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United States Section, International Boundary and Water Commission (USIBWC)

South Bay International Wastewater Treatment Plant (SBIWTP) Operational Approaches: Project Report for Full Scale Testing of TSS Removal Improvements

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Final Report

Approval Page

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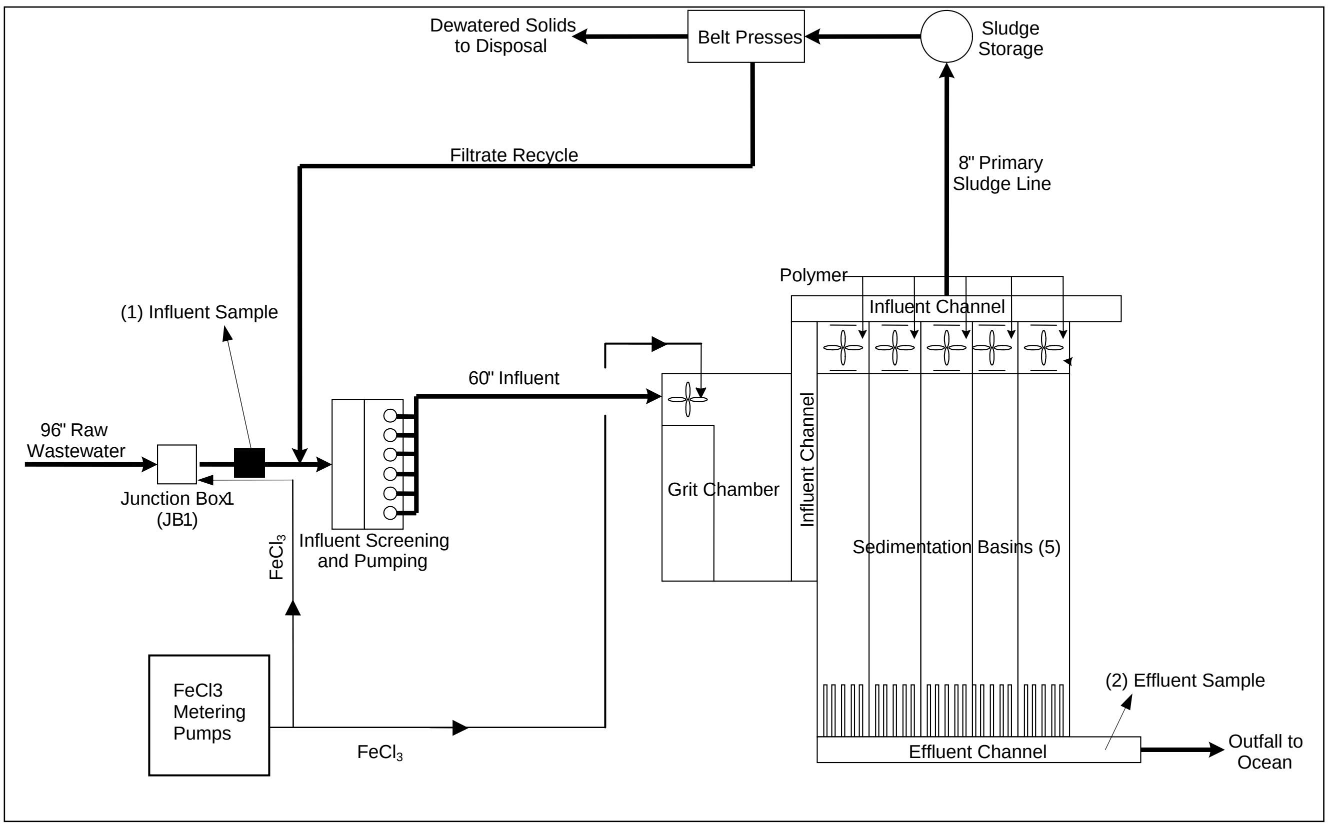
Executive Summary

The South Bay International Wastewater Treatment Plant (SBIWTP) is a 25 mgd chemically enhanced primary treatment (CEPT) facility that is located at the US-Mexico border in south San Diego County and treats wastewater generated in Tijuana, Baja California, Mexico. For the past several years, pending a secondary treatment upgrade or replacement anticipated in the future, the United States Section of the International Boundary and Water Commission (USIBWC) has been engaged in exploring options to improve TSS removal at this facility by using simple interim operational and low-cost capital modifications. Based on performance of similar facilities in the region, 85 percent TSS removal was set as the target. A schematic of the SBIWTP process is shown in the following figure.



The "South Bay International Wastewater Treatment Plant Optimization Study" (Reference 1 – Optimization Study) completed in October 2005 evaluated 15 alternatives based on relative cost and potential to improve TSS removal. As an extension of this study, a series of jar tests was also conducted to evaluate effects of several chemicals, dosage rates, and mixing intensities on TSS removal (Reference 2 – Jar Testing). The Optimization Study and Jar Testing resulted in recommendations for full-scale testing of some of the alternatives. Full-scale testing was implemented using funding from an EPA Section 510 Grant, Region IX, provided to the USIBWC to optimize Operation and Maintenance (O&M) at the SBIWTP. This document presents the details and results of the full-scale testing performed.

A Technical Implementation Plan (TIP) was prepared that defined the full-scale testing procedures in detail, including additional sampling and analysis required beyond the routine. Veolia Water completed minor modifications required at the plant for implementation of the full-scale testing under a separate contract with USIBWC and also provided the required additional O&M under this contract.

Full-scale testing started with a high ferric chloride dose aiming for a high probability of meeting and exceeding the TSS removal target of 85 percent. Stepwise dose reductions were then made to determine the minimum dose required to meet the target performance with no other modifications. Other modifications (including dilution of ferric chloride coagulant and distribution of the coagulant between two dosing locations) were then tested in an attempt to further lower the ferric chloride dose while still meeting target performance. Current conditions preceding initiation of full-scale testing served as the baseline. Parameters specifically sampled for full-scale testing (in addition to routinely tested parameters) are shown in the following table.

			(1) Influent		(2) Effluent	
Parameter	**Unit**	**Method**	**Type of Sample**	**Frequency**	**Type of Sample**	**Frequency**
Flow	mgd	--	Online	Daily average	--	--
TSS	mg/L	EPA 160.2	24-hour composite	Daily	24-hour composite	Daily
Turbidity	NTU	SM 2130-B	Online	Daily average	Online	Daily average
Temp	deg C	EPA 170.1	Grab	Daily	Grab	Daily
pH	SU	EPA 150.1	Grab	Daily	Grab	Daily

General operating conditions during full-scale testing were as follows:

Parameter	Minimum	Average	Maximum
Plant Influent Flow (mgd)	18	25	35
Influent Temperature (°C)	11	20	31
Effluent Temperature (°C)	13	20	28
Influent pH	6.5	7.1	7.5
Effluent pH	6.5	7.1	7.5

A summary of specific full-scale testing conditions and resulting TSS removal performance is presented in the table below:

Target Percent Dose at JB1	Target Dilution Ratio	Target Total Ferric Chloride Dose (mg/L)	Average of Influent TSS (mg/L)	Average of Effluent TSS (mg/L)	Average of Influent VSS as percent of TSS	Average of Effluent VSS as percent of TSS	Average of TSS Percent Removal
0	3	50.0	321	61	47	73	80
	3 Average		321	61	47	73	80
0 Average			321	61	47	73	80
75	3	45.0	323	55	50	77	82
	3 Average		323	55	50	77	82
75 Average			323	55	50	77	82
80	3	50.0	355	51	60	78	84
	3 Average		355	51	60	78	84
80 Average			355	51	60	78	84
100	0	40.0	381	68			81
		50.0	324	62	44	78	80
		55.0	375	55			85
		60.0	395	57			85
		65.0	363	57	45	79	83
	0 Average		365	59	45	79	83
	3	40.0	360	53	57	80	85
		50.0	315	53	44	65	83
		65.0	272	45	51	78	83
	3 Average		313	51	47	71	83
100 Average			350	57	47	73	83
Grand Average			345	57	50	74	83

Note: The target percent dose at the Grit Basin Influent Channel equals 100 less the target percent dose at JB1 listed in the table above. The sum of the percentages at these locations is 100.

A calendar month average summary of the same data is presented in the table below:

Month-Year	Target Percent Dose at JB1	Target Dilution Ratio	Target Total Ferric Chloride Dose (mg/L)	Influent TSS (mg/L)	Effluent TSS (mg/L)	Influent VSS as percent of TSS	Effluent VSS as percent of TSS	TSS Percent Removal
May-07	100.0	0.0	40.0	380.3	67.7			81.3
Jun-07	100.0	0.0	62.5	403.8	55.9			85.1
Jul-07	100.0	0.0	61.3	392.7	57.4			84.8
Aug-07	100.0	0.0	56.8	399.0	54.9			86.0
Sep-07	100.0	0.0	51.5	341.8	59.6			81.7
Oct-07	100.0	0.0	56.3	309.5	63.0	44.6	79.1	79.5
Nov-07	100.0	1.8	65.0	274.6	49.7	49.4	78.1	81.8
Dec-07	96.8	3.0	50.5	327.2	53.1	38.6	59.2	83.3
Jan-08	0.0	3.0	50.0	321.1	61.9	48.1	73.8	80.2
Feb-08	83.4	3.0	50.0	346.1	51.5	58.4	78.0	84.0
Mar-08	82.3	3.0	46.5	293.7	52.4	50.3	75.3	82.2
Apr-08	87.5	3.0	42.5	358.1	55.2	53.5	80.0	84.0

Note: The target percent dose at the Grit Basin Influent Channel equals 100 less the target percent dose at JB1 listed in the table above. The sum of the percentages at these locations is 100.

In the analysis presented below, the term "significant," when applied to data or results, refers to statistical significance. In general terms, to be statistically significant, the difference in average data between two conditions must be higher than the random variation in data within each condition and must meet additional "significance criteria". In this analysis, the assessment of significance was based on visual interpretation of the data and graphs. No formal statistical analyses were performed.

Based on the results of the full-scale testing and related data analysis and evaluations, the following specific conclusions may be drawn regarding the relative significance of the parameters tested:

- TSS percent removal shows significant correlation with influent TSS – higher influent TSS results in higher TSS percent removal.
- Within the ranges tested, ferric chloride dose, dilution ratio, or dosing location splits did not have a significant impact on TSS percent removal for ferric chloride doses of 45 mg/L and higher. The difference in TSS removal between the various conditions ranged from about 2 to 7 percent.
- For ferric chloride doses of 45 mg/L and higher, the target 85 percent TSS removal was achieved on average at an influent TSS of about 400 mg/L. Lower influent TSS resulted in lower TSS percent removal.

- For ferric chloride dose of 40 mg/L, TSS percent removal was comparable to that observed for the higher doses for influent TSS values above about 400 mg/L.
- For influent TSS below about 400 mg/L and ferric chloride dose of 40 mg/L, the TSS percent removal was significantly affected by the dilution ratio. This appeared to be the only condition where dilution ratio had a significant impact. At a dilution ratio of 3:1, the removal was comparable to that at higher doses for the same influent TSS. However, with no dilution, the removal appeared to drop by 5 to 10 percent.
- Overall, for ferric chloride doses of 45 mg/L and higher, influent TSS was the overriding parameter affecting TSS removal – the impact of other parameters was not significant.

Based on testing results, the following operating conditions are recommended for optimization of TSS removal:

- Ferric chloride dose of 45 mg/L
- Ferric chloride dilution water ratio of 3:1
- Add 100 percent ferric chloride dose at JB1, but maintain flexibility to dose at the grit influent channel

Results of extensive full-scale testing indicate that the 85 percent TSS removal target is achievable, but only under certain conditions. The key criterion (influent TSS greater than about 400 mg/L) is not under operator control. For lower influent TSS values, consistent 85 percent TSS removal is not realistically achievable even with very high ferric chloride doses. This conclusion is supported not only by the daily data, but also by data averaged by operating condition and data averaged by calendar month.

Over the 12-month full-scale testing duration, three calendar month average TSS removals equaled or exceeded 85 percent, including 84.8 rounded off to 85 (the corresponding influent TSS averages were 393, 399, and 404 mg/L). However, 11 out of the 12 monthly averages TSS removals were above 80 percent and all were above 79 percent.

It should be noted that although the TSS removal performance during full-scale testing did not, for the most part, show significant variation in response to the tested parameters of ferric chloride dose, dosing location, and dilution ratio (in comparison with random variation in the data), the overall performance during the testing period was significantly better than the performance prior to plant modifications that were implemented in preparation for full-scale testing. The typical TSS removal averaged about 75 percent prior to these modifications. In comparison, the lowest calendar month average removal during testing was 79 percent, and the overall average removal was about 83 percent. This clearly shows that USIBWC's efforts have resulted in significant performance improvements, even though these improvements are not related to dose, dosing location, or dilution. The most likely modification contributing to this improvement is the introduction of the chemical distribution manifold at both JB1 and grit basin influent channel.

The following table illustrates the effect of influent TSS concentration and the estimated percent removals that could be expected:

Monthly Average Influent TSS (mg/L)	Expected Monthly Average TSS Percent Removal Range	Resulting Monthly Average Effluent TSS (mg/L)
400 or higher	85	60 or higher
300 to 400	81 to 85	57 to 76
270 to 300	80 to 81	54 to 60

Data analysis performed in the course of testing also indicates that the SBIWTP influent wastewater characteristics are highly variable and significantly different from those of typical US municipal wastewaters. As an example, influent VSS as a fraction of influent TSS is typically between 70-75 percent for US municipal wastewaters, but varied at the SBIWTP between 45 and 85 percent at various time over the last eight years. It is likely that the plant has not been designed to accommodate such a high variability. The 85 percent TSS removal target currently set for SBIWTP is understood to be based on historical performance of the nearby US Chemically Enhanced Primary Treatment (CEPT) facilities, including Point Loma, Orange County, and Hyperion. However, these facilities serve areas wholly within the US and their influent characteristics are typical of US municipal wastewaters and significantly less variable. In contrast, SBIWTP influent originates entirely within Mexico.

If the 85 percent TSS removal target continues to apply to the CEPT process, it is recommended that an influent characterization program be undertaken to develop specific, targeted information that may help address current limitations and improve TSS removal performance. The information is essential to further optimize plant performance toward the 85 percent TSS removal goal.

Specific objectives suggested for further investigations are:

- Develop wastewater characterization specific to the SBIWTP influent
- Compare CEPT performance of the SBIWTP with that of Point Loma, Orange County, and Hyperion while accounting for key factors such as wastewater characteristics, chemical doses, and loading rates

These investigations will also provide the necessary information to rationally determine whether the current 85 percent TSS removal target is appropriate for the SBIWTP.

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1 Background Information

1.1 Project Objectives

The South Bay International Wastewater Treatment Plant (SBIWTP) is a 25 mgd chemically enhanced primary treatment (CEPT) facility that is located at the US-Mexico border in San Diego County and treats wastewater generated in Tijuana, Baja California, Mexico. For the past several years, pending a secondary treatment upgrade or replacement anticipated in the future, the United States Section of the International Boundary and Water Commission (USIBWC) has been engaged in exploring options to improve TSS removal at this facility by using simple interim operational and low-cost capital modifications. Based on performance of similar facilities in the region, 85 percent TSS removal was set as the target.

The "South Bay International Wastewater Treatment Plant Optimization Study" (Reference 1 – Optimization Study) completed in October 2005 evaluated 15 alternatives based on relative cost and potential to improve TSS removal. As an extension of this study, a series of jar tests was also conducted to evaluate effects of several chemicals, dosage rates, and mixing intensities on TSS removal (Reference 2 – Jar Testing). The Optimization Study and Jar Testing resulted in recommendations for full-scale testing of some of the alternatives. Full-scale testing was implemented using funding from an EPA Section 510 Grant, Region IX, provided to the USIBWC to optimize Operation and Maintenance (O&M) at the SBIWTP. This document presents the details and results of the full-scale testing performed.

1.2 Optimization Study and Jar Testing Overview

The Optimization Study evaluated major capital improvements as well as simpler operational and low-cost facility modifications to chemicals, chemical doses, dosing locations, mixing intensities, process flow configuration, and plant hydraulics. The alternatives were ranked based on preliminary estimates of relative cost and potential to improve TSS removal.

Initial preliminary testing was performed on some of these alternatives on a limited basis at full scale.

- Alternative 1 (numbering refers to Table 3 – "Workshop Two Alternatives" from the Optimization Study) involved chlorinating the influent at a rate of 1.5 mg/L to oxidize sulfides and yielded no significant TSS removal improvement.

- Alternative 6 consisted of a higher volumetric rate of more dilute ferric chloride coagulant (no change in dose) injected at the grit chamber in order to promote better mixing and dispersion. This modification was implemented for about 1 week and increased TSS removal by 3 to 4 percent.

- Alternative 8 consisted of reconfiguration of the polymer feed manifold to provide more even distribution and better mixing. No significant TSS removal improvement was observed with this modification.

The Jar Testing procedure was designed to create an approximate batch simulation of the SBIWTP continuous flow configuration including chemical doses, dosing locations, detention times in segments of the flow path, and mixing intensities. Chemicals tested included ferric chloride, ferrous chloride, poly ferric sulfate (PFS), polyaluminum chloride (PACl), magnesium chloride, three different cationic polymers, chlorine, a defoaming agent (Silicor), zeolite, and muriatic acid to lower pH.

Key findings from Jar Testing include:

1. Ferric chloride and PFS applied at Junction Box 1 (JB1) improved TSS removal. Adding PACl at JB1 also improved removal rates but required higher dosages. Increasing mixing intensity in the grit chamber improved TSS removal. See Figure 1 for a liquid flow schematic showing the locations of JB1 and the grit chamber.

2. 85 percent removal can be achieved using current ferric chloride dosage applied at JB1, but higher mixing intensity may be required at the grit chamber. During the jar tests 85 percent removal was nearly achieved by adding ferric chloride to JB1 without increased mixing intensity in the grit chamber.

3. A small increase in TSS removal might be achieved by adding ferric chloride or PFS at JB1 then replacing a portion of the iron dosage required with PACl at the grit chamber.

4. The following changes did not improve TSS removal in the jar tests:

   - increasing rapid mix or flocculation times
   - adding a cationic polymer to the grit chamber following the primary coagulant at JB1
   - adding zeolite
   - lowering pH

Ferric chloride (the original coagulant) was indicated as the most cost-effective coagulant on the basis of cost per pound of TSS removed over a range of 70 to 90 percent removal. Historical ferric chloride dose was about 50 mg/L. A significant increase in the general cost-effectiveness of ferric chloride is indicated by moving the rapid mix point to JB1 in order to take advantage of the additional mixing and floc formation time in the 144-inch line from JB1 to the headworks. Under average flow conditions, the hydraulic regime in this pipe would provide low-intensity mixing conducive to floc formation. TSS removal rates of 85 percent appeared possible using ferric chloride at a dose of 55 to 70 mg/L applied at JB1.

2 Full-Scale Testing Methodology

A Technical Implementation Plan (Reference 3 - TIP) was developed to define the framework and procedures for full-scale testing. Key elements of the TIP are presented in the following subsections. The complete TIP is presented as a separate document.

2.1 Plant Modifications for Full-Scale Testing

Modifications were first completed to allow implementation of the Optimization Study Alternatives 1 and 8. Alternative 6 was initially implemented using a temporary means of diluting the ferric chloride feed solution. More permanent modifications to dilute ferric chloride at each feed point with non-potable water from the neighboring City of San Diego facility were completed as part of this full-scale testing effort. This included dilution water flow metering and control for long-term implementation of this alternative. In addition, modifications were also completed to allow dosing of ferric chloride at JB1 and to provide operator control of the dose split between JB1 and the current dosing point at the head of the grit chamber. These modifications provided the ability to implement the alternatives tested in this full-scale study by varying selected operating parameters. A key modification implemented that is not related to any of the parameters tested but has the potential to significantly affect TSS removal performance was the replacement of an open pipe discharge with a manifold designed to more evenly distribute ferric chloride across the width of the influent flow to promote better mixing and chemical utilization. Such manifolds were installed at both dosing locations – JB1 and grit basin influent channel.

A photo log of key full-scale testing components and modifications is included in Appendix B – Photo Log. The modifications required for full-scale testing as well as the ongoing operation, maintenance, sampling, and some analysis were provided by Veolia Water under a contract with USIBWC separate from the routine Operation and Maintenance (O&M) contract.

2.2 Full-Scale Testing Procedures

The full-scale testing started with a high ferric chloride dose aiming for a high probability of meeting and exceeding the TSS removal target of 85 percent. Stepwise dose reductions were then made to determine the minimum dose required to meet the target performance with no other modifications. Other modifications were then tested in an attempt to further lower the ferric chloride dose while still meeting target performance. Current conditions preceding initiation of full-scale testing served as the baseline:

- Ferric chloride dose: about 38 mg/L
- Ferric chloride split to JB1: 100 percent
- Ferric chloride dilution: None

Details of this full-scale testing approach are described below in terms of changes to the baseline conditions and are reproduced here from the TIP:

1) Increase ferric chloride target dose to 65 mg/L. No dilution. Test for about 1 month. Assumption was that this would provide TSS removal of 85 percent or higher. Consensus of technical experts was that probability of failure for this step was low and would be addressed as necessary depending on the results.

2) Decrease ferric chloride target dose stepwise by 5 mg/L at a time. Test for about 1 month each. Stop when TSS removal drops below 85 percent. The last ferric chloride dose before TSS removal drops below 85 percent would be termed for the purposes of this project as the "baseline ferric threshold".

3) Increase ferric chloride dilution to 3:1 applied immediately upstream of the dosing location.

    a) Run at baseline ferric threshold for 1 month.

    b) If dilution improves TSS removal, decrease ferric chloride dose stepwise by 5 mg/L at a time. Test for about 1 month each. Stop when TSS removal drops below 85 percent. The last ferric chloride dose before TSS removal drops below 85 percent would be termed for the purposes of this project as the "diluted ferric threshold".

    c) If dilution does not improve TSS removal, discontinue dilution.

4) Change ferric chloride dose split: 80 percent to JB1 and 20 percent to grit influent channel

    a) Depending on outcome of step 3 above, start with either the baseline ferric threshold with no dilution or the diluted ferric threshold with 3:1 dilution. Test for about 1 month.

    b) If the ferric chloride dose split improves TSS removal, decrease ferric chloride dose stepwise by 5 mg/L at a time while maintaining the split percentage. Test for about 1 month each. Stop when TSS removal drops below 85 percent. The last ferric chloride dose before TSS removal drops below 85 percent would be termed for the purposes of this project as the "80/20 split ferric threshold".

    c) If the ferric chloride dose split does not improve TSS removal, testing is completed.

5) If 80/20 split tested in step 4 above results in a lower ferric threshold, repeat step 4 with a 50/50 split. Testing would be completed at the conclusion of this step.

Data was compiled weekly. Monthly meetings with USIBWC and SBIWTP staff were conducted approximately at the end of three weeks of testing for each modification and as otherwise necessary to make decisions on next steps. A list of meetings conducted is included in *Appendix C – List of Meetings*. The above testing procedure was followed with some exceptions. There were occasions during the course of full-scale testing when the results of ongoing data analysis indicated deviations from the TIP to better accomplish project objectives and better evaluate the interactions between various operating variables. These deviations from the TIP are listed below (the data analysis and results mentioned here are described in detail in subsequent sections of this report):

- During testing at a target dose of 50 mg/L, it became apparent that percent TSS removal was more a function of influent TSS concentration and less a function of ferric chloride dose. Testing at the 50 mg/L target dose was therefore extended for about a month to collect data over a larger range of influent TSS concentrations. The data did not show significant differences in percent TSS removal for ferric chloride doses from 50 mg/L to 65 mg/L so it was decided to proceed with testing the effects of dilution.

- A 3:1 dilution ratio was tested at target ferric chloride doses of 65 and 50 mg/L. Dilution did not have a significant impact at either target ferric chloride dose tested, so it was decided to proceed with the testing of the effects of ferric chloride dose splits between JB1 and the grit chamber. Testing of the dose splits was done at a target ferric chloride dose of 50 mg/L because this was the lowest dose tested that did not result in reduced performance compared to the highest does of 65 mg/L. Testing of the dose split began with 100 percent of the ferric chloride dose applied at the grit chamber and none at JB1. This deviated from the initial split outlined in the TIP of 80 percent of the dose to JB1 and 20 percent to the grit chamber. This deviation was intended to provide a quick indication of performance at the two ends of the possible dose spilt range. i.e. “bracket” the range. The 100 percent dose to the grit chamber resulted in slightly less removals, but it was decided to test a split of 80 percent to JB1 and 20 percent to the grit chamber to see if it would be more efficient to add the dose in stages.

- After testing the dose splits, it was decided to use the remaining month of the testing period to collect data at the ferric chloride target dose of 45 mg/L, which had not been previously tested, to see if comparable performance could be maintained at this dose.

2.3 *Sampling and Analysis*

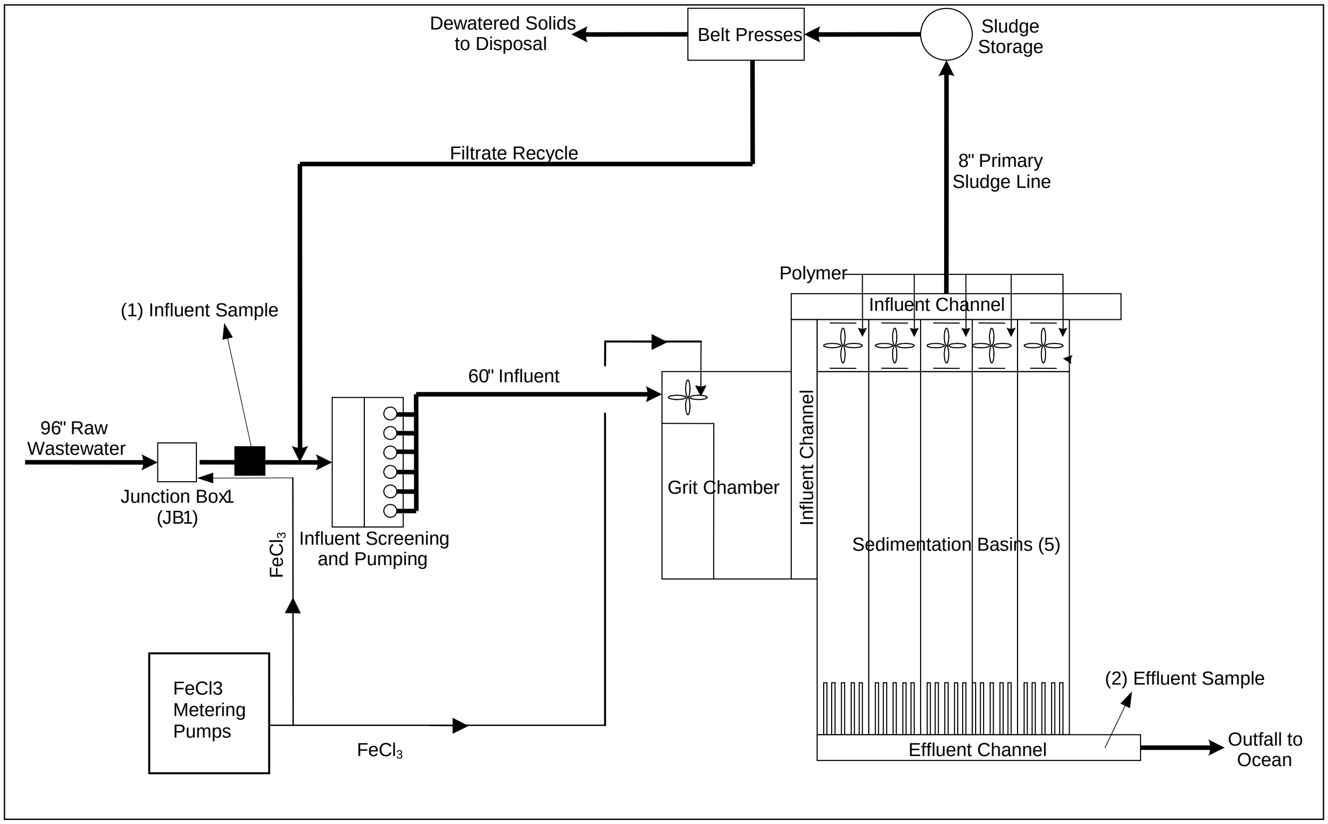
For each modification and test condition, TSS removal and other related performance parameters were monitored and evaluated through specific, targeted sampling and analysis. The sampling and analysis were specifically intended to assess TSS removal performance of the modifications tested, and were in addition to routine sampling, analysis, and monitoring performed for plant operation and control. However, results of sampling and analysis performed as part of the plant’s routine program were used for the purposes of this testing where applicable. All testing, operational and physical modifications, field measurements, sample collection, laboratory analyses, and data compilation were performed by Veolia Water SBIWTP staff or the designated certified laboratory.

The Sampling and Analysis Plan in Table 1 shows the parameters measured or analyzed and type and frequency of samples collected for each parameter and sampling location. A process flow schematic of the SBIWTP along with the influent and effluent sampling locations is shown in Figure 1. In addition to the parameters shown in Table 1, other relevant parameters such as chemical doses (ferric chloride, polymer, etc.), chemical application locations, the ferric chloride solution concentration, and number of units of tanks and equipment in service were also recorded daily and compiled on a weekly basis. Although not directly related to the full-scale testing objectives, additional parameters recorded included influent and effluent carbonaceous biochemical oxygen demand (CBOD), and acute and chronic effluent toxicity. The intent was to investigate possible correlation between these parameters and effluent TSS and/or TSS percent removal.

Table 1. Sampling and Analysis Plan

			(1) Influent		(2) Effluent	
Parameter	**Unit**	**Method**	**Type of Sample**	**Frequency**	**Type of Sample**	**Frequency**
Flow	mgd	--	Online	Daily average	--	--
TSS	mg/L	EPA 160.2	24-hour composite	Daily	24-hour composite	Daily
Turbidity	NTU	SM 2130-B	Online	Daily average	Online	Daily average
Temp	deg C	EPA 170.1	Grab	Daily	Grab	Daily
pH	SU	EPA 150.1	Grab	Daily	Grab	Daily

Figure 1. SBIWTP Liquids Flow Schematic with Influent and Effluent Sampling Locations



3 Full-Scale Testing Results and Data Analysis

This section presents the results of the full-scale testing and the data analysis performed. Relevant data including data specifically collected for full-scale testing as well as other routinely collected data of interest was compiled in a comprehensive database in a Microsoft Excel spreadsheet. Data analysis tools available in Excel such as pivot tables and pivot charts as well as trending and correlation graphs and built-in regression capabilities were used to investigate various cause-effect or coincidental relationships between the measured operating and performance parameters. The products of this analysis and a discussion of the results are presented below, including potential implications in terms of the key objective of 85 percent TSS removal.

In the analysis presented below, the term "significant," when applied to data or results, refers to statistical significance. In general terms, to be statistically significant, the difference in average data between two conditions must be higher than the random variation in data within each condition and must meet additional "significance criteria". In this analysis, the assessment of significance was based on visual interpretation of the data and graphs. No formal statistical analyses were performed.

3.1 Full-Scale Testing Database

The complete database compiled from the results of the full-scale testing described in this document is included for reference in Appendix A - Full-Scale Testing Complete Database.

3.2 General Plant Operating Conditions

The general average operating conditions prevailing at the SBIWTP over the full-scale testing period are summarized in this section.

- Plant influent flow averaged about 25 mgd, with a range from 18 to 35 mgd. This plant is designed to be base loaded with a fairly constant flow averaging 25 mgd. Peaks are diverted elsewhere. The daily average flow was therefore close to 25 mgd and any deviations from this flow were infrequent and of short duration.

- Plant influent temperature averaged about 20 °C, with a range from 11 °C to 31 °C. Plant effluent temperature averaged about 20 °C, with a range from 13 °C to 28 °C.

- Both influent and effluent pH averaged about 7.1 with a range from 6.5 to 7.5.

- All five (5) primary clarifiers were in service throughout the testing period.

The above general operating conditions are summarized in the table below:

Parameter	Minimum	Average	Maximum
Plant Influent Flow (mgd)	18	25	35
Influent Temperature (°C)	11	20	31
Effluent Temperature (°C)	13	20	28
Influent pH	6.5	7.1	7.5
Effluent pH	6.5	7.1	7.5

3.3 Operating Parameters and Performance Impacts

To evaluate the feasibility of achieving 85 percent TSS removal, the main focus of the full-scale testing described here was on the impacts of three specific operating parameters:

- Ferric chloride dose
- Ferric chloride dilution water ratio
- Percent split of ferric chloride dose between two dosing locations – JB1 and grit basin influent channel

The above parameters are under operator control and may be varied and optimized to maximize TSS removal.

However, in the course of the full-scale testing and data analysis two other significant parameters were identified that are not under operator control:

- Influent TSS concentration
- Influent VSS/TSS percentage

The data analysis was therefore extended to consider the impacts of these two additional parameters and is presented in the following sections.

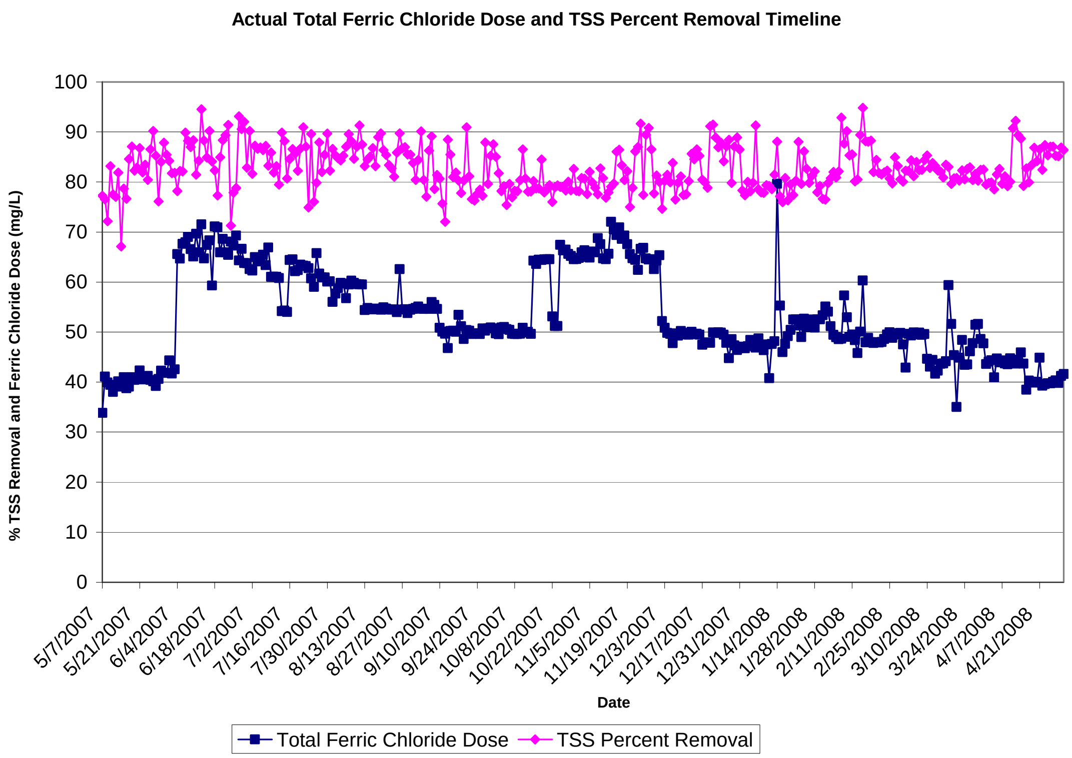
3.3.1 Ferric Chloride Dose

Figure 2 presents timelines for the actual total ferric chloride dose and TSS percent removal over the entire full-scale testing period. The target ferric chloride dose varied between 40 and 65 mg/L during this period and the actual dose[1] varied between about 34 mg/L and 72 mg/L. During the same period, the TSS percent removal varied in a narrow band with the average ranging between 75 and 85 percent and a

[1] The actual dose varied somewhat from the target dose because of batch-to-batch variations in the concentration of the ferric chloride product delivered by the manufacturer. The dose control algorithm was initially programmed with a fixed ferric chloride feed concentration representing an average value that could not be changed to reflect the batch-to-batch variations. This algorithm was subsequently modified to allow the feed concentration value to be varied for each batch. This resulted in significant reduction in the variation between target and actual ferric chloride doses.

variation of about +/- 5 percent. Although there were short-term variations resulting in the 10-percent-wide band and some variation in the band average, the percent removal showed no relationship with the ferric chloride dose.

Figure 2. Actual Total Ferric Chloride Dose and TSS Percent Removal Timeline



The lack of correlation between ferric chloride dose and TSS removal is confirmed by the graph shown in Figure 3. This graph shows that the TSS removal was confined to a relatively narrow, horizontal band over the entire range of ferric chloride doses tested.

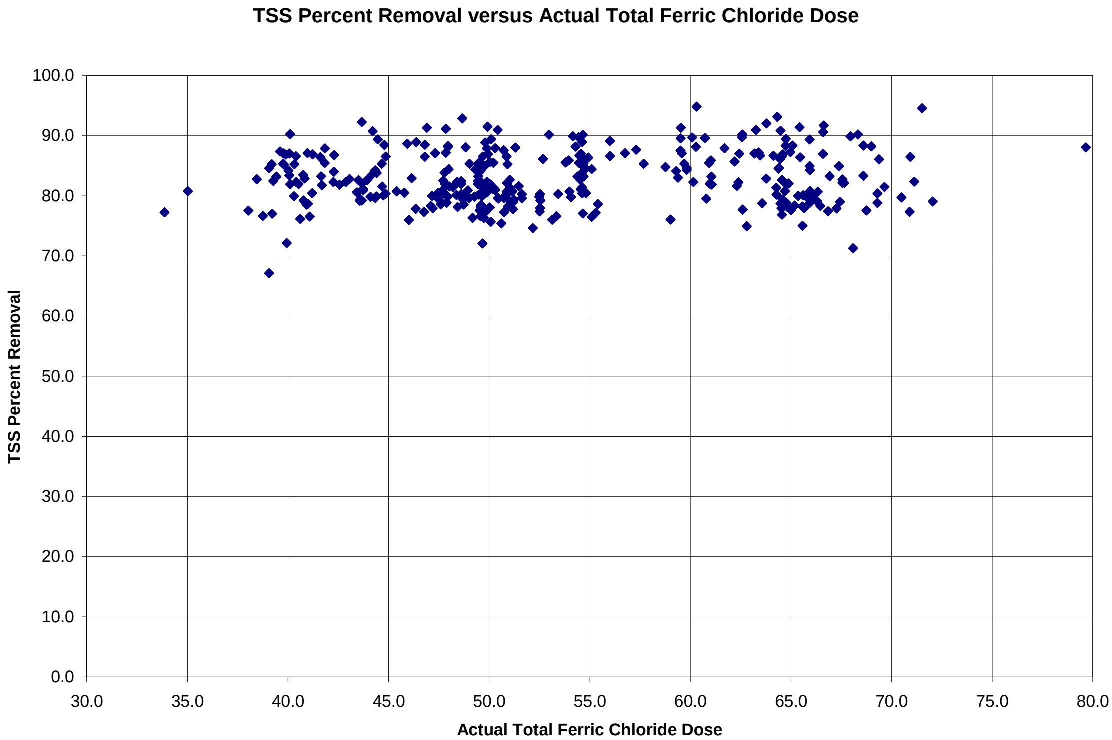


Figure 3. TSS Percent Removal versus Actual Total Ferric Chloride Dose

Ferric chloride dose was selected as a significant full-scale test parameter because it was the expectation of the technical experts that it would have a significant impact on TSS removal. The data, however, indicate otherwise. This somewhat unexpected finding is indicative of one or more of the following:

- The lowest ferric chloride dose tested (about 40 mg/L) represents an adequate or excess dose condition beyond which additional chemical provides little or no further coagulation and therefore no further TSS removal
- Other factors or parameters interact with the ferric chloride dose in such a manner as to compensate for any impact caused by ferric chloride dose

The second bullet above is unlikely since the combined impact of the other parameters would need to closely balance the dose impact to yield the flat removal response observed. The more likely explanation is that approximately 40 mg/L represents "dose saturation" and higher doses represent excess that provides little or no additional removal.

3.3.2 Dilution Water Ratio

Figure 4 shows a graph similar to Figure 3, except that the TSS removal values are categorized to assess the impact of dilution water to ferric chloride flow dilution ratio, if any. The two conditions represented in the graph are no dilution water and a dilution ratio of about 3:1.

Figure 4. TSS Percent Removal versus Actual Total Ferric Chloride Dose – Categorized by Dilution Water Ratio

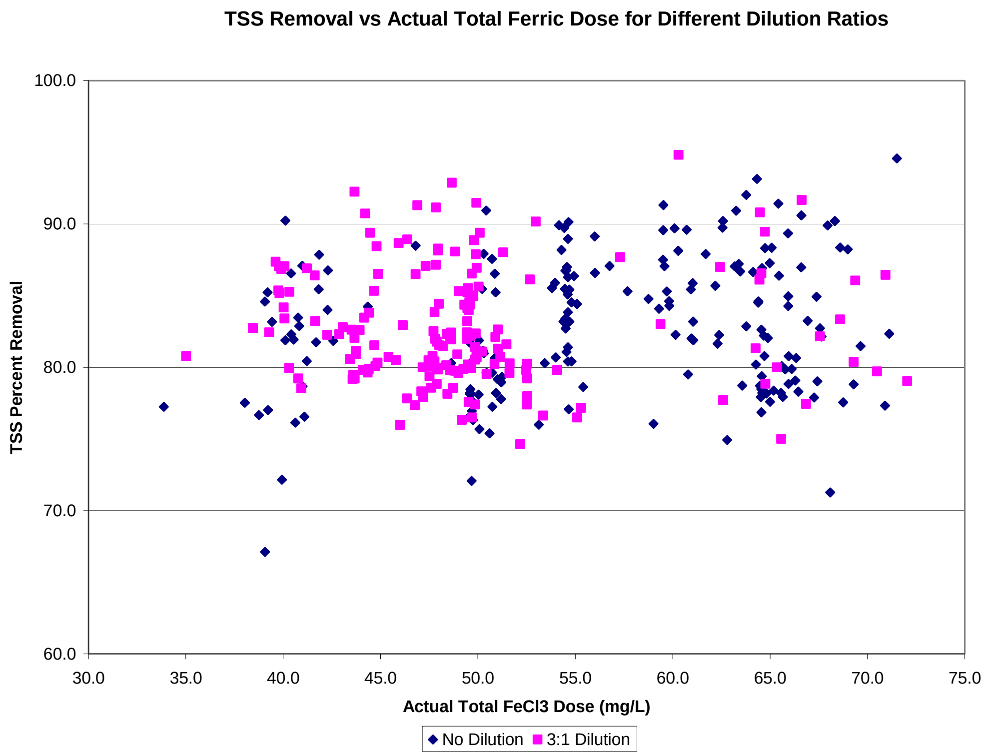


Figure 4 again shows that the dilution ratio has no significant impact on TSS removal. Both with and without dilution, the TSS removal ranged in a narrow horizontal band spanning the entire dose range tested.

3.3.3 Dosing Locations and Percent Split

Figure 5 shows a graph similar to Figure 3, except that the TSS removal values are categorized to assess the impact of splitting the ferric chloride dose between JB1 and grit basin influent channel in various proportions, if any. The conditions represented in the graph are 100, 80, and 75 percent of the dose to JB1, and 100 percent of the dose to the grit influent channel.

Figure 5. TSS Percent Removal versus Actual Total Ferric Chloride Dose – Categorized by Dose Split between JB1 and Grit Basin Influent Channel

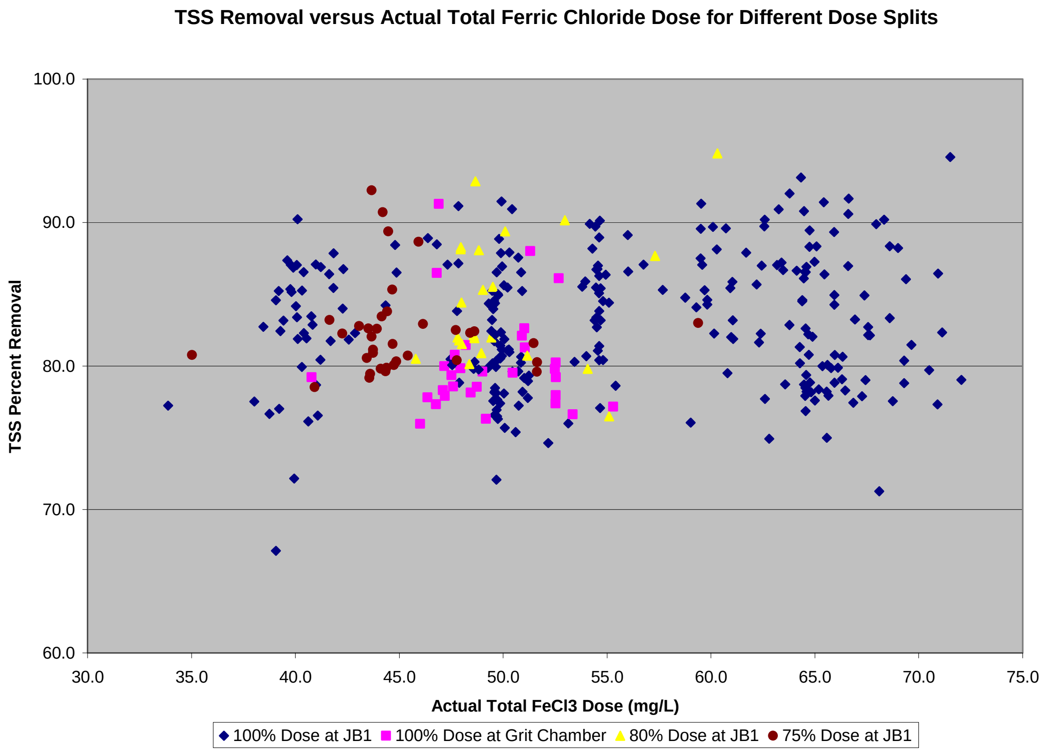


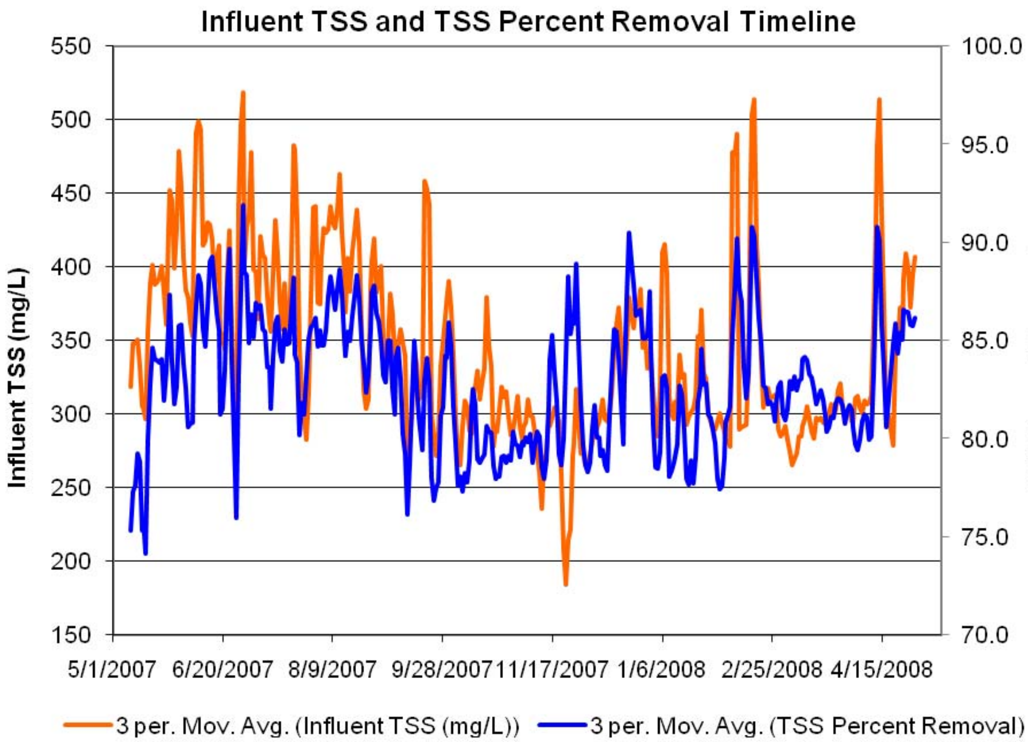
Figure 5 again shows that the split between the two dosing locations has little or no impact on TSS removal. For all the split percentages tested, the TSS removal ranged in a narrow band with approximately the same average value, with the qualification that slightly higher average values are indicated for the two conditions representing 75 and 80 percent of the dose to JB1 with the remaining dose added at the Grit Basin Influent Channel.

3.3.4 Influent TSS

The target TSS removal of 85 percent was achieved early in the course of the full-scale testing, at a target ferric chloride dose of 65 mg/L, which was the first dose tested following the baseline dose of 40 mg/L. The initial assumption was that the high removal was because of the high dose. However, continued testing revealed instances of lower removals at higher doses as well as higher removals at lower doses. The higher removals could not therefore be attributed to dose. Further analysis of the data revealed that by far the most significant parameter affecting TSS removal was the influent TSS concentration.

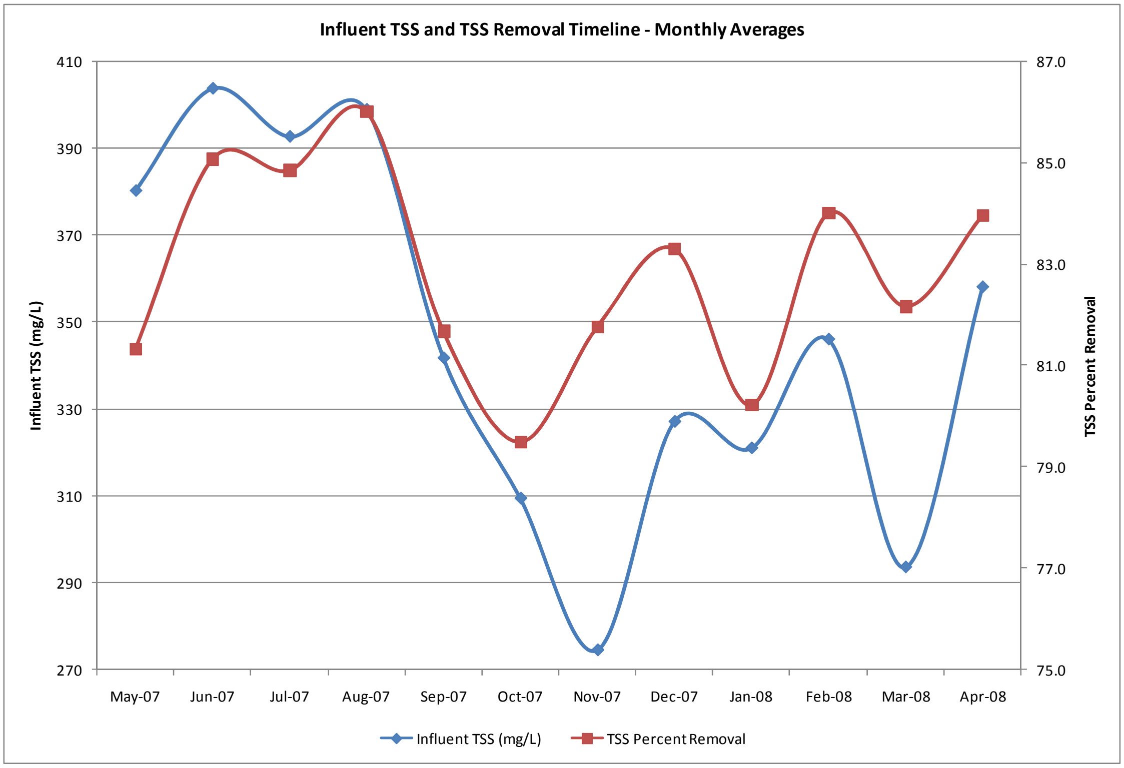
Figure 6 shows plots of influent TSS and TSS percent removal on a common timeline. This graph clearly shows that the variations in these two parameters match closely, indicating a high degree of correlation.

Figure 6. Influent TSS and TSS Removal Timeline



The same timeline is plotted in Figure 7 using monthly averages instead of daily data. The variations in monthly averages also match closely. Besides corroborating the close correlation, the monthly averages also indicate that the impact of other parameters such as ferric chloride dose, dosing location, and dilution is relatively insignificant significant, since most of the averages span significant variations in these parameters. This is discussed in greater detail in a later section.

Figure 7. Influent TSS and TSS Removal Timeline - Monthly Averages



The significant correlation between TSS removal and influent TSS is confirmed by the graphs shown in Figure 8 and Figure 9 (daily data and monthly averages, respectively).

The spread in the data suggests that other parameters may affect TSS removal and the correlation may be potentially improved by accounting for these parameters. The following subsection presents an analysis of the TSS removal versus influent TSS correlation in the context of interactions with the three other parameters evaluated in this study – ferric chloride dose, dilution ratio and dosing location splits.

Figure 8. TSS Removal versus Influent TSS

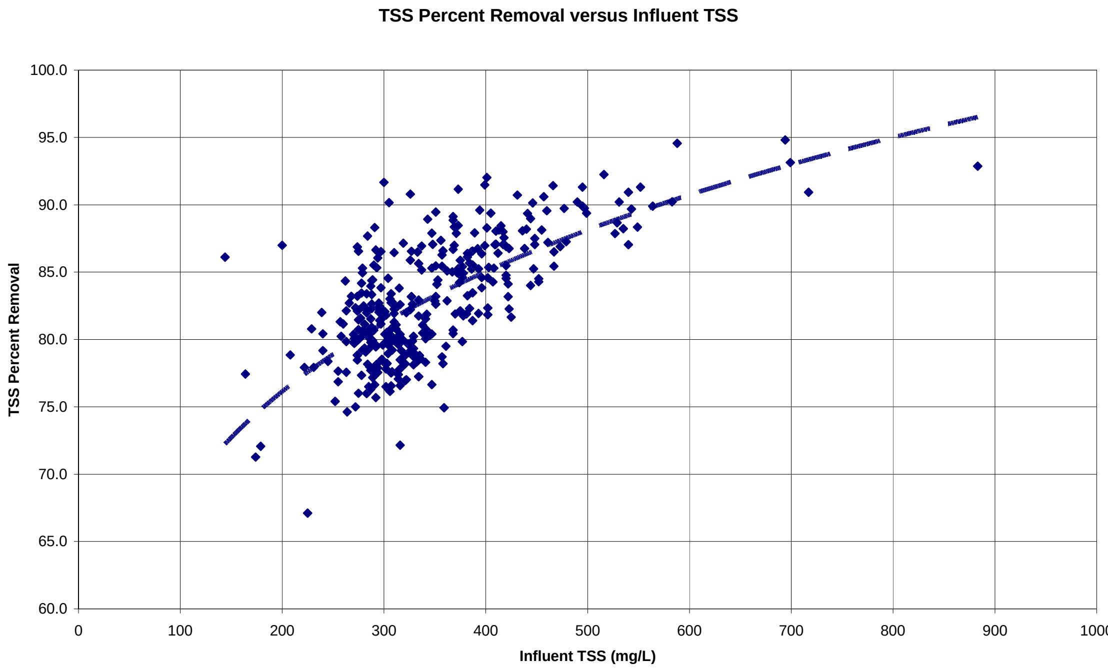
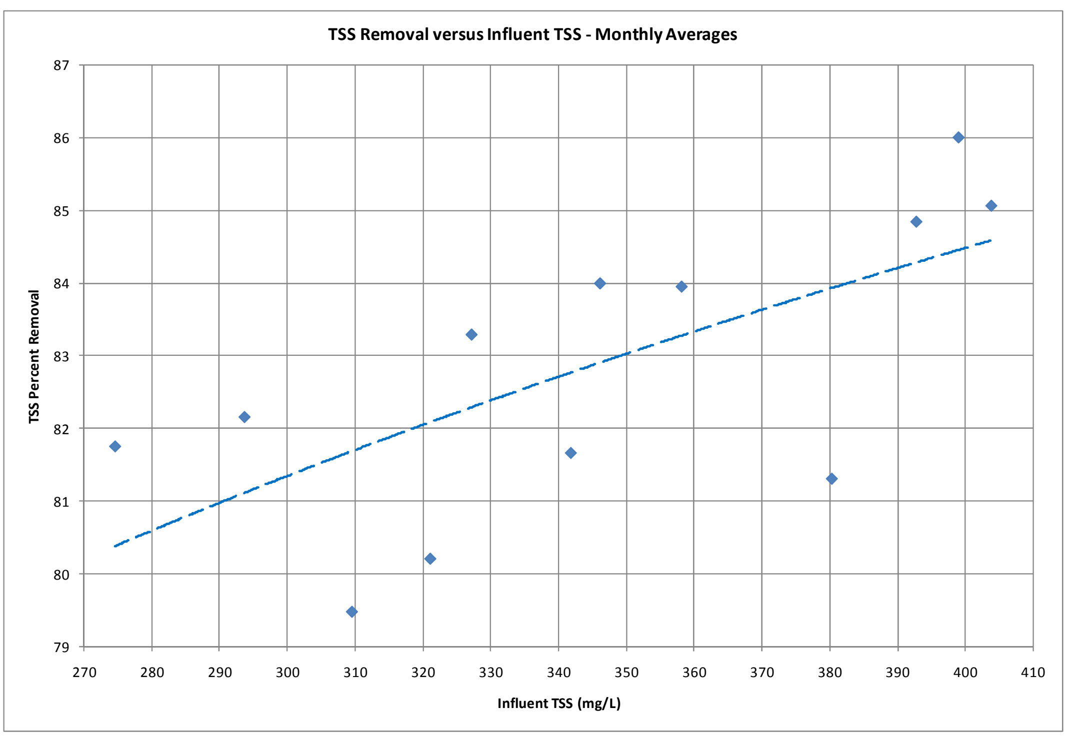


Figure 9. TSS Removal versus Influent TSS - Monthly Averages



3.3.4.1 Influent TSS Interactions with Other Parameters

Figure 10, Figure 11, and Figure 12 are plots of TSS percent removal versus influent TSS, categorized by ferric chloride dose, ferric chloride dose – dilution ratio combination, and ferric chloride dose – dosing location split combination, respectively. The plots also include trendlines and/or moving averages to help discern trends by reducing random variability in the data. These plots support the following inferences:

- TSS percent removal shows significant correlation with influent TSS – higher influent TSS results in higher TSS percent removal.
- Within the ranges tested, ferric chloride dose, dilution ratio, or dosing location splits did not have a significant impact on TSS percent removal for ferric chloride doses of 45 mg/L and higher. The difference in TSS removal between the various conditions ranged from about 2 to 7 percent.
- For ferric chloride doses of 45 mg/L and higher, the target 85 percent TSS removal was achieved on average at an influent TSS of about 400 mg/L. Lower influent TSS resulted in lower TSS percent removal.
- For a ferric chloride dose of 40 mg/L, TSS percent removal was comparable to that observed for the higher doses for influent TSS values above about 400 mg/L.
- For influent TSS below about 400 mg/L and ferric chloride dose of 40 mg/L, the TSS percent removal was significantly affected by the dilution ratio. This appeared to be the only condition where dilution ratio had a significant impact. At a dilution ratio of 3:1, the removal was comparable to that at higher doses for the same influent TSS. However, with no dilution, the removal appeared to drop by 5 to 10 percent.

Figure 10. TSS Percent Removal versus Influent TSS for Various Ferric Chloride Doses

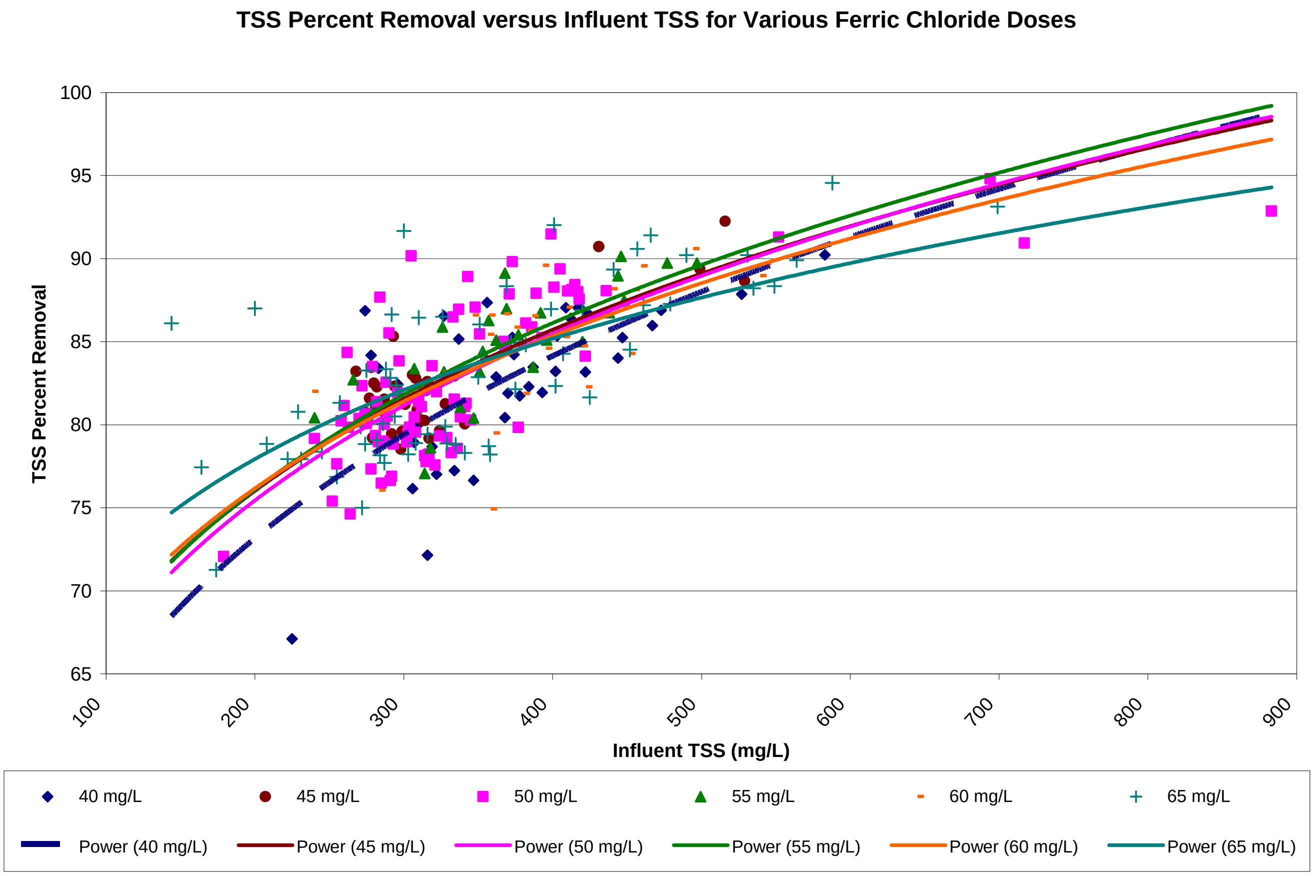


Figure 11. TSS Percent Removal versus Influent TSS for Various Ferric Chloride Dose – Dilution Ratio Combinations

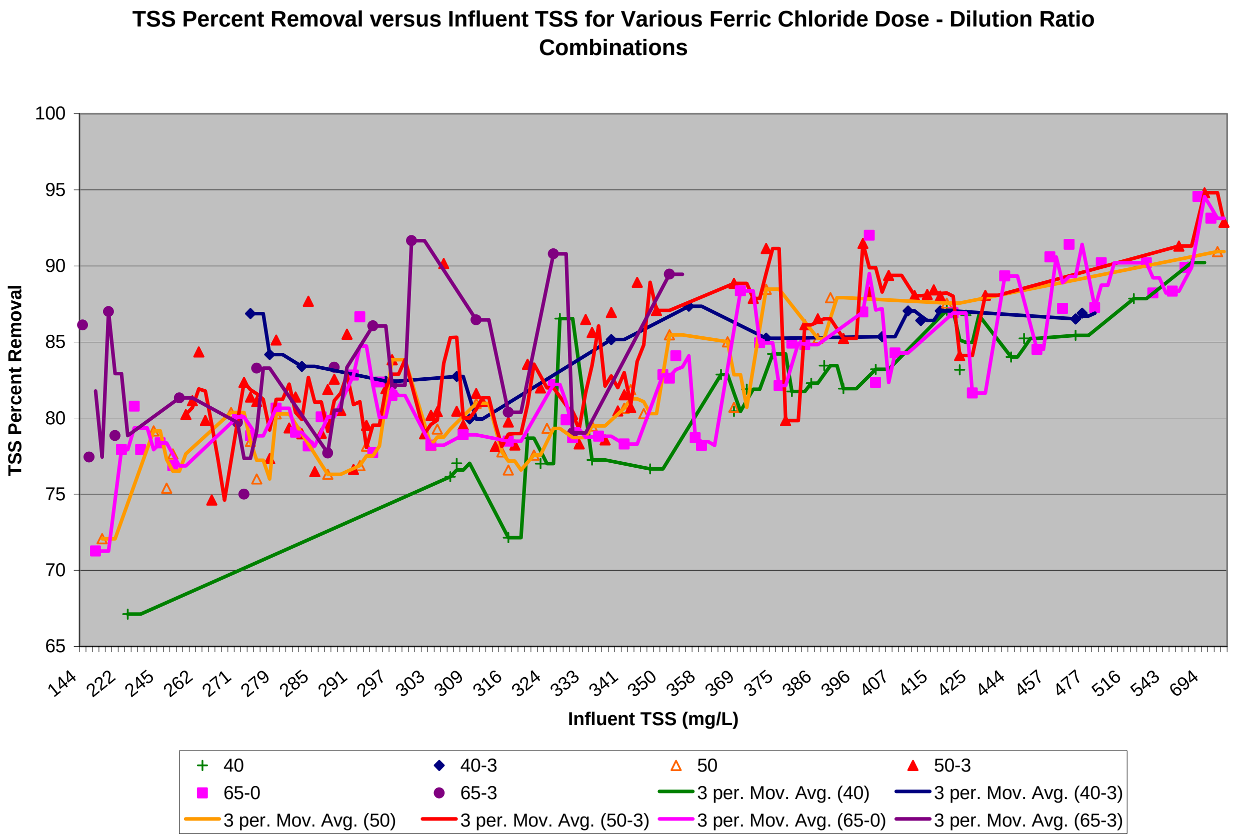
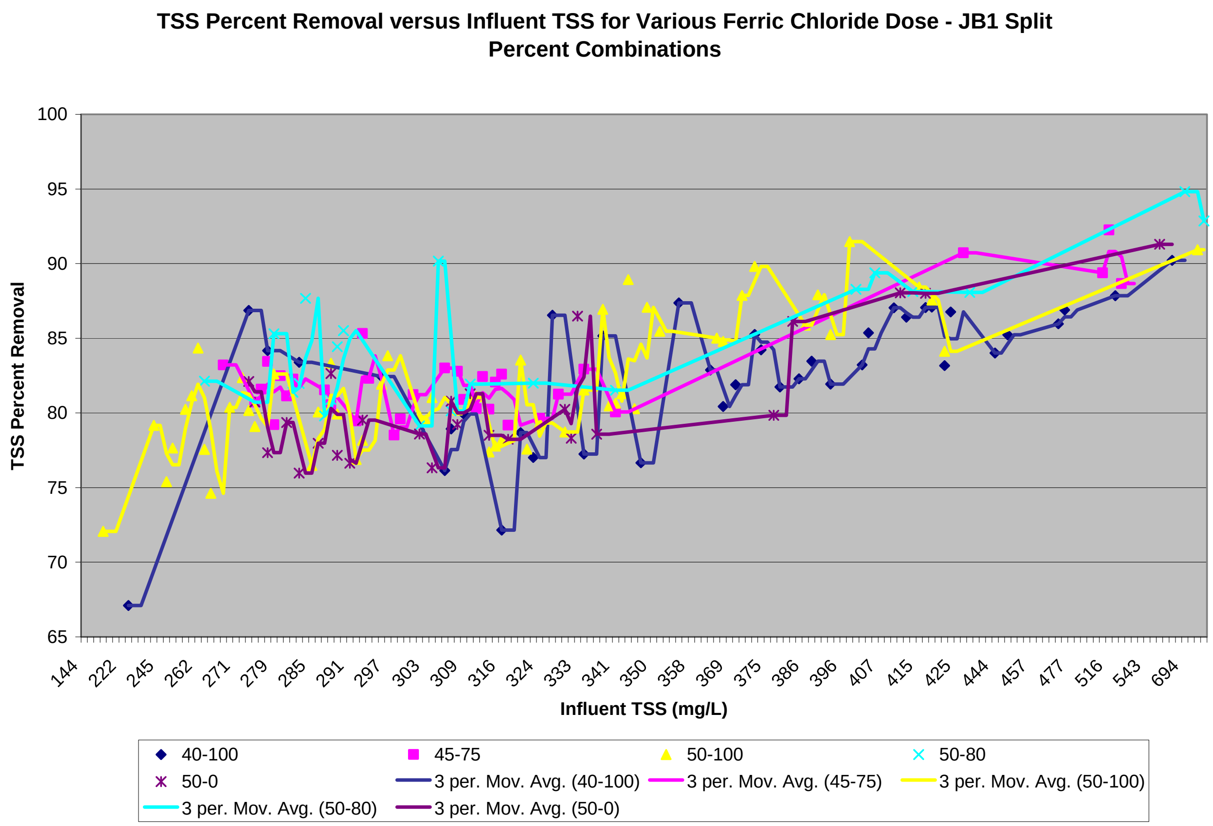


Figure 12. TSS Percent Removal versus Influent TSS for Various Ferric Chloride Dose – Dosing Location Split Combinations



3.3.5 Percent VSS

In the course of analyzing full-scale testing data and in the search for other parameters that might impact TSS percent removal, the influent VSS as a percent of TSS (percent VSS) was evaluated. It was noted that the influent percent VSS values during full-scale testing were unusually low compared to values expected in typical municipal wastewater. To get a better perspective of the VSS content, historical influent VSS and TSS data was obtained starting in 1999 and is plotted in Figure 13.

Figure 13. Influent VSS as Percent of TSS – Historical Timeline

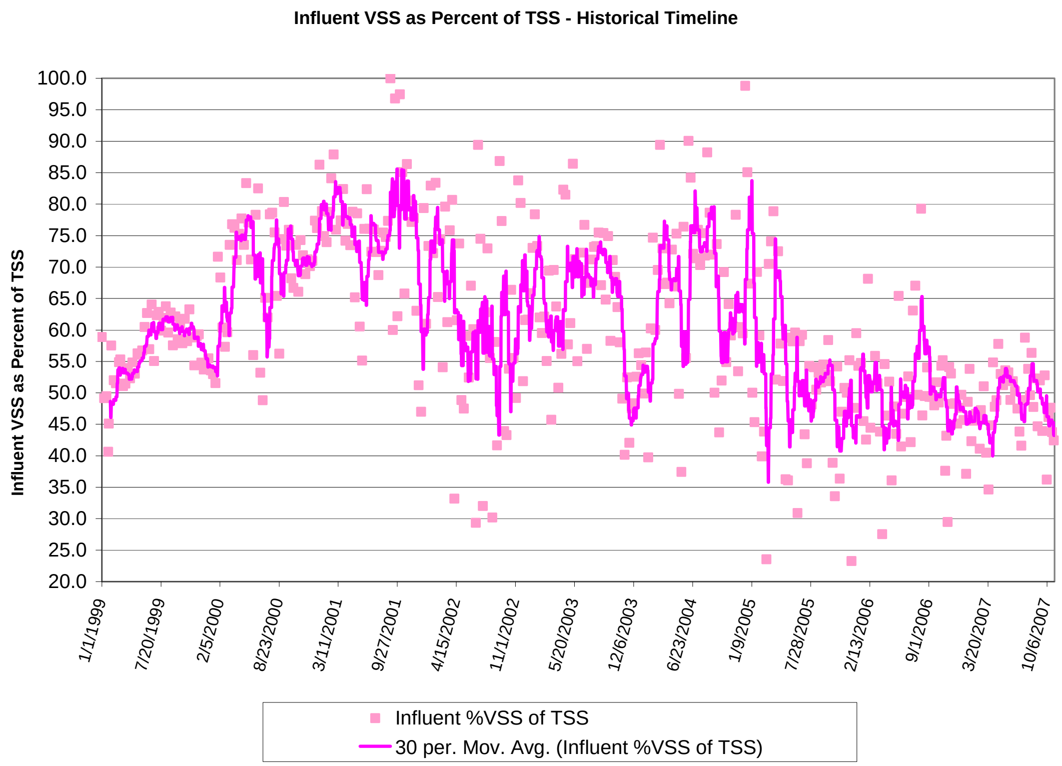


Figure 13 shows significant variation in the influent percent TSS over time. The 30-day moving average value at the beginning of 1999 was about 45 percent, and varied between 45 and 65 percent during the year. These values were significantly lower than the typical value of about 75 percent expected in municipal wastewater. The percent VSS showed an increasing trend from about 50-55 percent in early 2000 through about 85 percent around September 2001, and then decreased again to about 45 percent near the end of 2002. The value increased again in 2003 to peak at about 75 percent in August 2003, but showed a steep drop again ending at 45 percent by the end of 2003. The percent VSS rose to about 70 to 75 percent in early 2004, and remained in this general range through the end of 2004 with short term peak and valleys. In early 2005, the number dropped to about 45 to 50 percent and has remained within this general range to-date and through the full-scale testing. While there is no definite evidence indicating a correlation between influent percent VSS and TSS percent removal, it is reasonable to expect that the influent characteristics (including percent VSS) may significantly impact TSS removal.

3.3.6 BOD Considerations

Influent and effluent CBOD data routinely collected by SBIWTP was compiled along with the data specifically collected for full scale testing to investigate potential correlation with TSS removal. Figure 14 shows a graph of CBOD versus TSS for both influent and effluent. The graph shows that correlation between CBOD and TSS is strong for the influent but is weak for the effluent. This is consistent with the fact that while a significant fraction of the influent CBOD is particulate, the particulate fraction in the effluent is smaller because much of it has been removed through sedimentation.

Figure 14. Influent and Effluent CBOD versus TSS

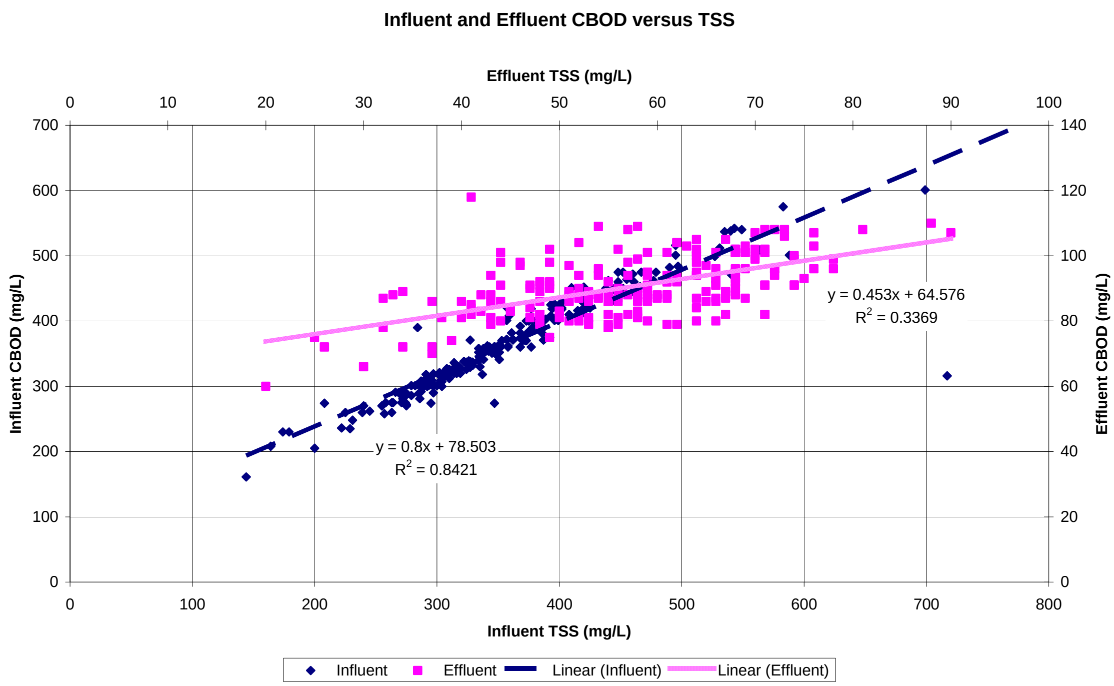
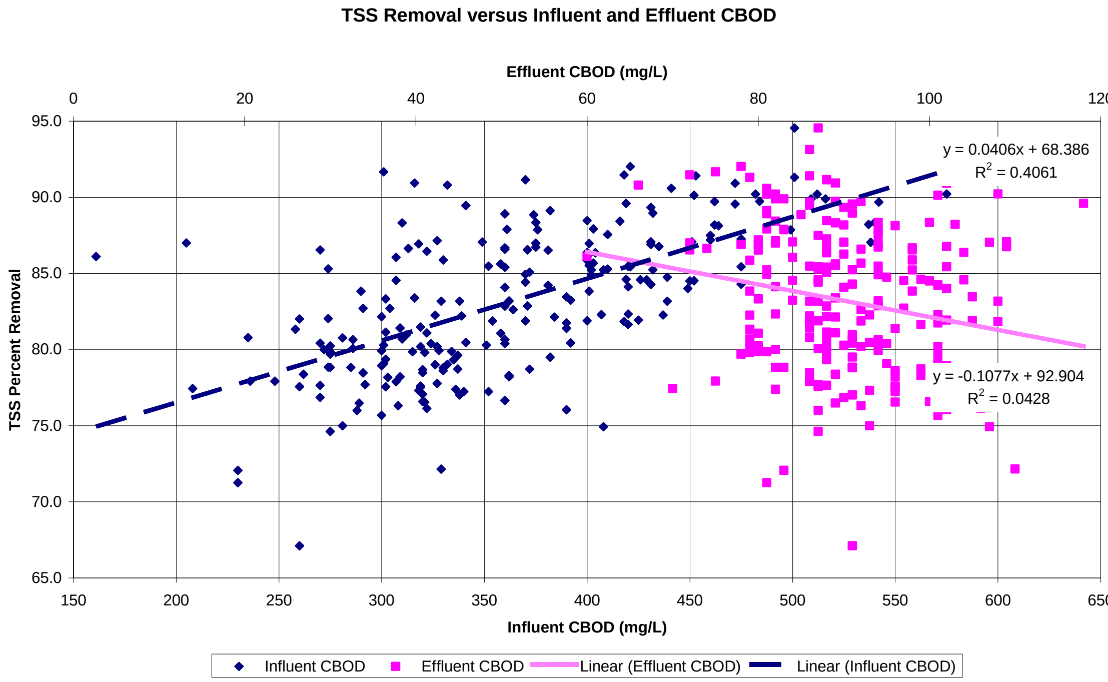


Figure 15 shows the correlation between TSS percent removal and influent and effluent CBOD. TSS percent removal shows a moderate correlation with influent CBOD with a positive slope, and a weak correlation with effluent CBOD with a negative slope. This is consistent with the correlations in Figure 14 and the previously shown strong correlation between percent TSS removal and influent TSS.

Figure 15. TSS Removal versus Influent and Effluent CBOD



3.3.7 Toxicity Considerations

Similar to CBOD, acute and chronic effluent toxicity data from routine analyses was compiled to investigate possible correlation with effluent TSS and TSS removal. As shown in Figure 16, both acute and chronic toxicity show very weak correlations with effluent TSS. Therefore, TSS percent removal is not expected to be significantly related to toxicity, as is confirmed by the weak correlations shown in Figure 17.

Figure 16. Effluent Toxicity versus TSS

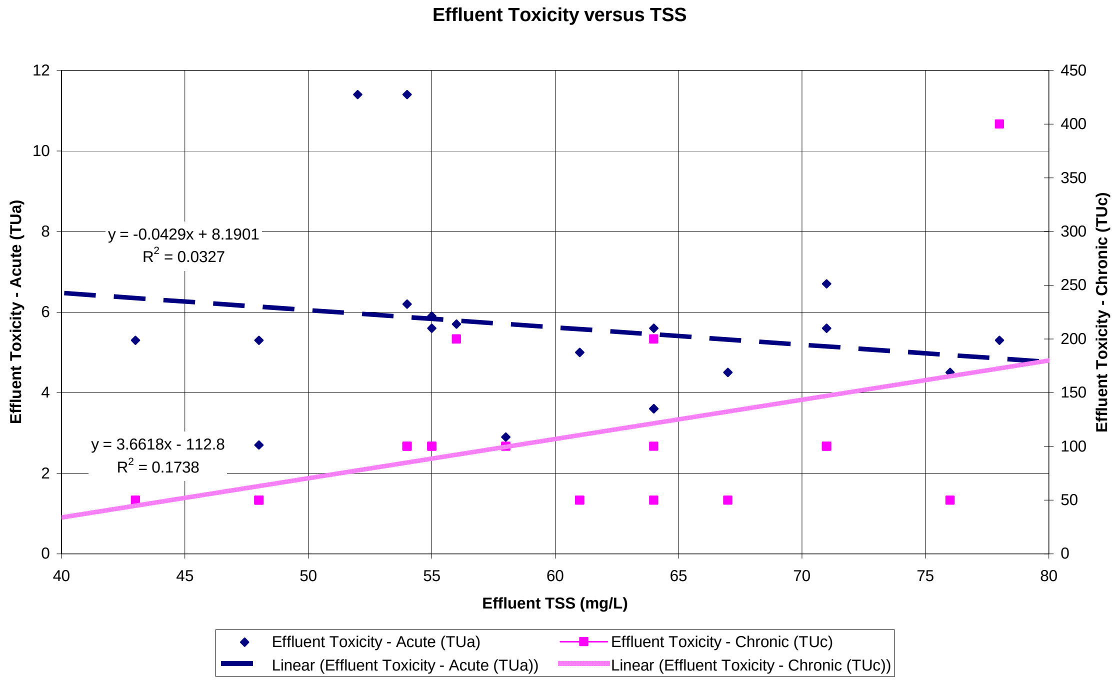
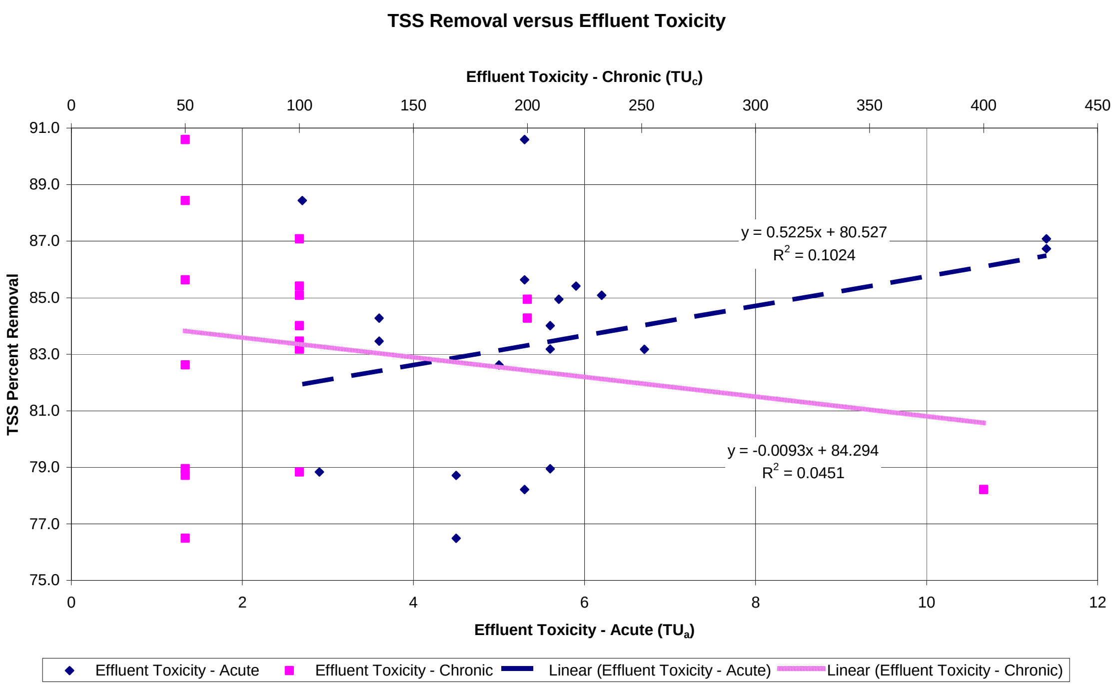


Figure 17. TSS Removal versus Effluent Toxicity



4 Conclusions and Recommendations

The main objective of this full-scale testing project was to determine parameters that affect TSS removal and to evaluate the feasibility of achieving a TSS removal of 85 percent by varying specific plant operating conditions and parameters. The previous section presents a large amount of data and discusses how the data was analyzed and what the likely interpretations are. This section synthesizes the results to form coherent conclusions based on the results and data analysis. An overall summary of full-scale testing conditions and the resulting TSS removal performance in provided in Table 2 for quick reference. A similar summary of calendar month averages is shown in

Table 3. Monthly average ferric chloride doses, dose splits, and dilutions shown in this table do not necessarily match the actual targets used because most calendar months spanned more than one operating conditions. The numbers in the table represent time-weighted average of the operating conditions in such cases.

Table 2. Full-Scale Testing Conditions and TSS Removal Performance Summary

Target Percent Dose at JB1	Target Dilution Ratio	Target Total Ferric Chloride Dose (mg/L)	Average of Influent TSS (mg/L)	Average of Effluent TSS (mg/L)	Average of Influent VSS as percent of TSS	Average of Effluent VSS as percent of TSS	Average of TSS Percent Removal
0	3	50.0	321	61	47	73	80
	3 Average		321	61	47	73	80
0 Average			321	61	47	73	80
75	3	45.0	323	55	50	77	82
	3 Average		323	55	50	77	82
75 Average			323	55	50	77	82
80	3	50.0	355	51	60	78	84
	3 Average		355	51	60	78	84
80 Average			355	51	60	78	84
100	0	40.0	381	68			81
		50.0	324	62	44	78	80
		55.0	375	55			85
		60.0	395	57			85
		65.0	363	57	45	79	83
	0 Average		365	59	45	79	83
	3	40.0	360	53	57	80	85
		50.0	315	53	44	65	83
		65.0	272	45	51	78	83
	3 Average		313	51	47	71	83
100 Average			350	57	47	73	83
Grand Average			345	57	50	74	83

Note: The target percent dose at the Grit Basin Influent Channel equals 100 less the target percent dose at JB1 listed in the table above. The sum of the percentages at these locations is 100.

Table 3. Full-Scale Testing Conditions and TSS Removal performance Summary - Monthly Averages

Month-Year	Target Percent Dose at JB1	Target Dilution Ratio	Target Total Ferric Chloride Dose (mg/L)	Influent TSS (mg/L)	Effluent TSS (mg/L)	Influent VSS as percent of TSS	Effluent VSS as percent of TSS	TSS Percent Removal
May-07	100.0	0.0	40.0	380.3	67.7			81.3
Jun-07	100.0	0.0	62.5	403.8	55.9			85.1
Jul-07	100.0	0.0	61.3	392.7	57.4			84.8
Aug-07	100.0	0.0	56.8	399.0	54.9			86.0
Sep-07	100.0	0.0	51.5	341.8	59.6			81.7
Oct-07	100.0	0.0	56.3	309.5	63.0	44.6	79.1	79.5
Nov-07	100.0	1.8	65.0	274.6	49.7	49.4	78.1	81.8
Dec-07	96.8	3.0	50.5	327.2	53.1	38.6	59.2	83.3
Jan-08	0.0	3.0	50.0	321.1	61.9	48.1	73.8	80.2
Feb-08	83.4	3.0	50.0	346.1	51.5	58.4	78.0	84.0
Mar-08	82.3	3.0	46.5	293.7	52.4	50.3	75.3	82.2
Apr-08	87.5	3.0	42.5	358.1	55.2	53.5	80.0	84.0

Note: The target percent dose at the Grit Basin Influent Channel equals 100 less the target percent dose at JB1 listed in the table above. The sum of the percentages at these locations is 100.

4.1 Relative Significance of Operating Parameters – Overriding Impact of Influent TSS

Based on the results of the full-scale testing and related data analysis and evaluations, the following specific conclusions may be drawn regarding the relative significance of the parameters tested:

- TSS percent removal shows significant correlation with influent TSS – higher influent TSS results in higher TSS percent removal.
- Within the ranges tested, ferric chloride dose, dilution ratio, or dosing location splits did not have a significant impact on TSS percent removal for ferric chloride doses of 45 mg/L and higher. The difference in TSS removal between the various conditions ranged from about 2 to 7 percent.
- For a ferric chloride doses of 45 mg/L and higher, the target 85 percent TSS removal was achieved on average at an influent TSS of about 400 mg/L. Lower influent TSS resulted in lower TSS percent removal.

- For ferric chloride dose of 40 mg/L, TSS percent removal was comparable to that observed for the higher doses for influent TSS values above about 400 mg/L.

- For influent TSS below about 400 mg/L and ferric chloride dose of 40 mg/L, the TSS percent removal was significantly affected by the dilution ratio. This appeared to be the only condition where dilution ratio had a significant impact. At a dilution ratio of 3:1, the removal was comparable to that at higher doses for the same influent TSS. However, with no dilution, the removal appeared to drop by 5 to 10 percent.

- Overall, for ferric chloride doses of 45 mg/L and higher, influent TSS was the overriding parameter affecting TSS removal – the impact of other parameters was not significant.

4.2 Percent VSS Anomalies

The influent VSS as percent of TSS averaged around 45 to 59 percent during full-scale testing, which is significantly lower than the typical range of 70 to 80 percent for municipal wastewater in the United States. Inspection of historical data revealed high variability in the VSS content with values ranging from 40 to 85 percent of TSS. Because the source of the wastewater is in Mexico, the causes of the variability and unusual characteristics are unknown and to a large extent beyond the control of USIBWC as well as the plant operators. Although, the available data does not indicate a direct discernible correlation between TSS removal and influent VSS, the VSS variability may be indicative of variability in other influent characteristics that may impact TSS removal. These other characteristics may include presence of industrial wastes or metals, pH variations, and presence of colloidal material and surfactants. Some of these characteristics have been measured in the past, but only over short time periods that do not allow correlation with the long-term VSS variations observed.

4.3 Implications for TSS Removal Target – Recommended Operating Conditions

The full-scale testing results indicate that the average TSS removal target of 85 percent is achievable, but it can be consistently achieved only if the influent TSS concentration is consistently equal to or higher than about 400 mg/L. This is amply evident based on several different ways of evaluating the data:

- Daily data (Figure 8)

- Data averaged by operating conditions (Table 2)

- Data averaged by calendar month (Figure 9, Table 3)

These three distinct perspectives consistently support the same interpretation and conclusion.

If this minimum influent TSS condition (about 400 mg/L) is met, a ferric chloride dose as low as 40 mg/L appears to be adequate to achieve this target and other parameters such as dilution ratio and dosing location seem to have minimal impact. For influent TSS concentrations below 400 mg/L, 85 percent removal could not be consistently achieved even at ferric chloride doses as high as 65 mg/L. For this case, addition of dilution water at a 3:1 ratio to the lowest tested ferric chloride dose of 40 mg/L resulted in significant TSS removal improvement over the removal without dilution. However, for doses higher than 40 mg/L and influent TSS concentrations higher than 400 mg/L, neither the dilution ratio nor the dosing location split had significant impact.

Based on the above analysis, the following operating conditions are recommended:

- Ferric chloride dose of 45 mg/L
- Ferric chloride dilution water ratio of 3:1
- Add 100 percent ferric chloride dose at JB1, but maintain flexibility to dose at the grit influent channel

These recommendations are designed to be conservative and maximize the potential for meeting the target TSS percent removal of 85 percent while avoiding excess dosing that does not provide incremental benefit. Even though the dosing location did not appear to have a significant impact on TSS removal, JB1 is recommended as the dosing location based on the longer coagulation and floc formation time it provides.

4.4 Considerations for Appropriate TSS Removal Target

Results of extensive full-scale testing indicate that the 85 percent TSS removal target is achievable, but only under certain conditions. The key criterion (influent TSS greater than about 400 mg/L) is not under operator control. For lower influent TSS values, consistent 85 percent TSS removal is not realistically achievable even with very high ferric chloride doses. This conclusion is supported not only by the daily data, but also by data averaged by operating condition and data averaged by calendar month. For example, in August 2007, influent TSS of 399 mg/L produced a TSS percent removal of 86 percent with a target ferric chloride dose of about 57 mg/L. In contrast, in November 2007, in spite of the very high ferric chloride dose of 65 mg/L, TSS removal was only about 82 percent because influent TSS was only 275 mg/L.

Over the 12-month full-scale testing duration, three calendar month average TSS removals equaled or exceeded 85 percent, including 84.8 rounded off to 85 (the corresponding influent TSS averages were 393, 399, and 404 mg/L). However, 11 out of the 12 monthly averages TSS removals were above 80 percent and all were above 79 percent.

It is speculated that the cause(s) of the above limitation may be related to influent characteristics that are also beyond operator control. However, this cannot be confirmed at this time without further testing.

It should be noted that although the TSS removal performance during full-scale testing did not, for the most part, show significant variation in response to the tested parameters of ferric chloride dose, dosing location, and dilution ratio (in comparison with random variation in the data), the overall performance during the testing period was significantly better than the performance prior to plant modifications that were implemented in preparation for full-scale testing. The typical TSS removal averaged about 75 percent prior to these modifications. In comparison, the lowest calendar month average removal during testing was 79 percent, and the overall average removal was about 83 percent. This clearly shows that USIBWC's efforts have resulted in significant performance improvements, even though these improvements are not related to dose, dosing location, or dilution. The most likely modification contributing to this improvement is the introduction of the chemical distribution manifold at both JB1 and grit basin influent channel.

The following table illustrates the effect of influent TSS concentration and the estimated percent removals that could be expected:

Monthly Average Influent TSS (mg/L)	Expected Monthly Average TSS Percent Removal Range	Resulting Monthly Average Effluent TSS (mg/L)
400 or higher	85	60 or higher
300 to 400	81 to 85	57 to 76
270 to 300	80 to 81	54 to 60

As can be seen from the above table, 85 percent removal at an influent TSS of 400 mg/L results in an effluent TSS of 60 mg/L. For an influent TSS of 300 mg/L, the same effluent TSS (and the same level of water quality protection) is achieved at a removal of only 80 percent. As the influent TSS decreases, lower percent TSS removals are required to produce the same effluent TSS and achieve the same level of water quality protection. Because water quality is impacted by effluent concentration and not percent removal, lower removals at lower influent TSS values will provide the same level of water quality protection that is achieved at 85 percent removal and 400 mg/L influent TSS.

4.5 Recommendations for Further Investigations

Data analysis and evaluations performed in the course of this full-scale testing indicate that the SBIWTP influent wastewater characteristics are highly variable and significantly different from those of typical US municipal wastewaters. As an example, influent VSS as a fraction of influent TSS is typically between 70-75 percent for US municipal wastewaters, but varied at the SBIWTP between 45 and 85 percent at various time over the last eight years. These characteristics directly affect plant performance and have not been adequately defined, and it is likely that the plant has not been designed to accommodate such a high variability. Results from full-scale testing indicate that partly because of the highly variable influent, percent TSS removal at the SBIWTP is more strongly affected by the influent TSS concentration than by any other operating parameter considered in this analysis, including ferric chloride dose. The 85 percent TSS removal target currently set for SBIWTP is understood to be based on historical performance of the nearby US Chemically Enhanced Primary Treatment (CEPT) facilities, including Point Loma, Orange County, and Hyperion. However, these facilities serve areas wholly within the US and their influent characteristics are typical of US municipal wastewaters and significantly less variable. In contrast, SBIWTP influent originates entirely within Mexico. Any previous performance comparisons between SBIWTP and other regional facilities have been cursory and have not accounted for all factors and variables involved, especially the all-critical influent characteristics.

If the 85 percent TSS removal target continues to apply to the CEPT process, it is recommended that an influent characterization program be undertaken to develop specific, targeted information that may help address current limitations and improve TSS removal performance. The information is essential to further optimize plant performance toward the 85 percent TSS removal goal.

Specific objectives suggested for further investigations are:

- Develop wastewater characterization specific to the SBIWTP influent
- Compare CEPT performance of the SBIWTP with that of Point Loma, Orange County, and Hyperion while accounting for key factors such as wastewater characteristics, chemical doses, and loading rates

These investigations will also provide the necessary information to rationally determine whether the current 85 percent TSS removal target is appropriate for the SBIWTP.

References

1. South Bay International Wastewater Treatment Plant (SBIWTP) Optimization Study, CDM, October 2005.

2. South Bay International Wastewater Treatment Plant Jar Test – Final Report, Memorandum from CDM to USIBWC, October 2005.

3. South Bay International Wastewater Treatment Plant (SBIWTP) Operational Approaches: Technical Implementation Plan for Full Scale Testing of TSS Removal Improvements – Final, CDM, December 2006.

Appendix A

Full-Scale Testing Complete Database

SBIWTP Full-Scale Testing Data

Date	Target FeCl3 dose @ JB1 (mg/L)	Target FeCl3 dose @ Grit Influent Channel (mg/L)	Target Total FeCl3 dose [mg/L]	Target Percent Dose @JB1 (%)	Target Dilution Ratio	Actual FeCl3 dose @ JB1 (mg/L)	Actual FeCl3 dose @ Grit Influent Channel (mg/L)	Actual Total Ferric chloride Dose (mg/L)	Actual Percent Dose @JB1 (%)	Total Dilution Flow (gpd)	Dilution Ratio	Polymer dose (mg/L)	Total Grit Basin air flow (scfm)	Influent Flow (mgd)	Influent TSS (mg/L)	Influent VSS (mg/L)	Influent %VSS of TSS	Influent CBOD (mg/L)	Influent Turbidity (NTU)	Influent Temp (deg C)	Influent pH (SU)	Effluent TSS (mg/L)	Effluent VSS (mg/L)	Effluent %VSS of TSS	Effluent CBOD (mg/L)	Effluent Turbidity (NTU)	Effluent Temp (deg C)	Effluent pH (SU)	TSS Percent Removal	Effluent Toxicity - Acute (TUa)	Effluent Toxicity - Chronic (TUc)	Notes
5/7/2007	40.00	0	40.0	100	0	33.87	0.00	33.9	100	0	0.00		334	27.37	334			352	-	23	-	76	0		107	53.7	22	7.3	77.2			
5/8/2007	40.00	0	40.0	100	0	41.08	0.00	41.1	100	0	0.00		334	26.16	307			321	-	24	-	72	0		96	52.8	22	7.3	76.5			
5/9/2007	40.00	0	40.0	100	0	39.94	0.00	39.9	100	0	0.00		332	25.18	316			329	-	23	-	88	0		110	68.2	24	7.4	72.2			
5/10/2007	40.00	0	40.0	100	0	39.43	0.00	39.4	100	0	0.00		447	24.63	422			439	180	23.5	7.2	71	0		108	50.8	23.3	7	83.2	6.7	100	
5/11/2007	40.00	0	40.0	100	0	38.03	0.00	38.0	100	0	0.00		446	26.68	307			319	-	22.7	-	69	0		103	54.9	23.3	7.2	77.5			
5/12/2007	40.00	0	40.0	100	0	39.22	0.00	39.2	100	0	0.00		439	29.28	322			338	-	23	-	74	0		91	50.9	23	7.2	77.0			
5/13/2007	40.00	0	40.0	100	0	40.11	0.00	40.1	100	0	0.00		436	25.64	370			370	-	23	-	67	0		105	52.8	22	7	81.9			
5/14/2007	40.00	0	40.0	100	0	39.07	0.00	39.1	100	0	0.00		430	28.94	225			260	-	23	-	74	0		91	50.7	22	7.2	67.1			
5/15/2007	40.00	0	40.0	100	0	40.99	0.00	41.0	100	0	0.00		430	25.05	319			320	-	22	-	68	0		102	57.2	22	7.2	78.7			
5/16/2007	40.00	0	40.0	100	0	38.76	0.00	38.8	100	0	0.00		341	25.68	347			360	-	22	-	81	0		108	57.2	22	7.2	76.7			
5/17/2007	40.00	0	40.0	100	0	39.07	0.00	39.1	100	0	0.00		348	25.65	402			429	-	23	-	62	0		104	30.2	22.8	7	84.6			
5/18/2007	40.00	0	40.0	100	0	40.98	0.00	41.0	100	0	0.00		347	27.08	418			431	180	22	7.3	54	0		109	45.7	22.2	7.2	87.1	11.4	100	
5/19/2007	40.00	0	40.0	100	0	40.41	0.00	40.4	100	0	0.00		343	28.68	384			407	-	22.5	-	68	0		101	34.8	22.8	7.1	82.3			
5/20/2007	40.00	0	40.0	100	0	40.83	0.00	40.8	100	0	0.00		344	26.88	362			371	-	20.5	-	62	0		94	51.4	22	7.3	82.9			
5/21/2007	40.00	0	40.0	100	0	42.30	0.00	42.3	100	0	0.00		350	24.74	423			435	-	22	-	56	0		102	40.4	22	7.1	86.8			
5/22/2007	40.00	0	40.0	100	0	40.53	0.00	40.5	100	0	0.00		343	27.44	393			425	180	22	7.1	71	0		102	52.1	22	7.3	81.9			
5/23/2007	40.00	0	40.0	100	0	40.77	0.00	40.8	100	0	0.00		447	28.51	387			390	-	22	-	64	0		105	43.3	22	7.2	83.5	3.6	100	
5/24/2007	40.00	0	40.0	100	0	41.21	0.00	41.2	100	0	0.00		439	27.2	368			392	-	22.2	-	72	0		94	56.9	22.5	7.2	80.4			
5/25/2007	40.00	0	40.0	100	0	40.40	0.00	40.4	100	0	0.00		441	27.16	327			371	-	23	-	44	0		98	40	23	7.2	86.5			
5/26/2007	40.00	0	40.0	100	0	40.11	0.00	40.1	100	0	0.00		439	29.03	583			575	-	23	-	57	0		108	49.7	22	7.2	90.2			
5/27/2007	40.00	0	40.0	100	0	39.20	0.00	39.2	100	0	0.00		436	27.71	447			432	-	22	-	66	0		91	45.1	23	7	85.2			
5/28/2007	40.00	0	40.0	100	0	40.62	0.00	40.6	100	0	0.00		433	27.95	306			322	180	23	7.2	73	0		106	40.8	22	7	76.1			
5/29/2007	40.00	0	40.0	100	0	42.28	0.00	42.3	100	0	0.00		430	27.27	444			449	-	23	-	71	0		102	40.2	22	7.2	84.0	5.6	100	
5/30/2007	40.00	0	40.0	100	0	41.84	0.00	41.8	100	0	0.00		339	26.28	527			499	-	20.5	-	64	0		94	40.5	22	7.2	87.9			
5/31/2007	40.00	0	40.0	100	0	41.83	0.00	41.8	100	0	0.00		338	25.27	467			475	-	22.5	-	68	0		102	35.4	23	7.2	85.4			
6/1/2007	40.00	0	40.0	100	0	44.34	0.00	44.3	100	0	0.00		340	24.29	374			381	-	24	-	59	0		101	-	23	-	84.2			
6/2/2007	40.00	0	40.0	100	0	41.69	0.00	41.7	100	0	0.00		345	26.49	378			390	-	21.5	-	69	0		101	-	22	-	81.7			
6/3/2007	40.00	0	40.0	100	0	42.57	0.00	42.6	100	0	0.00		338	26.29	402			418	-	21.5	-	73	0		108	-	20	-	81.8			
6/4/2007	65.00	0	65.0	100	0	65.56	0.00	65.6	100	0	0.00		345	27.39	358			362	180	24	7	78	0		96	61.1	23.5	7.2	78.2	5.3	400	
6/5/2007	65.00	0	65.0	100	0	64.68	0.00	64.7	100	0	0.00		344	27.1	326			339	-	23	-	58	0		86	50.1	22	7.1	82.2			
6/6/2007	65.00	0	65.0	100	0	67.65	0.00	67.7	100	0	0.00		338	28.08	375			384	-	23.5	-	67	0		89	53.8	23	7.1	82.1			
6/7/2007	65.00	0	65.0	100	0	67.96	0.00	68.0	100	0	0.00		338	27.16	564			509	-	23.5	-	57	0		82	40.4	23	7.2	89.9			
6/8/2007	65.00	0	65.0	100	0	69.00	0.00	69.0	100	0	0.00		435	27.2	535			537	-	24	-	63	0		103	39.3	23	7.2	88.2			
6/9/2007	65.00	0	65.0	100	0	66.60	0.00	66.6	100	0	0.00		430	29.63	399			401	-	24	-	52	0		94	42.7	23	7.3	87.0			
6/10/2007	65.00	0	65.0	100	0	65.08	0.00	65.1	100	0	0.00		439	29.13	549			540	-	23	-	64	0		100	45.7	22	7.2	88.3			
6/11/2007	65.00	0	65.0	100	0	69.65	0.00	69.6	100	0	0.00		424	26.62	297			319	-	23	-	55	0		86	39.6	23.5	7	81.5			
6/12/2007	65.00	0	65.0	100	0	65.94	0.00	65.9	100	0	0.00		421	29.75	407			431	180	24	7.2	64	0		101	40.6	23	7	84.3	3.6	200	
6/13/2007	65.00	0	65.0	100	0	71.51	0.00	71.5	100	0	0.00		412	26.5	588			501	-	23.5	-	32	0		87	40.1	21.5	7.2	94.6			
6/14/2007	65.00	0	65.0	100	0	64.74	0.00	64.7	100	0	0.00		337	29.05	291			310	-	24	-	34	0		89	35.7	24	7	88.3			
6/15/2007	65.00	0	65.0	100	0	67.38	0.00	67.4	100	0	0.00		346	27.8	378			402	-	23.5	-	57	0		94	49.4	24	7.3	84.9			
6/16/2007	65.00	0	65.0	100	0	68.33	0.00	68.3	100	0	0.00		341	29.83	490			482	-	24	-	48	0		82	36.3	24	7.3	90.2			
6/17/2007	65.00	0	65.0	100	0	59.30	0.00	59.3	100	0	0.00		339	29.47	352			360	-	23.5	-	56	0		90	44.4	22	7.2	84.1			
6/18/2007	65.00	0	65.0	100	0	71.12	0.00	71.1	100	0	0.00		337	25.39	402			420	-	24.5	-	71	0		82	52.8	24	7.4	82.3			
6/19/2007	65.00	0	65.0	100	0	70.90	0.00	70.9	100	0	0.00		336	25.32	291			318	-	24	-	66	0		93	57.3	22.5	7.2	77.3			
6/20/2007	65.00	0	65.0	100	0	65.93	0.00	65.9	100	0	0.00		448	25.87	372			370	180	24.6	6.9	56	0		81	50.2	24.5	7	84.9	5.7	200	
6/21/2007	65.00	0	65.0	100	0	68.60	0.00	68.6	100	0	0.00		445	26.4	369			375	-	24.5	-	43	0		94	37.9	24.6	7.2	88.3			
6/22/2007	65.00	0	65.0	100	0	65.93	0.00	65.9	100	0	0.00		437	26.67	441			431	-	23	-	47	0		90	35.3	24	7	89.3			
6/23/2007	65.00	0	65.0	100	0	65.43	0.00	65.4	100	0	0.00		439	28.44	466			453	-	28	-	40	0		86	24.5	24.5	7.1	91.4			
6/24/2007	65.00	0	65.0	100	0	68.09	0.00	68.1	100	0	0.00		441	25.04	174			230	-	23.5	-	50	0		81	23.7	22.8	6.9	71.3			
6/25/2007	65.00	0	65.0	100	0	67.27	0.00	67.3	100	0	0.00		431	24.22	294			307	-	24.5	-	65	0		86	28.1	25	6.9	77.9			
6/26/2007	65.00	0	65.0	100	0	69.30	0.00	69.3	100	0	0.00		430	23.15	335			330	-	24	-	71	0		91	54.1	23	7.2	78.8			
6/27/2007	65.00	0	65.0	100	0	64.33	0.00	64.3	100	0	0.00		364	24.34	699			601	-	25	-	48	0		86	33.9	25	6.8	93.1			
6/28/2007	65.00	0	65.0	100	0	66.61	0.00	66.6	100	0	0.00		337	23.42	457			441	180	25	6.9	43	0		81	28.8	24.5	6.7	90.6	5.3	50	
6/29/2007	65.00	0	65.0	100	0	63.78	0.00	63.8	100	0	0.00		432	22.48	401			421	-	25	-	32	0		78	24.3	25.3	6.9	92.0			
6/30/2007	65.00	0	65.0	100	0	63.77	0.00	63.8	100	0	0.00		340	24.76	350			360	-	25	-	60	0		88	19	23.5	6.8	82.9			
7/1/2007	65.00	0	65.0	100	0	62.58	0.00	62.6	100	0	0.00		338	26.33	531			512	-	25	-	52	0		81	16	25.5	6.9	90.2			
7/2/2007	65.00	0	65.0	100	0	62.31	0.00	62.3	100	0	0.00		340	29.13	425			420	-	24.5	-	78	0		99	23.2	24	6.7	81.6			
7/3/2007	65.00	0	65.0	100	0	64.98	0.00	65.0	100	0	0.00		338	27.78	479			475	-	25.5	-	61	0		88	29.8	25.5	6.9	87.3			
7/4/2007	65.00	0	65.0	100	0	64.13	0.00	64.1	100	0	0.00		339	27.49	292			313	-	25.5	-	39	0		74	25.1	25.5	6.7	86.6			
7/5/2007	65.00	0	65.0	100	0	64.59	0.00	64.6	100	0	0.00		343	27.38	420			431	-	25.6	7.1	55	0		78	28.6	25.7	6.7	86.9			
7/6/2007	65.00	0	65.0	100	0	65.46	0.00	65.5	100	0	0.00		338	26.69	382			400	-	24.5	-	52	0		104	22.7	25	6.8	86.4			
7/7/2007	65.00	0	65.0	100	0	63.40	0.00	63.4	100	0	0.00		438	28.25	461			460	-	23	-	59	0		80	13.1	25	6.7	87.2			
7/8/2007	65.00	0	65.0	100	0	66.93	0.00	66.9	100	0	0.00		437	24.21	382			392	-	24.5	-	64	0		84	17.2	25	6.7	83.2			
7/9/2007	60.00	0	60.0	100	0	61.03	0.00	61.0	100	0	0.00		430	26.5	375			400	-	25	-	53	0		79	25.3	25	6.9	85.9			
7/10/2007	60.00	0	60.0	100	0	61.06	0.00	61.1	100	0	0.00		434	26.87	381			400	-	23	-	69	0		87	46.1	25	7.3	81.9			
7/11/2007	60.00	0	60.0	100	0	61.05	0.00	61.0	100	0	0.00		426	26.35	327			329	180	25	6.9	55	0		86	39	25.3	6.7	83.2	5.6	100	
7/12/2007	60.00	0	60.0	100	0	60.79	0.00	60.8	100	0	0.00		346	26.63	361			382	-	26.5	-	74	0		91	51	25.5	6.8	79.5			
7/13/2007	60.00	0	60.0	100	0	54.16	0.00	54.2	100	0	0.00		340	26.88	495			516	-	25.8	-	50	0		83	43.4	25.5	6.5	89.9			
7/14/2007	60.00	0	60.0	100	0	54.29	0.00	54.3	100	0	0.00		344	27.23	440			462	-	31.5	-	52	0		90	31.8	26	6.7	88.2			
7/15/2007	60.00	0	60.0	100	0	53.99	0.00	54.0	100	0	0.00		343	24.98	290			310	-	30	-	56	0		79	47.8	25.5	6.6	80.7			
7/16/2007	60.00	0	60.0	100	0	64.40	0.00	64.4	100	0	0.00		343	26.83	396			426	-	24	-	61	0		87	34.9	25	6.7	84.6			
7/17/2007	60.00	0	60.0	100	0	64.53	0.00	64.5	100	0	0.00		342	26.57	387			371	180	26	6.6	52	0		88	34.9	25	6.7	86.6			
7/18/2007	60.00	0	60.0	100	0	62.20	0.00	62.2	100	0	0.00		342	25.71	384			403	-	25.8	-	55	0		92	34.8	25.5	6.7	85.7			
7/19/2007	60.00	0	60.0	100	0	62.39	0.00	62.4	100	0	0.00		437	26.34	310			326	-	26.5	-	55	0		79	18.1	26	6.8	82.3			
7/20/2007	60.00	0	60.0	100	0	63.47	0.00	63.5	100	0	0.00		432	25.59	368			360	-	26.5	-	49	0		98	18.9	26	6.9	86.7			

SBIWTP Full-Scale Testing Data

Date	Target FeCl3 dose @ JB1 (mg/L)	Target FeCl3 dose @ Grit Influent Channel (mg/L)	Target Total FeCl3 dose [mg/L]	Target Percent Dose @JB1 (%)	Target Dilution Ratio	Actual FeCl3 dose @ JB1 (mg/L)	Actual FeCl3 dose @ Grit Influent Channel (mg/L)	Actual Total Ferric chloride Dose (mg/L)	Actual Percent Dose @JB1 (%)	Total Dilution Flow (gpd)	Dilution Ratio	Polymer dose (mg/L)	Total Grit Basin air flow (scfm)	Influent Flow (mgd)	Influent TSS (mg/L)	Influent VSS (mg/L)	Influent %VSS of TSS	Influent CBOD (mg/L)	Influent Turbidity (NTU)	Influent Temp (deg C)	Influent pH (SU)	Effluent TSS (mg/L)	Effluent VSS (mg/L)	Effluent %VSS of TSS	Effluent CBOD (mg/L)	Effluent Turbidity (NTU)	Effluent Temp (deg C)	Effluent pH (SU)	TSS Percent Removal	Effluent Toxicity - Acute (TUa)	Effluent Toxicity - Chronic (TUc)	Notes
7/21/2007	60.00	0	60.0	100	0	63.26	0.00	63.3	100	0	0.00		438	25.78	540			472	-	26	-	49	0		102	15.8	26	6.8	90.9			
7/22/2007	60.00	0	60.0	100	0	63.18	0.00	63.2	100	0	0.00		431	24.54	540			538	-	26.5	-	70	0		107	24.6	26	6.8	87.0			
7/23/2007	60.00	0	60.0	100	0	62.80	0.00	62.8	100	0	0.00		428	25.49	359			408	180	23	6.9	90	0		107	25.9	25	7	74.9			
7/24/2007	60.00	0	60.0	100	0	60.72	0.00	60.7	100	0	0.00		426	26.19	394			419	-	27	-	41	0		118	22.9	26.5	6.8	89.6			
7/25/2007	60.00	0	60.0	100	0	59.02	0.00	59.0	100	0	0.00		426	26.78	284			390	-	27	-	68	0		102	35.5	27	6.9	76.1			
7/26/2007	60.00	0	60.0	100	0	65.78	0.00	65.8	100	0	0.00		347	26.53	263			275	-	26.5	-	53	0		81	25.4	26.5	6.7	79.8			
7/27/2007	60.00	0	60.0	100	0	61.69	0.00	61.7	100	0	0.00		346	26.22	347			361	-	25.5	-	42	0		83	25.3	27	6.9	87.9			
7/28/2007	60.00	0	60.0	100	0	60.97	0.00	61.0	100	0	0.00		342	27.16	239			260	-	25	-	43	0		86	35.4	26.5	6.7	82.0			
7/29/2007	60.00	0	60.0	100	0	60.93	0.00	60.9	100	0	0.00		340	23.89	357			421	-	24	-	52	0		87	20.5	23.5	7	85.4			
7/30/2007	60.00	0	60.0	100	0	60.09	0.00	60.1	100	0	0.00		338	26.03	543			542	-	23	-	56	0		86	39	25.5	6.7	89.7			
7/31/2007	60.00	0	60.0	100	0	60.15	0.00	60.2	100	0	0.00		341	25.34	423			437	-	26.5	-	75	0		93	18	27	7	82.3			
8/1/2007	60.00	0	60.0	100	0	56.01	0.00	56.0	100	0	0.00		339	25.12	358			360	-	22	-	48	0		92	24.7	21	7	86.6			
8/2/2007	60.00	0	60.0	100	0	57.68	0.00	57.7	100	0	0.00		440	26.72	347			274	-	23.3	-	51	0		88	26.8	26	7.1	85.3			
8/3/2007	60.00	0	60.0	100	0	58.76	0.00	58.8	100	0	0.00		439	29.98	420			439	180	24	7.1	64	0		95	28.2	26.5	6.9	84.8			
8/4/2007	60.00	0	60.0	100	0	59.82	0.00	59.8	100	0	0.00		441	28.33	452			475	-	25.4	-	71	0		91	12.3	26.5	7	84.3			
8/5/2007	60.00	0	60.0	100	0	59.70	0.00	59.7	100	0	0.00		438	24.38	408			410	-	24.5	-	60	0		87	21	26	7	85.3			
8/6/2007	60.00	0	60.0	100	0	56.76	0.00	56.8	100	0	0.00		438	25.52	410			451	-	23	-	53	0		88	22.2	24	7.1	87.1			
8/7/2007	60.00	0	60.0	100	0	59.51	0.00	59.5	100	0	0.00		437	27.59	460			472	-	25	-	48	0		91	29.4	26.5	7.2	89.6			
8/8/2007	60.00	0	60.0	100	0	60.28	0.00	60.3	100	0	0.00		435	26.07	455			464	-	24.6	-	54	0		96	26	26	7.4	88.1			
8/9/2007	60.00	0	60.0	100	0	59.82	0.00	59.8	100	0	0.00		339	26.81	377			419	180	23	7.3	58	0		99	35.2	26	7.2	84.6			
8/10/2007	60.00	0	60.0	100	0	59.58	0.00	59.6	100	0	0.00		342	26.94	448			475	-	23.5	-	58	0		90	30.8	25.5	6.9	87.1			
8/11/2007	60.00	0	60.0	100	0	59.53	0.00	59.5	100	0	0.00		342	27.96	495			501	-	24	-	43	0		79	21.3	26	7.1	91.3			
8/12/2007	55.00	0	55.0	100	0	59.50	0.00	59.5	100	0	0.00		335	24.54	448			460	-	25	-	56	0		87	32.6	26.5	7.3	87.5			
8/13/2007	55.00	0	55.0	100	0	54.40	0.00	54.4	100	0	0.00		342	26.64	327			338	-	25	-	55	0		87	27.2	26	6.9	83.2			
8/14/2007	55.00	0	55.0	100	0	54.81	0.00	54.8	100	0	0.00		338	26.97	420			452	-	24	-	65	0		97	36.7	25.5	7.3	84.5			
8/15/2007	55.00	0	55.0	100	0	54.61	0.00	54.6	100	0	0.00		336	27.5	362			372	180	25	7.4	54	0		88	31.8	27	7.4	85.1	6.2	100	
8/16/2007	55.00	0	55.0	100	0	54.54	0.00	54.5	100	0	0.00		436	26.28	438			450	-	25.5	-	58	0		109	33.7	26.2	7.1	86.8			
8/17/2007	55.00	0	55.0	100	0	54.69	0.00	54.7	100	0	0.00		433	26.57	351			362	-	25.5	-	59	0		94	32.3	26.5	7	83.2			
8/18/2007	55.00	0	55.0	100	0	54.62	0.00	54.6	100	0	0.00		431	28.33	444			432	-	25	-	49	0		91	30.9	26.5	7.3	89.0			
8/19/2007	55.00	0	55.0	100	0	54.44	0.00	54.4	100	0	0.00		427	26.37	477			462	-	24	-	49	0		92	34	26.5	7.2	89.7			
8/20/2007	55.00	0	55.0	100	0	54.93	0.00	54.9	100	0	0.00		431	28.27	396			404	-	23.5	-	54	0		88	33.9	26	6.9	86.4			
8/21/2007	55.00	0	55.0	100	0	54.69	0.00	54.7	100	0	0.00		426	26.99	377			360	180	23.5	7.3	55	0		88	36.9	26.5	7.3	85.4	5.9	100	
8/22/2007	55.00	0	55.0	100	0	54.49	0.00	54.5	100	0	0.00		425	27.09	307			316	-	25.5	-	51	0		89	33.4	26.5	7	83.4			
8/23/2007	55.00	0	55.0	100	0	54.51	0.00	54.5	100	0	0.00		420	25.58	266			291	-	25.5	-	46	0		97	31.3	26.5	7.2	82.7			
8/24/2007	55.00	0	55.0	100	0	54.55	0.00	54.6	100	0	0.00		447	25.82	338			358	-	24	-	64	0		80	34.2	26	7.1	81.1			
8/25/2007	55.00	0	55.0	100	0	53.95	0.00	54.0	100	0	0.00		438	28.2	326			330	-	25.5	-	46	0		98	18.9	26	6.9	85.9			
8/26/2007	55.00	0	55.0	100	0	62.56	0.00	62.6	100	0	0.00		439	26.1	497			484	-	23	-	51	0		89	29.2	24.5	7	89.7			
8/27/2007	55.00	0	55.0	100	0	54.48	0.00	54.5	100	0	0.00		438	27.73	392			375	180	23.5	7.1	52	0		94	33.9	26	7	86.7	11.4		
8/28/2007	55.00	0	55.0	100	0	54.57	0.00	54.6	100	0	0.00		438	27.43	369			375	-	23.5	-	48	0		82	35	26.5	6.9	87.0			
8/29/2007	55.00	0	55.0	100	0	53.80	0.00	53.8	100	0	0.00		437	26.99	387			401	-	25	-	56	0		89	37	26.5	7.1	85.5			
8/30/2007	55.00	0	55.0	100	0	54.47	0.00	54.5	100	0	0.00		435	27.06	420			420	-	27	-	61	0		94	35	26	7.3	85.5			
8/31/2007	55.00	0	55.0	100	0	54.63	0.00	54.6	100	0	0.00		342	27.25	396			401	-	27	-	64	0		98	36.9	27	7	83.8			
9/1/2007	55.00	0	55.0	100	0	54.81	0.00	54.8	100	0	0.00		341	29.62	240			270	-	27.5	-	47	0		91	-	27.5	-	80.4			
9/2/2007	55.00	0	55.0	100	0	55.09	0.00	55.1	100	0	0.00		337	27.65	353			370	-	25	-	55	0		87	-	28	-	84.4			
9/3/2007	55.00	0	55.0	100	0	54.65	0.00	54.7	100	0	0.00		340	29.71	446			452	-	27	-	44	0		101	-	28	-	90.1			
9/4/2007	55.00	0	55.0	100	0	54.62	0.00	54.6	100	0	0.00		339	29.88	347			360	-	27	-	68	0		95	-	27.5	-	80.4			
9/5/2007	55.00	0	55.0	100	0	54.66	0.00	54.7	100	0	0.00		340	28.97	314			320	-	26	-	72	0		108	-	27	-	77.1			
9/6/2007	55.00	0	55.0	100	0	54.62	0.00	54.6	100	0	0.00		343	26.99	357			401	-	25	-	49	0		90	-	25.5	-	86.3			
9/7/2007	55.00	0	55.0	100	0	56.00	0.00	56.0	100	0	0.00		340	26.91	368			382	-	24	-	40	0		81	-	25.5	-	89.1			
9/8/2007	55.00	0	55.0	100	0	55.41	0.00	55.4	100	0	0.00		433	28.06	318			330	-	24	-	68	0		96	-	25.2	-	78.6			
9/9/2007	55.00	0	55.0	100	0	54.62	0.00	54.6	100	0	0.00		433	28.43	387			390	-	25	-	72	0		96	-	25.5	-	81.4			
9/10/2007	50.00	0	50.0	100	0	50.86	0.00	50.9	100	0	0.00		433	26.65	341			360	-	23.5	-	66	0		91	-	25	-	80.6			
9/11/2007	50.00	0	50.0	100	0	50.08	0.00	50.1	100	0	0.00		430	24.85	292			300	-	23	-	71	0		101	-	25	-	75.7			
9/12/2007	50.00	0	50.0	100	0	49.67	0.00	49.7	100	0	0.00		344	24.74	179			230	-	23	-	50	0		83	-	25.5	-	72.1			Veolia discovered and cleared a clog in the influent sampling pump on 9/12 which resulted in an abnormally low influent TSS concentration on that date (and may have impacted the influent TSS concentration on 9/11 as well.)
9/13/2007	50.00	0	50.0	100	0	46.81	0.00	46.8	100	0	0.00		344	25.88	373			400	-	23	-	43	0		88	-	23	-	88.5			
9/14/2007	50.00	0	50.0	100	0	50.21	0.00	50.2	100	0	0.00		343	26.35	351			352	-	23.5	-	51	0		86	-	24.8	-	85.5			
9/15/2007	50.00	0	50.0	100	0	50.30	0.00	50.3	100	0	0.00		346	29.33	310			312	-	22.8	-	59	0		91	-	24.9	-	81.0			
9/16/2007	50.00	0	50.0	100	0	50.06	0.00	50.1	100	0	0.00		342	27.75	342			354	-	25	-	62	0		92	-	25	-	81.9			
9/17/2007	50.00	0	50.0	100	0	53.43	0.00	53.4	100	0	0.00		344	26.17	279			301	-	24	-	55	0		88	-	24.5	-	80.3			
9/18/2007	50.00	0	50.0	100	0	51.18	0.00	51.2	100	0	0.00		346	26.2	315			327	-	23	-	70	0		102	-	24	-	77.8			

SBIWTP Full-Scale Testing Data

Date	Target FeCl3 dose @ JB1 (mg/L)	Target FeCl3 dose @ Grit Influent Channel (mg/L)	Target Total FeCl3 dose [mg/L]	Target Percent Dose @JB1 (%)	Target Dilution Ratio	Actual FeCl3 dose @ JB1 (mg/L)	Actual FeCl3 dose @ Grit Influent Channel (mg/L)	Actual Total Ferric chloride Dose (mg/L)	Actual Percent Dose @JB1 (%)	Total Dilution Flow (gpd)	Dilution Ratio	Polymer dose (mg/L)	Total Grit Basin air flow (scfm)	Influent Flow (mgd)	Influent TSS (mg/L)	Influent VSS (mg/L)	Influent %VSS of TSS	Influent CBOD (mg/L)	Influent Turbidity (NTU)	Influent Temp (deg C)	Influent pH (SU)	Effluent TSS (mg/L)	Effluent VSS (mg/L)	Effluent %VSS of TSS	Effluent CBOD (mg/L)	Effluent Turbidity (NTU)	Effluent Temp (deg C)	Effluent pH (SU)	TSS Percent Removal	Effluent Toxicity - Acute (TUa)	Effluent Toxicity - Chronic (TUc)	Notes
9/19/2007	50.00	0	50.0	100	0	48.62	0.00	48.6	100	0	0.00		343	25.44	345			351	-	25.5	-	68	0		90	-	25.5	-	80.3			There was an overfeeding of polymer because of failure of the Polyblend system from September 19th to September 26th, 2007
9/20/2007	50.00	0	50.0	100	0	50.42	0.00	50.4	100	0	0.00		342	26.43	717			316	-	23.4	-	65	0		89	-	23.4	-	90.9			
9/21/2007	50.00	0	50.0	100	0	50.27	0.00	50.3	100	0	0.00		433	26.11	297			302	-	23.8	-	56	0		88	-	23	-	81.1			
9/22/2007	50.00	0	50.0	100	0	49.58	0.00	49.6	100	0	0.00		432	30.03	316			320	-	23	-	74	0		100	-	23.5	-	76.6			
9/23/2007	50.00	0	50.0	100	0	49.74	0.00	49.7	100	0	0.00		433	28.39	287			308	-	23.5	-	68	0		92	-	23	-	76.3			
9/24/2007	50.00	0	50.0	100	0	49.71	0.00	49.7	100	0	0.00		430	27.35	255			270	-	22.5	-	57	0		88	-	23	-	77.6			
9/25/2007	50.00	0	50.0	100	0	49.61	0.00	49.6	100	0	0.00		432	26.49	274			291	-	21.5	-	59	0		86	-	24	-	78.5			
9/26/2007	50.00	0	50.0	100	0	50.74	0.00	50.7	100	0	0.00		429	25.37	334			340	-	20.5	-	76	0		96	-	23	-	77.2			
9/27/2007	50.00	0	50.0	100	0	50.30	0.00	50.3	100	0	0.00		424	24.97	389			403	-	23.2	-	47	0		81	-	24	-	87.9			
9/28/2007	50.00	0	50.0	100	0	50.73	0.00	50.7	100	0	0.00		344	24.14	324			337	-	22.2	-	66	0		101	-	23	-	79.6			
9/29/2007	50.00	0	50.0	100	0	50.91	0.00	50.9	100	0	0.00		351	26.19	386			402	-	22.4	-	57	0		98	-	23.2	-	85.2			
9/30/2007	50.00	0	50.0	100	0	50.72	0.00	50.7	100	0	0.00		347	25.7	418			410	-	24	-	52	0		94	-	23.5	-	87.6			
10/1/2007	50.00	0	50.0	100	0	49.73	0.00	49.7	100	0	0.00		347	25.81	367				-	22	-	55	0			-	23	-	85.0			
10/2/2007	50.00	0	50.0	100	0	49.57	0.00	49.6	100	0	0.00		344	27.74	334				-	23	-	61	0			-	23.5	-	81.7			
10/3/2007	50.00	0	50.0	100	0	50.93	0.00	50.9	100	0	0.00		345	27.35	321				-	22.2	-	70	0			-	23	-	78.2			
10/4/2007	50.00	0	50.0	100	0	51.01	0.00	51.0	100	0	0.00		341	26.29	240				-	22.6	-	50	0			-	23	-	79.2			
10/5/2007	50.00	0	50.0	100	0	50.60	0.00	50.6	100	0	0.00		335	25.08	252				-	21.5	-	62	0			-	23	-	75.4			
10/6/2007	50.00	0	50.0	100	0	50.44	0.00	50.4	100	0	0.00		454	28.08	304				-	22	-	62	0			-	21.5	-	79.6			
10/7/2007	50.00	0	50.0	100	0	49.69	0.00	49.7	100	0	0.00		434	27.59	321				-	23	-	74	0			-	23.5	-	76.9			
10/8/2007	50.00	0	50.0	100	0	49.59	0.00	49.6	100	0	0.00		448	28.01	303				-	20	-	66	0			-	21.5	-	78.2			
10/9/2007	50.00	0	50.0	100	0	49.58	0.00	49.6	100	0	0.00		444	26.33	293				-	20	-	64	0			-	21	-	78.2			
10/10/2007	50.00	0	50.0	100	0	49.67	0.00	49.7	100	0	0.00		440	25.44	270				-	23	-	53	0			-	22	-	80.4			
10/11/2007	50.00	0	50.0	100	0	50.87	0.00	50.9	100	0	0.00		438	26.04	297				-	23.2	-	40	0			-	22	-	86.5			
10/12/2007	50.00	0	50.0	100	0	49.91	0.00	49.9	100	0	0.00		343	26.25	368				-	23	-	71	0			-	21	-	80.7			
10/13/2007	50.00	0	50.0	100	0	50.03	0.00	50.0	100	0	0.00		343	26.73	292				-	22.5	-	64	0			-	21.5	-	78.1			
10/14/2007	50.00	0	50.0	100	0	49.65	0.00	49.7	100	0	0.00		344	27.7	329				-	24	-	72	0			-	22	-	78.1			
10/15/2007	65.00	0	65.0	100	0	64.28	0.00	64.3	100	0	0.00		344	25.92	308			319	-	23	-	61	49	80.328	92	49.2	22	7.4	80.2			
10/16/2007	65.00	0	65.0	100	0	63.57	0.00	63.6	100	0	0.00		344	26.18	329			337	-	16	-	70	56	80	99	57.1	22	7.3	78.7			
10/17/2007	65.00	0	65.0	100	0	64.48	0.00	64.5	100	0	0.00		342	28.07	357	170	47.619	372	180	21.5	7.2	76	58	76.316	103	58	21.5	7.3	78.7	4.5	50	
10/18/2007	65.00	0	65.0	100	0	64.39	0.00	64.4	100	0	0.00		340	28.64	452			450	-	22	-	70	57	81.429	100	22.6	21.5	6.9	84.5			
10/19/2007	65.00	0	65.0	100	0	64.53	0.00	64.5	100	0	0.00		451	27.35	231			248	-	20.2	-	51	38	74.51	86	34.8	20	7	77.9			
10/20/2007	65.00	0	65.0	100	0	64.54	0.00	64.5	100	0	0.00		451	28.57	316			320	-	20	-	68	53	77.941	101	50.5	21.5	7.2	78.5			
10/21/2007	65.00	0	65.0	100	0	64.58	0.00	64.6	100	0	0.00		419	24.18	286			302	-	21	-	59	47	79.661	88	44.1	23	7.3	79.4			
10/22/2007	50.00	0	50.0	100	0	53.13	0.00	53.1	100	0	0.00		383	21.9	275			288	-	22	-	66	53	80.303	87	51.7	21	7.4	76.0			
10/23/2007	50.00	0	50.0	100	0	51.20	0.00	51.2	100	0	0.00		371	26.42	304	133	43.75	300	180	23	7.2	64	47	73.438	102	47.6	21	7.4	78.9	5.6	50	
10/24/2007	50.00	0	50.0	100	0	51.23	0.00	51.2	100	0	0.00		365	29.92	329			335	-	20	-	68	55	80.882	88	50.3	24	7.3	79.3			
10/25/2007	50.00	0	50.0	100	0	67.43	0.00	67.4	100	0	0.00		362	29.09	324			326	-	22.5	-	68	53	77.941	101	50.2	21.5	7.4	79.0			
10/26/2007	65.00	0	65.0	100	0	66.30	0.00	66.3	100	0	0.00		351	27.77	282			301	-	21.5	-	59	48	81.356	95	49.1	21.2	7.3	79.1			
10/27/2007	65.00	0	65.0	100	0	66.46	0.00	66.5	100	0	0.00		351	28.26	341			362	-	24	-	74	59	79.73	99	58.4	22.5	7.4	78.3			
10/28/2007	65.00	0	65.0	100	0	65.61	0.00	65.6	100	0	0.00		344	27.98	271			286	-	22.5	-	54	44	81.481	87	41.4	22	7.2	80.1			
10/29/2007	65.00	0	65.0	100	0	65.19	0.00	65.2	100	0	0.00		341	27	245	104	42.449	262	180	23.5	7	53	41	77.358	89	32.2	22	6.8	78.4			
10/30/2007	65.00	0	65.0	100	0	64.55	0.00	64.6	100	0	0.00		343	26.6	351			364	-	20	-	61	48	78.689	92	44.8	24	7.3	82.6	5	50	
10/31/2007	65.00	0	65.0	100	0	64.60	0.00	64.6	100	0	0.00		341	26.39	303			309	-	21.5	-	66	55	83.333	86	49.8	21	7.3	78.2			
11/1/2007	65.00	0	65.0	100	0	64.81	0.00	64.8	100	0	0.00		337	25.99	284			303	-	19	-	62	52	83.871	104	25	20.5	6.9	78.2			
11/2/2007	65.00	0	65.0	100	0	65.95	0.00	66.0	100	0	0.00		453	30.87	286			281	-	19	-	55	44	80	88	24.5	21	6.9	80.8			
11/3/2007	65.00	0	65.0	100	0	66.34	0.00	66.3	100	0	0.00		455	35.73	279			286	-	18.5	-	54	43	79.63	94	28.5	21	6.8	80.6			
11/4/2007	65.00	0	65.0	100	0	65.00	0.00	65.0	100	0	0.00		450	35.35	308			319	-	19	-	69	56	81.159	96	27.3	20.5	7	77.6			
11/5/2007	65.00	0	65.0	100	0	64.89	0.00	64.9	100	0	0.00		449	28.86	295	134	45.4237	274	154	19.5	6.8	53	41	77.358	86	39.5	21	6.9	82.0			
11/6/2007	65.00	0	65.0	100	0	66.11	0.00	66.1	100	0	0.00		447	25.2	328			334	-	19	-	66	56	84.848	80	49.6	21	7.2	79.9			
11/7/2007	65.00	0	65.0	100	0	65.94	0.00	65.9	100	0	0.00		447	25.8	274			275	-	19.5	-	58	46	79.31	83	43.6	20.5	7.4	78.8			
11/8/2007	65.00	0	65.0	100	0	68.75	0.00	68.8	100	0	0.00		444	23.41	294			302	-	21	-	66	52	78.788	96	48.2	20	7.3	77.6			
11/9/2007	65.00	0	65.0	100	0	67.56	0.00	67.6	100	0	0.00		454	23.09	295			304	-	21	-	51	37	72.549	97	34.9	20.2	7	82.7			
11/10/2007	65.00	0	65.0	100	0	64.71	0.00	64.7	100	0	0.00		351	27.64	229			235	-	22	-	44	34	77.273	86	33.3	20.5	6.9	80.8			
11/11/2007	65.00	0	65.0	100	0	64.55	0.00	64.6	100	0	0.00		343	26.55	255			270	-	22	-	59	41	69.492	90	49.3	20	6.9	76.9			
11/12/2007	65.00	0	65.0	100	0	65.65	0.00	65.7	100	0	0.00		346	27.65	222			236	-	22	-	49	37	75.51	75	46.3	23	6.8	77.9			
11/13/2007	65.00	0	65.0	100	3	72.05	0.00	72.0	100	11532	3.39		333	26.62	329	152	46.2006	332	180	24	7.3	69	56	81.159	101	44.2	22	7.4	79.0			
11/14/2007	65.00	0	65.0	100	3	70.50	0.00	70.5	100	11286	3.39		329	26.59	271			275	-	22	-	55	44	80	78	40.9	21	7.4	79.7			
11/15/2007	65.00	0	65.0	100	3	69.38	0.00	69.4	100	11199	3.71		325	24.5	294			307	-	21	-	41	32	78.049	84	32.3	20.5	6.9	86.1			
11/16/2007	65.00	0	65.0	100	3	70.93	0.00	70.9	100	9919	3.43		457	22.97	310			322	-	22	-	42	34	80.952	88	36.5	21	7	86.5			
11/17/2007	65.00	0	65.0	100	3	68.60	0.00	68.6	100	8577	3.18		457	24.17	288			302	-	21	-	48	39	81.25	80	32.4	20.5	6.9	83.3			
11/18/2007	65.00	0	65.0	100	3	69.30	0.00	69.3	100	6802	2.81		458	21.48	316			324	-	18	-	62	51	82.258	79	28.2	21	6.8	80.4			
11/19/2007	65.00	0	65.0	100	3	67.56	0.00	67.6	100	7384	2.70		455	24.88	297			300	-	17	-	53	43	81.132	88	37.6	20.5	7	82.2			
11/20/2007	65.00	0	65.0	100	3	65.57	0.00	65.6	100	9648	4.18		452	21.64	272			281	-	20	-	68	53	77.941	93	41	20	7.4	75.0			
11/21/2007	65.00	0	65.0	100	3	64.76	0.00	64.8	100	8114	3.43		448	22.49	208	130	62.5	274	180	18.5	7.3	44	32	72.727	91	48	19	7.4	78.8			
11/22/2007	65.00	0	65.0	100	3	64.46	0.00	64.5	100	7760	3.15		349	23.53	144			161	-	18	-	20	15	75	60	16.4	19	7	86.1			
11/23/2007	65.00	0	65.0	100	3	62.4	0.00	62.4	100	7122	3.01		355	22.15	200			205	-	18	-	26	20	76.923	72	21	19.5	7	87.0			
11/24/2007	65.00	0	65.0	100	3	66.63	0.00	66.6	100	8269	2.92		336	24.87	300			301	-	19.5	-	25	17	68	75	25.6	20.2	7.1	91.7			
11/25/2007	65.00	0	65.0	100	3	66.85	0.00	66.8	100	7014	2.70		333	22.7	164			208	-	18	-	37	28	75.676	70	42.5	19	7.1	77.4			
11/26/2007	65.00	0	65.0	100	3	64.74	0.00	64.7	100	8123	3.01		334	24.34	351	152	43.3048	341	180	18	7	37	28	75.676	86	21	19	7	89.5			

SBIWTP Full-Scale Testing Data

Date	Target FeCl3 dose @ JB1 (mg/L)	Target FeCl3 dose @ Grit Influent Channel (mg/L)	Target Total FeCl3 dose [mg/L]	Target Percent Dose @JB1 (%)	Target Dilution Ratio	Actual FeCl3 dose @ JB1 (mg/L)	Actual FeCl3 dose @ Grit Influent Channel (mg/L)	Actual Total Ferric chloride Dose (mg/L)	Actual Percent Dose @JB1 (%)	Total Dilution Flow (gpd)	Dilution Ratio	Polymer dose (mg/L)	Total Grit Basin air flow (scfm)	Influent Flow (mgd)	Influent TSS (mg/L)	Influent VSS (mg/L)	Influent %VSS of TSS	Influent CBOD (mg/L)	Influent Turbidity (NTU)	Influent Temp (deg C)	Influent pH (SU)	Effluent TSS (mg/L)	Effluent VSS (mg/L)	Effluent %VSS of TSS	Effluent CBOD (mg/L)	Effluent Turbidity (NTU)	Effluent Temp (deg C)	Effluent pH (SU)	TSS Percent Removal	Effluent Toxicity - Acute (TUa)	Effluent Toxicity - Chronic (TUc)	Notes
11/27/2007	65.00	0	65.0	100	3	64.48	0.00	64.5	100	7811	3.02		320	23.47	326			332	-	18	-	30	23	76.667	66	26.1	17	7.1	90.8			
11/28/2007	65.00	0	65.0	100	3	64.56	0.00	64.6	100	7754	3.02		318	23.25	275			270	-	17	-	37	28	75.676	72	56	18	7.1	86.5			
11/29/2007	65.00	0	65.0	100	3	62.60	0.00	62.6	100	8292	3.02		306	24.85	287			292	-	17.5	-	64	53	82.813	87	51.3	18.5	7.1	77.7			
11/30/2007	65.00	0	65.0	100	3	64.27	0.00	64.3	100	10544	3.02		444	30.84	257			258	-	18	-	48	39	81.25	79	45.1	19.3	7	81.3			
12/1/2007	65.00	0	65.0	100	3	65.36	0.00	65.4	100	8029	3.00		455	23.22	275			272	-	19.7	-	55	42	76.364	82	44	19	7.4	80.0			
12/2/2007	50.00	0	50.0	100	3	52.17	0.00	52.2	100	5154	2.87		457	19.49	264			275	-	21	-	67	55	82.09	87	48.6	22	7.3	74.6			
12/3/2007	50.00	0	50.0	100	3	50.86	0.00	50.9	100	5218	2.93		443	19.85	258			275	-	18	-	51	37	72.549	80	32.8	19	7.4	80.2			
12/4/2007	50.00	0	50.0	100	3	49.86	0.00	49.9	100	6454	3.00		326	24.49	296			309	180	15	7.3	55	39	70.909	86	42.4	18	7.4	81.4			
12/5/2007	50.00	0	50.0	100	3	49.64	0.00	49.6	100	7791	3.02		350	29.45	289			300	-	15	-	58	44	75.862	88	46	16.8	7.4	79.9			
12/6/2007	50.00	0	50.0	100	3	47.78	0.00	47.8	100	6509	3.08		344	25.18	297			290	-	17	-	48	33	68.75	79	40.2	17.5	7.3	83.8			
12/7/2007	50.00	0	50.0	100	3	49.71	0.00	49.7	100	7056	3.00		349	26.93	285			289	161	15	7.2	67	54	80.597	89	42.1	18	7.4	76.5	4.5	50	
12/8/2007	50.00	0	50.0	100	3	49.26	0.00	49.3	100	7581	3.00		350	29.17	303			315	-	17	-	61	47	77.049	88	41	18.8	7.4	79.9			
12/9/2007	50.00	0	50.0	100	3	50.20	0.00	50.2	100	5474	3.01		341	20.62	312			322	-	15.5	-	59	47	79.661	89	45.8	15	7.4	81.1			
12/10/2007	50.00	0	50.0	100	3	49.85	0.00	49.8	100	5888	3.01		329	22.32	314	147	46.8153	336	-	15	-	71	56	78.873	82	53.9	18	7.4	77.4			
12/11/2007	50.00	0	50.0	100	3	49.52	0.00	49.5	100	5705	3.03		331	21.65	263	117	44.4867	260	-	16.5	-	59	45	76.271	87	42	18.5	7.5	77.6			
12/12/2007	50.00	0	50.0	100	3	49.49	0.00	49.5	100	5858	3.01		326	22.32	308	137	44.4805	327	-	19	-	61	46	75.41	101	44.8	20	7.4	80.2			
12/13/2007	50.00	0	50.0	100	3	50.03	0.00	50.0	100	6771	2.99		322	25.76	334	155	46.4072	358	180	16.5	6.9	48	36	75	89	44.8	18.5	7.2	85.6	5.3	50	
12/14/2007	50.00	0	50.0	100	3	49.56	0.00	49.6	100	7263	3.02		478	27.59	304	150	49.3421	307	-	11	-	47	35	74.468	84	41.7	14	7.2	84.5			
12/15/2007	50.00	0	50.0	100	3	49.69	0.00	49.7	100	7934	3.03		467	29.99	386	147	38.0829	381	-	12.5	-	52	39	75	80	46	14.5	7.3	86.5			
12/16/2007	50.00	0	50.0	100	3	49.47	0.00	49.5	100	7448	3.02		460	28.33	393	186	47.3282	408	-	17	-	58	47	81.034	81	40.5	16	7.2	85.2			
12/17/2007	50.00	0	50.0	100	3	47.46	0.00	47.5	100	7089	3.02		458	26.87	338	171	50.5917	341	-	12	-	66	51	77.273	93	51.2	14	7.3	80.5			
12/18/2007	50.00	0	50.0	100	3	47.91	0.00	47.9	100	7056	3.02		447	26.53	319	162	50.7837	328	-	14	-	64	51	79.688	94	50	15	7.5	79.9			
12/19/2007	50.00	0	50.0	100	3	47.89	0.00	47.9	100	6463	3.03		431	24.27	274	153	55.8394	285	180	17	7.3	58	44	75.862	82	42.9	17	7.4	78.8	2.9	100	
12/20/2007	50.00	0	50.0	100	3	47.85	0.00	47.8	100	6938	3.02		427	26.12	373	108	28.9544	370	-	17	-	33	9	27.273	88	52.1	17.5	7	91.2			
12/21/2007	50.00	0	50.0	100	3	49.92	0.00	49.9	100	7643	3.00		354	28.7	399	110	27.5689	418	-	17.5	-	34	5	14.706	72	27	18	7.1	91.5			
12/22/2007	50.00	0	50.0	100	3	49.80	0.00	49.8	100	7135	3.00		361	26.86	368	119	32.337	374	-	13	-	41	11	26.829	85	22.8	14	7.2	88.9			
12/23/2007	50.00	0	50.0	100	3	49.94	0.00	49.9	100	6522	2.99		337	24.56	337	106	31.454	318	-	13	-	44	12	27.273	80	32.1	15	7.2	86.9			
12/24/2007	50.00	0	50.0	100	3	49.89	0.00	49.9	100	7178	3.00		313	26.99	371	108	29.1105	376	-	14	-	45	14	31.111	83	30.9	16	7.2	87.9			
12/25/2007	50.00	0	50.0	100	3	49.46	0.00	49.5	100	6022	3.02		305	22.67	422	121	28.673	420	180	13	7.3	67	21	31.343	82	33.1	15	7.3	84.1			
12/26/2007	50.00	0	50.0	100	3	47.84	0.00	47.8	100	6608	2.99		297	26.05	319	97	30.4075	327	-	13.8	-	41	8	19.512	82	34	14.5	7.2	87.1			
12/27/2007	50.00	0	50.0	100	3	44.80	0.00	44.8	100	6270	2.88		299	27.09	415	124	29.8795	416	-	11	-	48	10	20.833	82	34.3	13.5	7.3	88.4	2.7	50	
12/28/2007	50.00	0	50.0	100	3	48.58	0.00	48.6	100	6753	2.92		345	26.52	302	147	48.6755	321	-	11.5	-	61	51	83.607	79	52.5	13.5	7.3	79.8			
12/29/2007	50.00	0	50.0	100	3	47.32	0.00	47.3	100	5388	2.62		345	24.21	348	108	31.0345	349	-	13	-	45	10	22.222	84	22.8	13.8	7.2	87.1			
12/30/2007	50.00	0	50.0	100	3	46.38	0.00	46.4	100	5643	2.79		345	24.28	343	100	29.1545	360	-	13	-	38	10	26.316	81	27	13.5	7.1	88.9			
12/31/2007	0.00	50	50.0	0	3	0.00	46.80	46.8	0	7416	3.21		345	27.49	333	90	27.027		-	14	-	45	23	51.111		-	15.5	-	86.5			
1/1/2008	0.00	50	50.0	0	3	0.00	47.10	47.1	0	6018	3.19			22.3	332	80	24.0964		-	13.5	-	72	21	29.167		-	14	-	78.3			
1/2/2008	0.00	50	50.0	0	3	0.00	46.76	46.8	0	7268	3.20			27.06	278	138	49.6403		-	15.5	-	63	42	66.667		-	15.4	-	77.3			
1/3/2008	0.00	50	50.0	0	3	0.00	47.17	47.2	0	6938	3.19			25.73	275	125	45.4545		-	14.5	-	55	37	67.273		-	15.8	-	80.0			
1/4/2008	0.00	50	50.0	0	3	0.00	48.44	48.4	0	7046	3.10		472	26.49	302	149	49.3377		-	15.5	-	66	51	77.273		-	16	-	78.1			
1/5/2008	0.00	50	50.0	0	3	0.00	47.94	47.9	0	9148	3.13		470	34.47	377	235	62.3342		-	16	-	76	59	77.632		-	17	-	79.8			
1/6/2008	0.00	50	50.0	0	3	0.00	46.90	46.9	0	8326	3.19		474	31.43	552	260	47.1014		-	15	-	48	34	70.833		-	17	-	91.3			
1/7/2008	0.00	50	50.0	0	3	0.00	48.73	48.7	0	8382	3.08		260	31.51	317	177	55.836		-	15.5	-	68	51	75		-	17.5	-	78.5			
1/8/2008	0.00	50	50.0	0	3	0.00	47.20	47.2	0	5289	3.18		240	19.92	317	162	51.1041		-	17	-	70	55	78.571		-	17	-	77.9			
1/9/2008	0.00	50	50.0	0	3	0.00	46.35	46.4	0	5143	3.23		232	19.38	302	133	44.0397		-	15	-	67	50	74.627		-	17	-	77.8			
1/10/2008	0.00	50	50.0	0	3	0.00	47.52	47.5	0	5084	3.09		233	19.48	281	124	44.1281		-	17.5	-	58	45	77.586		-	17.5	-	79.4			
1/11/2008	0.00	50	50.0	0	3	0.00	40.78	40.8	0	4004	2.94		376	18.83	308	141	45.7792		-	17.5	-	64	42	65.625		-	18	-	79.2			
1/12/2008	0.00	50	50.0	0	3	0.00	47.60	47.6	0	5225	3.14		388	19.72	336	149	44.3452		-	18	-	72	56	77.778		-	17.5	-	78.6			
1/13/2008	0.00	50	50.0	0	3	0.00	48.20	48.2	0	5090	3.08		425	19.31	275	137	49.8182		-	16	-	51	33	64.706		-	17	-	81.5			Mechanical failure of ferric chloride feed system occurred at approx. noon on 1/13. Ferric feed transferred to JB1 at that time.
1/14/2008	0.00	50	50.0	0	3	59.12	20.54	79.7	74	7896	2.71		461	20.63	410	179	43.6585		-	16.5	-	49	33	67.347		-	18	-	88.0			
1/15/2008	0.00	50	50.0	0	3	20.35	34.94	55.3	37	5596	2.71		460	21.04	289	135	46.7128		-	18	-	66	49	74.242		-	20	-	77.2			Ferric chloride feed switched back to grit tank influent at approx. 9am on 1/15.
1/16/2008	0.00	50	50.0	0	3	0.00	46.01	46.0	0	5570	3.26		452	20.94	283	143	50.53		-	17.5	-	68	53	77.941		-	18	-	76.0			
1/17/2008	0.00	50	50.0	0	3	0.00	47.67	47.7	0	5503	3.15		137	22.14	307	145	47.2313		-	16.5	-	59	46	77.966		-	17	-	80.8			
1/18/2008	0.00	50	50.0	0	3	0.00	49.17	49.2	0	6526	3.27		443	24.55	304	163	53.6184		-	17.5	-	72	61	84.722		-	17.5	-	76.3			
1/19/2008	0.00	50	50.0	0	3	0.00	50.45	50.5	0	8363	3.27		401	30.7	293	145	49.4881		-	12	-	60	44	73.333		-	13	-	79.5			
1/20/2008	0.00	50	50.0	0	3	0.00	52.52	52.5	0	7495	3.14		383	27.49	314	155	49.3631		-	11	-	71	54	76.056		-	13	-	77.4			
1/21/2008	0.00	50	50.0	0	3	0.00	52.53	52.5	0	7097	3.14		341	26.01	329	159	48.3283		-	12	-	65	47	72.308		-	13.5	-	80.2			
1/22/2008	0.00	50	50.0	0	3	0.00	51.31	51.3	0	7394	3.16		397	27.55	417	214	51.3189		-	16	-	50	37	74		-	16	-	88.0			
1/23/2008	0.00	50	50.0	0	3	0.00	49.00	49.0	0	7793	3.14		343	28.45	314	165	52.5478		-	15	-	64	51	79.688		-	14	-	79.6			
1/24/2008	0.00	50	50.0	0	3	0.00	52.67	52.7	0	6532	3.14		369	22.16	382	216	56.5445		-	16	-	53	42	79.245		-	16	-	86.1			
1/25/2008	0.00	50	50.0	0	3	0.00	51.02	51.0	0	6263	3.24		561	21.26	288	134	46.5278		-	17	-	50	40	80		-	17	-	82.6			
1/26/2008	0.00	50	50.0	0	3	0.00	52.49	52.5	0	7705	3.14		508	26.26	302	146	48.3444		-	17.5	-	61	52	85.246		-	17.5	-	79.8			
1/27/2008	0.00	50	50.0	0	3	0.00	51.04	51.0	0	9781	3.24		487	33.19	310	140	45.1613		-	15	-	58	47	81.034		-	16	-	81.3			
1/28/2008	0.00	50	50.0	0	3	0.00	50.90	50.9	0	6984	3.24		507	23.76	274	127	46.3504		-	15	-	49	38	77.551		-	15	-	82.1			
1/29/2008	0.00	50	50.0	0	3	0.00	52.53	52.5	0	5847	3.14		536	19.89	286	148	51.7483		-	16	-	63	48	76.19		-	16	-	78.0			
1/30/2008	0.00	50	50.0	0	3	0.00	52.54	52.5	0	6592	3.14		492	22.42	308	144	46.7532		-	14.5	-	64	45	70.313		-	16	-	79.2			
1/31/2008	0.00	50	50.0	0	3	0.00	53.35	53.4	0	6489	3.14		501	22.6	291	128	43.9863		-	0	-	68	52	76.471		-	0	-	76.6			
2/1/2008	40.00	10	50.0	80	3	41.08	14.02	55.1	75	5526	2.70		382	21.63	302	140	46.3576		-	14	-	71	55	77.465		-	15.5	-	76.5			

SBIWTP Full-Scale Testing Data

Date	Target FeCl3 dose @ JB1 (mg/L)	Target FeCl3 dose @ Grit Influent Channel (mg/L)	Target Total FeCl3 dose [mg/L]	Target Percent Dose @JB1 (%)	Target Dilution Ratio	Actual FeCl3 dose @ JB1 (mg/L)	Actual FeCl3 dose @ Grit Influent Channel (mg/L)	Actual Total Ferric chloride Dose (mg/L)	Actual Percent Dose @JB1 (%)	Total Dilution Flow (gpd)	Dilution Ratio	Polymer dose (mg/L)	Total Grit Basin air flow (scfm)	Influent Flow (mgd)	Influent TSS (mg/L)	Influent VSS (mg/L)	Influent %VSS of TSS	Influent CBOD (mg/L)	Influent Turbidity (NTU)	Influent Temp (deg C)	Influent pH (SU)	Effluent TSS (mg/L)	Effluent VSS (mg/L)	Effluent %VSS of TSS	Effluent CBOD (mg/L)	Effluent Turbidity (NTU)	Effluent Temp (deg C)	Effluent pH (SU)	TSS Percent Removal	Effluent Toxicity - Acute (TUa)	Effluent Toxicity - Chronic (TUc)	Notes
2/2/2008	40.00	10	50.0	80	3	41.82	12.26	54.1	77	5725	2.78		367	22.17	287	148	51.5679		-	14.5	-	58	42	72.414		-	13.5	-	79.8			
2/3/2008	40.00	10	50.0	80	3	39.25	11.90	51.2	77	6897	2.93		380	26.84	275	126	45.8182		-	15	-	53	39	73.585		-	17	-	80.7			
2/4/2008	40.00	10	50.0	80	3	39.85	9.59	49.4	81	5844	3.04		449	22.68	283	132	46.6431		-	15	-	51	41	80.392		-	15	-	82.0			
2/5/2008	40.00	10	50.0	80	3	40.11	8.83	48.9	82	5938	3.06		456	23.11	288	149	51.7361		-	14	-	55	44	80		-	17	-	80.9			
2/6/2008	40.00	10	50.0	80	3	39.72	8.87	48.6	82	6182	3.08		427	24.12	263	133	50.5703		-	14	-	47	36	76.596		-	16	-	82.1			
2/7/2008	40.00	10	50.0	80	3	39.78	8.89	48.7	82	6143	3.09		408	23.82	883	615	69.6489		-	17	-	63	50	79.365		-	17	-	92.9			per email from Richard Perna: Influent TSS on 2/7 is unreasonably high. Our lab noted the unusual result and retested, obtaining the same value.
2/8/2008	40.00	10	50.0	80	3	39.56	17.75	57.3	69	6886	2.62		585	25.5	284	208	73.2394		-	17.5	-	35	30	85.714		-	17.5	-	87.7			
2/9/2008	40.00	10	50.0	80	3	39.55	13.43	53.0	75	6744	2.83		586	25.03	305	226	74.0984		-	18.5	-	30	28	93.333		-	18	-	90.2			
2/10/2008	40.00	10	50.0	80	3	38.15	10.88	49.0	78	6371	3.06		555	23.59	279	217	77.7778		-	21	-	41	35	85.366		-	19	-	85.3			
2/11/2008	40.00	10	50.0	80	3	39.77	9.73	49.5	80	6041	3.04		532	22.32	290	210	72.4138		-	15	-	42	37	88.095		-	17	-	85.5			
2/12/2008	40.00	10	50.0	80	3	39.56	8.82	48.4	82	6829	3.10		484	25.33	307	162	52.7687		-	16	-	61	45	73.77		-	16	-	80.1			
2/13/2008	40.00	10	50.0	80	3	37.03	8.76	45.8	81	6933	3.27		506	25.68	282	154	54.6099		-	19	-	55	42	76.364		-	21	-	80.5			
2/14/2008	40.00	10	50.0	80	3	39.97	10.13	50.1	80	6701	3.00		535	24.83	405	305	75.3086		-	15.5	-	43	36	83.721		-	17.5	-	89.4			
2/15/2008	40.00	10	50.0	80	3	39.92	20.39	60.3	66	5331	2.45		522	20.1	694	428	61.6715		-	14.5	-	36	31	86.111		-	15.5	-	94.8			
2/16/2008	40.00	10	50.0	80	3	39.16	8.80	48.0	82	6122	3.09		449	23.01	413	276	66.8281		-	16.5	-	49	38	77.551		-	17	-	88.1			
2/17/2008	40.00	10	50.0	80	3	39.25	9.58	48.8	80	6085	3.03		442	22.94	436	300	68.8073		-	15	-	52	30	57.692		-	17	-	88.1			
2/18/2008	40.00	10	50.0	80	3	39.19	8.78	48.0	82	6315	3.08		427	23.82	401	282	70.3242		-	16	-	47	29	61.702		-	17	-	88.3			
2/19/2008	40.00	10	50.0	80	3	39.09	8.72	47.8	82	6122	3.10		433	23.01	322	164	50.9317		-	16	-	58	42	72.414		-	18	-	82.0			
2/20/2008	40.00	10	50.0	80	3	39.16	8.83	48.0	82	6376	3.08		433	24.03	289	152	52.5952		-	18	-	45	37	82.222		-	18	-	84.4			
2/21/2008	40.00	10	50.0	80	3	39.12	8.76	47.9	82	6776	3.09		432	25.49	302	161	53.3113		-	18	-	55	42	76.364		-	18	-	81.8			
2/22/2008	40.00	10	50.0	80	3	39.15	8.86	48.0	82	7220	3.08		529	27.22	341	188	55.132		-	17.5	-	63	51	80.952		-	17.5	-	81.5			
2/23/2008	40.00	10	50.0	80	3	39.89	8.72	48.6	82	6561	3.04		502	24.72	310	184	59.3548		-	17.5	-	56	41	73.214		-	17.5	-	81.9			
2/24/2008	40.00	10	50.0	80	3	40.80	8.70	49.5	82	5864	2.98		527	22.15	282	165	58.5106		-	18	-	50	38	76		-	18	-	82.3			
2/25/2008	50.00	0	50.0	100	3	47.12	2.82	49.9	94	6144	2.97		535	23.09	342	204	59.6491		-	15	-	66	52	78.788		-	17	-	80.7			
2/26/2008	50.00	0	50.0	100	3	48.82	0.00	48.8	100	6270	3.02		490	23.54	316	162	51.2658		-	16	-	64	49	76.563		-	18	-	79.7			
2/27/2008	50.00	0	50.0	100	3	49.77	0.00	49.8	100	6488	3.01		455	23.98	279	133	47.6703		-	19.5	-	42	32	76.19		-	19	-	84.9			
2/28/2008	50.00	0	50.0	100	3	49.46	0.00	49.5	100	6527	3.02		463	24.13	274	139	50.7299		-	18.5	-	46	38	82.609		-	18.5	-	83.2			
2/29/2008	50.00	0	50.0	100	3	49.86	0.00	49.9	100	6404	3.00		444	23.66	303	138	45.5446		-	18	-	59	45	76.271		-	18	-	80.5			
3/1/2008	50.00	0	50.0	100	3	47.55	0.00	47.5	100	6642	3.02		372	25.6	286	147	51.3986		-	18	-	57	46	80.702		-	18	-	80.1			
3/2/2008	50.00	0	50.0	100	3	42.88	0.00	42.9	100	6438	3.02		381	27.5	288	135	46.875		-	18	-	51	40	78.431		-	19	-	82.3			
3/3/2008	50.00	0	50.0	100	3	49.62	0.00	49.6	100	6564	3.02		365	24.23	275	147	53.4545		-	16	-	49	39	79.592		-	18	-	82.2			
3/4/2008	50.00	0	50.0	100	3	49.31	0.00	49.3	100	6442	3.02		342	23.88	262	119	45.4198		-	16	-	41	33	80.488		-	18	-	84.4			
3/5/2008	50.00	0	50.0	100	3	49.93	0.00	49.9	100	7063	3.03		340	26.33	260	128	49.2308		-	17	-	49	39	79.592		-	18	-	81.2			
3/6/2008	50.00	0	50.0	100	3	49.52	0.00	49.5	100	7644	3.02		542	28.8	287	152	52.9617		-	17	-	46	34	73.913		-	16	-	84.0			
3/7/2008	50.00	0	50.0	100	3	49.89	0.00	49.9	100	7393	3.00		488	27.83	272	142	52.2059		-	16	-	48	31	64.583		-	16	-	82.4			
3/8/2008	50.00	0	50.0	100	3	49.43	0.00	49.4	100	7447	3.02		385	28.1	296	137	46.2838		-	17.5	-	52	40	76.923		-	16.5	-	82.4			
3/9/2008	50.00	0	50.0	100	3	49.61	0.00	49.6	100	6570	3.02		358	24.72	288	156	54.1667		-	16	-	45	32	71.111		-	16.5	-	84.4			
3/10/2008	33.75	11.25	45.0	75	3	37.73	6.93	44.7	84	6804	3.08		342	27.69	293	136	46.4164		-	13.5	-	43	33	76.744		-	17	-	85.3			
3/11/2008	33.75	11.25	45.0	75	3	35.45	7.61	43.1	82	6818	3.08		304	28.74	308	163	52.9221		-	15	-	53	38	71.698		-	16	-	82.8			
3/12/2008	33.75	11.25	45.0	75	3	36.40	8.01	44.4	82	7071	3.05		310	29.19	315	134	42.5397		-	15	-	51	39	76.471		-	17	-	83.8			
3/13/2008	33.75	11.25	45.0	75	3	36.24	5.41	41.6	87	6650	3.24		389	27.61	268	139	51.8657		-	16.5	-	45	31	68.889		-	17.5	-	83.2			
3/14/2008	33.75	11.25	45.0	75	3	35.58	6.68	42.3	84	6641	3.20		380	27.49	282	143	50.7092		-	16	-	50	36	72		-	17	-	82.3			
3/15/2008	33.75	11.25	45.0	75	3	35.72	7.94	43.7	82	6529	3.09		375	27.05	301	165	54.8173		-	18	-	54	41	75.926		-	18	-	82.1			
3/16/2008	33.75	11.25	45.0	75	3	35.65	8.09	43.7	82	6704	3.09		396	27.75	309	151	48.8673		-	14	-	59	46	77.966		-	16	-	80.9			
3/17/2008	33.75	11.25	45.0	75	3	36.24	7.92	44.2	82	4742	3.06		408	19.64	278	149	53.5971		-	15	-	46	35	76.087		-	18	-	83.5			
3/18/2008	33.75	11.25	45.0	75	3	39.61	19.78	59.4	67	5242	2.26		452	21.8	306	167	54.5752		-	17	-	52	39	75		-	18	-	83.0			
3/19/2008	33.75	11.25	45.0	75	3	38.00	13.62	51.6	74	6330	2.61		388	26.2	299	157	52.5084		-	17	-	61	46	75.41		-	17	-	79.6			
3/20/2008	33.75	11.25	45.0	75	3	35.63	9.78	45.4	78	6243	2.98		355	25.77	275	146	53.0909		-	16.5	-	53	42	79.245		-	17	-	80.7			
3/21/2008	33.75	11.25	45.0	75	3	27.39	7.63	35.0	78	5740	4.13		348	22.15	312	149	47.7564		-	15	-	60	40	66.667		-	16.5	-	80.8			
3/22/2008	33.75	11.25	45.0	75	3	35.35	9.50	44.9	79	6024	3.11		335	24.12	315	151	47.9365		-	17.5	-	62	47	75.806		-	17.5	-	80.3			
3/23/2008	33.75	11.25	45.0	75	3	39.13	9.29	48.4	81	5468	2.80		309	22.52	294	158	53.7415		-	16	-	52	41	78.846		-	18	-	82.3			
3/24/2008	33.75	11.25	45.0	75	3	35.44	7.99	43.4	82	6655	3.11		310	27.44	288	126	43.75		-	16	-	56	42	75		-	18	-	80.6			
3/25/2008	33.75	11.25	45.0	75	3	34.20	9.32	43.5	79	6611	3.10		313	27.3	328	179	54.5732		-	15	-	57	44	77.193		-	18	-	82.6			
3/26/2008	33.75	11.25	45.0	75	3	37.63	8.51	46.1	82	6064	2.97		454	24.51	334	154	46.1078		-	18	-	57	38	66.667		-	18	-	82.9			
3/27/2008	33.75	11.25	45.0	75	3	37.10	10.67	47.8	78	5429	3.03		451	21.69	301	129	42.8571		-	18	-	59	44	74.576		-	18	-	80.4			
3/28/2008	33.75	11.25	45.0	75	3	39.18	12.28	51.5	76	5848	2.76		371	23.72	277	152	54.8736		-	18	-	51	38	74.51		-	18.5	-	81.6			
3/29/2008	33.75	11.25	45.0	75	3	40.21	11.42	51.6	78	5975	2.89		350	23.13	314	165	52.5478		-	19.5	-	62	47	75.806		-	18.5	-	80.3			
3/30/2008	33.75	11.25	45.0	75	3	37.74	10.87	48.6	78	5495	2.86		349	22.76	313	161	51.4377		-	16	-	55	44	80		-	18.5	-	82.4			
3/31/2008	33.75	11.25	45.0	75	3	37.89	9.83	47.7	79	5800	2.81		365	24.94	280	141	50.3571		-	15	-	49	39	79.592		-	18	-	82.5			
4/1/2008	33.75	11.25	45.0	75	3	35.67	7.92	43.6	82	6125	3.08		348	26.28	292	143	48.9726		-	17	-	60	49	81.667		-	18	-	79.5			
4/2/2008	33.75	11.25	45.0	75	3	35.23	8.87	44.1	80	5948	3.06		373	25.43	312	173	55.4487		-	16	-	63	52	82.54		-	17	-	79.8			
4/3/2008	33.75	11.25	45.0	75	3	35.00	9.39	44.4	79	5808	3.03		447	24.94	328	159	48.4756		-	19	-	66	51	77.273		-	18	-	79.9			
4/4/2008	33.75	11.25	45.0	75	3	33.45	7.48	40.9	82	6204	3.09		450	26.52	298	130	43.6242		-	16	-	64	49	76.563		-	18.5	-	78.5			
4/5/2008	33.75	11.25	45.0	75	3	34.97	9.72	44.7	78	6804	3.02		458	27.24	287	148	51.5679		-	16.5	-	53	43	81.132		-	17.5	-	81.5			
4/6/2008	33.75	11.25	45.0	75	3	34.39	9.53	43.9	78	6410	3.06		478	25.73	316	167	52.8481		-	17.5	-	55	45	81.818		-	18.5	-	82.6			
4/7/2008	33.75	11.25	45.0	75	3	34.39	9.95	44.3	78	6573	3.05		476	26.28	324	153	47.2222		-	20	-	66	52	78.788		-	19	-	79.6			
4/8/2008	33.75	11.25	45.0	75	3	34.99	8.75	43.7	80	6256	3.10		463	24.95	281	144	51.2456		-	17	-	53	41	77.358		-	18	-	81.1			
4/9/2008	33.75	11.25	45.0	75	3	34.96	8.60	43.6	80	6223	3.09		474	24.94	317	176	55.5205		-	19	-	66	52	78.788		-	19	-	79.2			
4/10/2008	33.75	11.25	45.0	75	3	35.01	9.72	44.7	78	6386	3.10		401	27.11	341	163	47.8006		-	19	-	68	56	82.353		-	18.5	-	80.1			
4/11/2008	33.75	11.25	45.0	75	3	33.07	11.14	44.2	75	6312	3.06		412	27.46	431	240	55.6845		-	18	-	40	31	77.5		-	17.5	-	90.7			

SBIWTP Full-Scale Testing Data

Date	Target FeCl3 dose @ JB1 (mg/L)	Target FeCl3 dose @ Grit Influent Channel (mg/L)	Target Total FeCl3 dose [mg/L]	Target Percent Dose @JB1 (%)	Target Dilution Ratio	Actual FeCl3 dose @ JB1 (mg/L)	Actual FeCl3 dose @ Grit Influent Channel (mg/L)	Actual Total Ferric chloride Dose (mg/L)	Actual Percent Dose @JB1 (%)	Total Dilution Flow (gpd)	Dilution Ratio	Polymer dose (mg/L)	Total Grit Basin air flow (scfm)	Influent Flow (mgd)	Influent TSS (mg/L)	Influent VSS (mg/L)	Influent %VSS of TSS	Influent CBOD (mg/L)	Influent Turbidity (NTU)	Influent Temp (deg C)	Influent pH (SU)	Effluent TSS (mg/L)	Effluent VSS (mg/L)	Effluent %VSS of TSS	Effluent CBOD (mg/L)	Effluent Turbidity (NTU)	Effluent Temp (deg C)	Effluent pH (SU)	TSS Percent Removal	Effluent Toxicity - Acute (TUa)	Effluent Toxicity - Chronic (TUc)	Notes
4/12/2008	33.75	11.25	45.0	75	3	34.35	9.32	43.7	79	6137	3.10		353	26.64	516	272	52.7132		-	19.5	-	40	33	82.5		-	19	-	92.2			
4/13/2008	33.75	11.25	45.0	75	3	34.02	10.45	44.5	77	6039	3.04		302	26.31	499	226	45.2906		-	19.5	-	53	40	75.472		-	19.5	-	89.4			
4/14/2008	33.75	11.25	45.0	75	3	36.22	9.70	45.9	79	6131	2.96		310	26.56	529	266	50.2836		-	18	-	60	48	80		-	20	-	88.7			
4/15/2008	33.75	11.25	45.0	75	3	35.78	7.90	43.7	82	5666	3.09		303	24.67	279	142	50.8961		-	19.5	-	58	47	81.034		-	20	-	79.2			
4/16/2008	40.00	0	40.0	100	3	38.46	0.00	38.5	100	5007	3.02		303	25.34	307	166	54.0717		-	19	-	53	41	77.358		-	19	-	82.7			
4/17/2008	40.00	0	40.0	100	3	40.31	0.00	40.3	100	4739	2.97		470	24.44	309	148	47.8964		-	16	-	62	51	82.258		-	19	-	79.9			
4/18/2008	40.00	0	40.0	100	3	40.07	0.00	40.1	100	4837	2.99		470	24.89	283	154	54.417		-	17.5	-	47	40	85.106		-	19	-	83.4			
4/19/2008	40.00	0	40.0	100	3	39.90	0.00	39.9	100	4884	3.01		632	25.06	274	135	49.2701		-	16.5	-	36	29	80.556		-	19	-	86.9			
4/20/2008	40.00	0	40.0	100	3	40.03	0.00	40.0	100	4728	3.00		477	24.3	278	141	50.7194		-	16	-	44	36	81.818		-	19	-	84.2			
4/21/2008	40.00	0	40.0	100	3	44.87	0.00	44.9	100	4939	3.02		457	22.45	467	280	59.9572		-	17	-	63	51	80.952		-	19	-	86.5			
4/22/2008	40.00	0	40.0	100	3	39.28	0.00	39.3	100	4944	3.02		468	25.31	296	141	47.6351		-	18	-	52	43	82.692		-	19	-	82.4			
4/23/2008	40.00	0	40.0	100	3	39.61	0.00	39.6	100	4836	3.02		488	24.53	356	236	66.2921		-	19	-	45	40	88.889		-	19	-	87.4			
4/24/2008	40.00	0	40.0	100	3	39.76	0.00	39.8	100	4893	3.02		680	24.73	403	183	45.4094		-	19	-	59	49	83.051		-	18.5	-	85.4			
4/25/2008	40.00	0	40.0	100	3	39.78	0.00	39.8	100	4858	3.02		595	24.55	417	295	70.7434		-	16	-	54	39	72.222		-	19.5	-	87.1			
4/26/2008	40.00	0	40.0	100	3	40.07	0.00	40.1	100	5368	2.98		628	27.33	409	303	74.0831		-	16.5	-	53	40	75.472		-	20	-	87.0			
4/27/2008	40.00	0	40.0	100	3	40.32	0.00	40.3	100	4827	2.97		700	24.49	373	251	67.2922		-	15	-	55	41	74.545		-	21	-	85.3			
4/28/2008	40.00	0	40.0	100	3	39.81	0.00	39.8	100	4934	3.02		544	24.97	337	0	-		-	20	-	50	0	-		-	21	-	85.2			
4/29/2008	40.00	0	40.0	100	3	41.22	0.00	41.2	100	4854	2.90		348	24.35	473	0	-		-	21	-	62	0	-		-	21	-	86.9			
4/30/2008	40.00	0	40.0	100	3	41.62	0.00	41.6	100	4247	2.89		344	21.2	412	0	-		-	18	-	56	0	-		-	20	-	86.4			

For Historical VSS Data refer to CD Titled:

SBIWTP
Operational Approaches:
Project Report for Full Scale Testing of
TSS Removal Improvements

Dated: September 2008

Appendix B

Photo Log

Ferric Chloride Tanks

Ferric Chloride Feed Pumps for JB1

Ferric Chloride Dilution System for JB1

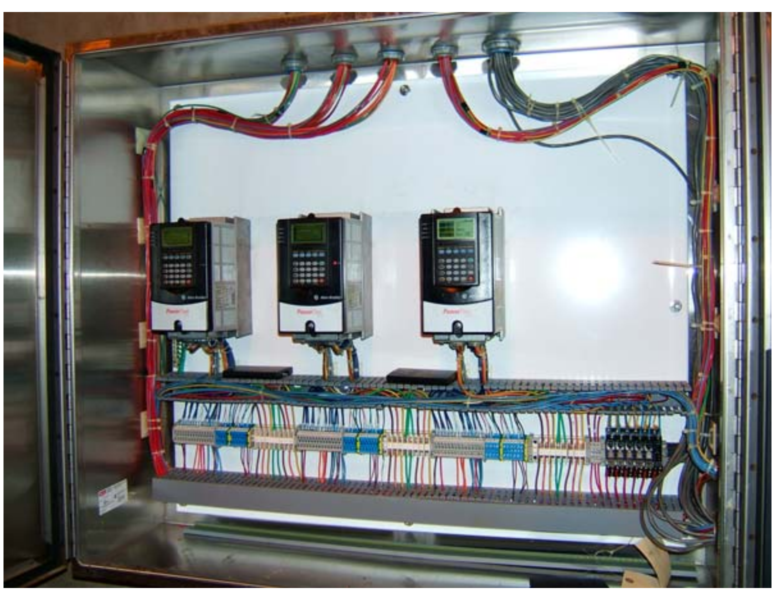
Ferric Chloride Feed Piping to JB1

Ferric Chloride Feed Manifold at JB1

Influent Sampler

Influent Sampler Composite Bottle

Old Ferric Chloride Feed Pumps for Grit Chamber



VFDs for Ferric Chloride Feed Pumps to Grit Chamber

Ferric Chloride Dilution System for Grit Chamber

Ferric Chloride Feed Manifold at Grit Chamber

Effluent Sample Location

Effluent Sampler

Appendix C

List of Meetings

United States Section, International Boundary and Water Commission (USIBWC)
South Bay International Wastewater Treatment Plant (SBIWTP)
Operational Approaches: Project Report for Full Scale Testing of TSS Removal Improvements

Project Meetings			
Meeting	**Date**	**Type**	**Participating Agencies**
W1	12/12/2006	Workshop 1	USEPA, SDWQCB, SWRCB, USIBWC, CDM,Veolia,OCSD, San Diego MWWD
1	5/31/2007	Monthly Meeting	USEPA, USIBWC, CDM, Veolia
2A	6/19/2007	Monthly Meeting	USIBWC, CDM, Veolia
2B	7/3/2007	Monthly Meeting	USIBWC, CDM, Veolia
3A	7/26/2007	Monthly Meeting	USIBWC, CDM, Veolia
3B	8/9/2007	Monthly Meeting	USIBWC, CDM, Veolia
4	9/6/2007	Monthly Meeting	CDM, Veolia
5A	10/4/2007	Monthly Meeting	CDM, Veolia
5B	10/11/2007	Monthly Meeting	USIBWC, CDM, Veolia
6	11/16/2007	Monthly Meeting	USIBWC, CDM, Veolia
7	12/19/2007	Monthly Meeting	USIBWC, CDM, Veolia
8	1/31/2008	Monthly Meeting	USIBWC, CDM, Veolia
9A	2/22/2008	Monthly Meeting	USIBWC, CDM, Veolia
9B	3/7/2008	Monthly Meeting	USIBWC, CDM, Veolia
9B	6/27/2008	Informational Meeting	SDWQCB, SWRCB, USIBWC,Veolia, CDM,OCSD, Seccion Mex. CILA, CESPT