (2,380-2,500) [3]	1,688 (1,682-1,740) [3]	7.13 (7.03-7.15) [3]	116 [1]	No Data [0]	No Data [0]	No Data [0]	2,093 (2,082-2,193) [3]
87	03/21/12 08:03	4,784 (4,704-4,812) [3]	3,078 (3,026-3,102) [3]	1,706 (1,678-1,710) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,777 (2,730-2,800) [3]
88	03/22/12 08:03	4,526 (4,506-4,548) [3]	2,850 (2,832-2,852) [3]	1,676 (1,674-1,696) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,553 (2,537-2,554) [3]
89	03/23/12 08:03	4,796 (4,516-4,850) [3]	3,032 (2,856-3,074) [3]	1,764 (1,660-1,776) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,721 (2,563-2,761) [3]
90	03/24/12 08:03	4,710 (4,536-4,712) [3]	3,088 (2,966-3,096) [3]	1,616 (1,570-1,622) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,802 (2,689-2,811) [3]
91	03/25/12 08:03	4,474 (4,130-4,606) [3]	2,922 (2,684-3,026) [3]	1,552 (1,446-1,580) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,648 (2,429-2,747) [3]
92	03/26/12 08:03	3,863 (3,802-3,973) [3]	2,694 (2,480-2,774) [3]	1,199 (1,169-1,322) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,488 (2,247-2,562) [3]
93	03/27/12 08:05	3,346 (3,328-3,368) [3]	1,898 (1,894-1,916) [3]	1,452 (1,430-1,452) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,646 (1,638-1,660) [3]
94	03/28/12 08:05	4,024 (3,988-4,116) [3]	2,316 (2,306-2,406) [3]	1,708 (1,682-1,710) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,015 (2,009-2,104) [3]
95	03/29/12 08:05	4,111 (3,941-4,119) [3]	2,622-2,879 [2]	1,240-1,319 [2]	No Data [0]	No Data [0]	78.0-78.5 [2]	No Data [0]	No Data [0]	2,389-2,660 [2]
96	03/30/12 08:05	4,816 (4,756-4,914) [3]	2,706 (2,658-2,780) [3]	2,110 (2,098-2,134) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,334 (2,288-2,403) [3]
97	03/31/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
98	04/01/12 08:05	5,584 (5,022-5,838) [3]	3,768 (3,400-3,956) [3]	1,816 (1,622-1,882) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	3,448 (3,114-3,624) [3]
99	04/02/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
100	04/03/12 08:05	3,860 (3,762-3,872) [3]	2,582 (2,504-2,588) [3]	1,278 (1,258-1,284) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,356 (2,282-2,361) [3]
101	04/04/12 08:05	3,206 (3,182-3,270) [3]	2,134 (2,078-2,192) [3]	1,078 (1,048-1,128) [3]	No Data [0]	No Data [0]	102.0-104.0 [2]	No Data [0]	No Data [0]	1,949 (1,879-2,002) [3]
102	04/05/12 08:05	3,292 (3,274-3,304) [3]	2,008 (1,988-2,012) [3]	1,286 (1,280-1,296) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,779 (1,761-1,786) [3]
103	04/06/12 08:05	3,034 (3,030-3,120) [3]	1,606 (1,588-1,618) [3]	1,446 (1,412-1,514) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,339 (1,333-1,369) [3]
104	04/07/12 08:05	3,788 (3,682-3,816) [3]	2,144 (2,090-2,160) [3]	1,628 (1,592-1,672) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,849 (1,809-1,873) [3]
105	04/08/12 08:05	3,166 (3,054-3,232) [3]	1,952 (1,876-1,996) [3]	1,214 (1,058-1,356) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,738 (1,637-1,809) [3]
106	04/09/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
107	04/10/12 08:05	3,570-3,748 [2]	2,090-2,216 [2]	1,480-1,532 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,829-1,946 [2]
108	04/11/12 08:05	4,424-4,866 [2]	3,074-3,458 [2]	MAX(INDEX(WQ_Data!BI\$2:BI\$2000),0)	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,836-3,210 [2]
109	04/12/12 08:05	7,212-7,512 [2]	5,364-5,634 [2]	1,848-1,878 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	5,038-5,303 [2]
110	04/13/12 08:05	6,896-7,136 [2]	4,696-4,906 [2]	2,200-2,230 [2]	No Data [0]	No Data [0]	377.0-450.0 [2]	0.0-0.0 [2]	22.2-22.4 [2]	4,308-4,512 [2]
111	04/14/12 08:05	7,216-7,366 [2]	4,644-4,765 [2]	2,572-2,602 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	4,190-4,305 [2]
112	04/15/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
113	04/16/12 08:05	7,852-8,164 [2]	5,866-6,118 [2]	1,986-2,046 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	5,516-5,757 [2]
114	04/17/12 08:05	7,074-7,960 [2]	5,294-6,084 [2]	1,780-1,876 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	4,980-5,753 [2]
115	04/18/12 08:05	5,788-5,848 [2]	3,936-4,014 [2]	1,834-1,852 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	3,609-3,690 [2]
116	04/19/12 08:05	6,984-7,062 [2]	4,876-4,970 [2]	2,092-2,108 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	4,504-4,601 [2]
117	04/20/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
118	04/21/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
119	04/22/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
120	04/23/12 08:05	6,223-6,596 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
121	04/24/12 08:05	5,540-5,872 [2]	3,922-4,228 [2]	1,618-1,644 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	3,636-3,938 [2]
122	04/25/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
123	04/26/12 08:05	4,640-5,012 [2]	2,958-3,286 [2]	1,682-1,726 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,661-2,981 [2]
124	04/27/12 08:05	7,684-7,988 [2]	5,807-6,034 [2]	1,877-1,954 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	5,476-5,689 [2]
125	04/28/12 08:05	7,493-7,521 [2]	5,595-5,622 [2]	1,898-1,899 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
126	04/29/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
127	04/30/12 08:05	7,922-8,228 [2]	6,100-6,356 [2]	1,822-1,872 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	5,778-6,026 [2]

Table 3.6-02: Conventional Activated Sludge with BioMag (CASB) Field Data Report, Part 19 of 35

	F	AT	AU	AV	AW	AX	AZ	BC	BD	BE
1	End	(22) CASB AERATION MIXED LIQUOR TSS (mg/L)	(22) CASB AERATION MIXED LIQUOR INERT SOLIDS (mg/L)	(22) CASB AERATION MIXED LIQUOR VSS (mg/L)	(22) CASB AERATION MIXED LIQUOR pH (SU)	(22) CASB AERATION MIXED LIQUOR Alkalinity (mg/L)	(22) CASB AERATION MIXED LIQUOR COD(s) (mg/L)	(22) CASB AERATION MIXED LIQUOR Nitrate (NO3-N) (mg/L)	(22) CASB AERATION MIXED LIQUOR Ammonia (NH3-N) (mg/L)	(22) CASB AERATION MIXED LIQUOR Magnetite (from Solids Wt) (mg/L)
128	05/01/12 08:05	7,109-7,183 [2]	5,488-5,548 [2]	1,621-1,635 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	5,202-5,259 [2]
129	05/02/12 08:05	7,794-7,898 [2]	5,932-5,998 [2]	1,862-1,900 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	5,603-5,663 [2]
130	05/03/12 08:05	8,170-8,372 [2]	6,311-6,446 [2]	1,859-1,926 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	7.4 [1]	5,983-6,106 [2]
131	05/04/12 08:05	9,059-9,173 [2]	7,001-7,092 [2]	2,058-2,082 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	6,638-6,724 [2]
132	05/05/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
133	05/06/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
134	05/07/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
135	05/08/12 08:05	5,602-5,735 [2]	4,349-4,454 [2]	1,253-1,281 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	4,128-4,228 [2]
136	05/09/12 08:05	6,531-6,569 [2]	5,379-5,418 [2]	1,151-1,152 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	5,176-5,215 [2]
137	05/10/12 08:05	7,418-7,570 [2]	5,735-5,882 [2]	1,683-1,688 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	5,438-5,584 [2]
138	05/11/12 08:05	7,209-7,256 [2]	5,545-5,578 [2]	1,664-1,678 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	5,251-5,282 [2]
139	05/12/12 08:05	5,878 (4,440-9,016) [3]	4,542 (3,382-7,048) [3]	1,336 (1,058-1,968) [3]	7.88 [1]	128 [1]	No Data [0]	No Data [0]	No Data [0]	4,306 (3,195-6,701) [3]
140	05/13/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
141	05/14/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
142	05/15/12 08:05	8,120-8,746 [2]	6,404-6,875 [2]	1,716-1,871 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	6,101-6,545 [2]
143	05/16/12 08:17	9,988-10,130 [2]	7,669-7,800 [2]	2,319-2,330 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	7,260-7,389 [2]
144	05/17/12 08:17	10,181-10,366 [2]	7,821-7,931 [2]	2,360-2,435 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	7,405-7,501 [2]
145	05/18/12 08:17	11,151-11,270 [2]	8,553-8,634 [2]	2,598-2,634 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	8,095-8,171 [2]
146	05/19/12 08:17	11,043-11,150 [2]	8,344-8,434 [2]	2,699-2,716 [2]	7.41 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	7,868-7,955 [2]
147	05/20/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
148	05/21/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
149	05/22/12 08:17	10,347-10,693 [2]	7,703-8,090 [2]	2,603-2,644 [2]	7.35 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	7,236-7,631 [2]
150	05/23/12 08:18	10,907-11,184 [2]	8,114-8,322 [2]	2,792-2,862 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	7,622-7,817 [2]
151	05/24/12 08:18	10,282-10,361 [2]	7,468-7,486 [2]	2,796-2,893 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	6,957-6,993 [2]
152	05/25/12 08:18	9,853-10,205 [2]	7,276-7,542 [2]	2,577-2,663 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	6,821-7,072 [2]
153	05/26/12 08:18	10,003-10,314 [2]	7,233-7,479 [2]	2,770-2,835 [2]	8.09 [1]	294 [1]	No Data [0]	No Data [0]	No Data [0]	6,744-6,979 [2]
154	05/27/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
155	05/28/12 08:18	9,284-9,807 [2]	6,861-7,339 [2]	2,423-2,468 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	6,433-6,903 [2]
156	05/29/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
157	05/30/12 08:18	9,600-9,881 [2]	6,969-7,171 [2]	2,631-2,710 [2]	7.90 [1]	190 [1]	No Data [0]	No Data [0]	No Data [0]	6,505-6,693 [2]
158	05/31/12 08:18	8,727-8,852 [2]	6,213-6,336 [2]	2,514-2,516 [2]	7.76 [1]	136 [1]	No Data [0]	No Data [0]	No Data [0]	5,769-5,892 [2]
159	06/01/12 08:18	8,738-8,821 [2]	6,287-6,371 [2]	2,450-2,451 [2]	No Data [0]	No Data [0]	No Data [0]	0.6 [1]	0.0 [1]	No Data [0]
160	06/02/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
161	06/03/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
162	06/04/12 08:18	9,376-9,536 [2]	6,474-6,630 [2]	2,902-2,906 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	5,962-6,117 [2]
163	06/05/12 08:18	7,343-7,511 [2]	5,542-6,144 [2]	1,367-1,801 [2]	7.83 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
164	06/06/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
165	06/07/12 08:18	8,389-8,582 [2]	6,087-6,216 [2]	2,302-2,366 [2]	7.71 [1]	158 [1]	No Data [0]	No Data [0]	No Data [0]	5,681-5,798 [2]
166	06/08/12 08:18	8,771-8,920 [2]	6,466-6,481 [2]	2,290-2,454 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	6,033-6,077 [2]
167	06/09/12 08:18	8,189-8,273 [2]	5,926-5,995 [2]	2,263-2,278 [2]	7.77 [1]	156 [1]	No Data [0]	No Data [0]	No Data [0]	5,527-5,593 [2]
168	06/10/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
169	06/11/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

Table 3.6-02: Conventional Activated Sludge with BioMag (CASB) Field Data Report, Part 20 of 35

	F	AT	AU	AV	AW	AX	AZ	BC	BD	BE
1	End	(22) CASB AERATION MIXED LIQUOR TSS (mg/L)	(22) CASB AERATION MIXED LIQUOR INERT SOLIDS (mg/L)	(22) CASB AERATION MIXED LIQUOR VSS (mg/L)	(22) CASB AERATION MIXED LIQUOR pH (SU)	(22) CASB AERATION MIXED LIQUOR Alkalinity (mg/L)	(22) CASB AERATION MIXED LIQUOR COD(s) (mg/L)	(22) CASB AERATION MIXED LIQUOR Nitrate (NO3-N) (mg/L)	(22) CASB AERATION MIXED LIQUOR Ammonia (NH3-N) (mg/L)	(22) CASB AERATION MIXED LIQUOR Magnetite (from Solids Wt) (mg/L)
170	06/12/12 08:18	7,976-8,044 [2]	5,914-5,963 [2]	2,062-2,081 [2]	7.72 [1]	100 [1]	No Data [0]	No Data [0]	No Data [0]	5,550-5,596 [2]
171	06/13/12 08:18	8,742-8,798 [2]	6,322-6,346 [2]	2,420-2,452 [2]	7.66 [1]	165 [1]	No Data [0]	No Data [0]	No Data [0]	5,895-5,913 [2]
172	06/14/12 08:18	10,050-10,582 [2]	7,305-7,730 [2]	2,751-2,852 [2]	7.44 [1]	181 [1]	No Data [0]	No Data [0]	No Data [0]	6,814-7,227 [2]
173	06/15/12 08:18	9,398-9,446 [2]	6,457-6,906 [2]	2,540-2,941 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	5,938-6,458 [2]
174	06/16/12 08:18	9,303-9,716 [2]	6,670-7,012 [2]	2,633-2,704 [2]	7.59 [1]	80 [1]	No Data [0]	No Data [0]	No Data [0]	6,205-6,535 [2]
175	06/17/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
176	06/18/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1.4 [1]	0.1 [1]	No Data [0]
177	06/19/12 08:18	11,378-11,427 [2]	7,925-7,944 [2]	3,454-3,483 [2]	7.58 [1]	164 [1]	No Data [0]	No Data [0]	No Data [0]	7,314-7,329 [2]
178	06/20/12 08:18	9,794-9,850 [2]	6,454-6,480 [2]	3,340-3,370 [2]	7.60 [1]	164 [1]	No Data [0]	No Data [0]	No Data [0]	5,865-5,885 [2]
179	06/21/12 08:18	9,875-10,083 [2]	6,531-6,709 [2]	3,344-3,374 [2]	7.71 [1]	168 [1]	No Data [0]	No Data [0]	No Data [0]	5,941-6,114 [2]
180	06/22/12 08:18	11,212-11,651 [2]	7,624-7,955 [2]	3,588-3,686 [2]	No Data [0]	No Data [0]	No Data [0]	0.2 [1]	5.4 [1]	6,991-7,315 [2]
181	06/23/12 08:18	8,831-9,129 [2]	5,928-6,178 [2]	2,903-2,951 [2]	7.81 [1]	250 [1]	No Data [0]	No Data [0]	No Data [0]	5,416-5,657 [2]
182	06/24/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
183	06/25/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
184	06/26/12 08:18	7,954-8,254 [2]	5,066-5,283 [2]	2,888-2,993 [2]	7.96 [1]	190 [1]	No Data [0]	No Data [0]	No Data [0]	4,556-4,733 [2]
185	06/27/12 08:17	8,151-8,232 [2]	5,026-5,092 [2]	3,125-3,140 [2]	7.80 [1]	180 [1]	No Data [0]	No Data [0]	No Data [0]	4,475-4,538 [2]
186	06/28/12 08:17	8,703-9,140 [2]	5,582-5,950 [2]	3,121-3,190 [2]	7.65 [1]	94 [1]	No Data [0]	No Data [0]	No Data [0]	5,031-5,387 [2]
187	06/29/12 08:17	9,438-9,532 [2]	5,879-5,958 [2]	3,559-3,574 [2]	7.65 [1]	112 [1]	No Data [0]	No Data [0]	No Data [0]	5,251-5,327 [2]
188	06/30/12 08:17	9,698-9,853 [2]	6,288-6,407 [2]	3,410-3,446 [2]	7.55 [1]	126 [1]	No Data [0]	No Data [0]	No Data [0]	5,686-5,799 [2]
189	07/01/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
190	07/02/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
191	07/03/12 08:17	8,624-9,030 [2]	5,753-6,102 [2]	2,871-2,928 [2]	7.53 [1]	76 [1]	No Data [0]	No Data [0]	No Data [0]	5,246-5,585 [2]
192	07/04/12 08:17	7,878-8,757 [2]	5,152-5,820 [2]	2,726-2,937 [2]	7.47 [1]	124 [1]	No Data [0]	No Data [0]	No Data [0]	4,671-5,302 [2]
193	07/05/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
194	07/06/12 08:17	5,482-5,662 [2]	3,350-3,477 [2]	2,132-2,185 [2]	7.61 [1]	151 [1]	No Data [0]	No Data [0]	No Data [0]	2,974-3,091 [2]
195	07/07/12 08:17	7,448-7,570 [2]	4,632-4,774 [2]	2,796-2,816 [2]	7.67 [1]	151 [1]	No Data [0]	No Data [0]	No Data [0]	4,135-4,281 [2]
196	07/08/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
197	07/09/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
198	07/10/12 08:17	4,606-4,782 [2]	2,419-2,574 [2]	2,187-2,208 [2]	7.65 [1]	145 [1]	No Data [0]	No Data [0]	0.4 [1]	2,033-2,184 [2]
199	07/11/12 08:17	5,723-5,860 [2]	3,340-3,440 [2]	2,379-2,420 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,924-3,013 [2]
200	07/12/12 08:17	6,967-7,020 [2]	4,073-4,105 [2]	2,835-2,973 [2]	7.97 [1]	244 [1]	No Data [0]	No Data [0]	No Data [0]	3,469-3,685 [2]
201	07/13/12 08:17	7,663-7,891 [2]	4,528-4,685 [2]	3,135-3,206 [2]	7.87 [1]	218 [1]	No Data [0]	No Data [0]	No Data [0]	3,975-4,119 [2]
202	07/14/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

[illegible]

	F	BF	BW	CA	CB	CG	CH	CI	CJ	CK
1	End	(22) CASB AERATION MIXED LIQUOR Magnetite (from MCM) (mg/L)	(25) CASB POST AERATION MIXED LIQUOR SAMPLE ID	(25) CASB POST AERATION MIXED LIQUOR pH (SU)	(25) CASB POST AERATION MIXED LIQUOR Alkalinity (mg/L)	(25) CASB POST AERATION MIXED LIQUOR Nitrate (NO3-N) (mg/L)	(25) CASB POST AERATION MIXED LIQUOR Ammonia (NH3-N) (mg/L)	(27) CASB RAS#2 SAMPLE ID	(27) CASB RAS#2 TSS (mg/L)	(27) CASB RAS#2 INERT SOLIDS (mg/L)
86	03/20/12 08:03	2,390 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
87	03/21/12 08:03	3,570 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
88	03/22/12 08:03	3,080 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
89	03/23/12 08:03	2,680 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
90	03/24/12 08:03	2,480 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
91	03/25/12 08:03	2,820 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
92	03/26/12 08:03	2,670 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
93	03/27/12 08:05	1,130 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
94	03/28/12 08:05	2,420 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
95	03/29/12 08:05	3,150 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
96	03/30/12 08:05	2,450 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
97	03/31/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
98	04/01/12 08:05	4,450 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
99	04/02/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
100	04/03/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
101	04/04/12 08:05	1,770 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
102	04/05/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
103	04/06/12 08:05	1,790 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
104	04/07/12 08:05	2,100 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
105	04/08/12 08:05	1,920 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	742 [1]	No Data [0]	No Data [0]
106	04/09/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
107	04/10/12 08:05	1,830 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	748 [1]	No Data [0]	No Data [0]
108	04/11/12 08:05	3,570 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	757 [1]	No Data [0]	No Data [0]
109	04/12/12 08:05	7,680 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	766-766 [2]	No Data [0]	No Data [0]
110	04/13/12 08:05	5,900 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	775 [1]	No Data [0]	No Data [0]
111	04/14/12 08:05	5,070 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	789 [1]	No Data [0]	No Data [0]
112	04/15/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
113	04/16/12 08:05	68 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	797 [1]	No Data [0]	No Data [0]
114	04/17/12 08:05	6,870 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	804 [1]	No Data [0]	No Data [0]
115	04/18/12 08:05	3,460 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	811 [1]	No Data [0]	No Data [0]
116	04/19/12 08:05	7,580 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	820 [1]	No Data [0]	No Data [0]
117	04/20/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
118	04/21/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
119	04/22/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
120	04/23/12 08:05	7,210 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	832 [1]	No Data [0]	No Data [0]
121	04/24/12 08:05	5,050 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
122	04/25/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
123	04/26/12 08:05	4,020 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	863-863 [2]	No Data [0]	No Data [0]
124	04/27/12 08:05	6,250 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
125	04/28/12 08:05	6,730 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
126	04/29/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
127	04/30/12 08:05	7,530 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	884 [1]	No Data [0]	No Data [0]

[illegible]

[illegible]

	F	CL	CM	CN	CO	CP	CQ	CT	CU	CV
1	End	(27) CASB RAS#2 VSS (mg/L)	(27) CASB RAS#2 pH (SU)	(27) CASB RAS#2 Magnetite (from Solids Wt) (mg/L)	(27) CASB RAS#2 Magnetite (from MCM) (mg/L)	CASB CLA SAMPLE ID	CASB CLA TSS (mg/L)	CASB CLA pH (SU)	CASB CLA Alkalinity (mg/L)	CASB CLA COD(t) (mg/L)
2	07/14/12 08:17	7,764 (1,528-18,172) [119]	7.34 (6.58-7.71) [36]	9,904 (1,865-30,963) [116]	8,970 (2,270-38,800) [37]	564 (6-1,956) [436]	18.8 (-5.0-103.2) [373]	7.23 (6.21-7.99) [107]	133 (75-200) [20]	40.7 (14.2-514.0) [305]
3										
4	12/29/11 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
5	12/30/11 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
6	12/31/11 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
7	01/01/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	6 (6-6) [3]	No Data [0]	6.79-6.82 [2]	No Data [0]	112.0 (94.9-125.0) [3]
8	01/02/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
9	01/03/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
10	01/04/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	11 (11-12) [3]	No Data [0]	No Data [0]	No Data [0]	117.0-262.0 [2]
11	01/05/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
12	01/06/12 08:02	10,090-11,652 [2]	No Data [0]	10,460-11,407 [2]	No Data [0]	18 (17-18) [6]	28.8 (8.5-35.5) [6]	6.96 (6.67-7.23) [6]	No Data [0]	76.0 (70.4-81.4) [5]
13	01/07/12 08:02	8,004 (7,808-8,130) [3]	No Data [0]	6,642 (6,448-6,675) [3]	5,830 [1]	24 (24-25) [5]	No Data [0]	No Data [0]	No Data [0]	30.1 (29.2-36.9) [5]
14	01/08/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
15	01/09/12 08:02	2,486 (2,372-3,890) [3]	No Data [0]	4,939 (3,626-5,371) [3]	No Data [0]	25 [1]	No Data [0]	No Data [0]	No Data [0]	35.8 [1]
16	01/10/12 08:02	11,172 (10,454-11,320) [3]	7.03 (6.90-7.06) [3]	6,888 (6,639-7,210) [3]	No Data [0]	36 (35-36) [6]	15.0 (10.0-18.8) [6]	7.18 (6.83-7.49) [6]	90-92 [2]	28.6 (23.4-29.4) [6]
17	01/11/12 08:02	9,230 (9,174-9,452) [3]	No Data [0]	5,729 (5,511-6,118) [3]	4,640 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
18	01/12/12 08:02	10,540 (10,382-10,556) [3]	7.10 (6.58-7.32) [3]	7,252 (7,228-7,439) [3]	5,990 [1]	44 (44-45) [5]	22.4 (18.8-28.8) [5]	7.24 (6.30-7.26) [5]	110-120 [2]	37.0 (31.4-37.4) [5]
19	01/13/12 08:02	11,162 (10,782-11,306) [3]	No Data [0]	11,737 (11,688-12,009) [3]	9,680 [1]	50 (45-50) [4]	29.0 (23.2-30.4) [4]	6.21 [1]	No Data [0]	25.0 (23.3-36.4) [4]
20	01/14/12 08:02	10,242 (10,082-10,428) [3]	7.06 (6.88-7.34) [3]	13,835 (13,801-14,136) [3]	No Data [0]	55 (55-55) [3]	36.8 (36.0-36.8) [3]	No Data [0]	No Data [0]	25.4 (24.9-28.0) [3]
21	01/15/12 08:02	8,082 (8,004-8,200) [3]	No Data [0]	11,974 (11,718-12,145) [3]	No Data [0]	60 (60-60) [3]	20.8 (20.8-21.6) [3]	No Data [0]	No Data [0]	21.6 (21.4-22.0) [3]
22	01/16/12 08:02	7,178 (6,882-8,622) [3]	No Data [0]	20,135 (17,352-20,198) [3]	No Data [0]	61 (61-61) [3]	27.2 (18.8-28.4) [3]	No Data [0]	No Data [0]	17.6 (17.5-18.5) [3]
23	01/17/12 08:02	17,824 (17,406-18,172) [3]	7.30 (7.25-7.37) [3]	30,669 (29,532-30,963) [3]	No Data [0]	140 (140-140) [3]	29.2 (24.8-34.0) [3]	7.82 (7.28-7.99) [3]	No Data [0]	18.8 (18.7-21.8) [3]
24	01/18/12 08:02	6,128 (6,108-6,174) [3]	7.51 (7.48-7.54) [3]	14,268 (14,180-14,333) [3]	No Data [0]	70 (69-71) [6]	29.0 (26.4-32.4) [6]	7.50 (7.48-7.54) [3]	No Data [0]	28.0 (24.0-28.5) [3]
25	01/19/12 08:02	8,734 (8,716-8,870) [3]	7.43 (7.36-7.49) [3]	16,680 (16,629-16,941) [3]	No Data [0]	76 (76-76) [3]	32.4 (22.8-34.8) [3]	7.38 (7.32-7.40) [3]	No Data [0]	32.2 (31.7-32.3) [3]
26	01/20/12 08:02	5,764 (5,638-5,794) [3]	No Data [0]	15,239 (14,953-15,434) [3]	No Data [0]	82 (82-82) [3]	40.8 (39.6-42.4) [3]	No Data [0]	No Data [0]	47.9 (46.3-48.2) [3]
27	01/21/12 08:02	6,990 (6,766-8,000) [3]	No Data [0]	16,590 (15,578-18,188) [3]	No Data [0]	85 (85-85) [4]	14.4 (5.2-21.4) [4]	No Data [0]	No Data [0]	47.5 (45.4-50.1) [3]
28	01/22/12 08:02	8,950 (8,584-8,960) [3]	No Data [0]	16,365 (16,019-16,467) [3]	No Data [0]	95 (95-95) [16]	16.3 (13.8-18.4) [16]	No Data [0]	No Data [0]	26.5-26.9 [2]
29	01/23/12 08:02	10,092 (9,990-10,120) [3]	No Data [0]	16,823 (16,541-16,882) [3]	No Data [0]	103 (102-103) [6]	14.7 (10.4-16.6) [6]	7.16 (7.05-7.29) [6]	No Data [0]	25.9 (24.8-26.9) [3]
30	01/24/12 08:02	8,874 (8,726-9,020) [3]	No Data [0]	14,216 (14,122-14,396) [3]	No Data [0]	110 (110-110) [3]	20.8 (20.2-21.2) [3]	7.28 (7.16-7.55) [3]	No Data [0]	30.7 (30.2-33.3) [3]
31	01/25/12 08:02	9,016 (8,886-9,078) [3]	No Data [0]	13,507 (13,464-13,626) [3]	No Data [0]	118 (118-118) [3]	14.0 (12.2-19.0) [3]	No Data [0]	No Data [0]	39.6 (39.0-46.2) [3]
32	01/26/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
33	01/27/12 08:02	8,102 (8,006-8,382) [3]	7.22 (7.21-7.46) [3]	15,245 (14,721-15,388) [3]	No Data [0]	132 (132-132) [3]	14.4 (14.0-19.8) [3]	6.91 (6.83-7.05) [3]	No Data [0]	42.3 (40.5-43.7) [3]
34	01/28/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	145 (145-145) [3]	23.8 (20.0-24.0) [3]	7.01 (6.86-7.08) [3]	No Data [0]	37.0-40.7 [2]
35	01/29/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	151 (151-151) [3]	7.2 (7.0-11.8) [3]	No Data [0]	No Data [0]	30.4-32.2 [2]
36	01/30/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	157 (157-157) [3]	15.0 (15.0-17.0) [3]	No Data [0]	No Data [0]	26.3-28.7 [2]
37	01/31/12 08:02	3,014 (2,704-3,084) [3]	No Data [0]	6,736 (6,075-6,790) [3]	No Data [0]	164 (164-164) [3]	10.8 (10.2-11.0) [3]	No Data [0]	No Data [0]	25.4-28.0 [2]
38	02/01/12 08:02	6,064 (5,800-6,322) [3]	No Data [0]	10,888 (10,790-11,294) [3]	No Data [0]	171 (171-171) [3]	8.0 (7.2-8.0) [3]	No Data [0]	No Data [0]	25.6-32.2 [2]
39	02/02/12 08:02	10,902 (10,674-10,934) [3]	No Data [0]	15,500 (15,230-15,578) [3]	11,740 [1]	183 (183-183) [4]	13.0 (12.6-13.4) [3]	7.47 (7.27-7.49) [3]	No Data [0]	44.0-44.7 [2]
40	02/03/12 08:02	No Data [0]	No Data [0]	No Data [0]	15,440 [1]	189 (189-189) [3]	13.6 (13.2-14.4) [3]	No Data [0]	No Data [0]	31.7-35.6 [2]
41	02/04/12 08:02	9,952 (9,750-10,012) [3]	No Data [0]	13,171 (12,881-13,210) [3]	10,580 [1]	197 (197-197) [4]	20.2 (19.0-24.2) [3]	No Data [0]	No Data [0]	29.0-30.0 [2]
42	02/05/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	201 (201-201) [3]	15.6 (13.8-16.2) [3]	No Data [0]	No Data [0]	21.0 [1]
43	02/06/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	210 [1]	No Data [0]	No Data [0]	No Data [0]	20.0 [1]

	F	CL	CM	CN	CO	CP	CQ	CT	CU	CV
1	End	(27) CASB RAS#2 VSS (mg/L)	(27) CASB RAS#2 pH (SU)	(27) CASB RAS#2 Magnetite (from Solids Wt) (mg/L)	(27) CASB RAS#2 Magnetite (from MCM) (mg/L)	CASB CLA SAMPLE ID	CASB CLA TSS (mg/L)	CASB CLA pH (SU)	CASB CLA Alkalinity (mg/L)	CASB CLA COD(t) (mg/L)
44	02/07/12 08:02	9,040 (8,862-9,066) [3]	7.62 (7.29-7.66) [3]	17,062 (16,658-17,089) [3]	No Data [0]	222 (222-222) [4]	24.2 (21.0-26.0) [3]	7.47 (7.21-7.48) [3]	No Data [0]	37.0 [1]
45	02/08/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
46	02/09/12 08:02	5,944 (5,786-5,954) [3]	7.51 (7.34-7.51) [3]	9,955 (9,725-9,959) [3]	3,290-8,998 [2]	239 (239-239) [3]	13.8 (10.4-14.2) [3]	7.58 (7.50-7.73) [3]	No Data [0]	29.0-31.0 [2]
47	02/10/12 08:02	5,456 (5,382-5,458) [3]	No Data [0]	9,189 (9,072-9,253) [3]	10,130 [1]	247 (247-247) [4]	6.8 (3.6-7.0) [3]	No Data [0]	No Data [0]	27.9-33.7 [2]
48	02/11/12 08:02	6,396 (6,384-6,682) [3]	7.23 (7.10-7.40) [3]	9,551 (9,457-9,853) [3]	11,960 [1]	262 (262-262) [3]	8.8 (8.2-9.0) [3]	6.92 (6.72-7.23) [3]	No Data [0]	41.0-54.6 [2]
49	02/12/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
50	02/13/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
51	02/14/12 08:02	5,714 (5,650-5,786) [3]	7.26 (7.06-7.49) [3]	6,028 (5,805-6,045) [3]	No Data [0]	284 (284-284) [3]	22.2 (20.8-26.4) [3]	6.66 (6.46-6.97) [3]	No Data [0]	56.6-58.8 [2]
52	02/15/12 08:02	5,440 (4,944-5,590) [3]	No Data [0]	7,132 (6,852-7,212) [3]	No Data [0]	297 (297-297) [3]	36.0 (24.6-36.2) [3]	No Data [0]	No Data [0]	63.7-65.3 [2]
53	02/16/12 08:02	7,188 (7,154-7,334) [3]	No Data [0]	8,992 (8,744-9,210) [3]	No Data [0]	308 (308-308) [3]	15.6 (15.2-16.2) [3]	7.06 (6.98-7.07) [3]	No Data [0]	55.7-56.2 [2]
54	02/17/12 08:02	5,926 (2,268-9,064) [3]	No Data [0]	7,982 (5,696-9,580) [3]	No Data [0]	320 (320-320) [3]	19.4 (17.0-19.4) [3]	No Data [0]	No Data [0]	47.6-48.3 [2]
55	02/18/12 08:02	9,680 (9,594-10,356) [3]	No Data [0]	No Data [0]	No Data [0]	331 (331-331) [3]	11.6 (11.0-13.8) [3]	No Data [0]	No Data [0]	45.8-47.5 [2]
56	02/19/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
57	02/20/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	341 (341-341) [3]	30.4 (26.2-37.8) [3]	No Data [0]	No Data [0]	68.4-74.2 [2]
58	02/21/12 08:02	6,462 (6,384-6,652) [3]	No Data [0]	5,677 (5,610-5,724) [3]	7,280 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
59	02/22/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
60	02/23/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
61	02/24/12 08:02	1,536 (1,528-1,538) [3]	7.68 (7.38-7.71) [3]	1,874 (1,865-1,903) [3]	2,270 [1]	371 (371-371) [3]	49.2 (44.4-53.6) [3]	7.43 (7.19-7.45) [3]	No Data [0]	123.0-124.0 [2]
62	02/25/12 08:02	No Data [0]	No Data [0]	No Data [0]	4,240 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
63	02/26/12 08:02	3,680 (3,580-3,694) [3]	No Data [0]	3,441 (3,392-3,568) [3]	3,250 [1]	388 (388-388) [3]	47.6 (30.8-50.0) [3]	No Data [0]	No Data [0]	68.6-73.6 [2]
64	02/27/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	395 (393-396) [6]	27.0 (21.0-46.0) [6]	No Data [0]	No Data [0]	82.5 (73.0-83.0) [4]
65	02/28/12 08:02	4,664 (4,638-4,762) [3]	No Data [0]	7,336 (7,299-7,516) [3]	8,580 [1]	400 (400-400) [3]	59.2 (54.0-72.0) [3]	No Data [0]	No Data [0]	67.0-71.9 [2]
66	02/29/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
67	03/01/12 08:02	No Data [0]	No Data [0]	No Data [0]	5,150 [1]	417 (417-417) [3]	No Data [0]	No Data [0]	No Data [0]	81.6-86.3 [2]
68	03/02/12 08:02	No Data [0]	No Data [0]	No Data [0]	3,980 [1]	427 (427-427) [3]	38.2 (36.2-39.8) [3]	7.45 (7.14-7.48) [3]	200 [1]	78.5-85.2 [2]
69	03/03/12 08:01	No Data [0]	No Data [0]	No Data [0]	5,720 [1]	436 (436-436) [4]	72.2 (71.2-72.2) [3]	No Data [0]	No Data [0]	94.2-96.4 [2]
70	03/04/12 08:01	No Data [0]	No Data [0]	No Data [0]	8,510 [1]	446 (446-446) [3]	36.0 (35.2-39.6) [3]	No Data [0]	No Data [0]	89.2-111.0 [2]
71	03/05/12 08:01	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
72	03/06/12 08:01	No Data [0]	No Data [0]	No Data [0]	No Data [0]	452 (452-452) [3]	19.6 (19.2-20.8) [3]	7.14 (7.12-7.18) [3]	No Data [0]	61.9-64.8 [2]
73	03/07/12 08:04	No Data [0]	No Data [0]	No Data [0]	No Data [0]	460 (460-460) [3]	17.6 (17.4-19.6) [3]	No Data [0]	No Data [0]	74.5-76.8 [2]
74	03/08/12 08:04	No Data [0]	No Data [0]	No Data [0]	No Data [0]	465 (465-465) [3]	23.0 (22.2-23.6) [3]	No Data [0]	No Data [0]	82.4-90.9 [2]
75	03/09/12 08:04	5,650 (1,528-10,356) [33]	7.38 (7.06-7.71) [9]	7,172 (1,865-9,853) [30]	5,720 (2,270-11,960) [11]	391 (247-465) [62]	24.6 (3.6-72.2) [57]	7.13 (6.46-7.48) [18]	200 [1]	72.5 (27.9-124.0) [40]
76	03/10/12 08:04	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
77	03/11/12 08:04	No Data [0]	No Data [0]	No Data [0]	No Data [0]	496 (496-496) [3]	10.0 (10.0-14.8) [3]	No Data [0]	No Data [0]	79.7-80.8 [2]
78	03/12/12 08:04	7,746 (7,642-7,764) [3]	No Data [0]	4,453 (4,385-4,502) [3]	5,900 [1]	507 (507-507) [3]	12.2 (11.6-14.0) [3]	No Data [0]	No Data [0]	35.1-40.8 [2]
79	03/13/12 08:04	No Data [0]	No Data [0]	No Data [0]	No Data [0]	516 (514-518) [6]	25.6 (10.8-46.0) [6]	6.93 (6.92-7.02) [3]	80 [1]	55.2 (38.7-70.0) [4]
80	03/14/12 08:04	2,914 (2,902-3,036) [3]	No Data [0]	3,598 (3,594-3,788) [3]	4,570 [1]	524 (523-524) [6]	12.9 (10.0-16.8) [6]	No Data [0]	No Data [0]	55.3 (50.0-56.4) [4]
81	03/15/12 08:04	4,578 (4,550-4,592) [3]	No Data [0]	7,991 (7,884-8,080) [3]	9,620 [1]	537 (537-537) [3]	16.4 (14.0-18.0) [3]	No Data [0]	No Data [0]	45.7-47.7 [2]
82	03/16/12 08:04	No Data [0]	No Data [0]	No Data [0]	No Data [0]	547 (547-547) [3]	12.2 (10.8-13.0) [3]	6.63 (6.22-6.79) [3]	135 [1]	64.2-64.6 [2]
83	03/17/12 08:04	No Data [0]	No Data [0]	No Data [0]	No Data [0]	556 (556-556) [3]	12.6 (11.6-13.0) [3]	No Data [0]	No Data [0]	60.5-68.4 [2]
84	03/18/12 08:03	No Data [0]	No Data [0]	No Data [0]	8,270 [1]	572 (572-572) [3]	11.0 (10.4-12.8) [3]	No Data [0]	No Data [0]	59.1-59.2 [2]
85	03/19/12 08:03	No Data [0]	No Data [0]	No Data [0]	No Data [0]	577 (577-577) [3]	18.8 (18.4-24.4) [3]	No Data [0]	No Data [0]	61.7-63.1 [2]

	F	CL	CM	CN	CO	CP	CQ	CT	CU	CV
1	End	(27) CASB RAS#2 VSS (mg/L)	(27) CASB RAS#2 pH (SU)	(27) CASB RAS#2 Magnetite (from Solids Wt) (mg/L)	(27) CASB RAS#2 Magnetite (from MCM) (mg/L)	CASB CLA SAMPLE ID	CASB CLA TSS (mg/L)	CASB CLA pH (SU)	CASB CLA Alkalinity (mg/L)	CASB CLA COD(t) (mg/L)
86	03/20/12 08:03	No Data [0]	No Data [0]	No Data [0]	No Data [0]	582 (582-582) [3]	10.8 (8.8-11.6) [3]	6.93 (6.86-7.02) [3]	130 [1]	47.1-56.1 [2]
87	03/21/12 08:03	No Data [0]	No Data [0]	No Data [0]	No Data [0]	596 (596-596) [3]	12.0 (11.0-12.6) [3]	No Data [0]	No Data [0]	58.9-61.0 [2]
88	03/22/12 08:03	No Data [0]	No Data [0]	No Data [0]	No Data [0]	607 (606-608) [6]	27.4 (24.4-28.0) [3]	7.30 (7.15-7.34) [3]	145 [1]	76.6-78.4 [2]
89	03/23/12 08:03	No Data [0]	No Data [0]	No Data [0]	No Data [0]	612 (612-612) [3]	20.6 (19.8-21.4) [3]	No Data [0]	No Data [0]	86.5-98.4 [2]
90	03/24/12 08:03	No Data [0]	No Data [0]	No Data [0]	No Data [0]	622 (622-622) [3]	25.6 (25.4-26.0) [3]	No Data [0]	No Data [0]	86.8-93.2 [2]
91	03/25/12 08:03	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
92	03/26/12 08:03	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
93	03/27/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
94	03/28/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
95	03/29/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
96	03/30/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
97	03/31/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
98	04/01/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	683 (683-683) [3]	26.8 (23.0-27.8) [3]	7.28 (6.95-7.51) [3]	185 [1]	94.1-97.8 [2]
99	04/02/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
100	04/03/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	699 (699-699) [3]	42.4 (38.6-42.8) [3]	No Data [0]	No Data [0]	No Data [0]
101	04/04/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	702 (702-702) [3]	26.6 (23.4-36.4) [3]	No Data [0]	No Data [0]	112.0-114.0 [2]
102	04/05/12 08:05	No Data [0]	No Data [0]	No Data [0]	6,780 [1]	711 (711-711) [3]	25.6 (17.8-30.8) [3]	7.13 [1]	150 [1]	87.6-89.6 [2]
103	04/06/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	729 (729-729) [3]	45.0 (43.4-48.4) [3]	No Data [0]	No Data [0]	110.0-116.0 [2]
104	04/07/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
105	04/08/12 08:05	No Data [0]	No Data [0]	No Data [0]	7,280 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
106	04/09/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
107	04/10/12 08:05	No Data [0]	No Data [0]	No Data [0]	8,970 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
108	04/11/12 08:05	No Data [0]	No Data [0]	No Data [0]	35,800 [1]	758-758 [2]	75.2-103.2 [2]	No Data [0]	No Data [0]	136.0-139.0 [2]
109	04/12/12 08:05	No Data [0]	No Data [0]	No Data [0]	38,800 [1]	767-767 [2]	36.0-53.8 [2]	No Data [0]	No Data [0]	108.0-124.0 [2]
110	04/13/12 08:05	No Data [0]	No Data [0]	No Data [0]	34,200 [1]	776-776 [2]	52.8-63.4 [2]	No Data [0]	No Data [0]	74.3-93.7 [2]
111	04/14/12 08:05	No Data [0]	No Data [0]	No Data [0]	22,250 [1]	790-790 [2]	42.4-75.2 [2]	No Data [0]	No Data [0]	90.6-93.2 [2]
112	04/15/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
113	04/16/12 08:05	No Data [0]	No Data [0]	No Data [0]	18,520 [1]	798-798 [2]	26.4-30.4 [2]	No Data [0]	No Data [0]	70.7-75.9 [2]
114	04/17/12 08:05	No Data [0]	No Data [0]	No Data [0]	31,500 [1]	806-806 [2]	37.8-40.4 [2]	No Data [0]	No Data [0]	93.0-94.4 [2]
115	04/18/12 08:05	No Data [0]	No Data [0]	No Data [0]	12,730 [1]	812 (812-812) [3]	30.0-41.6 [2]	7.11 [1]	No Data [0]	73.0-74.5 [2]
116	04/19/12 08:05	No Data [0]	No Data [0]	No Data [0]	21,100 [1]	821-821 [2]	33.4-37.0 [2]	No Data [0]	No Data [0]	88.8-89.6 [2]
117	04/20/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
118	04/21/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
119	04/22/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
120	04/23/12 08:05	No Data [0]	No Data [0]	No Data [0]	30,340 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
121	04/24/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	844-844 [2]	22.4-23.6 [2]	No Data [0]	No Data [0]	No Data [0]
122	04/25/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
123	04/26/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	862-862 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
124	04/27/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	869-869 [2]	14.0-15.0 [2]	No Data [0]	No Data [0]	21.2-25.1 [2]
125	04/28/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	878 (878-878) [3]	7.2-10.0 [2]	No Data [0]	No Data [0]	14.2-21.2 [2]
126	04/29/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
127	04/30/12 08:05	No Data [0]	No Data [0]	No Data [0]	15,450 [1]	885-885 [2]	10.0-10.2 [2]	No Data [0]	No Data [0]	21.7-23.3 [2]

	F	CL	CM	CN	CO	CP	CQ	CT	CU	CV
1	End	(27) CASB RAS#2 VSS (mg/L)	(27) CASB RAS#2 pH (SU)	(27) CASB RAS#2 Magnetite (from Solids Wt) (mg/L)	(27) CASB RAS#2 Magnetite (from MCM) (mg/L)	CASB CLA SAMPLE ID	CASB CLA TSS (mg/L)	CASB CLA pH (SU)	CASB CLA Alkalinity (mg/L)	CASB CLA COD(t) (mg/L)
128	05/01/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	896-896 [2]	14.0-14.4 [2]	7.29 [1]	75 [1]	15.2-19.8 [2]
129	05/02/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	906 (906-906) [3]	10.4-12.0 [2]	No Data [0]	No Data [0]	28.8-29.7 [2]
130	05/03/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	919 (919-919) [3]	14.8-16.0 [2]	No Data [0]	No Data [0]	19.8-25.8 [2]
131	05/04/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	931-931 [2]	24.4-26.8 [2]	No Data [0]	No Data [0]	50.6-58.7 [2]
132	05/05/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	940-940 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
133	05/06/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
134	05/07/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	948-948 [2]	85.6-90.4 [2]	No Data [0]	No Data [0]	65.8-72.6 [2]
135	05/08/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	959-959 [2]	No Data [0]	7.69 [1]	110 [1]	54.9-59.2 [2]
136	05/09/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	969 [1]	32.4 [1]	No Data [0]	No Data [0]	61.7 [1]
137	05/10/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	981 (981-981) [3]	27.6-33.2 [2]	7.56 [1]	96 [1]	52.1-52.3 [2]
138	05/11/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	994-994 [2]	24.8-28.4 [2]	No Data [0]	No Data [0]	31.1-40.0 [2]
139	05/12/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,006-1,006 [2]	10.0-13.6 [2]	7.68 [1]	135 [1]	23.4-44.6 [2]
140	05/13/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
141	05/14/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,015-1,015 [2]	3.2-5.2 [2]	No Data [0]	No Data [0]	20.6-22.7 [2]
142	05/15/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,025-1,025 [2]	12.4-13.2 [2]	No Data [0]	No Data [0]	19.1-27.3 [2]
143	05/16/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,038-1,038 [2]	24.4-32.8 [2]	No Data [0]	No Data [0]	23.7-23.8 [2]
144	05/17/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,054 (1,054-1,054) [3]	10.4-10.8 [2]	7.74 [1]	154 [1]	16.8-19.5 [2]
145	05/18/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,069 (1,069-1,069) [3]	10.0-10.5 [2]	7.95 [1]	152 [1]	21.6-24.1 [2]
146	05/19/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,083 (1,083-1,083) [3]	11.5-15.0 [2]	7.58 [1]	No Data [0]	15.1-18.2 [2]
147	05/20/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
148	05/21/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,083 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
149	05/22/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,113 [1]	6.8 [1]	7.50 [1]	No Data [0]	30.6 [1]
150	05/23/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,130 (1,130-1,130) [3]	8.0-9.6 [2]	No Data [0]	No Data [0]	19.4-20.7 [2]
151	05/24/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,144 (1,144-1,144) [3]	6.0-6.4 [2]	7.92 [1]	178 [1]	21.2-21.8 [2]
152	05/25/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,159 (1,159-1,159) [3]	17.5-21.0 [2]	7.93 [1]	160 [1]	20.9-21.8 [2]
153	05/26/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
154	05/27/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
155	05/28/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
156	05/29/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
157	05/30/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
158	05/31/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
159	06/01/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,209 (1,209-1,241) [3]	13.5-16.5 [2]	7.60 [1]	No Data [0]	15.8-16.9 [2]
160	06/02/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
161	06/03/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
162	06/04/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,252-1,252 [2]	14.0-16.0 [2]	No Data [0]	No Data [0]	28.8-30.3 [2]
163	06/05/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,266-1,266 [2]	16.5-22.5 [2]	7.63 [1]	No Data [0]	20.9-21.8 [2]
164	06/06/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,308 (1,270-1,332) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
165	06/07/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,328 (1,314-1,335) [10]	27.5 (26.2-58.5) [6]	7.71 [1]	No Data [0]	36.3-41.5 [2]
166	06/08/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,336-1,343 [2]	24.0 [1]	No Data [0]	No Data [0]	No Data [0]
167	06/09/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,359-1,359 [2]	No Data [0]	7.44 [1]	No Data [0]	45.8-51.8 [2]
168	06/10/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
169	06/11/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,366-1,366 [2]	32.8-33.6 [2]	No Data [0]	No Data [0]	No Data [0]

	F	CL	CM	CN	CO	CP	CQ	CT	CU	CV
1	End	(27) CASB RAS#2 VSS (mg/L)	(27) CASB RAS#2 pH (SU)	(27) CASB RAS#2 Magnetite (from Solids Wt) (mg/L)	(27) CASB RAS#2 Magnetite (from MCM) (mg/L)	CASB CLA SAMPLE ID	CASB CLA TSS (mg/L)	CASB CLA pH (SU)	CASB CLA Alkalinity (mg/L)	CASB CLA COD(t) (mg/L)
170	06/12/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,374-1,374 [2]	25.2-29.0 [2]	No Data [0]	No Data [0]	32.6-40.1 [2]
171	06/13/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,389-1,389 [2]	24.0-24.0 [2]	7.42 [1]	No Data [0]	32.7-36.7 [2]
172	06/14/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,426 (1,400-1,427) [6]	18.0 (13.0-20.6) [5]	7.56 [1]	No Data [0]	37.6 (30.9-44.7) [4]
173	06/15/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,429 (1,428-1,460) [5]	18.0 (17.5-20.0) [4]	No Data [0]	No Data [0]	36.2 (25.9-44.3) [5]
174	06/16/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,473 (1,461-1,477) [5]	11.0-15.5 [2]	No Data [0]	No Data [0]	24.4 (15.4-31.9) [4]
175	06/17/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
176	06/18/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,486-1,486 [2]	18.8-20.0 [2]	No Data [0]	No Data [0]	28.6-29.3 [2]
177	06/19/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,496-1,496 [2]	31.0-39.0 [2]	No Data [0]	No Data [0]	38.7-42.4 [2]
178	06/20/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,513-1,513 [2]	26.5-35.5 [2]	No Data [0]	No Data [0]	42.9-49.9 [2]
179	06/21/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,531 (1,525-1,537) [4]	28.8 (22.5-41.0) [4]	No Data [0]	No Data [0]	50.0-53.2 [2]
180	06/22/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,550-1,550 [2]	35.0-40.0 [2]	No Data [0]	No Data [0]	52.4-514.0 [2]
181	06/23/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,576-1,576 [2]	37.0-47.0 [2]	No Data [0]	No Data [0]	57.5-57.7 [2]
182	06/24/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
183	06/25/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
184	06/26/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,606-1,606 [2]	22.0-26.0 [2]	No Data [0]	No Data [0]	30.9-38.4 [2]
185	06/27/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,620-1,620 [2]	15.5-16.5 [2]	No Data [0]	No Data [0]	20.9-22.3 [2]
186	06/28/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,631-1,631 [2]	16.0-18.0 [2]	No Data [0]	No Data [0]	29.9-34.7 [2]
187	06/29/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,654-1,654 [2]	-5.0--3.0 [2]	No Data [0]	No Data [0]	25.5-26.3 [2]
188	06/30/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,681-1,681 [2]	2.0-2.0 [2]	No Data [0]	No Data [0]	24.3-28.7 [2]
189	07/01/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
190	07/02/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,691-1,691 [2]	7.6-8.0 [2]	7.88 [1]	No Data [0]	52.9-59.7 [2]
191	07/03/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,708 (1,703-1,712) [5]	10.6-14.8 [2]	No Data [0]	No Data [0]	25.8-36.6 [2]
192	07/04/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,726-1,726 [2]	8.0-10.0 [2]	7.47 [1]	118 [1]	38.0-39.0 [2]
193	07/05/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
194	07/06/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,735-1,735 [2]	41.0-46.0 [2]	No Data [0]	No Data [0]	86.7-86.8 [2]
195	07/07/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,771 (1,770-1,771) [4]	15.8 (10.8-19.0) [4]	No Data [0]	No Data [0]	106.5 (97.4-119.0) [4]
196	07/08/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
197	07/09/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
198	07/10/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
199	07/11/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,830-1,830 [2]	5.8-7.0 [2]	No Data [0]	No Data [0]	60.1-73.7 [2]
200	07/12/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,884-1,884 [2]	9.3-12.8 [2]	No Data [0]	No Data [0]	44.2-47.1 [2]
201	07/13/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,942 (1,942-1,946) [3]	5.4-7.8 [2]	No Data [0]	No Data [0]	34.2-37.2 [2]
202	07/14/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,956-1,956 [2]	2.2-7.8 [2]	No Data [0]	No Data [0]	38.4-39.0 [2]

	F	CW	CX	CY	CZ	DA	DB	DC	DD	DE
1	End	CASB CLA COD(s) (mg/L)	CASB CLA BOD(t) (mg/L)	CASB CLA BOD(s) (mg/L)	CASB CLA Nitrate (NO3- N) (mg/L)	CASB CLA Ammonia (NH3-N) (mg/L)	CASB CLA Nitrite (mg/L) (NO2--N)	CASB CLA Total Nitrogen (mg/L) (TN)	CASB CLA NOx (mg/L)	CASB CLA TKN (mg/L)
2	07/14/12 08:17	18.2 (11.2-60.4) [15]	11.4 (1.6-26.8) [79]	1.7 (1.6-2.2) [6]	0.79 (0.00-16.00) [55]	0.45 (0.00-27.60) [93]	0.6 (0.0-20.0) [4]	3.8 (-0.2-28.1) [46]	1.44 (0.12-12.70) [34]	1.9 (-2.5-27.1) [27]
3										
4	12/29/11 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
5	12/30/11 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
6	12/31/11 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
7	01/01/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
8	01/02/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
9	01/03/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
10	01/04/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
11	01/05/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
12	01/06/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
13	01/07/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
14	01/08/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
15	01/09/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
16	01/10/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
17	01/11/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
18	01/12/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
19	01/13/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
20	01/14/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
21	01/15/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
22	01/16/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
23	01/17/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
24	01/18/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
25	01/19/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
26	01/20/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
27	01/21/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
28	01/22/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
29	01/23/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
30	01/24/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2.39 (2.38-2.43) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
31	01/25/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.50 (0.49-0.50) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
32	01/26/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
33	01/27/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.83 (0.81-0.89) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
34	01/28/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.42 (0.42-0.43) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
35	01/29/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
36	01/30/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
37	01/31/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1.56-1.57 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
38	02/01/12 08:02	No Data [0]	6.0 [1]	No Data [0]	No Data [0]	0.46-0.47 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
39	02/02/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	4.28 (2.44-5.54) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
40	02/03/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
41	02/04/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	5.00 (4.91-5.71) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
42	02/05/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
43	02/06/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

	F	CW	CX	CY	CZ	DA	DB	DC	DD	DE
1	End	CASB CLA COD(s) (mg/L)	CASB CLA BOD(t) (mg/L)	CASB CLA BOD(s) (mg/L)	CASB CLA Nitrate (NO3- N) (mg/L)	CASB CLA Ammonia (NH3-N) (mg/L)	CASB CLA Nitrite (mg/L) (NO2--N)	CASB CLA Total Nitrogen (mg/L) (TN)	CASB CLA NOx (mg/L)	CASB CLA TKN (mg/L)
44	02/07/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	11.35 (10.30-11.50) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
45	02/08/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
46	02/09/12 08:02	No Data [0]	8.9 (8.6-13.4) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
47	02/10/12 08:02	No Data [0]	6.8 (6.5-7.9) [4]	No Data [0]	No Data [0]	9.83 (9.68-10.20) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
48	02/11/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
49	02/12/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
50	02/13/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
51	02/14/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
52	02/15/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	27.40-27.60 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
53	02/16/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
54	02/17/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	8.90-8.90 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
55	02/18/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
56	02/19/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
57	02/20/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
58	02/21/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
59	02/22/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
60	02/23/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
61	02/24/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
62	02/25/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
63	02/26/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
64	02/27/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
65	02/28/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
66	02/29/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
67	03/01/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
68	03/02/12 08:02	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
69	03/03/12 08:01	No Data [0]	26.7-26.8 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
70	03/04/12 08:01	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
71	03/05/12 08:01	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
72	03/06/12 08:01	No Data [0]	13.2 (13.2-17.2) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
73	03/07/12 08:04	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
74	03/08/12 08:04	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
75	03/09/12 08:04	No Data [0]	13.2 (6.5-26.8) [9]	No Data [0]	No Data [0]	9.83 (8.90-27.60) [8]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
76	03/10/12 08:04	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
77	03/11/12 08:04	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
78	03/12/12 08:04	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
79	03/13/12 08:04	No Data [0]	22.2 (21.8-25.5) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
80	03/14/12 08:04	No Data [0]	15.9 (14.8-16.9) [6]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
81	03/15/12 08:04	No Data [0]	12.6 (12.2-12.9) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
82	03/16/12 08:04	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
83	03/17/12 08:04	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
84	03/18/12 08:03	No Data [0]	12.8 (11.7-14.1) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
85	03/19/12 08:03	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

[illegible]

	F	CW	CX	CY	CZ	DA	DB	DC	DD	DE
1	End	CASB CLA COD(s) (mg/L)	CASB CLA BOD(t) (mg/L)	CASB CLA BOD(s) (mg/L)	CASB CLA Nitrate (NO3-N) (mg/L)	CASB CLA Ammonia (NH3-N) (mg/L)	CASB CLA Nitrite (mg/L) (NO2--N)	CASB CLA Total Nitrogen (mg/L) (TN)	CASB CLA NOx (mg/L)	CASB CLA TKN (mg/L)
128	05/01/12 08:05	13.9-14.6 [2]	5.7-5.9 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
129	05/02/12 08:05	20.5-23.2 [2]	3.2 (3.0-3.4) [3]	2.2 (1.6-2.2) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
130	05/03/12 08:05	15.1-21.9 [2]	3.2 (2.0-4.2) [3]	1.6 (1.6-1.7) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
131	05/04/12 08:05	No Data [0]	No Data [0]	No Data [0]	0.30 [1]	12.90 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
132	05/05/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	24.00 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
133	05/06/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
134	05/07/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	14.25 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
135	05/08/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	22.2 [1]	5.43 [1]	16.8 [1]
136	05/09/12 08:05	No Data [0]	13.8 [1]	No Data [0]	13.00 [1]	7.14 [1]	20.0 [1]	20.8 [1]	2.78 [1]	18.0 [1]
137	05/10/12 08:05	No Data [0]	11.4 (11.2-13.4) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	15.1 [1]	12.70 [1]	2.4 [1]
138	05/11/12 08:05	No Data [0]	5.2-5.7 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	13.3 [1]	2.73 [1]	10.6 [1]
139	05/12/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.4 [1]	2.05 [1]	-1.7 [1]
140	05/13/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
141	05/14/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	5.4 [1]	7.88 [1]	-2.5 [1]
142	05/15/12 08:05	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	8.4 [1]	1.52 [1]	6.9 [1]
143	05/16/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2.8 [1]	2.35 [1]	0.4 [1]
144	05/17/12 08:17	No Data [0]	2.9 (2.7-3.6) [3]	No Data [0]	1.50 [1]	0.20 [1]	No Data [0]	1.1 [1]	1.40 [1]	0.0 [1]
145	05/18/12 08:17	No Data [0]	2.0 (1.6-2.8) [3]	No Data [0]	2.10 [1]	0.20 [1]	No Data [0]	2.5 [1]	No Data [0]	No Data [0]
146	05/19/12 08:17	No Data [0]	No Data [0]	No Data [0]	1.70 [1]	0.19 [1]	No Data [0]	0.6 [1]	No Data [0]	No Data [0]
147	05/20/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
148	05/21/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
149	05/22/12 08:17	No Data [0]	5.9 [1]	No Data [0]	9.20 [1]	0.20 [1]	No Data [0]	3.2 [1]	No Data [0]	No Data [0]
150	05/23/12 08:18	No Data [0]	2.7 (2.5-3.4) [3]	No Data [0]	2.10 [1]	0.00 [1]	No Data [0]	3.4 [1]	No Data [0]	No Data [0]
151	05/24/12 08:18	18.2-20.7 [2]	3.9 (3.4-5.5) [3]	No Data [0]	1.30 [1]	0.22 [1]	No Data [0]	3.3 [1]	1.34 [1]	1.9 [1]
152	05/25/12 08:18	11.4-11.8 [2]	4.7 (4.7-5.1) [3]	No Data [0]	1.30 [1]	0.07 [1]	No Data [0]	4.3 [1]	No Data [0]	No Data [0]
153	05/26/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
154	05/27/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
155	05/28/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
156	05/29/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
157	05/30/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
158	05/31/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
159	06/01/12 08:18	No Data [0]	No Data [0]	No Data [0]	0.45 [1]	0.00-0.06 [2]	No Data [0]	0.7 [1]	1.48 [1]	No Data [0]
160	06/02/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
161	06/03/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
162	06/04/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	10.3 [1]	2.00 [1]	8.3 [1]
163	06/05/12 08:18	No Data [0]	No Data [0]	No Data [0]	2.92 [1]	0.22 [1]	No Data [0]	1.0 [1]	2.42 [1]	No Data [0]
164	06/06/12 08:18	No Data [0]	No Data [0]	No Data [0]	1.14 (0.50-16.00) [4]	0.20 (0.02-0.22) [3]	0.0 [1]	No Data [0]	No Data [0]	No Data [0]
165	06/07/12 08:18	No Data [0]	No Data [0]	No Data [0]	0.40 (0.38-0.70) [3]	0.19 (0.15-0.20) [3]	No Data [0]	No Data [0]	0.18 [1]	No Data [0]
166	06/08/12 08:18	No Data [0]	No Data [0]	No Data [0]	1.74 [1]	0.14 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
167	06/09/12 08:18	No Data [0]	No Data [0]	No Data [0]	0.00 [1]	0.23 [1]	No Data [0]	0.7 [1]	0.85 [1]	No Data [0]
168	06/10/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
169	06/11/12 08:18	No Data [0]	No Data [0]	No Data [0]	7.20 [1]	0.43 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

	F	CW	CX	CY	CZ	DA	DB	DC	DD	DE
1	End	CASB CLA COD(s) (mg/L)	CASB CLA BOD(t) (mg/L)	CASB CLA BOD(s) (mg/L)	CASB CLA Nitrate (NO3-N) (mg/L)	CASB CLA Ammonia (NH3-N) (mg/L)	CASB CLA Nitrite (mg/L) (NO2--N)	CASB CLA Total Nitrogen (mg/L) (TN)	CASB CLA NOx (mg/L)	CASB CLA TKN (mg/L)
170	06/12/12 08:18	No Data [0]	No Data [0]	No Data [0]	2.43 [1]	0.29 [1]	No Data [0]	5.0 [1]	2.60 [1]	2.4 [1]
171	06/13/12 08:18	No Data [0]	No Data [0]	No Data [0]	0.87 [1]	0.18 [1]	0.1 [1]	2.5 [1]	0.86 [1]	1.7 [1]
172	06/14/12 08:18	54.9-60.4 [2]	No Data [0]	No Data [0]	0.95 (0.44-0.99) [3]	0.19 (0.13-0.23) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
173	06/15/12 08:18	No Data [0]	No Data [0]	No Data [0]	0.79 (0.48-1.19) [3]	0.18 (0.10-0.25) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
174	06/16/12 08:18	No Data [0]	No Data [0]	No Data [0]	0.56 (0.56-0.57) [3]	0.13 (0.04-0.13) [3]	No Data [0]	1.7 [1]	0.70 [1]	1.0 [1]
175	06/17/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
176	06/18/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2.4 [1]	1.36 [1]	1.0 [1]
177	06/19/12 08:18	No Data [0]	No Data [0]	No Data [0]	0.30 [1]	0.33 [1]	No Data [0]	No Data [0]	0.29 [1]	No Data [0]
178	06/20/12 08:18	No Data [0]	No Data [0]	No Data [0]	0.25 [1]	0.48 [1]	No Data [0]	0.0 [1]	0.25 [1]	No Data [0]
179	06/21/12 08:18	No Data [0]	No Data [0]	No Data [0]	0.45 [1]	0.35 [1]	No Data [0]	-0.2 [1]	0.24 [1]	-0.4 [1]
180	06/22/12 08:18	No Data [0]	No Data [0]	No Data [0]	0.36 [1]	0.12 [1]	No Data [0]	0.8 [1]	0.35 [1]	0.5 [1]
181	06/23/12 08:18	No Data [0]	No Data [0]	No Data [0]	1.11 [1]	21.30 [1]	No Data [0]	28.1 [1]	1.03 [1]	27.1 [1]
182	06/24/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
183	06/25/12 08:18	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
184	06/26/12 08:18	No Data [0]	No Data [0]	No Data [0]	1.80 [1]	0.30 [1]	1.1 [1]	0.8 [1]	0.27 [1]	No Data [0]
185	06/27/12 08:17	No Data [0]	No Data [0]	No Data [0]	0.30 [1]	0.26 [1]	No Data [0]	1.0 [1]	0.19 [1]	0.8 [1]
186	06/28/12 08:17	No Data [0]	No Data [0]	No Data [0]	3.97 [1]	0.15 [1]	No Data [0]	5.5 [1]	4.36 [1]	1.2 [1]
187	06/29/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.27 [1]	No Data [0]	3.3 [1]	1.69 [1]	1.6 [1]
188	06/30/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.32 [1]	No Data [0]	4.1 [1]	No Data [0]	No Data [0]
189	07/01/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
190	07/02/12 08:17	No Data [0]	No Data [0]	No Data [0]	10.50 [1]	0.27 [1]	No Data [0]	14.2 [1]	10.30 [1]	3.9 [1]
191	07/03/12 08:17	No Data [0]	No Data [0]	No Data [0]	1.26-11.10 [2]	0.66 [1]	No Data [0]	16.9 (11.3-20.4) [3]	11.40 [1]	5.5 [1]
192	07/04/12 08:17	No Data [0]	No Data [0]	No Data [0]	3.94 [1]	0.30 [1]	No Data [0]	6.0 [1]	No Data [0]	No Data [0]
193	07/05/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
194	07/06/12 08:17	No Data [0]	No Data [0]	No Data [0]	0.08 [1]	14.45 [1]	No Data [0]	17.2 [1]	0.13 [1]	17.1 [1]
195	07/07/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.58-5.09 [2]	No Data [0]	4.6-11.3 [2]	1.34-2.06 [2]	3.2-9.2 [2]
196	07/08/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
197	07/09/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
198	07/10/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
199	07/11/12 08:17	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.28 [1]	No Data [0]	7.1 [1]	No Data [0]	No Data [0]
200	07/12/12 08:17	No Data [0]	No Data [0]	No Data [0]	0.08 [1]	0.78 [1]	No Data [0]	2.5 [1]	No Data [0]	No Data [0]
201	07/13/12 08:17	No Data [0]	No Data [0]	No Data [0]	0.06-0.08 [2]	0.45-0.47 [2]	No Data [0]	1.2 [1]	0.12 [1]	1.1 [1]
202	07/14/12 08:17	No Data [0]	No Data [0]	No Data [0]	0.15 [1]	0.85 [1]	No Data [0]	2.0 [1]	No Data [0]	No Data [0]

3.6.3 Experimental Plan Results

3.6.3.1 Experimental Plan 01

EXPERIMENTAL PLAN 01 was conducted from January 28 to February 9 to evaluate the treatment performance at a flow rate equivalent to the average daily flow for treating to a goal of 30 mg/L BOD and 30 mg/L TSS.

During this Experimental Trial, the main aeration basin was the only tank in use, with a volume of 2681 gallons, and Clarifier #2 was used for clarification. Mixed liquor wasting was accomplished by opening the valves to fill Clarifier #1 to a specified volume, then shutting the valves and wasting the collected volume of mixed liquor. 630 gallons of mixed liquor were wasted every day to target a SRT of 4 days. Clarifier #2 was used for clarification. Polymer was not fed to the system during this period of time, having been shut off on January 23. Figure 3.6-01 shows the flow rate, dissolved oxygen, temperature, and effluent water quality during the Experimental Trial. All effluent samples met the goal of TSS and BOD less than 30 mg/L. The RAS rate from the clarifier varied over the week, starting at 3.5 gpm and rising to 5 gpm. RAS rates may have been lower than optimal because the RAS pumps were not able to pump higher flow rates. Operating conditions and water quality results are tabulated in Table 3.6-03.

Composite samples were collected on January 30, February 3, and February 9 for analysis by Eastern Analytical under lab reports #107265, #107376, and #107547, respectively. A boxplot of the water quality results is shown in Figure 3.6-02.

Table 3.6-03: Results for CASB Experimental Trial 01

Parameter	Results	Goal
Influent Flow Rate (gpm)	7.0 (4.8 – 10.9)	8.2
Influent TSS (mg/L)	105 (62 – 151) [36]	
Influent BOD (mg/L)	210 (89 – 273) [3]	
BOD Loading Rate(lbs BOD/1000 cf · day)	37	46
Clarifier Surface Overflow Rate (gpd/sf)	630	1038
Clarifier Solids Loading Rate (lb/sf·day)	16.8	45
Solids Retention Time (days)	4	
Aeration Tank ML TSS (mg/L)	4800 (3760 – 6184) [24]	
Aeration Tank ML VSS (mg/L)	1680 (1404 - 2108) [21]	
Aeration Tank ML Magnetite (mg/L)	2790 (1939 – 4073) [21]	
RAS Rate (gpm)	3.5 - 5	
Polymer Type and Dose	None	
Solids Depth in Clarifier (ft)	2' - 4'	
Effluent BOD (Field)	9.2 (6 – 13) [4]	30
Effluent BOD (Laboratory)	<6, 11, 9	
Effluent BOD (Calculated from COD)	7.7 (5 – 11) [19]	
Effluent TSS (Field)	14.2 (7 – 26) [30]	30
Effluent TSS (Laboratory)	<5, 10, 9	

Figure 3.6-01: Results of CASB Experimental Trial 01

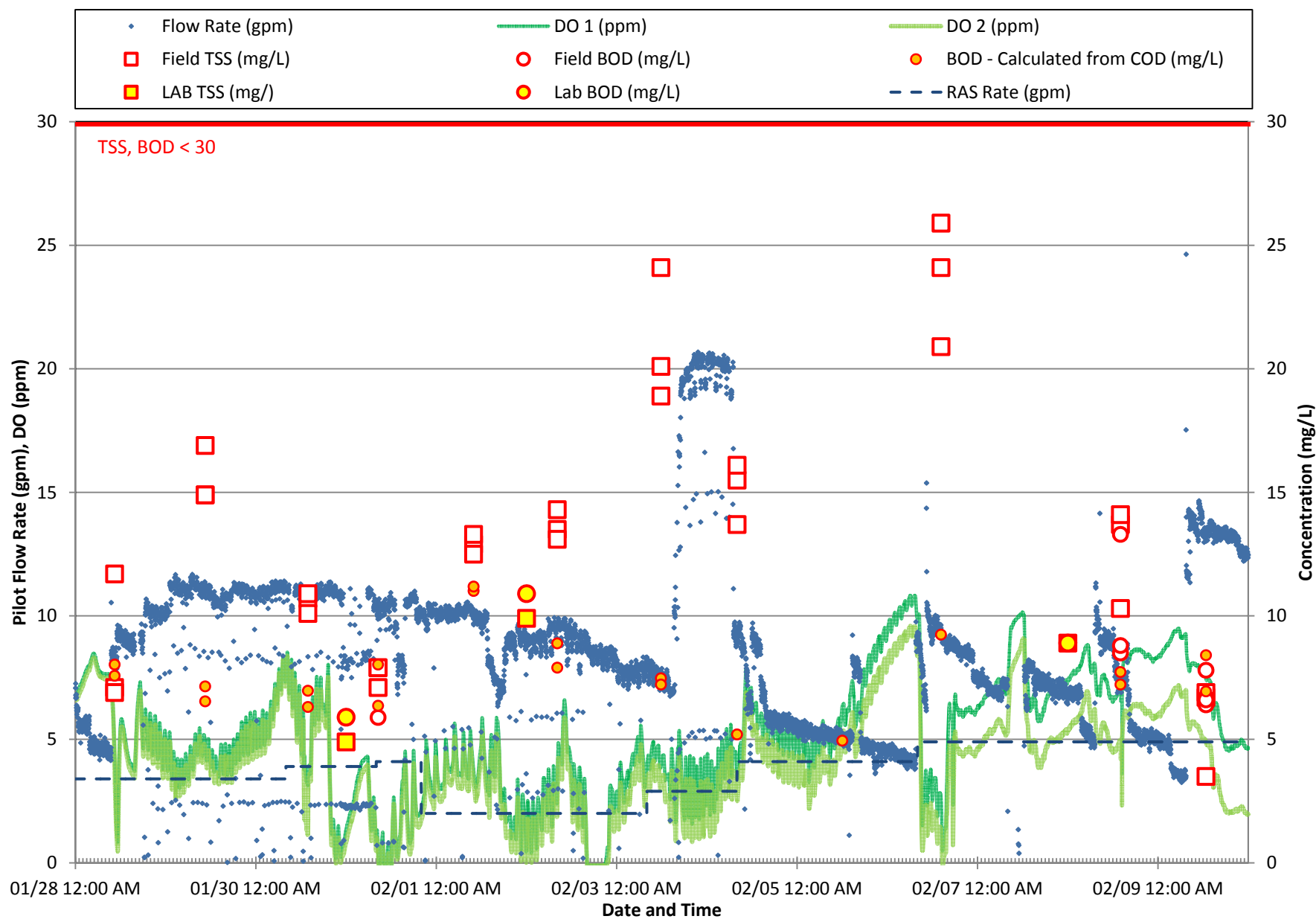
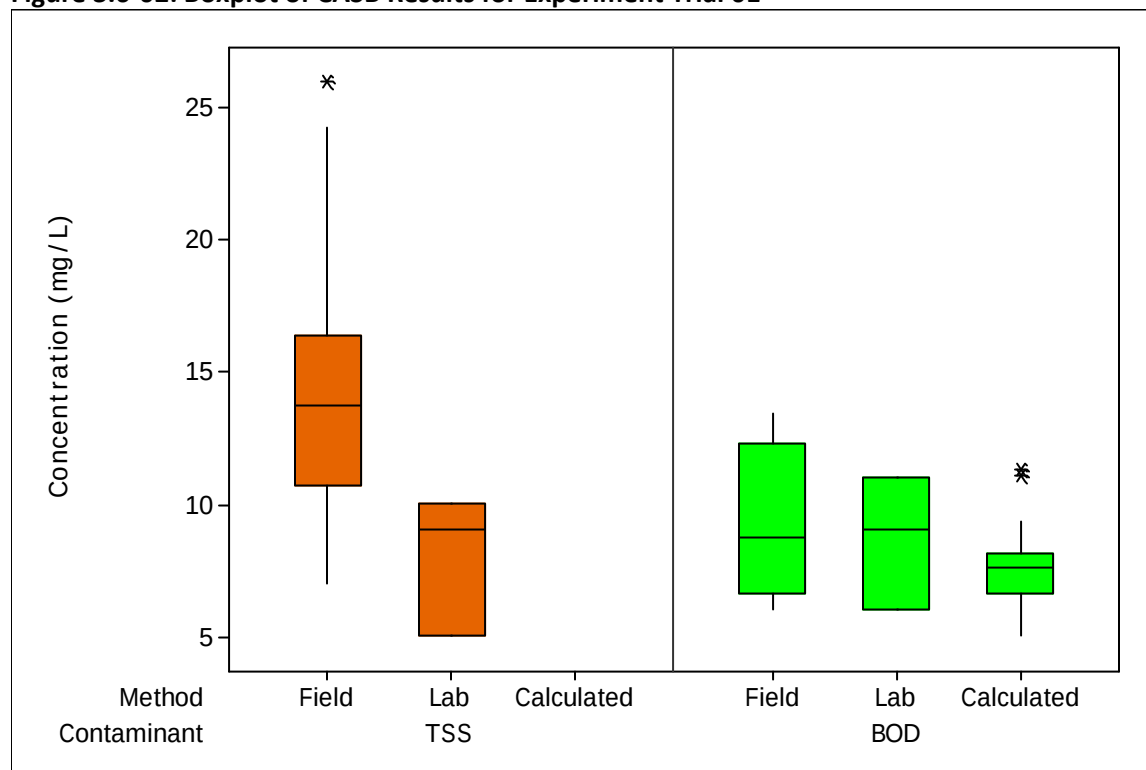


Figure 3.6-02: Boxplot of CASB Results for Experiment Trial 01



3.6.3.2 Experimental Plan 02

EXPERIMENTAL PLAN 02 was conducted from April 27 through May 3, 2012 to evaluate the treatment performance at a flow rate equivalent to the maximum month average daily flow for treating to a treatment goal of 30 mg/L BOD and 30 mg/L TSS.

The influent flow rate for this trial averaged 5.9 gpm, and had an average BOD loading rate of 28 lb BOD/1000 cf of aerated reactor volume. An additional 11 gpm of potable water was added to the mixed liquor just upstream of the clarifier to increase the clarifier loading rate to 1521 gpd/sf.

During this Experimental Trial, the post anoxic zone was being used as an additional aeration tank, so the total aerated volume was 3908 gallons, and Clarifier #2 was used for clarification. Mixed liquor wasting was accomplished by a surface skimmer assembly that pumped to fill Clarifier #1 to a specified volume, then shutting off the surface skimming pump, and wasting the collected volume of mixed liquor. 630 gallons of mixed liquor was wasted every day to target a SRT of 4 days. Polymer was not fed to the system during this period of time, having been shut off on April 26. Figure 3.6-03 shows the flow rate, dissolved oxygen, temperature, and effluent water quality during the Experimental Trial. All effluent samples met the goal of TSS and BOD less than 30 mg/L. The RAS rate from the clarifier was 11 gpm over the entire Experimental Trial. Composite samples were collected daily April 30 through May 22. Lab samples were collected on April 30, May 1, and May 2 and results were provided by Eastern

Analytical under lab reports #109782, #109817, and #109907, respectively. Operating conditions and water quality results are tabulated in Table 3.6-04.

Figure 3.6-03 shows the data collected during Experimental Trial 02.

Table 3.6-04: Results for CASB Experimental Trial 02

Parameter	Results	Goal
Influent Flow Rate (gpm)	5.9 (+11 to clarifier)	11.4
Influent TSS (mg/L)	113 (99 – 130) [12]	N/A
Influent BOD (mg/L)	186 (161 – 227) [10]	N/A
BOD Loading Rate(lbs BOD/1000 cf · day)	28	60
Clarifier Surface Overflow Rate (gpd/sf)	1521	1444
Clarifier Solids Loading Rate (lb/sf·day)	27.2	71
Solids Retention Time (days)	4	
Aeration Tank ML TSS (mg/L)	7990 (7100 – 9170) [12]	
Aeration Tank ML VSS (mg/L)	1870 (1620 – 2080) [12]	
Aeration Tank ML Magnetite (mg/L)	5900 (5200 – 6725) [10]	
RAS Rate (gpm)	11	
Polymer Type and Dose	None	
Solids Depth in Clarifier (ft)	2'-3'	
Effluent BOD (Field)	4.7 (2 – 7.3) [6]	30
Effluent BOD (Laboratory)	<6, <6, <6	
Effluent BOD (Calculated from COD)	6.9 (3.6 – 14.8) [12]	
Effluent BOD (Laboratory), Filtered	<6, <6, <6	N/A
Effluent TSS (Field)	14.2 (7.2 – 26.8) [12]	30
Effluent TSS (Laboratory)	10, 9, 13	

Figure 3.6-04 shows a boxplot of the TSS and BOD results compared to a reference line for the 30/30 permit limit.

Figure 3.6-03: Results of CASB Experimental Trial 02

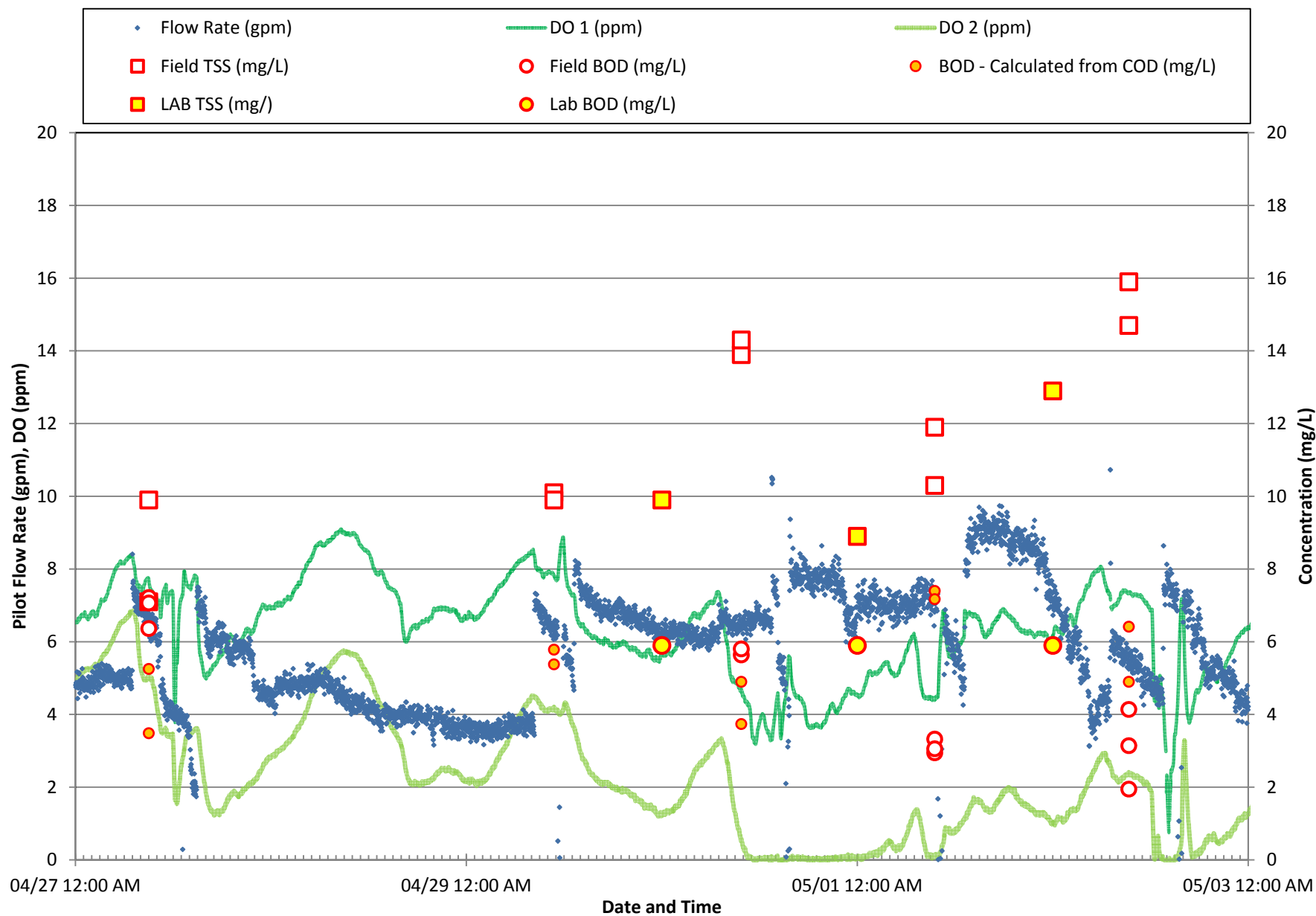
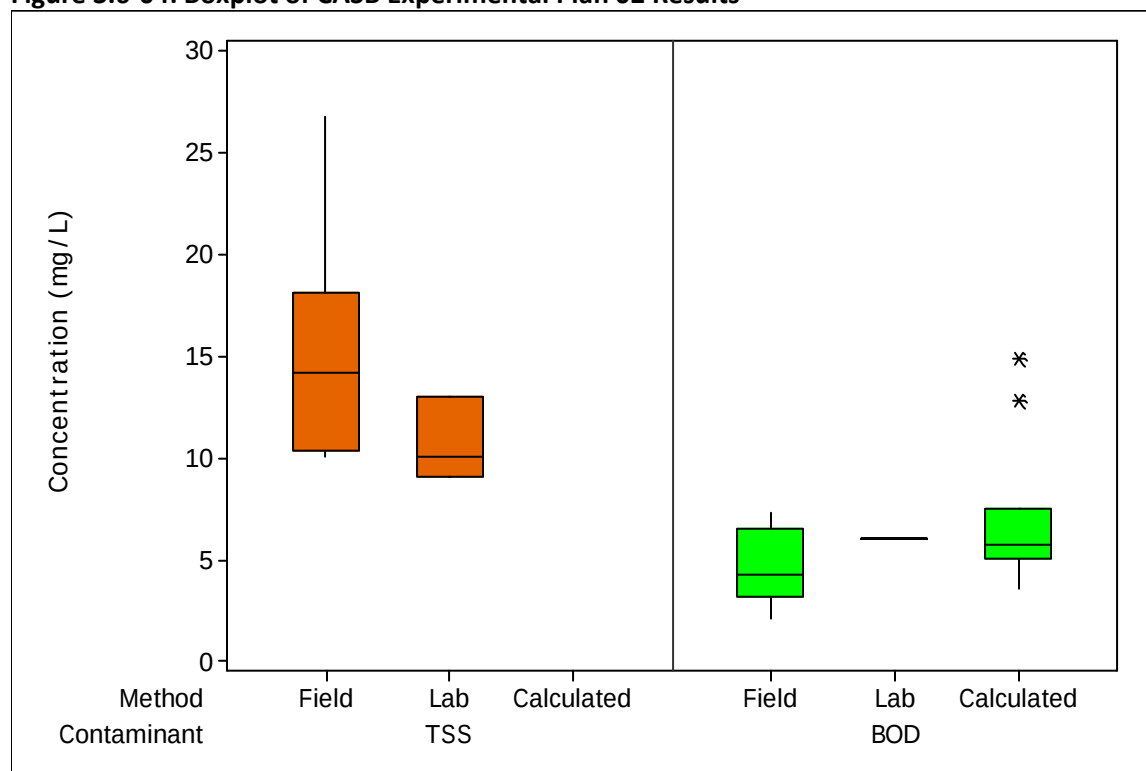


Figure 3.6-04: Boxplot of CASB Experimental Plan 02 Results



3.6.3.3 Experimental Plan 03

EXPERIMENTAL PLAN 03 evaluated the treatment performance for a treatment goal of 30 mg/L BOD, 30 mg/L TSS, and 8 mg/L total nitrogen with existing (un-spiked) concentrations of ammonia at a BOD loading rate approximating max month conditions. Experimental Trial 03 was completed between May 14 and May 24, under two slightly different reactor configurations. Initially, the system was configured to use the both aeration tank and the post-anoxic tank as aeration tanks to provide aerated volume for both BOD removal and nitrification. After three samples had been collected, the vendor changed the operation to use the post-anoxic tank as a de-oxygenation tank.

The influent flow rate for this trial averaged 10.9 gpm, and had an average BOD loading rate of 62 lb BOD/1000 cf of aerated reactor volume if the deoxygenation tank is not counted as reactor volume, or 55 lb BOD/1000 cf if the deoxygenation tank is included as aerated volume. The average ammonia concentration during this trial was 18.6 mg/L. An additional 4 gpm of potable water was added to the mixed liquor just upstream of the clarifier to increase the clarifier loading rate to 1340 gpd/sf.

Clarifier #1 was used for mixed liquor wasting. Mixed liquor wasting was accomplished by a surface skimmer assembly that pumped to fill Clarifier #1 to a specified volume, then shutting off the surface skimming pump, and wasting the collected volume of mixed liquor.

Clarifier #2 was used for clarification. Floating solids collected on the surface of Clarifier #2, and the surface of was cleaned each day with a bucket and hose, with the autosampler turned off to prevent sample collection during the cleaning. Figure 3.6-05 shows the flow rate, dissolved oxygen,

temperature, and effluent water quality during the Experimental Trial. Note that DO Probe #1 had been relocated to the pre-anoxic tank on May 21. All effluent samples met the goal of TSS and BOD less than 30 mg/L, and the TN goal of 8. The RAS rate from the clarifier ranged from 9 to 13 gpm over the entire Experimental Trial. The internal Recycle rate (IR) was 19 gpm. Lab samples were collected on May 15, 18, 21, 22, 23, 24 and results were provided by Eastern Analytical under lab reports #110368, 110487, 110533, 110559, 110632, and 110656. Operating conditions and water quality results are tabulated in Table 3.6-05.

Table 3.6-05: Results for CASB Experimental Trial 03

Parameter	Results	Goal
Influent Flow Rate (gpm)	10.9 (+4 potable)	11.4
Influent TSS Concentration (mg/L)	133 (78 – 182) [19]	N/A
Influent BOD Concentration (mg/L)	225 (151 – 355) [18]	N/A
Influent Ammonia Concentration (mg/L)	18.7 (13.2 – 26.9) [10]	N/A
BOD Loading Rate(lbs BOD/1000 cf · day)	62	60
Clarifier Surface Overflow Rate (gpd/sf)	1340	1444
Clarifier Solids Loading Rate (lb/sf·day)	55.1	71
Solids Retention Time (days)	4	
Aeration Tank ML TSS (mg/L)	10415 (8120 – 11270) [20]	
Aeration Tank ML VSS (mg/L)	2550 (1715 – 8635) [20]	
Aeration Tank ML Magnetite (mg/L)	7415 (6100 – 8170) [20]	
RAS Rate (gpm)	10.9-16	
Polymer Type and Dose	None	
Solids Depth in Clarifier (ft)	2'-3'	
Effluent BOD (Field)	3.5 (1.6 – 5.9) [17]	30
Effluent BOD (Laboratory)	<6, <6, <6, <6, 9	
Effluent BOD (Calculated from COD)	5.3 (3.8 – 7.7) [20]	
Effluent BOD (Laboratory), Filtered	<6, <6, <6, <6, <6	N/A
Effluent TSS (Field)	12.5 (4.8-32.8) [20]	30
Effluent TSS (Laboratory)	<5, <5, 7	
Effluent TN (Field)	3.8 (0.6 – 8.8) [10]	
Effluent TN (Laboratory)	3.6, 3.6, 11, 3.7, 2.8, 3.4	

Samples were analyzed for the dissolved components to determine the effect of the dilution water on the effluent concentrations. Dissolved concentrations were similar to the total concentrations, suggesting that the clarifiers were removing all precipitated contaminants, and that the dissolved components would be higher if not diluted with potable water. The dissolved contaminant concentration was multiplied by the dilution factor (1.5) to obtain the likely “undiluted” total contaminant concentration. Results are shown in Table 3.6-06

Figure 3.6-05: Results of CASB Experimental Trial 03

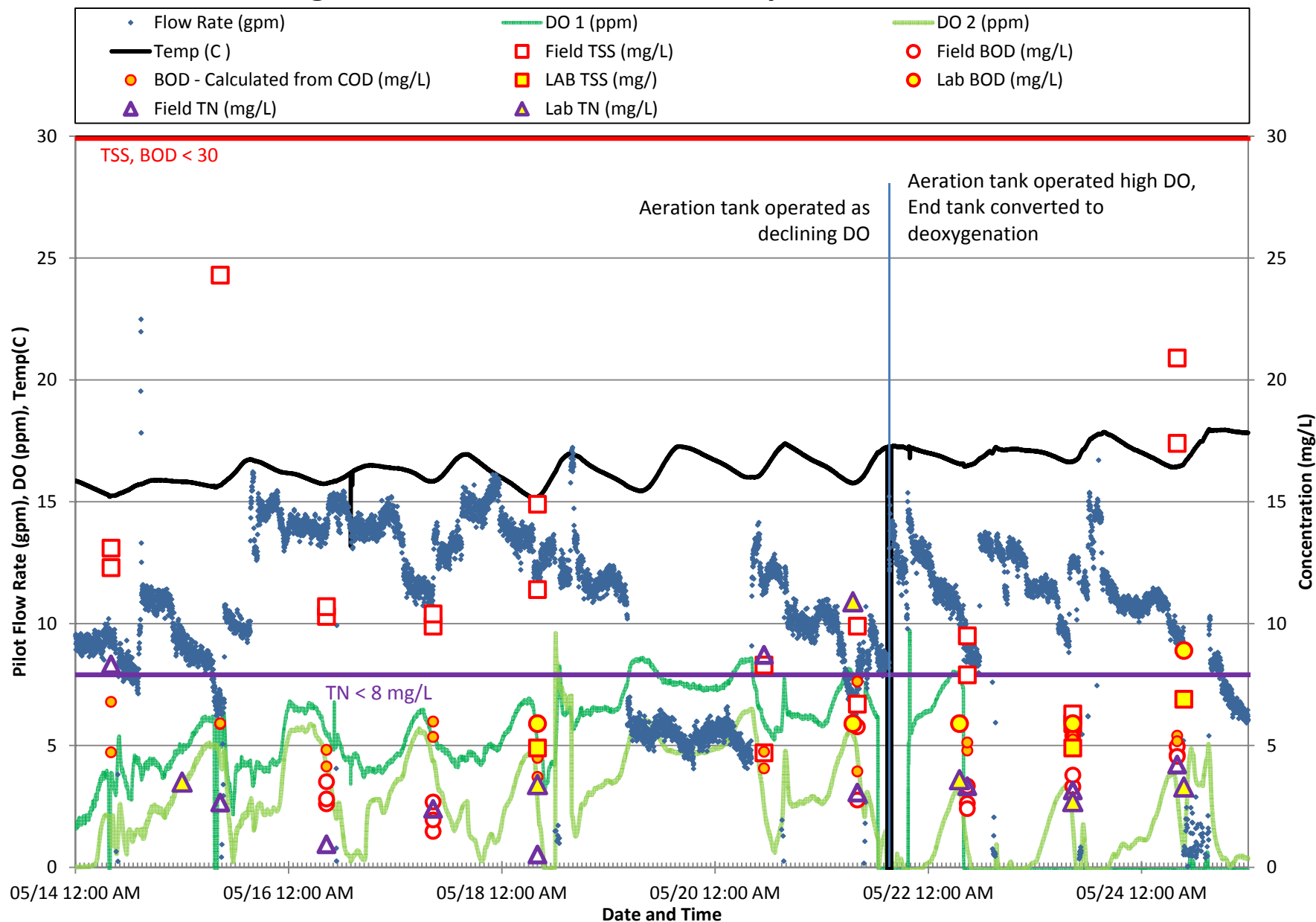
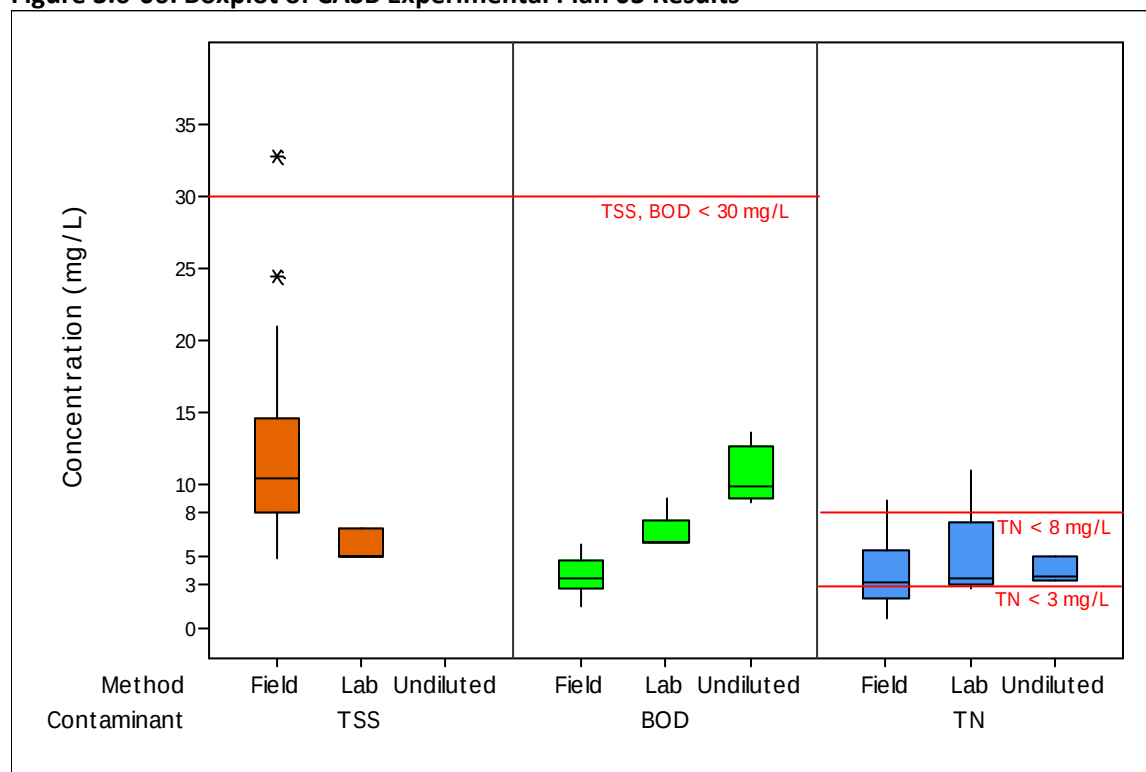


Table 3.6-06: Laboratory Results for Dissolved Contaminants from CASB Experimental Trial 03

Date	COD (mg/L)			NOx-N (mg/L)			TN (mg/L)		
	Total	Dissolved	w/o Dilution	Total	Dissolved	w/o Dilution	Total	Dissolved	w/o Dilution
5/18	31	36	54	2.3	2.4	3.6	3.5	3.3	5.0
5/21	31	26	39	11	11	16.5	11	11	16.5
5/22				2.8	2.8	4.2	2.8		
5/23	23	23	34.5	1.6	1.6	2.4	1.6	2.2	3.3
5/24	23	26	39	2.4	2.4	3.6	2.4	2.4	3.6

Figure 3.6-06 shows a boxplot of the TSS and BOD results compared to a reference line for the 30/30 permit limit, and the TN results compared to both the TN<8 and TN<3 goals. The high TN result has been omitted from Figure, as it was found to be an outlier, likely a result of a mechanical upset.

Figure 3.6-06: Boxplot of CASB Experimental Plan 03 Results



3.6.3.4 *Experimental Plan 04*

EXPERIMENTAL PLAN 04 is described in Section 3.6.4

3.6.3.5 *Experimental Plan 05*

EXPERIMENTAL PLAN 05 evaluated the treatment performance for a treatment goal of 30 mg/L BOD, 30 mg/L TSS, and 8 mg/L total nitrogen with an elevated concentration of ammonia at a target BOD loading approximating maximum month conditions. Experimental Trial 05 was completed between June 25 and July 2. The system was configured to use the post-anoxic tank as a de-oxygenation tank.

Aqueous ammonia was added to the primary effluent to increase the influent TKN to the system to approximately 35 mg/L. Soda ash was added to the primary effluent to increase the primary effluent total alkalinity to approximately 150 mg/L as CaCO_3 . The average flow rate was 8.8 gpm, with the average BOD loading rate of 56 lb BOD/1000 cf-day if only the main aeration tank is used for reactor volume, or 41 lb BOD/1000 cf-day if the de-oxygenation tank is used as a part of the reactor volume. There was no dilution water added to increase the loading rate on the clarifier.

Figure 3.6-07 shows the data collected during Experimental Trial 05. Effluent TSS met the goal of 30 mg/L in all samples, and all laboratory TN samples met the effluent goal of 8 mg/L TN. Three sets of lab samples had effluent TN concentrations higher than the goal, likely due to clogging of the IR pump. The high TN values from July 1 through July 3 are not included in the summary results shown in Table 3.6-07 or in Figure 3.6-07.

The RAS rate from the clarifier ranged from 8.5 to 10 gpm over the Experimental Trial. The internal Recycle rate (IR) was 25 to 37 gpm, except for declining rates that began on July 3 as the IR pump began to clog. Lab samples were collected on June 26, and 29, and July 2 and results were provided by Eastern Analytical under lab reports #111706, and 111809. Operating conditions and water quality results are tabulated in Table 3.6-07.

Figure 3.6-08 shows boxplots of the TSS and BOD results compared to a reference line for the 30/30 permit limit, and the TN results compared to both the $\text{TN}<8$ and $\text{TN}<3$ goals. The high TN data that were caused by IR pump clogging have been omitted.

Table 3.6-07: Results for CASB Experimental Trial 05

Parameter	Results	Goal
Influent Flow Rate (gpm)	9.8	13.5
Influent TSS Concentration (mg/L)	100 (70 – 146) [12]	N/A
Influent BOD Concentration (mg/L), calculated	210 (127 – 490) [18]	
Influent Ammonia Concentration (mg/L)	30 (18 – 56) [17]	
BOD Loading Rate(lbs BOD/1000 cf · day)	56	60
Clarifier Surface Overflow Rate (gpd/sf)	792	1444
Clarifier Solids Loading Rate (lb/sf·day)	54.9	71
Solids Retention Time (days)	3 – 5.5	
Aeration Tank ML TSS (mg/L)	8884 (7950 – 9850) [12]	
Aeration Tank ML VSS (mg/L)	3190 (2870 – 3570) [12]	
Aeration Tank ML Magnetite (mg/L)	5130 (4475 – 5800) [12]	
RAS Rate (gpm)	8.5 – 10	
Polymer Type and Dose	None	
Solids Depth in Clarifier (ft)	2.5 – 3.0	
Effluent BOD (Calculated from COD)	8.2 (5.2 – 15.1) [14]	30
Effluent TSS (Field)	10.7 (0 – 26) [14]	30
Effluent TSS (Laboratory)	8, 13, 21	
Effluent TN (Field)	2.95 (0.83 – 5.51) [5]	< 8
Effluent TN (Laboratory)	4.6, 6.1, 6.7	
Effluent NH3 (Laboratory)	0.72, 0.18, 0.20	N/A
Effluent NOx (Laboratory)	2.4, 3.8, 4.8	N/A

Figure 3.6-07: Results of CASB Experimental Trial 05

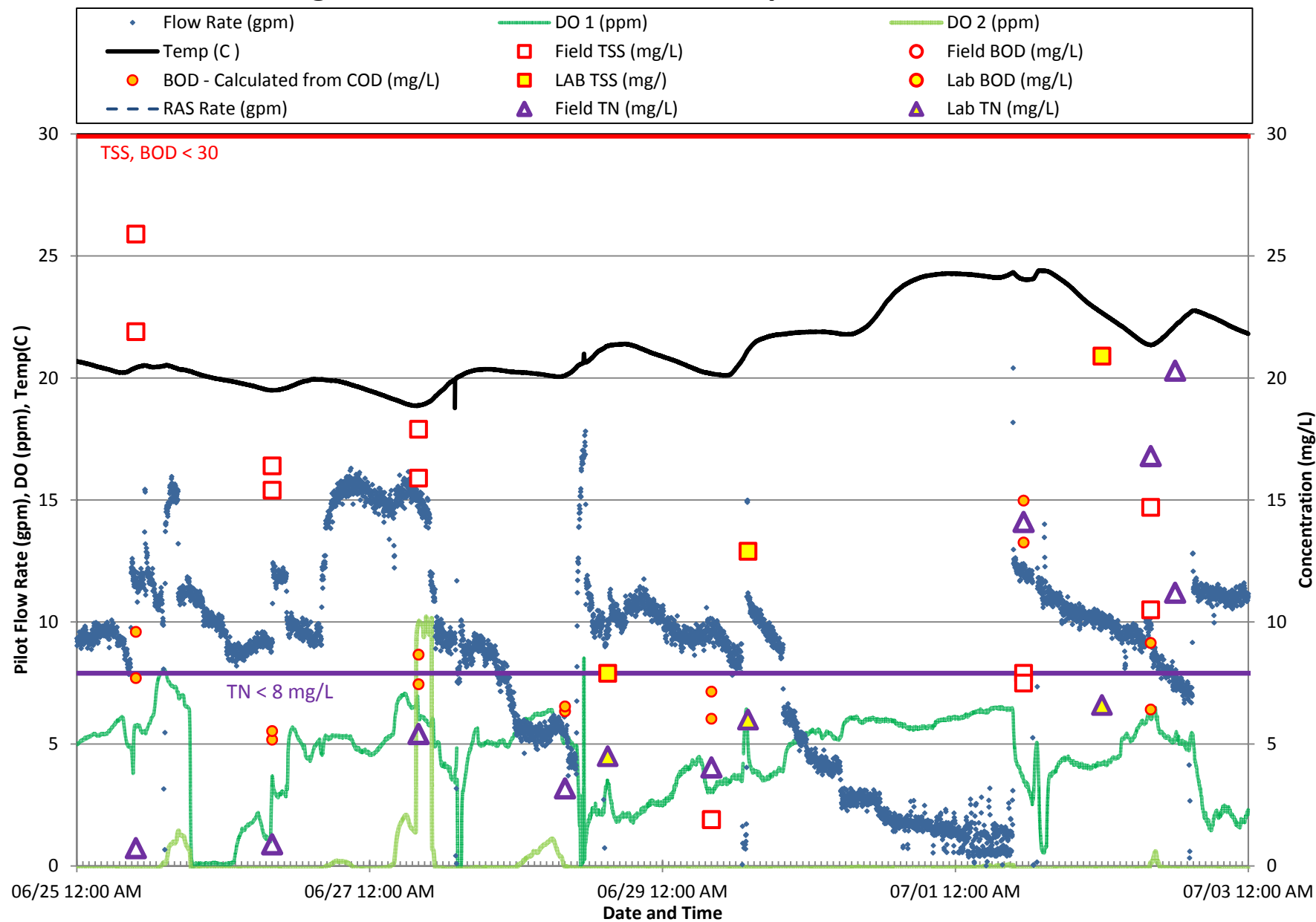
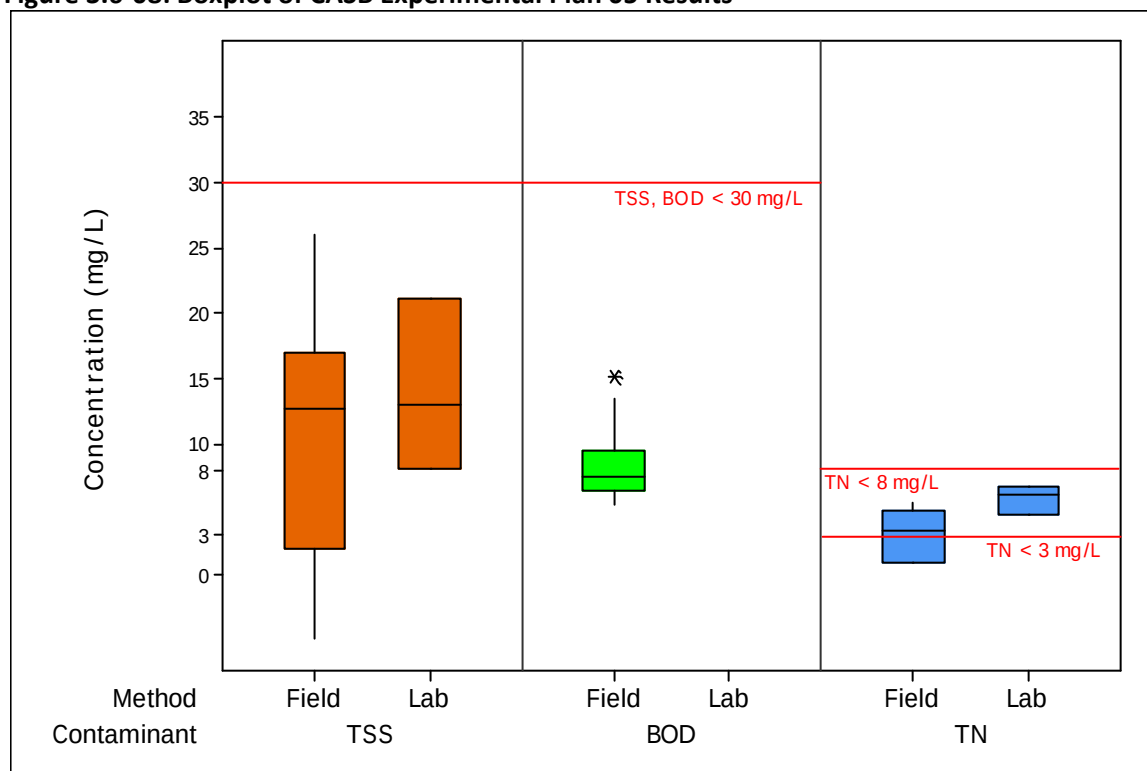


Figure 3.6-08: Boxplot of CASB Experimental Plan 05 Results



3.6.3.6 Experimental Plan 06

EXPERIMENTAL PLAN 06 evaluated the treatment performance for a treatment goal of 30 mg/L BOD, 30 mg/L TSS, and 3 mg/L total nitrogen with an elevated concentration of ammonia under a BOD load approximating max month conditions. Experimental Trial 06 was completed between July 7 and July 14. The system had been re-configured to use the post-anoxic tank as an anoxic zone, and the post-aerobic tank.

The IR pump was installed at the downstream end of the post-anoxic zone. The RAS rate from the clarifier ranged from 3 to 4 gpm over the Experimental Trial. The internal Recycle rate (IR) was 36 gpm to 45 gpm. Operating conditions and water quality results are tabulated in Table 3.6-08.

Aqueous ammonia was added to the primary effluent to increase the influent TKN to the system to approximately 45 mg/L. Soda ash was added to the primary effluent to increase the primary effluent total alkalinity to approximately 150 mg/L as CaCO_3 . The average flow rate was 8.5 gpm, with an average BOD loading rate of 73 lb BOD/1000 cf-day. There was no dilution water added to increase the loading rate on the clarifiers.

Figure 3.6-09 shows the data collected during Experimental Trial 06. Samples on July 10 were collected prior to the optimization of the denitrification system, and the Vendor asked that they not be included in the analysis. Samples on July 11 were collected immediately after the system had been off line for several hours, and were not included in the analysis. The high TN concentrations prior to July 12 are not

included in the boxplots in Figure 3.6-10. The boxplots summarize results of TSS, BOD and TN analyses by Field and Lab methods.

Table 3.6-08: Results for CASB Experimental Trial 06

Parameter	Results	Goal
Influent Flow Rate (gpm)	8.5	13.5
Influent TSS (mg/L)	123 (98 – 145) [10]	N/A
Influent BOD (mg/L), calculated	280 (157 – 395) [30]	
Influent Ammonia (mg/L)	41 (22 – 58)[19]	
BOD Loading Rate(lbs BOD/1000 cf · day)	73	60
Clarifier Surface Overflow Rate (gpd/sf)	792	704
Clarifier Solids Loading Rate (lb/sf·day)	24.0	70
Solids Retention Time (days)	2.5 - 4	
Aeration Tank ML TSS (mg/L)	7385 (7000 – 7890) [4]	
Aeration Tank ML VSS (mg/L)	3040 (2835 – 3200) [4]	
Aeration Tank ML Magnetite (mg/L)	3810 (3470 – 4120) [4]	
RAS Rate (gpm)	3-4	
Polymer Type and Dose	None	
Solids Depth in Clarifier (ft)	1.0 – 2.0	
Effluent BOD (Calculated from COD)	11.2 (8.6 – 15.4) [8]	30
Effluent TSS (Field)	5.9 (1 - 12.8) [8]	30
Effluent TSS (Laboratory)	10, <5, 16, 6, 7	
Effluent TN (Field)	2.45 (1.2 – 4.1) [4]	< 3
Effluent TN (Laboratory)	[7.8, 4.2]* ¹ , 4.3, 2.2, 2.8	
Effluent NH3 (Laboratory)	0.26, 0.11, 1.5, 0.44, 0.88	N/A
Effluent NOx (Laboratory)	5.9, 2.8, <0.5, <0.5, <0.5	N/A

*1 – TN data collected prior to the establishment of proper DO control, not believed to be representative of the 4-satage CASB system and not included in further analyses.

Figure 3.6-09: Results of CASB Experimental Trial 06

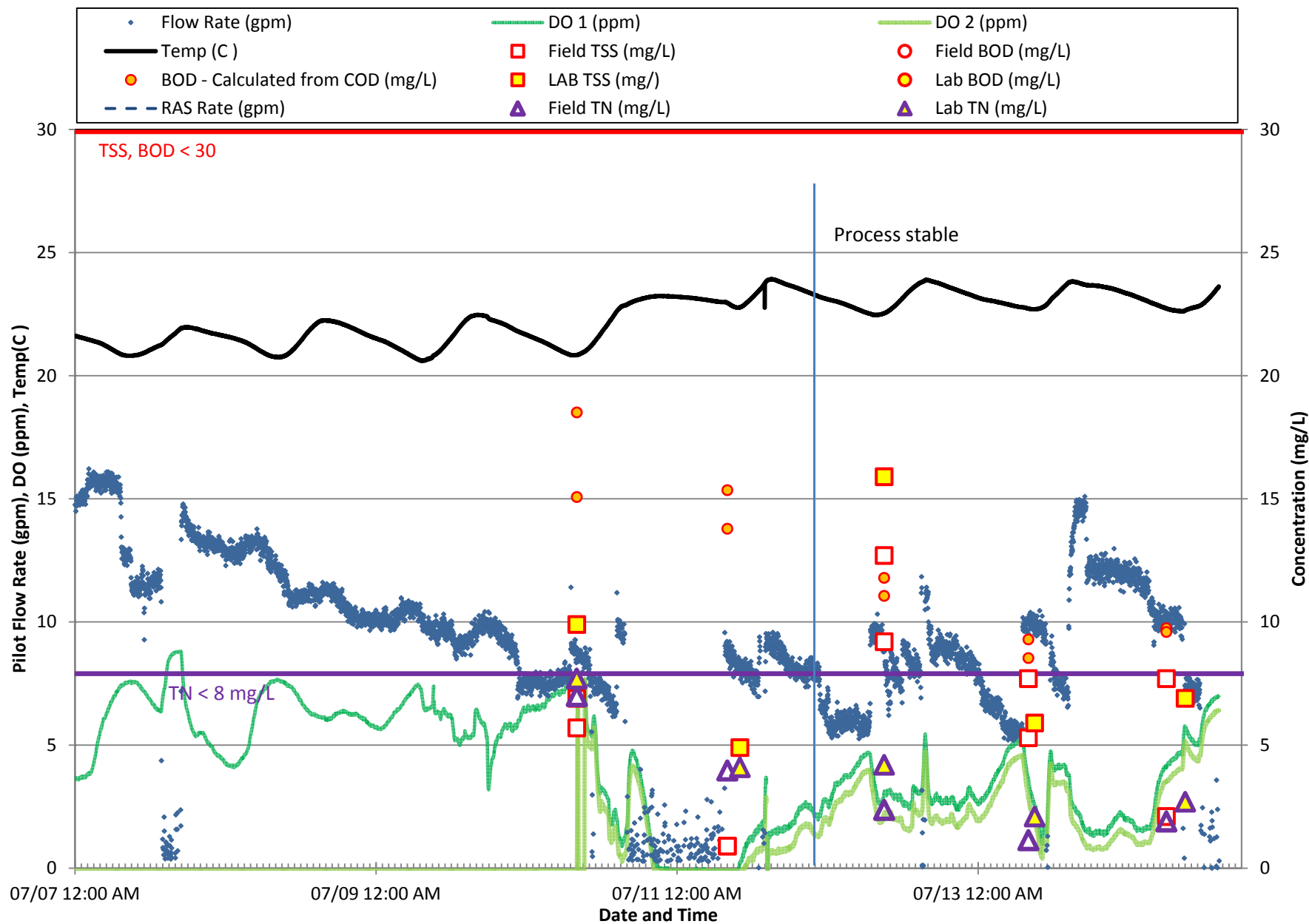
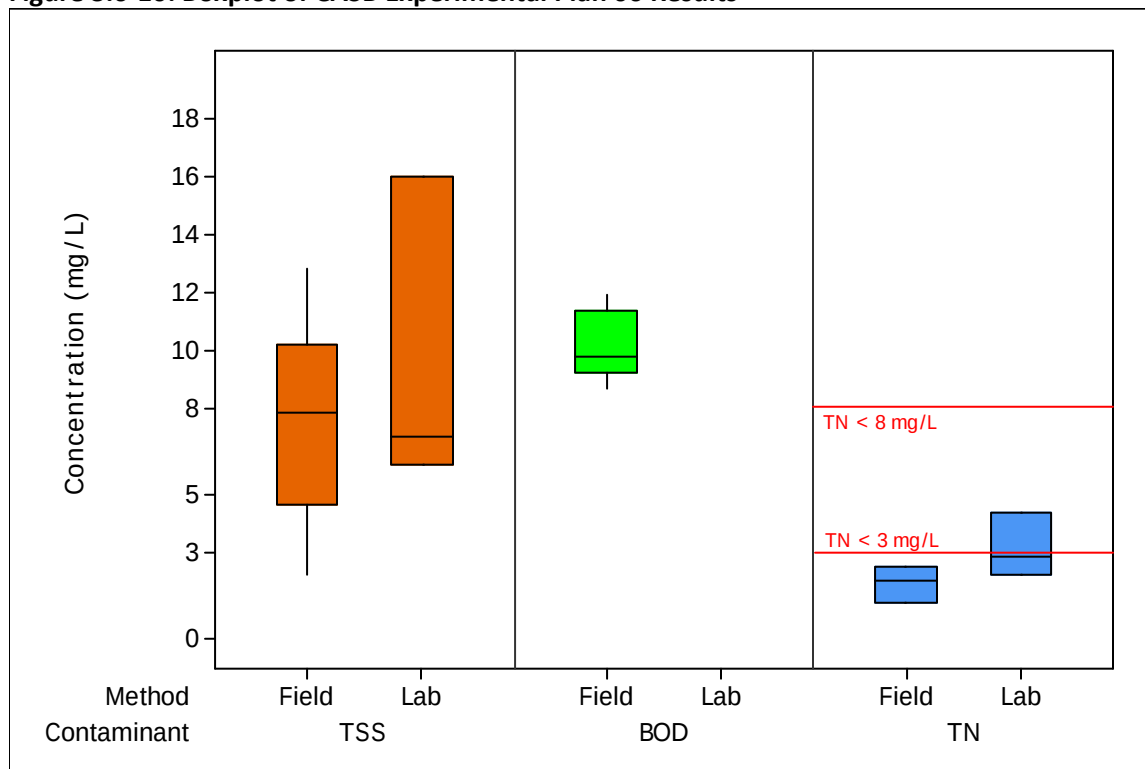


Figure 3.6-10: Boxplot of CASB Experimental Plan 06 Results



3.6.4 Stress Trial Results, Results of Experimental Trial 04

3.6.4.1 Full Strength, Mid flow, Short duration (FMS) Hydraulic Stress Test

Results from the Full-strength, Mid flow, Short duration (FMS) Trial are shown graphically in Figure 3.6-11. The flow rate was increased from 11 gpm to 22 gpm at 10:00 AM on June 1. The 22 gpm flow rate resulted in a clarifier surface overflow rate of 1980 gpd/sf, and a clarifier solids loading rate of 85.9 lb/sf-day. The RAS rate was increased from 13.3 gpm to 16.4 gpm, and the air flow was increased to maintain DO. Polymer was not used during the FMS stress test. A representative of the vendor completed a mock stress test on the previous day to determine the appropriate settings.

The system had been stable prior to the start of the test, with TSS, COD and TN concentrations below the respective goals on June 30. There was an insufficient volume of sample collected before the flow increase for TSS analyses, so there is not data for TSS immediately prior to the flow increase, but TSS concentrations remained below 20 mg/L for the duration of the flow increase, and the recovery period. Total nitrogen concentrations remained below 8 mg/L for the entire duration of the test.

Samples were also analyzed for COD, TN, Ammonia, NO_x, and TKN, but are not shown on the figures for clarity purposes.

A series of one-way ANOVAs were completed on each parameter to determine if there was an effect attributable to the flow increase (see Section 2.6 for an explanation of the statistical methods used). The p-values from the ANOVAs are shown in Table 3.6-08. Each ANOVA compared three data sets: Pre-

peak, Mid-peak, and Recovery. For example, the CASB Clarifier TSS data were grouped into sets for Pre, Mid and Recovery. The ANOVA then tested the hypothesis that the means of the three data sets were equal within a 90% level of confidence (the null hypothesis). The probability (p) was 0.149, which indicates there was a 14.9% probability that the means were equal for CASB Clarifier TSS data before, during and after the hydraulic peak. The p-value was tested against a level of significance (α) that was selected to be 0.100, which is the minimum allowable probability to accept the null hypothesis as true. In this example p is greater than α ($0.149 > 0.100$) so the null hypothesis is accepted: there was no statistically significant difference in CASB Clarifier TSS before, during, or after the peak.

The p-values from the ANOVAs are shown in Table 3.6-08. The probability values for ammonia-nitrogen for the Aeration Tank and the CASB Clarifier were 0.014 and 0.094 respectively, meaning that the null hypothesis (that the means were equal) should be rejected since p was less than alpha for both sites ($0.014 < 0.100$ and $0.094 < 0.100$). There was a statistically significant difference in ammonia data for Pre, Mid and Recovery samples, for both the Aeration Tank and Clarifier, i.e. the hydraulic peak had a significant effect upon ammonia concentrations.

Box plots of the same parameters are shown in Figures 3.6-12 and 3.6-13. The complete data set is shown in Table 3.6-09.

Table 3.6-08 CASB Experimental Plan 04 FMS – Summary of ANOVA Results

Parameter	p -value	
	Aeration Tank	CASB Clarifier
TSS	No Data	0.149
COD	0.468	0.086
Ammonia-N	0.014	0.094
TN	0.010	0.001
NOx	0.064	0.004
TKN	0.013	0.026

The highlighted p-values were statistically significant at the 0.100 threshold ($p < 0.100$) meaning that there was a greater than 90% probability that the given water quality parameter changed during one of the steps (Pre, Mid or Recovery). The practical significance may be small however, as the TN concentration in the aeration tank increased from 1.9 to only 3.5 mg/L over the course of the stress test, and the TN concentration in the Clarifier effluent increased from 2.2 to only 4.4 mg/L. All of the TN concentrations were below the target of 8 mg/L. The statistical analysis indicates that TN was affected by the hydraulic peak, but the TN still met the TN<8 goal.

Figure 3.6-11: CASB FMS | 2-hour, Medium Flow Stress Test

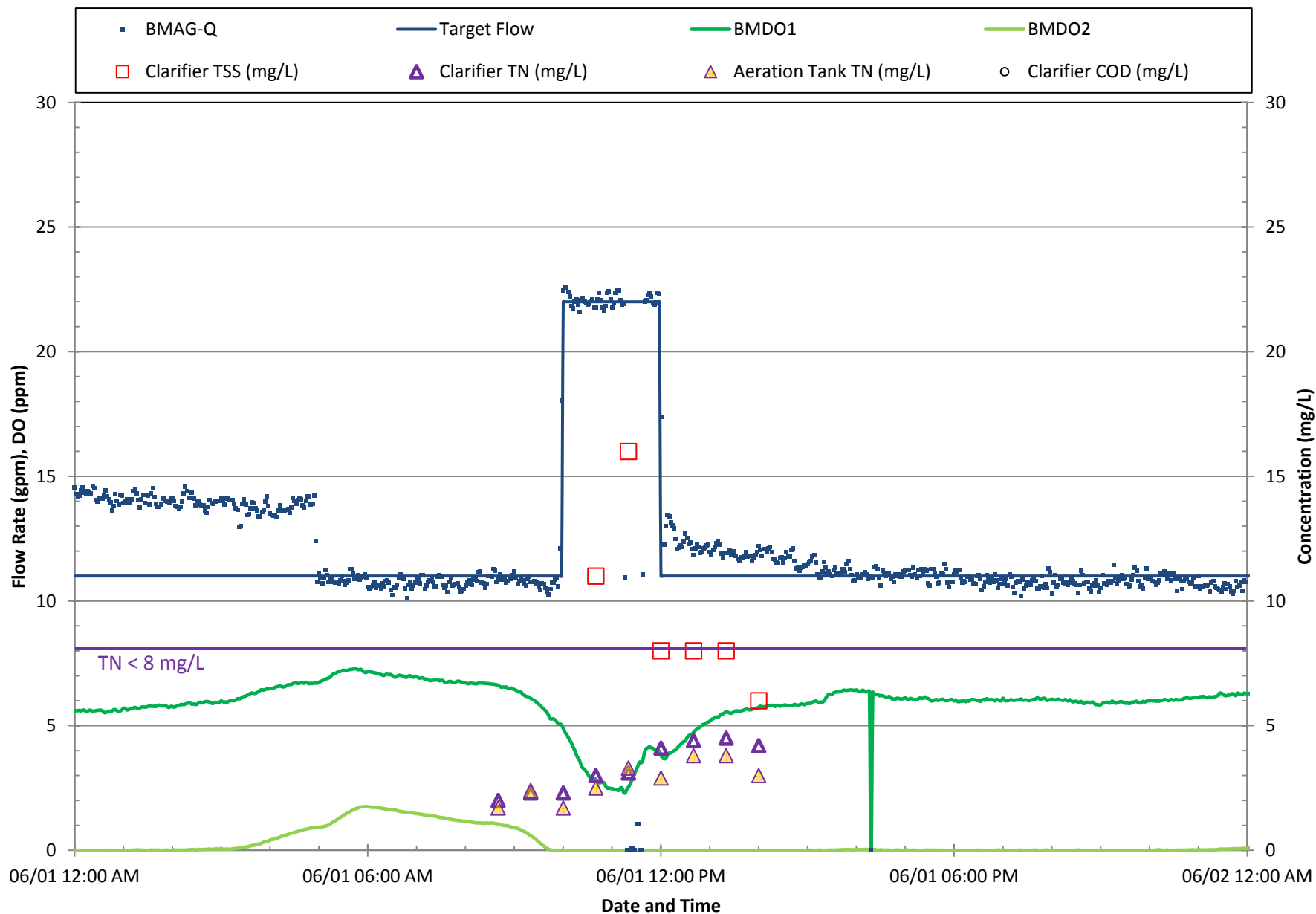


Figure 3.6-12: BoxPlots CASB FMS Stress Test, TSS and COD

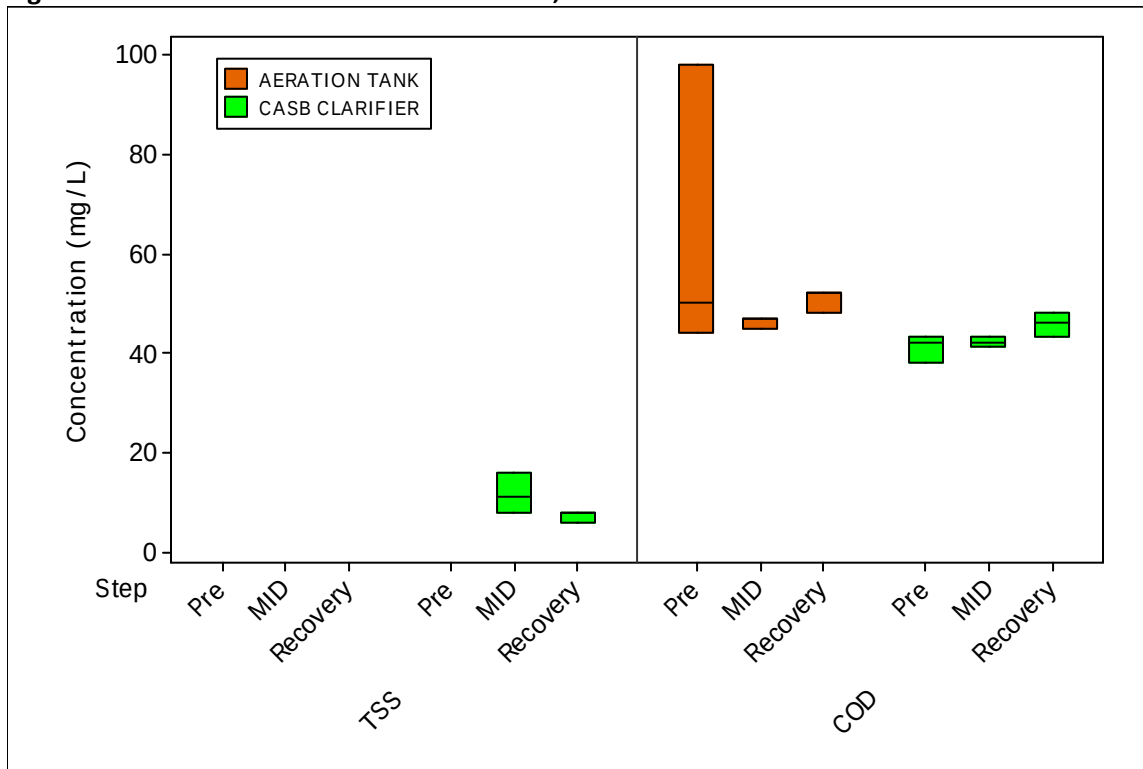


Figure 3.6-13: Boxplots CASB FMS Stress Test, Ammonia, NOx, and TN

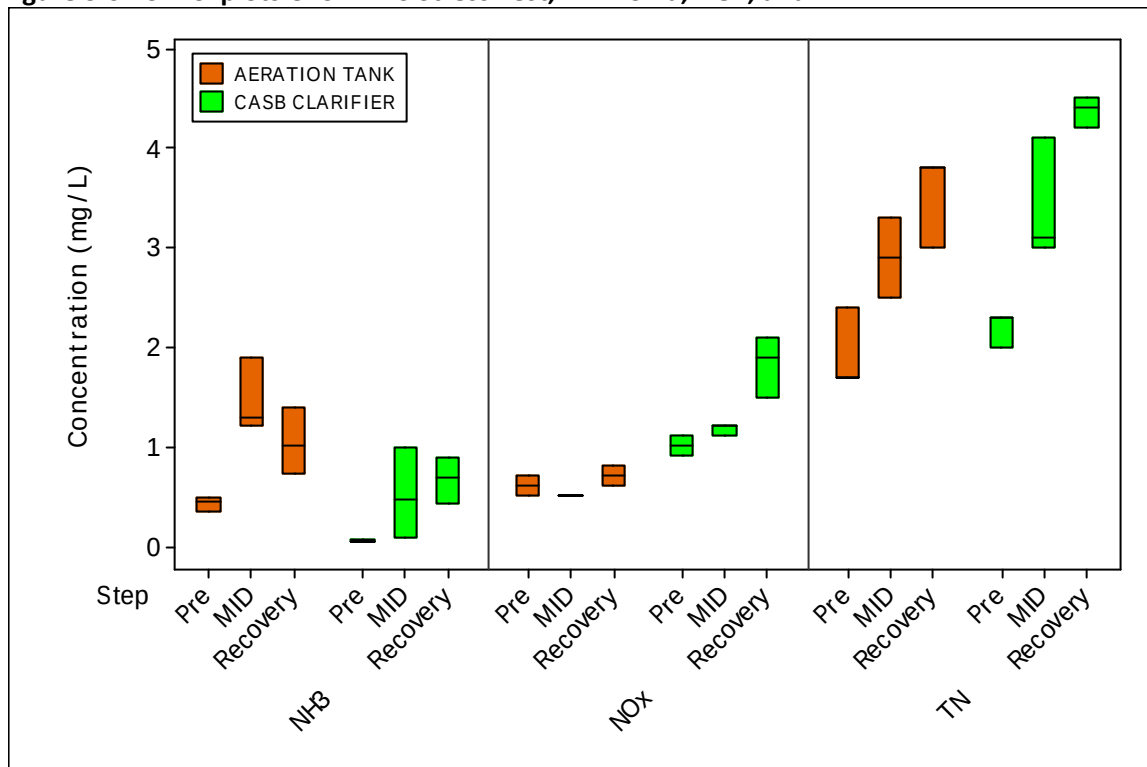


Table 3.6-09: Water Quality Results for CASB Experimental Plan 04 FMS

Date and Time	Location	Type	Step	Concentration (mg/L)					
				TSS	COD	Ammonia	TN	NOx	TKN
06/01/12 08:40	Aeration Tank	L	Pre		98	0.34	<0.5	1.7	1.7
06/01/12 08:40	CASB Cla	L			38	0.05	0.9	1.1	2
06/01/12 09:20	Aeration Tank	L			50	0.44	0.6	1.8	2.4
06/01/12 09:20	CASB Cla	L			42	0.05	1	1.3	2.3
06/01/12 10:00	Aeration Tank	L			44	0.48	0.7	1	1.7
06/01/12 10:00	CASB Cla	L			43	0.06	1.1	1.2	2.3
06/01/12 10:40	Aeration Tank	L	Mid-Level Flow		47	1.2	<0.5	2.5	2.5
06/01/12 10:40	CASB Cla	L		11	43	0.09	1.2	1.8	3
06/01/12 11:20	Aeration Tank	L			47	1.9	<0.5	3.3	3.3
06/01/12 11:20	CASB Cla	L		16	41	0.47	1.2	1.9	3.1
06/01/12 12:00	Aeration Tank	L			45	1.3	<0.5	2.9	2.9
06/01/12 12:00	CASB Cla	L		8	42	0.99	1.1	3	4.1
06/01/12 12:40	Aeration Tank	L	Recovery		52	1.4	0.6	3.2	3.8
06/01/12 12:40	CASB Cla	L		8	48	0.89	1.5	2.9	4.4
06/01/12 13:20	Aeration Tank	L			52	1	0.8	3	3.8
06/01/12 13:20	CASB Cla	L		8	43	0.69	1.9	2.6	4.5
06/01/12 14:00	Aeration Tank	L			48	0.72	0.7	2.3	3
06/01/12 14:00	CASB Cla	L		6	46	0.43	2.1	2.1	4.2

* Sample Type: F = Field, L = Laboratory

3.6.4.2 Full-strength, Peak flow, Short duration (FPS) Hydraulic Stress Test

Results from the Full-strength, Peak flow, Short duration (FPS) Trial are shown graphically in Figure 3.6-14. The flow rate was increased from 13.5 gpm to 28 gpm at 10:00 AM on June 5. The 28 gpm flow rate resulted in a clarifier surface overflow rate of 2520 gpd/sf, and a clarifier solids loading rate of 76.7 lb/sf-day. The RAS rate had remained 16.4 gpm since the previous stress test was completed on June 1. The air flow was increased to maintain DO. Polymer was not used during the FPS stress test. A representative of the vendor completed a mock stress test on the previous day to determine the appropriate settings.

The system had been stable prior to the start of the test, with TSS, COD and TN concentrations below the respective goals on June 30. Total nitrogen concentrations remained below 8 mg/L for the entire duration of the test.

Samples were also analyzed for COD, TN, Ammonia, NO_x, and TKN, but are not shown on the figures for clarity purposes. A series of one-way ANOVAs were completed on each parameter to determine if there was an effect of the flow increase. The p-values from the ANOVAs are shown in Table 3.6-09. Box plots of the same parameters are shown in Figures 3.6-15 and 3.6-16. The complete data set is shown in Table 3.6-10.

Table 3.6-09 CASB Experimental Plan 04 FPS – Summary of ANOVA Results

Parameter	p -value	
	Aeration Tank	CASB Clarifier
TSS	No Data	0.904
COD	0.377	0.729
Ammonia	0.162	0.163
TN	0.029	0.974
NO _x	0.027	0.874
TKN	0.174	0.473

The highlighted p-values were statistically significant at the 0.100 threshold ($p < 0.100$) meaning that there was a greater than 90% probability that the given water quality parameter changed during one of the steps (Pre, Mid or Recovery). The practical significance may be small however, as the TN concentration in the aeration tank increased from 4.9 mg/L to 5.2 mg/L, and then decreased to 3.1 mg/L during the recovery phase. All of the TN concentrations were below the target of 8 mg/L. The statistical analysis indicates that Aeration Tank TN was affected by the hydraulic peak, but the TN still met the TN < 8 goal.

Figure 3.6-14: CASB FPS | 2-hour, Peak Flow Stress Test

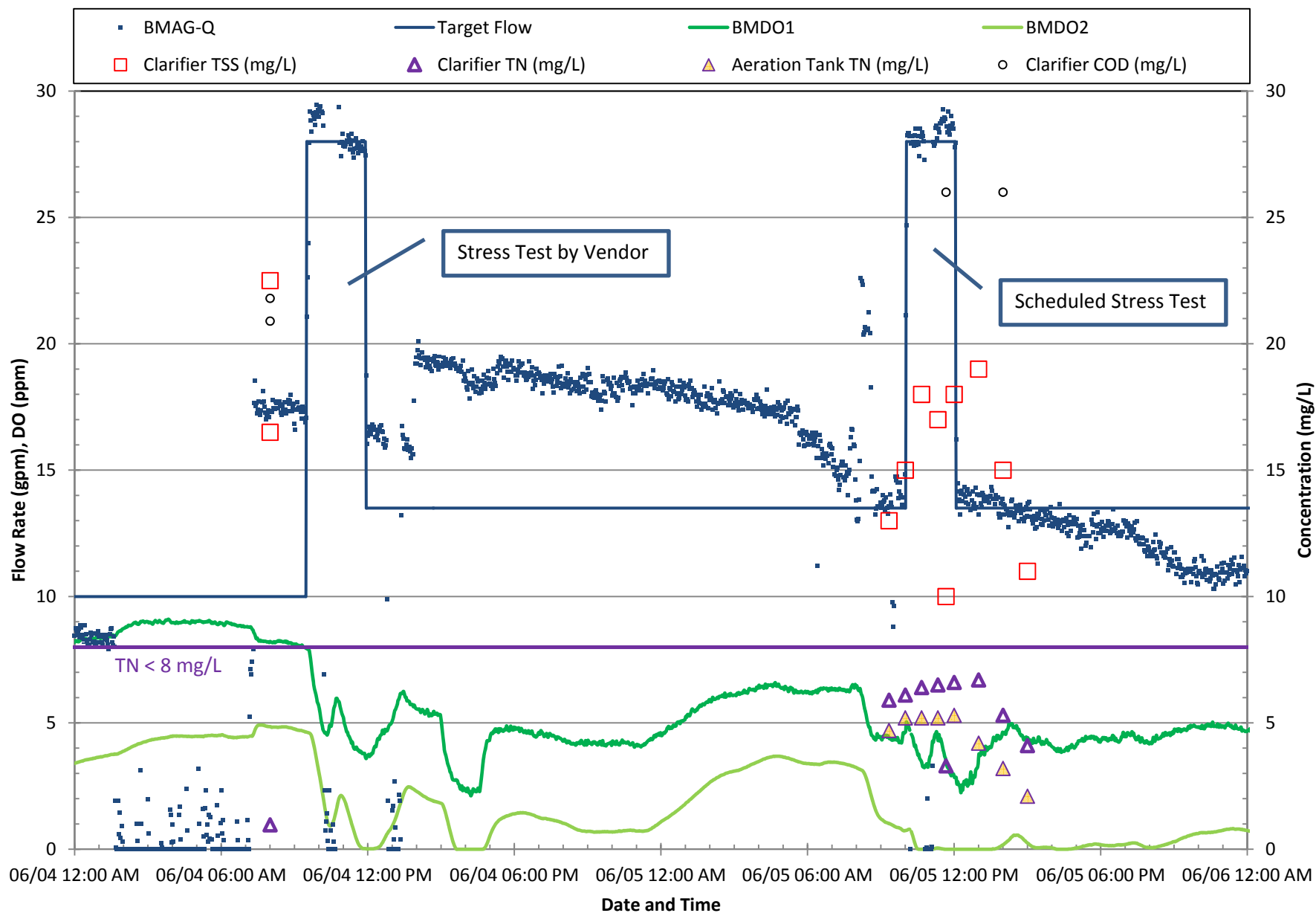


Figure 3.6-15: BoxPlots CASB FPS Stress Test, TSS and COD

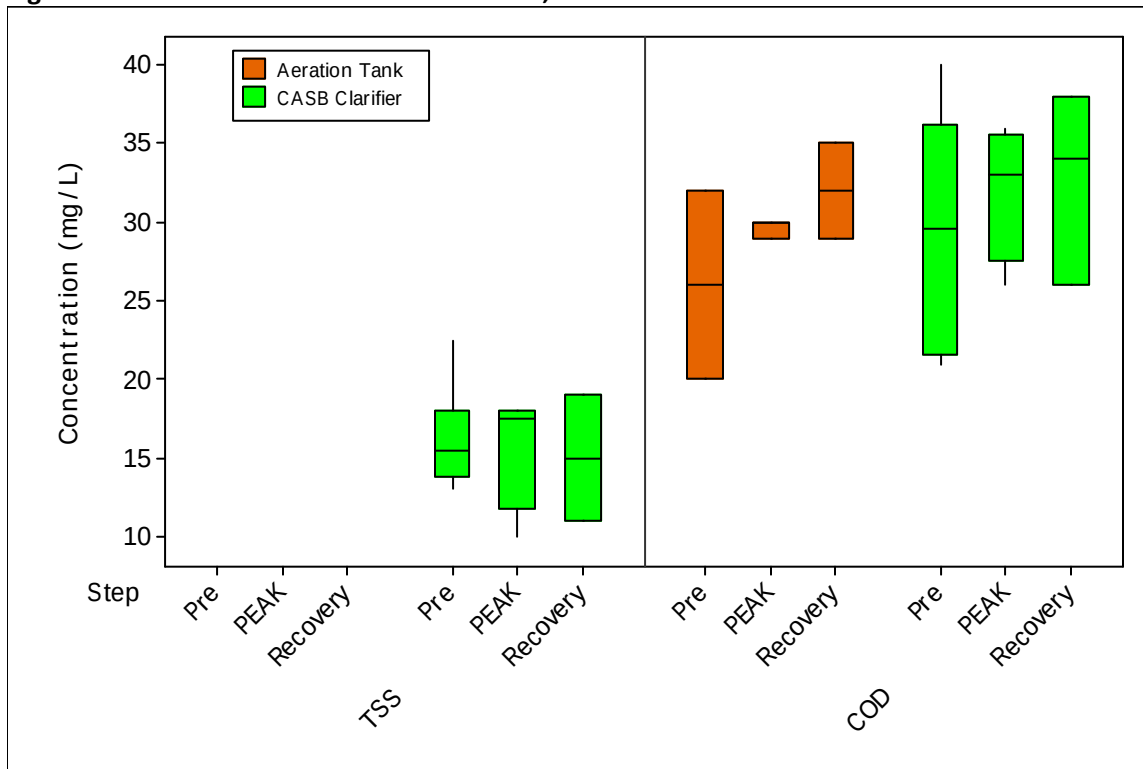


Figure 3.6-16: Boxplots CASB FPS Stress Test, Ammonia, NOx, and TN

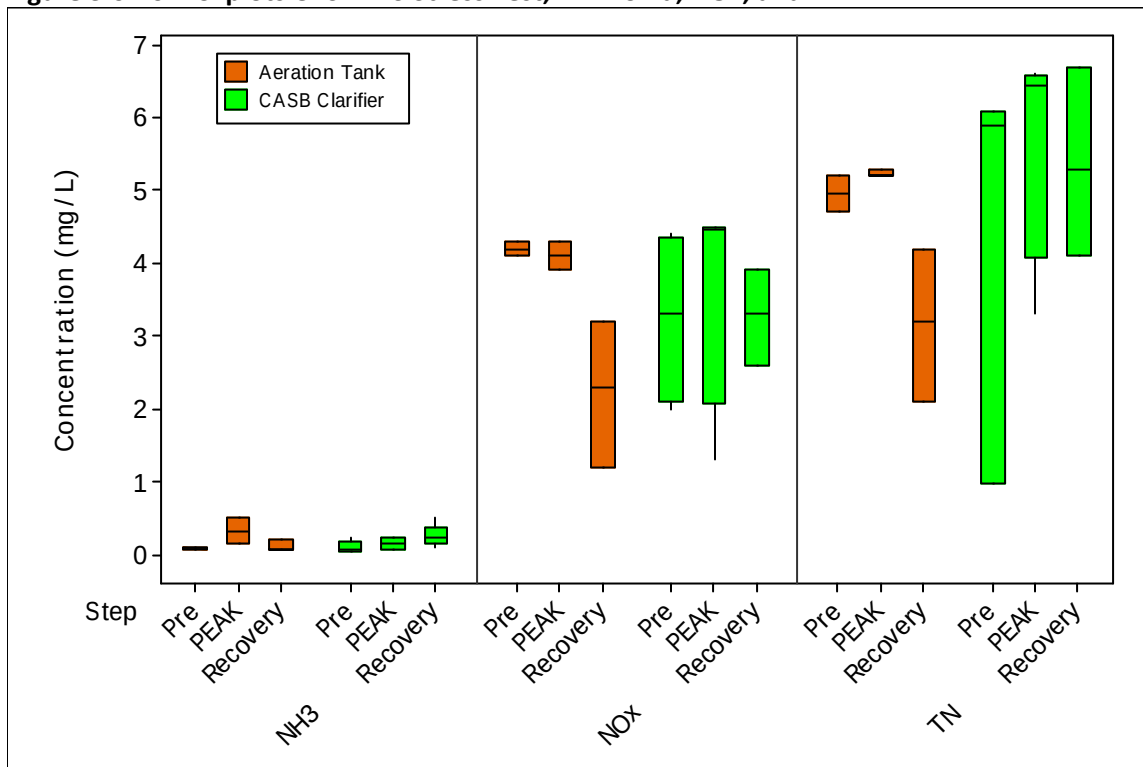


Table 3.6-10a: Water Quality Results for CASB Experimental Plan 04 FPS

Date and Time	Location	Type	Step	Concentration (mg/L)					
				TSS	COD	Ammonia	TN	NOx	TKN
06/04/12 08:00	02 PRIMARY EFF	F	Pre	45.5	147.0	5.1	0.314	3.810	4.130
06/04/12 08:00	02 PRIMARY EFF	F		53.5	129.0				
06/04/12 08:00	Aeration Tank	F		7343					
06/04/12 08:00	Aeration Tank	F		7511					
06/04/12 08:00	Aeration Tank 2	F				0.24			
06/04/12 08:00	CASB Clarifier	F		16.5	20.9	0.22	2.420		0.968
06/04/12 08:00	CASB Clarifier	F		22.5	21.8				
06/05/12 08:00	CASB Clarifier	F				0.02			
06/05/12 09:20	Aeration Tank	L			32	0.07	4.1	0.6	4.7
06/05/12 09:20	CASB Clarifier	L		13	35	<0.05	4.2	1.7	5.9
06/05/12 10:00	Aeration Tank	L			20	0.08	4.3	0.9	5.2
06/05/12 10:00	CASB Clarifier	L		15	40	<0.05	4.4	1.7	6.1
06/05/12 10:40	Aeration Tank	L	PEAK		30	0.31	4.1	1.1	5.2
06/05/12 10:40	CASB Clarifier	L		18	36	<0.05	4.5	1.9	6.4
06/05/12 11:40	CASB Clarifier	L		10	26	0.13	1.3	2	3.3
06/05/12 11:20	Aeration Tank	L			30	0.13	4.3	0.9	5.2
06/05/12 11:20	CASB Clarifier	L		17	34	0.23	4.4	2.1	6.5
06/05/12 12:00	02 PRIMARY EFF	F			309.0				
06/05/12 12:00	02 PRIMARY EFF	F			320.0				
06/05/12 12:00	Aeration Tank	L			29	0.51	3.9	1.4	5.3
06/05/12 12:00	CASB Clarifier	L		18	32	0.18	4.5	2.1	6.6
06/05/12 13:00	Aeration Tank	L			32	0.21	3.2	1	4.2
06/05/12 13:00	CASB Clarifier	L		19	38	0.49	3.9	2.8	6.7
06/05/12 14:00	Aeration Tank	L	Recovery		29	0.05	2.3	0.9	3.2
06/05/12 14:00	CASB Clarifier	L		15	26	0.23	3.3	2	5.3
06/05/12 15:00	02 PRIMARY EFF	F							
06/05/12 15:00	02 PRIMARY EFF	F							
06/05/12 15:00	Aeration Tank	L			35	<0.05	1.2	0.9	2.1
06/05/12 15:00	CASB Clarifier	F				0.2			
06/05/12 15:00									

* Sample Type: F = Field, L = Laboratory

Table 3.6-10b: Water Quality Results for CASB Experimental Plan 04 FPS

Date and Time	Location	Type	Step	Concentration (mg/L)					
				TSS	COD	Ammonia	TN	NOx	TKN
06/05/12 15:00	CASB Clarifier	L	Recovery	11	34	0.08	2.6	1.5	4.1
06/05/12 18:00	CASB Clarifier	F	Recovery			0.22			

3.6.4.3 Full-strength, Peak flow, Medium duration (FPM) Hydraulic Stress Test

Results from the Full-strength, Peak flow, Medium duration (FPM) Trial are shown graphically in Figure 3.6-17. The flow rate was increased from 13.5 gpm to 28 gpm at 10:00 AM on June 7. The 28 gpm flow rate resulted in a clarifier surface overflow rate of 2520 gpd/sf and a clarifier solids loading rate of 93 lb/sf·day. The RAS rate had remained 16.4 gpm since the previous stress test was completed on June 5. The air flow was increased to maintain DO. Polymer was not used during the FPS stress test.

The system had been stable prior to the start of the test, with TSS, COD and TN concentrations below the respective goals on June 30. Total nitrogen concentrations remained below 8 mg/L for the entire duration of the test.

Samples were also analyzed for COD, TN, Ammonia, NOx, and TKN, but are not shown on the figures for clarity purposes. A series on one-way ANOVAs were completed on each parameter to determine if there was an effect of the flow increase. The p-values from the ANOVAs are shown in Table 3.6-11. Box plots of the same parameters are shown in Figures 3.6-18 and 3.6-19. The complete data set is shown in Table 3.6-12.

Table 3.6-11 CASB Experimental Plan 04 FPM – Summary of ANOVA Results

Parameter	p -value	
	Aeration Tank	CASB Clarifier
TSS	No Data	0.000
COD	0.305	0.976
Ammonia	0.100	0.296
TN	0.174	0.359
NOx	0.153	0.000
TKN	0.826	0.504

The highlighted p-values were statistically significant at the 0.100 threshold ($p < 0.100$) meaning that there was a greater than 90% probability that the given water quality parameter changed during one of the steps (Pre, Mid or Recovery). The practical significance may be small however, as the TSS declined as a result of the high flow rate, and the increase in NOx in the clarified effluent was only 0.9 mg/L. All of the TN concentrations were below the target of 8 mg/L.

Figure 3.6-17: CASB FPM | 6-hour, Peak Flow Stress Test

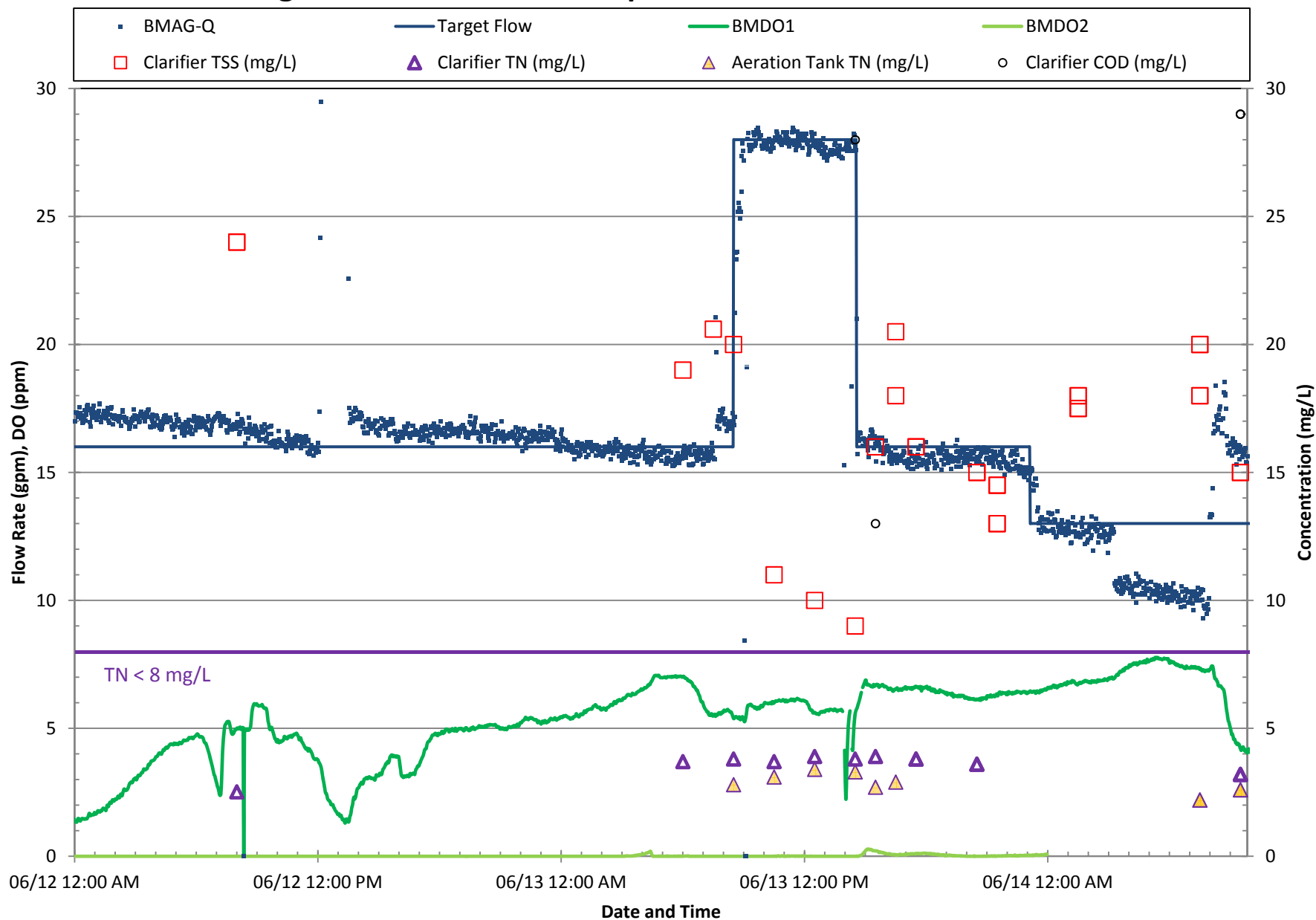


Figure 3.6-18: BoxPlots CASB FPM Stress Test, TSS and COD

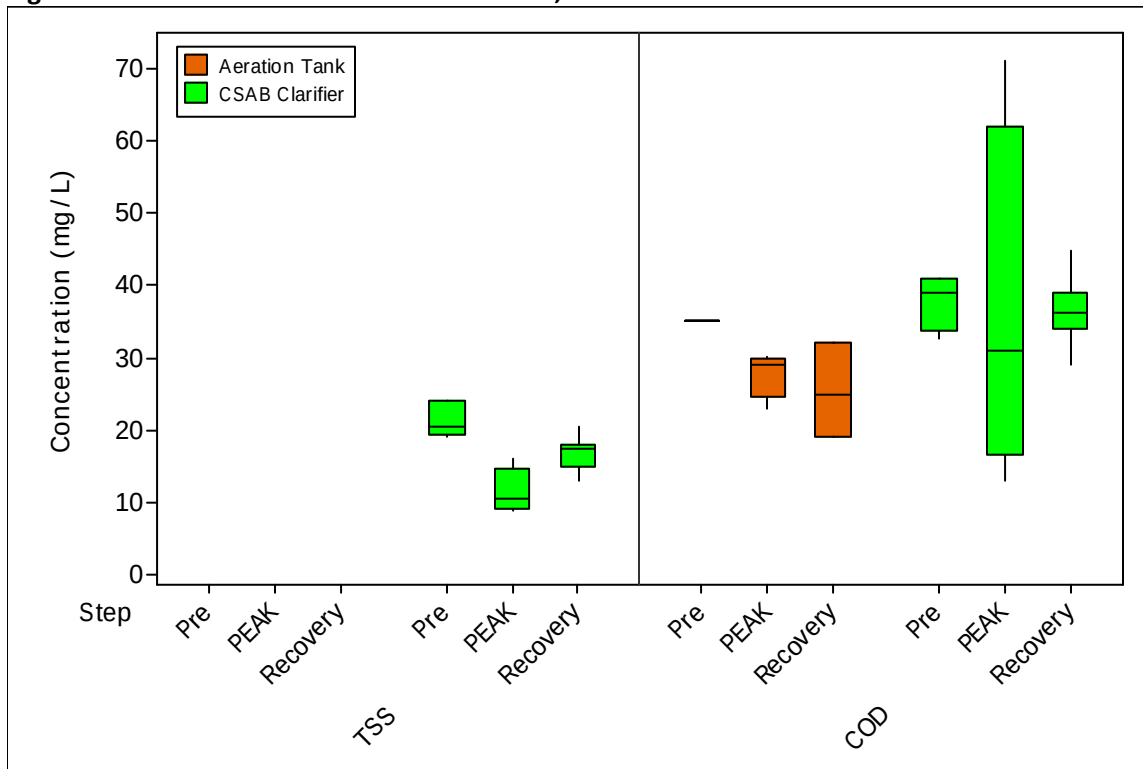


Figure 3.6-19: Boxplots CASB FPM Stress Test, Ammonia, NOx, and TN

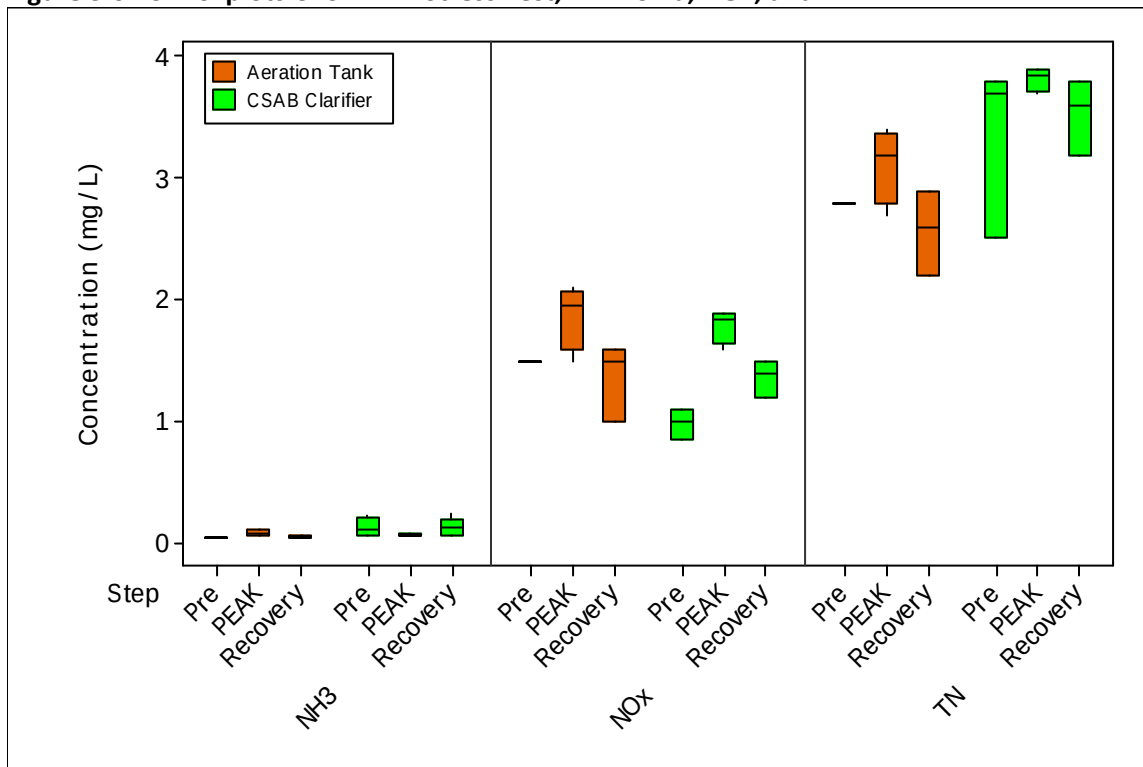


Table 3.6-12a: Water Quality Results for CASB Experimental Plan 04 FPM

Date and Time	Location	Type	Step	Concentration (mg/L)					
				TSS	COD	Ammonia	TN	NOx	TKN
06/12/12 08:00	02 PRIMARY EFF	F	Pre	104	346.0	15.8	0.259	20.000	20.200
06/12/12 08:00	02 PRIMARY EFF	F	Pre	106	364.0				
06/12/12 08:00	Aeration Tank	F	Pre	8798					
06/12/12 08:00	Aeration Tank	F	Pre	8742					
06/12/12 08:00	Aeration Tank 2	F	Pre			0.14			
06/12/12 08:00	CASB Cla	F	Pre	24	36.7	0.18	0.863	1.660	2.520
06/12/12 08:00	CASB Cla	F	Pre	24	32.7				
06/13/12 06:00	CASB Cla	L	Pre	19	41	0.06	1.1	2.6	3.7
06/13/12 07:30	02 PRIMARY EFF	F	Pre		475.0	20	0.266	24.900	25.200
06/13/12 07:30	02 PRIMARY EFF	F	Pre		521.0				
06/13/12 07:30	CASB Cla	F	Pre	20.6		0.23			
06/13/12 07:30	CASB Cla	F	Pre						
06/13/12 08:30	Aeration Tank	F	Pre	10050					
06/13/12 08:30	Aeration Tank	F	Pre	10582					
06/13/12 08:30	Aeration Tank	L	Pre		35	0.05	1.5	1.3	2.8
06/13/12 08:30	CASB Cla	L	Pre	20	41	0.06	1	2.8	3.8
06/13/12 10:30	Aeration Tank	L	PEAK		29	0.07	1.9	1.2	3.1
06/13/12 10:30	CASB Cla	L	PEAK	11	34	0.07	1.6	2.1	3.7
06/13/12 12:30	Aeration Tank	L	PEAK		30	0.07	2	1.4	3.4
06/13/12 12:30	CASB Cla	L	PEAK	10	71	0.07	1.9	2	3.9
06/13/12 14:30	Aeration Tank	L	PEAK		23	0.12	2.1	1.2	3.3
06/13/12 14:30	CASB Cla	L	PEAK	9	28	0.08	1.9	1.9	3.8
06/13/12 15:30	Aeration Tank	L	PEAK		29	0.1	1.5	1.2	2.7
06/13/12 15:30	CASB Cla	L	PEAK	16	13	0.06	1.8	2.1	3.9
06/13/12 16:30	Aeration Tank	L	Recovery		32	<0.05	1.5	1.4	2.9
06/13/12 16:30	CASB Cla	F	Recovery	18	39.0	0.13			
06/13/12 16:30	CASB Cla	F	Recovery	20.5	36.2				
06/13/12 17:30	CASB Cla	L	Recovery	16	34	0.06	1.4	2.4	3.8
06/13/12 20:30	CASB Cla	L	Recovery	15	34	0.06	1.5	2.1	3.6

* Sample Type: F = Field, L = Laboratory

Table 3.6-12b: Water Quality Results for CASB Experimental Plan 04 FPM

Date and Time	Location	Type	Step	Concentration (mg/L)					
				TSS	COD	Ammonia	TN	NOx	TKN
06/13/12 21:30	CASB Cla	F	Recovery	13	30.9	0.19			
06/13/12 21:30	CASB Cla	F	Recovery	14.5	44.7				
06/14/12 01:30	CASB Cla	F	Recovery	17.5	35.8	0.25			
06/14/12 01:30	CASB Cla	F	Recovery	18	36.3				
06/14/12 07:30	Aeration Tank	L	Recovery		19	0.05	1	1.2	2.2
06/14/12 07:30	CASB Cla	F	Recovery	18	36.2	0.18			
06/14/12 07:30	CASB Cla	F	Recovery	20	44.3				
06/14/12 08:00	02 PRIMARY EFF	F	Recovery	82.5	443.0	11.6	0.162	16.000	16.100
06/14/12 08:00	02 PRIMARY EFF	F	Recovery	84.5	251.0				
06/14/12 09:30	Aeration Tank	L	Recovery		25	0.06	1.6	1	2.6
06/14/12 09:30	CASB Cla	L	Recovery	15	29	0.1	1.2	2	3.2

3.6.4.4 Diluted-strength, Peak flow, Extended duration (DPE) Hydraulic Stress Test

Results from the Diluted-strength, Peak flow, Extended duration (DPE) Trial are shown graphically in Figure 3.6-20. The flow rate was increased from 13.5 gpm to 28 gpm at 10:30 AM on June 14, by adding 14 gpm of potable water to the inlet of the pre-anoxic tank. The 28 gpm flow rate resulted in a clarifier surface overflow rate of 2520 gpd/sf, and a clarifier solids loading rate of 75.7 lb/sf-day. The RAS rate was increased from 12 gpm to 16.4 gpm, and the air flow was increased to maintain DO. Polymer was added at a dose of 1 mg/L during the high flow period.

The system had been stable prior to the start of the test, with TSS, COD and TN concentrations below the respective goals on June 13. Total nitrogen concentrations remained below 8 mg/L for the duration of the test.

Samples were also analyzed for COD, TN, Ammonia, NO_x, and TKN, but are not shown on the figures for clarity purposes. A series of one-way ANOVAs were completed on each parameter to determine if there was an effect of the flow increase. The p-values from the ANOVAs are shown in Table 3.6-13. Box plots of the same parameters are shown in Figures 3.6-21 and 3.6-22. The complete data set is shown in Table 3.6-14.

Table 3.6-13 CASB Experimental Plan 04 DPE – Summary of ANOVA Results

Parameter	p -value	
	Aeration Tank	CASB Clarifier
TSS	No Data	0.000
COD	0.525	0.001
Ammonia	0.135	0.871
TN	0.071	0.108
NO _x	0.096	0.734
TKN	0.071	0.023

The highlighted p-values were statistically significant at the 0.100 threshold ($p < 0.100$) meaning that there was a greater than 90% probability that the given water quality parameter changed during one of the steps (Pre, Mid or Recovery). There is no practical significance however, because all of the clarifier water quality parameters actually declined during the peak when the primary influent to the CASB was diluted with potable water. All of the TN concentrations were below the target of 8 mg/L.

Figure 3.6-20: CASB DPE | 24 hour, Peak Flow Stress Test, Diluted

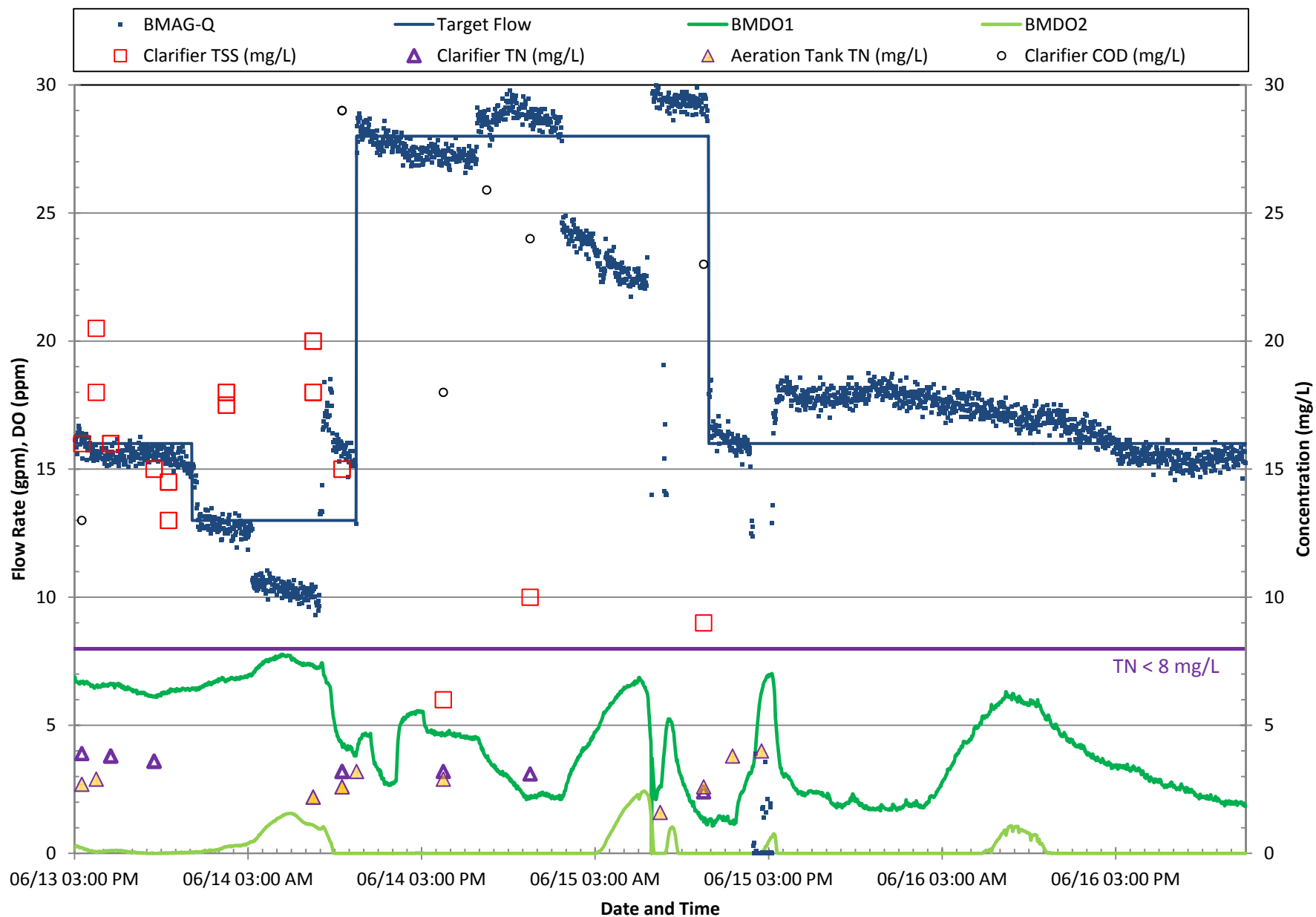


Figure 3.6-21: BoxPlots CASB DPE Stress Test, TSS and COD

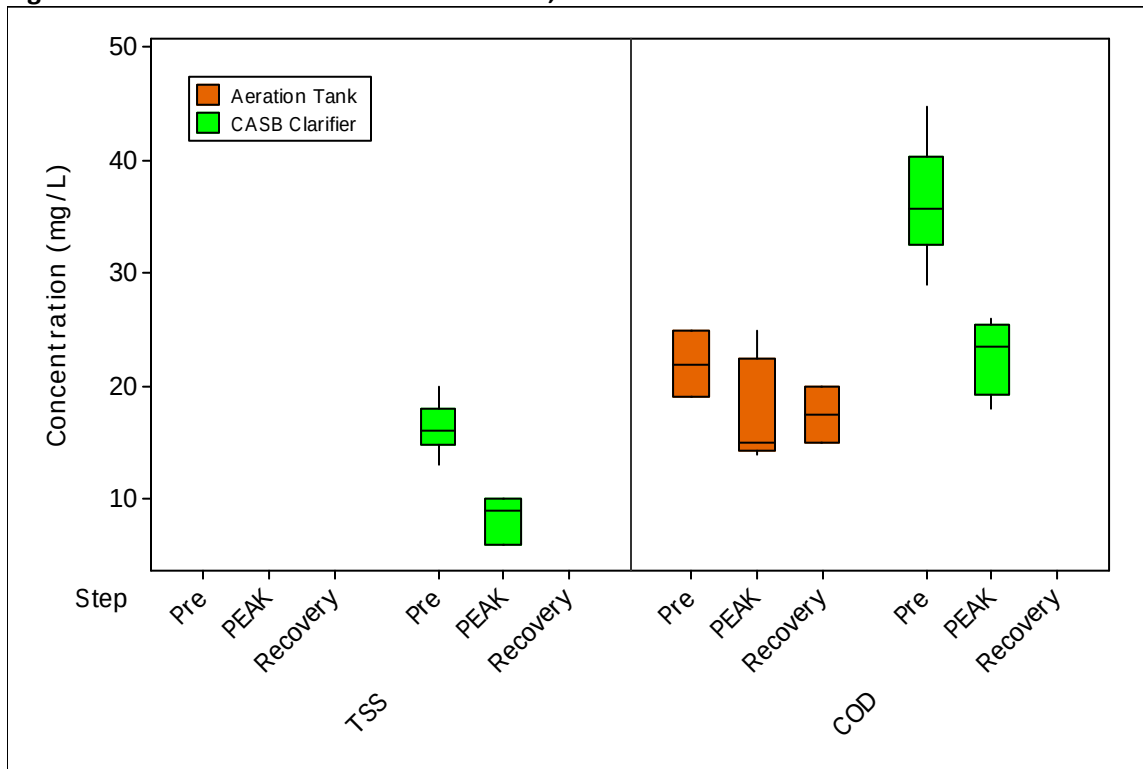


Figure 3.6-22: Boxplots CASB DPE Stress Test, Ammonia, NOx, and TN

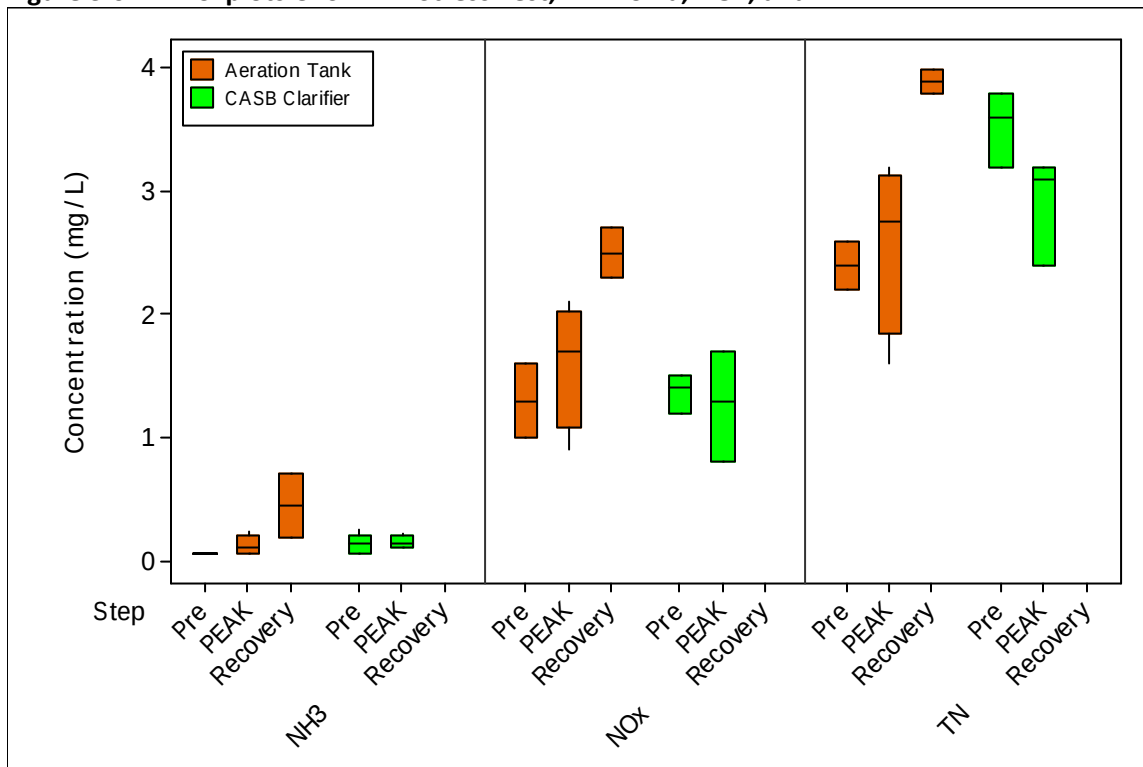


Table 3.6-14: Water Quality Results for CASB Experimental Plan 04 DPE

Date and Time	Location	Type	Step	Concentration (mg/L)					
				TSS	COD	Ammonia	TN	NOx	TKN
06/13/12 17:30	CASB Cla	L	Pre	16	34	0.06	1.4	2.4	3.8
06/13/12 20:30	CASB Cla	L	Pre	15	34	0.06	1.5	2.1	3.6
06/13/12 21:30	CASB Cla	F	Pre	13	30.9	0.19			
06/13/12 21:30	CASB Cla	F	Pre	14.5	44.7				
06/14/12 01:30	CASB Cla	F	Pre	17.5	35.8	0.25			
06/14/12 01:30	CASB Cla	F	Pre	18	36.3				
06/14/12 07:30	Aeration Tank	L	Pre		19	0.05	1	1.2	2.2
06/14/12 07:30	CASB Cla	F	Pre	18	36.2	0.18			
06/14/12 07:30	CASB Cla	F	Pre	20	44.3				
06/14/12 08:00	02 PRIMARY EFF	F	Pre	82.5	443.0	11.6	0.162	16.000	16.100
06/14/12 08:00	02 PRIMARY EFF	F	Pre	84.5	251.0				
06/14/12 09:30	Aeration Tank	L	Pre		25	0.06	1.6	1	2.6
06/14/12 09:30	CASB Cla	L	Pre	15	29	0.1	1.2	2	3.2
06/14/12 10:30	Aeration Tank	L	PEAK		25	0.09	2.1	1.1	3.2
06/14/12 14:00	Aeration Tank	F	PEAK	9398					
06/14/12 14:00	Aeration Tank	F	PEAK	9446					
06/14/12 16:30	02 PRIMARY EFF	F	PEAK		354.0				
06/14/12 16:30	02 PRIMARY EFF	F	PEAK		344.0				
06/14/12 16:30	Aeration Tank	L	PEAK		14	0.11	1.8	1.1	2.9
06/14/12 16:30	CASB Cla	L	PEAK	6	18	0.14	1.7	1.5	3.2
06/14/12 19:30	CASB Cla	F	PEAK		25.9	0.1			
06/14/12 22:30	CASB Cla	L	PEAK	10	24	0.22	1.3	1.8	3.1
06/15/12 07:30	Aeration Tank	L	PEAK		15	0.05	0.9	0.7	1.6
06/15/12 10:30	Aeration Tank	L	PEAK		15	0.24	1.6	1	2.6
06/15/12 10:30	CASB Cla	L	PEAK	9	23	0.13	0.8	1.6	2.4
06/15/12 12:30	Aeration Tank	L	Recovery		15	0.7	2.3	1.5	3.8
06/15/12 14:30	Aeration Tank	L	Recovery		20	0.19	2.7	1.3	4

* Sample Type: F = Field, L = Laboratory

3.6.5 BOD Removal Rates

To evaluate the performance of the CASB process for BOD removal, the data from all phases and trials were combined to evaluate the removal capacity over a broad range of flow rates and organic loading rates. Figure 3.6-23 was produced from the following data:

- All data between January 1 and July 14, inclusive of the stress tests, were included in the analysis.
- Influent BOD was estimated from the Primary Effluent COD using the ratio of 1.9 COD: 1 BOD
- Effluent BOD was estimated from the effluent COD using the ratio 3.96:1 BOD
- The design SARR was provided by the Vendor

Figure 3.6-23 shows that the removal rate was consistently 95% of the influent BOD.

3.6.6 Ammonia Removal Capacity

To evaluate the performance of the CASB process for ammonia removal, the removal capacity was calculated based on the aerated volume of the bioreactor. Data was included in Figure 3.6-24 for the period from May 14 when the anoxic recycle was started, through July 3 when the system was converted to a four-stage process.

3.6.7 Nitrate Removal Capacity

To evaluate the performance of the CASB process for denitrification, the Specific Denitrification Rate was calculated using the equation:

$$SDNR \left(\frac{gr \text{ } NO_3}{gr \text{ MLVSS} \cdot day} \right) = \frac{NO_3 \text{ removed } \frac{gr}{day}}{(V_{Anoxic} \text{ } m^3) \cdot \left(MLVSS \frac{mg}{L} \right)}$$

Data was included in Figure 3.6-25 for the period May 14, when the anoxic recycle was started until July 3, when the system was converted to a four-stage process.

Figure 3.6-23: BOD Loading and Removal through CASB Pilot System

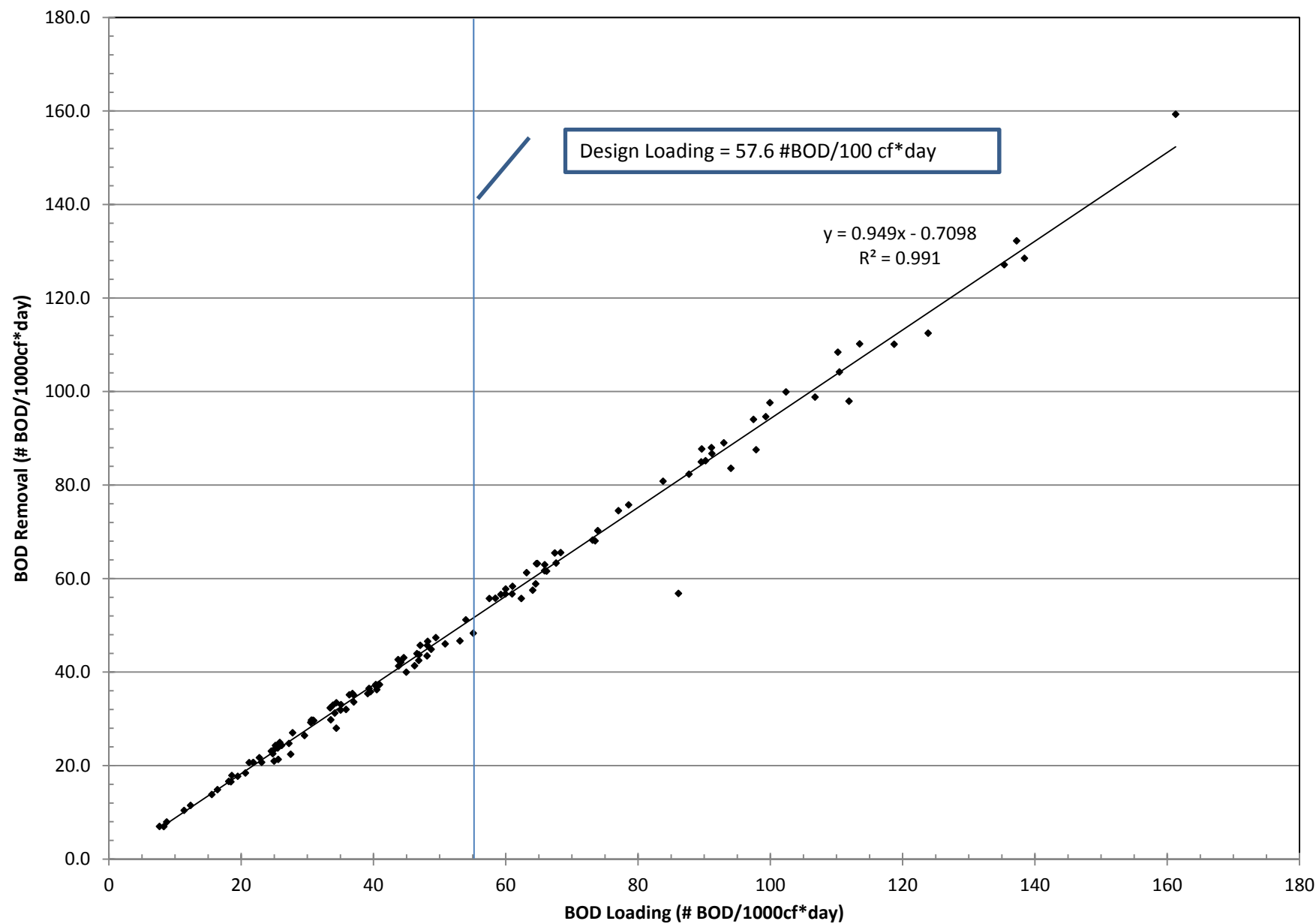


Figure 3.6-24: Ammonia Removal through CAS with BioMag Pilot System

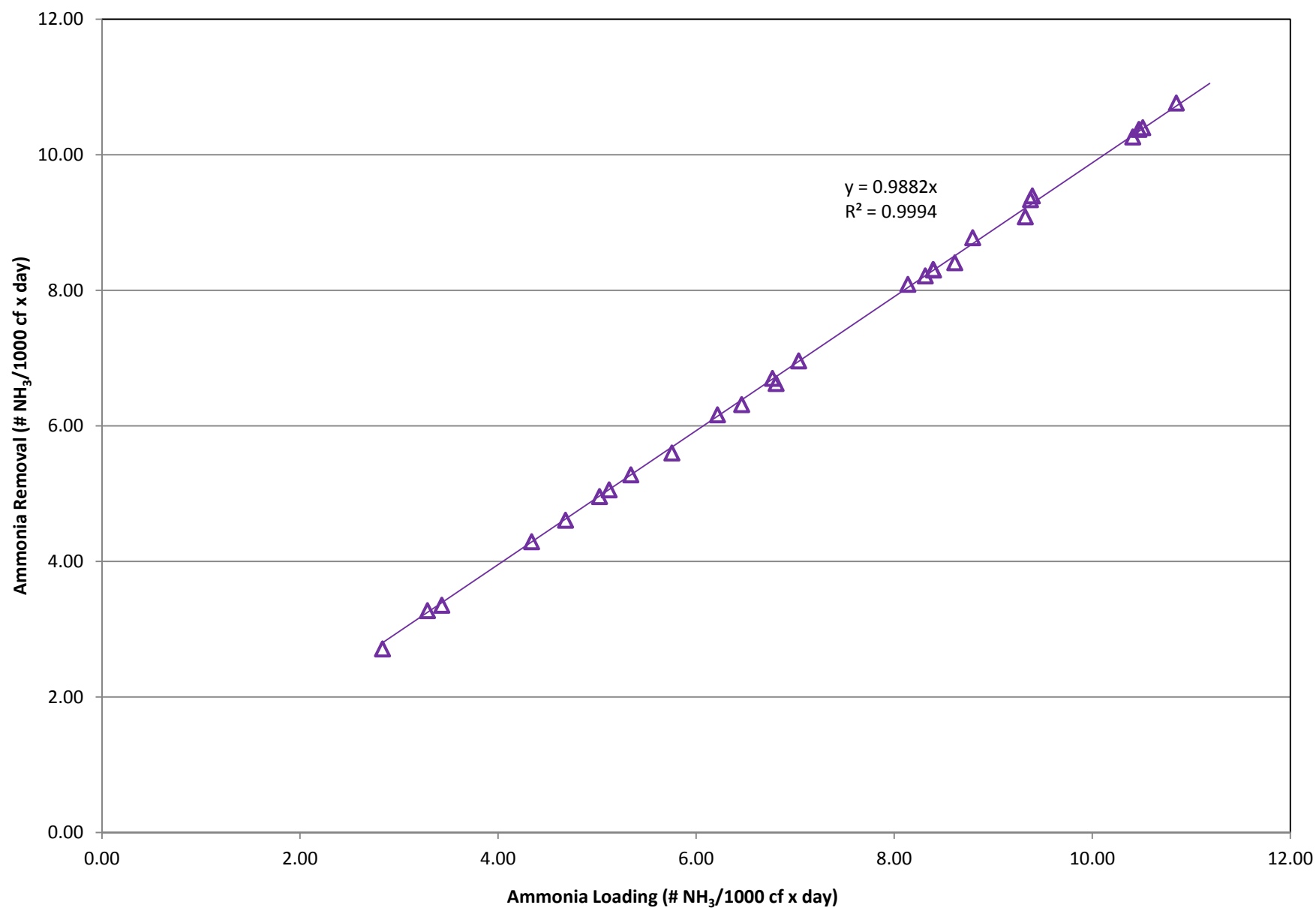
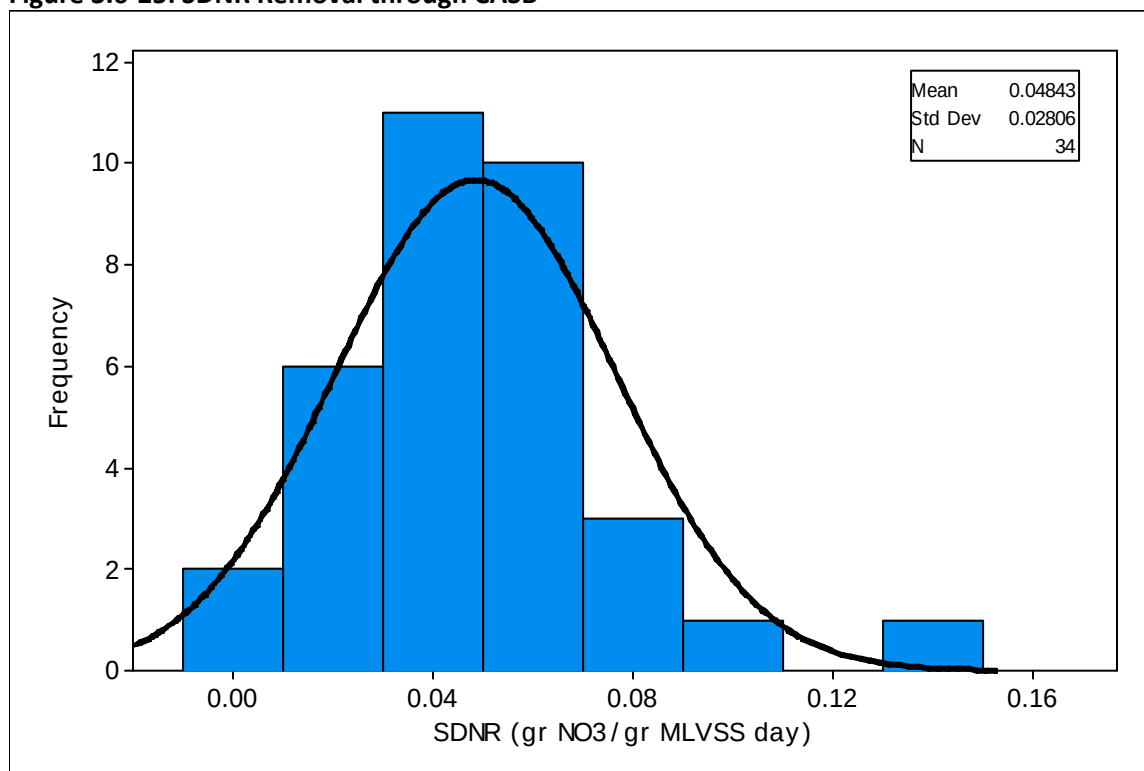


Figure 3.6-25: SDNR Removal through CASB



3.6.8: Settling Velocity Index (SVI) Data

Settling tests were completed on both the mixed liquor from the aeration tank, and on the mixed liquor entering the Clarifier center well, after the addition of polymer. Results of the settling tests are included in Table 3.6-14. The column headers are identified as follows:

CWP samples were collected from the center stilling well of the pilot-scale secondary clarifier after the addition of polymer.

CW samples were collected from the center stilling well of the pilot-scale secondary clarifier when no polymer was used .

ML samples were collected from the discharge end of the Mixed Liquor tank.

The single New Hampton ML sample was collected from the mixed liquor tank immediately after filling with mixed liquor provided by the Hampton NH WWTF.

The VSS and Magnetite concentration rows show the average VSS result for the day the SVI test was completed.

The SVI was calculated based on the following equation:

$$SVI \left(\frac{mL}{gr} \right) = \frac{Volume \text{ at } 30 \text{ min} \left(\frac{mL}{L} \right)}{MLVSS \left(\frac{gr}{L} \right)}$$

The average SVI was 125 ml/gr. On March 6 and 7, the SVI values were 421 and 560, respectively, during a period when filamentous organisms were detected in large quantities.

A series of samples were collected between January 18 and January 23 to assess the effect of polymer on settleability of the biomass floc. Figure 3.6-26 shows the effect of polymer on settling times. On the three dates where the two were compared, the 1 ppm polymer dose reduced the 30 minute settleable solids by 58 mLs (215 mLs to 158 mLs on Jan 18), 100 mLs (250 mLs to 150 mLs on Jan 21), and 120 mLs (240 mLs to 120 mLs on Jan 23). Polymer was not used during Experimental Trials 01, 02, 03, 05 or 06, but had been used occasionally between trials. Polymer was used during the peak flow stress tests.

Figure 3.6-27 was prepared to determine if there was a relationship between the SVI and magnetite concentration. There does appear to be a relationship where increased magnetite concentration results in declining SVI.

Table 3.6-14: Settling Data for Conventional Activated Sludge with BioMag

Settling Time (minutes)	CWP	CWP	ML	CWP	ML	CWP	ML	CWP	CW	CW	ML	CW	ML	CW	CW	ML	ML	ML	New Hampton ML	ML	ML	CW	CW	CW	CW	CW	CW	CW	ML	ML	ML	ML	ML	CW	ML	
	1/18	1/18	1/18	1/18	1/21	1/21	1/23	1/23	1/24	1/24	2/27	2/27	2/29	2/29	3/2	3/2	3/6	3/7	3/9	3/12	3/12	3/14	3/15	3/16	3/17	3/18	3/20	3/21	3/22	3/22	3/23	3/25	3/26	3/29	4/3	6/1
0.00	2000	2000	2000	2000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
0.50					950	550					1000	1000	1000	1000			1000	1000	1000			900	950	960	970	970	990	990	960	970	960	980	950	950		
0.67									990	990																										
1.00	900	700	1600	850	910	350			900	900	1000	1000	980	980	1000	1000	1000	1000	990	990	970	800	830	950	950	980	970	980	870	900	900	940	900	900	750	
1.25									840	840																										
1.50					820	310			770	770	850	900	930	950	960	980	1000	1000	980			620	670	920	940	970	950	960	720	770	800	860	830	800		
1.75									710	700																										
2.00	700	520	1200	620	770	270			640	630	775	825	850	880	900	900	990	990	980	980	940	520	560	860	920	960	940	940	600	630	670	800	720	700	330	600
2.25										570																										
2.50									520	490													500	790												
2.75										440																										
3.00	600	450	1000	520	650	240			420	390	550	600	650	650	750	750	980	990	920	970	870	430	470	720	830	950	940	900	460	500	510	540	450	450	310	
3.25										360																										
3.50									375	340																										
3.75										330																										
4.00	550	400			570	220			295	315							970	980	850	960	800	380	420	590			820	820	410			360	350	370	280	480
4.50										295																										
5.00	500		800	440	510	200			300	280	300	300	450	390	410	430	950	970	660	930	700	350	380	530	540	890	730	720	370	400	400		310	330	230	
6.00			600							255										870	620						610									410
7.00		340																									540					260				
8.00	450		480																	740	530						500									360
9.00	420																																			
10.00		310			380	180				200	220	220	340	300	290	320	890	960	460	610	480	270		400	430		450	450	280	300		240	220	240	200	320
12.00									200																	530					280					
15.00	390	300		330	330	160	350	140	180	170	180	180	300	260	240	280	760	940		460	400	230		340	360	460	380	380				200	200		160	
20.00	370				280	160	300	130	160	150	160	150	265	230	220	290	700	905		410	350	200		300	330	430	340	330	200	230	230	170	170		150	245
25.00		290		320	260	150	270	110	150	140	150	140	235	205	190	220	640	860		370	320		190	270	290	380	300	300			200	155	150		140	230
30.00	350	280	430	310	250	150	240	120	140	135	140	135	215	185	175	200	590	840	330	340	300	170	180	250	280	330	290	270	170	180	180	140	140	150	130	220
VSS (mg/L)	2400	2400	2400	2400	2200	2200	3230	3230	3000	3000	1230	1230	1600	1600	1500	1400	1400	1500	1500	2528	2528	2242	2008	2096	1818	3850	1688	1706	1676	1676	1764	1552	1199	1240	1278	2450
Magnetite (mg/L)	5600	5600	5600	5600	5160	5160	5070	5070	4890	4890	1850	1850	1600	1600	1300	1400	800	740	1800	1300	1300	2665	3192	3138	2650	1360	2093	2777	2553	2553	2721	2650	2488	2800	2356	5800
SVI (mL/gr)	73	58	90	65	114	68	74	37	47	45	114	110	134	116	117	143	421	560	220	134	119	76	90	119	154	86	172	158	101	107	102	90	117	121	102	90

Figure 3.6-26: Effect of Polymer on Settling Times of Mixed Liquor

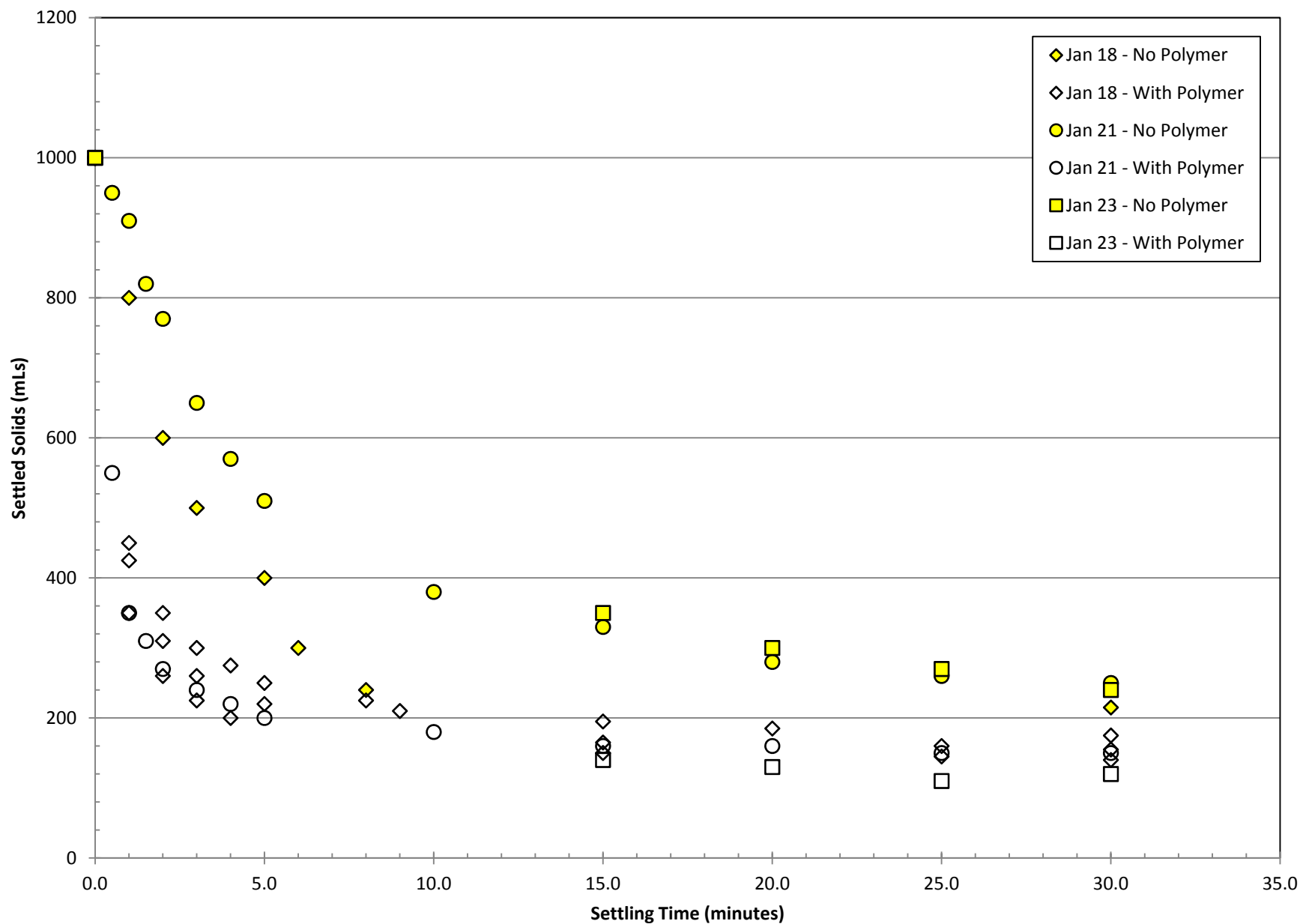
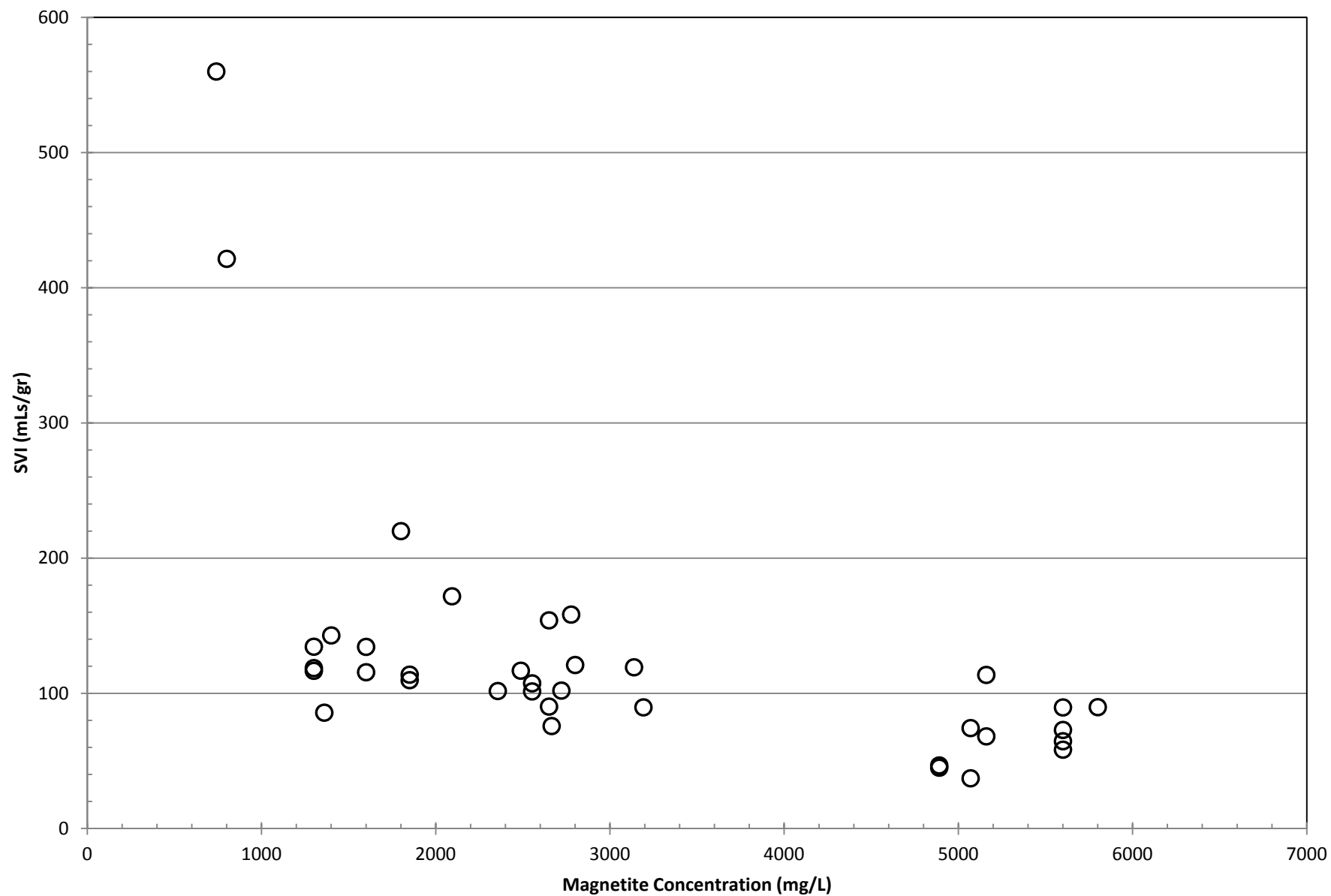


Figure 3.6-27: Relationship between SVI and Magnetite Concentration



3.7 MBBR AND DAF RESULTS

3.7.1 Schedule of MBBR and DAF Experiments

The pilot-scale MBBR and DAF system was operated to complete a series of Experimental Plans designed by AECOM to assess the performance of the process under a variety of flow and permit scenarios. The different phases of operation of the system are detailed in Table 3.7-01, and described below.

Table 3.7-01: MBBR and DAF Trial Schedule

Phase	Dates	Description
1	12/28 – 1/23	Start up - Filled and emptied the BOD reactor with a sump pump in “batch” mode while media growth is established
2	1/24 – 3/10	Start up - Continuous flow through BOD reactor. Flow is sent through NR1, NR2, DN1 reactor at night
	1/28- 1/30	Leak in BOD tank. Media removed, leak repaired, media re-installed
	3/07	DAF system is repaired/optimized
3	3/10 – 3/20	EXPERIMENTAL PLAN 01 - Average Daily Flow Trial for BOD and TSS removal
4	3/22 – 4/03	EXPERIMENTAL PLAN 02 - Max Month Load Trial for BOD and TSS removal
5	4/04 – 5/14	Transition to TN Removal, Acclimate media
6	5/15 – 5/30	EXPERIMENTAL PLAN 03 - Max Month BOD Loading, TN<8
7	5/30	EXPERIMENTAL PLAN 04 – 2 hour, med stress test
	6/03	EXPERIMENTAL PLAN 04 – 2 hour, peak stress test
	6/07-6/10	Media lost from NR2 into NR1, repaired
	6/14	EXPERIMENTAL PLAN 04 – 6 hour, med stress test
	6/19 – 6/21	EXPERIMENTAL PLAN 04 – 24 hour, med stress test
8	6/22	Add supplemental Ammonia feed to primary clarifier effluent
	6/24	Reduced surface area of openings between NR1, NR2, DN1
	6/26 – 7/03	EXPERIMENTAL PLAN 05 – Supplemental Ammonia, TN<8
9	7/03 – 7/09	Convert system to TN<3 mode, acclimate
	7/09 – 7/17	EXPERIMENTAL PLAN 06 – Supplemental Ammonia, TN<3

Phase 1 - Effluent from the pilot scale primary clarifier was added to the MBBR BOD Reactor starting on December 28. For the first 25 days, a sump pump was connected to a timer that added 84 gallons every 6 hours to the BOD Reactor, and 336 gallons of decant was removed with a sump pump once per day when an operator was on site. The average Surface Area Loading rate during this period was 0.21 gr BOD/m²·day due to the low volume of wastewater added to the tank. The average temperature in the BOD Reactor during this period was 8.7°C, which was lower than the average influent wastewater temperature because the BOD reactor was not continuously flowing, and was subject to low air temperature. Effluent soluble COD was measured during this period to monitor and assess biological growth on the MBBR media.

Phase 2 – Effluent from the pilot scale primary clarifier was added to the MBBR BOD Reactor continuously. Effluent from the BOD reactor was either (1) piped to the DAF system for clarification and sampling, or (2) sent through the NR1, NR2 and DN1 reactors to begin acclimation of the nitrification and denitrification media. The DAF was operated continuously during this period unless shut down for

mechanical reasons, receiving effluent from the BOD reactor when an operator was on site and collecting samples (typically 6-8 hours per day), and receiving effluent from the NR1, NR2 and DN1 reactors over night.

On January 28, a tear was found in the liner of the BOD reactor, causing a small leak. The liquid was drained from the reactor, and the media was removed and stored in an adjacent tank. During the media storage period, the media was periodically filled with effluent from the primary clarifier similar to the manner that the batch operation was conducted in Phase 1. The leak was repaired on January 30, and the media was re-installed.

Throughout the Phase 2 testing, the DAF effluent was poor, with effluent results typically higher in TSS and COD than comparable filtered effluent (bench filtration with a 10 micron glass fiber filter). A series of efforts were undertaken to improve the performance of the DAF, including re-piping the feed water of the Nikuni pump (air saturation pump) to use potable water, relocating the Nikuni pump to ground level to increase suction head on the pump. World Water Works visited the site on at least two occasions to test the system (February 22 and March 7). World Water Works replaced the inlet header to maintain higher velocities into the reactor tank, and DAF performance improved.

Phase 3 – The MBBR BOD reactor was operated at an average flow rate of 8.4 gpm to mimic the average daily organic load into the reactor. The design average daily loading was estimated to be 6,099 lb/day into 19,915 cf of media, or 0.3 lb BOD/cf·day (7.57 gr BOD/m²·day). During Experimental Trial 01 the average loading into the system was 4.9 gr BOD/m²·day. The DAF system was operated at 6.4 gpm, with a cationic polymer dose of 7.4 ppm.

Phase 4 – The MBBR BOD reactor was operated at an average flow rate of 11.6 gpm to mimic the average daily organic load into the reactor. The design average daily loading was estimated to be 8,718 lb/day into 19,915 cf of media, or 0.44 lb BOD/cf·day (10.77 gr BOD/m²·day). During Experimental Trial 02 the average loading into the system was 9.4 gr BOD/m²·day. The DAF system was operated at 6.4 gpm, with a cationic polymer dose of 8 ppm.

Phase 5 – The MBBR system was operated with the nitrification reactors (NR1 and NR2) and the denitrification reactor (DN1) receiving effluent from the BOD reactor full time. Note that during Phase 2 (January 1 to March 7), the effluent from the BOD reactor had been discharged to the NR1, NR2, and DN1 tank for several hours per day to acclimate the media. BOD was not discharged into the NR1, NR2 and DN1 Tanks during Phases 3 and 4, as sampling during Experimental Plan 01 and 02 required 24-hour samples be collected.

A supplemental carbon source (MicroC 1000) was added to the denitrification reactor, and the DAF was operated on effluent from the DN1 tank. The supplemental carbon feed rate was adjusted based on the dissolved oxygen concentration and the nitrate concentration in the NR2 tank, or based on COD from the DAF effluent.

Phase 6 - The flow rate through the MBBR system was adjusted daily to maintain a target organic loading of 7.57 gr BOD/m²·day, and field and laboratory samples were collected as part of Experimental

Plan 03. During the trial, the average loading into the system was 9.4 gr BOD/m²·day, and varied from 2.2 to 9.8 gr BOD/m²·day. Four set of laboratory samples were collected.

Phase 7 – Experimental Plan 04 included four separate periods of high flow, intended to mimic different storm events. The four experiments conducted on the MBBR system included:

Full-strength, Mid flow, short duration (FMS) Trial – The flow rate was increased from a baseline flow of 11 to 19 gpm for 2 hours. Samples were collected and analyzed in the field. However, the large number of field analyses eventually became too difficult and time consuming to process in the field (MBBR and CASB stress tests were in progress simultaneously requiring analyses for both systems) and samples for subsequent stress tests were delivered to Eastern Analytical for laboratory analysis.

Full-strength, Peak flow, short duration (FPS) Trial – The flow rate was increased from a baseline flow of 13 to 22 gpm for 2 hours.

Full-strength, Peak flow, Medium duration (FPM) Trial – The flow rate was increased from a baseline flow of 16 to 22 gpm for 6 hours. Recovery samples were collected for 24 hours.

Diluted Strength, Peak Flow, Extended Duration (DPE) Trial – The flow rate was increased from a baseline flow of 10 to 22 gpm for 26 hours. Recovery samples were collected for 48 hours.

Prior to and after the flow increases, the baseline flow was set to a target loading that matched the loading during Experimental Plan 03. During the entire set of peak flow trials, the average loading into the system was 8.1 gr BOD/m²·day, and varied from 2.1 to 14.7 gr BOD/m²·day. For each trial, a minimum of two samples were collected prior to the increase in flow to establish the background performance of the MBBR and DAF, three samples were collected during the increased flow period, and at least three samples were collected after the flow rate was reduced to monitor the recovery period. The flow increase was effectively instantaneous because the flow control valve that controlled flow to the MBBR would not allow precise changes in flow. There were no changes made to the air flow into the BOD or nitrification reactors, mixing speed, or supplemental carbon dose. Note that a probe to monitor ORP was installed in the DN1 tank during the start of the FMS trial, and the supplemental carbon dose was adjusted to maintain an ORP value in the DN1 tank of between -80 and -120 mV during baseline flow periods. The flow rate through the DAF was not varied during this trial.

Phase 8 – The openings in the baffle walls that separated NR1/NR2 and NR2/DN1 were reduced in area. Each of these two baffle walls initially had screened openings with an area of 4.75 sf, which was 20% of the total submerged cross sectional area of the tank. The Vendor recommended that better control of the DO concentration between the tanks could be achieved if the opening area was reduced, so a portion of the open area of each baffle wall was blocked on June 26, leaving an open area of 1.36 sf in each baffle.

A source of supplemental ammonia was fed into the primary clarifier effluent to increase the concentration and loading of ammonia and TKN to each process. Between June 22 and July 9 the supplemental ammonia dosage was controlled to provide an increase of 15 mg/L of ammonia, or a

primary TKN concentration of approximately 35 mg/L (ambient TKN and supplemental ammonia combined). Soda ash was fed into the primary effluent flow to increase the alkalinity to 150 mg/L as CaCO_3 . The MBBR system was operated as it had been during Experimental Trial 03, with the flow rate adjusted to target an organic loading of 7.57 gr BOD/m²-day. The supplemental carbon dose was adjusted to maintain an ORP value in the DN1 tank of between -80 and -120 mV.

Phase 9 –The DN2 tank was filled with a mixture of acclimated and virgin media. Acclimated media was taken from the BOD tank (10 cf) and the DN1 tank (10 cf), and placed in DN2 with virgin media (18.1 cf). Virgin media was added to the BOD and NR1 tanks to replace the volumes of acclimated media that had been removed (10 cf virgin media for each). The mixer from the NR1 tank was relocated into the DN2 tank. DN1 had been bypassed during all previous experiments, but the bypass was now closed so that all MBBR flow passed through DN2. Effluent from DN2 fed the DAF, and the excess flow was wasted.

A source of supplemental ammonia was fed into the primary clarifier effluent to increase the concentration and loading of ammonia and TKN to each process. Starting on July 9, the supplemental ammonia dosage was controlled to provide an increase of 25 mg/L of ammonia, or a primary TKN concentration of approximately 45 mg/L (ambient and supplemental combined). Soda ash was fed into the primary effluent flow to increase the alkalinity to 300 mg/L as CaCO_3 .

3.7.2 Results

Table 3.7-02 includes field data from all pilot testing. The water quality data is presented in the format:

Median (minimum – maximum) [number of samples]

A description of the data contained in each column is described below.

Columns E and F – “Start” and “End” delineate the date and time that the online data is summarized. The water quality data was normally collected from the composite samplers programmed to start sampling at 8:am for 24 hours, so water quality samples represent conditions which were in effect between the start and end times.

Column G – “Phase” represents the testing phase described in Section 3.7.1.

Column M – “Notes” includes notes and comments concerning the daily operations

Column N – “Influent Flow to Reactor (gpm)” summarizes the data collected by the Signet flow meter installed between the MBBR feed pump and the Influent to the MBBR BOD Reactor. The flow meter did not record all flow to the MBBR system during the batch feed operation (Phase 1 from December 28, 2011 through January 22, 2012) as a separate sump pump was often used.

Columns O, P, Q – “Probe #1 Location”, “DO Probe #1 (ppm)”, and “Temperature Probe #1 (°C)” summarize the data provided by one of the HACH online Dissolved Oxygen Probes installed in the MBBR tank. The probes were installed by hanging into the tanks, and were sometimes removed from a tank for cleaning or calibration, or relocated from one tank to another. The “location” column identifies the location of the probe, recorded manually in the pilot notes. The “DO” and “Temperature” data was

recorded every two minutes on a data recording device, and is summarized in the respective columns. Data that represents periods when the probe was calibrated or suspended above the liquid during testing (due to low tank level, maintenance on the system, or cleaning) were removed from the analysis, and are not included in the summary of the data.

Columns R, S, T - "Probe #2 Location", "DO Probe #2 (ppm)", and "Temperature Probe #2 (°C)" contain the information provided by the second HACH online DO as described above.

Column U - "DAF Q" shows the flow rate into the DAF pilot unit in gallons per minute. Note that the DAF did not receive all flow from the MBBR, and that some portion of the MBBR flow was discharged without clarification.

Column V - "NR2 ORP (mV)" includes the data recorded by a HACH Oxidation Reduction Probe installed in the NR2 tank on June 1 to control the supplemental carbon dose.

Columns W, AV, BL, CB, CR, DX - "...Sample ID" identifies the sample ID number, or range of ID numbers used. A unique ID number was assigned to each field sample when it was collected, and the Sample ID is used to track field samples.

Columns X through EM - summarize water quality results from field analyses collected and analyzed in accordance with the methods described in Section 2.7.1. The sample locations are as follows:

"(02,03) PRIMARY EFFLUENT" samples were collected at the effluent weir of the pilot-scale primary clarifier before June 25, or collected at the influent of the MBBR reactor after June 25. Soda Ash and aqueous ammonia was added to the pilot-scale primary clarifier on June 25, but several parameters were not affected, and water quality results for TSS, COD, and BOD columns with headers "(02,03) PRIMARY EFFLUENT" represent pilot-scale primary effluent regardless of the spiked feed.

"(02) UNSPIKED PRIMARY EFFLUENT" samples were collected at the effluent weir of the pilot-scale primary clarifier upstream of the soda ash and aqueous ammonia feed location, and represent pilot-scale primary clarifier pH and alkalinity without the addition of soda ash, and concentrations of ammonia, nitrate, total nitrogen, and TKN without supplemental ammonia. The site was often used to control the supplemental soda ash and aqueous ammonia feed rate.

"(03) SPIKED PRIMARY EFFLUENT" samples were collected at the influent of the MBBR reactor after June 25 and represent pilot-scale primary clarifier pH and alkalinity with the addition of soda ash, and concentrations of ammonia, nitrate, total nitrogen, and TKN with supplemental ammonia.

"(11) MBBR BOD" samples were collected from the BOD reactor itself, or from a tap on the inlet of the pilot-scale DAF reactor if the DAF system were receiving water directly from the BOD tank.

"(12) MBBR NR1" samples were collected from the NR1 reactor, near the partition with the NR2 tank.

"(14) MBBR NR2" samples were collected from the NR2 reactor.

“(15) MBBR DN1” samples were collected from the DN1 reactor, or from a tap on the inlet of the pilot-scale DAF reactor if the DAF system were receiving water directly from the DN1 tank. During the high stress testing, the sample was collected from inside the reaction tank effluent piping with an autosampler suction line.

“(16) MBBR DN2” samples were collected from the DN2 reactor, or from a tap on the inlet of the pilot-scale DAF reactor if the DAF system were receiving water directly from the DN2 tank.

“(17) DAF EFF” samples were collected from the effluent stilling well on the DAF pilot. Grab samples were collected by dipping a 500 mL beaker into the stilling well area, and composite samples were collected by suspending the inlet of the autosampler hose into the stilling well area.

	E	F	G	M	N	O	P	Q	R
1	Start	End	Phase	Notes	Influent Flow to Reactor (gpm)	Probe #1 Location	DO Probe #1 (ppm)	Temperature Probe #1 (°C)	Probe #2 Location
2	12/28/11 18:56	03/06/12 08:00	ALL	ALL DATA SUMMARIZED IN THIS ROW	10.2 (0.0-38.6) [30249]		5.3 (0.0-12.0) [45755]	10.6 (0.1-12.1) [44931]	
3									
4	12/28/11 18:56	12/29/11 08:00	1	Operating in Batch Feed Mode	No Data [0]	BOD Tank (Mid L, Mid Ht)	11.6 (11.0-12.0) [392]	6.5 (5.3-7.6) [392]	BOD Tank (Mid L, Mid Ht)
5	12/29/11 08:02	12/30/11 08:00	1		No Data [0]	BOD Tank (Mid L, Mid Ht)	12.0 (6.4-12.0) [720]	4.4 (3.8-5.3) [720]	BOD Tank (Mid L, Mid Ht)
6	12/29/11 08:02	12/30/11 08:00	1		No Data [0]	BOD Tank (Mid L, Mid Ht)	12.0 (6.4-12.0) [720]	4.4 (3.8-5.3) [720]	BOD Tank (Mid L, Mid Ht)
7	12/30/11 08:02	12/31/11 08:00	1		No Data [0]	BOD Tank (Mid L, Mid Ht)	3.1 (0.0-12.0) [720]	9.0 (3.6-9.4) [720]	BOD Tank (Mid L, Mid Ht)
8	12/31/11 08:02	01/01/12 08:00	1		No Data [0]	BOD Tank (Mid L, Mid Ht)	10.5 (0.0-10.9) [720]	9.1 (8.6-9.3) [720]	BOD Tank (Mid L, Mid Ht)
9	01/01/12 08:02	01/02/12 08:00	1		No Data [0]	BOD Tank (Mid L, Mid Ht)	10.2 (7.9-11.0) [720]	9.3 (8.8-9.7) [720]	BOD Tank (Mid L, Mid Ht)
10	01/02/12 08:02	01/03/12 08:00	1		No Data [0]	BOD Tank (Mid L, Mid Ht)	10.9 (6.9-11.5) [720]	9.1 (7.8-9.7) [720]	BOD Tank (Mid L, Mid Ht)
11	01/03/12 08:02	01/04/12 08:00	1		No Data [0]	BOD Tank (Mid L, Mid Ht)	11.8 (9.4-12.0) [720]	6.4 (4.7-7.9) [720]	BOD Tank (Mid L, Mid Ht)
12	01/04/12 08:02	01/05/12 08:00	1		6.7 (1.4-7.6) [10]	BOD Tank (Mid L, Mid Ht)	11.4 (2.6-12.0) [718]	6.4 (3.9-7.2) [718]	BOD Tank (Mid L, Mid Ht)
13	01/05/12 08:02	01/06/12 08:00	1		No Data [0]	BOD Tank (Mid L, Mid Ht)	10.3 (0.8-11.9) [719]	8.3 (6.3-8.9) [719]	BOD Tank (Mid L, Mid Ht)
14	01/06/12 08:02	01/07/12 08:00	1		No Data [0]	BOD Tank (Mid L, Mid Ht)	8.9 (3.3-10.8) [719]	9.5 (8.2-10.3) [719]	BOD Tank (Mid L, Mid Ht)
15	01/07/12 08:02	01/08/12 08:00	1		No Data [0]	BOD Tank (Mid L, Mid Ht)	10.0 (9.6-10.0) [720]	11.5 (10.3-12.1) [720]	BOD Tank (Mid L, Mid Ht)
16	01/08/12 08:02	01/09/12 08:00	1		No Data [0]	BOD Tank (Mid L, Mid Ht)	10.0 (7.7-10.4) [106]	12.0 (12.0-12.1) [106]	BOD Tank (Mid L, Mid Ht)
17	01/09/12 08:02	01/10/12 08:00	1		No Data [0]	BOD Tank (Mid L, Mid Ht)	10.7 (6.7-11.6) [553]	9.9 (9.4-10.6) [553]	BOD Tank (Mid L, Mid Ht)
18	01/10/12 08:02	01/11/12 08:00	1	Polymer jar testing on MBBR BOD ML for DAF Optimization	5.4 (0.9-19.1) [120]	BOD Tank (Mid L, Mid Ht)	5.6 (2.3-11.3) [717]	11.3 (9.4-11.7) [717]	BOD Tank (Mid L, Mid Ht)
19	01/11/12 08:02	01/12/12 08:00	1	Install 5mm inlet strainer on MBBR feed	5.2 (0.1-5.9) [99]	BOD Tank (Mid L, Mid Ht)	9.7 (0.3-11.2) [716]	10.8 (8.4-11.5) [716]	BOD Tank (Mid L, Mid Ht)
20	01/12/12 08:02	01/13/12 08:00	1		6.1 (1.7-7.0) [85]	BOD Tank (Mid L, Mid Ht)	11.7 (8.9-12.0) [719]	7.9 (7.7-10.5) [719]	BOD Tank (Mid L, Mid Ht)
21	01/13/12 08:02	01/14/12 08:00	1	DAF leak in residual basin	5.2 (1.7-14.6) [176]	BOD Tank (Mid L, Mid Ht)	10.7 (7.7-11.8) [719]	9.8 (7.7-10.8) [719]	BOD Tank (Mid L, Mid Ht)
22	01/14/12 08:02	01/15/12 08:00	1	MBBR drain pipe frozen (batch mode = stagnant flow)	0.8-1.2 [2]	BOD Tank (Mid L, Mid Ht)	11.6 (10.9-12.0) [720]	8.7 (6.8-9.1) [720]	BOD Tank (Mid L, Mid Ht)
23	01/15/12 08:02	01/16/12 08:00	1	replace drain line	5.3 (2.3-5.6) [26]	BOD Tank (Mid L, Mid Ht)	12.0 (11.3-12.0) [720]	6.1 (4.8-7.4) [720]	BOD Tank (Mid L, Mid Ht)
24	01/16/12 08:02	01/17/12 08:00	1	batch feed mode during days	No Data [0]	BOD Tank (Mid L, Mid Ht)	11.5 (10.7-12.0) [720]	6.5 (4.7-6.9) [720]	BOD Tank (Mid L, Mid Ht)
25	01/17/12 08:02	01/18/12 08:00	1	added surge tank to drain line to prevent overflows	2.2 (1.3-7.7) [521]	BOD Tank (Mid L, Mid Ht)	4.0 (1.1-11.2) [717]	10.6 (6.9-11.5) [717]	BOD Tank (Mid L, Mid Ht)
26	01/18/12 08:02	01/19/12 08:00	1	cover MBBR tanks to keep media warm, set up sump pump to feed	6.8 (0.1-8.0) [202]	BOD Tank (Mid L, Mid Ht)	10.1 (0.9-11.1) [718]	10.9 (4.7-11.4) [718]	BOD Tank (Mid L, Mid Ht)
27	01/19/12 08:02	01/20/12 08:00	1		7.1 (0.0-19.6) [152]	BOD Tank (Mid L, Mid Ht)	5.9 (3.1-11.1) [720]	10.9 (9.7-11.2) [720]	BOD Tank (Mid L, Mid Ht)
28	01/20/12 08:02	01/21/12 08:00	1		9.1 (0.0-12.7) [267]	BOD Tank (Mid L, Mid Ht)	3.0 (0.9-7.4) [720]	10.8 (10.4-11.1) [720]	BOD Tank (Mid L, Mid Ht)
29	01/21/12 08:02	01/22/12 08:00	1	Some ice on surface of MBBR BOD tank	No Data [0]	BOD Tank (Mid L, Mid Ht)	8.3 (5.5-10.3) [719]	9.3 (8.2-10.4) [719]	BOD Tank (Mid L, Mid Ht)
30	01/22/12 08:02	01/23/12 08:00	2	Began flow through operation, pump to DAF	12.2 (10.4-12.6) [7]	BOD Tank (Mid L, Mid Ht)	10.4 (8.0-10.8) [720]	8.0 (8.0-8.3) [720]	BOD Tank (Mid L, Mid Ht)
31	01/23/12 08:02	01/24/12 08:00	2	Shut off polymer @ 1/23 14:00	12.5 (0.0-14.1) [720]	BOD Tank (Mid L, Mid Ht)	1.1 (0.5-7.5) [720]	10.5 (8.4-11.4) [720]	BOD Tank (Mid L, Mid Ht)
32	01/24/12 08:02	01/25/12 08:00	2		11.1 (1.8-12.6) [707]	BOD Tank (Mid L, Mid Ht)	2.5 (2.0-5.1) [720]	11.3 (10.1-11.5) [720]	BOD Tank (Mid L, Mid Ht)
33	01/25/12 08:02	01/26/12 08:00	2		3.3 (1.6-23.5) [521]	BOD Tank (Mid L, Mid Ht)	5.2 (2.3-9.9) [716]	11.4 (4.5-11.8) [716]	BOD Tank (Mid L, Mid Ht)
34	01/26/12 08:02	01/27/12 08:00	2		12.1 (9.4-24.2) [720]	BOD Tank (Mid L, Mid Ht)	2.4 (1.6-9.0) [720]	11.6 (6.8-11.8) [720]	BOD Tank (Mid L, Mid Ht)
35	01/27/12 08:02	01/28/12 08:00	2	discovered leak in BOD tank, moved media to new tank	10.5 (0.4-11.9) [717]	BOD Tank (Mid L, Mid Ht)	7.0 (3.9-8.9) [720]	9.6 (6.8-10.1) [720]	BOD Tank (Mid L, Mid Ht)
36	01/28/12 08:02	01/29/12 08:00	2	MBBR media not in tank, stored dry in separate tank	2.8 (2.3-21.5) [85]	BOD Tank (Mid L, Mid Ht)	6.4 (1.3-12.0) [719]	7.8 (5.8-12.0) [719]	BOD Tank (Mid L, Mid Ht)
37	01/29/12 08:02	01/30/12 08:00	2	repaired BOD tank, refill and restart	No Data [0]	BOD Tank (Mid L, Mid Ht)	7.5 (6.4-8.9) [720]	7.8 (7.7-7.9) [720]	BOD Tank (Mid L, Mid Ht)
38	01/30/12 08:02	01/31/12 08:00	2		9.0 (0.0-18.4) [508]	BOD Tank (Mid L, Mid Ht)	3.2 (0.1-12.0) [720]	10.5 (2.7-10.9) [720]	BOD Tank (Mid L, Mid Ht)
39	01/31/12 08:02	02/01/12 08:00	2	Feed NR1, NR2, DN1 Tank at night, DAF during day (N/D)	14.3 (0.0-22.1) [716]	BOD Tank (Mid L, Mid Ht)	1.5 (1.2-4.5) [718]	10.9 (10.4-11.4) [718]	BOD Tank (Mid L, Mid Ht)
40	02/01/12 08:02	02/02/12 08:00	2	N/D	12.9 (0.0-16.3) [718]	BOD Tank (Mid L, Mid Ht)	1.2 (0.2-1.6) [718]	11.2 (3.5-11.3) [718]	Nit #1 Tank (Near Entry, Mid Ht)
41	02/02/12 08:02	02/03/12 08:00	2	N/D	12.4 (0.0-16.6) [719]	BOD Tank (Mid L, Mid Ht)	1.3 (0.0-12.0) [719]	10.9 (1.8-11.2) [719]	Nit #1 Tank (Near Entry, Mid Ht)
42	02/03/12 08:02	02/04/12 08:00	2	Cleaned DAF Tank	10.6 (0.0-14.5) [720]	BOD Tank (Mid L, Mid Ht)	1.1 (0.8-1.5) [720]	10.9 (10.3-11.0) [720]	Nit #1 Tank (Near Entry, Mid Ht)
43	02/04/12 08:02	02/05/12 08:00	2	N/D	10.0 (0.0-13.4) [720]	BOD Tank (Mid L, Mid Ht)	0.9 (0.8-1.7) [720]	10.8 (10.2-11.1) [720]	Nit #1 Tank (Near Entry, Mid Ht)
44	02/05/12 08:02	02/06/12 08:00	2	N/D	11.1 (0.0-14.0) [720]	BOD Tank (Mid L, Mid Ht)	0.9 (0.7-1.6) [720]	10.4 (10.0-11.0) [720]	Nit #1 Tank (Near Entry, Mid Ht)
45	02/06/12 08:02	02/07/12 08:00	2	N/D	12.3 (10.5-13.6) [719]	BOD Tank (Mid L, Mid Ht)	2.7 (1.0-5.4) [719]	10.9 (10.0-11.2) [719]	Nit #1 Tank (Near Entry, Mid Ht)
46	02/07/12 08:02	02/08/12 08:00	2	N/D	9.0 (7.8-14.0) [719]	BOD Tank (Mid L, Mid Ht)	2.4 (2.0-5.8) [719]	11.0 (10.4-11.2) [719]	Nit #1 Tank (Near Entry, Mid Ht)
47	02/08/12 08:02	02/09/12 08:00	2	N/D	14.2 (0.0-15.0) [718]	BOD Tank (Mid L, Mid Ht)	1.9 (0.9-7.1) [718]	11.1 (5.6-11.4) [718]	Nit #1 Tank (Near Entry, Mid Ht)
48	02/09/12 08:02	02/10/12 08:00	2	DAF Effluent line backed up, installed vent line	12.1 (0.0-13.5) [720]	BOD Tank (Mid L, Mid Ht)	3.0 (2.1-7.6) [720]	11.1 (10.3-11.4) [720]	Nit #1 Tank (Near Entry, Mid Ht)
49	02/10/12 08:02	02/11/12 08:00	2	MBBR lost flow due to electrical failure, repaired	13.0 (0.0-19.9) [719]	BOD Tank (Mid L, Mid Ht)	2.7 (1.8-7.9) [719]	11.2 (10.4-11.5) [719]	Nit #1 Tank (Near Entry, Mid Ht)
50	02/11/12 08:02	02/12/12 08:00	2	high solids in effluent of DAF	11.1 (0.0-15.7) [720]				Nit #1 Tank (Near Entry, Mid Ht)
51	02/12/12 08:02	02/13/12 08:00	2	N/D	9.2 (0.0-10.7) [720]				Nit #1 Tank (Near Entry, Mid Ht)
52	02/13/12 08:02	02/14/12 08:00	2	Changed polymer to Aries Chemical	8.1 (0.0-9.2) [720]				Nit #1 Tank (Near Entry, Mid Ht)
53	02/14/12 08:02	02/15/12 08:00	2	clean DAF, N/D	12.1 (0.0-17.9) [719]				Nit #1 Tank (Near Entry, Mid Ht)
54	02/15/12 08:02	02/16/12 08:00	2	Debugging DAF air recycle system	11.2 (6.1-14.7) [717]				Nit #1 Tank (Near Entry, Mid Ht)

	E	F	G	M	N	O	P	Q	R
1	Start	End	Phase	Notes	Influent Flow to Reactor (gpm)	Probe #1 Location	DO Probe #1 (ppm)	Temperature Probe #1 (°C)	Probe #2 Location
55	02/16/12 08:02	02/17/12 08:00	2	N/D	12.4 (6.7-17.6) [715]				Nit #1 Tank (Near Entry, Mid Ht)
56	02/17/12 08:02	02/18/12 08:00	2	N/D	12.7 (5.1-13.8) [720]				BOD Tank (Mid L, Mid Ht)
57	02/18/12 08:02	02/19/12 08:00	2	N/D	12.8 (10.9-13.6) [720]				BOD Tank (Mid L, Mid Ht)
58	02/19/12 08:02	02/20/12 08:00	2	N/D	12.6 (11.4-13.9) [720]				BOD Tank (Mid L, Mid Ht)
59	02/20/12 08:02	02/21/12 08:00	2	N/D	12.2 (10.1-13.1) [719]				BOD Tank (Mid L, Mid Ht)
60	02/21/12 08:02	02/22/12 08:00	2	Dan Dair onsite to debug DAF, relocate DAF inject point to orig	10.1 (9.2-11.8) [720]				BOD Tank (Mid L, Mid Ht)
61	02/22/12 08:02	02/23/12 08:00	2	compare DAF effluent "with air vs aithout air"	9.6 (9.0-10.8) [718]				BOD Tank (Mid L, Mid Ht)
62	02/23/12 08:02	02/24/12 08:00	2	Reduced flow to MBBR, Install Baffle Wall	8.9 (6.3-10.2) [720]				BOD Tank (Mid L, Mid Ht)
63	02/24/12 08:02	02/25/12 08:00	2	N/D	6.3 (4.0-11.9) [715]				BOD Tank (Mid L, Mid Ht)
64	02/25/12 08:02	02/26/12 08:00	2	N/D	5.7 (0.9-12.5) [718]				BOD Tank (Mid L, Mid Ht)
65	02/26/12 08:02	02/27/12 08:00	2	N/D	7.2 (4.8-8.3) [720]				BOD Tank (Mid L, Mid Ht)
66	02/27/12 08:02	02/28/12 08:00	2	N/D	6.1 (4.5-7.2) [719]				BOD Tank (Mid L, Mid Ht)
67	02/28/12 08:02	02/29/12 08:00	2	N/D	6.1 (4.5-8.1) [544]				BOD Tank (Mid L, Mid Ht)
68	02/29/12 08:02	03/01/12 08:00	2	MBBR feed pump blocked	5.6 (3.1-7.2) [697]				BOD Tank (Mid L, Mid Ht)
69	03/01/12 08:02	03/02/12 08:00	2	Cleaned MBBR feed pump	6.4 (2.2-7.8) [692]				BOD Tank (Mid L, Mid Ht)
70	03/02/12 08:02	03/03/12 08:00	2	N/D	4.3 (1.1-31.1) [704]				BOD Tank (Mid L, Mid Ht)
71	03/03/12 08:02	03/04/12 08:00	2	N/D	4.2 (1.2-15.7) [715]				BOD Tank (Mid L, Mid Ht)
72	03/04/12 08:02	03/05/12 08:00	2	N/D	3.7 (0.0-4.3) [497]				BOD Tank (Mid L, Mid Ht)
73	03/05/12 08:02	03/06/12 08:00	2	Restarting DAF	7.0 (0.0-38.6) [627]				BOD Tank (Mid L, Mid Ht)
74	03/06/12 08:02	03/07/12 08:00	2	Chandler and Kyle onsite to debug DAF	10.2 (4.3-40.0) [720]				BOD Tank (Mid L, Mid Ht)
75	03/07/12 08:02	03/08/12 08:00	3	N/D	8.5 (7.5-10.7) [717]				BOD Tank (Mid L, Mid Ht)
76	03/08/12 08:02	03/09/12 08:00	3	Reduced Polymer Dose	8.7 (0.5-9.9) [716]				BOD Tank (Mid L, Mid Ht)
77	03/09/12 08:02	03/10/12 08:00	3	Start BOD at AD	8.5 (1.4-9.4) [706]				BOD Tank (Mid L, Mid Ht)
78	03/10/12 08:02	03/11/12 08:00	3	Noted that DAF effluent poorer at reduced polymer dose	7.9 (7.3-8.7) [718]				BOD Tank (Mid L, Mid Ht)
79	03/11/12 08:02	03/12/12 08:00	3	Lab sample (EAI#108372)	7.4 (2.0-9.7) [718]				BOD Tank (Mid L, Mid Ht)
80	03/12/12 08:02	03/13/12 08:00	3		9.4 (1.3-11.2) [705]			No Data [0]	BOD Tank (Mid L, Mid Ht)
81	03/13/12 08:02	03/14/12 08:00	3		6.1 (0.8-18.2) [712]			No Data [0]	BOD Tank (Mid L, Mid Ht)
82	03/14/12 08:02	03/15/12 08:00	3	Solids in effluent side of DAF, Cleaned DAF Tank	6.6 (0.6-20.7) [706]			6.7 (0.8-6.9) [613]	BOD Tank (Mid L, Mid Ht)
83	03/15/12 08:02	03/16/12 08:00	3	Cleaned MBBR feed pump	13.7 (0.6-17.4) [674]			6.6 (6.2-6.8) [720]	BOD Tank (Mid L, Mid Ht)
84	03/16/12 08:02	03/17/12 08:00	3		9.5 (1.2-38.6) [692]			6.9 (6.3-7.0) [720]	BOD Tank (Mid L, Mid Ht)
85	03/17/12 08:02	03/18/12 07:59	3	Polymer system offline (empty)	5.8 (3.4-8.8) [689]			7.0 (6.6-7.3) [689]	BOD Tank (Mid L, Mid Ht)
86	03/18/12 08:01	03/19/12 07:59	3	Lab sample (EAI#108514)	9.3 (3.4-13.1) [720]			7.0 (6.7-7.3) [720]	BOD Tank (Mid L, Mid Ht)
87	03/19/12 08:01	03/20/12 07:59	3	Lab sample (EAI#108547), End BOD at AD	8.7 (4.1-12.6) [694]			7.3 (6.7-7.6) [718]	BOD Tank (Mid L, Mid Ht)
88	03/20/12 08:01	03/21/12 07:59	4		8.2 (3.3-10.9) [710]			7.5 (7.0-7.8) [720]	BOD Tank (Mid L, Mid Ht)
89	03/21/12 08:01	03/22/12 07:59	4	Increase flow for MM Trial	10.4 (5.5-16.5) [701]	BOD Tank (Mid L, Mid Ht)	1.1 (0.0-4.7) [175]	7.8 (5.4-8.4) [718]	BOD Tank (Mid L, Mid Ht)
90	03/22/12 08:01	03/23/12 07:59	4	MM Trial	13.3 (2.4-14.6) [705]	BOD Tank (Mid L, Mid Ht)	5.9 (5.0-8.9) [628]	7.8 (7.3-11.9) [720]	BOD Tank (Mid L, Mid Ht)
91	03/23/12 08:01	03/24/12 07:59	4	MM Trial	12.9 (2.5-14.4) [699]	BOD Tank (Mid L, Mid Ht)	5.5 (5.1-8.6) [720]	7.7 (7.0-8.2) [720]	BOD Tank (Mid L, Mid Ht)
92	03/24/12 08:01	03/25/12 07:59	4	MM Trial	9.4 (8.6-12.4) [720]	BOD Tank (Mid L, Mid Ht)	6.4 (5.6-8.9) [720]	7.6 (6.9-7.8) [720]	BOD Tank (Mid L, Mid Ht)
93	03/25/12 08:01	03/26/12 07:59	4	MM Trial	12.8 (8.0-18.4) [720]	BOD Tank (Mid L, Mid Ht)	5.8 (4.7-8.9) [720]	7.5 (7.0-7.7) [720]	BOD Tank (Mid L, Mid Ht)
94	03/26/12 08:01	03/27/12 07:59	4	MM Trial	11.3 (1.9-15.8) [692]	BOD Tank (Mid L, Mid Ht)	3.6 (1.0-8.1) [718]	7.3 (6.9-7.7) [718]	BOD Tank (Mid L, Mid Ht)
95	03/27/12 08:01	03/28/12 07:59	4	MM Trial, Cleaned DAF tank and pipes	9.3 (0.0-15.0) [720]	BOD Tank (Mid L, Mid Ht)	7.5 (0.9-12.0) [720]	6.9 (3.9-7.9) [720]	BOD Tank (Mid L, Mid Ht)
96	03/28/12 08:01	03/29/12 07:59	4	MM Trial	11.3 (9.2-17.8) [718]	BOD Tank (Mid L, Mid Ht)	6.0 (3.9-8.4) [718]	7.7 (5.3-7.9) [718]	BOD Tank (Mid L, Mid Ht)
97	03/29/12 08:01	03/30/12 07:59	4	MM Trial	0.0 (0.0-22.4) [720]	BOD Tank (Mid L, Mid Ht)	9.5 (5.2-12.0) [720]	7.3 (3.2-7.9) [720]	BOD Tank (Mid L, Mid Ht)
98	03/30/12 08:01	03/31/12 07:59	4	MM Trial	11.8 (0.0-22.3) [720]	BOD Tank (Mid L, Mid Ht)	6.4 (5.3-12.0) [720]	7.7 (3.5-7.8) [720]	BOD Tank (Mid L, Mid Ht)
99	03/31/12 08:01	04/01/12 07:59	4	MM Trial	11.1 (0.0-12.1) [720]	BOD Tank (Mid L, Mid Ht)	6.4 (5.5-12.0) [720]	7.9 (3.4-8.1) [720]	BOD Tank (Mid L, Mid Ht)
100	04/01/12 08:01	04/02/12 07:59	4	MM Trial	9.7 (0.0-11.3) [720]	BOD Tank (Mid L, Mid Ht)	10.8 (6.5-12.0) [720]	6.8 (3.2-8.1) [720]	BOD Tank (Mid L, Mid Ht)
101	04/02/12 08:01	04/03/12 07:59	4	shut off DAF tank for cleaning	12.6 (0.0-37.5) [699]	BOD Tank (Mid L, Mid Ht)	5.9 (4.8-12.0) [720]	7.7 (3.2-8.2) [720]	BOD Tank (Mid L, Mid Ht)
102	04/03/12 08:01	04/04/12 07:59	5	Transition to TN removal	9.2 (1.9-13.4) [696]		4.5 (4.1-7.6) [223]		
103	04/04/12 08:01	04/05/12 07:59	5	Transition to TN removal	11.6 (1.7-12.8) [703]		No Data [0]		
104	04/05/12 08:01	04/06/12 07:59	5	Transition to TN removal	10.7 (1.8-11.8) [691]		No Data [0]		
105	04/06/12 08:01	04/07/12 07:59	5	Transition to TN removal	10.6 (7.4-11.8) [650]		No Data [0]		
106	04/07/12 08:01	04/08/12 07:59	5	Transition to TN removal	6.0 (1.7-10.5) [720]		No Data [0]		
107	04/08/12 08:01	04/09/12 07:59	5	Transition to TN removal	1.4 (0.0-40.0) [382]		No Data [0]		

	E	F	G	M	N	O	P	Q	R
1	Start	End	Phase	Notes	Influent Flow to Reactor (gpm)	Probe #1 Location	DO Probe #1 (ppm)	Temperature Probe #1 (°C)	Probe #2 Location
108	04/09/12 08:01	04/10/12 07:59	5	Transition to TN removal	8.8 (1.7-11.9) [702]		No Data [0]		
109	04/10/12 08:01	04/11/12 07:59	5		10.3 (2.0-12.9) [699]	BOD Tank (Mid L, Mid Ht)	No Data [0]		NR2 Tank (END, Top 3rd)
110	04/11/12 08:01	04/12/12 07:59	5		6.3 (4.4-10.4) [715]	BOD Tank (Mid L, Mid Ht)	3.5 (0.0-6.7) [408]		NR2 Tank (END, Top 3rd)
111	04/12/12 08:01	04/13/12 07:59	5		10.2 (0.6-11.5) [700]	BOD Tank (Mid L, Mid Ht)	4.1 (0.0-7.5) [702]		NR2 Tank (END, Top 3rd)
112	04/13/12 08:01	04/14/12 07:59	5		8.7 (0.6-36.3) [705]	BOD Tank (Mid L, Mid Ht)	4.7 (2.2-8.3) [720]		NR2 Tank (END, Top 3rd)
113	04/14/12 08:01	04/15/12 07:59	5		7.3 (5.7-9.1) [720]	BOD Tank (Mid L, Mid Ht)	6.8 (6.2-8.7) [720]		NR2 Tank (END, Top 3rd)
114	04/15/12 08:01	04/16/12 07:59	5		7.1 (1.0-10.5) [718]	BOD Tank (Mid L, Mid Ht)	7.0 (6.4-8.8) [720]		NR2 Tank (END, Top 3rd)
115	04/16/12 08:01	04/17/12 07:59	5	Changed air settings in NR2	7.5 (0.5-8.5) [688]	BOD Tank (Mid L, Mid Ht)	3.8 (0.1-8.1) [720]		NR2 Tank (END, Top 3rd)
116	04/17/12 08:01	04/18/12 07:59	5		8.6 (0.8-9.7) [686]	BOD Tank (Mid L, Mid Ht)	2.4 (0.1-6.1) [720]		NR2 Tank (END, Top 3rd)
117	04/18/12 08:01	04/19/12 07:59	5		8.0 (6.3-9.9) [718]	BOD Tank (Mid L, Mid Ht)	1.1 (0.0-3.4) [716]		NR2 Tank (END, Top 3rd)
118	04/19/12 08:01	04/20/12 07:59	5	Changed air settings in NR2	7.7 (0.7-10.1) [664]	BOD Tank (Mid L, Mid Ht)	3.4 (0.6-6.6) [720]		NR2 Tank (END, Top 3rd)
119	04/20/12 08:01	04/21/12 07:59	5		10.2 (1.0-11.0) [716]	BOD Tank (Mid L, Mid Ht)	2.0 (0.0-5.0) [708]		NR2 Tank (END, Top 3rd)
120	04/21/12 08:01	04/22/12 07:59	5		8.3 (5.8-9.6) [720]	BOD Tank (Mid L, Mid Ht)	2.3 (1.4-5.0) [720]		NR2 Tank (END, Top 3rd)
121	04/22/12 08:01	04/23/12 07:59	5		6.0 (3.7-8.1) [720]	BOD Tank (Mid L, Mid Ht)	5.4 (2.8-10.1) [720]		NR2 Tank (END, Top 3rd)
122	04/23/12 08:01	04/24/12 07:59	5		7.5 (2.2-9.6) [714]	BOD Tank (Mid L, Mid Ht)	4.4 (1.1-9.5) [720]		NR2 Tank (END, Top 3rd)
123	04/24/12 08:01	04/25/12 07:59	5		6.2 (4.9-9.7) [718]	BOD Tank (Mid L, Mid Ht)	3.3 (0.3-7.8) [718]		NR2 Tank (END, Top 3rd)
124	04/25/12 08:01	04/26/12 07:59	5		7.5 (0.8-8.5) [697]	BOD Tank (Mid L, Mid Ht)	6.0 (1.0-8.6) [718]		NR2 Tank (END, Top 3rd)
125	04/26/12 08:01	04/27/12 07:59	5		8.1 (0.7-8.8) [707]	BOD Tank (Mid L, Mid Ht)	5.5 (4.6-9.9) [720]		NR2 Tank (END, Top 3rd)
126	04/27/12 08:01	04/28/12 07:59	5		7.3 (0.5-8.0) [718]	BOD Tank (Mid L, Mid Ht)	4.5 (1.1-8.1) [720]		NR2 Tank (END, Top 3rd)
127	04/28/12 08:01	04/29/12 07:59	5		6.5 (5.6-7.7) [720]	BOD Tank (Mid L, Mid Ht)	4.3 (2.7-7.5) [720]		NR2 Tank (END, Top 3rd)
128	04/29/12 08:01	04/30/12 07:59	5	4/30 Changed air setting in NR2	5.6 (0.6-8.7) [701]	NR1 Tank (Mid L, Mid Ht)	5.3 (4.9-9.0) [720]		NR2 Tank (END, Top 3rd)
129	04/30/12 08:01	05/01/12 07:59	5		6.5 (0.5-9.8) [713]	NR1 Tank (Mid L, Mid Ht)	6.1 (1.8-7.3) [720]		NR2 Tank (END, Top 3rd)
130	05/01/12 08:01	05/02/12 07:59	5		6.0 (0.6-8.1) [698]	NR1 Tank (Mid L, Mid Ht)	6.8 (6.3-7.8) [719]		NR2 Tank (END, Top 3rd)
131	05/02/12 08:01	05/03/12 07:59	5		7.1 (0.7-11.6) [699]	NR1 Tank (Mid L, Mid Ht)	4.5 (3.6-6.7) [718]		NR2 Tank (END, Top 3rd)
132	05/03/12 08:01	05/04/12 07:59	5		7.4 (4.7-10.2) [719]	NR1 Tank (Mid L, Mid Ht)	3.2 (2.2-5.3) [719]	15.0 (8.9-15.5) [719]	NR2 Tank (END, Top 3rd)
133	05/04/12 08:01	05/05/12 07:59	5		6.4 (0.0-8.8) [703]	NR1 Tank (Mid L, Mid Ht)	5.1 (2.2-7.4) [720]	15.0 (14.5-15.2) [720]	NR2 Tank (END, Top 3rd)
134	05/05/12 08:01	05/06/12 07:59	5		8.0 (4.2-9.3) [719]	NR1 Tank (Mid L, Mid Ht)	5.1 (4.1-7.7) [719]	15.1 (14.4-15.4) [719]	NR2 Tank (END, Top 3rd)
135	05/06/12 08:01	05/07/12 07:59	5		6.7 (3.9-10.3) [720]	NR1 Tank (Mid L, Mid Ht)	6.1 (5.1-7.5) [720]	15.1 (14.4-15.4) [720]	NR2 Tank (END, Top 3rd)
136	05/07/12 08:01	05/08/12 07:59	5		8.8 (0.6-11.7) [695]	NR1 Tank (Mid L, Mid Ht)	5.2 (4.2-7.0) [720]	15.6 (14.5-16.2) [720]	NR2 Tank (END, Top 3rd)
137	05/08/12 08:01	05/09/12 07:59	5		5.6 (0.2-9.2) [699]	NR1 Tank (Mid L, Mid Ht)	7.3 (6.0-8.4) [719]	15.4 (15.3-15.6) [719]	NR2 Tank (END, Top 3rd)
138	05/09/12 08:01	05/10/12 07:59	5		5.2 (0.4-8.2) [708]	NR1 Tank (Mid L, Mid Ht)	7.1 (5.6-8.0) [717]	16.0 (12.2-16.1) [717]	NR2 Tank (END, Top 3rd)
139	05/10/12 08:01	05/11/12 07:59	5		5.7 (0.6-12.6) [689]	NR1 Tank (Mid L, Mid Ht)	7.3 (6.5-8.7) [720]	15.5 (14.5-15.9) [720]	NR2 Tank (END, Top 3rd)
140	05/11/12 08:01	05/12/12 07:59	5		8.6 (0.1-11.3) [685]	NR1 Tank (Mid L, Mid Ht)	6.0 (5.2-8.0) [720]	14.8 (14.1-15.2) [720]	NR2 Tank (END, Top 3rd)
141	05/12/12 08:01	05/13/12 07:59	5		6.1 (4.6-8.4) [720]	NR1 Tank (Mid L, Mid Ht)	5.5 (5.2-7.2) [720]	15.7 (14.1-16.1) [720]	NR2 Tank (END, Top 3rd)
142	05/13/12 08:01	05/14/12 07:59	5		7.4 (0.4-8.3) [719]	NR1 Tank (Mid L, Mid Ht)	4.7 (4.2-6.9) [720]	15.6 (14.9-16.2) [720]	NR2 Tank (END, Top 3rd)
143	05/14/12 08:01	05/15/12 07:59	5	Lab sample to confirm NO3 Tests (EAI#110368)	10.0 (0.6-12.1) [707]	NR1 Tank (Mid L, Mid Ht)	4.4 (3.4-6.5) [720]	15.4 (14.8-15.6) [720]	NR2 Tank (END, Top 3rd)
144	05/15/12 08:01	05/16/12 07:59	6		10.1 (0.9-11.3) [708]	NR1 Tank (Mid L, Mid Ht)	4.2 (3.7-6.7) [713]	15.9 (15.1-16.5) [713]	NR2 Tank (END, Top 3rd)
145	05/16/12 08:01	05/17/12 07:59	6	Lab sample (EAI#110487)	9.5 (3.7-15.7) [715]	NR1 Tank (Mid L, Mid Ht)	4.0 (3.4-6.4) [718]	16.1 (13.0-16.3) [718]	NR2 Tank (END, Top 3rd)
146	05/17/12 08:01	05/18/12 07:59	6		10.2 (5.7-12.2) [720]	NR1 Tank (Mid L, Mid Ht)	3.7 (3.0-6.4) [720]	15.8 (15.0-16.7) [720]	NR2 Tank (END, Top 3rd)
147	05/18/12 08:01	05/19/12 07:59	6		11.6 (0.3-14.6) [689]	NR1 Tank (Mid L, Mid Ht)	4.0 (2.2-6.5) [720]	15.9 (15.0-17.0) [720]	NR2 Tank (END, Top 3rd)
148	05/19/12 08:01	05/20/12 07:59	6		9.4 (6.9-11.8) [720]	NR1 Tank (Mid L, Mid Ht)	4.5 (4.1-7.2) [720]	16.3 (15.1-16.9) [720]	NR2 Tank (END, Top 3rd)
149	05/20/12 08:01	05/21/12 07:59	6	Lab sample (EAI#110533)	8.4 (0.3-9.6) [703]	NR1 Tank (Mid L, Mid Ht)	5.5 (4.7-7.4) [720]	16.5 (15.6-17.3) [720]	NR2 Tank (END, Top 3rd)
150	05/21/12 08:01	05/22/12 07:59	6	Lab sample (EAI#110559)	8.5 (0.2-16.8) [708]	NR1 Tank (Mid L, Mid Ht)	4.6 (2.3-8.4) [718]	17.0 (15.7-17.2) [718]	NR2 Tank (END, Top 3rd)
151	05/22/12 08:01	05/23/12 08:00	6	Lab sample (EAI#110632)	8.6 (3.2-10.1) [699]	NR1 Tank (Mid L, Mid Ht)	6.6 (4.9-8.3) [719]	17.3 (16.7-17.7) [719]	NR2 Tank (END, Top 3rd)
152	05/23/12 08:02	05/24/12 08:00	6	Lab sample (EAI#110656)	7.2 (2.5-15.5) [698]	NR1 Tank (Mid L, Mid Ht)	7.2 (2.5-9.0) [718]	17.7 (5.5-18.7) [718]	NR2 Tank (END, Top 3rd)
153	05/24/12 08:02	05/25/12 08:00	6		3.3 (0.0-6.7) [560]	NR1 Tank (Mid L, Mid Ht)	8.4 (7.7-9.5) [719]	18.2 (17.1-18.5) [719]	NR2 Tank (END, Top 3rd)
154	05/25/12 08:02	05/26/12 08:00	6		6.6 (5.2-7.7) [719]	NR1 Tank (Mid L, Mid Ht)	6.8 (6.1-8.4) [719]	17.5 (17.3-17.9) [719]	NR2 Tank (END, Top 3rd)
155	05/26/12 08:02	05/27/12 08:00	6		5.0 (4.2-5.5) [720]	NR1 Tank (Mid L, Mid Ht)	7.1 (7.0-8.4) [720]	18.3 (17.3-18.9) [720]	NR2 Tank (END, Top 3rd)
156	05/27/12 08:02	05/28/12 08:00	6		12.8 (4.3-21.8) [720]	NR1 Tank (Mid L, Mid Ht)	5.6 (5.2-8.4) [720]	17.5 (16.9-18.1) [720]	NR2 Tank (END, Top 3rd)
157	05/28/12 08:02	05/29/12 08:00	6		10.1 (6.4-12.1) [720]	NR1 Tank (Mid L, Mid Ht)	5.6 (3.8-8.0) [720]	17.8 (16.9-18.6) [720]	NR2 Tank (END, Top 3rd)
158	05/29/12 08:02	05/30/12 08:00	6		9.6 (2.3-14.0) [707]	NR1 Tank (Mid L, Mid Ht)	5.8 (3.3-8.2) [720]	17.9 (17.6-18.4) [720]	NR2 Tank (END, Top 3rd)
159	05/30/12 08:02	05/31/12 08:00	7	FMS Trial 10:00 to 12:00	8.7 (2.7-11.8) [718]	NR1 Tank (Mid L, Mid Ht)	3.8 (2.3-7.2) [717]	18.3 (17.6-18.8) [718]	NR2 Tank (END, Top 3rd)
160	05/31/12 08:02	06/01/12 08:00	7		8.6 (6.3-21.7) [719]	NR1 Tank (Mid L, Mid Ht)	4.9 (1.7-7.3) [719]	19.0 (18.2-19.9) [719]	NR2 Tank (END, Top 3rd)

	E	F	G	M	N	O	P	Q	R
1	Start	End	Phase	Notes	Influent Flow to Reactor (gpm)	Probe #1 Location	DO Probe #1 (ppm)	Temperature Probe #1 (°C)	Probe #2 Location
161	06/01/12 08:02	06/02/12 08:00	7		10.8 (6.5-11.9) [719]	NR1 Tank (Mid L, Mid Ht)	2.5 (1.6-7.3) [719]	18.2 (17.5-18.9) [719]	NR2 Tank (END, Top 3rd)
162	06/02/12 08:02	06/03/12 08:00	7		8.4 (2.0-31.1) [663]	NR1 Tank (Mid L, Mid Ht)	8.1 (5.7-8.8) [720]	17.3 (17.0-17.5) [720]	NR2 Tank (END, Top 3rd)
163	06/03/12 08:02	06/04/12 08:00	7	FPS Trial 10:00 to 12:00	8.8 (0.6-14.2) [683]	NR1 Tank (Mid L, Mid Ht)	8.0 (7.3-9.0) [720]	16.8 (16.0-17.0) [720]	NR2 Tank (END, Top 3rd)
164	06/04/12 08:02	06/05/12 08:00	7		13.0 (0.4-15.2) [706]	NR1 Tank (Mid L, Mid Ht)	8.2 (7.8-9.2) [720]	16.1 (15.8-16.2) [720]	NR2 Tank (END, Top 3rd)
165	06/05/12 08:02	06/06/12 08:00	7		11.5 (8.4-26.1) [719]	NR1 Tank (Mid L, Mid Ht)	7.1 (3.6-9.1) [719]	16.4 (15.8-16.6) [719]	NR2 Tank (END, Top 3rd)
166	06/06/12 08:02	06/07/12 08:00	7		16.8 (4.2-19.0) [717]	NR1 Tank (Mid L, Mid Ht)	5.4 (1.9-8.6) [718]	16.5 (6.4-17.4) [718]	NR2 Tank (END, Top 3rd)
167	06/07/12 08:02	06/08/12 08:00	7	Media escaped NR2->NR1	16.0 (6.2-17.4) [696]	NR1 Tank (Mid L, Mid Ht)	2.3 (0.0-10.2) [720]	16.8 (15.0-17.4) [720]	NR2 Tank (END, Top 3rd)
168	06/08/12 08:02	06/09/12 08:00	7	Repaired Wall and relocate NR1, NR2 media	13.8 (0.0-40.0) [487]	NR1 Tank (Mid L, Mid Ht)	4.9 (0.8-10.1) [720]	17.2 (15.9-30.0) [720]	NR2 Tank (END, Top 3rd)
169	06/09/12 08:02	06/10/12 08:00	7		9.2 (1.2-12.7) [719]	NR1 Tank (Mid L, Mid Ht)	5.5 (5.1-7.0) [720]	17.8 (16.9-18.7) [720]	NR2 Tank (END, Top 3rd)
170	06/10/12 08:02	06/11/12 08:00	7	Repaired Wall and relocate NR1, NR2 media	17.3 (2.9-18.0) [691]	NR1 Tank (Mid L, Mid Ht)	4.2 (3.7-7.1) [690]	17.1 (16.7-17.9) [690]	NR2 Tank (END, Top 3rd)
171	06/11/12 08:02	06/12/12 08:00	7		10.9 (0.5-40.0) [572]	NR1 Tank (Mid L, Mid Ht)	7.3 (1.8-8.3) [528]	17.9 (17.4-18.0) [528]	NR2 Tank (END, Top 3rd)
172	06/12/12 08:02	06/13/12 08:00	7		11.0 (8.9-16.7) [719]	NR1 Tank (Mid L, Mid Ht)	5.1 (2.1-8.1) [719]	18.1 (17.4-18.6) [719]	NR2 Tank (END, Top 3rd)
173	06/13/12 08:02	06/14/12 08:00	7		16.0 (0.0-19.0) [716]	NR1 Tank (Mid L, Mid Ht)	5.4 (2.7-7.1) [717]	17.8 (6.9-18.1) [717]	NR2 Tank (END, Top 3rd)
174	06/14/12 08:02	06/15/12 08:00	7	FMM Trial 13:30 to 18:50	15.8 (0.1-22.8) [714]	NR1 Tank (Mid L, Mid Ht)	4.6 (3.6-7.5) [719]	17.8 (17.0-18.6) [719]	NR2 Tank (END, Top 3rd)
175	06/15/12 08:02	06/16/12 08:00	7		15.5 (0.4-17.2) [682]	NR1 Tank (Mid L, Mid Ht)	4.1 (2.9-7.7) [720]	17.8 (16.8-19.0) [720]	NR2 Tank (END, Top 3rd)
176	06/16/12 08:02	06/17/12 08:00	7	poor NH3 during high temps	13.1 (8.5-15.0) [720]	NR1 Tank (Mid L, Mid Ht)	4.4 (3.3-6.4) [720]	17.5 (16.8-17.9) [720]	NR2 Tank (END, Top 3rd)
177	06/17/12 08:02	06/18/12 08:00	7	poor NH3 during high temps	17.8 (0.4-18.7) [720]	NR1 Tank (Mid L, Mid Ht)	3.2 (2.5-6.8) [720]	17.5 (16.9-18.4) [720]	NR2 Tank (END, Top 3rd)
178	06/18/12 08:02	06/19/12 08:00	7		16.5 (12.1-19.5) [719]	NR1 Tank (Mid L, Mid Ht)	4.1 (1.6-7.4) [719]	18.2 (17.0-18.9) [719]	NR2 Tank (END, Top 3rd)
179	06/19/12 08:02	06/20/12 08:00	7	DPE Trial Begins 8:00	9.1 (2.3-16.0) [687]	NR1 Tank (Mid L, Mid Ht)	6.9 (4.9-7.9) [719]	19.3 (17.6-19.6) [719]	NR2 Tank (END, Top 3rd)
180	06/20/12 08:02	06/21/12 08:00	7	DPE Trial Ends 10:15	9.9 (8.8-11.1) [718]	NR1 Tank (Mid L, Mid Ht)	7.2 (1.8-8.4) [718]	20.2 (6.2-20.9) [718]	NR2 Tank (END, Top 3rd)
181	06/21/12 08:02	06/22/12 08:00	7		12.1 (10.4-13.5) [718]	NR1 Tank (Mid L, Mid Ht)	7.1 (6.5-8.7) [718]	19.1 (17.5-20.3) [718]	NR2 Tank (END, Top 3rd)
182	06/22/12 08:02	06/23/12 08:00	7		14.6 (0.4-17.2) [713]	NR1 Tank (Mid L, Mid Ht)	7.4 (6.0-8.1) [720]	20.5 (18.4-21.5) [720]	NR2 Tank (END, Top 3rd)
183	06/23/12 08:02	06/24/12 08:00	7		12.4 (9.4-16.8) [720]	NR1 Tank (Mid L, Mid Ht)	7.7 (7.1-8.6) [720]	20.4 (19.3-20.9) [720]	NR2 Tank (END, Top 3rd)
184	06/24/12 08:02	06/25/12 08:00	7		10.8 (8.6-12.1) [720]	NR1 Tank (Mid L, Mid Ht)	7.1 (6.8-8.7) [720]	19.9 (19.2-20.8) [720]	NR2 Tank (END, Top 3rd)
185	06/25/12 08:02	06/26/12 08:00	7	reduced wall openings NR1-NR2, NR2-DN1	10.4 (0.3-16.8) [483]	NR1 Tank (Mid L, Mid Ht)	8.2 (5.2-9.3) [720]	19.9 (18.9-20.9) [720]	NR2 Tank (END, Top 3rd)
186	06/26/12 08:02	06/27/12 07:59	7		11.1 (6.8-13.0) [718]	NR1 Tank (Mid L, Mid Ht)	7.1 (6.6-8.8) [718]	19.1 (18.4-19.5) [718]	NR2 Tank (END, Top 3rd)
187	06/27/12 08:01	06/28/12 07:59	7		8.9 (0.5-11.1) [714]	NR1 Tank (Mid L, Mid Ht)	6.8 (5.9-8.5) [717]	19.2 (18.4-19.8) [717]	NR2 Tank (END, Top 3rd)
188	06/28/12 08:01	06/29/12 07:59	7		9.5 (0.9-11.1) [719]	NR1 Tank (Mid L, Mid Ht)	6.9 (6.2-7.8) [720]	20.0 (18.8-20.8) [720]	NR2 Tank (END, Top 3rd)
189	06/29/12 08:01	06/30/12 07:59	8		8.3 (3.5-10.7) [698]	NR1 Tank (Mid L, Mid Ht)	6.9 (6.2-8.6) [719]	21.0 (19.4-21.6) [719]	NR2 Tank (END, Top 3rd)
190	06/30/12 08:01	07/01/12 07:59	8		2.7 (1.7-4.2) [720]	NR1 Tank (Mid L, Mid Ht)	7.3 (6.9-7.8) [720]	22.7 (21.0-23.3) [720]	NR2 Tank (END, Top 3rd)
191	07/01/12 08:01	07/02/12 07:59	8		6.8 (1.3-22.5) [702]	NR1 Tank (Mid L, Mid Ht)	6.3 (5.3-7.8) [720]	22.0 (21.1-22.7) [720]	NR2 Tank (END, Top 3rd)
192	07/02/12 08:01	07/03/12 07:59	8		10.3 (3.3-12.0) [715]	NR1 Tank (Mid L, Mid Ht)	4.4 (3.1-6.7) [717]	21.2 (20.3-22.1) [717]	NR2 Tank (END, Top 3rd)
193	07/03/12 08:01	07/04/12 07:59	9	Installed media in DN2 tank (10,10,10), BOD tank (10), DN1 Tank (10)	9.9 (3.1-34.7) [640]	NR1 Tank (Mid L, Mid Ht)	5.0 (0.4-8.4) [719]	20.9 (20.3-27.6) [719]	NR2 Tank (END, Top 3rd)
194	07/04/12 08:01	07/05/12 07:59	9	Install mixing pumps in DN1, DN2	8.0 (0.9-12.6) [711]	NR1 Tank (Mid L, Mid Ht)	2.5 (0.1-6.3) [717]	21.3 (20.4-22.0) [717]	NR2 Tank (END, Top 3rd)
195	07/05/12 08:01	07/06/12 07:59	9	DN2 Mixer wired, Cleaned DAF	12.7 (3.8-14.4) [710]	NR1 Tank (Mid L, Mid Ht)	4.3 (1.5-6.5) [719]	20.8 (20.0-22.3) [719]	NR2 Tank (END, Top 3rd)
196	07/06/12 08:01	07/07/12 07:59	9		10.8 (9.5-11.5) [719]	NR1 Tank (Mid L, Mid Ht)	4.6 (2.9-6.3) [719]	21.3 (20.0-22.3) [719]	NR2 Tank (END, Top 3rd)
197	07/07/12 08:01	07/08/12 07:59	9		11.5 (0.5-12.6) [669]	NR1 Tank (Mid L, Mid Ht)	5.8 (4.9-6.5) [720]	21.0 (20.2-21.9) [720]	NR2 Tank (END, Top 3rd)
198	07/08/12 08:01	07/09/12 07:59	9	Increase TKN to 45 mg/L	9.3 (6.9-11.8) [720]	NR1 Tank (Mid L, Mid Ht)	5.6 (5.3-6.6) [720]	21.1 (20.2-22.0) [720]	NR2 Tank (END, Top 3rd)
199	07/09/12 08:01	07/10/12 07:59	9	Started TN<3 w/High Inf TKN	10.4 (0.0-15.5) [557]	NR1 Tank (Mid L, Mid Ht)	4.3 (3.6-6.2) [718]	21.3 (20.3-22.3) [718]	NR2 Tank (END, Top 3rd)
200	07/10/12 08:01	07/11/12 07:59	9		7.7 (0.1-10.6) [241]	NR1 Tank (Mid L, Mid Ht)	8.0 (2.9-9.0) [717]	23.2 (20.4-23.9) [717]	NR2 Tank (END, Top 3rd)
201	07/11/12 08:01	07/12/12 07:59	9		10.9 (0.1-16.6) [685]	NR1 Tank (Mid L, Mid Ht)	5.8 (5.0-9.1) [717]	22.0 (0.0-23.4) [718]	NR2 Tank (END, Top 3rd)
202	07/12/12 08:01	07/13/12 07:59	9		8.4 (0.8-9.4) [706]	NR1 Tank (Mid L, Mid Ht)	6.2 (5.4-8.1) [719]	22.2 (21.5-23.5) [719]	NR2 Tank (END, Top 3rd)
203	07/13/12 08:01	07/14/12 07:57	9		10.8 (0.7-14.9) [701]	NR1 Tank (Mid L, Mid Ht)	4.9 (4.0-8.6) [719]	22.4 (21.4-23.3) [719]	NR2 Tank (END, Top 3rd)
204	07/14/12 08:01	07/15/12 07:57	9		7.9 (0.4-14.6) [710]	NR1 Tank (Mid L, Mid Ht)	5.2 (4.6-6.5) [719]	22.8 (21.4-23.5) [719]	NR2 Tank (END, Top 3rd)
205	07/15/12 08:01	07/16/12 07:57	9		4.9 (4.0-6.4) [720]	NR1 Tank (Mid L, Mid Ht)	6.0 (5.5-7.4) [720]	23.1 (22.3-23.6) [720]	NR2 Tank (END, Top 3rd)
206	07/16/12 08:01	07/17/12 14:59	9	Shut Down system	7.5 (0.6-14.9) [914]	NR1 Tank (Mid L, Mid Ht)	4.2 (1.8-7.8) [931]	23.5 (22.5-24.4) [931]	NR2 Tank (END, Top 3rd)
207									
208									
209									
210									

	F	S	T	U	V	W	X	Y	AA	AB	AC	AD
1	End	DO Probe #2 (ppm)	Temperature Probe #2 (°C)	DAF Q	NR2 ORP (mV)	(02,03) PRIMARY EFFLUENT SAMPLE ID	(02,03) PRIMARY EFFLUENT TSS (mg/L)	(02,03) PRIMARY EFFLUENT INERT SOLIDS (mg/L)	(02) UN SPIKED PRIMARY EFFLUENT pH (SU)	(03) SPIKED PRIMARY EFFLUENT pH (SU)	(02) UN SPIKED PRIMARY EFFLUENT Alkalinity (mg/L)	(03) SPIKED PRIMARY EFFLUENT Alkalinity (mg/L)
2	03/06/12 08:00	7.1 (0.0-12.0) [48439]	10.4 (0.0-11.8) [48512]	5.8 (-7.6-10.5) [19505]		2-2,019 [556]	122 (6-1,555) [414]	#DIV/0!	7.09 (5.00-9.94) [154]	8.41 (6.75-216.00) [39]	156.5 (5.0-218.0) [80]	247.0 (9.0-408.0) [41]
3												
4	12/29/11 08:00	11.7 (11.2-12.0) [392]	6.5 (5.3-7.6) [392]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
5	12/30/11 08:00	12.0 (6.1-12.0) [720]	4.4 (3.8-5.4) [720]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
6	12/30/11 08:00	12.0 (6.1-12.0) [720]	4.4 (3.8-5.4) [720]	No Data [0]		2-2 [3]	No Data [0]	No Data [0]	6.94-7.00 [2]	No Data [0]	No Data [0]	No Data [0]
7	12/31/11 08:00	3.5 (0.0-12.0) [720]	9.0 (0.0-9.4) [720]	No Data [0]		4-4 [3]	No Data [0]	No Data [0]	7.30-7.52 [2]	No Data [0]	120.0 [1]	No Data [0]
8	01/01/12 08:00	12.0 (0.0-12.0) [720]	4.5 (3.5-9.0) [720]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
9	01/02/12 08:00	10.5 (8.2-12.0) [720]	9.2 (4.5-9.7) [720]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
10	01/03/12 08:00	11.0 (7.2-11.6) [720]	9.1 (7.8-9.7) [720]	No Data [0]		8-8 [3]	149 (68-182) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
11	01/04/12 08:00	12.0 (9.7-12.0) [720]	6.4 (4.7-7.9) [720]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
12	01/05/12 08:00	12.0 (8.0-12.0) [718]	6.3 (0.0-6.6) [718]	No Data [0]		14-14 [3]	161 (144-179) [3]	No Data [0]	7.19 (7.01-7.27) [3]	No Data [0]	162.6 [1]	No Data [0]
13	01/06/12 08:00	10.8 (7.4-12.0) [719]	7.0 (0.8-8.5) [719]	No Data [0]		21-21 [3]	106 (103-118) [3]	No Data [0]	7.24 (7.16-7.38) [3]	No Data [0]	128.0 [1]	No Data [0]
14	01/07/12 08:00	12.0 (7.1-12.0) [719]	2.0 (1.6-8.7) [719]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
15	01/08/12 08:00	12.0 (11.8-12.0) [720]	5.5 (1.9-8.3) [720]	No Data [0]		28-28 [3]	111 (95-117) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
16	01/09/12 08:00	12.0 (12.0-12.0) [106]	6.6 (3.5-8.0) [106]	No Data [0]		32-32 [3]	174 (172-177) [3]	No Data [0]	7.05 (6.84-7.17) [3]	No Data [0]	170.0 [1]	No Data [0]
17	01/10/12 08:00	10.9 (5.9-11.7) [553]	9.9 (9.2-10.6) [553]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
18	01/11/12 08:00	5.9 (2.4-11.4) [717]	11.3 (9.5-11.7) [717]	No Data [0]		41-41 [3]	117 (117-139) [3]	No Data [0]	7.10 (6.67-7.30) [3]	No Data [0]	200.0 [1]	No Data [0]
19	01/12/12 08:00	9.7 (0.4-11.3) [716]	10.8 (8.4-11.5) [716]	No Data [0]		47-47 [3]	181 (178-183) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
20	01/13/12 08:00	11.8 (9.0-12.0) [719]	7.9 (7.7-10.6) [719]	No Data [0]		52-52 [3]	174 (172-174) [3]	No Data [0]	7.28 (7.24-7.51) [3]	No Data [0]	No Data [0]	No Data [0]
21	01/14/12 08:00	10.8 (7.8-11.9) [719]	9.8 (7.8-10.8) [719]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
22	01/15/12 08:00	11.6 (11.0-12.0) [720]	8.7 (6.8-9.1) [720]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
23	01/16/12 08:00	12.0 (11.4-12.0) [720]	6.2 (4.8-7.4) [720]	No Data [0]		137-137 [3]	122 (117-134) [3]	No Data [0]	7.52 (7.21-7.80) [3]	No Data [0]	No Data [0]	No Data [0]
24	01/17/12 08:00	11.6 (10.8-12.0) [720]	6.5 (4.7-7.0) [720]	No Data [0]		66-66 [3]	201 (199-205) [3]	No Data [0]	7.09 (7.06-7.10) [3]	No Data [0]	No Data [0]	No Data [0]
25	01/18/12 08:00	4.0 (1.1-11.3) [717]	10.6 (6.9-11.5) [717]	No Data [0]		73-73 [3]	198 (78-200) [3]	No Data [0]	6.96 (6.81-6.99) [3]	No Data [0]	No Data [0]	No Data [0]
26	01/19/12 08:00	11.0 (0.9-11.8) [718]	9.4 (4.7-11.4) [718]	No Data [0]		79-79 [3]	213 (198-219) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
27	01/20/12 08:00	5.9 (3.1-11.8) [720]	10.9 (8.3-11.3) [720]	No Data [0]		87-87 [3]	159 (153-160) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
28	01/21/12 08:00	3.1 (0.9-7.4) [720]	10.8 (10.4-11.1) [720]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
29	01/22/12 08:00	8.3 (5.4-10.4) [719]	9.4 (8.3-10.4) [719]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
30	01/23/12 08:00	10.4 (8.0-10.9) [720]	8.0 (8.0-8.3) [720]	No Data [0]		107-107 [2]	179-186 [2]	No Data [0]	7.22-7.32 [2]	No Data [0]	No Data [0]	No Data [0]
31	01/24/12 08:00	1.5 (0.8-7.6) [720]	10.6 (8.4-11.4) [720]	4.6 (-7.6-5.0) [621]		115-115 [3]	170 (168-171) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
32	01/25/12 08:00	2.7 (2.1-5.4) [720]	11.3 (10.1-11.5) [720]	5.0 (4.4-5.3) [720]		126-126 [3]	136 (135-137) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
33	01/26/12 08:00	5.3 (2.5-9.9) [716]	11.4 (4.5-11.8) [716]	4.7 (0.3-5.2) [512]		129-129 [3]	125 (122-127) [3]	No Data [0]	6.99 (6.98-7.07) [3]	No Data [0]	No Data [0]	No Data [0]
34	01/27/12 08:00	2.7 (1.9-9.1) [720]	11.6 (6.8-11.8) [720]	4.7 (4.1-5.1) [720]		142-142 [3]	90 (66-103) [3]	No Data [0]	7.25 (6.93-7.28) [3]	No Data [0]	No Data [0]	No Data [0]
35	01/28/12 08:00	7.2 (4.3-9.1) [720]	9.6 (6.8-10.1) [720]	4.6 (3.9-4.9) [720]		150-150 [3]	90 (80-101) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
36	01/29/12 08:00	6.1 (0.0-11.6) [719]	7.8 (0.0-11.1) [719]	4.2 (0.6-4.3) [127]		156-156 [3]	69 (66-72) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
37	01/30/12 08:00	7.3 (6.5-8.5) [720]	7.8 (7.7-7.9) [720]	No Data [0]		161-161 [3]	129 (123-132) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
38	01/31/12 08:00	3.3 (0.1-12.0) [720]	10.5 (2.3-11.0) [720]	2.0 (0.1-10.0) [463]		168-168 [3]	87 (79-95) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
39	02/01/12 08:00	1.6 (1.3-3.9) [718]	10.9 (10.4-11.4) [718]	6.2 (3.3-9.2) [242]		178-178 [4]	135 (133-137) [3]	No Data [0]	7.10 (7.02-7.21) [3]	No Data [0]	No Data [0]	No Data [0]
40	02/02/12 08:00	1.2 (0.3-1.6) [718]	11.2 (3.5-11.3) [718]	6.5 (0.9-7.2) [703]		186-186 [3]	132 (128-136) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
41	02/03/12 08:00	9.2 (0.0-12.0) [719]	10.8 (1.9-11.2) [719]	6.3 (0.0-10.4) [282]		194-194 [4]	143 (143-151) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
42	02/04/12 08:00	9.5 (8.6-12.0) [720]	10.6 (10.2-10.9) [720]	9.7 (1.7-10.3) [197]		204-204 [3]	75 (65-89) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
43	02/05/12 08:00	8.4 (7.2-11.4) [720]	10.6 (10.3-10.8) [720]	5.9 (1.6-6.4) [77]		209-209 [3]	82 (72-89) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
44	02/06/12 08:00	8.0 (7.0-9.1) [720]	10.4 (10.1-10.8) [720]	4.3 (2.3-9.4) [559]		223 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
45	02/07/12 08:00	4.6 (2.9-11.0) [719]	10.7 (10.0-11.1) [719]	1.9 (0.8-7.3) [719]		225-225 [4]	65 (62-66) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
46	02/08/12 08:00	4.9 (2.1-9.1) [719]	10.7 (10.4-11.0) [719]	6.0 (5.3-6.9) [719]		235-235 [3]	138 (138-149) [3]	No Data [0]	7.24 (7.12-7.36) [3]	No Data [0]	No Data [0]	No Data [0]
47	02/09/12 08:00	3.3 (1.2-9.3) [718]	10.8 (5.2-11.3) [718]	6.0 (4.4-7.8) [718]		243-243 [3]	109 (89-116) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
48	02/10/12 08:00	5.4 (2.7-9.1) [720]	10.8 (10.5-11.2) [720]	6.2 (1.3-7.6) [720]		260-260 [3]	103 (93-118) [3]	No Data [0]	6.87 (6.74-6.98) [3]	No Data [0]	No Data [0]	No Data [0]
49	02/11/12 08:00	4.5 (1.3-9.5) [719]	11.0 (10.4-11.5) [719]	6.2 (0.0-7.0) [719]		267-267 [3]	114 (86-118) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
50	02/12/12 08:00	4.8 (4.2-9.1) [720]	10.7 (9.7-11.0) [720]	6.8 (2.9-7.0) [720]		275-275 [3]	147 (135-156) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
51	02/13/12 08:00	6.0 (3.9-9.5) [720]	9.7 (9.0-10.0) [720]	6.2 (6.0-7.0) [720]		282-282 [3]	195 (160-199) [3]	No Data [0]	6.60 (6.59-6.82) [3]	No Data [0]	No Data [0]	No Data [0]
52	02/14/12 08:00	7.0 (5.4-10.0) [720]	10.2 (9.5-10.9) [720]	6.1 (0.0-6.3) [720]		295-295 [3]	202 (198-204) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
53	02/15/12 08:00	5.6 (3.5-9.8) [719]	11.1 (10.4-11.5) [719]	6.1 (4.2-6.8) [719]		306-306 [3]	134 (120-183) [3]	No Data [0]	6.94 (6.85-7.15) [3]	No Data [0]	160.0 [1]	No Data [0]
54	02/16/12 08:00	5.7 (3.4-9.3) [718]	11.5 (4.2-11.7) [718]	6.2 (5.7-6.4) [718]		318-318 [3]	105 (95-116) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

	F	S	T	U	V	W	X	Y	AA	AB	AC	AD
1	End	DO Probe #2 (ppm)	Temperature Probe #2 (°C)	DAF Q	NR2 ORP (mV)	(02,03) PRIMARY EFFLUENT SAMPLE ID	(02,03) PRIMARY EFFLUENT TSS (mg/L)	(02,03) PRIMARY EFFLUENT INERT SOLIDS (mg/L)	(02) UN SPIKED PRIMARY EFFLUENT pH (SU)	(03) SPIKED PRIMARY EFFLUENT pH (SU)	(02) UN SPIKED PRIMARY EFFLUENT Alkalinity (mg/L)	(03) SPIKED PRIMARY EFFLUENT Alkalinity (mg/L)
55	02/17/12 08:00	9.6 (5.9-9.9) [718]	11.4 (11.3-11.5) [718]	6.5 (0.0-9.1) [718]		329-329 [3]	116 (107-123) [3]	No Data [0]	No Data [0]	No Data [0]	128.0 [1]	No Data [0]
56	02/18/12 08:00	3.4 (1.3-9.9) [720]	11.5 (10.8-11.6) [720]	5.5 (2.1-9.3) [720]		336-336 [3]	101 (92-106) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
57	02/19/12 08:00	1.9 (1.0-5.5) [720]	11.1 (10.5-11.5) [720]	4.0 (2.7-10.5) [720]		339-339 [3]	135 (133-189) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
58	02/20/12 08:00	1.9 (1.6-4.2) [720]	10.9 (10.5-11.3) [720]	4.4 (3.7-8.3) [720]		342-342 [3]	158 (147-197) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
59	02/21/12 08:00	1.2 (0.4-5.4) [719]	11.0 (10.3-11.3) [719]	2.0 (0.3-9.5) [670]		348-348 [3]	205 (201-224) [3]	No Data [0]	7.56 (7.27-7.70) [3]	No Data [0]	182.0 [1]	No Data [0]
60	02/22/12 08:00	1.3 (0.6-4.6) [720]	11.2 (10.7-11.7) [720]	2.7 (1.8-7.0) [720]		359-359 [3]	88 (85-102) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
61	02/23/12 08:00	2.5 (0.4-8.8) [718]	11.4 (4.6-11.7) [718]	6.1 (2.4-7.0) [718]		369-369 [3]	151 (137-200) [3]	No Data [0]	6.99 (6.78-7.04) [3]	No Data [0]	164.0 [1]	No Data [0]
62	02/24/12 08:00	2.7 (2.3-4.4) [720]	11.2 (10.5-11.6) [720]	6.6 (5.9-7.0) [720]		379-379 [3]	143 (119-153) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
63	02/25/12 08:00	2.7 (2.3-8.6) [720]	10.7 (7.9-11.4) [720]	6.2 (2.7-6.7) [249]		384-384 [3]	62 (58-67) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
64	02/26/12 08:00	4.2 (3.4-8.7) [720]	10.3 (8.9-10.6) [720]	No Data [0]		390-395 [6]	66 (31-84) [6]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
65	02/27/12 08:00	4.6 (3.9-7.7) [720]	10.5 (9.2-10.8) [720]	No Data [0]		398-398 [4]	125 (124-127) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
66	02/28/12 08:00	4.2 (0.1-6.6) [648]	10.9 (10.0-11.0) [719]	No Data [0]		410-410 [3]	97 (94-106) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
67	02/29/12 08:00	5.4 (1.2-8.0) [720]	10.6 (10.3-10.7) [720]	No Data [0]		415-415 [4]	153 (140-155) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
68	03/01/12 08:00	3.5 (0.8-6.6) [718]	10.5 (5.9-10.7) [718]	No Data [0]		425-425 [3]	91 (90-105) [3]	No Data [0]	6.91 (6.62-7.02) [3]	No Data [0]	162.0 [1]	No Data [0]
69	03/02/12 08:00	7.4 (3.2-10.6) [720]	9.3 (4.2-9.8) [720]	No Data [0]		434-434 [4]	104 (76-106) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
70	03/03/12 08:00	5.4 (4.1-8.7) [719]	11.0 (8.9-11.1) [719]	No Data [0]		443-443 [3]	107 (87-110) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
71	03/04/12 08:00	9.0 (1.2-10.1) [715]	9.3 (0.0-10.7) [717]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
72	03/05/12 08:00	9.1 (8.0-10.1) [720]	10.5 (9.4-11.1) [720]	No Data [0]		449-449 [4]	96 (91-97) [3]	No Data [0]	7.17 (7.10-7.22) [3]	No Data [0]	No Data [0]	No Data [0]
73	03/06/12 08:00	7.6 (5.8-10.2) [710]	10.1 (8.5-11.3) [710]	1.1 (0.1-2.1) [415]		459-459 [3]	100 (100-108) [3]	1,968 (1,956-1,968) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
74	03/07/12 08:00	4.7 (3.8-7.9) [720]	10.4 (9.5-10.7) [720]	8.0 (0.9-8.5) [654]		464-464 [3]	106 (102-113) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
75	03/08/12 08:00	5.5 (1.1-8.0) [718]	10.8 (9.9-11.0) [718]	5.6 (0.2-9.9) [690]		474-475 [6]	78 (50-114) [6]	No Data [0]	7.04 (6.82-7.10) [6]	No Data [0]	132.5 [1]	No Data [0]
76	03/09/12 08:00	7.3 (4.9-9.6) [719]	10.8 (9.6-11.1) [719]	6.1 (5.6-6.7) [719]		487-487 [3]	86 (81-86) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
77	03/10/12 08:00	6.7 (4.7-9.5) [720]	10.4 (9.3-10.5) [720]	6.3 (5.2-6.7) [720]		494-494 [3]	58 (49-64) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
78	03/11/12 08:00	7.4 (6.2-9.5) [720]	10.3 (9.3-10.5) [720]	6.2 (5.5-7.0) [720]		504-504 [3]	62 (60-83) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
79	03/12/12 08:00	6.7 (6.0-9.2) [720]	10.8 (9.5-11.0) [720]	6.9 (5.8-7.0) [720]		512-512 [3]	69 (58-79) [3]	No Data [0]	6.88 (6.78-7.00) [3]	No Data [0]	160.0 [1]	No Data [0]
80	03/13/12 08:00	6.0 (4.8-7.8) [719]	11.1 (10.0-11.5) [719]	7.1 (5.4-7.3) [719]		520-520 [3]	75 (73-76) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
81	03/14/12 08:00	5.5 (3.8-9.4) [720]	11.7 (10.5-12.0) [720]	5.8 (4.1-6.7) [720]		535-535 [3]	106 (102-106) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
82	03/15/12 08:00	5.2 (4.3-7.8) [712]	11.2 (10.3-11.6) [712]	6.6 (0.6-7.2) [713]		546-546 [3]	106 (106-111) [3]	No Data [0]	6.74 (6.34-6.75) [3]	No Data [0]	132.5 [1]	No Data [0]
83	03/16/12 08:00	4.7 (4.0-9.0) [720]	11.0 (10.3-11.3) [720]	6.7 (5.5-7.1) [720]		554-554 [3]	104 (100-106) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
84	03/17/12 08:00	4.4 (3.1-7.1) [720]	11.5 (10.6-11.7) [720]	6.8 (0.8-8.3) [674]		568-568 [3]	124 (123-129) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
85	03/18/12 07:59	5.2 (4.7-9.8) [689]	11.7 (9.8-12.1) [689]	5.6 (4.2-6.8) [689]		575-575 [3]	65 (64-72) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
86	03/19/12 07:59	3.9 (2.5-9.8) [720]	11.8 (10.2-12.2) [720]	5.8 (3.9-6.1) [720]		580-580 [3]	95 (94-100) [3]	No Data [0]	6.95 (6.82-9.94) [3]	No Data [0]	146.0 [1]	No Data [0]
87	03/20/12 07:59	1.0 (0.0-4.9) [567]	12.1 (11.1-12.7) [718]	5.7 (4.6-6.3) [718]		592-592 [3]	109 (96-110) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
88	03/21/12 07:59	0.9 (0.0-4.6) [566]	12.5 (11.7-13.0) [720]	5.8 (4.9-6.0) [720]		601-601 [3]	132 (132-134) [3]	No Data [0]	6.84 (6.79-6.91) [3]	No Data [0]	140.0 [1]	No Data [0]
89	03/22/12 07:59	1.6 (0.0-6.9) [704]	13.0 (8.9-14.0) [718]	5.4 (4.9-5.8) [718]		610-610 [3]	121 (119-127) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
90	03/23/12 07:59	6.1 (0.3-8.7) [720]	13.1 (12.1-13.8) [720]	5.5 (1.1-6.2) [677]		620-620 [3]	135 (133-140) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
91	03/24/12 07:59	5.1 (4.1-8.1) [720]	12.8 (11.6-13.6) [720]	5.3 (1.1-6.4) [715]		630-630 [3]	106 (91-110) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
92	03/25/12 07:59	6.0 (5.2-8.4) [720]	12.7 (11.6-13.0) [720]	7.8 (1.2-8.1) [720]		635-635 [3]	111 (108-113) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
93	03/26/12 07:59	5.5 (4.2-8.4) [720]	12.6 (11.7-12.8) [720]	7.9 (1.6-8.1) [720]		642-642 [3]	129 (120-138) [3]	No Data [0]	6.85 (6.62-6.99) [3]	No Data [0]	140.0 [1]	No Data [0]
94	03/27/12 07:59	2.5 (0.1-7.3) [718]	12.2 (11.5-12.9) [718]	5.8 (4.3-7.9) [718]		655-655 [3]	159 (158-169) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
95	03/28/12 07:59	7.1 (0.1-11.8) [720]	11.9 (7.0-13.2) [720]	6.0 (0.2-6.5) [472]		661-661 [3]	182 (180-194) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
96	03/29/12 07:59	5.9 (3.8-6.8) [718]	12.9 (8.8-13.1) [718]	6.4 (1.9-7.1) [137]		669-669 [3]	172 (168-174) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
97	03/30/12 07:59	9.2 (5.1-12.0) [720]	12.4 (6.0-13.2) [720]	5.9 (0.1-6.7) [591]		677-677 [3]	145 (143-146) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
98	03/31/12 07:59	6.1 (5.1-12.0) [720]	12.8 (6.4-13.0) [720]	6.2 (4.5-6.7) [691]		681-681 [3]	172 (164-189) [3]	No Data [0]	6.89 (6.63-6.94) [3]	No Data [0]	155.0 [1]	No Data [0]
99	04/01/12 07:59	6.0 (4.8-12.0) [720]	13.1 (5.5-13.5) [720]	5.8 (2.1-6.0) [720]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
100	04/02/12 07:59	9.3 (6.2-11.7) [720]	13.1 (6.6-15.4) [720]	4.5 (0.1-6.0) [720]		694-694 [3]	148 (119-151) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
101	04/03/12 07:59	4.9 (1.9-11.1) [720]	12.9 (8.3-13.6) [720]	5.4 (1.0-5.9) [720]		705-705 [3]	166 (160-171) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
102	04/04/12 07:59	1.2 (0.5-6.0) [223]	13.0 (12.6-13.7) [223]	4.9 (0.9-5.1) [192]		709-715 [6]	188 (142-1,555) [6]	1,286 (1,280-1,296) [3]	6.59-6.94 [2]	No Data [0]	150.0-160.0 [2]	No Data [0]
103	04/05/12 07:59	No Data [0]	No Data [0]	No Data [0]		723-723 [3]	199 (196-203) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
104	04/06/12 07:59	No Data [0]	No Data [0]	No Data [0]		732-732 [3]	186 (175-198) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
105	04/07/12 07:59	No Data [0]	No Data [0]	No Data [0]		739-739 [3]	167 (165-169) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
106	04/08/12 07:59	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
107	04/09/12 07:59	No Data [0]	No Data [0]	No Data [0]		745-745 [2]	225-251 [2]	No Data [0]	6.94 [1]	No Data [0]	160.0 [1]	No Data [0]

Peirce Island Pilot Study Report

September 2012

	F	S	T	U	V	W	X	Y	AA	AB	AC	AD
						(02,03) PRIMARY EFFLUENT SAMPLE ID	(02,03) PRIMARY EFFLUENT TSS (mg/L)	(02,03) PRIMARY EFFLUENT INERT SOLIDS (mg/L)	(02) UN SPIKED PRIMARY EFFLUENT pH (SU)	(03) SPIKED PRIMARY EFFLUENT pH (SU)	(02) UN SPIKED PRIMARY EFFLUENT Alkalinity (mg/L)	(03) SPIKED PRIMARY EFFLUENT Alkalinity (mg/L)
1	End	DO Probe #2 (ppm)	Temperature Probe #2 (°C)	DAF Q	NR2 ORP (mV)							
108	04/10/12 07:59	No Data [0]	No Data [0]	No Data [0]		754-754 [2]	213-237 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
109	04/11/12 07:59	No Data [0]	No Data [0]	No Data [0]		764-764 [2]	174-187 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
110	04/12/12 07:59	0.4 (0.0-2.9) [454]	14.2 (13.4-14.7) [491]	No Data [0]		773-786 [4]	225 (211-280) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
111	04/13/12 07:59	1.0 (0.0-2.7) [636]	14.0 (13.3-14.6) [719]	No Data [0]		786 [1]	300 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
112	04/14/12 07:59	4.1 (2.0-7.2) [720]	14.1 (13.2-14.7) [720]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
113	04/15/12 07:59	6.0 (5.3-8.2) [720]	14.3 (13.2-14.8) [720]	No Data [0]		794-794 [2]	144-148 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
114	04/16/12 07:59	6.6 (5.9-8.3) [720]	14.8 (13.5-15.4) [720]	No Data [0]		801-801 [2]	151-168 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
115	04/17/12 07:59	3.1 (0.2-7.5) [720]	15.4 (14.4-16.3) [720]	No Data [0]		808-808 [3]	178-185 [2]	No Data [0]	6.80 [1]	No Data [0]	No Data [0]	No Data [0]
116	04/18/12 07:59	3.4 (0.5-5.5) [720]	15.7 (14.5-16.6) [720]	No Data [0]		817-817 [2]	193-193 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
117	04/19/12 07:59	1.6 (0.1-8.1) [718]	14.8 (11.0-15.6) [718]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
118	04/20/12 07:59	0.1 (0.0-9.8) [660]	15.2 (14.2-15.7) [720]	No Data [0]		825-825 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	210.0 [1]	No Data [0]
119	04/21/12 07:59	0.2 (0.0-4.6) [328]	15.3 (14.6-16.0) [719]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
120	04/22/12 07:59	No Data [0]	15.6 (14.6-15.9) [720]	No Data [0]		830-830 [3]	157-174 [2]	No Data [0]	7.38 [1]	No Data [0]	178.0 [1]	No Data [0]
121	04/23/12 07:59	0.1 (0.0-0.5) [276]	14.6 (11.5-15.0) [720]	No Data [0]		839-839 [2]	164-172 [2]	No Data [0]	7.41 [1]	No Data [0]	96.0 [1]	No Data [0]
122	04/24/12 07:59	0.3 (0.0-7.2) [719]	12.8 (10.9-13.2) [720]	No Data [0]		847-847 [2]	90-103 [2]	No Data [0]	7.57 [1]	No Data [0]	94.0 [1]	No Data [0]
123	04/25/12 07:59	0.3 (0.0-4.3) [694]	13.6 (11.5-14.0) [718]	4.6 (0.9-8.2) [622]		857-857 [2]	123-126 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
124	04/26/12 07:59	0.3 (0.0-4.2) [541]	14.2 (10.8-14.7) [718]	5.3 (4.9-6.0) [718]		865-865 [2]	118-120 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
125	04/27/12 07:59	0.3 (0.1-2.6) [702]	14.4 (13.5-14.7) [720]	5.4 (5.2-6.1) [720]		872-872 [2]	108-114 [2]	No Data [0]	7.09 [1]	No Data [0]	144.0 [1]	No Data [0]
126	04/28/12 07:59	0.1 (0.0-0.4) [210]	14.0 (12.9-14.7) [720]	5.2 (4.6-5.4) [720]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
127	04/29/12 07:59	No Data [0]	14.1 (12.7-14.4) [720]	4.1 (3.8-4.8) [720]		882-882 [2]	104-107 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
128	04/30/12 07:59	0.8 (0.2-7.7) [12]	14.1 (13.4-14.7) [720]	5.1 (4.0-5.4) [720]		889-889 [3]	99-101 [2]	No Data [0]	6.89 [1]	No Data [0]	140.0 [1]	No Data [0]
129	05/01/12 07:59	4.4 (0.2-7.2) [720]	14.9 (13.7-15.0) [720]	4.9 (0.5-6.5) [716]		899-899 [3]	126-130 [2]	No Data [0]	6.96 [1]	No Data [0]	138.0 [1]	No Data [0]
130	05/02/12 07:59	4.7 (2.8-6.1) [719]	14.4 (14.2-14.7) [719]	4.9 (4.6-5.2) [719]		912-912 [2]	112-112 [2]	No Data [0]	7.10 [1]	No Data [0]	116.0 [1]	No Data [0]
131	05/03/12 07:59	1.9 (0.5-5.1) [718]	15.2 (11.4-15.6) [718]	4.9 (4.7-5.3) [718]		924-924 [2]	121-122 [2]	No Data [0]	7.27 [1]	No Data [0]	152.0 [1]	No Data [0]
132	05/04/12 07:59	0.7 (0.0-2.7) [572]	15.0 (14.7-15.4) [719]	6.0 (4.1-7.0) [719]		934-934 [2]	308-314 [2]	No Data [0]	7.13 [1]	No Data [0]	190.0 [1]	No Data [0]
133	05/05/12 07:59	5.8 (0.0-7.9) [652]	15.0 (14.4-15.2) [720]	3.0 (2.2-5.7) [720]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
134	05/06/12 07:59	5.4 (3.2-8.4) [719]	15.1 (14.4-15.4) [719]	2.4 (0.1-2.6) [339]		942-942 [2]	113-117 [2]	No Data [0]	7.39 [1]	No Data [0]	No Data [0]	No Data [0]
135	05/07/12 07:59	5.5 (3.3-6.8) [720]	15.2 (14.4-15.4) [720]	5.8 (4.3-6.5) [665]		950-950 [2]	141-147 [2]	No Data [0]	7.20 [1]	No Data [0]	143.0 [1]	No Data [0]
136	05/08/12 07:59	5.0 (2.0-6.7) [720]	15.6 (14.6-16.3) [720]	4.9 (0.5-5.4) [131]		961-961 [3]	193-196 [2]	No Data [0]	7.37 [1]	No Data [0]	164.0 [1]	No Data [0]
137	05/09/12 07:59	6.1 (4.2-7.8) [719]	15.4 (15.3-15.6) [719]	No Data [0]		973-973 [3]	174-189 [2]	No Data [0]	7.33 [1]	No Data [0]	140.0 [1]	No Data [0]
138	05/10/12 07:59	3.2 (1.3-5.9) [717]	16.0 (0.0-16.1) [718]	No Data [0]		986-986 [3]	158-170 [2]	No Data [0]	7.13 [1]	No Data [0]	136.0 [1]	No Data [0]
139	05/11/12 07:59	3.1 (0.1-6.4) [720]	15.6 (14.6-15.9) [720]	No Data [0]		998-998 [2]	100-108 [2]	No Data [0]	7.03 [1]	No Data [0]	108.0 [1]	No Data [0]
140	05/12/12 07:59	2.4 (1.9-3.9) [720]	14.8 (14.2-15.3) [720]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
141	05/13/12 07:59	1.9 (1.4-3.4) [720]	15.8 (14.2-16.1) [720]	No Data [0]		1,008-1,008 [2]	87-94 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
142	05/14/12 07:59	2.0 (1.1-3.5) [720]	15.6 (15.0-16.2) [720]	No Data [0]		1,017-1,017 [2]	78-96 [2]	No Data [0]	7.30 [1]	No Data [0]	140.0 [1]	No Data [0]
143	05/15/12 07:59	1.7 (1.3-2.9) [720]	15.4 (14.9-15.7) [720]	4.6 (1.3-5.1) [612]		1,029-1,029 [3]	110-117 [2]	No Data [0]	7.01 [1]	No Data [0]	150.0 [1]	No Data [0]
144	05/16/12 07:59	1.5 (1.3-2.6) [713]	16.0 (15.2-16.5) [713]	4.4 (4.1-5.2) [713]		1,045-1,045 [3]	153-157 [2]	No Data [0]	7.67 [1]	No Data [0]	142.0 [1]	No Data [0]
145	05/17/12 07:59	5.9 (2.0-7.6) [718]	16.2 (13.0-16.4) [718]	4.8 (4.6-5.7) [718]		1,059-1,059 [3]	118-120 [2]	No Data [0]	7.38 [1]	No Data [0]	154.0 [1]	No Data [0]
146	05/18/12 07:59	3.3 (1.6-7.6) [720]	15.9 (15.1-16.7) [720]	4.5 (4.3-5.2) [720]		1,073-1,073 [3]	138 [1]	No Data [0]	7.23 [1]	No Data [0]	152.0 [1]	No Data [0]
147	05/19/12 07:59	5.0 (0.9-7.5) [720]	16.0 (15.1-17.0) [720]	5.3 (4.8-5.5) [720]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
148	05/20/12 07:59	6.7 (5.6-8.5) [720]	16.4 (15.1-16.9) [720]	5.2 (5.0-5.4) [720]		1,088-1,088 [2]	122-137 [2]	No Data [0]	7.26 [1]	No Data [0]	No Data [0]	No Data [0]
149	05/21/12 07:59	3.8 (1.6-8.4) [720]	16.5 (15.7-17.3) [720]	5.0 (4.8-5.2) [720]		1,103-1,103 [3]	118-130 [2]	No Data [0]	7.21 [1]	No Data [0]	160.0 [1]	No Data [0]
150	05/22/12 07:59	2.3 (0.1-4.9) [718]	17.0 (15.8-17.2) [718]	4.8 (4.6-4.9) [718]		1,120-1,120 [3]	180-182 [2]	No Data [0]	7.26 [1]	No Data [0]	184.0 [1]	No Data [0]
151	05/23/12 08:00	4.1 (2.6-5.2) [719]	17.3 (16.7-17.7) [719]	4.1 (3.9-4.7) [719]		1,134-1,134 [3]	164-176 [2]	No Data [0]	7.08 [1]	No Data [0]	180.0 [1]	No Data [0]
152	05/24/12 08:00	2.3 (0.6-5.4) [718]	17.7 (5.5-18.7) [718]	4.6 (2.3-5.7) [718]		1,149-1,149 [3]	108-131 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
153	05/25/12 08:00	1.2 (0.6-2.8) [719]	18.2 (17.1-18.5) [719]	4.5 (2.4-4.6) [36]		1,165-1,165 [2]	204-205 [2]	No Data [0]	7.50 [1]	No Data [0]	182.0 [1]	No Data [0]
154	05/26/12 08:00	0.5 (0.4-1.1) [719]	17.5 (17.4-18.0) [719]	7.7 (1.7-8.0) [521]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
155	05/27/12 08:00	1.1 (0.6-1.4) [720]	18.3 (17.4-19.0) [720]	7.1 (7.0-7.6) [720]		1,170-1,170 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
156	05/28/12 08:00	0.5 (0.4-1.4) [720]	17.4 (16.9-18.1) [720]	6.9 (6.5-7.2) [720]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
157	05/29/12 08:00	0.4 (0.2-0.7) [720]	17.8 (16.9-18.6) [720]	6.4 (6.2-6.7) [720]		1,173-1,173 [2]	131-156 [2]	No Data [0]	7.53 [1]	No Data [0]	172.0 [1]	No Data [0]
158	05/30/12 08:00	0.5 (0.3-0.8) [720]	17.9 (17.6-18.3) [720]	3.3 (0.2-7.1) [693]		1,187-1,187 [2]	193-202 [2]	No Data [0]	7.19 [1]	No Data [0]	216.0 [1]	No Data [0]
159	05/31/12 08:00	0.8 (0.1-2.4) [718]	18.3 (17.6-18.8) [718]	6.6 (6.4-6.7) [718]	No Data [0]	1,201-1,240 [6]	149 (124-161) [4]	No Data [0]	6.96 [1]	No Data [0]	176.0 [1]	No Data [0]
160	06/01/12 08:00	1.6 (0.5-2.5) [719]	19.0 (18.2-19.9) [719]	6.3 (2.9-6.6) [719]	70 ± 18 [604]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

Peirce Island Pilot Study Report

September 2012

	F	S	T	U	V	W	X	Y	AA	AB	AC	AD
						(02,03) PRIMARY EFFLUENT SAMPLE ID	(02,03) PRIMARY EFFLUENT TSS (mg/L)	(02,03) PRIMARY EFFLUENT INERT SOLIDS (mg/L)	(02) UN SPIKED PRIMARY EFFLUENT pH (SU)	(03) SPIKED PRIMARY EFFLUENT pH (SU)	(02) UN SPIKED PRIMARY EFFLUENT Alkalinity (mg/L)	(03) SPIKED PRIMARY EFFLUENT Alkalinity (mg/L)
1	End	DO Probe #2 (ppm)	Temperature Probe #2 (°C)	DAF Q	NR2 ORP (mV)							
161	06/02/12 08:00	0.5 (0.2-1.7) [719]	18.2 (17.5-18.9) [719]	5.9 (5.5-6.2) [719]	-99 ± 77 [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
162	06/03/12 08:00	0.7 (0.2-1.0) [720]	17.4 (17.0-17.5) [720]	5.3 (4.4-5.7) [720]	-68 ± 34 [720]	1,246-1,246 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
163	06/04/12 08:00	0.5 (0.2-0.7) [720]	16.9 (16.1-17.1) [720]	4.0 (1.0-4.8) [713]	-84 ± 17 [720]	1,256-1,256 [2]	46-54 [2]	No Data [0]	7.20 [1]	No Data [0]	98.0 [1]	No Data [0]
164	06/05/12 08:00	0.6 (0.4-0.8) [720]	16.1 (15.8-16.3) [720]	6.5 (1.1-6.9) [679]	-117 ± 60 [720]	1,296-1,310 [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
165	06/06/12 08:00	0.6 (0.3-0.8) [719]	16.4 (15.8-16.6) [719]	6.0 (5.6-7.1) [719]	-123 ± 24 [720]	1,318-1,318 [2]	93-94 [2]	No Data [0]	7.24 [1]	No Data [0]	120.0 [1]	No Data [0]
166	06/07/12 08:00	0.5 (0.2-0.8) [718]	16.5 (6.4-17.5) [718]	5.4 (5.2-5.8) [718]	-137 ± 15 [720]	1,348-1,348 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
167	06/08/12 08:00	0.2 (0.0-2.4) [699]	16.8 (15.6-17.4) [720]	5.7 (1.9-6.5) [680]	-162 ± 23 [720]	1,354-1,354 [2]	93-93 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
168	06/09/12 08:00	1.9 (0.2-9.0) [720]	17.2 (15.0-30.0) [720]	7.1 (0.5-7.2) [466]	-144 ± 108 [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
169	06/10/12 08:00	3.4 (2.9-5.0) [720]	17.8 (16.9-18.7) [720]	7.1 (6.8-7.5) [720]	-3 ± 18 [720]	1,362-1,362 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
170	06/11/12 08:00	3.3 (2.3-5.5) [690]	17.1 (16.7-18.0) [690]	6.5 (6.1-6.9) [690]	-26 ± 23 [690]	1,368-1,368 [2]	80-85 [2]	No Data [0]	7.51 [1]	No Data [0]	150.0 [1]	No Data [0]
171	06/12/12 08:00	4.7 (0.0-5.6) [528]	17.8 (17.4-18.0) [528]	No Data [0]	36 ± 75 [528]	1,378-1,378 [2]	104-106 [2]	No Data [0]	7.37 [1]	No Data [0]	166.0 [1]	No Data [0]
172	06/13/12 08:00	1.6 (0.3-3.0) [719]	18.1 (17.4-18.5) [719]	2.9 (0.8-6.5) [199]	-130 ± 44 [719]	1,414-1,415 [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
173	06/14/12 08:00	1.4 (0.4-2.7) [717]	17.7 (6.8-18.1) [717]	6.7 (4.6-6.9) [667]	-155 ± 44 [717]	1,421-1,456 [4]	83-85 [2]	No Data [0]	7.14 [1]	No Data [0]	126.0 [1]	No Data [0]
174	06/15/12 08:00	0.7 (0.0-2.6) [719]	17.7 (16.9-18.6) [719]	6.6 (6.5-6.8) [719]	-131 ± 41 [719]	1,472-1,472 [2]	87-97 [2]	No Data [0]	7.36 [1]	No Data [0]	No Data [0]	No Data [0]
175	06/16/12 08:00	0.5 (0.0-1.5) [719]	17.7 (16.8-18.9) [720]	6.7 (6.0-6.9) [720]	-200 ± 69 [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
176	06/17/12 08:00	0.4 (0.0-1.1) [586]	17.4 (16.7-17.8) [720]	6.7 (6.6-6.9) [720]	-144 ± 77 [720]	1,481-1,481 [2]	98-99 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
177	06/18/12 08:00	0.6 (0.0-1.3) [266]	17.4 (16.8-18.4) [720]	6.6 (6.4-6.9) [720]	-264 ± 86 [720]	1,490-1,495 [4]	91-102 [2]	No Data [0]	6.82-7.44 [2]	No Data [0]	154.0-159.0 [2]	No Data [0]
178	06/19/12 08:00	0.9 (0.0-4.5) [700]	18.1 (16.9-18.8) [719]	3.6 (0.8-7.3) [691]	-177 ± 65 [719]	1,509-1,509 [2]	124-133 [2]	No Data [0]	7.21 [1]	No Data [0]	166.0 [1]	No Data [0]
179	06/20/12 08:00	3.1 (1.2-4.3) [719]	19.3 (17.5-19.5) [719]	3.5 (0.8-3.7) [578]	-82 ± 25 [719]	1,521-1,521 [2]	115-126 [2]	No Data [0]	7.21 [1]	No Data [0]	166.0 [1]	No Data [0]
180	06/21/12 08:00	3.7 (0.7-5.3) [718]	20.1 (6.1-20.9) [718]	6.5 (0.0-6.7) [714]	-90 ± 51 [718]	1,546-1,561 [4]	111-127 [2]	No Data [0]	7.24 [1]	No Data [0]	166.0 [1]	No Data [0]
181	06/22/12 08:00	3.5 (2.5-6.3) [718]	19.1 (17.5-20.3) [718]	5.9 (5.5-6.5) [718]	-117 ± 88 [718]	1,572-1,572 [2]	125-146 [2]	No Data [0]	7.32 [1]	No Data [0]	170.0 [1]	No Data [0]
182	06/23/12 08:00	4.5 (1.7-6.0) [720]	20.5 (18.3-21.4) [720]	5.3 (4.8-5.6) [720]	-72 ± 64 [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
183	06/24/12 08:00	5.9 (5.1-7.0) [720]	20.3 (19.3-20.9) [720]	4.6 (4.4-5.4) [720]	-46 ± 75 [720]	1,585-1,601 [7]	105-107 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
184	06/25/12 08:00	4.6 (4.2-7.1) [720]	19.9 (19.2-20.8) [720]	5.6 (3.0-5.7) [132]	156 ± 21 [720]	1,602-1,610 [3]	117-119 [2]	No Data [0]	7.82 [1]	No Data [0]	190.0 [1]	No Data [0]
185	06/26/12 08:00	5.3 (1.7-6.9) [720]	19.9 (18.9-20.8) [720]	No Data [0]	105 ± 49 [720]	1,608-1,625 [8]	144-146 [2]	No Data [0]	7.04-7.38 [2]	8.00 [1]	155.0-158.0 [2]	208.0 [1]
186	06/27/12 07:59	0.4 (0.0-8.1) [718]	19.1 (18.5-19.6) [718]	3.3 (1.6-8.5) [661]	-69 ± 59 [718]	1,627-1,637 [8]	92-96 [2]	No Data [0]	6.88-7.63 [2]	7.60-8.89 [2]	124.0-158.0 [2]	206.0-272.0 [2]
187	06/28/12 07:59	1.7 (0.0-3.0) [626]	19.2 (18.3-19.8) [717]	6.1 (2.9-8.5) [717]	-77 ± 52 [717]	1,644-1,660 [7]	70-71 [2]	No Data [0]	6.84-7.12 [2]	7.83 (7.48-8.04) [4]	126.0-174.0 [2]	204.0 (166.0-258.0) [4]
188	06/29/12 07:59	0.4 (0.1-3.4) [720]	20.2 (18.8-20.9) [720]	6.4 (5.7-6.9) [720]	-224 ± 76 [720]	1,665-1,674 [5]	82-86 [2]	No Data [0]	6.88 [1]	7.94-8.47 [2]	124.0 [1]	200.0-224.0 [2]
189	06/30/12 07:59	0.6 (0.2-1.6) [719]	21.3 (19.6-21.8) [719]	3.5 (0.6-6.0) [673]	-81 ± 47 [719]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
190	07/01/12 07:59	0.8 (0.4-1.7) [720]	22.9 (21.2-23.5) [720]	3.5 (3.2-3.8) [720]	-77 ± 6 [720]	1,685-1,687 [4]	No Data [0]	No Data [0]	7.10 [1]	8.00-8.68 [2]	140.0 [1]	198.0-202.0 [2]
191	07/02/12 07:59	1.0 (0.1-1.8) [720]	22.3 (21.4-23.0) [720]	6.1 (1.3-6.9) [720]	-180 ± 69 [720]	1,694-1,718 [10]	86-88 [2]	No Data [0]	7.00 (6.61-7.30) [3]	8.60 (7.14-216.00) [5]	164.0 (160.0-218.0) [3]	242.0 (196.0-298.0) [4]
192	07/03/12 07:59	1.3 (0.2-3.2) [717]	21.4 (20.5-22.3) [717]	5.3 (5.0-5.9) [717]	-136 ± 49 [717]	1,720-1,720 [2]	134-142 [2]	No Data [0]	No Data [0]	7.90 [1]	No Data [0]	240.0 [1]
193	07/04/12 07:59	1.1 (0.0-4.6) [712]	21.1 (20.5-23.5) [719]	5.6 (0.3-6.3) [668]	-114 ± 99 [719]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
194	07/05/12 07:59	1.3 (0.0-3.9) [716]	21.4 (20.5-22.1) [717]	6.9 (6.1-8.3) [702]	-97 ± 94 [717]	1,731-1,731 [2]	95-121 [2]	No Data [0]	No Data [0]	8.19 [1]	No Data [0]	226.0 [1]
195	07/06/12 07:59	2.5 (0.3-5.2) [719]	20.9 (20.1-21.9) [719]	No Data [0]	-216 ± 66 [719]	1,740-1,763 [5]	No Data [0]	No Data [0]	6.42 [1]	8.65 [1]	188.0 [1]	232.0-247.0 [2]
196	07/07/12 07:59	2.4 (0.3-5.3) [719]	21.4 (20.1-22.4) [719]	No Data [0]	-300 ± 28 [719]	1,742-1,782 [7]	130-145 [2]	No Data [0]	No Data [0]	7.63 (7.05-7.78) [3]	No Data [0]	255.0 (245.0-280.0) [5]
197	07/08/12 07:59	4.5 (3.3-5.5) [720]	21.2 (20.4-21.9) [720]	No Data [0]	-219 ± 51 [720]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
198	07/09/12 07:59	4.4 (1.9-5.7) [720]	21.3 (20.4-22.2) [720]	No Data [0]	-137 ± 61 [720]	1,819-1,822 [4]	107-113 [2]	No Data [0]	No Data [0]	7.87 [1]	No Data [0]	228.0 [1]
199	07/10/12 07:59	1.2 (0.5-3.0) [718]	21.4 (20.4-22.4) [718]	4.0 (0.0-8.0) [496]	-129 ± 113 [718]	1,825-1,853 [7]	127-131 [2]	No Data [0]	6.61 [1]	8.57 (7.92-8.57) [3]	154.0 [1]	284.0 (276.0-384.0) [3]
200	07/11/12 07:59	3.5 (0.4-8.9) [717]	23.1 (20.5-24.2) [717]	3.7 (0.2-8.7) [677]	-40 ± 72 [717]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
201	07/12/12 07:59	1.0 (0.2-8.7) [717]	22.5 (21.6-30.0) [717]	4.5 (0.0-9.4) [557]	-68 ± 59 [718]	1,877-1,921 [11]	120-131 [2]	No Data [0]	7.04 [1]	8.41-8.98 [2]	182.0 [1]	362.0-364.0 [2]
202	07/13/12 07:59	1.0 (0.7-2.0) [719]	22.5 (21.6-23.7) [719]	3.7 (3.5-9.3) [719]	-74 ± 8 [719]	1,917-1,935 [5]	98-105 [2]	No Data [0]	No Data [0]	8.50 [1]	No Data [0]	336.0 [1]
203	07/14/12 07:57	0.5 (0.2-2.1) [719]	22.6 (21.7-23.5) [719]	3.3 (3.0-7.7) [719]	-124 ± 28 [719]	1,949-1,949 [2]	143-145 [2]	No Data [0]	No Data [0]	8.53 [1]	No Data [0]	380.0 [1]
204	07/15/12 07:57	0.4 (0.2-0.8) [719]	23.0 (21.6-23.7) [719]	2.3 (2.1-3.0) [719]	-70 ± 18 [719]	1,964-1,965 [2]	No Data [0]	No Data [0]	7.02 [1]	8.72 [1]	206.0 [1]	292.0 [1]
205	07/16/12 07:57	0.3 (0.1-0.8) [720]	23.4 (22.6-23.9) [720]	2.2 (1.9-2.4) [720]	-84 ± 30 [720]	1,966-2,013 [12]	No Data [0]	No Data [0]	6.63 [1]	6.75-8.55 [2]	192.0 [1]	236.0-408.0 [2]
206	07/17/12 14:59	0.2 (0.0-0.5) [931]	23.8 (22.7-24.6) [931]	5.9 (0.4-10.0) [914]	-62 ± 42 [931]	2,000-2,019 [10]	117-127 [2]	No Data [0]	6.30 [1]	8.59-8.76 [2]	144.0 [1]	360.0-406.0 [2]
207												
208												
209												
210												

	F	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP
1	End	(02,03) PRIMARY EFFLUENT COD(t) (mg/L)	(02,03) PRIMARY EFFLUENT COD(s) (mg/L)	(02,03) PRIMARY EFFLUENT BOD(t) (mg/L)	(02,03) PRIMARY EFFLUENT BOD(s) (mg/L)	(02) UN SPIKED PRIMARY EFFLUENT Nitrate (NO3-N) (mg/L)	(02) UN SPIKED PRIMARY EFFLUENT Ammonia (NH3-N) (mg/L)	(02) UN SPIKED PRIMARY EFFLUENT Nitrite (NO2-N) (mg/L)	(02) UN SPIKED PRIMARY EFFLUENT Total Nitrogen (TN- N) (mg/L)	(02) UN SPIKED PRIMARY EFFLUENT NOx (-N) (mg/L)	(02) UN SPIKED PRIMARY EFFLUENT TKN (-N) (mg/L)	(03) SPIKED PRIMARY EFFLUENT Nitrate (NO3-N) (mg/L)	(03) SPIKED PRIMARY EFFLUENT Ammonia (NH3-N) (mg/L)
2	03/06/12 08:00	407 (12-931) [381]	194 (6-401) [241]	#DIV/0!	#DIV/0!	#DIV/0!	16.7 (4.0-34.5) [130]	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.3 (0.2-4.0) [16]	31.5 (6.1-58.0) [55]
3													
4	12/29/11 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
5	12/30/11 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
6	12/30/11 08:00	493 (459-528) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
7	12/31/11 08:00	269 (243-360) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
8	01/01/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
9	01/02/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
10	01/03/12 08:00	731 (724-737) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
11	01/04/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
12	01/05/12 08:00	365 (364-404) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
13	01/06/12 08:00	323 (310-396) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
14	01/07/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
15	01/08/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
16	01/09/12 08:00	509 (476-524) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
17	01/10/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
18	01/11/12 08:00	459 (457-505) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
19	01/12/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
20	01/13/12 08:00	411 (306-413) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
21	01/14/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
22	01/15/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
23	01/16/12 08:00	212 (209-213) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
24	01/17/12 08:00	466 (458-466) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
25	01/18/12 08:00	647 (647-660) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
26	01/19/12 08:00	452 (452-456) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
27	01/20/12 08:00	439-458 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
28	01/21/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
29	01/22/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
30	01/23/12 08:00	525-539 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	26.4-26.4 [2]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
31	01/24/12 08:00	657 (493-700) [3]	288 (286-297) [3]	No Data [0]	No Data [0]	No Data [0]	13.0 (12.9-13.1) [3]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
32	01/25/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
33	01/26/12 08:00	378-379 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	16.1 (15.9-16.1) [3]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
34	01/27/12 08:00	204-208 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	6.5 (6.5-6.5) [3]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
35	01/28/12 08:00	162-176 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
36	01/29/12 08:00	223-226 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
37	01/30/12 08:00	397 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	12.5-12.6 [2]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
38	01/31/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	11.5-11.7 [2]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
39	02/01/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	12.9 (10.7-13.3) [4]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
40	02/02/12 08:00	152 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
41	02/03/12 08:00	338-371 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	13.0 (11.7-14.1) [4]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
42	02/04/12 08:00	276 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
43	02/05/12 08:00	340 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
44	02/06/12 08:00	406 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
45	02/07/12 08:00	320-334 [2]	No Data [0]	270-273 [2]	No Data [0]	No Data [0]	10.4 (9.3-11.5) [4]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
46	02/08/12 08:00	434-441 [2]	No Data [0]	210-215 [2]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
47	02/09/12 08:00	413-437 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	16.2 (15.4-16.3) [3]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
48	02/10/12 08:00	412-418 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
49	02/11/12 08:00	396-397 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
50	02/12/12 08:00	550-571 [2]	245-245 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
51	02/13/12 08:00	537-539 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	14.4-15.1 [2]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
52	02/14/12 08:00	605-606 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	19.0-19.1 [2]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
53	02/15/12 08:00	418-435 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
54	02/16/12 08:00	404-424 [2]	No Data [0]	No Data [0]	161 (120-183) [3]	No Data [0]	17.6-17.9 [2]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

	F	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP
1	End	(02,03) PRIMARY EFFLUENT COD(t) (mg/L)	(02,03) PRIMARY EFFLUENT COD(s) (mg/L)	(02,03) PRIMARY EFFLUENT BOD(t) (mg/L)	(02,03) PRIMARY EFFLUENT BOD(s) (mg/L)	(02) UN SPIKED PRIMARY EFFLUENT Nitrate (NO3-N) (mg/L)	(02) UN SPIKED PRIMARY EFFLUENT Ammonia (NH3-N) (mg/L)	(02) UN SPIKED PRIMARY EFFLUENT Nitrite (NO2-N) (mg/L)	(02) UN SPIKED PRIMARY EFFLUENT Total Nitrogen (TN- N) (mg/L)	(02) UN SPIKED PRIMARY EFFLUENT NOx (-N) (mg/L)	(02) UN SPIKED PRIMARY EFFLUENT TKN (-N) (mg/L)	(03) SPIKED PRIMARY EFFLUENT Nitrate (NO3-N) (mg/L)	(03) SPIKED PRIMARY EFFLUENT Ammonia (NH3-N) (mg/L)
55	02/17/12 08:00	390-400 [2]	186-186 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
56	02/18/12 08:00	437-449 [2]	271-272 [2]	251 (221-252) [3]	130 (128-184) [3]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
57	02/19/12 08:00	475-549 [2]	192-197 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
58	02/20/12 08:00	445-448 [2]	223-229 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
59	02/21/12 08:00	777-793 [2]	356-361 [2]	468 [1]	No Data [0]	No Data [0]	22.5-22.6 [2]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
60	02/22/12 08:00	407-410 [2]	236-236 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
61	02/23/12 08:00	483-485 [2]	229-237 [2]	246-285 [2]	121 [1]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
62	02/24/12 08:00	422-440 [2]	216-217 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
63	02/25/12 08:00	212-216 [2]	109-109 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
64	02/26/12 08:00	208 (208-209) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
65	02/27/12 08:00	397-398 [2]	160-161 [2]	150 (146-153) [4]	79 (76-83) [4]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
66	02/28/12 08:00	476-486 [2]	283-290 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
67	02/29/12 08:00	435-442 [2]	211-215 [2]	280 (257-291) [4]	124 (120-132) [4]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
68	03/01/12 08:00	372-373 [2]	194-198 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
69	03/02/12 08:00	381-381 [2]	206-208 [2]	226 (222-233) [3]	129 (124-141) [4]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
70	03/03/12 08:00	427-445 [2]	248-251 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
71	03/04/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
72	03/05/12 08:00	339-340 [2]	168-178 [2]	182 (176-214) [4]	86-93 [2]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
73	03/06/12 08:00	310-346 [2]	153-172 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
74	03/07/12 08:00	406-459 [2]	213-275 [2]	215 (213-247) [3]	101 (97-105) [3]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
75	03/08/12 08:00	300 (262-340) [4]	135 (125-140) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
76	03/09/12 08:00	285-320 [2]	107-125 [2]	152-156 [2]	No Data [0]	2.1 [1]	11.1 [1]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
77	03/10/12 08:00	229-235 [2]	116-122 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
78	03/11/12 08:00	204-215 [2]	91-97 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
79	03/12/12 08:00	256-260 [2]	114-115 [2]	114-127 [2]	48-49 [2]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
80	03/13/12 08:00	254-258 [2]	129-132 [2]	124 (109-125) [3]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
81	03/14/12 08:00	327-333 [2]	169-172 [2]	177-177 [2]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
82	03/15/12 08:00	355-356 [2]	170-172 [2]	No Data [0]	No Data [0]	0.4-0.5 [2]	15.1-15.2 [2]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
83	03/16/12 08:00	327-328 [2]	149-153 [2]	180 (172-181) [3]	88 (87-90) [3]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
84	03/17/12 08:00	351-373 [2]	151-155 [2]	208 (206-212) [3]	110 (98-124) [3]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
85	03/18/12 07:59	285-288 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
86	03/19/12 07:59	305-309 [2]	127-129 [2]	165 (160-186) [3]	No Data [0]	No Data [0]	9.4-9.5 [2]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
87	03/20/12 07:59	386-420 [2]	181-185 [2]	222 (218-238) [3]	106 (103-108) [3]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
88	03/21/12 07:59	435-450 [2]	186-195 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
89	03/22/12 07:59	412-422 [2]	194-198 [2]	No Data [0]	No Data [0]	No Data [0]	17.1-17.2 [2]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
90	03/23/12 07:59	414-414 [2]	178-178 [2]	227 (225-229) [3]	104-108 [2]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
91	03/24/12 07:59	364-365 [2]	168-168 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
92	03/25/12 07:59	300-308 [2]	162-165 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
93	03/26/12 07:59	325-330 [2]	158-162 [2]	169 (164-171) [3]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
94	03/27/12 07:59	468-469 [2]	244-250 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
95	03/28/12 07:59	407-426 [2]	226-231 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
96	03/29/12 07:59	500-507 [2]	263-266 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
97	03/30/12 07:59	426-427 [2]	200-202 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
98	03/31/12 07:59	494-496 [2]	233-234 [2]	No Data [0]	No Data [0]	0.7-0.8 [2]	21.6-21.7 [2]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
99	04/01/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
100	04/02/12 07:59	397-405 [2]	193-194 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
101	04/03/12 07:59	580-665 [2]	301-330 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
102	04/04/12 07:59	593 (583-612) [4]	293 (256-329) [4]	324 (321-348) [3]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
103	04/05/12 07:59	512-551 [2]	273-284 [2]	No Data [0]	No Data [0]	0.2-0.2 [2]	20.7-20.8 [2]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
104	04/06/12 07:59	510-546 [2]	252-257 [2]	275 (268-282) [3]	127 (120-133) [3]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
105	04/07/12 07:59	466-468 [2]	266-266 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
106	04/08/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
107	04/09/12 07:59	529-537 [2]	292-293 [2]	No Data [0]	No Data [0]	0.1-0.1 [2]	18.7-18.8 [2]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

	F	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP
		(02,03) PRIMARY EFFLUENT COD(t) (mg/L)	(02,03) PRIMARY EFFLUENT COD(s) (mg/L)	(02,03) PRIMARY EFFLUENT BOD(t) (mg/L)	(02,03) PRIMARY EFFLUENT BOD(s) (mg/L)	(02) UN SPIKED PRIMARY EFFLUENT Nitrate (NO3-N) (mg/L)	(02) UN SPIKED PRIMARY EFFLUENT Ammonia (NH3-N) (mg/L)	(02) UN SPIKED PRIMARY EFFLUENT Nitrite (NO2-N) (mg/L)	(02) UN SPIKED PRIMARY EFFLUENT Total Nitrogen (TN- N) (mg/L)	(02) UN SPIKED PRIMARY EFFLUENT NOx (-N) (mg/L)	(02) UN SPIKED PRIMARY EFFLUENT TKN (-N) (mg/L)	(03) SPIKED PRIMARY EFFLUENT Nitrate (NO3-N) (mg/L)	(03) SPIKED PRIMARY EFFLUENT Ammonia (NH3-N) (mg/L)
1	End												
108	04/10/12 07:59	587-603 [2]	349-353 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
109	04/11/12 07:59	527-534 [2]	320-336 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
110	04/12/12 07:59	704 (626-778) [3]	325 [1]	277 (259-291) [3]	156 (150-177) [3]	0.8 [1]	30.3 [1]		40.4 [1]	0.6 [1]	39.8 [1]	No Data [0]	No Data [0]
111	04/13/12 07:59	785 [1]	327 [1]	No Data [0]	No Data [0]	0.1 [1]	28.9 [1]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
112	04/14/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
113	04/15/12 07:59	481-572 [2]	233-234 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
114	04/16/12 07:59	425-427 [2]	193-197 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
115	04/17/12 07:59	558-561 [2]	279-280 [2]	290 (284-292) [3]	159 (153-161) [3]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
116	04/18/12 07:59	571-587 [2]	277-278 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		34.5-34.6 [2]	0.4-0.5 [2]	34.1-34.1 [2]	No Data [0]	No Data [0]
117	04/19/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
118	04/20/12 07:59	607-622 [2]	No Data [0]	No Data [0]	No Data [0]	0.8 [1]	33.9-34.5 [2]		37.8 [1]	0.7 [1]	37.0 [1]	No Data [0]	No Data [0]
119	04/21/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
120	04/22/12 07:59	544-579 [2]	185-276 [2]	246 (244-269) [3]	96 [1]	0.2-0.2 [2]	No Data [0]		25.6-33.1 [2]	0.2-0.4 [2]	25.4-32.7 [2]	No Data [0]	No Data [0]
121	04/23/12 07:59	354-359 [2]	124-127 [2]	No Data [0]	No Data [0]	No Data [0]	12.1-12.6 [2]		19.1 [1]	0.5 [1]	18.5 [1]	No Data [0]	No Data [0]
122	04/24/12 07:59	206-220 [2]	91-92 [2]	98 [1]	No Data [0]	No Data [0]	6.0 [1]		6.7-10.9 [2]	0.2-0.2 [2]	6.5-10.8 [2]	No Data [0]	No Data [0]
123	04/25/12 07:59	343-345 [2]	163-165 [2]	No Data [0]	No Data [0]	No Data [0]	11.3 [1]		14.6 [1]	0.3 [1]	14.3 [1]	No Data [0]	No Data [0]
124	04/26/12 07:59	329-338 [2]	152-153 [2]	No Data [0]	No Data [0]	No Data [0]	13.2 [1]		20.8 [1]	0.3 [1]	20.4 [1]	No Data [0]	No Data [0]
125	04/27/12 07:59	333-340 [2]	170-177 [2]	180-187 [2]	88-91 [2]	No Data [0]	14.8 [1]		22.0 [1]	0.0 [1]	21.4 [1]	No Data [0]	No Data [0]
126	04/28/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
127	04/29/12 07:59	323-323 [2]	154-157 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
128	04/30/12 07:59	320-330 [2]	148-150 [2]	166 (161-179) [3]	49 [1]	0.6 [1]	17.7 [1]		22.1 [1]	0.3 [1]	21.8 [1]	No Data [0]	No Data [0]
129	05/01/12 07:59	420-438 [2]	221-222 [2]	217 (207-227) [3]	112-119 [2]	No Data [0]	17.4 [1]		24.7 [1]	0.4 [1]	24.3 [1]	No Data [0]	No Data [0]
130	05/02/12 07:59	305-309 [2]	144-145 [2]	164-169 [2]	72-75 [2]	No Data [0]	12.9 [1]		19.3 [1]	0.5 [1]	18.8 [1]	No Data [0]	No Data [0]
131	05/03/12 07:59	387-393 [2]	214-215 [2]	No Data [0]	No Data [0]	No Data [0]	18.0 [1]		22.4 [1]	0.5 [1]	21.9 [1]	No Data [0]	No Data [0]
132	05/04/12 07:59	854-882 [2]	336-339 [2]	No Data [0]	No Data [0]	No Data [0]	26.9 [1]		39.6 [1]	0.7 [1]	39.0 [1]	No Data [0]	No Data [0]
133	05/05/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
134	05/06/12 07:59	210-211 [2]	118-120 [2]	No Data [0]	No Data [0]	No Data [0]	19.6 [1]		18.8 [1]	0.3 [1]	18.5 [1]	No Data [0]	No Data [0]
135	05/07/12 07:59	330-342 [2]	121-122 [2]	No Data [0]	No Data [0]	No Data [0]	17.3 [1]		20.9 [1]	0.4 [1]	20.5 [1]	No Data [0]	No Data [0]
136	05/08/12 07:59	433-437 [2]	185-187 [2]	269 (264-270) [3]	127 (125-143) [3]	No Data [0]	21.1 [1]		27.7 [1]	0.5 [1]	27.2 [1]	No Data [0]	No Data [0]
137	05/09/12 07:59	469-470 [2]	217-219 [2]	234 (228-267) [3]	117 (113-126) [3]	No Data [0]	17.2 [1]		23.2 [1]	0.5 [1]	22.7 [1]	No Data [0]	No Data [0]
138	05/10/12 07:59	391-406 [2]	176-188 [2]	207 (207-210) [3]	89 (89-95) [3]	No Data [0]	16.5 [1]		12.3 [1]	0.3 [1]	12.0 [1]	No Data [0]	No Data [0]
139	05/11/12 07:59	181-189 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	5.5 [1]		1.0 [1]	0.1 [1]	0.9 [1]	No Data [0]	No Data [0]
140	05/12/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
141	05/13/12 07:59	259-264 [2]	107-111 [2]	No Data [0]	No Data [0]	No Data [0]	12.5 [1]		12.3 [1]	0.3 [1]	12.0 [1]	No Data [0]	No Data [0]
142	05/14/12 07:59	267-276 [2]	118-118 [2]	No Data [0]	No Data [0]	No Data [0]	13.2 [1]		20.2 [1]	0.3 [1]	19.9 [1]	No Data [0]	No Data [0]
143	05/15/12 07:59	370-376 [2]	195-206 [2]	190 (180-196) [3]	101 (100-106) [3]	No Data [0]	17.7 [1]		22.6 [1]	0.3 [1]	22.2 [1]	No Data [0]	No Data [0]
144	05/16/12 07:59	394-397 [2]	177-178 [2]	196 (193-221) [3]	90 (89-91) [3]	No Data [0]	17.2 [1]		13.7 [1]	0.4 [1]	13.3 [1]	No Data [0]	No Data [0]
145	05/17/12 07:59	356-389 [2]	185-189 [2]	No Data [0]	No Data [0]	No Data [0]	15.9 [1]		23.5 [1]	0.4 [1]	23.0 [1]	No Data [0]	No Data [0]
146	05/18/12 07:59	328-346 [2]	148-150 [2]	131 (131-140) [3]	No Data [0]	No Data [0]	17.6 [1]		10.1 [1]	0.4 [1]	9.6 [1]	No Data [0]	No Data [0]
147	05/19/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
148	05/20/12 07:59	316-317 [2]	140-143 [2]	No Data [0]	No Data [0]	No Data [0]	19.9 [1]		24.4 [1]	0.4 [1]	24.0 [1]	No Data [0]	No Data [0]
149	05/21/12 07:59	337-341 [2]	153-155 [2]	152 (151-153) [3]	74 (72-90) [3]	No Data [0]	19.8 [1]		7.6 [1]	0.3 [1]	7.3 [1]	No Data [0]	No Data [0]
150	05/22/12 07:59	584-615 [2]	316-320 [2]	349 (340-355) [3]	172 (161-180) [3]	No Data [0]	26.9 [1]		33.8 [1]	0.6 [1]	33.2 [1]	No Data [0]	No Data [0]
151	05/23/12 08:00	490-497 [2]	240-242 [2]	248 (247-311) [3]	136 (129-141) [3]	No Data [0]	20.4 [1]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
152	05/24/12 08:00	373-379 [2]	191-202 [2]	194 (175-202) [3]	94 (92-96) [3]	No Data [0]	19.2 [1]		32.4 [1]	0.3 [1]	32.1 [1]	No Data [0]	No Data [0]
153	05/25/12 08:00	460-548 [2]	168-170 [2]	No Data [0]	No Data [0]	No Data [0]	18.0 [1]		23.4 [1]	0.6 [1]	22.8 [1]	No Data [0]	No Data [0]
154	05/26/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
155	05/27/12 08:00	221-241 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	15.3 [1]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
156	05/28/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
157	05/29/12 08:00	371-373 [2]	146-151 [2]	No Data [0]	No Data [0]	No Data [0]	19.7 [1]		19.8 [1]	0.5 [1]	19.3 [1]	No Data [0]	No Data [0]
158	05/30/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	31.4 [1]		11.6 [1]	0.6 [1]	11.0 [1]	No Data [0]	No Data [0]
159	05/31/12 08:00	626 (606-802) [6]	399-401 [2]	No Data [0]	No Data [0]	No Data [0]	18.7 [1]		12.0 [1]	0.5 [1]	11.5 [1]	No Data [0]	No Data [0]
160	06/01/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

	F	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP
		(02,03) PRIMARY EFFLUENT COD(t) (mg/L)	(02,03) PRIMARY EFFLUENT COD(s) (mg/L)	(02,03) PRIMARY EFFLUENT BOD(t) (mg/L)	(02,03) PRIMARY EFFLUENT BOD(s) (mg/L)	(02) UN SPIKED PRIMARY EFFLUENT Nitrate (NO3-N) (mg/L)	(02) UN SPIKED PRIMARY EFFLUENT Ammonia (NH3-N) (mg/L)	(02) UN SPIKED PRIMARY EFFLUENT Nitrite (NO2-N) (mg/L)	(02) UN SPIKED PRIMARY EFFLUENT Total Nitrogen (TN- N) (mg/L)	(02) UN SPIKED PRIMARY EFFLUENT NOx (-N) (mg/L)	(02) UN SPIKED PRIMARY EFFLUENT TKN (-N) (mg/L)	(03) SPIKED PRIMARY EFFLUENT Nitrate (NO3-N) (mg/L)	(03) SPIKED PRIMARY EFFLUENT Ammonia (NH3-N) (mg/L)
1	End												
161	06/02/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
162	06/03/12 08:00	127-130 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		14.4 [1]	1.4 [1]	13.0 [1]	No Data [0]	No Data [0]
163	06/04/12 08:00	129-147 [2]	87-89 [2]	No Data [0]	No Data [0]	No Data [0]	5.1 [1]		4.1 [1]	0.3 [1]	3.8 [1]	No Data [0]	No Data [0]
164	06/05/12 08:00	309-320 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
165	06/06/12 08:00	249-291 [2]	129-131 [2]	No Data [0]	No Data [0]	No Data [0]	8.0 [1]		6.2 [1]	0.2 [1]	6.0 [1]	No Data [0]	No Data [0]
166	06/07/12 08:00	353-375 [2]	194-196 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		24.8 [1]	0.2 [1]	25.6 [1]	No Data [0]	No Data [0]
167	06/08/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
168	06/09/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
169	06/10/12 08:00	238-258 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	16.8 [1]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
170	06/11/12 08:00	244-262 [2]	128-137 [2]	No Data [0]	No Data [0]	No Data [0]	13.0 [1]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
171	06/12/12 08:00	346-364 [2]	185-188 [2]	No Data [0]	No Data [0]	No Data [0]	15.8 [1]		20.2 [1]	0.3 [1]	20.0 [1]	No Data [0]	No Data [0]
172	06/13/12 08:00	475-521 [2]	250-251 [2]	No Data [0]	No Data [0]	0.3 [1]	20.0 [1]		25.2 [1]	0.3 [1]	24.9 [1]	No Data [0]	No Data [0]
173	06/14/12 08:00	349 (251-443) [4]	142-143 [2]	No Data [0]	No Data [0]	0.3 [1]	11.6 [1]		16.1 [1]	0.2 [1]	16.0 [1]	No Data [0]	No Data [0]
174	06/15/12 08:00	338-347 [2]	181-183 [2]	No Data [0]	No Data [0]	0.5 [1]	12.3 [1]		17.0 [1]	0.2 [1]	16.9 [1]	No Data [0]	No Data [0]
175	06/16/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
176	06/17/12 08:00	328-332 [2]	157-159 [2]	No Data [0]	No Data [0]	No Data [0]	14.6 [1]		23.8 [1]	0.3 [1]	23.5 [1]	No Data [0]	No Data [0]
177	06/18/12 08:00	209 (106-306) [4]	151-152 [2]	No Data [0]	No Data [0]	0.1-0.3 [2]	5.7-19.0 [2]		20.7 [1]	0.3 [1]	20.5 [1]	No Data [0]	No Data [0]
178	06/19/12 08:00	460-461 [2]	258-260 [2]	No Data [0]	No Data [0]	0.3 [1]	18.1 [1]		18.9 [1]	0.3 [1]	18.6 [1]	No Data [0]	No Data [0]
179	06/20/12 08:00	400-410 [2]	212-215 [2]	No Data [0]	No Data [0]	0.3 [1]	25.3 [1]		13.5 [1]	0.3 [1]	13.3 [1]	No Data [0]	No Data [0]
180	06/21/12 08:00	399 (391-411) [4]	215-219 [2]	No Data [0]	No Data [0]	0.4 [1]	19.9 [1]		15.3 [1]	0.3 [1]	15.0 [1]	No Data [0]	No Data [0]
181	06/22/12 08:00	367-377 [2]	189-189 [2]	No Data [0]	No Data [0]	0.2 [1]	19.8 [1]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
182	06/23/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
183	06/24/12 08:00	347-347 [2]	250-262 [2]	No Data [0]	No Data [0]	No Data [0]	23.4-23.4 [2]		25.5 [1]	0.5 [1]	25.0 [1]	No Data [0]	23.4 [1]
184	06/25/12 08:00	373-385 [2]	No Data [0]	No Data [0]	No Data [0]	0.2 [1]	19.5 [1]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	30.9 [1]
185	06/26/12 08:00	444-461 [2]	239-244 [2]	No Data [0]	No Data [0]	No Data [0]	6.0-9.2 [2]		No Data [0]	No Data [0]	No Data [0]	0.4-0.4 [2]	20.2 (6.1-29.9) [3]
186	06/27/12 07:59	266-269 [2]	134-136 [2]	No Data [0]	No Data [0]	0.2 [1]	17.4 (15.4-25.5) [3]		27.3 [1]	0.2 [1]	27.0 [1]	No Data [0]	33.9 (26.8-56.0) [4]
187	06/28/12 07:59	302-303 [2]	163-165 [2]	No Data [0]	No Data [0]	No Data [0]	11.1-23.4 [2]		No Data [0]	No Data [0]	No Data [0]	0.3 [1]	24.9 (17.8-40.5) [4]
188	06/29/12 07:59	340-342 [2]	188-190 [2]	No Data [0]	No Data [0]	No Data [0]	10.4 [1]		No Data [0]	No Data [0]	No Data [0]	0.2-0.3 [2]	26.1 (17.9-29.5) [3]
189	06/30/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
190	07/01/12 07:59	295 (241-337) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	18.2 [1]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	35.1-36.2 [2]
191	07/02/12 07:59	630 (336-931) [4]	189-193 [2]	No Data [0]	No Data [0]	No Data [0]	11.9-27.6 [2]		No Data [0]	No Data [0]	No Data [0]	0.2 [1]	27.3-28.7 [2]
192	07/03/12 07:59	527-531 [2]	282-286 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	0.3 [1]	29.5 [1]
193	07/04/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
194	07/05/12 07:59	412-741 [2]	243-369 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	0.2 [1]	45.9 [1]
195	07/06/12 07:59	613 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	9.7-23.9 [2]		11.1 [1]	0.2 [1]	10.9 [1]	No Data [0]	19.0-35.6 [2]
196	07/07/12 07:59	589 (531-710) [4]	301-307 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	0.3 [1]	31.5-31.8 [2]
197	07/08/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
198	07/09/12 07:59	412-415 [2]	233-234 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	26.0-31.5 [2]
199	07/10/12 07:59	523-553 [2]	291-295 [2]	No Data [0]	No Data [0]	No Data [0]	18.1 [1]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	28.4 (24.5-47.3) [5]
200	07/11/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
201	07/12/12 07:59	507 (299-551) [9]	281-284 [2]	No Data [0]	No Data [0]	No Data [0]	27.4 [1]		No Data [0]	No Data [0]	No Data [0]	2.4 [1]	42.4 (32.4-49.0) [6]
202	07/13/12 07:59	475 (427-505) [5]	272-277 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	0.3 [1]	36.9-37.8 [2]
203	07/14/12 07:57	641-645 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	47.6 [1]
204	07/15/12 07:57	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	26.0 [1]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	39.4 [1]
205	07/16/12 07:57	608 (550-750) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	20.8-25.0 [2]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	43.7 (21.8-58.0) [6]
206	07/17/12 14:59	538 (466-604) [8]	353-360 [2]	No Data [0]	No Data [0]	No Data [0]	20.2 [1]		No Data [0]	No Data [0]	No Data [0]	0.4 [1]	45.9-50.5 [2]
207													
208													
209													
210													

	F	AQ	AR	AS	AT	AU	AV	AW	AZ	BA	BB	BC	BE	BF
1	End	(03) SPIKED PRIMARY EFFLUENT Nitrite (NO2-N) (mg/L)	(03) SPIKED PRIMARY EFFLUENT Total Nitrogen (TN-N) (mg/L)	(03) SPIKED PRIMARY EFFLUENT NOx (-N) (mg/L)	(03) SPIKED PRIMARY EFFLUENT TKN (-N) (mg/L)		(11) MBBR BOD (mg/L) EFFLUENT SAMPLE ID	(11) MBBR BOD EFFLUENT TSS (mg/L)	(11) MBBR BOD EFFLUENT pH (SU)	(11) MBBR BOD EFFLUENT Alkalinity (mg/L)	(11) MBBR BOD EFFLUENT COD(t) (mg/L)	(11) MBBR BOD EFFLUENT COD(s) (mg/L)	(11) MBBR BOD EFFLUENT BOD(s) (mg/L)	(11) MBBR BOD EFFLUENT Nitrate (NO3-N) (mg/L)
2	03/06/12 08:00	#DIV/0!	38.8 (4.0-54.8) [21]	0.3 (0.1-4.0) [21]	39.4 (19.1-54.4) [16]		5-1,848 [312]	140 (23-325) [206]	7.25 (6.64-7.80) [92]	156.0 (116.0-192.0) [15]	133.5 (67.8-325.0) [12]	97 (16-311) [195]	23 (8-142) [43]	0.3 (0.0-0.7) [23]
3														
4	12/29/11 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
5	12/30/11 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
6	12/30/11 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
7	12/31/11 08:00		No Data [0]	No Data [0]	No Data [0]		5-5 [3]	No Data [0]	6.88-7.01 [2]	No Data [0]	No Data [0]	142 (133-168) [3]	No Data [0]	No Data [0]
8	01/01/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
9	01/02/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
10	01/03/12 08:00		No Data [0]	No Data [0]	No Data [0]		9-9 [3]	No Data [0]	No Data [0]	No Data [0]	101.0 (97.9-117.0) [3]	No Data [0]	No Data [0]	No Data [0]
11	01/04/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
12	01/05/12 08:00		No Data [0]	No Data [0]	No Data [0]		19-19 [3]	No Data [0]	7.15 (7.13-7.80) [3]	No Data [0]	No Data [0]	54 (50-74) [3]	No Data [0]	No Data [0]
13	01/06/12 08:00		No Data [0]	No Data [0]	No Data [0]		26-26 [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	17 (16-17) [3]	No Data [0]	No Data [0]
14	01/07/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
15	01/08/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
16	01/09/12 08:00		No Data [0]	No Data [0]	No Data [0]		37-37 [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	22 (20-24) [3]	No Data [0]	No Data [0]
17	01/10/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
18	01/11/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
19	01/12/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
20	01/13/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
21	01/14/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
22	01/15/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
23	01/16/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
24	01/17/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
25	01/18/12 08:00		No Data [0]	No Data [0]	No Data [0]		77-77 [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	142 (134-192) [3]	No Data [0]	No Data [0]
26	01/19/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
27	01/20/12 08:00		No Data [0]	No Data [0]	No Data [0]		88-89 [4]	No Data [0]	No Data [0]	No Data [0]	200.0-208.0 [2]	128-129 [2]	No Data [0]	No Data [0]
28	01/21/12 08:00		No Data [0]	No Data [0]	No Data [0]		96-97 [4]	No Data [0]	No Data [0]	No Data [0]	124.0-173.0 [2]	30-38 [2]	No Data [0]	No Data [0]
29	01/22/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
30	01/23/12 08:00		No Data [0]	No Data [0]	No Data [0]		111-111 [3]	No Data [0]	7.23 (7.20-7.29) [3]	No Data [0]	No Data [0]	309 (308-311) [3]	No Data [0]	No Data [0]
31	01/24/12 08:00		No Data [0]	No Data [0]	No Data [0]		119-124 [6]	210 (174-219) [3]	No Data [0]	No Data [0]	No Data [0]	142 (142-145) [3]	No Data [0]	No Data [0]
32	01/25/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
33	01/26/12 08:00		No Data [0]	No Data [0]	No Data [0]		133-133 [3]	125 (125-127) [3]	7.17 (6.90-7.21) [3]	No Data [0]	No Data [0]	114-116 [2]	No Data [0]	No Data [0]
34	01/27/12 08:00		No Data [0]	No Data [0]	No Data [0]		144-144 [3]	70 (52-75) [3]	7.26 (6.89-7.39) [3]	No Data [0]	No Data [0]	57-58 [2]	No Data [0]	No Data [0]
35	01/28/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
36	01/29/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
37	01/30/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
38	01/31/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
39	02/01/12 08:00		No Data [0]	No Data [0]	No Data [0]		179-179 [3]	125 (123-132) [3]	No Data [0]	No Data [0]	No Data [0]	60-62 [2]	No Data [0]	No Data [0]
40	02/02/12 08:00		No Data [0]	No Data [0]	No Data [0]		190-190 [2]	129-132 [2]	No Data [0]	No Data [0]	No Data [0]	66-68 [2]	No Data [0]	No Data [0]
41	02/03/12 08:00		No Data [0]	No Data [0]	No Data [0]		198-198 [3]	115 (110-116) [3]	No Data [0]	No Data [0]	No Data [0]	98-104 [2]	No Data [0]	No Data [0]
42	02/04/12 08:00		No Data [0]	No Data [0]	No Data [0]		205-205 [3]	91 (85-91) [3]	No Data [0]	No Data [0]	No Data [0]	82 [1]	No Data [0]	No Data [0]
43	02/05/12 08:00		No Data [0]	No Data [0]	No Data [0]		211-211 [3]	36 (23-42) [3]	No Data [0]	No Data [0]	No Data [0]	55 [1]	No Data [0]	No Data [0]
44	02/06/12 08:00		No Data [0]	No Data [0]	No Data [0]		216-224 [4]	154 (148-157) [3]	7.26 (7.17-7.30) [3]	No Data [0]	No Data [0]	143-155 [2]	No Data [0]	No Data [0]
45	02/07/12 08:00		No Data [0]	No Data [0]	No Data [0]		226-226 [3]	89 (82-90) [3]	No Data [0]	No Data [0]	No Data [0]	97-97 [2]	No Data [0]	No Data [0]
46	02/08/12 08:00		No Data [0]	No Data [0]	No Data [0]		236-236 [3]	93 (55-108) [3]	7.35 (7.29-7.39) [3]	No Data [0]	No Data [0]	137-140 [2]	No Data [0]	No Data [0]
47	02/09/12 08:00		No Data [0]	No Data [0]	No Data [0]		244-244 [3]	102 (96-126) [3]	No Data [0]	No Data [0]	No Data [0]	72-74 [2]	23 (22-28) [3]	No Data [0]
48	02/10/12 08:00		No Data [0]	No Data [0]	No Data [0]		261-261 [3]	95 (94-98) [3]	6.84 (6.64-7.08) [3]	No Data [0]	No Data [0]	97-106 [2]	No Data [0]	No Data [0]
49	02/11/12 08:00		No Data [0]	No Data [0]	No Data [0]		268-268 [3]	145 (115-151) [3]	No Data [0]	No Data [0]	No Data [0]	74-77 [2]	No Data [0]	No Data [0]
50	02/12/12 08:00		No Data [0]	No Data [0]	No Data [0]		276-276 [3]	122 (42-126) [3]	No Data [0]	No Data [0]	No Data [0]	96-97 [2]	No Data [0]	No Data [0]
51	02/13/12 08:00		No Data [0]	No Data [0]	No Data [0]		283-283 [3]	139 (137-141) [3]	6.72 (6.70-7.12) [3]	No Data [0]	No Data [0]	131-139 [2]	No Data [0]	No Data [0]
52	02/14/12 08:00		No Data [0]	No Data [0]	No Data [0]		296-296 [3]	255 (233-290) [3]	No Data [0]	No Data [0]	No Data [0]	131-136 [2]	No Data [0]	No Data [0]
53	02/15/12 08:00		No Data [0]	No Data [0]	No Data [0]		307-307 [3]	178 (114-191) [3]	6.96 (6.89-7.08) [3]	No Data [0]	No Data [0]	142-143 [2]	No Data [0]	No Data [0]
54	02/16/12 08:00		No Data [0]	No Data [0]	No Data [0]		319-319 [3]	136 (124-146) [3]	No Data [0]	No Data [0]	No Data [0]	91-93 [2]	No Data [0]	No Data [0]

	F	AQ	AR	AS	AT	AU	AV	AW	AZ	BA	BB	BC	BE	BF
1	End	(03) SPIKED PRIMARY EFFLUENT Nitrite (NO2-N) (mg/L)	(03) SPIKED PRIMARY EFFLUENT Total Nitrogen (TN-N) (mg/L)	(03) SPIKED PRIMARY EFFLUENT NOx (-N) (mg/L)	(03) SPIKED PRIMARY EFFLUENT TKN (-N) (mg/L)		(11) MBBR BOD (mg/L) EFFLUENT SAMPLE ID	(11) MBBR BOD EFFLUENT TSS (mg/L)	(11) MBBR BOD EFFLUENT pH (SU)	(11) MBBR BOD EFFLUENT Alkalinity (mg/L)	(11) MBBR BOD EFFLUENT COD(t) (mg/L)	(11) MBBR BOD EFFLUENT COD(s) (mg/L)	(11) MBBR BOD EFFLUENT BOD(s) (mg/L)	(11) MBBR BOD EFFLUENT Nitrate (NO3-N) (mg/L)
55	02/17/12 08:00		No Data [0]	No Data [0]	No Data [0]		330-330 [3]	160 (151-176) [3]	No Data [0]	No Data [0]	No Data [0]	122-123 [2]	No Data [0]	No Data [0]
56	02/18/12 08:00		No Data [0]	No Data [0]	No Data [0]		337-337 [3]	164 (145-171) [3]	No Data [0]	No Data [0]	No Data [0]	71-74 [2]	No Data [0]	No Data [0]
57	02/19/12 08:00		No Data [0]	No Data [0]	No Data [0]		340-340 [3]	123 (121-124) [3]	No Data [0]	No Data [0]	No Data [0]	85-87 [2]	37-39 [2]	No Data [0]
58	02/20/12 08:00		No Data [0]	No Data [0]	No Data [0]		343-343 [3]	162 (153-168) [3]	No Data [0]	No Data [0]	No Data [0]	150-150 [2]	No Data [0]	No Data [0]
59	02/21/12 08:00		No Data [0]	No Data [0]	No Data [0]		349-349 [3]	246 (242-246) [3]	7.25 (7.03-7.44) [3]	No Data [0]	No Data [0]	242-246 [2]	142 [1]	No Data [0]
60	02/22/12 08:00		No Data [0]	No Data [0]	No Data [0]		360-360 [3]	115 (104-123) [3]	No Data [0]	No Data [0]	No Data [0]	129-130 [2]	No Data [0]	No Data [0]
61	02/23/12 08:00		No Data [0]	No Data [0]	No Data [0]		370-370 [3]	161 (160-162) [3]	7.13 (6.91-7.18) [3]	No Data [0]	No Data [0]	212-214 [2]	123 [1]	No Data [0]
62	02/24/12 08:00		No Data [0]	No Data [0]	No Data [0]		383-383 [3]	136 (126-138) [3]	No Data [0]	No Data [0]	No Data [0]	115-124 [2]	No Data [0]	No Data [0]
63	02/25/12 08:00		No Data [0]	No Data [0]	No Data [0]		385-385 [3]	71 (65-77) [3]	No Data [0]	No Data [0]	No Data [0]	71-78 [2]	No Data [0]	No Data [0]
64	02/26/12 08:00		No Data [0]	No Data [0]	No Data [0]		391-391 [3]	64 (42-78) [3]	No Data [0]	No Data [0]	No Data [0]	41-42 [2]	No Data [0]	No Data [0]
65	02/27/12 08:00		No Data [0]	No Data [0]	No Data [0]		399-399 [3]	130 (121-138) [3]	No Data [0]	No Data [0]	No Data [0]	125-132 [2]	49 (44-52) [3]	No Data [0]
66	02/28/12 08:00		No Data [0]	No Data [0]	No Data [0]		411-411 [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	150-153 [2]	No Data [0]	No Data [0]
67	02/29/12 08:00		No Data [0]	No Data [0]	No Data [0]		416-416 [3]	149 (144-151) [3]	No Data [0]	No Data [0]	No Data [0]	79-85 [2]	24-26 [2]	No Data [0]
68	03/01/12 08:00		No Data [0]	No Data [0]	No Data [0]		426-426 [3]	139 (129-140) [3]	7.13 (6.96-7.22) [3]	No Data [0]	No Data [0]	88-97 [2]	No Data [0]	No Data [0]
69	03/02/12 08:00		No Data [0]	No Data [0]	No Data [0]		435-435 [4]	159 (152-173) [3]	No Data [0]	No Data [0]	No Data [0]	97-100 [2]	23 [1]	No Data [0]
70	03/03/12 08:00		No Data [0]	No Data [0]	No Data [0]		444-444 [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	114-140 [2]	No Data [0]	No Data [0]
71	03/04/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
72	03/05/12 08:00		No Data [0]	No Data [0]	No Data [0]		450-450 [3]	89 (81-105) [3]	No Data [0]	No Data [0]	No Data [0]	86-86 [2]	14 (13-15) [3]	No Data [0]
73	03/06/12 08:00		No Data [0]	No Data [0]	No Data [0]		462-462 [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	47-65 [2]	No Data [0]	No Data [0]
74	03/07/12 08:00		No Data [0]	No Data [0]	No Data [0]		467-467 [3]	72 (66-78) [3]	No Data [0]	No Data [0]	No Data [0]	249-282 [2]	No Data [0]	No Data [0]
75	03/08/12 08:00		No Data [0]	No Data [0]	No Data [0]		478-478 [3]	71 (65-74) [3]	7.38 (7.14-7.39) [3]	No Data [0]	No Data [0]	53-64 [2]	No Data [0]	No Data [0]
76	03/09/12 08:00		No Data [0]	No Data [0]	No Data [0]		492-492 [3]	92 (83-101) [3]	No Data [0]	No Data [0]	No Data [0]	37-41 [2]	No Data [0]	0.4 [1]
77	03/10/12 08:00		No Data [0]	No Data [0]	No Data [0]		495-495 [3]	44 (30-47) [3]	No Data [0]	No Data [0]	No Data [0]	46-50 [2]	No Data [0]	No Data [0]
78	03/11/12 08:00		No Data [0]	No Data [0]	No Data [0]		503-503 [3]	52 (47-62) [3]	No Data [0]	No Data [0]	No Data [0]	50-53 [2]	No Data [0]	No Data [0]
79	03/12/12 08:00		No Data [0]	No Data [0]	No Data [0]		513-513 [3]	93 (73-98) [3]	7.02 (6.96-7.25) [3]	No Data [0]	No Data [0]	86-89 [2]	14 (14-15) [3]	No Data [0]
80	03/13/12 08:00		No Data [0]	No Data [0]	No Data [0]		527-527 [3]	117 (109-117) [3]	No Data [0]	No Data [0]	No Data [0]	105-124 [2]	No Data [0]	No Data [0]
81	03/14/12 08:00		No Data [0]	No Data [0]	No Data [0]		536-536 [3]	216 (209-220) [3]	No Data [0]	No Data [0]	No Data [0]	103-106 [2]	15 (12-15) [3]	No Data [0]
82	03/15/12 08:00		No Data [0]	No Data [0]	No Data [0]		545-545 [3]	159 (151-165) [3]	7.06 (6.75-7.20) [3]	137.5 [1]	No Data [0]	105-109 [2]	No Data [0]	0.6-0.7 [2]
83	03/16/12 08:00		No Data [0]	No Data [0]	No Data [0]		555-555 [3]	124 (120-131) [3]	No Data [0]	No Data [0]	No Data [0]	63-64 [2]	22 (22-23) [3]	No Data [0]
84	03/17/12 08:00		No Data [0]	No Data [0]	No Data [0]		571-571 [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	47-50 [2]	No Data [0]	No Data [0]
85	03/18/12 07:59		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
86	03/19/12 07:59		No Data [0]	No Data [0]	No Data [0]		581-581 [3]	96 (92-99) [3]	7.29 (7.18-7.29) [3]	138.0 [1]	No Data [0]	63-67 [2]	No Data [0]	No Data [0]
87	03/20/12 07:59		No Data [0]	No Data [0]	No Data [0]		593-593 [3]	148 (146-154) [3]	No Data [0]	No Data [0]	No Data [0]	80-82 [2]	No Data [0]	No Data [0]
88	03/21/12 07:59		No Data [0]	No Data [0]	No Data [0]		604-604 [3]	155 (151-166) [3]	No Data [0]	No Data [0]	No Data [0]	60-64 [2]	No Data [0]	No Data [0]
89	03/22/12 07:59		No Data [0]	No Data [0]	No Data [0]		611-611 [3]	140 (138-150) [3]	No Data [0]	No Data [0]	No Data [0]	73-82 [2]	No Data [0]	No Data [0]
90	03/23/12 07:59		No Data [0]	No Data [0]	No Data [0]		621-621 [3]	171 (168-180) [3]	No Data [0]	No Data [0]	No Data [0]	82-88 [2]	36 (35-39) [3]	No Data [0]
91	03/24/12 07:59		No Data [0]	No Data [0]	No Data [0]		631-631 [3]	110 (106-110) [3]	No Data [0]	No Data [0]	No Data [0]	71-81 [2]	No Data [0]	No Data [0]
92	03/25/12 07:59		No Data [0]	No Data [0]	No Data [0]		638-638 [3]	143 (135-145) [3]	No Data [0]	No Data [0]	No Data [0]	77-84 [2]	No Data [0]	No Data [0]
93	03/26/12 07:59		No Data [0]	No Data [0]	No Data [0]		643-643 [3]	188 (187-211) [3]	6.99 (6.78-7.31) [3]	192.0 [1]	No Data [0]	179-180 [2]	64 (63-65) [3]	No Data [0]
94	03/27/12 07:59		No Data [0]	No Data [0]	No Data [0]		656-656 [3]	247 (232-253) [3]	No Data [0]	No Data [0]	No Data [0]	115-116 [2]	No Data [0]	No Data [0]
95	03/28/12 07:59		No Data [0]	No Data [0]	No Data [0]		665-665 [3]	198 (191-206) [3]	No Data [0]	No Data [0]	No Data [0]	121-123 [2]	No Data [0]	No Data [0]
96	03/29/12 07:59		No Data [0]	No Data [0]	No Data [0]		670-670 [3]	235 (231-241) [3]	No Data [0]	No Data [0]	No Data [0]	117-121 [2]	No Data [0]	No Data [0]
97	03/30/12 07:59		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
98	03/31/12 07:59		No Data [0]	No Data [0]	No Data [0]		682-682 [3]	222 (205-224) [3]	7.06 (6.77-7.39) [3]	160.0 [1]	303.0-325.0 [2]	112-113 [2]	No Data [0]	0.2-0.3 [2]
99	04/01/12 07:59		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
100	04/02/12 07:59		No Data [0]	No Data [0]	No Data [0]		695-695 [3]	269 (266-289) [3]	No Data [0]	No Data [0]	No Data [0]	201-205 [2]	No Data [0]	No Data [0]
101	04/03/12 07:59		No Data [0]	No Data [0]	No Data [0]		703-703 [3]	272 (266-285) [3]	No Data [0]	No Data [0]	No Data [0]	194-204 [2]	No Data [0]	No Data [0]
102	04/04/12 07:59		No Data [0]	No Data [0]	No Data [0]		710-710 [3]	85 (60-154) [3]	7.03 [1]	170.0 [1]	No Data [0]	108-110 [2]	41 (37-42) [3]	0.2-0.2 [2]
103	04/05/12 07:59		No Data [0]	No Data [0]	No Data [0]		724-724 [3]	298 (288-302) [3]	No Data [0]	No Data [0]	No Data [0]	113-133 [2]	No Data [0]	0.2-0.3 [2]
104	04/06/12 07:59		No Data [0]	No Data [0]	No Data [0]		734-734 [3]	231 (230-248) [3]	No Data [0]	No Data [0]	No Data [0]	88-88 [2]	14 (14-16) [3]	No Data [0]
105	04/07/12 07:59		No Data [0]	No Data [0]	No Data [0]		740-740 [3]	176 (126-204) [3]	No Data [0]	No Data [0]	No Data [0]	210-211 [2]	No Data [0]	No Data [0]
106	04/08/12 07:59		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
107	04/09/12 07:59		No Data [0]	No Data [0]	No Data [0]		746-746 [2]	311-325 [2]	7.20 [1]	175.0 [1]	No Data [0]	246-249 [2]	No Data [0]	0.2-0.3 [2]

	F	AQ	AR	AS	AT	AU	AV	AW	AZ	BA	BB	BC	BE	BF
		(03) SPIKED PRIMARY EFFLUENT Nitrite (NO2-N) (mg/L)	(03) SPIKED PRIMARY EFFLUENT Total Nitrogen (TN-N) (mg/L)	(03) SPIKED PRIMARY EFFLUENT NOx (-N) (mg/L)	(03) SPIKED PRIMARY EFFLUENT TKN (-N) (mg/L)		(11) MBBR BOD (mg/L) EFFLUENT SAMPLE ID	(11) MBBR BOD EFFLUENT TSS (mg/L)	(11) MBBR BOD EFFLUENT pH (SU)	(11) MBBR BOD EFFLUENT Alkalinity (mg/L)	(11) MBBR BOD EFFLUENT COD(t) (mg/L)	(11) MBBR BOD EFFLUENT COD(s) (mg/L)	(11) MBBR BOD EFFLUENT BOD(s) (mg/L)	(11) MBBR BOD EFFLUENT Nitrate (NO3-N) (mg/L)
1	End													
108	04/10/12 07:59		No Data [0]	No Data [0]	No Data [0]		755-755 [2]	276-287 [2]	No Data [0]	No Data [0]	No Data [0]	258-265 [2]	No Data [0]	No Data [0]
109	04/11/12 07:59		No Data [0]	No Data [0]	No Data [0]		769-769 [2]	223-265 [2]	No Data [0]	No Data [0]	No Data [0]	268-272 [2]	No Data [0]	No Data [0]
110	04/12/12 07:59		No Data [0]	No Data [0]	No Data [0]		778-778 [2]	292-320 [2]	No Data [0]	No Data [0]	No Data [0]	189-190 [2]	No Data [0]	0.0-0.0 [2]
111	04/13/12 07:59		No Data [0]	No Data [0]	No Data [0]		787-787 [2]	276-312 [2]	No Data [0]	No Data [0]	No Data [0]	167-173 [2]	No Data [0]	0.6-0.7 [2]
112	04/14/12 07:59		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
113	04/15/12 07:59		No Data [0]	No Data [0]	No Data [0]		795-795 [2]	130-164 [2]	No Data [0]	No Data [0]	No Data [0]	70-72 [2]	No Data [0]	No Data [0]
114	04/16/12 07:59		No Data [0]	No Data [0]	No Data [0]		802-802 [2]	234-251 [2]	No Data [0]	No Data [0]	No Data [0]	112-114 [2]	No Data [0]	No Data [0]
115	04/17/12 07:59		No Data [0]	No Data [0]	No Data [0]		809-809 [3]	231-240 [2]	7.15 [1]	No Data [0]	No Data [0]	78-84 [2]	14 (14-15) [3]	No Data [0]
116	04/18/12 07:59		No Data [0]	No Data [0]	No Data [0]		818-818 [2]	190-194 [2]	No Data [0]	No Data [0]	No Data [0]	67-76 [2]	No Data [0]	No Data [0]
117	04/19/12 07:59		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
118	04/20/12 07:59		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
119	04/21/12 07:59		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
120	04/22/12 07:59		No Data [0]	No Data [0]	No Data [0]		833-833 [2]	172 [1]	7.44 [1]	174.0 [1]	No Data [0]	151-176 [2]	No Data [0]	0.3 [1]
121	04/23/12 07:59		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
122	04/24/12 07:59		No Data [0]	No Data [0]	No Data [0]		848-848 [3]	73-80 [2]	7.11 [1]	130.0 [1]	No Data [0]	77-79 [2]	10 (8-39) [3]	No Data [0]
123	04/25/12 07:59		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
124	04/26/12 07:59		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
125	04/27/12 07:59		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
126	04/28/12 07:59		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
127	04/29/12 07:59		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
128	04/30/12 07:59		No Data [0]	No Data [0]	No Data [0]		890 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	65 [1]	No Data [0]	No Data [0]
129	05/01/12 07:59		No Data [0]	No Data [0]	No Data [0]		900-900 [2]	No Data [0]	7.32 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
130	05/02/12 07:59		No Data [0]	No Data [0]	No Data [0]		913-913 [2]	No Data [0]	7.46 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
131	05/03/12 07:59		No Data [0]	No Data [0]	No Data [0]		925-925 [2]	No Data [0]	7.55 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
132	05/04/12 07:59		No Data [0]	No Data [0]	No Data [0]		935-935 [2]	No Data [0]	7.35 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
133	05/05/12 07:59		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
134	05/06/12 07:59		No Data [0]	No Data [0]	No Data [0]		943-943 [2]	No Data [0]	7.43 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
135	05/07/12 07:59		No Data [0]	No Data [0]	No Data [0]		951-951 [2]	No Data [0]	7.25 [1]	156.0 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
136	05/08/12 07:59		No Data [0]	No Data [0]	No Data [0]		962 [1]	No Data [0]	7.35 [1]	132.0 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
137	05/09/12 07:59		No Data [0]	No Data [0]	No Data [0]		974 [1]	No Data [0]	7.36 [1]	150.0 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
138	05/10/12 07:59		No Data [0]	No Data [0]	No Data [0]		987 [1]	No Data [0]	7.20 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
139	05/11/12 07:59		No Data [0]	No Data [0]	No Data [0]		999 [1]	No Data [0]	7.31 [1]	116.0 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
140	05/12/12 07:59		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
141	05/13/12 07:59		No Data [0]	No Data [0]	No Data [0]		1,009 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
142	05/14/12 07:59		No Data [0]	No Data [0]	No Data [0]		1,018 [1]	No Data [0]	7.31 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
143	05/15/12 07:59		No Data [0]	No Data [0]	No Data [0]		1,030 [1]	No Data [0]	7.22 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
144	05/16/12 07:59		No Data [0]	No Data [0]	No Data [0]		1,046 [1]	No Data [0]	7.27 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
145	05/17/12 07:59		No Data [0]	No Data [0]	No Data [0]		1,060 [1]	No Data [0]	7.34 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
146	05/18/12 07:59		No Data [0]	No Data [0]	No Data [0]		1,074 [1]	No Data [0]	7.32 [1]	152.0 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
147	05/19/12 07:59		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
148	05/20/12 07:59		No Data [0]	No Data [0]	No Data [0]		1,089 [1]	No Data [0]	7.72 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.4 [1]
149	05/21/12 07:59		No Data [0]	No Data [0]	No Data [0]		1,104 [1]	No Data [0]	7.25 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.3 [1]
150	05/22/12 07:59		No Data [0]	No Data [0]	No Data [0]		1,121 [1]	No Data [0]	7.24 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
151	05/23/12 08:00		No Data [0]	No Data [0]	No Data [0]		1,135-1,135 [2]	No Data [0]	7.38 [1]	No Data [0]	No Data [0]	52-55 [2]	No Data [0]	No Data [0]
152	05/24/12 08:00		No Data [0]	No Data [0]	No Data [0]		1,150-1,150 [2]	No Data [0]	7.13 [1]	No Data [0]	No Data [0]	58-58 [2]	No Data [0]	No Data [0]
153	05/25/12 08:00		No Data [0]	No Data [0]	No Data [0]		1,166-1,166 [2]	No Data [0]	7.44 [1]	172.0 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
154	05/26/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
155	05/27/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
156	05/28/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
157	05/29/12 08:00		No Data [0]	No Data [0]	No Data [0]		1,174-1,174 [2]	No Data [0]	7.73 [1]	No Data [0]	No Data [0]	46-50 [2]	No Data [0]	No Data [0]
158	05/30/12 08:00		No Data [0]	No Data [0]	No Data [0]		1,197-1,197 [2]	No Data [0]	7.62 [1]	No Data [0]	No Data [0]	69-71 [2]	No Data [0]	No Data [0]
159	05/31/12 08:00		No Data [0]	No Data [0]	No Data [0]		1,202-1,212 [3]	No Data [0]	7.60 [1]	No Data [0]	No Data [0]	45-46 [2]	No Data [0]	No Data [0]
160	06/01/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

	F	AQ	AR	AS	AT	AU	AV	AW	AZ	BA	BB	BC	BE	BF
		(03) SPIKED PRIMARY EFFLUENT Nitrite (NO2-N) (mg/L)	(03) SPIKED PRIMARY EFFLUENT Total Nitrogen (TN-N) (mg/L)	(03) SPIKED PRIMARY EFFLUENT NOx (-N) (mg/L)	(03) SPIKED PRIMARY EFFLUENT TKN (-N) (mg/L)		(11) MBBR BOD (mg/L) EFFLUENT SAMPLE ID	(11) MBBR BOD EFFLUENT TSS (mg/L)	(11) MBBR BOD EFFLUENT pH (SU)	(11) MBBR BOD EFFLUENT Alkalinity (mg/L)	(11) MBBR BOD EFFLUENT COD(t) (mg/L)	(11) MBBR BOD EFFLUENT COD(s) (mg/L)	(11) MBBR BOD EFFLUENT BOD(s) (mg/L)	(11) MBBR BOD EFFLUENT Nitrate (NO3-N) (mg/L)
1	End													
161	06/02/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
162	06/03/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
163	06/04/12 08:00		No Data [0]	No Data [0]	No Data [0]		1,257-1,257 [2]	No Data [0]	7.29 [1]	No Data [0]	No Data [0]	34-38 [2]	No Data [0]	No Data [0]
164	06/05/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
165	06/06/12 08:00		No Data [0]	No Data [0]	No Data [0]		1,319-1,319 [2]	No Data [0]	7.40 [1]	No Data [0]	No Data [0]	33-36 [2]	No Data [0]	No Data [0]
166	06/07/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
167	06/08/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
168	06/09/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
169	06/10/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
170	06/11/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
171	06/12/12 08:00		No Data [0]	No Data [0]	No Data [0]		1,392 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.2 [1]
172	06/13/12 08:00		No Data [0]	No Data [0]	No Data [0]		1,396-1,396 [2]	No Data [0]	7.35 [1]	No Data [0]	No Data [0]	136-139 [2]	No Data [0]	0.2 [1]
173	06/14/12 08:00		No Data [0]	No Data [0]	No Data [0]		1,447 [1]	No Data [0]	7.42 [1]	184.0 [1]	143.0 [1]	No Data [0]	No Data [0]	0.7 [1]
174	06/15/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
175	06/16/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
176	06/17/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
177	06/18/12 08:00		No Data [0]	No Data [0]	No Data [0]		1,498 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
178	06/19/12 08:00		No Data [0]	No Data [0]	No Data [0]		1,503 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
179	06/20/12 08:00		No Data [0]	No Data [0]	No Data [0]		1,526-1,532 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.2-0.3 [2]
180	06/21/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
181	06/22/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
182	06/23/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
183	06/24/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
184	06/25/12 08:00		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
185	06/26/12 08:00		39.7-42.7 [2]	0.4-0.4 [2]	42.3 [1]		1,613 [1]	No Data [0]	7.65 [1]	No Data [0]	No Data [0]	68 [1]	No Data [0]	No Data [0]
186	06/27/12 07:59		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
187	06/28/12 07:59		19.7 [1]	0.2 [1]	19.4 [1]		1,648-1,648 [2]	No Data [0]	7.72 [1]	No Data [0]	No Data [0]	64-67 [2]	No Data [0]	No Data [0]
188	06/29/12 07:59		34.0-36.1 [2]	0.2-0.3 [2]	33.8-35.9 [2]		1,675-1,675 [2]	No Data [0]	7.77 [1]	No Data [0]	67.8-68.6 [2]	No Data [0]	No Data [0]	No Data [0]
189	06/30/12 07:59		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
190	07/01/12 07:59		43.8 [1]	0.1 [1]	43.7 [1]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
191	07/02/12 07:59		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
192	07/03/12 07:59		40.6 [1]	0.4 [1]	40.3 [1]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
193	07/04/12 07:59		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
194	07/05/12 07:59		46.1 [1]	0.2 [1]	45.9 [1]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
195	07/06/12 07:59		19.3 [1]	0.2 [1]	19.1 [1]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
196	07/07/12 07:59		35.1-38.8 [2]	0.3-0.3 [2]	34.8-38.5 [2]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
197	07/08/12 07:59		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
198	07/09/12 07:59		33.9 [1]	0.2 [1]	33.6 [1]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
199	07/10/12 07:59		35.2 [1]	0.3 [1]	34.9 [1]		1,848 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
200	07/11/12 07:59		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
201	07/12/12 07:59		44.5 [1]	0.3 [1]	44.2 [1]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
202	07/13/12 07:59		43.4 [1]	0.3 [1]	43.1 [1]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
203	07/14/12 07:57		51.1 [1]	0.5 [1]	50.6 [1]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
204	07/15/12 07:57		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
205	07/16/12 07:57		No Data [0]	No Data [0]	No Data [0]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
206	07/17/12 14:59		54.8 [1]	0.4 [1]	54.4 [1]		No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
207														
208														
209														
210														

[illegible]

[illegible]

	F	BG	BH	BI	BJ	BK	BL	BM	BP	BQ	BS	BU	BV	BW
		(11) MBBR BOD EFFLUENT Ammonia (NH3-N) (mg/L)	(11) MBBR BOD EFFLUENT Nitrite (NO2-N) (mg/L)	(11) MBBR BOD EFFLUENT Total Nitrogen (TN-N) (mg/L)	(11) MBBR BOD EFFLUENT NOx (- N) (mg/L)	(11) MBBR BOD EFFLUENT TKN (-N) (mg/L)	(12) MBBR NR1 EFFLUENT SAMPLE ID	(12) MBBR NR1 EFFLUENT TSS (mg/L)	(12) MBBR NR1 EFFLUENT pH (SU)	(12) MBBR NR1 EFFLUENT Alkalinity (mg/L)	(12) MBBR NR1 EFFLUENT COD(s) (mg/L)	(12) MBBR NR1 EFFLUENT BOD(s) (mg/L)	(12) MBBR NR1 EFFLUENT Nitrate (NO3-N) (mg/L)	(12) MBBR NR1 EFFLUENT Ammonia (NH3-N) (mg/L)
108	04/10/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
109	04/11/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
110	04/12/12 07:59	17.7-17.8 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	779-779 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	9.9-11.2 [2]	3.1-4.1 [2]
111	04/13/12 07:59	20.2-20.6 [2]	No Data [0]	25.8 [1]	0.4 [1]	35.8 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
112	04/14/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
113	04/15/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
114	04/16/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
115	04/17/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
116	04/18/12 07:59	No Data [0]	No Data [0]	16.8-17.4 [2]	8.8-9.5 [2]	7.8-8.0 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
117	04/19/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
118	04/20/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
119	04/21/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
120	04/22/12 07:59	No Data [0]	No Data [0]	26.4 [1]	0.2 [1]	26.2 [1]	834-834 [2]	148 [1]	7.27 [1]	170 [1]	158.0 [1]	No Data [0]	0.8 [1]	No Data [0]
121	04/23/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
122	04/24/12 07:59	8.9 [1]	No Data [0]	9.4 [1]	0.5 [1]	8.9 [1]	849-849 [3]	127-143 [2]	6.87 [1]	108 [1]	18.7-20.4 [2]	2.4 (2.2-3.2) [3]	No Data [0]	3.5 [1]
123	04/25/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
124	04/26/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
125	04/27/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
126	04/28/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
127	04/29/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
128	04/30/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	891-891 [2]	No Data [0]	6.69 [1]	145 [1]	29.3-30.8 [2]	No Data [0]	0.7 [1]	12.0 [1]
129	05/01/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	901-901 [2]	No Data [0]	7.27 [1]	88 [1]	No Data [0]	No Data [0]	8.7 [1]	3.7 [1]
130	05/02/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	914-914 [2]	No Data [0]	7.29 [1]	56 [1]	No Data [0]	No Data [0]	12.3 [1]	1.0 [1]
131	05/03/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	926-926 [2]	No Data [0]	7.28 [1]	64 [1]	No Data [0]	No Data [0]	11.3 [1]	2.0 [1]
132	05/04/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	936-936 [2]	No Data [0]	7.34 [1]	122 [1]	No Data [0]	No Data [0]	0.3 [1]	4.1 [1]
133	05/05/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
134	05/06/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	944-944 [2]	No Data [0]	7.31 [1]	No Data [0]	No Data [0]	No Data [0]	2.2 [1]	1.2 [1]
135	05/07/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	952-952 [2]	No Data [0]	7.41 [1]	170 [1]	No Data [0]	No Data [0]	0.5 [1]	0.5 [1]
136	05/08/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	963 [1]	No Data [0]	7.60 [1]	146 [1]	No Data [0]	No Data [0]	0.4 [1]	0.4 [1]
137	05/09/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	975 [1]	No Data [0]	7.80 [1]	138 [1]	No Data [0]	No Data [0]	9.2 [1]	0.6 [1]
138	05/10/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	988 [1]	No Data [0]	7.39 [1]	94 [1]	No Data [0]	No Data [0]	0.9 [1]	0.3 [1]
139	05/11/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,000 [1]	No Data [0]	7.45 [1]	146 [1]	No Data [0]	No Data [0]	2.0 [1]	0.4 [1]
140	05/12/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
141	05/13/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,010 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2.0 [1]	0.7 [1]
142	05/14/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,019 [1]	No Data [0]	7.85 [1]	148 [1]	No Data [0]	No Data [0]	2.6 [1]	0.4 [1]
143	05/15/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,031 [1]	No Data [0]	7.79 [1]	136 [1]	No Data [0]	No Data [0]	2.3 [1]	0.5 [1]
144	05/16/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,047 [1]	No Data [0]	7.69 [1]	124 [1]	No Data [0]	No Data [0]	1.9 [1]	0.5 [1]
145	05/17/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,061 [1]	No Data [0]	7.68 [1]	152 [1]	No Data [0]	No Data [0]	3.0 [1]	0.6 [1]
146	05/18/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,075 [1]	No Data [0]	7.41 [1]	140 [1]	No Data [0]	No Data [0]	3.6 [1]	1.2 [1]
147	05/19/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
148	05/20/12 07:59	21.7 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,090 [1]	No Data [0]	7.39 [1]	No Data [0]	No Data [0]	No Data [0]	2.4 [1]	8.8 [1]
149	05/21/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,105 [1]	No Data [0]	7.24 [1]	96 [1]	No Data [0]	No Data [0]	5.9 [1]	0.5 [1]
150	05/22/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,122 [1]	No Data [0]	7.75 [1]	144 [1]	No Data [0]	No Data [0]	0.3 [1]	3.3 [1]
151	05/23/12 08:00	8.7 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,136 [1]	No Data [0]	7.74 [1]	100 [1]	No Data [0]	No Data [0]	5.2 [1]	0.5 [1]
152	05/24/12 08:00	9.4 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,151 [1]	No Data [0]	7.24 [1]	84 [1]	No Data [0]	No Data [0]	7.7 [1]	0.2 [1]
153	05/25/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,167 [1]	No Data [0]	7.22 [1]	92 [1]	No Data [0]	No Data [0]	8.1 [1]	0.5 [1]
154	05/26/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
155	05/27/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
156	05/28/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
157	05/29/12 08:00	14.1 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,175 [1]	No Data [0]	7.70 [1]	108 [1]	No Data [0]	No Data [0]	8.4 [1]	0.3 [1]
158	05/30/12 08:00	7.8 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,188 [1]	No Data [0]	7.54 [1]	100 [1]	No Data [0]	No Data [0]	9.1 [1]	0.3 [1]
159	05/31/12 08:00	7.3 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,203-1,213 [3]	No Data [0]	7.58 [1]	102 [1]	No Data [0]	No Data [0]	9.0 [1]	0.1 [1]
160	06/01/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

	F	BG	BH	BI	BJ	BK	BL	BM	BP	BQ	BS	BU	BV	BW
		(11) MBBR BOD EFFLUENT Ammonia (NH3-N) (mg/L)	(11) MBBR BOD EFFLUENT Nitrite (NO2-N) (mg/L)	(11) MBBR BOD EFFLUENT Total Nitrogen (TN-N) (mg/L)	(11) MBBR BOD EFFLUENT NOx (- N) (mg/L)	(11) MBBR BOD EFFLUENT TKN (-N) (mg/L)	(12) MBBR NR1 EFFLUENT SAMPLE ID	(12) MBBR NR1 EFFLUENT TSS (mg/L)	(12) MBBR NR1 EFFLUENT pH (SU)	(12) MBBR NR1 EFFLUENT Alkalinity (mg/L)	(12) MBBR NR1 EFFLUENT COD(s) (mg/L)	(12) MBBR NR1 EFFLUENT BOD(s) (mg/L)	(12) MBBR NR1 EFFLUENT Nitrate (NO3-N) (mg/L)	(12) MBBR NR1 EFFLUENT Ammonia (NH3-N) (mg/L)
1	End													
161	06/02/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
162	06/03/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
163	06/04/12 08:00	3.2 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,258 [1]	No Data [0]	7.64 [1]	110 [1]	No Data [0]	No Data [0]	3.4 [1]	0.4 [1]
164	06/05/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
165	06/06/12 08:00	5.5 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,320-1,320 [2]	No Data [0]	7.61 [1]	118 [1]	No Data [0]	No Data [0]	1.4 [1]	0.4 [1]
166	06/07/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
167	06/08/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
168	06/09/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
169	06/10/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
170	06/11/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
171	06/12/12 08:00	23.2 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,393 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.5 [1]	15.8 [1]
172	06/13/12 08:00	8.1 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,397-1,397 [2]	No Data [0]	7.72 [1]	142 [1]	No Data [0]	No Data [0]	1.2 [1]	0.3 [1]
173	06/14/12 08:00	18.6 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,448 [1]	No Data [0]	7.67 [1]	165 [1]	No Data [0]	No Data [0]	2.2 [1]	10.4 [1]
174	06/15/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
175	06/16/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
176	06/17/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,482 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	5.3 [1]	1.0 [1]
177	06/18/12 08:00	29.3 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,491-1,499 [2]	No Data [0]	7.60 [1]	146 [1]	No Data [0]	No Data [0]	0.5 [1]	7.7-21.5 [2]
178	06/19/12 08:00	13.5 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,504 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	4.2 [1]
179	06/20/12 08:00	5.6 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,527-1,533 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2.1-6.5 [2]	0.7-5.7 [2]
180	06/21/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
181	06/22/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
182	06/23/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
183	06/24/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
184	06/25/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
185	06/26/12 08:00	4.4 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,614 [1]	No Data [0]	7.63 [1]	85 [1]	66.3 [1]	No Data [0]	No Data [0]	0.2 [1]
186	06/27/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
187	06/28/12 07:59	11.0 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,640-1,661 [3]	No Data [0]	7.76 (7.51-7.88) [3]	114 (82-155) [3]	No Data [0]	No Data [0]	0.3-10.8 [2]	6.3 (0.8-14.7) [3]
188	06/29/12 07:59	19.4 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,669-1,676 [2]	No Data [0]	7.50-7.51 [2]	94-95 [2]	No Data [0]	No Data [0]	11.0 [1]	1.3-1.4 [2]
189	06/30/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
190	07/01/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,688 [1]	No Data [0]	7.69 [1]	65 [1]	No Data [0]	No Data [0]	11.1 [1]	2.0 [1]
191	07/02/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,698 [1]	No Data [0]	7.52 [1]	76 [1]	No Data [0]	No Data [0]	No Data [0]	0.7 [1]
192	07/03/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,721 [1]	No Data [0]	7.36 [1]	98 [1]	No Data [0]	No Data [0]	No Data [0]	0.8 [1]
193	07/04/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
194	07/05/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,737 [1]	No Data [0]	7.47 [1]	91 [1]	No Data [0]	No Data [0]	No Data [0]	4.0 [1]
195	07/06/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
196	07/07/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,766 [1]	No Data [0]	7.67 [1]	196 [1]	No Data [0]	No Data [0]	No Data [0]	7.7 [1]
197	07/08/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
198	07/09/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
199	07/10/12 07:59	31.8 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,849 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1.2 [1]
200	07/11/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
201	07/12/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,878 [1]	No Data [0]	7.79 [1]	168 [1]	No Data [0]	No Data [0]	0.9 [1]	16.2 [1]
202	07/13/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,936 [1]	No Data [0]	7.68 [1]	158 [1]	No Data [0]	No Data [0]	14.7 [1]	1.2 [1]
203	07/14/12 07:57	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,950-1,950 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	10.1 [1]	11.5 [1]
204	07/15/12 07:57	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
205	07/16/12 07:57	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,968 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.7 [1]
206	07/17/12 14:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,003 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.8 [1]
207														
208														
209														
210														

[illegible]

[illegible]

	F	BX	BY	BZ	CA	CB	CC	CF	CG	CI	CK	CL	CM	CN
													(14) MBBR NR2 EFFLUENT Ammonia (NH3-N) (mg/L)	(14) MBBR NR2 Nitrite (NO2-N) (mg/L)
1	End	(12) MBBR NR1 Nitrite (NO2-N) (mg/L)	(12) MBBR NR1 Total Nitrogen (TN- N) (mg/L)	(12) MBBR NR1 NOx (-N) (mg/L)	(12) MBBR NR1 TKN (-N) (mg/L)	(14) MBBR NR2 EFFLUENT SAMPLE ID	(14) MBBR NR2 EFFLUENT TSS (mg/L)	(14) MBBR NR2 EFFLUENT pH (SU)	(14) MBBR NR2 EFFLUENT Alkalinity (mg/L)	(14) MBBR NR2 EFFLUENT COD(s) (mg/L)	(14) MBBR NR2 EFFLUENT BOD(s) (mg/L)	(14) MBBR NR2 EFFLUENT Nitrate (NO3-N) (mg/L)		
108	04/10/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
109	04/11/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
110	04/12/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
111	04/13/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
112	04/14/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
113	04/15/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
114	04/16/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
115	04/17/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
116	04/18/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
117	04/19/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
118	04/20/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	826-826 [2]	No Data [0]	No Data [0]	178 [1]	48.4-53.4 [2]	No Data [0]	1.0 [1]	13.9-14.0 [2]	No Data [0]
119	04/21/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
120	04/22/12 07:59	No Data [0]	18.8 [1]	0.5 [1]	18.3 [1]	835-835 [2]	1,502 [1]	7.47 [1]	160 [1]	No Data [0]	No Data [0]	0.5 [1]	No Data [0]	No Data [0]
121	04/23/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	840-840 [2]	644-700 [2]	7.08 [1]	40 [1]	25.0-30.4 [2]	No Data [0]	No Data [0]	2.5-2.6 [2]	No Data [0]
122	04/24/12 07:59	No Data [0]	6.7 [1]	1.8 [1]	4.8 [1]	850-850 [3]	170-181 [2]	6.90 [1]	100 [1]	28.6-29.7 [2]	2.8 (2.7-3.6) [3]	3.5 [1]	3.0 [1]	No Data [0]
123	04/25/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	858-858 [2]	145-146 [2]	7.27 [1]	120 [1]	33.5-35.5 [2]	No Data [0]	0.3 [1]	No Data [0]	No Data [0]
124	04/26/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	866-866 [2]	No Data [0]	No Data [0]	No Data [0]	30.1-31.1 [2]	No Data [0]	1.9 [1]	6.2 [1]	No Data [0]
125	04/27/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
126	04/28/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
127	04/29/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
128	04/30/12 07:59	No Data [0]	13.8 [1]	1.4 [1]	12.4 [1]	892-892 [2]	No Data [0]	6.90 [1]	155 [1]	27.0-29.2 [2]	No Data [0]	0.5 [1]	11.7 [1]	No Data [0]
129	05/01/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	902-902 [2]	No Data [0]	7.09 [1]	92 [1]	35.1-36.1 [2]	No Data [0]	8.6 [1]	3.9 [1]	No Data [0]
130	05/02/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	915-915 [2]	No Data [0]	7.33 [1]	54 [1]	26.9-32.7 [2]	No Data [0]	13.5 [1]	0.8 [1]	No Data [0]
131	05/03/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	927-927 [2]	No Data [0]	7.25 [1]	72 [1]	39.5-39.8 [2]	No Data [0]	11.5 [1]	1.8 [1]	No Data [0]
132	05/04/12 07:59	5.0 [1]	No Data [0]	No Data [0]	No Data [0]	937-937 [2]	No Data [0]	7.19 [1]	124 [1]	63.5-67.1 [2]	No Data [0]	0.3 [1]	4.1 [1]	4.0 [1]
133	05/05/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
134	05/06/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	945-945 [2]	No Data [0]	7.27 [1]	No Data [0]	43.3-47.0 [2]	No Data [0]	2.7 [1]	1.2 [1]	No Data [0]
135	05/07/12 07:59	3.0 [1]	No Data [0]	No Data [0]	No Data [0]	953-953 [2]	No Data [0]	7.32 [1]	178 [1]	47.5-50.9 [2]	No Data [0]	0.6 [1]	0.1 [1]	4.0 [1]
136	05/08/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	964-964 [2]	No Data [0]	7.55 [1]	140 [1]	51.8-53.0 [2]	No Data [0]	0.3 [1]	0.2 [1]	No Data [0]
137	05/09/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	976-976 [2]	No Data [0]	7.72 [1]	136 [1]	36.6-39.8 [2]	No Data [0]	8.6 [1]	0.5 [1]	4.0 [1]
138	05/10/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	989-989 [2]	No Data [0]	7.43 [1]	96 [1]	30.1-33.7 [2]	No Data [0]	1.2 [1]	0.2 [1]	No Data [0]
139	05/11/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,001-1,001 [2]	No Data [0]	7.36 [1]	147 [1]	24.3-28.2 [2]	No Data [0]	1.5 [1]	0.2 [1]	No Data [0]
140	05/12/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
141	05/13/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,011-1,011 [2]	No Data [0]	No Data [0]	No Data [0]	27.0-28.2 [2]	No Data [0]	1.3 [1]	0.4 [1]	No Data [0]
142	05/14/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,020-1,020 [2]	No Data [0]	7.72 [1]	152 [1]	21.1-27.2 [2]	No Data [0]	1.2 [1]	0.1 [1]	No Data [0]
143	05/15/12 07:59	No Data [0]	4.3 [1]	3.0 [1]	1.4 [1]	1,032-1,041 [3]	No Data [0]	7.69 [1]	146 [1]	26.4-32.6 [2]	No Data [0]	0.5-0.9 [2]	0.2 [1]	No Data [0]
144	05/16/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,048-1,048 [2]	No Data [0]	7.80 [1]	132 [1]	23.5-24.0 [2]	No Data [0]	0.3 [1]	0.5 [1]	No Data [0]
145	05/17/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,062-1,062 [2]	No Data [0]	7.51 [1]	158 [1]	29.9-30.5 [2]	No Data [0]	1.3 [1]	0.4 [1]	No Data [0]
146	05/18/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,076-1,076 [2]	No Data [0]	7.26 [1]	146 [1]	28.1-31.3 [2]	No Data [0]	1.8 [1]	0.6 [1]	No Data [0]
147	05/19/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
148	05/20/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,091-1,091 [2]	No Data [0]	7.21 [1]	No Data [0]	39.9-46.4 [2]	No Data [0]	6.7 [1]	0.9 [1]	No Data [0]
149	05/21/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,106-1,106 [2]	No Data [0]	7.21 [1]	100 [1]	22.9-25.3 [2]	No Data [0]	5.3 [1]	0.4 [1]	No Data [0]
150	05/22/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,123-1,123 [2]	No Data [0]	7.72 [1]	130 [1]	32.7-35.9 [2]	No Data [0]	2.9 [1]	0.4 [1]	No Data [0]
151	05/23/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,137-1,137 [2]	No Data [0]	7.53 [1]	102 [1]	36.5-37.7 [2]	No Data [0]	4.5 [1]	0.5 [1]	No Data [0]
152	05/24/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,152-1,152 [2]	No Data [0]	7.18 [1]	86 [1]	30.0-32.6 [2]	No Data [0]	7.5 [1]	0.3 [1]	No Data [0]
153	05/25/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,168-1,168 [2]	No Data [0]	7.15 [1]	92 [1]	27.5-30.5 [2]	No Data [0]	7.8 [1]	0.4 [1]	No Data [0]
154	05/26/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
155	05/27/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
156	05/28/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
157	05/29/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,176-1,176 [2]	No Data [0]	7.58 [1]	106 [1]	18.5-24.3 [2]	No Data [0]	8.0 [1]	0.3 [1]	No Data [0]
158	05/30/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,189-1,189 [2]	No Data [0]	7.43 [1]	98 [1]	33.4-36.6 [2]	No Data [0]	9.5 [1]	0.1 [1]	No Data [0]
159	05/31/12 08:00	No Data [0]	No Data [0]	8.3 [1]	No Data [0]	1,204-1,214 [3]	No Data [0]	7.50 [1]	104 [1]	27.9-28.4 [2]	No Data [0]	8.5 [1]	0.0 [1]	No Data [0]
160	06/01/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

	F	BX	BY	BZ	CA	CB	CC	CF	CG	CI	CK	CL	CM	CN
1	End	(12) MBBR NR1 Nitrite (NO2-N) (mg/L)	(12) MBBR NR1 Total Nitrogen (TN- N) (mg/L)	(12) MBBR NR1 NOx (-N) (mg/L)	(12) MBBR NR1 TKN (-N) (mg/L)	(14) MBBR NR2 EFFLUENT SAMPLE ID	(14) MBBR NR2 EFFLUENT TSS (mg/L)	(14) MBBR NR2 EFFLUENT pH (SU)	(14) MBBR NR2 EFFLUENT Alkalinity (mg/L)	(14) MBBR NR2 EFFLUENT COD(s) (mg/L)	(14) MBBR NR2 EFFLUENT BOD(s) (mg/L)	(14) MBBR NR2 EFFLUENT Nitrate (NO3-N) (mg/L)	(14) MBBR NR2 EFFLUENT Ammonia (NH3-N) (mg/L)	(14) MBBR NR2 Nitrite (NO2-N) (mg/L)
161	06/02/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
162	06/03/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,247 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	3.8 [1]	0.2 [1]	No Data [0]
163	06/04/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,259-1,259 [2]	No Data [0]	7.51 [1]	112 [1]	35.2-36.3 [2]	No Data [0]	3.0 [1]	0.3 [1]	No Data [0]
164	06/05/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
165	06/06/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,321-1,321 [2]	No Data [0]	7.55 [1]	118 [1]	31.6-32.3 [2]	No Data [0]	0.6 [1]	0.3 [1]	No Data [0]
166	06/07/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
167	06/08/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
168	06/09/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
169	06/10/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
170	06/11/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
171	06/12/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,394 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.4 [1]	13.2 [1]	No Data [0]
172	06/13/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,398-1,398 [2]	No Data [0]	7.53 [1]	144 [1]	48.8-50.0 [2]	No Data [0]	1.1 [1]	0.0 [1]	No Data [0]
173	06/14/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,449 [1]	No Data [0]	7.65 [1]	175 [1]	No Data [0]	No Data [0]	1.9 [1]	9.3 [1]	No Data [0]
174	06/15/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
175	06/16/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
176	06/17/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
177	06/18/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,500 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	22.2 [1]	No Data [0]
178	06/19/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,505 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	3.7 [1]	No Data [0]
179	06/20/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,528-1,534 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2.2-7.6 [2]	0.8-5.2 [2]	No Data [0]
180	06/21/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
181	06/22/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
182	06/23/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
183	06/24/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
184	06/25/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
185	06/26/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,615 [1]	No Data [0]	7.46 [1]	83 [1]	No Data [0]	No Data [0]	No Data [0]	0.1 [1]	No Data [0]
186	06/27/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
187	06/28/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,641-1,662 [4]	No Data [0]	7.48 (7.31-7.72) [3]	88 (78-118) [3]	33.0-36.0 [2]	No Data [0]	7.4-11.5 [2]	1.6 (0.3-4.7) [3]	No Data [0]
188	06/29/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,670-1,677 [3]	No Data [0]	7.29-7.36 [2]	108-111 [2]	No Data [0]	No Data [0]	6.6 [1]	0.7-0.8 [2]	No Data [0]
189	06/30/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
190	07/01/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,689 [1]	No Data [0]	7.35 [1]	75 [1]	No Data [0]	No Data [0]	7.8 [1]	1.2 [1]	No Data [0]
191	07/02/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,699-1,699 [2]	No Data [0]	7.34 [1]	96 [1]	40.0-46.3 [2]	No Data [0]	No Data [0]	0.2 [1]	No Data [0]
192	07/03/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,722-1,722 [2]	No Data [0]	7.06 [1]	110 [1]	45.9-46.3 [2]	No Data [0]	No Data [0]	0.6 [1]	No Data [0]
193	07/04/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
194	07/05/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,738-1,738 [2]	No Data [0]	7.25 [1]	92 [1]	46.5-63.3 [2]	No Data [0]	No Data [0]	2.3 [1]	No Data [0]
195	07/06/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
196	07/07/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,767-1,767 [2]	No Data [0]	7.55 [1]	193 [1]	163.0-164.0 [2]	No Data [0]	No Data [0]	6.2 [1]	No Data [0]
197	07/08/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
198	07/09/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
199	07/10/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,850 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	3.7 [1]	0.3 [1]	No Data [0]
200	07/11/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
201	07/12/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,879-1,879 [2]	No Data [0]	7.82 [1]	185 [1]	39.0-41.5 [2]	No Data [0]	11.6 [1]	0.2 [1]	No Data [0]
202	07/13/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,937-1,937 [2]	No Data [0]	7.61 [1]	183 [1]	43.5-44.2 [2]	No Data [0]	7.0 [1]	0.5 [1]	No Data [0]
203	07/14/12 07:57	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,951 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1.7 [1]	9.7 [1]	No Data [0]
204	07/15/12 07:57	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,959 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2.0 [1]	No Data [0]
205	07/16/12 07:57	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1,969 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1.0 [1]	No Data [0]
206	07/17/12 14:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2,004 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.4 [1]	No Data [0]
207														
208														
209														
210														

[illegible]

Peirce Island Pilot Study Report

[illegible]

	F	CO	CP	CQ	CR	CS	CV	CW	CY	DA	DB	DC	DD	DE	DF
		(14) MBBR NR2 Total Nitrogen (TN- N) (mg/L)	(14) MBBR NR2 NOx (-N) (mg/L)	(14) MBBR NR2 TKN (-N) (mg/L)	(15) MBBR DN1 EFFLUENT SAMPLE ID	(15) MBBR DN1 EFFLUENT TSS (mg/L)	(15) MBBR DN1 EFFLUENT pH (SU)	(15) MBBR DN1 EFFLUENT Alkalinity (mg/L)	(15) MBBR DN1 EFFLUENT COD(s) (mg/L)	(15) MBBR DN1 EFFLUENT BOD(s) (mg/L)	(15) MBBR DN1 EFFLUENT Nitrate (NO3-N) (mg/L)	(15) MBBR DN1 EFFLUENT Ammonia (NH3-N) (mg/L)	(15) MBBR DN1 Nitrite (NO2-N) (mg/L)	(15) MBBR DN1 Total Nitrogen (TN- N) (mg/L)	(15) MBBR DN1 NOx (-N) (mg/L)
1	End														
108	04/10/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
109	04/11/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
110	04/12/12 07:59	No Data [0]	No Data [0]	No Data [0]	780-780 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	11.4-13.0 [2]	1.8-2.1 [2]	No Data [0]	No Data [0]	No Data [0]
111	04/13/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
112	04/14/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
113	04/15/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
114	04/16/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
115	04/17/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
116	04/18/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
117	04/19/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
118	04/20/12 07:59	14.3 [1]	0.8 [1]	13.5 [1]	827-827 [2]	No Data [0]	No Data [0]	174 [1]	48.9-52.6 [2]	No Data [0]	0.8 [1]	13.2-13.7 [2]	No Data [0]	14.2 [1]	0.8 [1]
119	04/21/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
120	04/22/12 07:59	16.1 [1]	0.4 [1]	15.7 [1]	836-836 [2]	287 [1]	7.51 [1]	No Data [0]	No Data [0]	No Data [0]	1.7 [1]	No Data [0]	No Data [0]	17.1 [1]	0.4 [1]
121	04/23/12 07:59	5.7 [1]	3.0 [1]	2.7 [1]	841-841 [2]	152-156 [2]	7.08 [1]	32 [1]	21.1-26.0 [2]	No Data [0]	No Data [0]	1.6-1.8 [2]	No Data [0]	6.4 [1]	2.5 [1]
122	04/24/12 07:59	6.5 [1]	1.3 [1]	5.2 [1]	851-851 [3]	96-114 [2]	7.18 [1]	92 [1]	24.9-29.1 [2]	3.1 (3.0-3.3) [3]	4.8 [1]	3.3 [1]	No Data [0]	8.0 [1]	2.4 [1]
123	04/25/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
124	04/26/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
125	04/27/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
126	04/28/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
127	04/29/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
128	04/30/12 07:59	13.7 [1]	1.4 [1]	12.3 [1]	893-893 [2]	No Data [0]	6.92 [1]	145 [1]	27.4-28.9 [2]	No Data [0]	0.4 [1]	11.8 [1]	No Data [0]	14.6 [1]	0.8 [1]
129	05/01/12 07:59	No Data [0]	No Data [0]	No Data [0]	903-903 [2]	No Data [0]	6.72 [1]	94 [1]	35.9-38.7 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
130	05/02/12 07:59	No Data [0]	No Data [0]	No Data [0]	916-916 [2]	No Data [0]	7.34 [1]	54 [1]	27.8-29.8 [2]	No Data [0]	13.9 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
131	05/03/12 07:59	No Data [0]	No Data [0]	No Data [0]	928-928 [2]	No Data [0]	7.18 [1]	72 [1]	33.3-37.0 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
132	05/04/12 07:59	No Data [0]	No Data [0]	No Data [0]	938-938 [2]	No Data [0]	7.22 [1]	124 [1]	124.0-126.0 [2]	No Data [0]	0.3 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
133	05/05/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
134	05/06/12 07:59	No Data [0]	No Data [0]	No Data [0]	946-946 [2]	No Data [0]	7.11 [1]	No Data [0]	77.1-81.3 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
135	05/07/12 07:59	No Data [0]	No Data [0]	No Data [0]	954-954 [2]	No Data [0]	7.14 [1]	172 [1]	67.4-68.5 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
136	05/08/12 07:59	No Data [0]	No Data [0]	No Data [0]	965-965 [2]	No Data [0]	7.40 [1]	138 [1]	78.0-78.6 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.8 [1]	17.0 [1]
137	05/09/12 07:59	No Data [0]	No Data [0]	No Data [0]	977-977 [2]	No Data [0]	7.60 [1]	138 [1]	40.3-40.3 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	9.3 [1]	7.5 [1]
138	05/10/12 07:59	2.9 [1]	0.6 [1]	2.3 [1]	990-990 [2]	No Data [0]	7.30 [1]	104 [1]	35.0-38.9 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	0.2 [1]	0.1 [1]
139	05/11/12 07:59	No Data [0]	No Data [0]	No Data [0]	1,002-1,002 [2]	No Data [0]	7.17 [1]	150 [1]	29.4-30.3 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
140	05/12/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
141	05/13/12 07:59	No Data [0]	No Data [0]	No Data [0]	1,012-1,012 [2]	No Data [0]	No Data [0]	No Data [0]	25.5-29.8 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1.1 [1]	0.4 [1]
142	05/14/12 07:59	No Data [0]	No Data [0]	No Data [0]	1,021-1,021 [2]	No Data [0]	7.67 [1]	162 [1]	30.3-33.4 [2]	No Data [0]	No Data [0]	0.0 [1]	No Data [0]	0.7 [1]	0.3 [1]
143	05/15/12 07:59	4.5 [1]	0.5 [1]	3.9 [1]	1,033-1,033 [2]	No Data [0]	7.60 [1]	152 [1]	30.5-30.9 [2]	No Data [0]	No Data [0]	0.2 [1]	No Data [0]	No Data [0]	No Data [0]
144	05/16/12 07:59	No Data [0]	No Data [0]	No Data [0]	1,049-1,049 [2]	No Data [0]	7.62 [1]	138 [1]	18.8-23.1 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
145	05/17/12 07:59	No Data [0]	No Data [0]	No Data [0]	1,063-1,063 [2]	No Data [0]	7.73 [1]	162 [1]	25.5-33.3 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
146	05/18/12 07:59	No Data [0]	No Data [0]	No Data [0]	1,077-1,077 [2]	No Data [0]	7.16 [1]	150 [1]	26.3-28.6 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
147	05/19/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
148	05/20/12 07:59	No Data [0]	No Data [0]	No Data [0]	1,092-1,092 [2]	No Data [0]	7.19 [1]	No Data [0]	44.5-49.9 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
149	05/21/12 07:59	No Data [0]	No Data [0]	No Data [0]	1,107-1,107 [2]	No Data [0]	7.07 [1]	114 [1]	26.3-28.5 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
150	05/22/12 07:59	No Data [0]	No Data [0]	No Data [0]	1,124-1,124 [2]	No Data [0]	7.65 [1]	136 [1]	35.6-36.2 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
151	05/23/12 08:00	No Data [0]	No Data [0]	No Data [0]	1,138-1,138 [2]	No Data [0]	7.11 [1]	106 [1]	36.1-39.1 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
152	05/24/12 08:00	No Data [0]	No Data [0]	No Data [0]	1,153-1,153 [2]	No Data [0]	7.04 [1]	90 [1]	29.6-29.9 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
153	05/25/12 08:00	No Data [0]	No Data [0]	No Data [0]	1,169-1,169 [2]	No Data [0]	7.03 [1]	96 [1]	27.4-28.8 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2.1 [1]	No Data [0]
154	05/26/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
155	05/27/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
156	05/28/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
157	05/29/12 08:00	No Data [0]	No Data [0]	No Data [0]	1,177-1,177 [2]	No Data [0]	7.45 [1]	108 [1]	26.5-29.3 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
158	05/30/12 08:00	No Data [0]	No Data [0]	No Data [0]	1,190-1,190 [2]	No Data [0]	7.39 [1]	No Data [0]	33.4-35.0 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	4.1 [1]	No Data [0]
159	05/31/12 08:00	No Data [0]	8.3 [1]	No Data [0]	1,216-1,230 [16]	211 (186-247) [16]	No Data [0]	No Data [0]	35.7 (25.9-67.7) [16]	No Data [0]	No Data [0]	3.9 (1.2-9.2) [8]	No Data [0]	8.6 (4.9-9.8) [8]	2.6 (1.4-5.5) [8]
160	06/01/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

[illegible]

[illegible]

	F	DG	DX	DY	EB	EC	ED	EE	EF	EH	EI	EK	EL	EM
			(17) MBBR DAF EFFLUENT SAMPLE ID	(17) MBBR DAF EFFLUENT TSS (mg/L)	(17) MBBR DAF EFFLUENT pH (SU)	(17) MBBR DAF EFFLUENT Alkalinity (mg/L)	(17) MBBR DAF EFFLUENT COD(t) (mg/L)	(17) MBBR DAF EFFLUENT COD(s) (mg/L)	(17) MBBR DAF EFFLUENT BOD(t) (mg/L)	(17) MBBR DAF EFFLUENT Nitrate (NO3-N) (mg/L)	(17) MBBR DAF Ammonia (NH3-N) (mg/L)	(17) MBBR DAF Total Nitrogen (TN- N) (mg/L)	(17) MBBR DAF NOx (-N) (mg/L)	(17) MBBR DAF TKN (-N) (mg/L)
1	End	(15) MBBR DN1 TKN (-N) (mg/L)												
55	02/17/12 08:00	No Data [0]	332-332 [3]	41 (29-43) [3]	No Data [0]	No Data [0]	104.0-105.0 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
56	02/18/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
57	02/19/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
58	02/20/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
59	02/21/12 08:00	No Data [0]	350-350 [3]	28 (26-29) [3]	No Data [0]	No Data [0]	89.3-90.1 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
60	02/22/12 08:00	No Data [0]	361-376 [5]	37 (23-38) [5]	No Data [0]	No Data [0]	82.3-89.6 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
61	02/23/12 08:00	No Data [0]	372-376 [4]	32 (28-36) [4]	7.22 (6.97-7.28) [3]	No Data [0]	185.0-185.0 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
62	02/24/12 08:00	No Data [0]	380-381 [6]	42 (37-44) [3]	No Data [0]	No Data [0]	119.0-122.0 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
63	02/25/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
64	02/26/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
65	02/27/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
66	02/28/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
67	02/29/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
68	03/01/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
69	03/02/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
70	03/03/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
71	03/04/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
72	03/05/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
73	03/06/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
74	03/07/12 08:00	No Data [0]	468-468 [3]	12 (10-14) [3]	No Data [0]	No Data [0]	57.7-58.7 [2]	No Data [0]	20.3 (20.2-20.5) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
75	03/08/12 08:00	No Data [0]	472-482 [6]	5 (4-9) [6]	7.23 (6.90-7.42) [6]	No Data [0]	33.0 (29.3-39.1) [4]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
76	03/09/12 08:00	No Data [0]	483-489 [6]	7 (7-10) [6]	No Data [0]	No Data [0]	40.7 (28.3-52.3) [4]	No Data [0]	10.2 (10.2-12.2) [3]	0.9-1.0 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
77	03/10/12 08:00	No Data [0]	497-497 [3]	2 (2-3) [3]	No Data [0]	No Data [0]	35.9-37.8 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
78	03/11/12 08:00	No Data [0]	506-506 [3]	19 (18-20) [3]	No Data [0]	No Data [0]	55.2-56.0 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
79	03/12/12 08:00	No Data [0]	515-515 [3]	38 (35-38) [3]	7.16 (7.11-7.29) [3]	146 [1]	89.3-89.5 [2]	No Data [0]	29.6 (29.6-32.6) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
80	03/13/12 08:00	No Data [0]	521-521 [3]	16 (16-20) [3]	No Data [0]	No Data [0]	63.1-63.5 [2]	No Data [0]	8.9-9.1 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
81	03/14/12 08:00	No Data [0]	539-539 [3]	19 (19-22) [3]	No Data [0]	No Data [0]	62.9-67.6 [2]	No Data [0]	14.4-14.5 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
82	03/15/12 08:00	No Data [0]	548-548 [3]	12 (12-12) [3]	6.89 (6.50-7.14) [3]	135 [1]	53.4-56.4 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
83	03/16/12 08:00	No Data [0]	557-557 [3]	16 (15-16) [3]	No Data [0]	No Data [0]	73.5-74.2 [2]	No Data [0]	24.1 (22.9-24.2) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
84	03/17/12 08:00	No Data [0]	569-569 [3]	19 (19-21) [3]	No Data [0]	No Data [0]	58.7-61.5 [2]	No Data [0]	22.2 (18.5-27.2) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
85	03/18/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
86	03/19/12 07:59	No Data [0]	583-583 [3]	16 (16-16) [3]	7.41 (7.28-7.44) [3]	170 [1]	No Data [0]	74.9-76.3 [2]	34.2 (31.0-35.6) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
87	03/20/12 07:59	No Data [0]	595-595 [3]	13 (11-15) [3]	No Data [0]	No Data [0]	63.4-66.3 [2]	No Data [0]	17.6 (17.2-19.6) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
88	03/21/12 07:59	No Data [0]	603-603 [3]	9 (9-10) [3]	7.42 (7.24-7.46) [3]	145 [1]	65.6-68.3 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
89	03/22/12 07:59	No Data [0]	613-613 [3]	10 (9-11) [3]	No Data [0]	No Data [0]	59.7-68.0 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
90	03/23/12 07:59	No Data [0]	623-623 [3]	20 (19-20) [3]	No Data [0]	No Data [0]	72.4-74.9 [2]	No Data [0]	21.6 (19.9-23.9) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
91	03/24/12 07:59	No Data [0]	632-632 [3]	36 (35-38) [3]	No Data [0]	No Data [0]	103.0-118.0 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
92	03/25/12 07:59	No Data [0]	637-637 [3]	17 (17-19) [3]	No Data [0]	No Data [0]	56.4-57.2 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
93	03/26/12 07:59	No Data [0]	644-644 [3]	30 (30-32) [3]	6.84 (6.67-7.24) [3]	158 [1]	77.4-79.2 [2]	No Data [0]	22.1 (22.1-22.3) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
94	03/27/12 07:59	No Data [0]	657-657 [3]	19 (18-19) [3]	No Data [0]	No Data [0]	74.2-78.6 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
95	03/28/12 07:59	No Data [0]	664-664 [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
96	03/29/12 07:59	No Data [0]	674-674 [3]	39 (37-40) [3]	No Data [0]	No Data [0]	106.0-107.0 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
97	03/30/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
98	03/31/12 07:59	No Data [0]	685-685 [3]	27 (25-27) [3]	7.07 (6.72-7.41) [3]	170 [1]	95.6-98.4 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
99	04/01/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
100	04/02/12 07:59	No Data [0]	700-700 [3]	113 (111-115) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
101	04/03/12 07:59	No Data [0]	707-707 [3]	46 (42-48) [3]	No Data [0]	No Data [0]	172.0-173.0 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
102	04/04/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
103	04/05/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
104	04/06/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
105	04/07/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
106	04/08/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
107	04/09/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

	F	DG	DX	DY	EB	EC	ED	EE	EF	EH	EI	EK	EL	EM
			(17) MBBR DAF EFFLUENT SAMPLE ID	(17) MBBR DAF EFFLUENT TSS (mg/L)	(17) MBBR DAF EFFLUENT pH (SU)	(17) MBBR DAF EFFLUENT Alkalinity (mg/L)	(17) MBBR DAF EFFLUENT COD(t) (mg/L)	(17) MBBR DAF EFFLUENT COD(s) (mg/L)	(17) MBBR DAF EFFLUENT BOD(t) (mg/L)	(17) MBBR DAF EFFLUENT Nitrate (NO3-N) (mg/L)	(17) MBBR DAF Ammonia (NH3-N) (mg/L)	(17) MBBR DAF Total Nitrogen (TN- N) (mg/L)	(17) MBBR DAF NOx (-N) (mg/L)	(17) MBBR DAF TKN (-N) (mg/L)
1	End	(15) MBBR DN1 TKN (-N) (mg/L)												
108	04/10/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
109	04/11/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
110	04/12/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
111	04/13/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
112	04/14/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
113	04/15/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
114	04/16/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
115	04/17/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
116	04/18/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
117	04/19/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
118	04/20/12 07:59	13.4 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
119	04/21/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
120	04/22/12 07:59	16.7 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
121	04/23/12 07:59	3.9 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
122	04/24/12 07:59	5.6 [1]	852-852 [3]	11-18 [2]	6.88 [1]	80 [1]	26.3-29.6 [2]	No Data [0]	3.7 (3.6-4.3) [3]	No Data [0]	3.3 [1]	8.1 [1]	2.1 [1]	6.0 [1]
123	04/25/12 07:59	No Data [0]	859-859 [2]	10-10 [2]	No Data [0]	No Data [0]	31.5-32.1 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2.8 [1]	0.6 [1]	2.2 [1]
124	04/26/12 07:59	No Data [0]	867-867 [2]	8-10 [2]	No Data [0]	No Data [0]	31.6-33.4 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	9.8 [1]	1.8 [1]	8.0 [1]
125	04/27/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
126	04/28/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
127	04/29/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
128	04/30/12 07:59	13.8 [1]	894-894 [2]	8-10 [2]	7.01 [1]	165 [1]	27.8-32.4 [2]	No Data [0]	No Data [0]	0.4 [1]	12.6 [1]	No Data [0]	No Data [0]	No Data [0]
129	05/01/12 07:59	No Data [0]	904-904 [3]	9-9 [2]	No Data [0]	No Data [0]	31.2-36.2 [2]	No Data [0]	2.8 (2.3-3.0) [3]	No Data [0]	No Data [0]	14.7 [1]	7.8 [1]	7.0 [1]
130	05/02/12 07:59	No Data [0]	917-917 [3]	10-13 [2]	No Data [0]	No Data [0]	27.6-29.0 [2]	No Data [0]	2.0 (2.0-2.3) [3]	No Data [0]	No Data [0]	15.5 [1]	13.4 [1]	2.1 [1]
131	05/03/12 07:59	No Data [0]	929-929 [2]	10-16 [2]	No Data [0]	No Data [0]	37.1-39.8 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	15.6 [1]	11.0 [1]	4.6 [1]
132	05/04/12 07:59	No Data [0]	939-939 [2]	16-16 [2]	No Data [0]	No Data [0]	134.0-136.0 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	5.1 [1]	0.1 [1]	4.9 [1]
133	05/05/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
134	05/06/12 07:59	No Data [0]	947-947 [2]	34-38 [2]	No Data [0]	No Data [0]	70.4-72.9 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	4.2 [1]	1.8 [1]	2.4 [1]
135	05/07/12 07:59	No Data [0]	955-955 [2]	35-36 [2]	7.13 [1]	194 [1]	86.4-87.4 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	1.4 [1]	0.1 [1]	1.3 [1]
136	05/08/12 07:59	16.2 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
137	05/09/12 07:59	1.8 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
138	05/10/12 07:59	0.0 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
139	05/11/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
140	05/12/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
141	05/13/12 07:59	0.7 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
142	05/14/12 07:59	0.4 [1]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
143	05/15/12 07:59	No Data [0]	1,034-1,034 [2]	12-16 [2]	7.35 [1]	152 [1]	32.1-40.0 [2]	No Data [0]	No Data [0]	0.2 [1]	No Data [0]	1.4 [1]	0.3 [1]	1.0 [1]
144	05/16/12 07:59	No Data [0]	1,050-1,050 [3]	12-12 [2]	7.62 [1]	136 [1]	23.3-25.8 [2]	No Data [0]	5.8 (5.3-6.2) [3]	No Data [0]	No Data [0]	0.2 [1]	0.2 [1]	0.0 [1]
145	05/17/12 07:59	No Data [0]	1,064-1,064 [3]	17-17 [2]	7.72 [1]	160 [1]	35.1-39.0 [2]	No Data [0]	6.0 (5.1-7.1) [3]	No Data [0]	No Data [0]	1.7 [1]	No Data [0]	No Data [0]
146	05/18/12 07:59	No Data [0]	1,078-1,078 [3]	21-26 [2]	7.15 [1]	152 [1]	27.4-28.7 [2]	No Data [0]	14.5 (9.6-23.5) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
147	05/19/12 07:59	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
148	05/20/12 07:59	No Data [0]	1,093-1,093 [2]	14-20 [2]	7.18 [1]	No Data [0]	35.2-42.3 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	7.0 [1]	No Data [0]	No Data [0]
149	05/21/12 07:59	No Data [0]	1,108-1,108 [3]	14-19 [2]	7.36 [1]	102 [1]	32.5-34.4 [2]	No Data [0]	6.3 (5.9-8.0) [3]	No Data [0]	No Data [0]	2.0 [1]	No Data [0]	No Data [0]
150	05/22/12 07:59	No Data [0]	1,125-1,125 [3]	33-38 [2]	7.75 [1]	146 [1]	51.7-54.4 [2]	No Data [0]	14.8 (13.9-19.2) [3]	0.7 [1]	No Data [0]	5.9 [1]	No Data [0]	No Data [0]
151	05/23/12 08:00	No Data [0]	1,139-1,139 [3]	20-21 [2]	7.53 [1]	124 [1]	42.4-46.6 [2]	No Data [0]	10.6 (9.5-12.0) [3]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
152	05/24/12 08:00	No Data [0]	1,154-1,154 [3]	18-28 [2]	7.30 [1]	104 [1]	47.1-53.7 [2]	No Data [0]	13.7 (12.6-19.3) [3]	No Data [0]	No Data [0]	19.6 [1]	No Data [0]	No Data [0]
153	05/25/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
154	05/26/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
155	05/27/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
156	05/28/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]
157	05/29/12 08:00	No Data [0]	1,178-1,178 [2]	14-16 [2]	7.51 [1]	62 [1]	12.5-12.6 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	2.7 [1]	No Data [0]	No Data [0]
158	05/30/12 08:00	No Data [0]	1,191-1,191 [2]	18-24 [2]	7.13 [1]	No Data [0]	37.8-41.8 [2]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	4.0 [1]	No Data [0]	No Data [0]
159	05/31/12 08:00	5.8 (1.6-8.1) [8]	1,218-1,231 [16]	26 (15-49) [16]	No Data [0]	No Data [0]	49.5 (38.5-84.0) [16]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	10.5 (8.7-18.0) [8]	4.5 (2.5-11.8) [8]	6.0 (1.6-8.0) [8]
160	06/01/12 08:00	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]	No Data [0]

[illegible]

3.7.3 Experimental Plan Results

3.7.3.1 Experimental Plan 01

EXPERIMENTAL PLAN 01 was conducted from March 10 through March 20, 2012 to evaluate the treatment performance of each process at a flow rate equivalent to the average daily flow for treating to a treatment goal of 30 mg/L BOD and 30 mg/L TSS.

Figure 3.7-01 shows the data collected during Experimental Trial 01 on the MBBR and DAF. The influent flow rate was typically declining overnight due to the buildup of rags and paper on the flow control valve. Flow rate was adjusted in the morning to a flow rate slightly above the target for the day. The set of field samples collected on March 12 was not representative because the polymer feed line became detached from the injector overnight, and the sample results are not included in further presentations of the data. The dissolved oxygen concentration was monitored by only one online probe during this period due to a failure in the membrane cap of DO probe #2, and DO probe #2 required a membrane replacement by the end of the trial. Low DO measurements at the end of the trial were likely due to probe malfunctioning, as grab samples showed dissolved oxygen concentrations in excess of 4 mg/L. The high effluent BOD concentrations measured by field analysis on March 19 were not duplicated by lab results collected from the same composite sample, but the field results are included in Table 3.7-03.

The autosampler on the DAF experienced mechanical problems on March 11 through 16, preventing the collection of composite samples. A grab sample was collected for lab analysis on March 13. Samples were collected on March 13 (grab sample), 19 and 20 (composite samples), and results were provided by Eastern Analytical under lab reports #108372, #108514 and #108547. Results are summarized in Table 3.7-03

Table 3.7-03: Results for Experimental Plan 01 on MBBR and DAF

Parameter	Results	Goal
Influent Flow Rate (gpm)	8.4 (5.8 – 13.7)	12.4
Influent TSS (mg/L)	92 (49 – 134) [36]	N/A
Influent BOD (mg/L)	174 (109 – 238) [19]	
Detention Time (hrs)	1.97 (1.21 – 2.85)	1.36
BOD Loading Rate(grams BOD/1000 cf · day)	5.2 (3.2 – 8.6)	7.6
Effluent BOD (Laboratory)	8, 20, 17	30
Effluent BOD (Field)	21.3 (8.9 – 35.6) [16]	
Effluent TSS (Laboratory)	16, 13, 19	30
Effluent TSS (Field)	14.5 (2.0-22.0) [30]	

Figure 3.7-02 shows a boxplot of the TSS and BOD results compared to a reference line for the 30/30 permit limit. Three of the 18 field BOD test results were higher than the goal of 30 mg/L BOD, but a 1-sample t test showed that the average BOD for the experiment met the goal with an error of <0.001. All of the laboratory BOD data were below the 30 mg/L goal.

Figure 3.7-01: Results from Experimental Trial 01 - MBBR and DAF

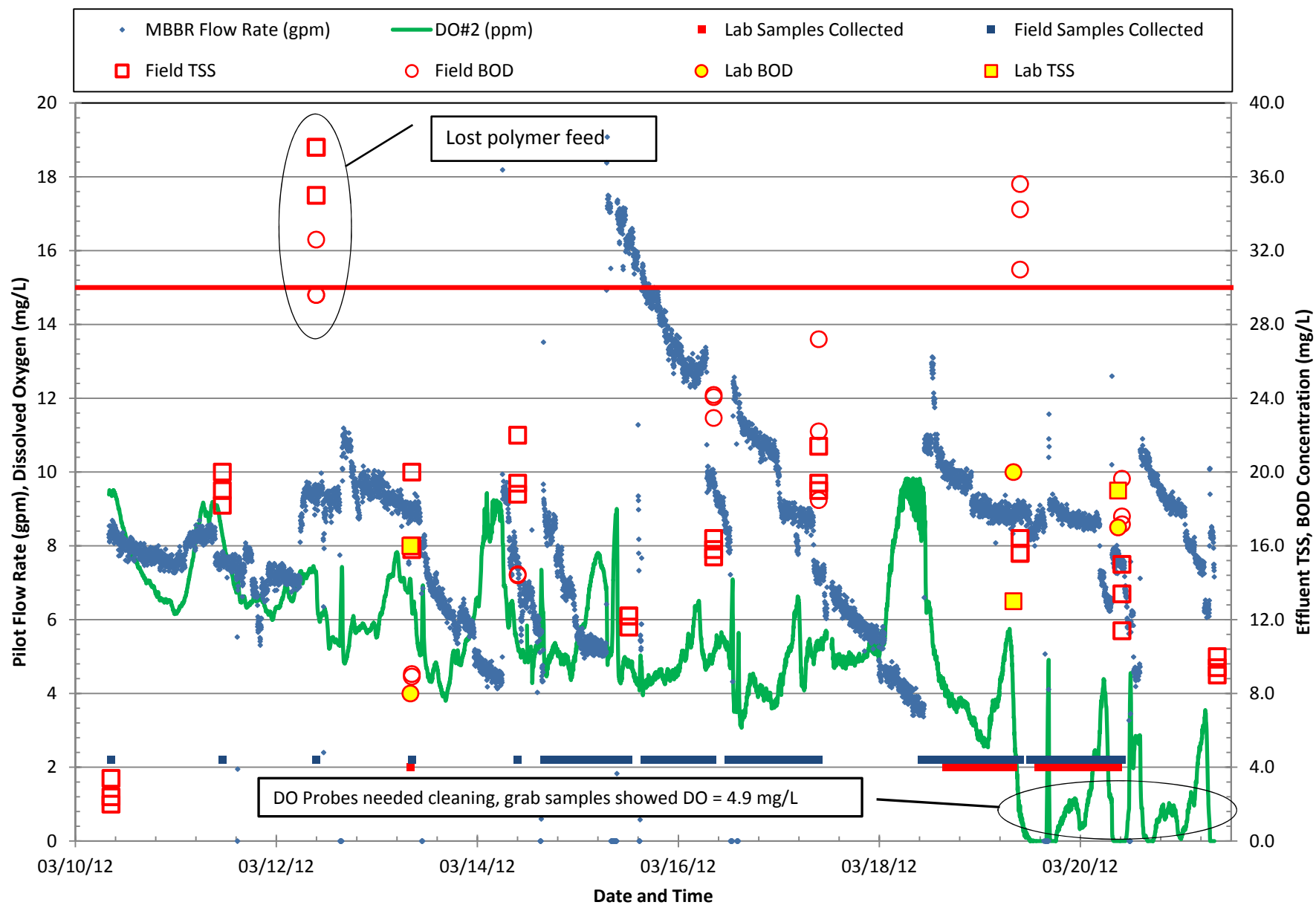
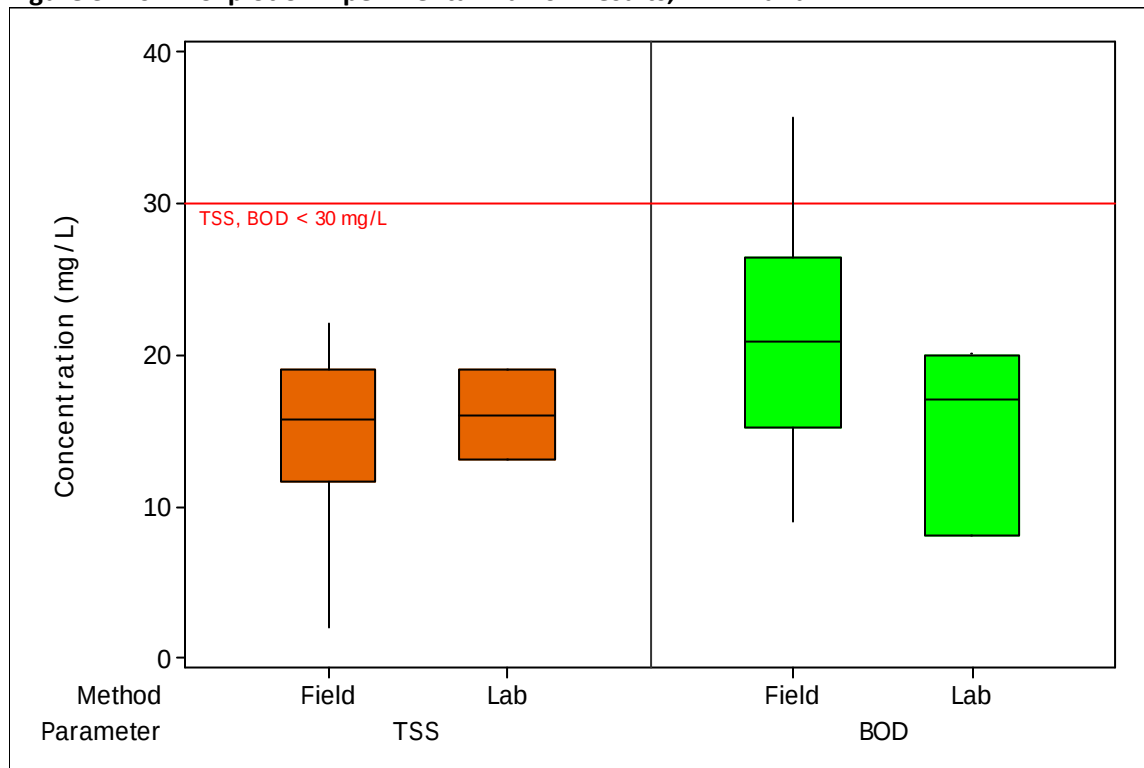


Figure 3.7-02: Boxplot of Experimental Plan 01 Results, MBBR and DAF



3.7.3.2 Experimental Plan 02

EXPERIMENTAL PLAN 02 was conducted from March 22 through April 3, 2012 to evaluate the treatment performance at a flow rate equivalent to the maximum month BOD loading for treating to a treatment goal of 30 mg/L BOD and 30 mg/L TSS.

Figure 3.7-03 shows the data collected during Experimental Trial 02 on the MBBR and DAF. The flow rate was typically declining overnight due to the buildup of rags and paper on the flow control valve, but was more stable than the flow rate during Experimental Trial 01, and ranged between 9 and 14 gpm. The dissolved oxygen concentration was monitored by only the DO#1 online probe during this period. DO Probe #1 had a new membrane cap installed on March 22, and DO Probe #2 was installed in the NR1 reactor. Dissolved oxygen measurements remained above 1 for the duration of the trial with most concentrations above 4 mg/L.

During most of Experimental Trial 02 there was a marked increase in the water surface elevation in the DAF tank, resulting in an ineffective sludge removal process. The height of the sludge rake was not adjustable in the pilot DAF unit and could not function effectively when the floating sludge blanket was too high. As a result there was carryover of solids from the aeration tank into the effluent clearwell. A number of investigations were undertaken to determine the cause of the high water surface, until it was discovered on March 28 that the two 2" diameter pipes (laterals) that transferred treated water from the aeration tank to the clearwell were partially occluded with solids and polymer. The buildup in the

pipe had created a backup, and may have contributed to the solids in the effluent clearwell. Figure 3.7-04 shows the sludge accumulated in one of the 2" pipes, viewed from the access port on the downstream side of the DAF pilot unit.

The small scale of the DAF pilot unit meant that there were very short depths and distances between components. For example, the collection laterals (2" diameter pipes suspended above the floor of the aeration tank that collected clarified water and transferred it to the effluent tank) were only inches removed from the pretreated influent (polymer and microbubbles) to the aeration tank.

Figure 3.7-03: Results from Experimental Trial 02 - MBBR and DAF

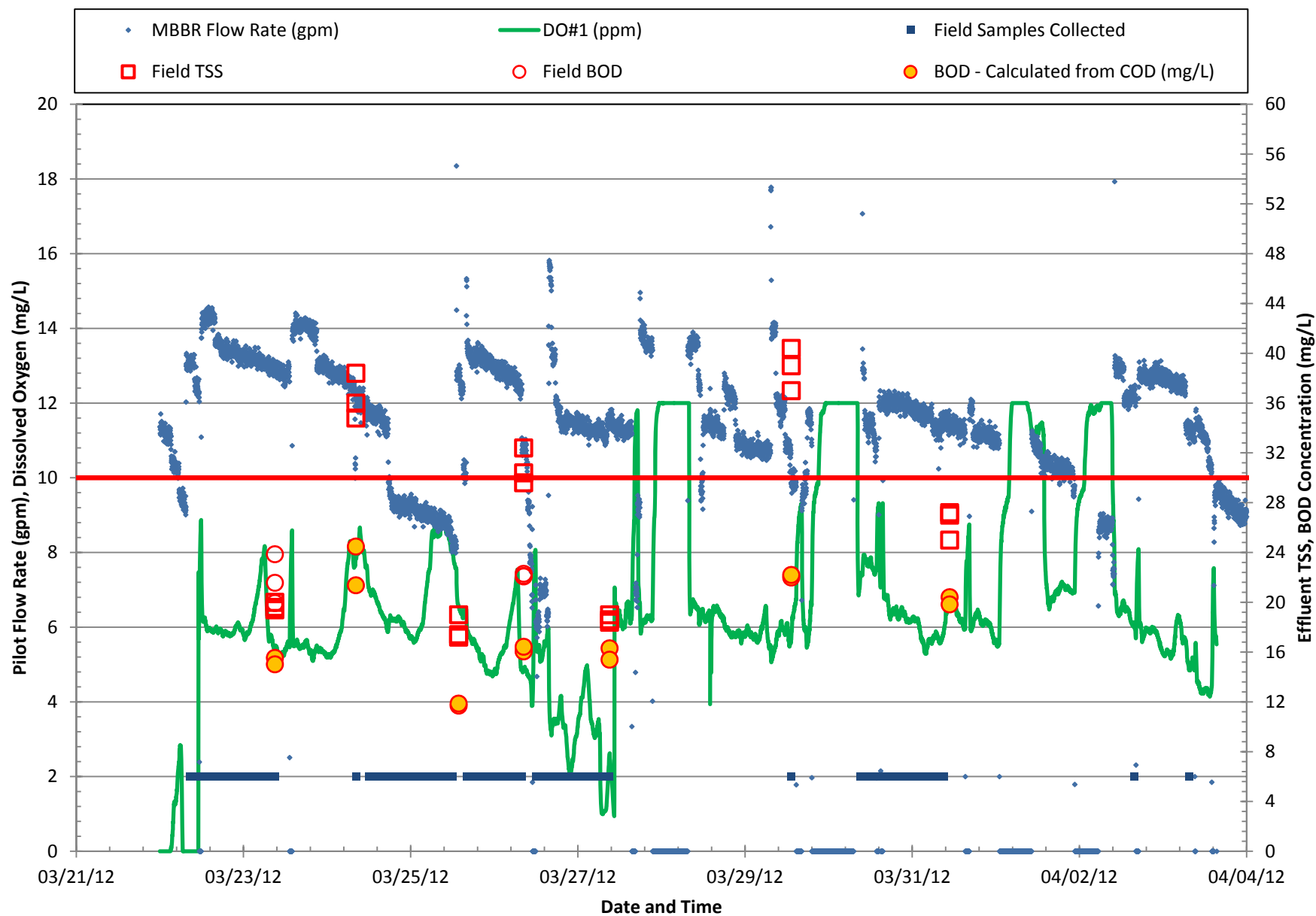


Figure 3.7-04: Accumulated Solids in DAF Effluent Piping on March 28, 2012



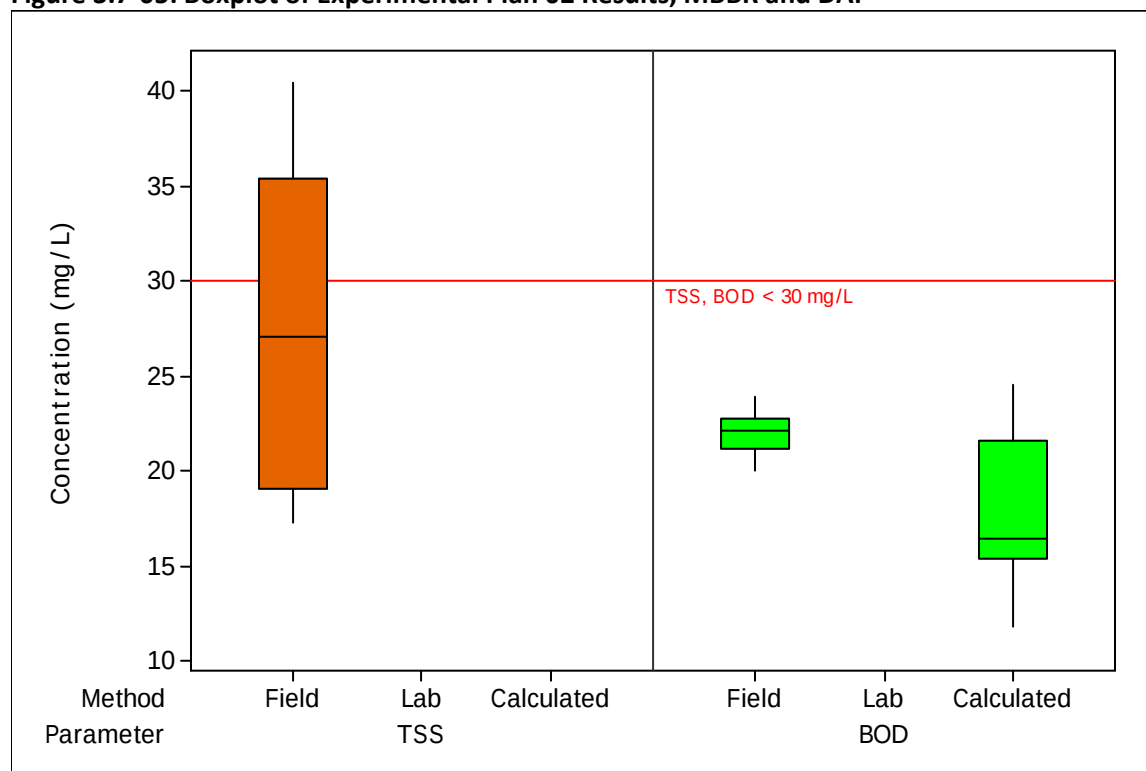
No laboratory samples were collected during the trial due to the difficulties with the DAF effluent. Field results are summarized on Table 3.7-04.

Table 3.7-04: Results for Experimental Trial 02 on MBBR and DAF

Parameter	Results	Goal
Influent Flow Rate (gpm)	11.4 (9.3 – 13.3)	17.2
Influent TSS (mg/L)	145 (91 – 194) [36]	N/A
Influent BOD (mg/L)	197 (164 – 229) [6]	
Detention Time (hrs)	1.45 (1.24-1.77)	0.98
BOD Loading Rate(grams BOD/1000 cf · day)	9.6 (5.5 – 15.1)	10.77
Effluent BOD (Field)	22 (20 – 24) [6]	30
Effluent BOD (Calculated from COD)	17.8 (11.7 – 24.5) [14]	
Effluent TSS (Field)	26.9 (17.2 – 40.4) [21]	30

Figure 3.7-05 shows a boxplot of the TSS and BOD results compared to a reference line for the 30/30 permit limit. It is believed that all of the high TSS results were attributed to a plugged effluent line on the DAF.

Figure 3.7-05: Boxplot of Experimental Plan 02 Results, MBBR and DAF



3.7.3.3 Experimental Plan 03

EXPERIMENTAL PLAN 03 was conducted from May 15 through May 30, 2012 to evaluate the treatment performance for treating to a goal of 30 mg/L BOD, 30 mg/L TSS, and 8 mg/L total nitrogen. Lime was added to the MBBR NR1 reactor to maintain a total alkalinity in the NR2 tank greater than 70 mg/L as CaCO_3 , and MicroC 1000 was added to the DN1 tank to maintain conditions necessary to convert nitrate to nitrite.

There were three mechanical issues during Experimental Trial 03, all involved shutting off the flow to the MBBR or DAF processes for a short period of time. The MBBR feed pump was cleaned on May 21, the main pilot feed pump was cleaned on May 23, and the DAF system was cleaned on May 24.

Figure 3.7-06 shows the data collected during Experimental Trial 03 on the MBBR and DAF. The flow rate through the process was adjusted daily to target an organic loading of 7.57 grams BOD/1000cf x day, and was typically adjusted in the afternoon based on the COD results from the previous 24-hour composite sample. The influent BOD loading for the period averaged 6.4 grams BOD/1000 cf-day. The dissolved oxygen concentration was monitored in the NR1 reactor by DO Probe #1, and in the NR2 tank by DO Probe #2. During this trial, the target dissolved oxygen concentration in the NR 1 tank was 4-6 mg/L, and <1 mg/L in the NR2 tank.

Grab samples were collected on May 15 and 31 and results were provided by Eastern Analytical under lab reports #110368 and #110863, respectively. Composite samples were collected on May 18, 21, 22,

23, and 24, and results were provided by Eastern Analytical under lab reports #110487, #110533, #110559, #110632, and #110656. Results are summarized in Table 3.7-05

Figure 3.7-06: Results from Experimental Trial 03 - MBBR and DAF

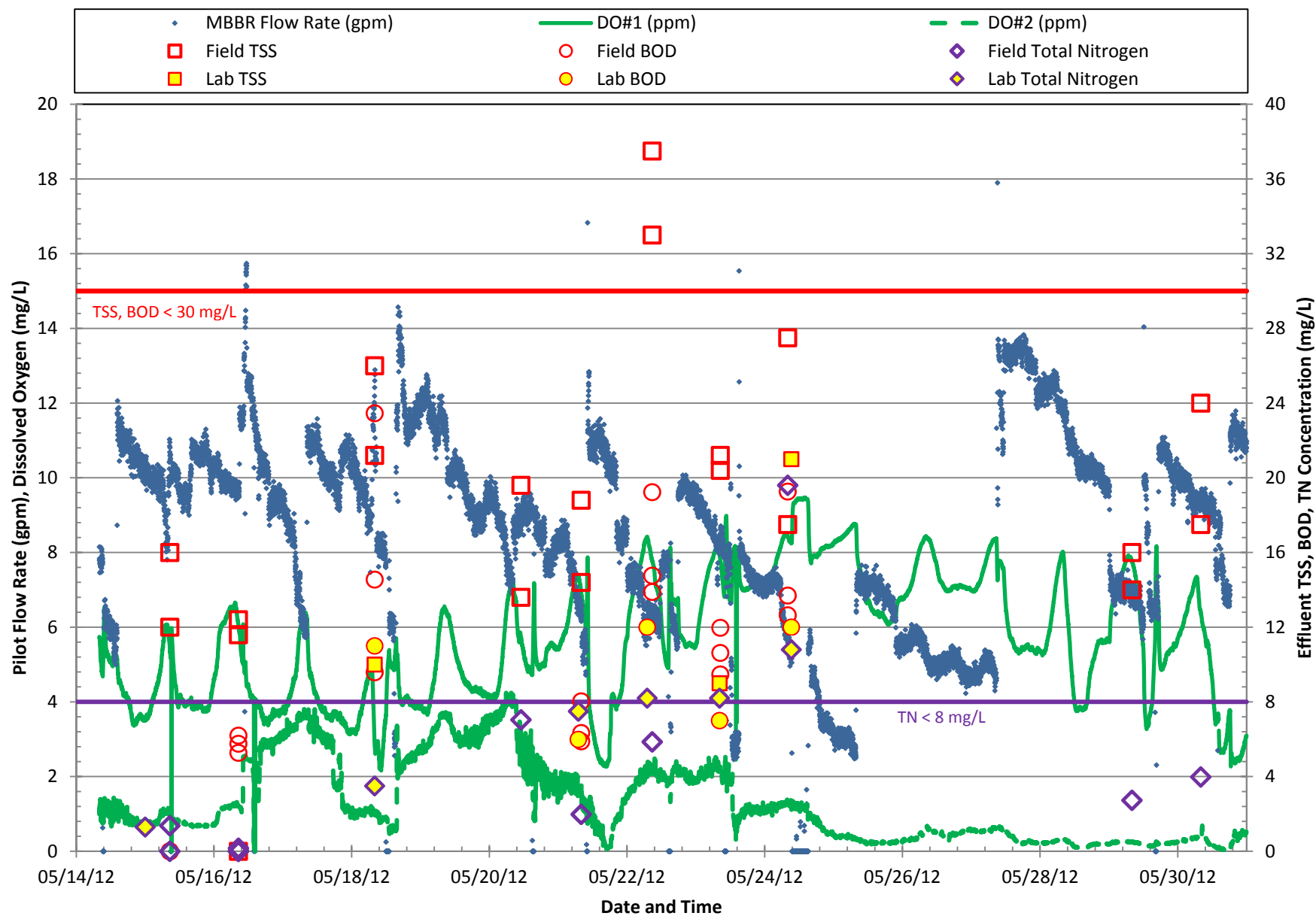


Table 3.7-05: Results for Experimental Trial 03 on MBBR and DAF

Parameter	Results	Goal
Influent Flow Rate (gpm)	8.7 (3.3 – 12.8)	13.6
Influent TSS (mg/L)	166 (108 – 205) [8]	N/A
Influent BOD (mg/L)	190 (175 – 202) [3]	
Influent Ammonia (mg/L)	20.7 (15.3 – 31.4) [5]	
BOD Loading Rate(grams BOD/1000 cf · day)	6.6	7.6
TKN Loading Rate(grams TKN/1000 cf · day)	0.28	
Effluent BOD (Field)	11.7 (5.3 – 23.5) [18]	30
Effluent BOD (Calculated from COD)	7.5 (2.6 – 11.3) [20]	
Effluent TSS (Field)	19.7 (11.6 – 37.5) [20]	30
Effluent TSS (Lab)	13.3 (9 – 21) [3]	
Effluent TN (Field)	5.3 (0.2 – 19.6) [8]	8
Effluent TN (Lab)	7.5 (1.3 – 13) [7]	

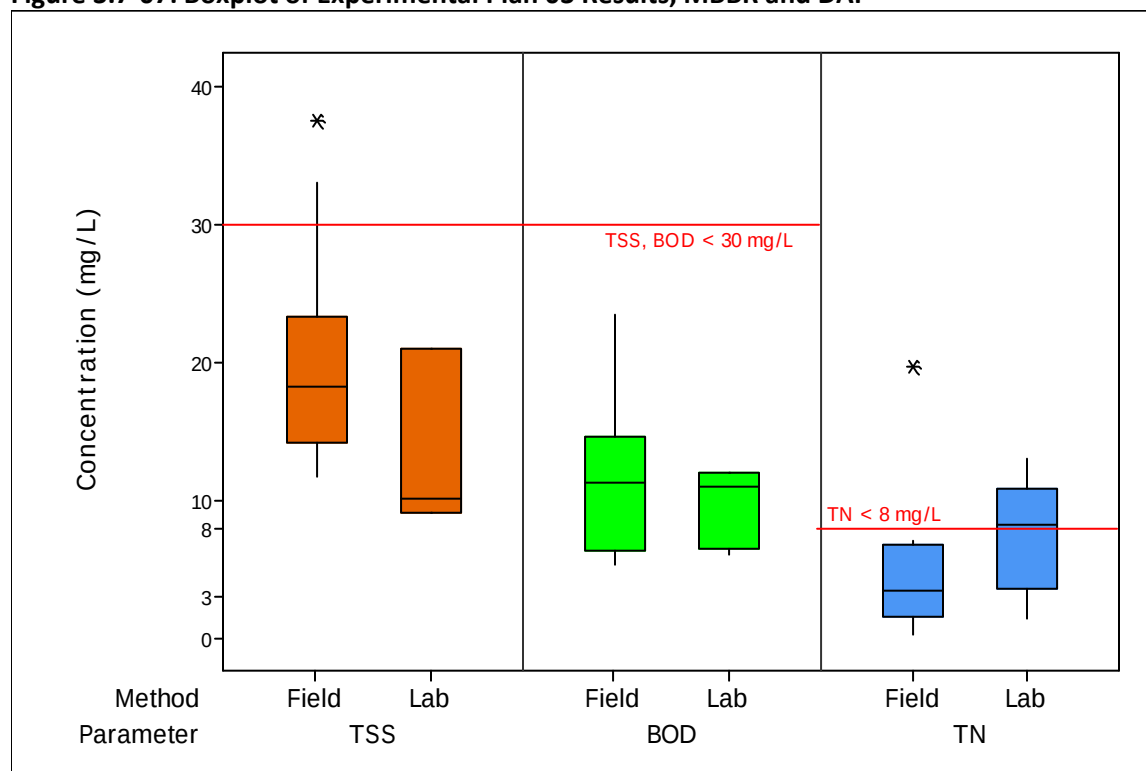
The effluent total nitrogen concentrations increased throughout the testing period from 1.3 mg/L on May 15 to 13 mg/L on May 31. Laboratory analyses of NO_x showed that the increased total nitrogen was likely a problem with the denitrification stage of the reactor. During this phase of the testing, the supplemental carbon dose was adjusted based on the nitrate concentration and dissolved oxygen concentration in the NR2 reactor. It is possible that the supplemental carbon dose was too low during this period. It was also noted during this period that there were stagnant corners in the DN1 reactor, which reduced the effective volume of the tank and may have contributed to poor denitrification during this phase. Table 3.7-06 shows the laboratory results for the test period.

Table 3.7-06: Laboratory Results for MBBR/DAF Experimental Trial 03

Report	Date and Time	Concentration (mg/L)			
		NO _x -N	Ammonia-N	TKN	TN
#110368	5/15/12 10:00	<0.5	<0.05	1.3	1.3
#110487	5/18/12 8:00	0.6	0.82	2.9	3.5
#110533	5/21/12 7:00	5.8	0.11	1.7	7.5
#110559	5/22/12 7:00	0.9	4.1	7.3	8.2
#110632	5/23/12 8:15	6.0	0.07	2.2	8.2
#110656	5/24/12 9:15	8.0	<0.05	2.6	10.8
#110863	5/31/12 12:00	8.3	2.5	4.7	13

Figure 3.7-07 shows a boxplot of the TSS, BOD, and TN results compared to a reference line for the 30/30 and TN<8 permit limit.

Figure 3.7-07: Boxplot of Experimental Plan 03 Results, MBBR and DAF



3.7.3.4 Experimental Plan 04

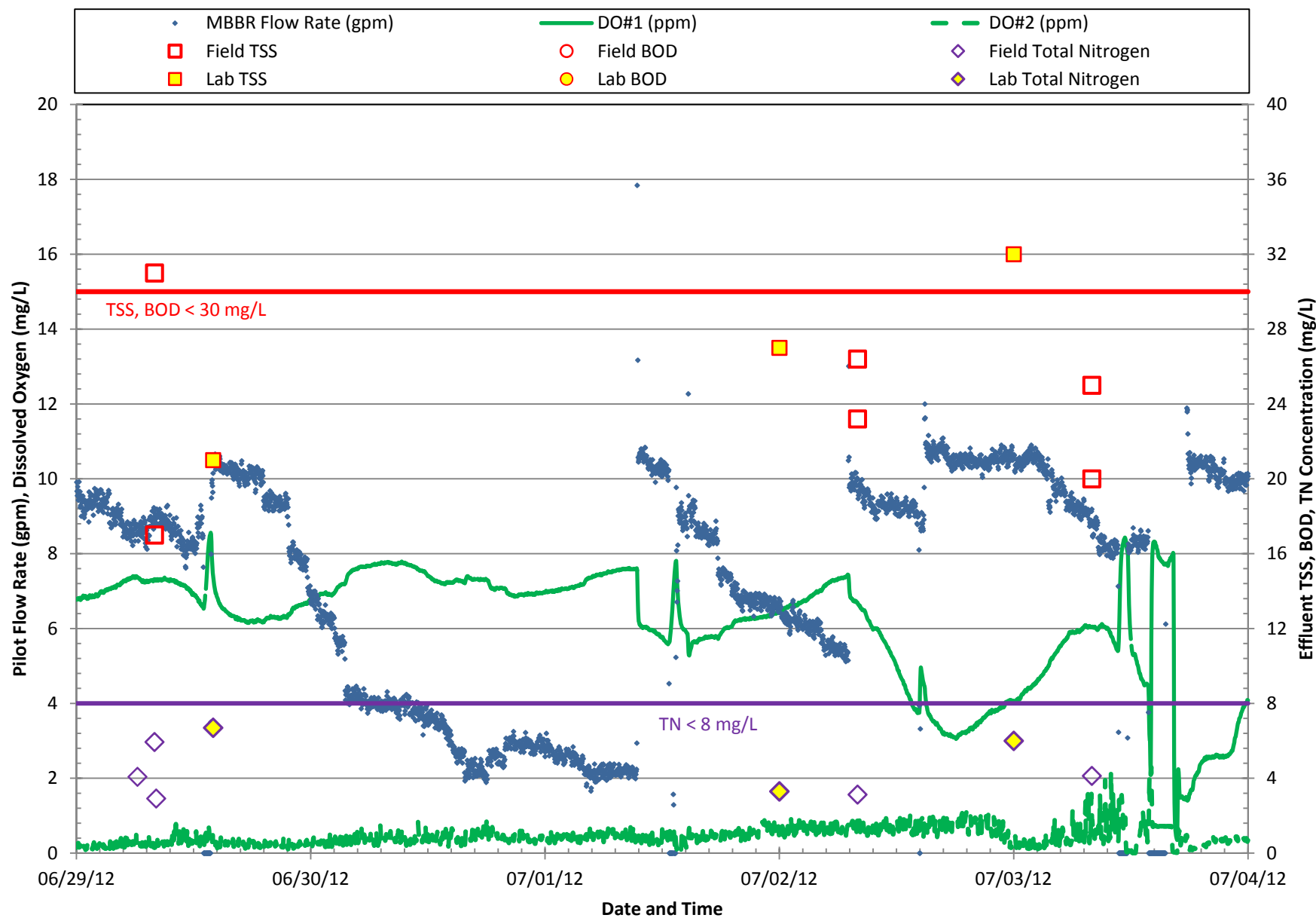
EXPERIMENTAL PLAN 04 is described in Section 3.7.4

3.7.3.5 Experimental Plan 05

EXPERIMENTAL PLAN 05 was conducted from June 29 through July 3, 2012 to evaluate the treatment performance for treating to a goal of 30 mg/L BOD, 30 mg/L TSS, and 8 mg/L total nitrogen. The Experimental Plan differed from Experimental Plan 03 because additional ammonia was added to the primary effluent to increase the influent TKN to the system to approximately 45 mg/L. Soda ash was added to the primary effluent to increase the primary effluent total alkalinity to approximately 150 mg/L as CaCO_3 . The screened openings in the baffle walls dividing NR1 from NR2, and NR2 from DN1, were modified to reduce the opening surface area for better DO control. MicroC 1000 was added to the DN1 tank to convert nitrate to nitrite, and was paced to maintain an ORP in the DN1 tank of less than -80 mV.

Figure 3.7-08 shows the data collected during Experimental Trial 05 on the MBBR and DAF. The flow rate through the process was adjusted daily to target an organic loading of 7.57 gr BOD/1000 cf-day, and was typically adjusted in the afternoon based on the results from the previous 24-hour composite sample. The influent BOD loading for the period averaged 6.8 gr BOD/1000 cf-day. The dissolved oxygen concentration was monitored in the NR1 reactor by DO Probe #1, and in the NR2 tank by DO Probe #2. During this trial, the target dissolved oxygen concentration in the NR 1 tank was 4-6 mg/L, and <1 mg/L in the NR2 tank.

Figure 3.7-08: Results from Experimental Trial 05 - MBBR and DAF



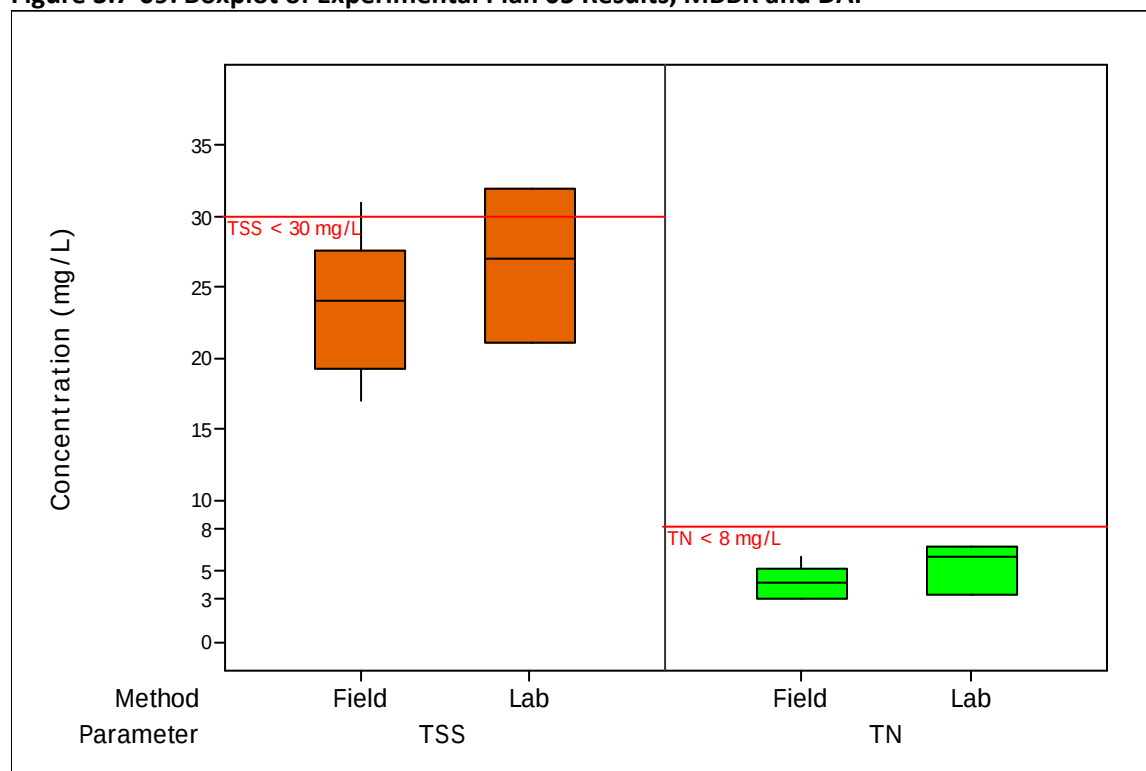
Composite samples were collected on June 29, July 2 and July 3 and results were provided by Eastern Analytical under lab reports #111706, and #111809. Results are summarized on Table 3.7-07

Table 3.7-07: Results for Experimental Trial 05 on MBBR and DAF

Parameter	Results	Goal
Influent Flow Rate (gpm)	7.03	13.6
Influent TSS (mg/L)	103 (82 – 142) [6]	N/A
Influent BOD (mg/L), calculated from COD	238 (127 – 490) [12]	
Influent Ammonia (mg/L)	29 (18 – 36) [8]	
BOD Loading Rate(grams BOD/1000 cf · day)	6.8	7.6
TKN Loading Rate(grams TKN/1000 cf · day)	0.46	
Effluent BOD (Field)	None collected	30
Effluent BOD (Calculated from COD)	17.4 (13.3 – 22.4) [6]	
Effluent BOD (Lab)	None collected	
Effluent TSS (Field)	23.8 (17 – 31) [6]	30
Effluent TSS (Lab)	21, 27, 32	
Effluent TN (Field)	4.0 (2.9 – 5.9) [5]	8
Effluent TN (Lab)	6.7, 3.3, 6	

Figure 3.7-09 shows a boxplot of the TSS, BOD, and TN results compared to a reference line for the 30/30 and TN<8 permit limit. Removal of total nitrogen during Experimental Trial 05 was improved over the nitrogen removal during Experimental Trial 03 even with the increased influent TKN concentration. The improvement was likely due to improved mixing in both the NR1 and DN1 tanks, and the ability to control the supplemental carbon dose with information from the online ORP probe in the DN1 tank. TSS removal through the DAF continued to be marginal, with two of the nine samples above the TSS limit of 30 mg/L.

Figure 3.7-09: Boxplot of Experimental Plan 05 Results, MBBR and DAF



3.7.3.6 Experimental Plan 06

EXPERIMENTAL PLAN 06 was conducted from July 9 through July 17, 2012 to evaluate the treatment performance for treating to a treatment goal of 30 mg/L BOD, 30 mg/L TSS, and 3 mg/L total nitrogen. Modifications to add an additional denitrification zone were completed on July 3, and the system was allowed to acclimate for approximately one week prior to starting the experimental testing.

Figure 3.7-10 shows the data collected during Experimental Trial 06 on the MBBR and DAF. The flow rate through the process was adjusted daily to target an organic loading of 7.57 gr BOD/1000cf-day, and was typically adjusted in the afternoon based on the results from the previous 24-hour composite sample. The influent BOD loading for the period averaged 9.3 gr BOD/1000 cf-day. Flow to the pilot system was interrupted due to an alarm malfunction on July 10 through July 11. The dissolved oxygen concentration was monitored in the NR1 reactor by DO Probe #1, and in the NR2 tank by DO Probe #2. During this trial, the target dissolved oxygen concentration in the NR 1 tank was 4-6 mg/L, and <1 mg/L in the NR2 tank.

Composite samples were collected on July 10, 13, 14, and 17 and results were provided by Eastern Analytical under lab reports #112088, and #112277. Results are summarized on Table 3.7-08.

Figure 3.7-10: Results from Experimental Trial 06 - MBBR and DAF

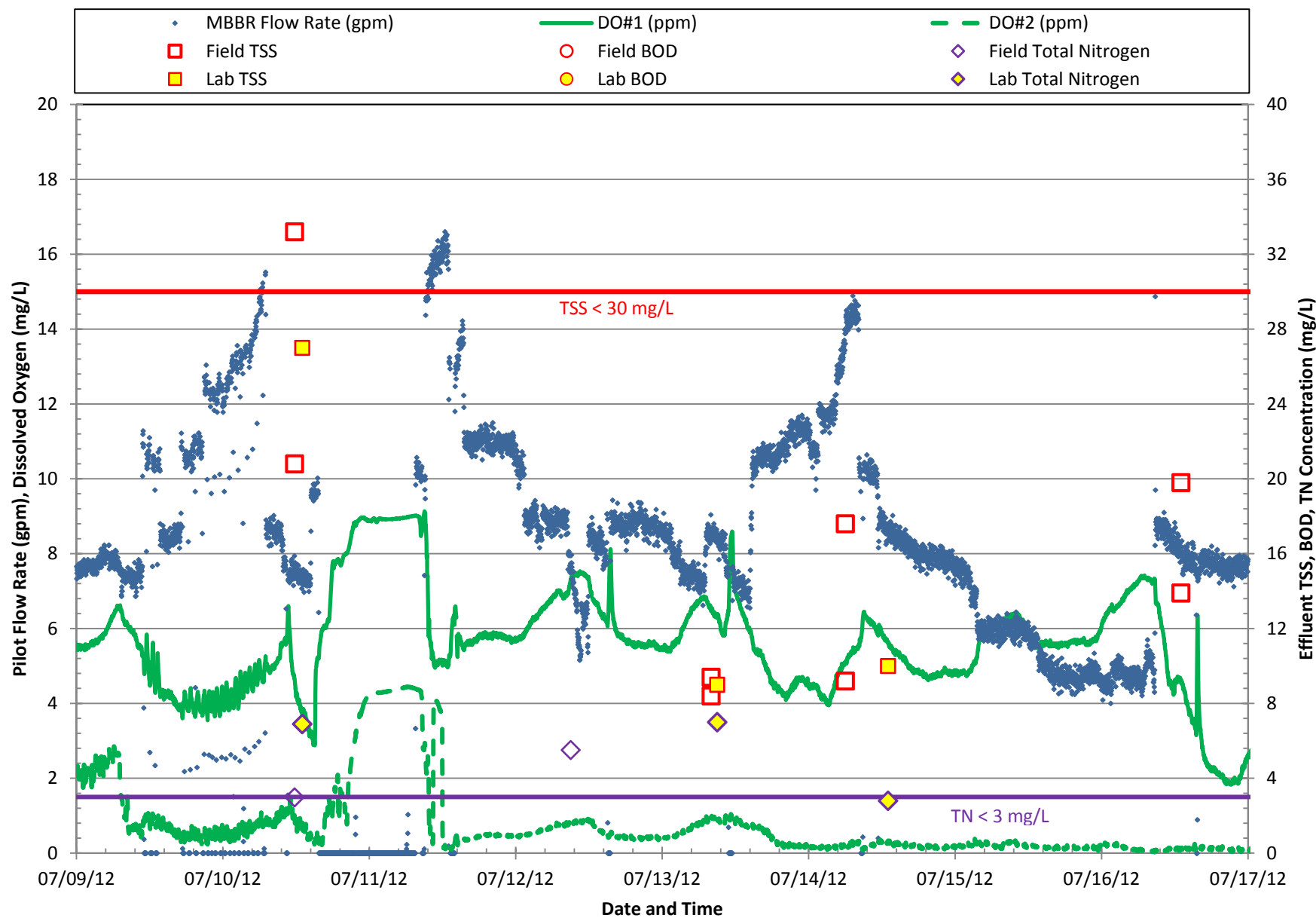


Table 3.7-08: Results for Experimental Trial 06 on MBBR and DAF

Parameter	Results	Goal
Influent Flow Rate (gpm)	8.56 (4.88 – 10.87)	13.6
Influent TSS (mg/L)	122 (98 – 145) [12]	N/A
Influent BOD (mg/L), Calculated from COD	274 (157 – 395) [32]	
Influent Ammonia (mg/L)	38 (22 – 58) [25]	
BOD Loading Rate(grams BOD/1000 cf · day)	9.3	7.6
TKN Loading Rate(grams TKN/1000 cf · day)	0.74	
Effluent BOD (Field)	Not collected	30
Effluent BOD (Calculated from COD)	17.5 (11.2 – 31.5) [11]	
Effluent BOD (Lab)	Not collected	
Effluent TSS (Field)	15.3 (8.4 – 33.2) [10]	30
Effluent TSS (Lab)	27, 9, 10, 12	
Effluent TN (Field)	2.98, 5.5	3
Effluent TN (Lab)	6.9, 7, 2.8, 3.8	

Figure 3.7-11 shows a boxplot of the TSS, BOD, and TN results compared to a reference line for the 30/30 and TN<3 permit limit.

Figure 3.7-11: Boxplot of Experimental Plan 06 Results, MBBR and DAF

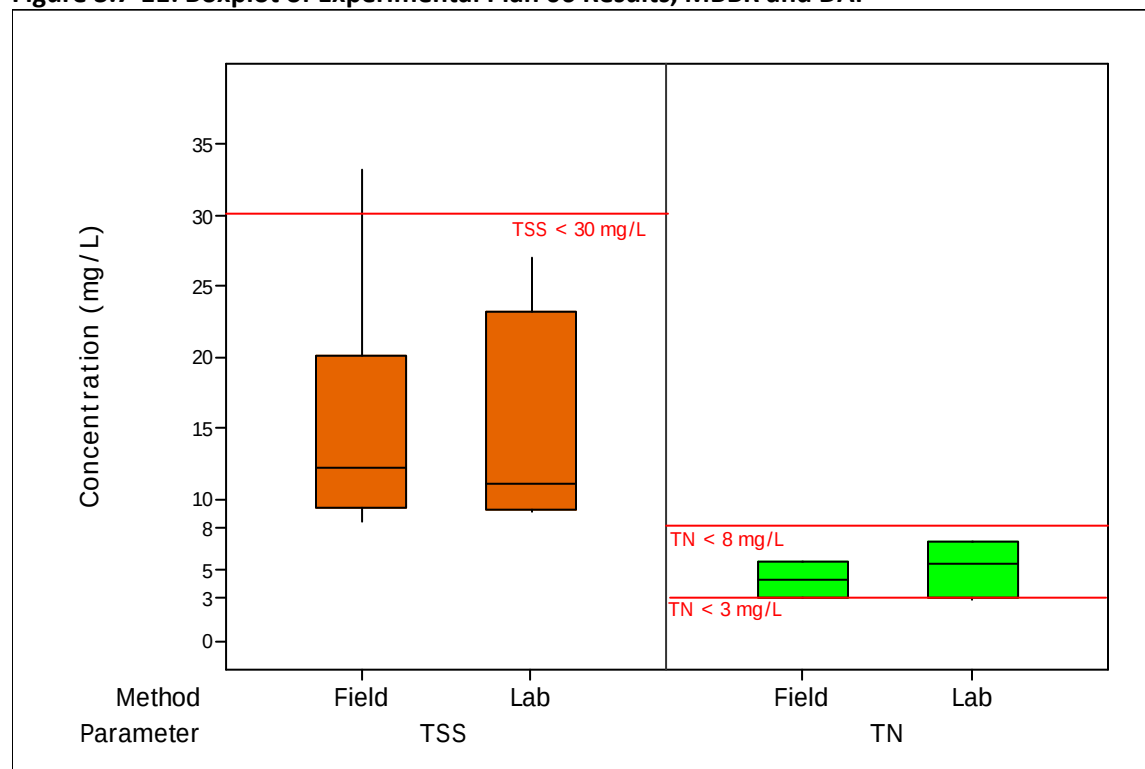


Table 3.7-08 and Figure 3.7-11 show that the process did not meet the effluent TN goal of less than 3 mg/L during the pilot testing with the elevated influent ammonia. It is possible that the 1 week acclimation time was not long enough to grow sufficient biomass on the virgin media to treat the elevated ammonia.

3.7.4 Stress Trial Results, Results of Experimental Trial 04

3.7.4.1 Full Strength, Mid flow, Short duration (FMS) Hydraulic Stress Test

Results from the Full-strength, Mid flow, short duration (FMS) Trial are shown graphically in Figure 3.7-12. The flow rate was increased from 8 gpm to 19 gpm at 10:03 am on May 31. Two samples collected on the same day prior to the flow rate increase were below the goals for TSS and COD (assuming a COD:BOD ratio of 4.8), and were very close to the TN goal of 8 mg/L. The three TN field results for the process prior to the flow rate increase were 4.09 (previous day), 6.91, 7.12 mg/L TN-N from the DN1 reactor, and 3.98 (previous day), 8.77, 9.61 from the DAF system. TN results were not available before the commencement of the test, and it was assumed that results were similar to the acceptable results from the previous day.

The increased flow rate depressed the dissolved oxygen concentration in both nitrification reactors immediately, and the DO recovered within 3 hours of recovery time (note that the air feed was not adjusted during the trial). The increase in flow also appeared to have an effect on the TN, COD and TSS from the process, but both TSS and TN were below their respective goals within 2 hours of recovery time. The pattern of COD and TSS on Figure 3.7-12 suggested that additional samples should be collected to fully evaluate system recovery.

A series of one-way ANOVAs were completed on each parameter to determine if there was an effect attributable to the flow increase (see Section 2.6 for an explanation of the statistical methods used). Each ANOVA compared three data sets: Pre-peak, Mid-peak, and Recovery. For example, the DN1 Reactor COD data were grouped into sets for Pre, Mid and Recovery. The ANOVA then tested the hypothesis that the means of the three data sets were equal within a 90% level of confidence (the null hypothesis). The probability (p) was 0.696, which indicates there was a 69.6% probability that the means were equal for DN1 COD data before, during and after the hydraulic peak. The p-value was tested against a level of significance (α) that was selected to be 0.100, which is the minimum allowable probability to accept the null hypothesis as true. In this example p is greater than α ($0.696 > 0.100$) so the null hypothesis is accepted: there was no statistically significant difference in DN1 COD before, during, or after the peak.

The p-values from the ANOVAs are shown in Table 3.7-09. All water quality parameters measured during the FMS stress test are included in Table 3.7-10.

Table 3.7-09: MBBR/DAF Experimental Plan 04 FMS – Summary of ANOVA Results

Parameter	p -value	
	DN1 Reactor	DAF Effluent
TSS	0.158	0.968
COD	0.696	0.020
TN	0.161	0.644
Ammonia	0.374	No Data
NOx	0.039	0.713

The low p-values that are highlighted in Table 3.7-10 were each less than 0.100 (10%), which indicates a low probability that the means of the data were the same, or conversely that the hydraulic stress test had a statistically significant effect upon DN1 NO_x-N and DAF COD. Both ANOVA calculations are described below.

Boxplots for TSS and COD are shown in Figure 3.7-13, and boxplots for NH₃-N, NO_x-N and TN are shown in Figure 3.7-14.

One-way ANOVA: DAF COD versus Step

Source	DF	SS	MS	F	P
Step	2	1307	654	4.87	0.020
Error	19	2548	134		
Total	21	3855			

S = 11.58 R-Sq = 33.91% R-Sq(adj) = 26.95%

				Individual 95% CIs For Mean Based on Pooled StDev
Step	N	Mean	StDev	
1 Pre	6	49.05	11.04	(-----+-----+-----+-----+-----+-----)
2 Spike	6	61.30	17.84	(-----*-----)
3 Recovery	10	42.64	6.22	(-----*-----)
				(-----+-----+-----+-----+-----+-----)
				40 50 60 70

Pooled StDev = 11.58

The ANOVA table shows that the DAF COD during the peak flow condition averaged 61.3, while it averaged 49.05 before the flow increase and 42.64 after the flow increase. Since the BOD associated with the higher COD is approximately 12 mg/L, and still below the regulatory limit of 30 mg/L, the increase in COD may not be practically significant.

One-way ANOVA: DN1 NO_x-N versus Step

Figure 3.7-12: MBBR FMS | 2-hour, Medium Flow Stress Test

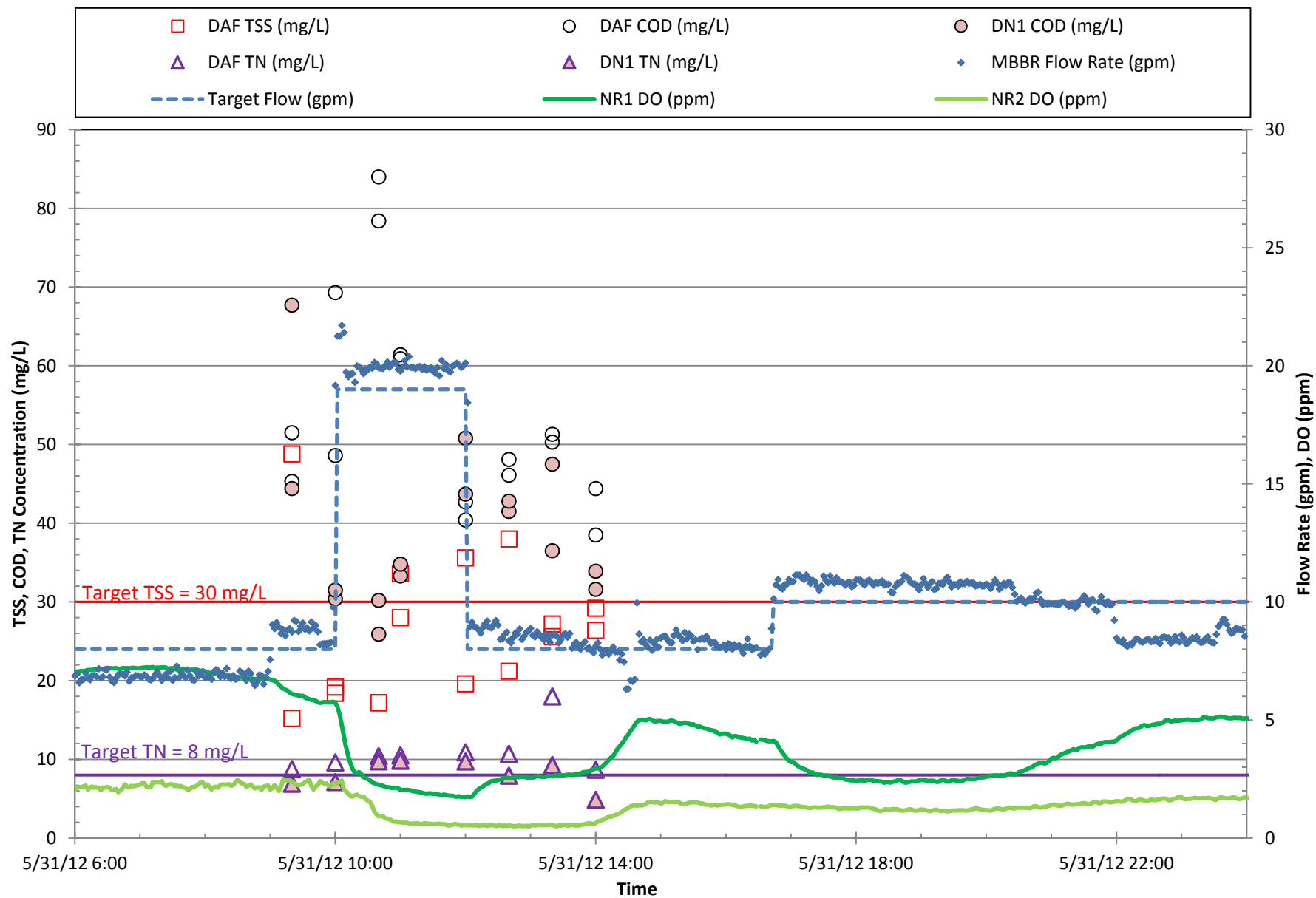


Figure 3.7-13: Boxplot of MBBR and DAF Experimental Plan 04 FMS Results, TSS and COD

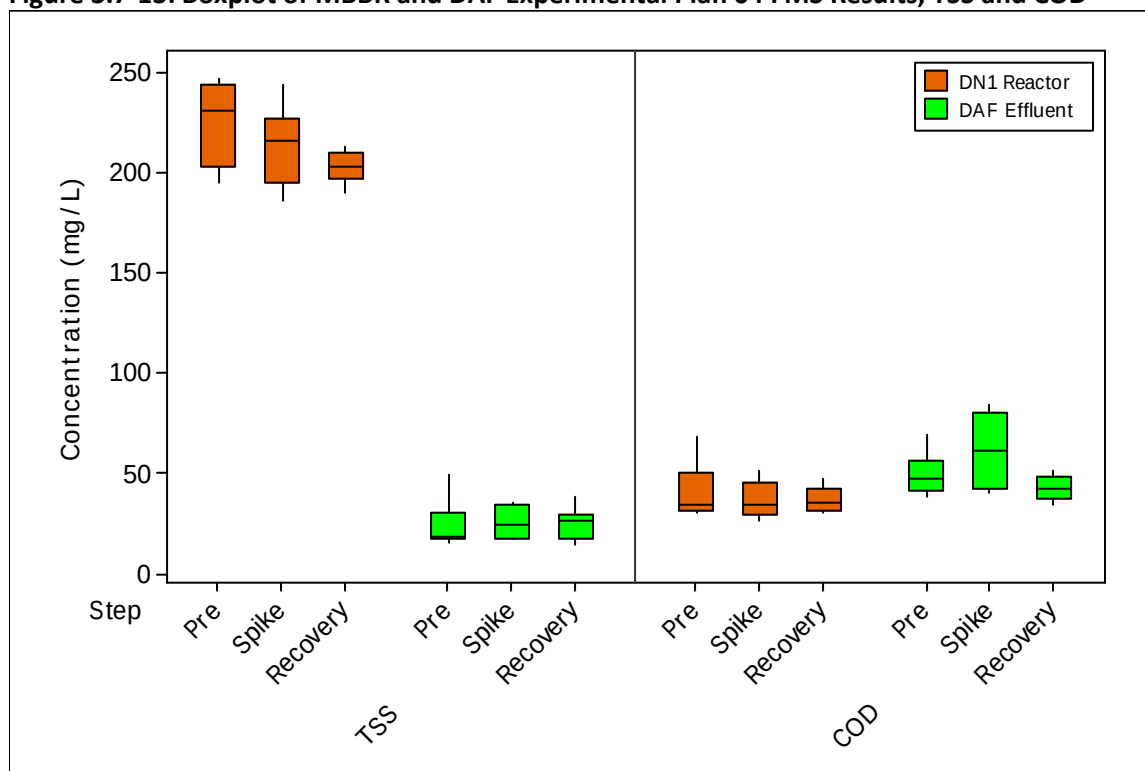


Figure 3.7-14: Boxplot of MBBR/DAF Experimental Plan 04 FMS Results, Ammonia, NOx and TN and NOx

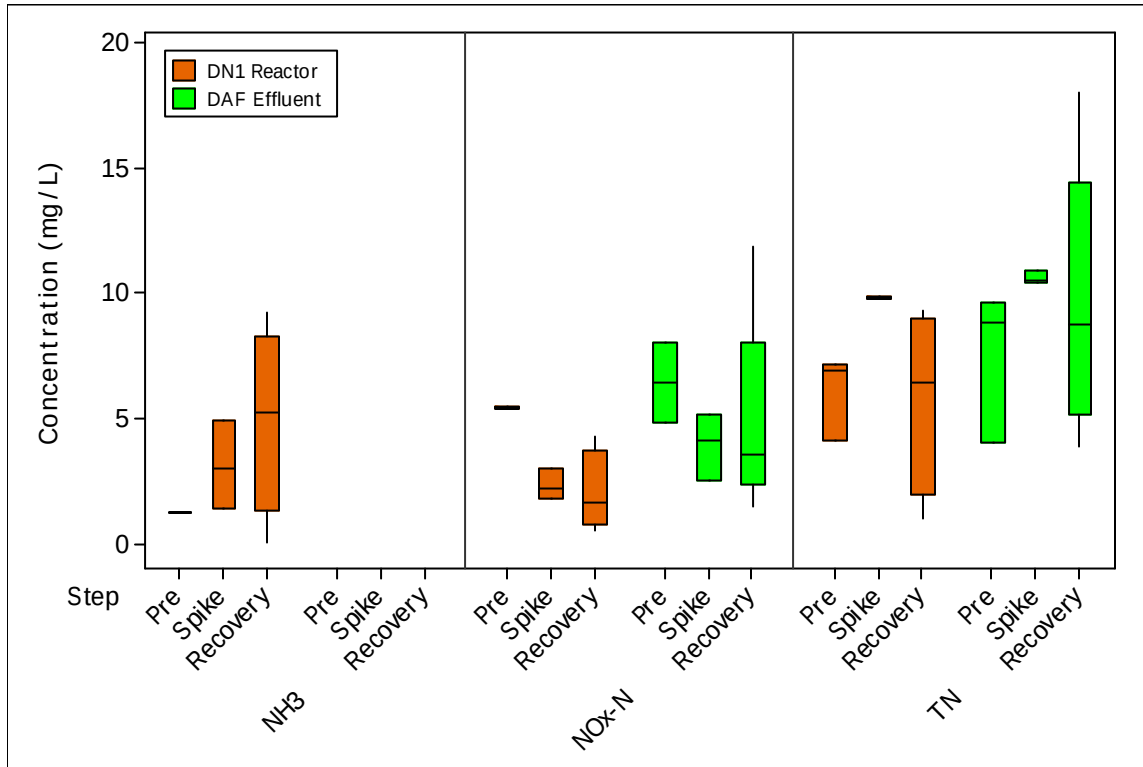


Table 3.7-10a: Water Quality Results for MBBR/DAF Experimental Plan 04 FMS

Date and Time	Location	Type	Step	Concentration (mg/L)					
				TSS	COD	COD(s)	NH ₃	TN	NOx-N
5/30 08:00	02 PRIMARY EFF	F	Pre-Spike	202.0			31.4	11.60	0.551
5/30 08:00	02 PRIMARY EFF	F		192.5					
5/30 08:00	11 MBBR BOD	F				70.6	7.8		
5/30 08:00	11 MBBR BOD	F				68.5			
5/30 08:00	12 MBBR NR1	F					0.33		
5/30 08:00	14 MBBR NR2	F				33.4	0.05		
5/30 08:00	14 MBBR NR2	F				36.6			
5/30 08:00	15 MBBR DN1	F				33.4		4.09	
5/30 08:00	15 MBBR DN1	F				35.0			
5/30 08:00	17 DAF EFF	F		17.5	41.8			3.98	
5/30 08:00	17 DAF EFF	F		24.0	37.8				
5/31 08:00	02 PRIMARY EFF	F		124.4	636.0				
5/31 08:00	02 PRIMARY EFF	F		146.0	631.0				
5/31 08:30	02 PRIMARY EFF	F		152.0	621.0	399.0	18.7	12.00	0.478
5/31 08:30	02 PRIMARY EFF	F		161.0	802.0	401.0			
5/31 08:30	11 MBBR BOD	F				44.6	7.3		
5/31 08:30	11 MBBR BOD	F				46.0			
5/31 08:30	12 MBBR NR1	F					0.05		8.310
5/31 08:30	12 MBBR NR1	F							
5/31 08:30	14 MBBR NR2	F				27.9	0.02		8.310
5/31 08:30	14 MBBR NR2	F				28.4			
5/31 09:20	15 MBBR DN1	F		226.4		67.7	1.23	6.91	5.340
5/31 09:20	15 MBBR DN1	F		234.4		44.4			
5/31 09:20	17 DAF EFF	F		48.8	45.3			8.77	4.820
5/31 09:20	17 DAF EFF	F		15.2	51.5				
5/31 10:00	15 MBBR DN1	F		246.8		30.4	1.23	7.12	5.450
5/31 10:00	15 MBBR DN1	F		194.4		31.5			
5/31 10:00	17 DAF EFF	F		18.4	48.6			9.61	7.970
5/31 10:00	17 DAF EFF	F		19.2	69.3				

* Sample Type: F = Field, L = Laboratory

Table 3.7-10b: Water Quality Results for MBBR/DAF Experimental Plan 04 FMS (continued)

Date and Time	Location	Type	Step	Concentration (mg/L)					
				TSS	COD	COD(s)	NH ₃	TN	NOx-N
5/31 10:40	15 MBBR DN1	F	Spike	213.6		25.9	1.36	9.74	2.950
5/31 10:40	15 MBBR DN1	F		243.6		30.2			
5/31 10:40	17 DAF EFF	F		17.2	78.4			10.40	4.080
5/31 10:40	17 DAF EFF	F		17.2	84.0				
5/31 11:00	15 MBBR DN1	F		218.4		33.3	2.98	9.82	1.770
5/31 11:00	15 MBBR DN1	F		220.8		34.8			
5/31 11:00	17 DAF EFF	F		33.6	61.4			10.50	2.510
5/31 11:00	17 DAF EFF	F		28	60.9				
5/31 12:00	02 PRIMARY EFF	F			606.0				
5/31 12:00	02 PRIMARY EFF	F			614.0				
5/31 12:00	15 MBBR DN1	F		197.2		50.8	4.86	9.73	2.200
5/31 12:00	15 MBBR DN1	F		186		43.7			
5/31 12:00	17 DAF EFF	F		35.6	42.7			10.90	5.150
5/31 12:00	17 DAF EFF	F		19.6	40.4				
5/31 12:40	15 MBBR DN1	F	Recovery	208.4		41.5	5.49	7.93	1.390
5/31 12:40	15 MBBR DN1	F		189.6		42.8			
5/31 12:40	17 DAF EFF	F		21.2	46.1			10.70	3.550
5/31 12:40	17 DAF EFF	F		38	48.1				
5/31 13:20	15 MBBR DN1	F		201.2		36.5	9.2	9.29	4.290
5/31 13:20	15 MBBR DN1	F		199.2		47.5			
5/31 13:20	17 DAF EFF	F		25.6	50.3			18.00	11.800
5/31 13:20	17 DAF EFF	F		27.2	51.3				
5/31 14:00	15 MBBR DN1	F		212.8		31.6	4.86	4.86	1.820
5/31 14:00	15 MBBR DN1	F		204.8		33.9			
5/31 14:00	17 DAF EFF	F		26.4	44.4			8.68	3.240
5/31 14:00	17 DAF EFF	F		29.2	38.5				
6/03 09:30	02 PRIMARY EFF	F			130.0			14.40	1.430
6/03 09:30	02 PRIMARY EFF	F			127.0				
6/03 09:30	14 MBBR NR2	F					0.17		

Table 3.7-10c: Water Quality Results for MBBR/DAF Experimental Plan 04 FMS (continued)

Date and Time	Location	Type	Step	Concentration (mg/L)					
				TSS	COD	COD(s)	NH ₃	TN	NO _x -N
6/03 09:30	15 MBBR DN1	F	Recovery			30.6	0.07		
6/03 09:30	15 MBBR DN1	F				30.6			
6/03 09:30	17 DAF EFF	F		15.6	39.3			3.86	1.470
6/03 09:30	17 DAF EFF	F		14.8	39.2				
6/04 08:00	02 PRIMARY EFF	F		45.5	147.0	88.6	5.1	4.13	0.314
6/04 08:00	02 PRIMARY EFF	F		53.5	129.0	86.8			
6/04 08:00	11 MBBR BOD	F				34.1	3.2		
6/04 08:00	11 MBBR BOD	F				37.7			
6/04 08:00	12 MBBR NR1	F					0.36		
6/04 08:00	14 MBBR NR2	F				36.3	0.3		
6/04 08:00	14 MBBR NR2	F				35.2			
6/04 08:00	15 MBBR DN1	F				34.3		1.00	0.497
6/04 08:00	15 MBBR DN1	F				35.6			
6/04 08:00	17 DAF EFF	F		17.6	34.4			6.48	4.260
6/04 08:00	17 DAF EFF	F		29.6	34.8				
6/04 12:00	17 DAF EFF	F							

3.7.4.2 Full-strength, Peak flow, short duration (FPS) Trial –

Results from the Full-strength, Peak flow, short duration (FPS) Trial are shown graphically in Figure 3.7-15. The flow rate was increased from 13.5 gpm to 23 gpm at 10:03 am on June 5. Three samples collected prior to the flow rate increase were below the goals for TSS, TN, and COD (assuming a COD:BOD ratio of 4.8), and were very close to the TN goal of 8 mg/L.

The increased flow rate depressed the dissolved oxygen concentration in the nitrification reactor NR1 immediately, and the DO recovered within 3 hours of recovery time (note that the air feed was not adjusted during the trial). The increase in flow also appeared to have an immediate effect on the TN, COD and TSS from the process, but both TSS and TN were below their respective goals within 2 hours of recovery time.

A series of one-way ANOVAs were completed on each parameter to determine if the flow increase had an effect upon effluent water quality parameters. The p-values from the ANOVAs are shown in Table 3.7-11. Box plots are shown in Figures 3.7-16 and 3.7-17.

Table 3.7-11: MBBR/DAF Experimental Plan 04 FPS – Summary of ANOVA Results

Parameter	p -value	
	DN1 Reactor	DAF Effluent
TSS	0.230	0.264
COD	0.103	0.525
TN	0.025	0.272
Ammonia	0.178	0.318
NOx	0.267	0.911

The low p-values that are highlighted in Table 3.7-11 indicate that there was a statistically significant effect from the hydraulic stress test for the DN1 Reactor TN values. There is not a statistically significant effect on the ammonia in the DN1 reactor, despite a marked increase in the ammonia measurements in the DN1 reactor. It is likely that the statistical test fails to detect a difference because low ammonia data is included in the recovery data. It is clear from Figure 3.7-15 and the boxplot Figure 3.7-16 and 3.7-17 that the ammonia and TN concentrations are impacted by the increase in flow rate.

All water quality parameters measured during the FPS stress test are included in Tables 3.7-12.

Figure 3.7-15: MBBR FPS | 2-hour, Peak Flow Stress Test

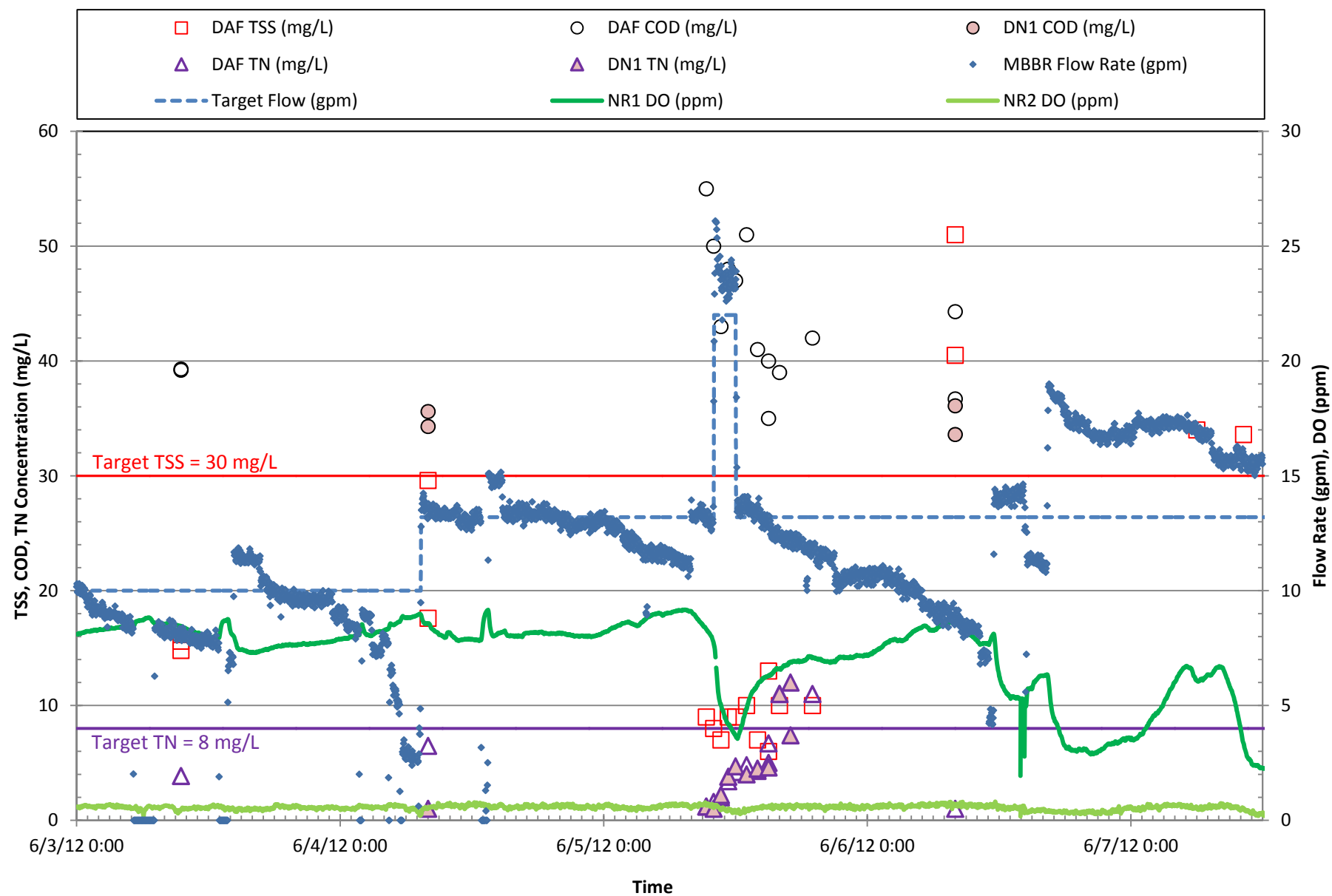


Figure 3.7-16: Boxplot of MBBR/DAF Experimental Plan 04 FPS Results, TSS and COD

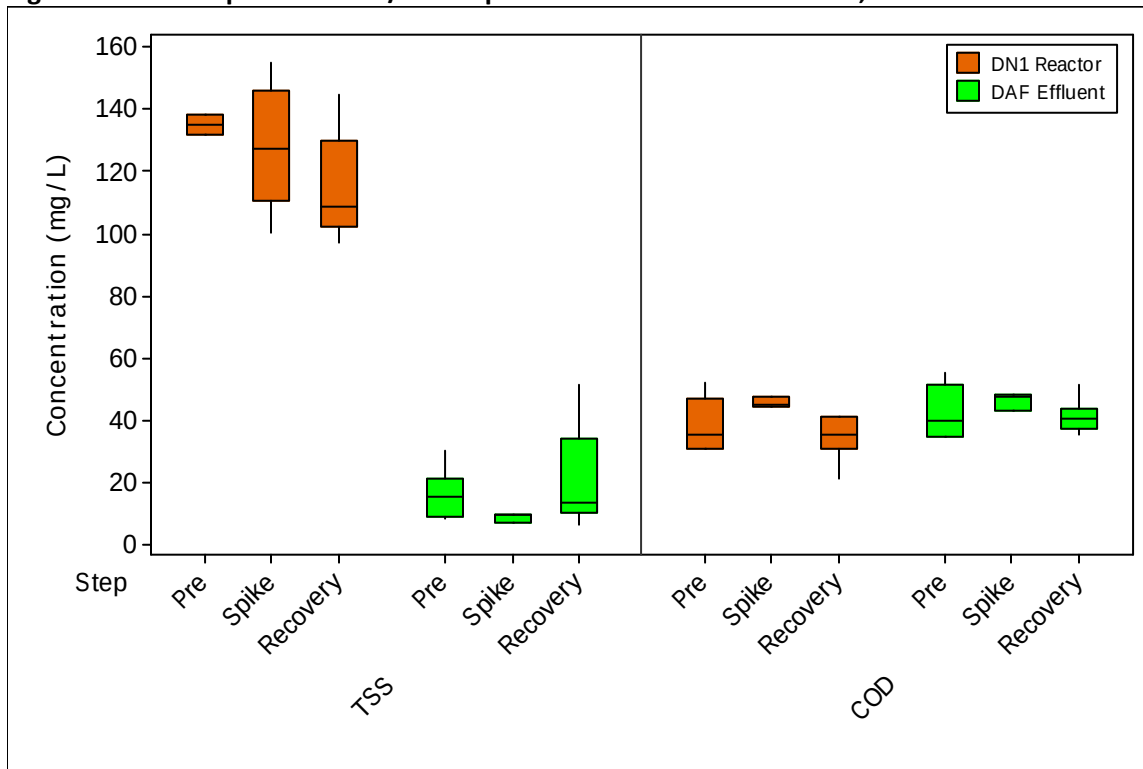


Figure 3.7-17: Boxplot of MBBR/DAF Experimental Plan 04 FPS Results, Ammonia, TN and NOx

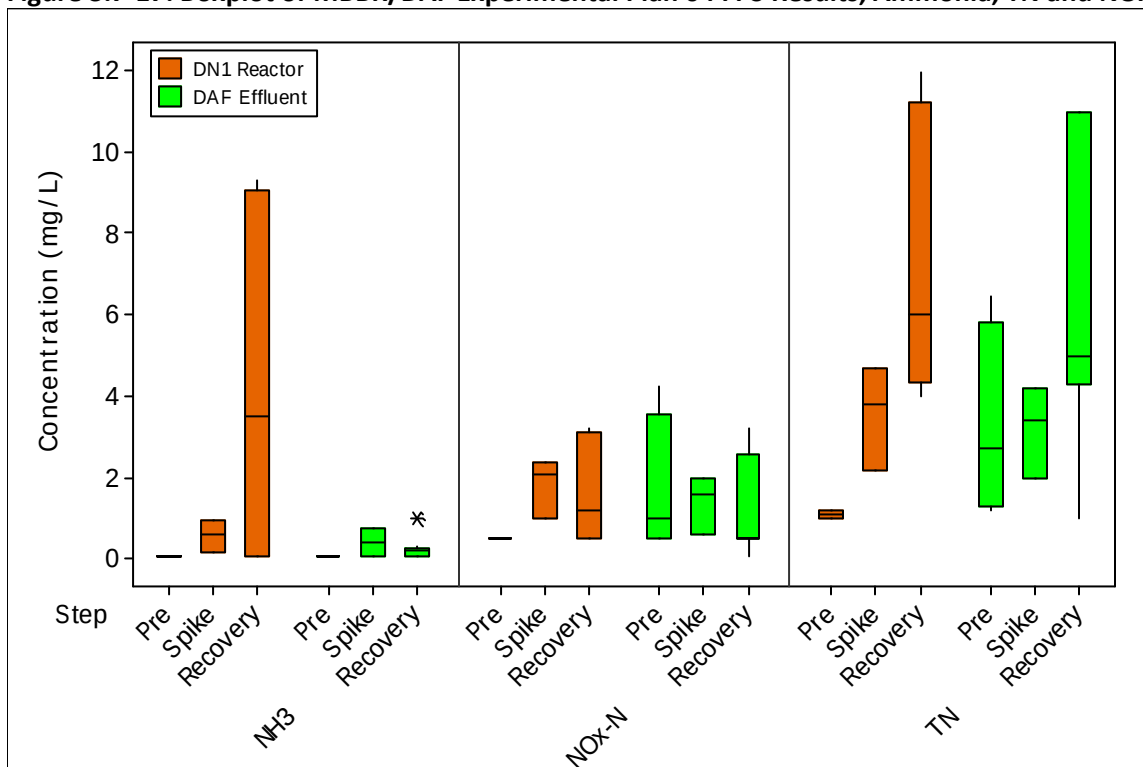


Table 3.7-12a: Water Quality Results for MBBR/DAF Experimental Plan 04 FPS

Date and Time	Location	Type	Step	Concentration (mg/L)					
				TSS	COD	COD(s)	NH ₃	TN	NOx-N
6/03 09:30	02 PRIMARY EFF	F	Pre-Spike		130.0			14.40	1.430
6/03 09:30	02 PRIMARY EFF	F			127.0				
6/03 09:30	14 MBBR NR2	F					0.17		
6/03 09:30	15 MBBR DN1	F			30.6		0.07		
6/03 09:30	15 MBBR DN1	F			30.6				
6/03 09:30	17 DAF EFF	F		15.6	39.3			3.86	1.470
6/03 09:30	17 DAF EFF	F		14.8	39.2				
6/04 08:00	02 PRIMARY EFF	F		45.5	147.0	88.6	5.1	4.13	0.314
6/04 08:00	02 PRIMARY EFF	F		53.5	129.0	86.8			
6/04 08:00	11 MBBR BOD	F				34.1	3.2		
6/04 08:00	11 MBBR BOD	F				37.7			
6/04 08:00	12 MBBR NR1	F					0.36		
6/04 08:00	14 MBBR NR2	F				36.3	0.3		
6/04 08:00	14 MBBR NR2	F				35.2			
6/04 08:00	15 MBBR DN1	F				34.3		<1	0.497
6/04 08:00	15 MBBR DN1	F				35.6			
6/04 08:00	17 DAF EFF	F		17.6		34.4		6.48	4.260
6/04 08:00	17 DAF EFF	F		29.6		34.8			
6/04 12:00	17 DAF EFF	F							
6/05 08:00	17 DAF EFF	F					0.09		
6/05 09:20	17 DAF EFF	L		9	55		<0.05	1.2	<0.5
6/05 09:20	15 MBBR DN1	L			52		<0.05	1.2	<0.5
6/05 10:00	17 DAF EFF	L		8	50		<0.05	1.6	<0.5
6/05 10:00	15 MBBR DN1	L			45		<0.05	1	<0.5
6/05 10:00	02 PRIMARY EFF	L		120	220		8.9	23	<0.5
6/05 10:00	15 MBBR DN1	F		138					
6/05 10:00	15 MBBR DN1	F		132					
6/05 10:40	17 DAF EFF	L	Spike	7	43		0.07	2	0.6
6/05 10:40	15 MBBR DN1	L			47		0.18	2.2	1

* Sample Type: F = Field, L = Laboratory

Table 3.7-12b: Water Quality Results for MBBR/DAF Experimental Plan 04 FPS (continued)

Date and Time	Location	Type	Step	Concentration (mg/L)					
				TSS	COD	COD(s)	NH ₃	TN	NOx-N
6/05 10:40	15 MBBR DN1	F	Spike	143					
6/05 10:40	15 MBBR DN1	F		155					
6/05 11:20	17 DAF EFF	L		9	48		0.39	3.4	1.6
6/05 11:20	15 MBBR DN1	L			44		0.6	3.8	2.1
6/05 11:20	15 MBBR DN1	F		121					
6/05 11:20	15 MBBR DN1	F		133					
6/05 12:00	17 DAF EFF	L		9	47		0.76	4.2	2
6/05 12:00	15 MBBR DN1	L			45		0.97	4.7	2.4
6/05 12:00	02 PRIMARY EFF	L		89	270		12	27	<0.5
6/05 12:00	02 PRIMARY EFF	F			309.0				
6/05 12:00	02 PRIMARY EFF	F			320.0				
6/05 12:00	15 MBBR DN1	F		100					
6/05 12:00	15 MBBR DN1	F		114					
6/05 13:00	17 DAF EFF	L	Recovery	10	51		1	4.8	1.9
6/05 13:00	15 MBBR DN1	L			41		0.79	4	1.9
6/05 13:00	15 MBBR DN1	F		107					
6/05 13:00	15 MBBR DN1	F		115					
6/05 15:00	17 DAF EFF	L		13	35		<0.5	6.7	<0.5
6/05 17:00	15 MBBR DN1	L			21		6.2	7.4	<0.5
6/05 19:00	17 DAF EFF	L		10	42		<0.5	11	<0.5
6/05 14:00	17 DAF EFF	L		7	41		0.09	4.3	2.6
6/05 16:00	15 MBBR DN1	L			31		9.3	11	<0.5
6/05 14:00	15 MBBR DN1	L			40		0.06	4.5	3.1
6/05 14:00	15 MBBR DN1	F		102					
6/05 14:00	15 MBBR DN1	F		103					
6/05 16:00	17 DAF EFF	L		10	39		<0.5	11	<0.5
6/05 15:00	17 DAF EFF	L		6	40		<0.05	5	3.2
6/05 17:00	15 MBBR DN1	L			30		9	12	<0.5
6/05 15:00	15 MBBR DN1	L			41		<0.05	4.6	3.2

Table 3.7-12c: Water Quality Results for MBBR/DAF Experimental Plan 04 FPS (continued)

Date and Time	Location	Type	Step	Concentration (mg/L)					
				TSS	COD	COD(s)	NH ₃	TN	NOx-N
6/05 15:00	02 PRIMARY EFF	L	Recovery	84	330		6.8	19	<0.5
6/05 15:00	02 PRIMARY EFF	F							
6/05 15:00	02 PRIMARY EFF	F							
6/05 15:00	15 MBBR DN1	F		97					
6/05 15:00	15 MBBR DN1	F		110					
6/05 15:00	17 DAF EFF	F					0.22		
6/05 15:00	17 DAF EFF	F							
6/05 18:00	17 DAF EFF	F					0.26		
6/06 00:00	17 DAF EFF	F							
6/06 00:00	17 DAF EFF	F					0.23		
6/06 06:00	17 DAF EFF	F							
6/06 06:00	17 DAF EFF	F					0.26		
6/06 08:00	02 PRIMARY EFF	F		93	291.0	129.0	8	6.20	0.216
6/06 08:00	02 PRIMARY EFF	F		93.5	249.0	131.0			
6/06 08:00	11 MBBR BOD	F				35.7	5.5		
6/06 08:00	11 MBBR BOD	F				32.5			
6/06 08:00	12 MBBR NR1	F					0.36		
6/06 08:00	12 MBBR NR1	F							
6/06 08:00	14 MBBR NR2	F				31.6	0.27		
6/06 08:00	14 MBBR NR2	F				32.3			
6/06 08:00	15 MBBR DN1	F				36.1			
6/06 08:00	15 MBBR DN1	F				33.6			
6/06 08:00	17 DAF EFF	F		40.5	36.7			<1	0.070
6/06 08:00	17 DAF EFF	F		51	44.3				
6/07 06:00	17 DAF EFF	F		34					
6/07 07:10	17 DAF EFF	F					0.34		
6/07 09:30	15 MBBR DN1	F		135					
6/07 09:30	15 MBBR DN1	F		144.5					
6/07 10:15	17 DAF EFF	F		33.6					

Table 3.7-12d: Water Quality Results for MBBR/DAF Experimental Plan 04 FPS (continued)

Date and Time	Location	Type	Step	Concentration (mg/L)					
				TSS	COD	COD(s)	NH ₃	TN	NO _x -N
6/07 11:00	02 PRIMARY EFF	F			375.0	196.0		24.80	0.230
6/07 11:00	02 PRIMARY EFF	F			353.0	194.0			
6/07 13:00	17 DAF EFF	F		24.8					

3.7.4.3 Full-strength, Peak flow, Medium duration (FPM) Trial –

The Full-strength, Peak flow, Medium duration (FPM) Trial was started after repairs to the interior wall separating the NR1 and NR2 tanks were repaired. Media from the NR2 tank were pushed into the NR1 tank by a mixer, and the NR1 and NR2 media were completely mixed in the NR1 tank. The repair was completed on June 11.

Results from the Full-strength, Peak flow, Medium duration (FPM) Trial are shown graphically in Figure 3.7-18. The flow rate was increased from 15 gpm to 22 gpm at 10:30 am on June 14, and reduced back to 10 gpm at 18:50. The test lasted 8.3 hours instead of the 6 hours that had been planned due to problems with other systems. Samples collected prior to the flow rate increase were below the goals for TSS, TN, and COD.

The increased flow rate depressed the dissolved oxygen concentration in the nitrification reactor NR1 only slightly. The increase in flow appeared to have a small effect on the TN, with effluent concentration increasing above the TN goal of 8 mg/L during and immediately after the flow increase.

A series of one-way ANOVAs were completed on each parameter to determine if there was an effect of the flow increase. ANOVA results are summarized in Table 3.7-13. Box plots are shown in Figure 3.7-19 and 3.7-20.

Results showed that there was a slight increase in DAF effluent TSS, though all results remained below the goal of 30 mg/L. There was also an effect on nitrogen removal, with an increase in both ammonia and total nitrogen concentrations in the DN1 reactor and DAF effluents. The recovery period was fairly rapid, with TN concentration below the goal within 6 hours.

Table 3.7-13: MBBR/DAF Experimental Plan 04 FPM – Summary of ANOVA Results

Parameter	p -value	
	DN1 Reactor	DAF Effluent
TSS	0.112	0.068
COD	0.218	0.128
TN	0.030	0.004
Ammonia	0.003	0.001
NOx	0.340	0.649

All water quality parameters measured during the FPS stress test are included in Tables 3.7-14a through 3.7-14c.

Figure 3.7-18: MBBR FPM | 6-hour, Peak Flow Stress Test

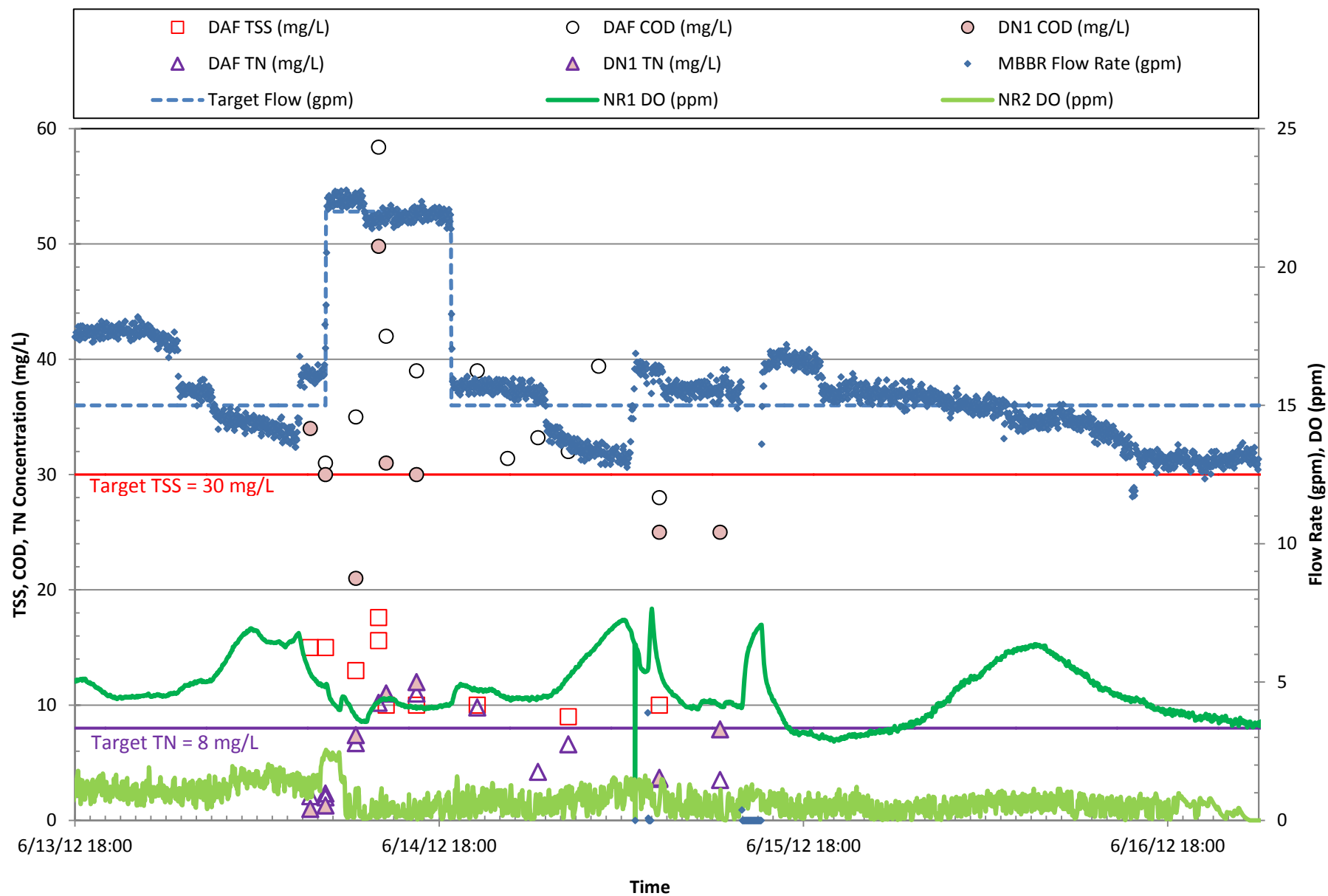


Figure 3.7-19: Boxplot of MBBR/DAF Experimental Plan 04 FPM Results, TSS and COD

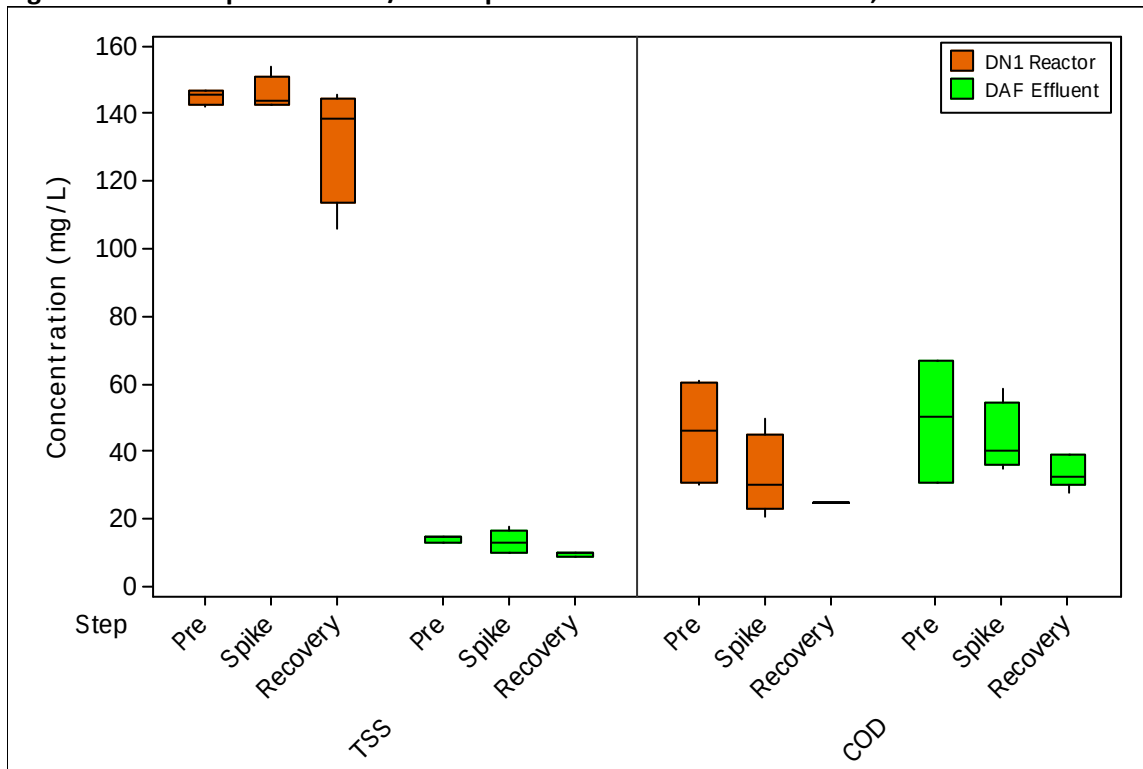


Figure 3.7-20: Boxplot of MBBR/DAF Experimental Plan 04 FPM Results, Ammonia, NOx, and TN

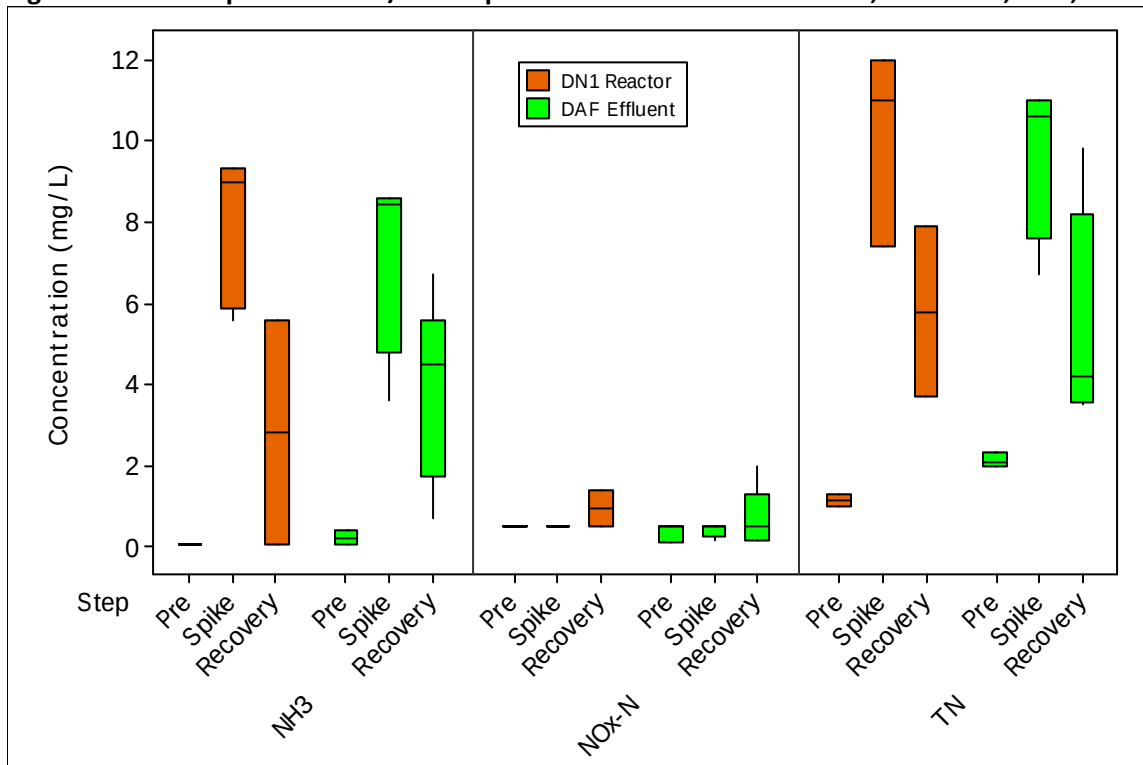


Table 3.7-14a: Water Quality Results for MBBR/DAF Experimental Plan 04 FPM

Date and Time	Location	Type	Step	Concentration (mg/L)					
				TSS	COD	COD(s)	NH ₃	TN	NOx-N
6/13 07:30	02 PRIMARY EFF	F	1 Pre		475.0	251.0	20	25.20	0.266
6/13 07:30	02 PRIMARY EFF	F	1 Pre		521.0	250.0			
6/13 07:30	11 MBBR BOD	F	1 Pre			136.0	8.1		
6/13 07:30	11 MBBR BOD	F	1 Pre			139.0			
6/13 07:30	12 MBBR NR1	F	1 Pre				0.303		
6/13 07:30	12 MBBR NR1	F	1 Pre						
6/13 07:30	14 MBBR NR2	F	1 Pre			48.8	0		
6/13 07:30	14 MBBR NR2	F	1 Pre			50.0			
6/13 07:30	15 MBBR DN1	F	1 Pre			58.2	0		
6/13 07:30	15 MBBR DN1	F	1 Pre			61.3			
6/13 08:30	02 PRIMARY EFF	L	1 Pre	120	370		15	30	<0.5
6/13 11:10	17 DAF EFF	F	1 Pre	12.8	50.2		0.36		
6/13 11:10	17 DAF EFF	F	1 Pre	14.8					
6/13 14:30	02 PRIMARY EFF	L	1 Pre	86	230		11	21	<0.5
6/13 14:30	02 PRIMARY EFF	F	1 Pre						
6/13 14:30	02 PRIMARY EFF	F	1 Pre						
6/14 07:30	02 PRIMARY EFF	L	1 Pre	83	250		11	20	<0.5
6/14 08:00	02 PRIMARY EFF	F	1 Pre	82.5	443.0	142.0	11.6	16.10	0.162
6/14 08:00	02 PRIMARY EFF	F	1 Pre	84.5	251.0	143.0			
6/14 09:30	17 DAF EFF	L	1 Pre	15	67		<0.5	2.1	<0.5
6/14 09:30	15 MBBR DN1	L	1 Pre		34		<.05	1	<0.5
6/14 09:30	15 MBBR DN1	F	1 Pre	142					
6/14 09:30	15 MBBR DN1	F	1 Pre	147					
6/14 10:30	17 DAF EFF	L	1 Pre	15	31		<0.5	2	<0.5
6/14 10:30	15 MBBR DN1	L	1 Pre		30		0.08	1.3	<0.5
6/14 10:30	15 MBBR DN1	F	1 Pre	144.6					
6/14 10:30	15 MBBR DN1	F	1 Pre	146.3					
6/14 10:30	17 DAF EFF	F	1 Pre				0.42	2.34	0.110

* Sample Type: F = Field, L = Laboratory

Table 3.7-14b: Water Quality Results for MBBR/DAF Experimental Plan 04 FPM (continued)

Date and Time	Location	Type	Step	Concentration (mg/L)					
				TSS	COD	COD(s)	NH ₃	TN	NO _x -N
6/14 12:30	15 MBBR DN1	F	2 Spike	145			5.59		
6/14 12:30	15 MBBR DN1	F	2 Spike	154					
6/14 12:30	15 MBBR DN1	L	2 Spike		21.0		6.2	7.40	<0.5
6/14 12:30	17 DAF EFF	L	2 Spike	13	35.0		3.6	6.70	<0.5
6/14 14:00	11 MBBR BOD	F	2 Spike		143.0		18.6		
6/14 14:00	12 MBBR NR1	F	2 Spike		45.3		10.4		
6/14 14:00	14 MBBR NR2	F	2 Spike		43.2		9.3		
6/14 14:00	15 MBBR DN1	F	2 Spike		49.8		9.3		
6/14 14:00	17 DAF EFF	F	2 Spike	15.6	58.4		8.6	10.20	0.159
6/14 14:00	17 DAF EFF	F	2 Spike	17.6					
6/14 14:30	15 MBBR DN1	F	2 Spike	143					
6/14 14:30	15 MBBR DN1	F	2 Spike	143					
6/14 14:30	15 MBBR DN1	L	2 Spike		31.0		9.3	11.00	<0.5
6/14 14:30	17 DAF EFF	L	2 Spike	10	42.0		8.3	11.00	<0.5
6/14 16:30	02 PRIMARY EFF	L	2 Spike	70	180		16	32	<0.5
6/14 16:30	02 PRIMARY EFF	F	2 Spike		354.0				
6/14 16:30	02 PRIMARY EFF	F	2 Spike		344.0				
6/14 16:30	15 MBBR DN1	F	2 Spike	143					
6/14 16:30	15 MBBR DN1	F	2 Spike	150					
6/14 14:30	15 MBBR DN1	L	2 Spike		30.0		9	12.00	<0.5
6/14 14:30	17 DAF EFF	L	2 Spike	10	39.0		8.6	11.00	<0.5
6/14 20:30	17 DAF EFF	L	3 Recovery	10	39		6.7	9.8	<0.5
6/14 22:30	17 DAF EFF	F	3 Recovery		31.4		5.19		
6/15 00:30	17 DAF EFF	F	3 Recovery		33.2		4.98	4.21	0.170
6/15 02:30	17 DAF EFF	L	3 Recovery	9	32		4	6.6	0.6
6/15 04:30	17 DAF EFF	F	3 Recovery		39.4		2.08		
6/15 08:30	17 DAF EFF	L	3 Recovery	10	28		0.7	3.6	2
6/15 08:30	15 MBBR DN1	L	3 Recovery		25		<0.5	3.7	1.4
6/15 08:30	15 MBBR DN1	F	3 Recovery	137					

Table 3.7-14c: Water Quality Results for MBBR/DAF Experimental Plan 04 FPM (continued)

Date and Time	Location	Type	Step	Concentration (mg/L)					
				TSS	COD	COD(s)	NH ₃	TN	NO _x -N
6/15 08:30	15 MBBR DN1	F	3 Recovery	106					
6/15 10:30	02 PRIMARY EFF	L	3 Recovery	100	320		18	34	<0.5
6/15 10:30	02 PRIMARY EFF	F	3 Recovery	87	347.0	183.0	12.3	17.00	0.157
6/15 10:30	02 PRIMARY EFF	F	3 Recovery	97	338.0	181.0			
6/15 12:30	15 MBBR DN1	L	3 Recovery		25		5.6	7.9	<0.5
6/15 12:30	15 MBBR DN1	F	3 Recovery	140					
6/15 12:30	15 MBBR DN1	F	Recovery	146					
6/15 12:30	17 DAF EFF	F						3.51	0.166

3.7.4.4 Diluted Strength, Peak Flow, Extended Duration (DPE) Trial -

Results from the Diluted-strength, Peak flow, Extended duration (DPE) Trial are shown graphically in Figure 3.7-21. The flow rate of primary effluent was increased from 10 gpm to 11 gpm at 10:00 am on June 21, and an additional 11 gpm of potable water was added to the influent of the MBBR BOD tank. The potable water flow rate was shut off at 10:00 am on June 22, and the primary effluent flow rate was reduced to 13.2 gpm. Note that the flow rate was set to 13.2 gpm to meet the organic loading rate goal based on the COD primary effluent results from the previous day. Samples collected prior to the flow rate increase were below the goals for TSS, TN, and COD (assuming a COD:BOD ratio of 4.8).

The increased flow rate did not depress the dissolved oxygen concentration in the nitrification reactors, probably because there was not an associated increase in organic loading. The increase in flow appeared to have a small effect on the TN, with effluent concentration increasing above the TN goal of 8 mg/L approximately 3 hours after the flow increase.

A series of one-way ANOVAs were completed on each parameter to determine if there was an effect of the flow increase, and box plots are shown in Figure 3.7-22 and 3.7-23. ANOVA results are summarized in Table 3.7-15.

Results showed that there was a slight increase in DAF effluent TSS, though all results remained below the goal of 30 mg/L. The high concentration of COD in the DN1 and DAF samples during the high-flow period are likely due to overfeeding of supplemental carbon (the MicroC pump was paced using a timer for intermittent operation, but there was a timer malfunction at the end of the peak flow period that caused continuous operation through the recovery period and consequently overfeeding). There was also an effect on nitrogen removal, with an increase in both ammonia and total nitrogen concentrations in the DN1 reactor and DAF effluents. The recovery period was fairly rapid, with TN concentration below the goal within 6 hours.

Table 3.7-15: MBBR/DAF Experimental Plan 04 DPE – Summary of ANOVA Results

Parameter	p -value	
	DN1 Reactor	DAF Effluent
TSS	0.206	0.040
COD	0.301	0.193
TN	0.056	0.129
Ammonia	0.026	0.227
NOx	0.401	0.040

The ANOVA result shows that DAF TSS was statistically significant, but the TSS declined from an average of 17 mg/L before the flow increase to 15 mg/L during the increase, and 8 mg/L during the recovery period. There was no apparent decrease in TSS removal performance. The ANOVA results did not indicate that COD was statistically significant because there was only one high COD samples, and all other samples were within the range of pre-spike and recovery COD concentrations.

The ANOVA results showed a statistically significant impact to ammonia, NO_x and TN concentrations in both the DN1 reactor and the DAF effluent, and it appears that the effect is practically significant as well, with increased ammonia and TN concentrations for between 1 and 2 hydraulic residence times of the combined reactors.

All water quality parameters measured during the FPS stress test are included in Tables 3.7-16a through 3.7-16e.

Figure 3.7-21: MBBR DPE | 24-hour, Peak Flow, Diluted Influent

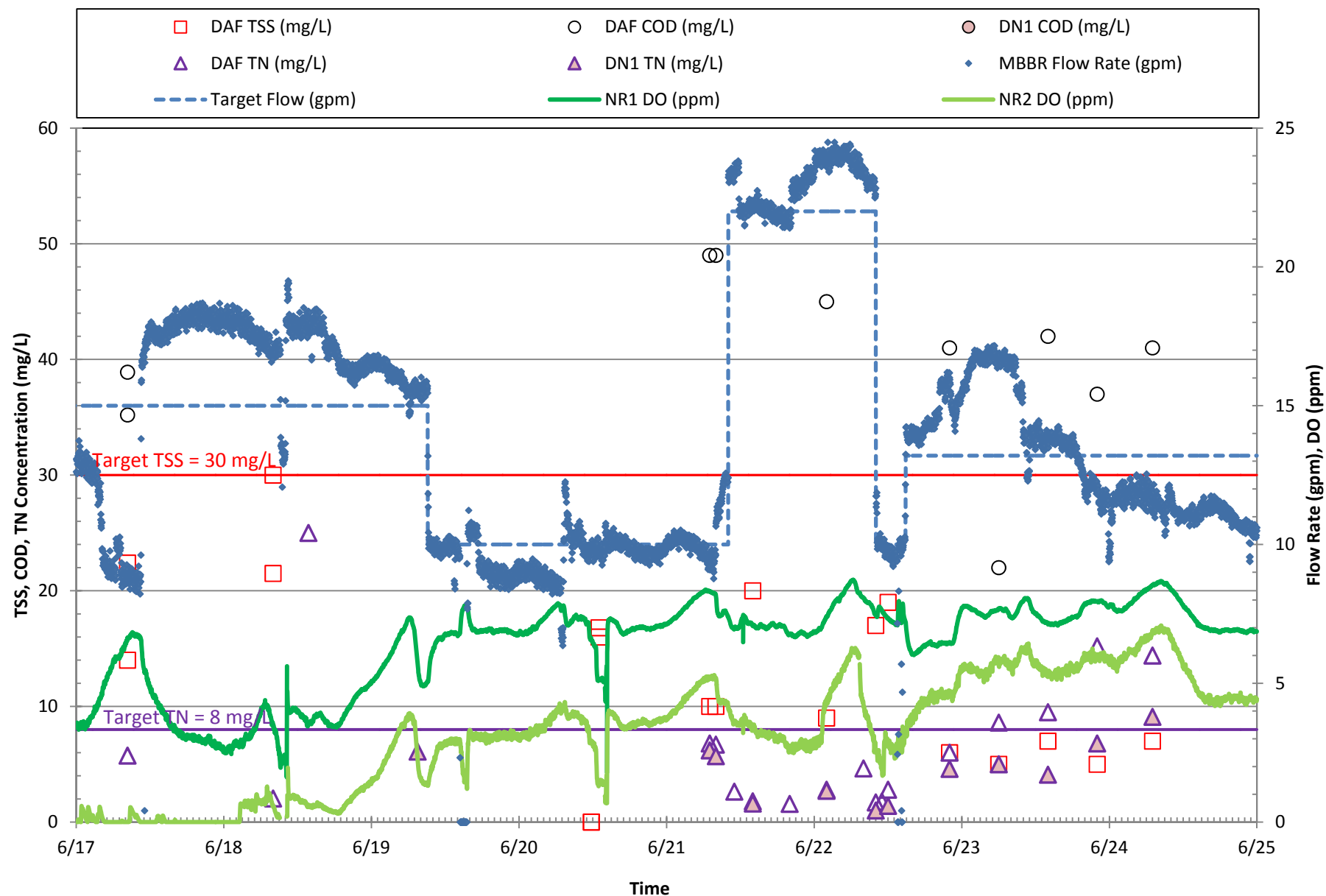


Figure 3.7-22: Boxplot of MBBR/DAF Experimental Plan 04 DPE Results, TSS and COD

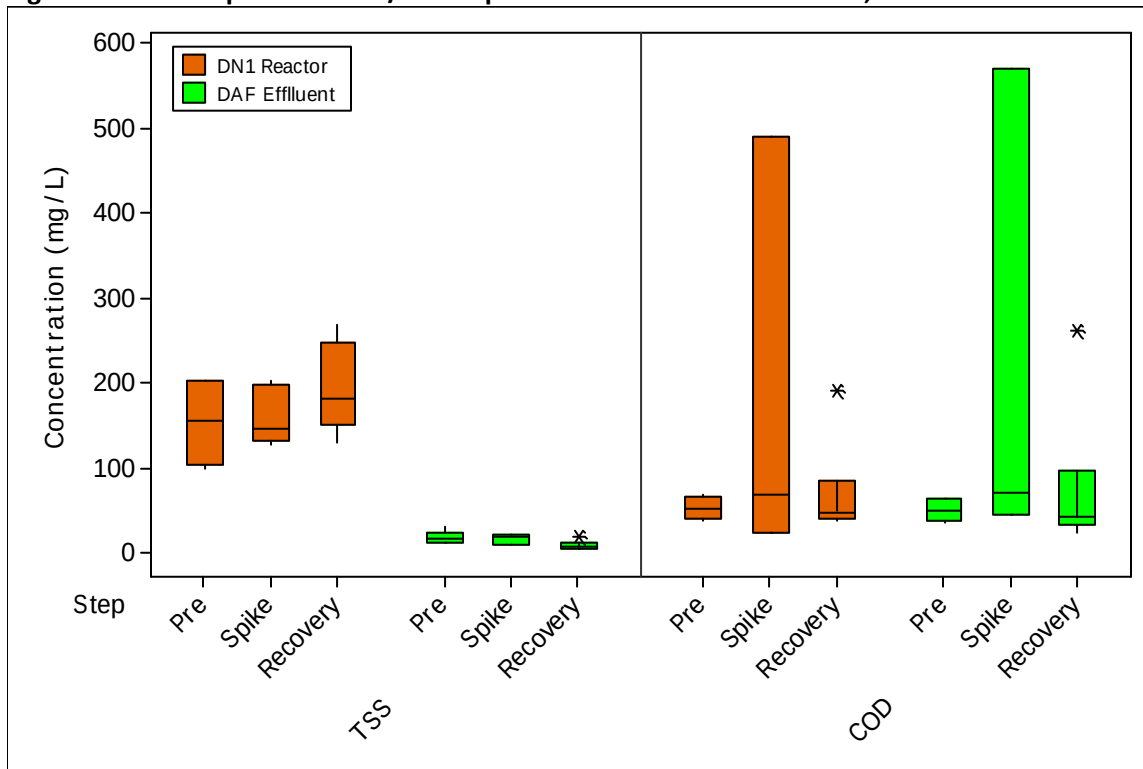


Figure 3.7-23: Boxplot of MBBR/DAF Experimental Plan 04 DPE Results, Ammonia, NOx, and TN

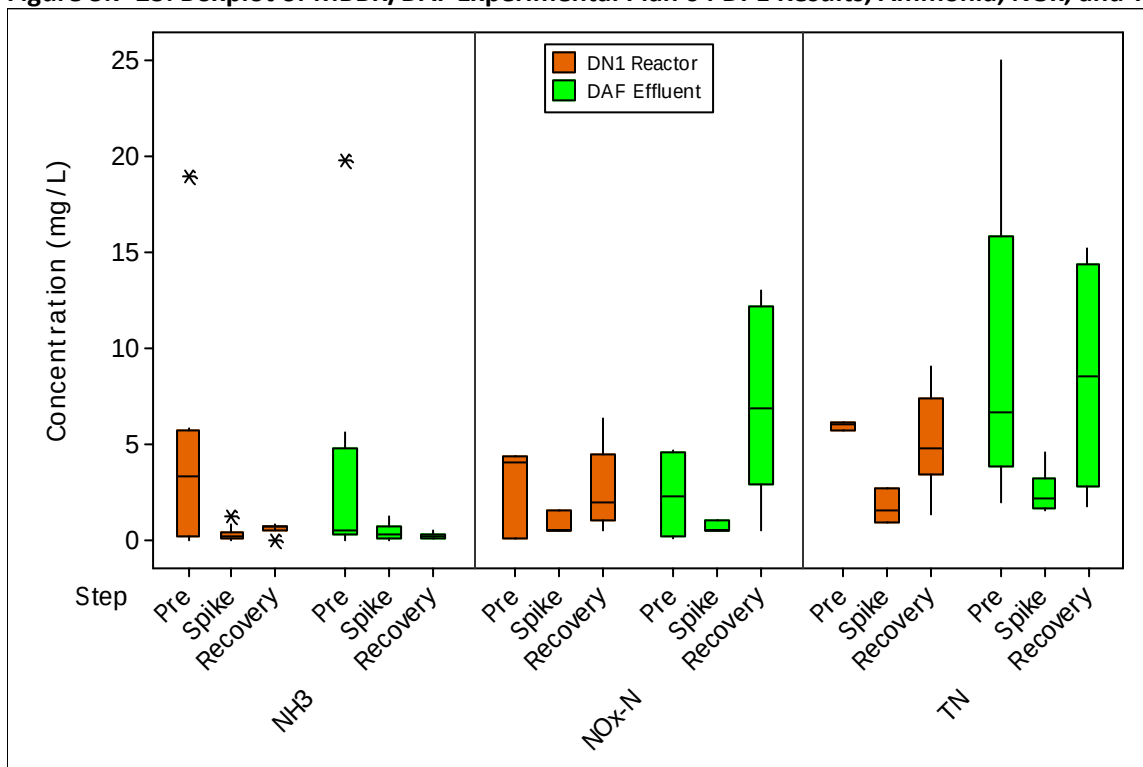


Table 3.7-16a: Water Quality Results for MBBR/DAF Experimental Plan 04 DPE

Date and Time	Location	Type	Step	Concentration (mg/L)					
				TSS	COD	COD(s)	NH ₃	TN	NOx-N
6/17 08:00	02 PRIMARY EFF	F	1 Pre	99	328.0	157.0	14.6	23.80	0.287
6/17 08:00	02 PRIMARY EFF	F	1 Pre	98	332.0	159.0			
6/17 08:20	17 DAF EFF	F	1 Pre	14	38.9			5.75	2.330
6/17 08:20	17 DAF EFF	F	1 Pre	22.4	35.2				
6/17 09:00	12 MBBR NR1	F	1 Pre				1		
6/17 09:00	15 MBBR DN1	F	1 Pre				0.34		
6/18 08:00	02 PRIMARY EFF	F	1 Pre	90.5	306.0	151.0	19	20.70	0.288
6/18 08:00	02 PRIMARY EFF	F	1 Pre	101.5	306.0	152.0			
6/18 08:00	02 PRIMARY EFF	F	1 Pre		111.0		5.7		
6/18 08:00	02 PRIMARY EFF	F	1 Pre		106.0				
6/18 08:00	12 MBBR NR1	F	1 Pre				7.7		
6/18 08:00	15 MBBR DN1	F	1 Pre			61.3	5.72		
6/18 08:00	15 MBBR DN1	F	1 Pre			66.9			
6/18 08:00	17 DAF EFF	F	1 Pre	21.5	63.1		5.69	2.04	0.210
6/18 08:00	17 DAF EFF	F	1 Pre	30	63.4				
6/18 13:45	11 MBBR BOD	F	1 Pre				29.3		
6/18 13:45	12 MBBR NR1	F	1 Pre				21.5		
6/18 13:45	14 MBBR NR2	F	1 Pre				22.2		
6/18 13:45	15 MBBR DN1	F	1 Pre				19		
6/18 13:45	17 DAF EFF	F	1 Pre				19.8	25.00	0.146
6/19 07:30	02 PRIMARY EFF	F	1 Pre	124	461.0	258.0	18.1	18.90	0.280
6/19 07:30	02 PRIMARY EFF	F	1 Pre	133	460.0	260.0			
6/19 07:30	11 MBBR BOD	F	1 Pre				13.5		
6/19 07:30	12 MBBR NR1	F	1 Pre				4.2		
6/19 07:30	14 MBBR NR2	F	1 Pre				3.7		
6/19 07:30	15 MBBR DN1	F	1 Pre				3	6.09	0.092
6/19 08:40	15 MBBR DN1	F	1 Pre				5.9		
6/20 08:00	02 PRIMARY EFF	F	1 Pre	115	400.0	212.0	25.3	13.50	0.274
6/20 08:00	02 PRIMARY EFF	F	1 Pre	126	410.0	215.0			

* Sample Type: F = Field, L = Laboratory

Table 3.7-16b: Water Quality Results for MBBR/DAF Experimental Plan 04 DPE (continued)

Date and Time	Location	Type	Step	Concentration (mg/L)					
				TSS	COD	COD(s)	NH ₃	TN	NOx-N
6/20 08:00	11 MBBR BOD	F	1 Pre				5.6		
6/20 08:00	12 MBBR NR1	F	1 Pre				0.7		
6/20 08:00	14 MBBR NR2	F	1 Pre				0.8		
6/20 08:00	15 MBBR DN1	F	1 Pre				0.3		
6/20 11:45	17 DAF EFF	F	1 Pre				0.72		
6/20 11:45	17 DAF EFF	F	1 Pre						
6/20 13:00	11 MBBR BOD	F	1 Pre						
6/20 13:00	12 MBBR NR1	F	1 Pre				5.68		
6/20 13:00	14 MBBR NR2	F	1 Pre				5.24		
6/20 13:00	15 MBBR DN1	F	1 Pre				4.07		
6/20 13:00	17 DAF EFF	F	1 Pre	16			3.45		
6/20 13:00	17 DAF EFF	F	1 Pre	16.8					
6/20 14:00	17 DAF EFF	F	1 Pre				4.52		
6/20 15:00	15 MBBR DN1	F	1 Pre				5.64		
6/20 16:20	15 MBBR DN1	F	1 Pre				3.62		
6/21 05:50	17 DAF EFF	F	1 Pre				0.43		
6/21 06:50	17 DAF EFF	F	1 Pre				0.45		
6/21 07:00	17 DAF EFF	L	1 Pre	10	49		0.15	6.8	4.7
6/21 07:00	15 MBBR DN1	L	1 Pre		38		0.05	6.2	4.4
6/21 07:00	15 MBBR DN1	F	1 Pre	202.8			0.14		
6/21 07:00	15 MBBR DN1	F	1 Pre	194.8					
6/21 07:00	17 DAF EFF	F	1 Pre				0.33		
6/21 08:00	17 DAF EFF	L	1 Pre	10	49		<0.05	6.7	4.4
6/21 08:00	15 MBBR DN1	L	1 Pre		43		<0.05	5.7	4.1
6/21 08:00	02 PRIMARY EFF	F	1 Pre	111	391.0	215.0	19.9	15.30	0.317
6/21 08:00	02 PRIMARY EFF	F	1 Pre	127	395.0	219.0			
6/21 08:00	15 MBBR DN1	F	1 Pre	97.4					

Table 3.7-16c: Water Quality Results for MBBR/DAF Experimental Plan 04 DPE (continued)

Date and Time	Location	Type	Step	Concentration (mg/L)					
				TSS	COD	COD(s)	NH ₃	TN	NOx-N
6/21 08:00	15 MBBR DN1	F	1 Pre	116.8					
6/21 11:00	17 DAF EFF	F	2 Spike				0.2		
6/21 11:00	17 DAF EFF	F	2 Spike					2.63	
6/21 13:06	15 MBBR DN1	F	2 Spike				0.39		
6/21 14:00	17 DAF EFF	L	2 Spike	20	71		0.14	1.8	<0.5
6/21 14:00	15 MBBR DN1	L	2 Spike		68		<0.05	1.6	<0.5
6/21 14:50	15 MBBR DN1	F	2 Spike	201			0.24		
6/21 14:50	15 MBBR DN1	F	2 Spike	197					
6/21 14:50	17 DAF EFF	F	2 Spike				0.44		
6/21 17:00	15 MBBR DN1	F	2 Spike				0.29		
6/21 20:00	02 PRIMARY EFF	L	2 Spike	94	240		22	37	<0.5
6/21 20:00	02 PRIMARY EFF	F	2 Spike		411.0				
6/21 20:00	02 PRIMARY EFF	F	2 Spike		403.0				
6/21 20:00	15 MBBR DN1	F	2 Spike				0.25		
6/21 20:00	17 DAF EFF	F	2 Spike				0.634		
6/21 20:00	17 DAF EFF	F	2 Spike					1.57	
6/21 23:00	15 MBBR DN1	F	2 Spike				0.26		
6/22 02:00	17 DAF EFF	L	2 Spike	9	45		<0.05	2.8	1.1
6/22 02:00	15 MBBR DN1	L	2 Spike		24		0.05	2.7	1.6
6/22 02:00	15 MBBR DN1	F	2 Spike				0.2		
6/22 02:00	15 MBBR DN1	F	2 Spike	144.6					
6/22 02:00	15 MBBR DN1	F	2 Spike	144					
6/22 05:00	15 MBBR DN1	F	2 Spike				0.28		
6/22 08:00	02 PRIMARY EFF	F	2 Spike	125	367.0	189.0	19.8		
6/22 08:00	02 PRIMARY EFF	F	2 Spike	146	377.0	189.0			
6/22 08:00	15 MBBR DN1	F	2 Spike				0.82		
6/22 08:00	17 DAF EFF	F	2 Spike					4.64	
6/22 09:00	15 MBBR DN1	F	2 Spike				1.3		
6/22 09:00	17 DAF EFF	F	2 Spike				1.24		

Table 3.7-16d: Water Quality Results for MBBR/DAF Experimental Plan 04 DPE (continued)

Date and Time	Location	Type	Step	Concentration (mg/L)					
				TSS	COD	COD(s)	NH ₃	TN	NOx-N
6/22 10:00	17 DAF EFF	L	2 Spike	17	570			1.7	<0.5
6/22 10:00	15 MBBR DN1	L	2 Spike		490		<0.05	1	<0.5
6/22 10:00	02 PRIMARY EFF	L	2 Spike	110	240		26	44	<0.5
6/22 10:00	15 MBBR DN1	F	2 Spike				0.47		
6/22 10:00	15 MBBR DN1	F	2 Spike	133					
6/22 10:00	15 MBBR DN1	F	2 Spike	127					
6/22 10:00	17 DAF EFF	F	3 Recovery				0.58		
6/22 11:00	17 DAF EFF	F	3 Recovery					1.77	
6/22 12:00	17 DAF EFF	L	3 Recovery	19	260			2.8	<0.5
6/22 12:00	15 MBBR DN1	L	3 Recovery		190		<0.05	1.4	<0.5
6/22 12:00	15 MBBR DN1	F	3 Recovery	170					
6/22 12:00	15 MBBR DN1	F	3 Recovery	170					
6/22 19:00	15 MBBR DN1	F	3 Recovery	267					
6/22 19:00	15 MBBR DN1	F	3 Recovery	267					
6/22 22:00	17 DAF EFF	L	3 Recovery	6	41		0.21	6	3.7
6/22 22:00	15 MBBR DN1	L	3 Recovery		48		0.88	4.6	1.7
6/23 03:00	15 MBBR DN1	F	3 Recovery	248					
6/23 03:00	15 MBBR DN1	F	3 Recovery	246					
6/23 06:00	17 DAF EFF	L	3 Recovery	5	22		0.12	8.6	6.7
6/23 06:00	15 MBBR DN1	L	3 Recovery		40		0.66	5	2.3
6/23 11:00	15 MBBR DN1	F	3 Recovery	193					
6/23 11:00	15 MBBR DN1	F	3 Recovery	194					
6/23 14:00	17 DAF EFF	L	3 Recovery	7	42		0.17	9.5	7.1
6/23 14:00	15 MBBR DN1	L	3 Recovery		48		0.72	4.1	1.3
6/23 19:00	15 MBBR DN1	F	3 Recovery	144					
6/23 19:00	15 MBBR DN1	F	3 Recovery	164					
6/23 22:00	17 DAF EFF	L	3 Recovery	5	37		0.16	15.2	13
6/23 22:00	15 MBBR DN1	L	3 Recovery		43		0.75	6.8	3.9
6/24 03:00	15 MBBR DN1	F	3 Recovery	128.6					

Table 3.7-16e: Water Quality Results for MBBR/DAF Experimental Plan 04 DPE (continued)

Date and Time	Location	Type	Step	Concentration (mg/L)					
				TSS	COD	COD(s)	NH ₃	TN	NOx-N
6/24 03:00	15 MBBR DN1	F	3 Recovery	130.4					
6/24 07:00	17 DAF EFF	L	3 Recovery	7	41		0.28	14.4	12
6/24 07:00	15 MBBR DN1	L	3 Recovery		38		0.75	9.1	6.4
6/24 07:30	02 PRIMARY EFF	F	3 Recovery	105	347.0	262.0	23.4	25.50	0.478
6/24 07:30	02 PRIMARY EFF	F	3 Recovery	107.2	347.0	250.0			
6/24 09:00	02 PRIMARY EFF	F	3 Recovery				23.44		

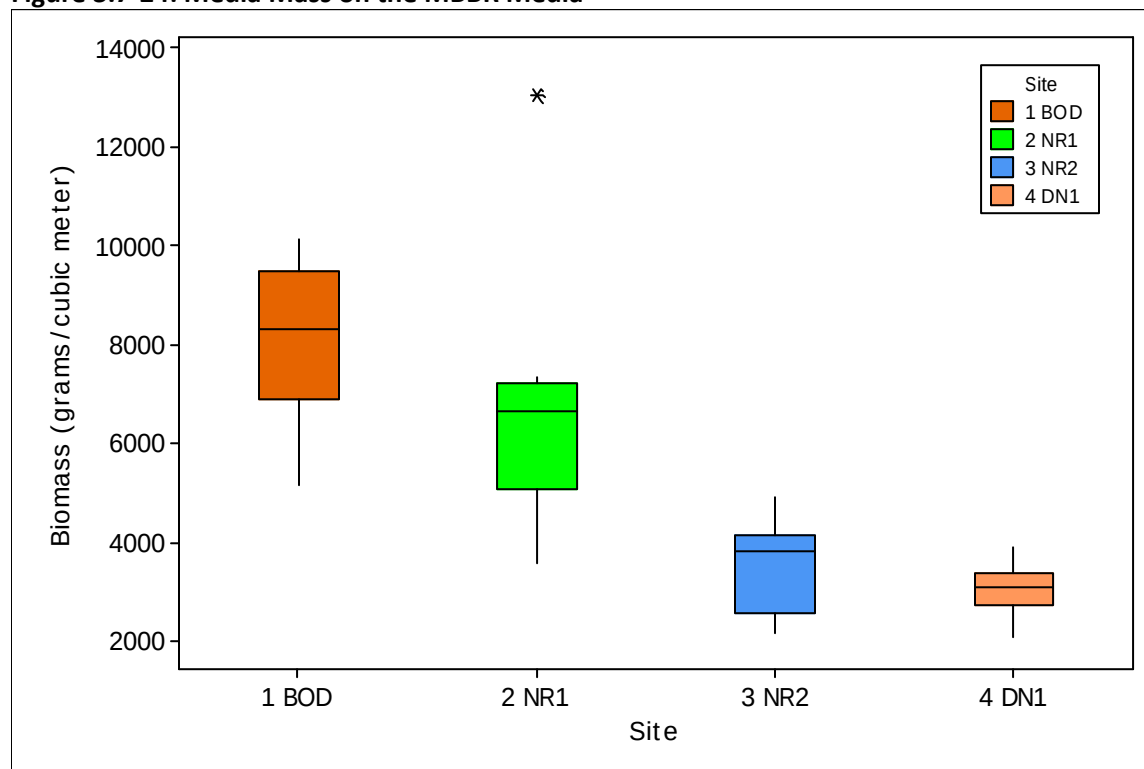
3.7.5 Media Mass Calculations

The mass of growth on the media was periodically measured following a procedure provided by World Water Works. Results are shown in Table 3.7-17.

Table 3.7-17: Media Mass Results

Date	Media Mass (grams/m ³)			
	BOD	NR1	NR2	DN1
3/23/2012	5177			
3/23/2012	6435			
3/23/2012	6787			
4/5/2012	7225	3641		
5/10/2012	7322	5085	2183	2608
5/17/2012	8295	6695	2569	3162
5/21/2012	7857	6314	3008	2969
5/31/2012	9721	7240	3837	3042
5/31/2012	10045	13037	4153	3270
6/3/2012	6912	6466	2444	2094
6/5/2012	8334	6649	3786	3548
6/5/2012	9493	7348	3837	3307
6/7/2012	10151	6731	3861	3899
6/24/2012	8618		4902	
6/27/2012	9076	3586	4468	2796

Figure 3.7-24: Media Mass on the MBBR Media



3.7.6 BOD Removal Capacity

Since the influent organic concentration was constantly changing, the BOD loading rate into the MBBR varied from 1.5 to 18.4 gr BOD/m²·day. To evaluate the performance of the MBBR process for BOD removal, the data from all phases and Experimental Plans were combined to evaluate the removal capacity over a broad range of flow rates and organic loading rates. Figure 3.7-25 was produced from the following data:

- All data between February 3 and August 17 inclusive of the stress tests, were included in the analysis.
- Influent BOD was estimated from the Primary Effluent COD using the ratio of 1.9 COD: 1 BOD
- Effluent BOD was estimated from the effluent COD using the ratio 3.9:1 BOD
- The design SARR was provided by the Vendor

Figure 3.7-25 shows that the removal rate is consistently 87% of the influent BOD.

3.7.7 Ammonia Removal Capacity

To evaluate the performance of the MBBR process for ammonia removal, the removal capacity was calculated based on the surface area of the media. Figure 3.7-26 used data after April 2 through July 17, but excluded the hydraulic stress test data.

3.7.8 Nitrate Removal Capacity

To evaluate the performance of the BAF process for denitrification, the removal capacity was calculated based on the surface area of the media. Figure 3.7-27 used data after April 2 through July 17, but excluded the hydraulic stress test data.

Figure 3.7-27: Nitrate Removal through MBBR DN1&DN2 Reactors

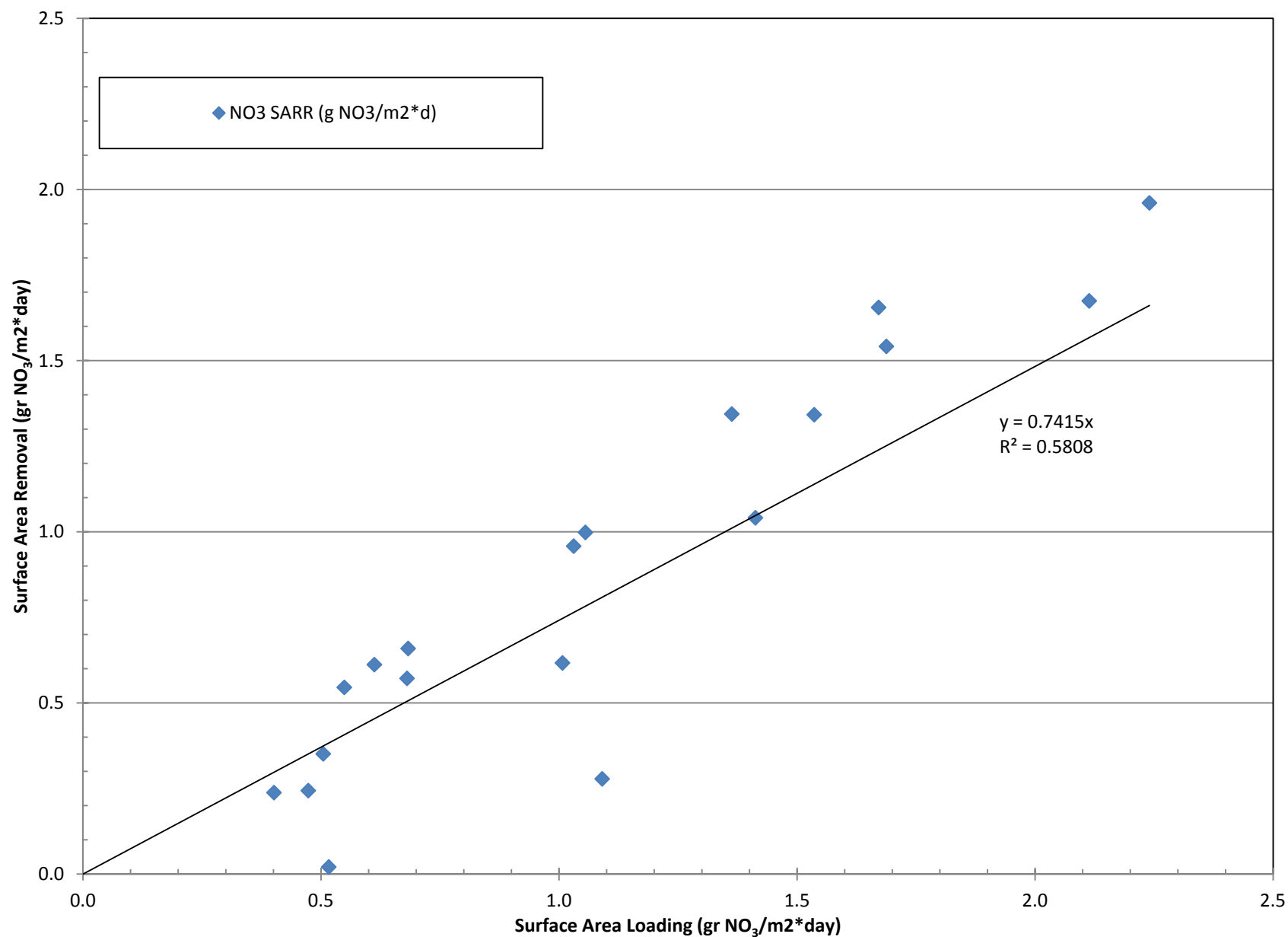


Figure 3.7-26: Ammonia Removal through MBBR NR1&NR2 Reactor

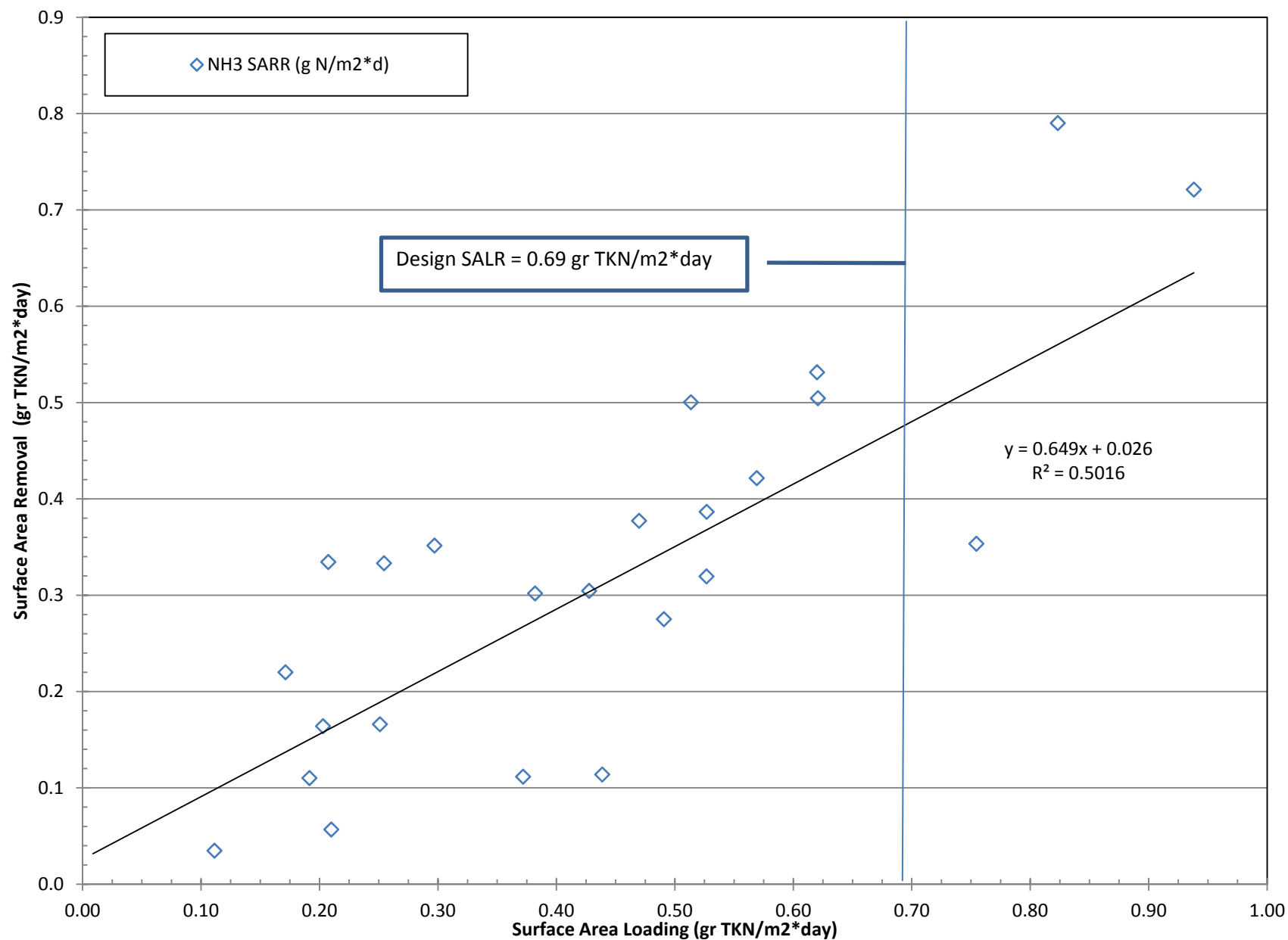
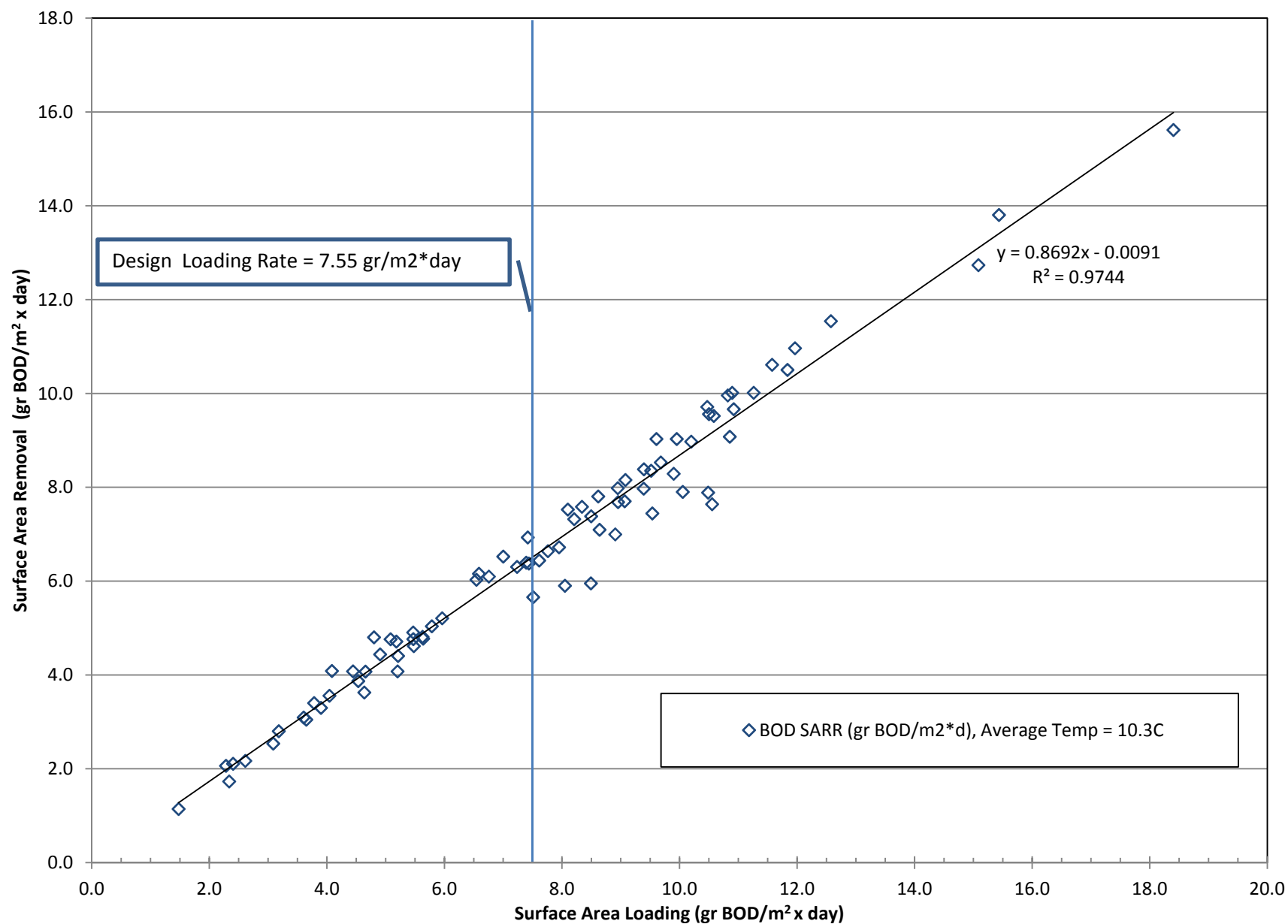


Figure 3.7-25: BOD Removal through MBBR BOD Reactor



3.7.9 DAF Operation and Performance

The pilot scale DAF system was used to provide water quality information for MBBR bioreactor effluent. Due to the small size of the pilot-scale DAF, and other concerns with the operation, it is unlikely that the pilot data can be directly used to evaluate the performance of full-scale DAF processes. The concerns with the pilot-scale DAF were:

1. The pilot scale DAF did not use an air saturator and injection process that is commonly used for large municipal wastewater applications. Pilot-scale DAF units which do adequately mimic the full-scale saturator and injection systems would have been too large for this pilot study, would have required the bioreactor to be much larger scale, and were not practical for the pilot study. The limitations of the small-scale DAF were discussed prior to the pilot study.
2. The pilot scale DAF system was highly dependent on hydraulic factors for proper operation. For instance, during the start up period, minor modifications to the elevation of the Nikuni pump, the location of the polymer injection, and the number and type of fittings between the air injection and reactor tank appeared to have a large impact on the DAF performance. The Vendor eventually provided a clear section of piping to visually observe the existence of air-saturated water at the injection location as a basis for adjusting the Nikuni pump, but after frequent cleaning, the clear section of piping became too stained to see bubble formation. The formation of a foamy coating on the DAF reactor surface was sometimes used to determine if the DAF system was operating properly. The pilot-scale DAF flow rate was not varied during the pilot study because hydraulic factors do not scale up from pilot-scale to full-scale easily.
3. The DAF system was susceptible to the accumulation of solids in the influent header, effluent troughs, effluent stilling well, and Nikuni feed pump, which impacted effluent quality. The DAF rakes, aeration basin and effluent tank were normally cleaned daily, and external equipment was normally cleaned once every week, unless an Experimental Trial was underway, or other issues became a priority. Certain components such as collection laterals, air/polymer injection spool, and influent manifold tended to become plugged with solids, and proper cleaning required draining and partially disassembling the DAF, requiring several hours to complete. Some data that showed surprisingly high TSS in the DAF effluent were likely due to the release of material trapped in the DAF equipment. The author of this report has insufficient experience with full-scale DAF systems at wastewater treatment applications to know if this is a problem with full-scale DAF systems.

These concerns make it inadvisable to use the pilot scale data to establish loading rate, air to solids ratios, or sludge production data for full-scale design considerations. These limitations were known and discussed during the pilot project, and the flow rates and air to solids ratios were not varied or tested due to these limitations and the limits on the time and effort available during the pilot study.

Despite these limitations, the pilot-scale DAF is believed appropriate for evaluating the water quality that can be expected from a full-scale DAF. Multiple samples were collected to compare the effluent

water quality produced by the DAF with the water quality produced by filtering the water through a 10 µm filter. A paired t-test was used to evaluate the data.

There were 116 paired samples of COD collected from both the DAF effluent and filtered from the MBBR reactor effluent. The samples included effluent samples from the MBBR BOD tank, DN1 tank and DN2 tank. The average difference between the DAF and the filtered concentration was 0.62 mg/L with the DAF effluent slightly lower than the filtered concentrations. There was no statistically significant difference in the concentrations.

There were 17 paired samples of BOD collected from both the DAF effluent and filtered from the MBBR reactor effluent. The samples included effluent samples from the MBBR BOD tank, and DN1 tank. The average difference between the DAF and the filtered concentration was 6.7 mg/L with the DAF effluent slightly lower than the filtered concentrations. There was no statistically significant difference in the concentrations.

There were 13 paired samples of TN collected from both the DAF effluent and filtered from the MBBR reactor effluent. The samples included effluent samples from the MBBR DN1 tank collected during the stress tests. The average difference between the DAF and the filtered concentration was 2.1 mg/L with the DAF effluent slightly higher than the filtered concentrations. The difference was found to be statistically significant, and may be practically significant as well, as the average DAF effluent TN was 9.38 mg/L, and the average filtered TN was 7.24 mg/L, suggesting that improved DAF removal could achieve regulatory compliance. It is difficult to interpret the TN data, however, since all samples were collected during the stress tests, and the conditions during the stress test were not representative of normal full-scale operation.

Polymer dose was selected based on a number of bench scale studies conducted by polymer vendors. In each case, the vendor used a sample of MBBR effluent from the tank that was in use at the time, and added various polymers to 1 L samples. The molecular weight and surface charge of the polymer were varied according the vendors experience. The suitability of a polymer was judged visually, with a clear supernatant and stable floc the goals for each polymer. The polymer used for all Experimental Trials was Aries 26614 polymer.

The DAF vendor advised that a different polymer dose would be required for the TSS and BOD removal phase than for the TN removal phase, due to changes in the sloughed biomass density. An effort was begun on March 11 to optimize the polymer dose, and the dose was reduced to 3.8 ppm. The DAF effluent TSS for the three days with the lower polymer dose averaged 24.3 ppm, and the polymer dose was restored to the vendor-recommended dose. No effort was made to optimize the polymer dose when operating on TN removal. Table 3.6-18 shows the polymer doses used throughout the pilot effort.

Table 3.7-18: MBBR DAF Polymer doses

Dates	Polymer Dose	Average Effluent TSS	Treatment Mode	Recommended Dose
3/7 to 3/11	7.1 ppm	8.6 mg/L	BOD, TSS	6-8 ppm
3/11 to 3/13	3.8 ppm	24.3 mg/L		
3/14 to 3/24	7.8 ppm	17.3 mg/L		
3/25 to 7/14	1.9 ppm	15.5 mg/L	TN	1-2 ppm

4 Summary

The following comments and observations are offered:

1. Differences in Raw water Organics Concentrations - The BOD concentrations measured by Blueleaf during the pilot operations were significantly higher than historical concentrations measured by the Peirce Island WWTF. It is unclear whether the difference in organics concentration is due to measurement bias, or due to the increased frequency of sampling by the pilot operators. The case for measurement bias is seen in Figure 2.7-02, where the field results are, on average, higher than corresponding lab results for high-concentration samples. Alternatively, the operators reported that raw waste water appeared different on the weekends, with a substantially different appearance on the surface of the pilot scale primary clarifier. Since the Peirce Island WWTF samples consist of samples that are collected only midweek, high organic concentrations would not be included in the historical water quality record. Figure 4.1-01 shows a frequency histogram for BOD concentrations. It shows that the historical record (shown as the Red bars marked "Full Scale 2008 to 2012") have an average BOD concentration of 175 mg/L, and have less than 6% of the samples with BOD that exceed 275 mg/L. However, the samples collected by Blueleaf during the pilot study show that 40% of the field BOD measurements were greater than 275 mg/L, and 37% of the field COD measurements were greater than 275%. It is unlikely that both the field BOD and COD methods detected a high frequency of very high organics. It is more likely that there are frequent occasions when the influent organic concentration to the Peirce Island WWTF facility is dramatically increased for short periods of time.

2. Impact of Blackwater - Blueleaf suspects that the pilot system received a greater percentage of the "blackwater" belt filter press filtrate than the full-scale system, and that the high organics load, and variability of the organics load was increased due to the belt filter press filtrate contribution. The belt filter press influent probably had less of an effect upon the raw water samples discussed in Item #1, since the raw water samples were normally collected from the full-scale autosampler which collected sample approximately 12 ft downstream from the pilot raw water supply pump. The pilot supply pump was installed in close proximity to the point where the belt filter press filtrate was discharged into the raw influent. It is believed that the belt filter press filtrate had a disproportionate effect upon the pilot supply, with the raw water pumped to the pilot plant having a greater fraction of the black water than the raw water autosampler, and the WWTF. The belt filter press influence may have impacted the primary clarifier removal rates, since the calculation of removal rate was based on influent raw water samples that were likely cleaner than the raw water that was actually transferred to the pilot scale primary clarifier. During occurrences of black water, raw water samples from the WWTF raw water autosampler might not have been representative of pilot plant influent water quality.

3. Scale up of Pilot Scale Primary Clarifier - The pilot scale primary clarifier was a scaled down cross-section of the existing Peirce Island primary clarifier. The distance between the full-scale clarifier center well and effluent weir was equal to the distance between the pilot scale influent and effluent weir, but the pilot clarifier had a much reduced depth. In addition, the sludge removal and scum removal in the pilot-scale primary clarifier was manually operated, and was likely not as efficient as the full-scale

clarifiers. The design engineer should compare the removal data obtained from the pilot-scale primary clarifier at this pilot with other full-scale primary clarifier performance data.

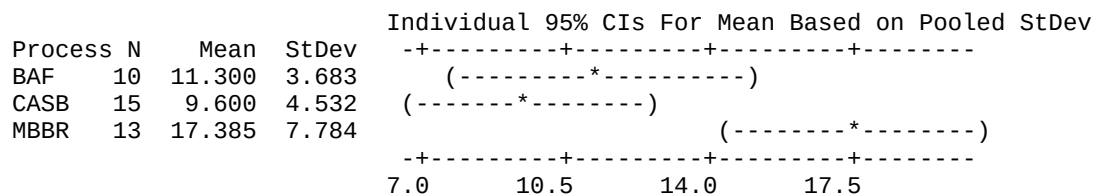
4. FOG Impact - Fats, Oil and Grease were not observed on the pilot scale, or full-scale primary clarifiers during the pilot study. There was anecdotal evidence that the floating material in the Primary Clarifier was heavier on the weekends than during the weeks, but there did not appear to be an effect on the Secondary Treatment processes.

5. Comparison of Effluent TSS – A one-way ANOVA was used to compare the effluent TSS for all processes, using laboratory results only. The results showed that there was a statistically significant difference in the laboratory TSS concentrations between processes. The results are shown below.

One-way ANOVA: TSS Concentration (mg/L) versus Process

Source	DF	SS	MS	F	P
Process	2	449.0	224.5	6.91	0.003
Error	35	1136.8	32.5		
Total	37	1585.8			

S = 5.699 R-Sq = 28.32% R-Sq(adj) = 24.22%



Pooled StDev = 5.699

Grouping Information Using Tukey Method

Process	N	Mean	Grouping
MBBR	13	17.385	A
BAF	10	11.300	B
CASB	15	9.600	B

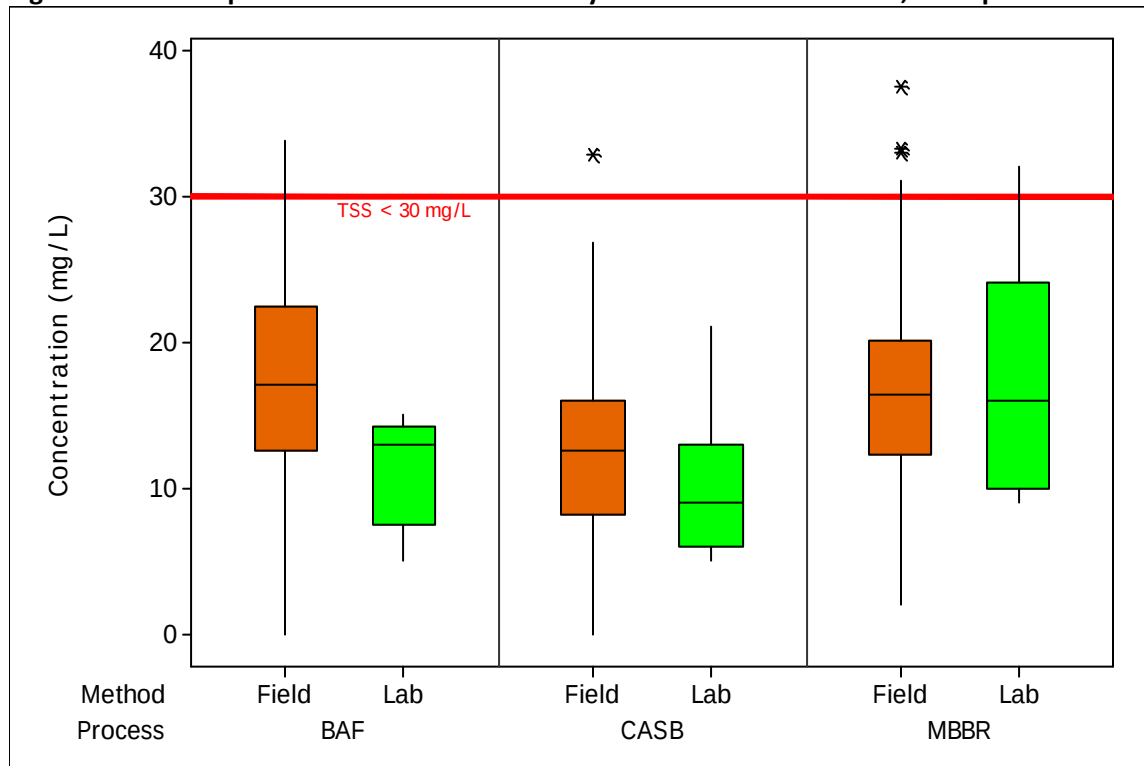
Means that do not share a letter are significantly different.

The Tukey analysis shows that the TSS from the MBBR process was statistically different than the effluent TSS from either the CASB or BAF. The average effluent TSS concentration of the BAF differed from the average effluent TSS concentration of the CASB system by only 2.7 mg/L, which is less than the standard deviation of TSS of either of the two processes. Note that the standard deviation of effluent TSS from the MBBR is much higher than the other two processes. The high standard deviation is due to the frequent occurrence of high TSS escaping the DAF, likely from poor cleaning, or poor hydraulics.

Figure 4.1-02 shows a box plot for both the lab and field TSS from each process. Note that the tail from the MBBR includes very low TSS concentrations, indicating that the MBBR and DAF could have very low

effluent TSS concentrations, but not consistently. It is unclear if the poor performance of the DAF is an indicator of technology, or of the specific DAF unit used during this pilot study.

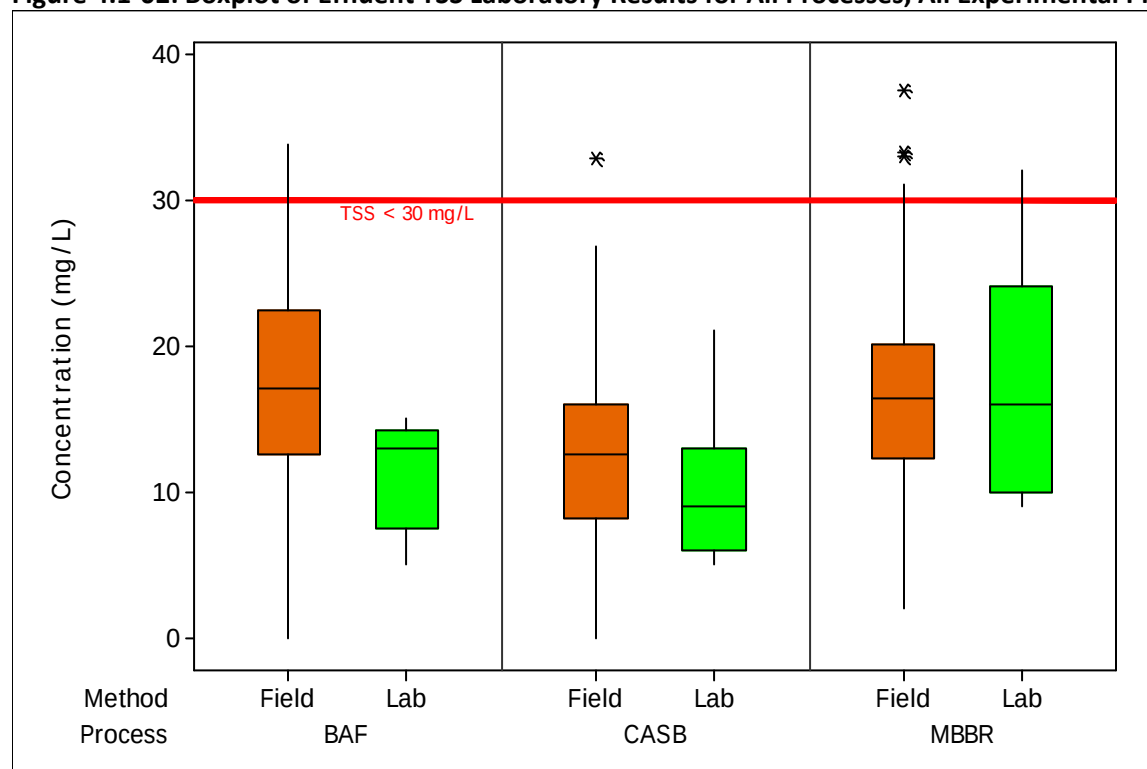
Figure 4.1-02: Boxplot of Effluent TSS Laboratory Results for All Processes, All Experimental Plans



6. Comparison of Effluent BOD - A one-way ANOVA was used to compare the effluent BOD for all processes, using laboratory results only. The results showed that there was not a statistically significant difference in the laboratory BOD concentrations. The BAF process had higher median effluent BOD than the other two processes, but the statistical test could not detect a difference because there were only three lab samples collected for BOD. The results are shown below.

The Tukey analysis shows that the TSS from the MBBR process were statistically different than the effluent TSS from either the CASB or BAF processes. The average effluent TSS concentration of the BAF differed from the average effluent TSS concentration of the CASB system by 2.7 mg/L, which is less than the standard deviation of TSS of either of the two processes. Note that the standard deviation of effluent TSS from the MBBR was much higher than the other two processes. The high standard deviation is due to the frequent occurrence of high TSS escaping the DAF, likely from poor cleaning, and/or poor hydraulics. Figure 4.1-02 shows a box plot for both the lab and field TSS from each process. Note that the tail from the MBBR includes very low TSS concentrations, indicating that the MBBR and DAF could have very low effluent TSS concentrations, but this low measured concentration was not consistent. It is unclear if the poor performance of the DAF is an indicator of technology, or of the specific scaled-down DAF unit used during this pilot study.

Figure 4.1-02: Boxplot of Effluent TSS Laboratory Results for All Processes, All Experimental Plans



6. Comparison of Effluent BOD - A one-way ANOVA using laboratory results only was also used to compare the effluent BOD for all processes. The results showed that there was not a statistically significant difference in the effluent laboratory BOD concentrations. The BAF process had higher median effluent BOD as compared to the other two processes, but the statistical test could not detect a difference because there were only three lab samples collected for BOD, and no samples collected when both BAF stages were operational. The results are shown below.

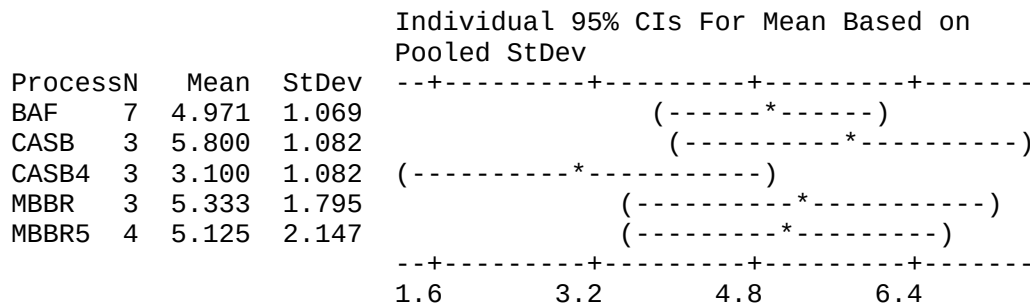
6. Comparison of Effluent TN - A one-way ANOVA was used to compare the effluent TN for all processes, using laboratory results only. Note that there are five processes being compared, with CASB4 representing the four-stage conventional activated sludge process, and MBBR5 representing the 5-stage MBBR process, both used for TN removal below 3 mg/L. There was only one configuration of the BAF process tested. The data from the Experimental Plans 05 and 06 were used, so all data represents periods with high influent ammonia loading.

The results showed that there was not a statistically significant difference between effluent TN concentrations. The four-stage CASB process had the lowest effluent average TN of 3.1 mg/L, while the “normal” 2-stage MLE CASB had the highest effluent TN concentration of 5.8 mg/L. There was not a statistically significant difference between any of the TN effluents.

One-way ANOVA: TN Concentration (mg/L) versus Process

Source	DF	SS	MS	F	P
Process	4	12.95	3.24	1.53	0.245
Error	15	31.81	2.12		
Total	19	44.76			

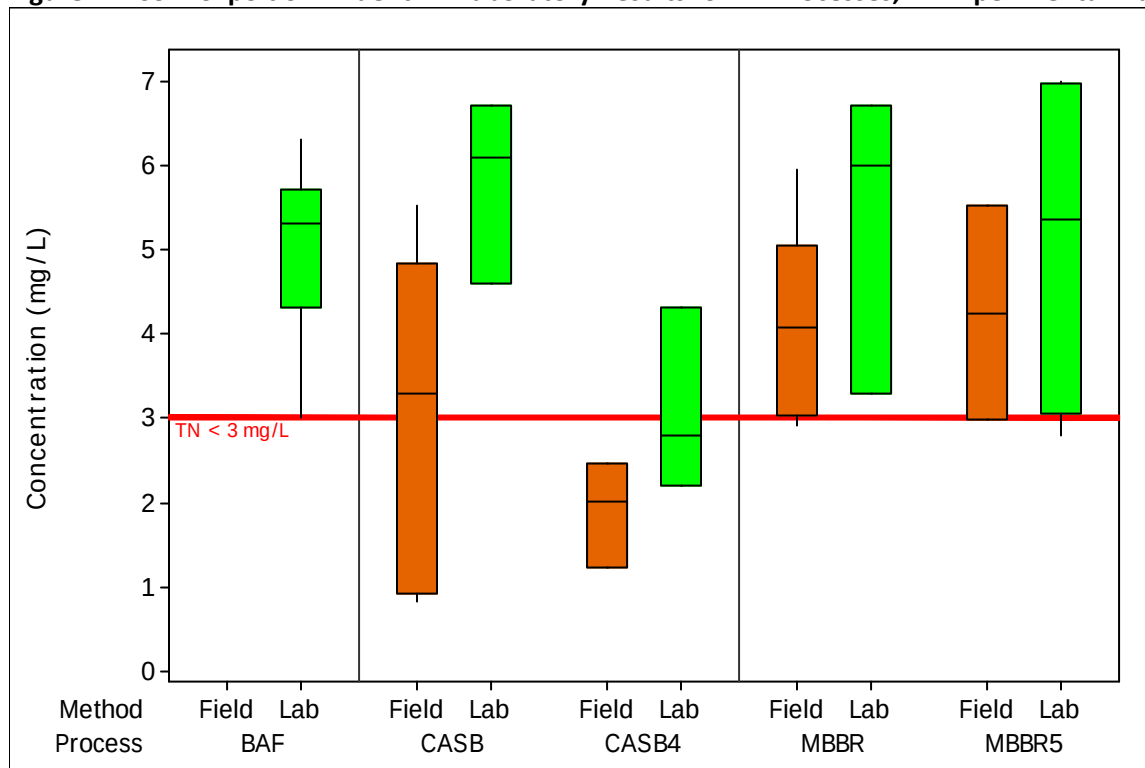
S = 1.456 R-Sq = 28.94% R-Sq(adj) = 9.99%



Pooled StDev = 1.456

Figure 4.1-03 shows a boxplot for the TN data with reference lines for both 3 mg/L and 8 mg/L TN.

Figure 4.1-03: Boxplot of Effluent TN Laboratory Results for All Processes, All Experimental Plans



7. BAF Operation Observations – The BAF pilot system was simple to operate, due to the automation built into the pilot system, and to the nature of the process. Mechanical issues that interrupted the BAF operation were commonly mundane issues with level-indicating floats that prevented the system from restarting after a backwash cycle.

The existence of the large backwash water supply tank caused delays with the acclimation of the C/N BAF system, as high solids were re-introduced into the Stage #1 during each backwash. When the solids were flushed from the storage tank, the C/N system began to completely nitrify the influent TKN within 24 hours.

The use of the BAF 1 effluent tank as the BAF 2 feed tank made it difficult to assess BAF 2 performance on some occasions, especially during short duration stress tests when BAF 1 effluent water quality changed rapidly. The tank itself might have affected BAF 2 influent water quality by retaining settled solids. The BAF 2 feed water was observed on occasion to be poorer quality than the BAF 1 effluent, suggesting the possibility of biological activity in the BAF 1 effluent/BAF 2 feed tank.

The pilot operators suspected that there was potential to improve the effluent water quality by adjusting the air feed to reduce turbulence. Two sets of samples showed effluent TSS that was less than 5 mg/L. Subsequent attempts to recreate the air feed conditions were abandoned because the air control valve had insufficient fine-tuning capabilities (in effect the air regulators allowed two settings: off and high, separated by perhaps a 20° turn of the regulator control knob). The vendor should be

consulted to determine if there are significant improvements that could be achieved with better air flow control, and the full-scale design should include the ability to control the air flow control.

The flow rate into the BAF pilot system was controlled by a PID loop, and remained very constant during the pilot study. The pilot system did not duplicate varying flow conditions that the full scale system may experience. Kruger states that their full scale systems operate multiple cells within a limited range of flows, and that large variations in flow are accommodated by bringing cells online or offline. The hydraulic stress tests did test the capacity of the BAF to accommodate large and sudden changes in flow and loading. The results of the 24 hour stress tests suggested that the BAF filters did in fact acclimate to significantly increased nitrogen loads. Over the course of each 24 hour stress test, BAF 1 effluent ammonia concentrations initially spiked, but then decreased, suggesting that the nitrifying filter had the capacity to treat a wide range of influent ammonia loads if given sufficient time to acclimate. The change in hydraulics had much less effect upon performance than the change in mass loading.

One disadvantage of the BAF pilot system was the inability to access the media zones inside the filter to troubleshoot performance. There were a series of taps on the outside of the pilot filter, but the media retention screens were not functioning and samples could not be obtained.

8. CASB System Observations – The CASB system was started and acclimated very quickly. It produced a high-quality effluent within a few days of startup. The process was also very responsive to process changes, producing poor water nearly immediately if the conditions were outside of the optimal range and good effluent water quality when the conditions were returned to an appropriate range.

The responsiveness of the system allowed the system to perform well during the pilot study Experimental Plans. The vendor representative was onsite while most of the Experimental Plans were completed, and either maintained the optimal ranges for the system, or notified Blueleaf personnel that changes were required. A high degree of operator attention was required because the air feed was manually controlled, not automated as is typical at most full-scale conventional activated sludge plants.

The Blueleaf operators found the pilot process fairly complicated to operate with a higher degree of operator knowledge and expertise required. Normal maintenance entailed a few hours to measure mixed liquor TSS and VSS concentration, determine the mass of magnetite required to be added, waste solids, and perform field testing on the various reaction tanks. Many of these functions can likely be automated for a full scale system, and the design engineer will need to consider what level of automation is appropriate.

Filaments were a major problem during the pilot study. The first problem with filaments was likely caused by conditions in the pilot system which promoted their growth after the inadvertent loss of biomass. The second problem with filaments was caused by obtaining a seed with a pre-existing growth of filaments from a local WWTF. In both cases, understanding the factors that promoted the growth of filamentous organisms, how to identify and enumerate the organisms, and control their growth was required during the pilot. Increasing the magnetite concentration had little effect on the settleability of the filamentous organisms. The addition of chlorine to the RAS line, the addition of a defoaming agent

to the reaction tank inlet, and daily surface wasting eventually reduced the filamentous organism population to a controllable level.

The time and expertise provided by the vendor representatives were important for maintaining a well performing system, and especially for addressing issues such as filaments, proper VSS/magnetite ratios, modifications to the physical installations, etc. Proper operator training or support would be important for a full-scale system.

Magnetite handling was completed manually at the pilot scale, and is not recommended for full scale application. The pilot scale equipment that was installed to mix and discharge the magnetite slurry plugged and failed regularly, and the lines that transferred mixed liquor with magnetite were often plugged with magnetite. A full-scale design should rely on proven equipment and designs that the vendor has had success with at other sites. Maintaining appropriate velocities in any pipes or channels containing mixed liquor with magnetite would be a critical design parameter. Improper pipe sizing might result in settling in the pipes, which occurred constantly with the pilot plant and required frequent maintenance.

Proper mixing and aeration was critical at the pilot scale, and additional mixers were added to keep the magnetite suspended in solution. The vendor should be consulted to determine the mixing required for the full scale system.

A polymer was needed at times to control the effluent TSS. The frequency of polymer addition was not carefully documented during the pilot study, as one polymer stock was used for both the DAF system and the CASB system. When the polymer was used, a typical dose was 1 ppm of Aries 26614. Aries 26614 is a high charge, high molecular weight, polyacrylamide flocculent. Proper dispersion and mixing into the clarifier influent was also important.

9. MBBR System Observations – The MBBR system was fairly simple to operate and troubleshoot. The growth of organisms on the media appeared to be easy to establish and maintain. Evaluating the mass of biogrowth on the media was straightforward. There was also easy access to different sections of the reaction tanks, so the operator could directly assess BOD removal, nitrification, and denitrification.

At the pilot scale, media retention was fairly simple, but screens and pumps required constant cleaning, as the sloughed organic matter blocked screens constantly.

There was poor mixing in the smaller reaction tanks, especially NR2 and DN1, and keeping the media from stagnating in the corners was difficult. Stagnant media was likely not effective in providing treatment, and reduced the surface area available for biogrowth and substrate utilization. Some of the stagnant media issue may have been due to the small tank size, and the fact that corners trapped a larger fraction of media in a small tank than they would in a large full scale tank. The design engineer should consider the design at other sites, and consult with the media vendor for proper mixing recommendations.

The media itself was of some concern at the pilot scale. A fraction of the media beads were not manufactured to the proper size and shape, being flattened along the axis. These beads often passed through, or lodged in, screen structures. Many actually passed through small submersible pumps, and they were a regular cause of clogging pumps, valves, and small diameter pipes such as the DAF feed line.

The pilot scale DAF system was used to provide water quality information for MBBR bioreactor effluent. Due to the small size of the pilot-scale DAF, the need to clean the DAF and other concerns with the operation, it is unlikely that the pilot data can be directly used to evaluate the performance of full-scale DAF processes. Problems with the DAF operation likely contributed to high effluent concentrations of TSS, DAF, and TN which may not be representative of a full-scale application.