OMNI ENVIRONMENTAL LLC

June 30, 2010

VIA USPS

Mr. Richard J. Sheola
Township Administrator/CFO
Township of Long Hill
915 Valley Road
Gillette, New Jersey 07933

RE: CAPACITY ASSURANCE REPORT

Dear Mr. Sheola:

Please find enclosed eight (8) copies of the final Capacity Assurance Report together with one (1) CD containing an electronic file copy of the report. This final report addresses the Township's comments on the draft report and incorporates the previously reviewed Executive Summary.

It has been a pleasure working with the Township to identify the most cost effective alternative to address your present and future wastewater needs. We look forward to continuing this productive relationship as this important project advances to the preliminary design phase.

In the meantime, if you have any questions or need additional information, please contact me at (609) 454-4555 or via email at TBradley@Omni-Env.com.

Sincerely,

Timothy D. Bradley, P.E.
Director – Wastewater Practice

Enclosure
cc: Mario Bonaccorso
2629B

LONG HILL TOWNSHIP WASTEWATER TREATMENT PLANT

CAPACITY ASSURANCE REPORT

FINAL

Submitted To:
TOWNSHIP OF LONG HILL

Prepared By:
OMNI ENVIRONMENTAL LLC

June 30, 2010

LONG HILL TOWNSHIP WASTEWATER TREATMENT PLANT

CAPACTIY ASSURANCE REPORT

<u>FINAL</u>

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EXECUTIVE SUMMARY

Background

The Long Hill Township Wastewater Treatment Plant (WWTP) routinely receives flow in excess of its permitted capacity of 0.9 million gallons per day (mgd). A Process Analysis and Flow Re-Rating Study (Study) was prepared by T&M Associates in 2005 to identify required improvements to accommodate future growth. This Study assumed that a 50% reduction in I&I would occur through implementation of I&I remedial measures, and based on this reduction in flow, concluded that plant upgrade costs between $700,000 and $1.5 million would be required. The cost of achieving a 50% reduction in I&I was not presented.

Recognizing that achieving a 50% reduction in I&I may not be cost-effective, the Township authorized the preparation of this updated study and Capacity Assurance Report to analyze three different I&I reduction scenarios and to develop budgetary capital cost estimates for WWTP and collection system improvements associated with each I&I reduction scenario. The scope of this updated study also included evaluating the impact of complying with expected future effluent limitations.

Existing Facilities

The WWTP was originally constructed in the 1930s, and has undergone major upgrades in 1975, 1984, and 1991. The current facilities provide advanced treatment and consist of an influent pumping system, two (2) static screens, two (2) oxidation ditches, two (2) final clarifiers, four (4) effluent filers, a post aeration system, an ultraviolet disinfection system, and a sludge thickening and storage system.

The sanitary sewer system, which delivers wastewater flow to the WWTP, consists of the following components:

- 286,290 Linear Feet (LF) of Township-owned sanitary sewer mains
- 221,325 LF of privately-owned service lateral pipe
- 1,260 manholes
- 8 pumping stations
- 15,200 LF of force mains

Significant portions of the sanitary sewer system are either in or adjacent to flood plains and wetlands.

Anticipated Effluent Limitations

As a result of the Passaic River Basin Total Maximum Daily Load (TMDL) study, it is expected that NJDEP will impose monthly average Total Phosphorus (TP) limits of 0.76 mg/L for all dischargers to the Passaic River. Reliably achieving this anticipated effluent limit will require capital improvements and will increase O&M costs.

NJDEP has recently begun imposing effluent limitations for nitrate (NO_3) based on the 10 mg/L in-stream water quality standard. The expected effluent limitation was estimated based on available information to be approximately 31 mg/l. Since the WWTP's current effluent NO_3 concentration is approximately 15 mg/L, it is anticipated that capital improvements will not be required to comply with a future effluent limit for NO_3.

Wastewater Characterization

Influent data was obtained for the years 2007, 2008 and 2009 to characterize the key influent parameters relevant to plant capacity. The data was analyzed to determine the average annual, maximum monthly (i.e. highest 30 day average), and maximum daily (i.e. highest 24 hour average) values during each year. The variability in each parameter was characterized by peaking factors, which are calculated as the maximum value divided by the corresponding annual average value. The resulting current wastewater characteristics are summarized in the table below.

Current Wastewater Characteristics

Parameter	Units	Average Annual	Maximum Monthly	MM:AA Peaking Factor	Maximum Daily	MD:AA Peaking Factor	Peak Hourly	MH:AA Peaking Factor
Flow	mgd	1.095	1.75	1.6	3.43	3.1	4.40	4.0
CBOD	mg/l	142	121	-	87	-	-	-
	Lb/d	1,294	1,776	1.4	2,494	1.9	-	-
TSS	mg/l	187	155	-	132	-	-	-
	Lb/d	1,710	2,265	1.3	3,782	2.2	-	-
TP	mg/l	3.5	2.7	-	1.5	-	-	-
	Lb/d	32	39	1.3	44	1.6	-	-
NH_3 – N	mg/l	16	14	-	10	-	-	-
	Lb/d	147	202	1.4	283	1.9	-	-
TKN – N	mg/l	26	22	-	16	-	-	-
	Lb/d	235	323	1.4	453	1.9	-	-

Current Infiltration and Inflow (I&I)

The hourly flow and daily precipitation data from 2009 were analyzed to calculate the existing flow rates of I&I in the sanitary sewer system. I&I consists of Rainfall Dependent I&I (RDII) and Base Infiltration. RDII occurs as a direct result of rainfall while base infiltration is the result of groundwater entering the system. The current annual average flow rate of I&I was estimated to be approximately 0.43 mgd, comprised of 0.25 mgd of base infiltration and 0.18 mgd of RDII. The current peak flow rate of I&I was estimated to be approximately 3 mgd, with RDII accounting for approximately 90%, or 2.7 mgd, of the total peak I&I flow rate.

Plant Performance

The existing plant produces effluent concentrations of $CBOD_5$, TSS, NH_3-N, and TP that are significantly below the corresponding effluent limitations on a monthly average basis. However, these results are based on sampling of most parameters only 3 times per month, and do not reflect the significant difficulties and challenges experienced by the plant during peak wet weather flow events.

Future Flow Scenarios

Future flows have been estimated for three I&I reduction scenarios: (1) no I&I reduction, (2) 25% I&I reduction, and (3) 50% I&I reduction. A summary of the future annual average, maximum monthly, maximum daily and peak hourly flows under each I&I reduction scenario is presented in the table below.

Comparison of Future Flows based on I&I Reduction

Future Flow Condition	No I&I Reduction	25% I&I Reduction	50% I&I Reduction
Annual Average	1.242 mgd	1.128 mgd	1.014 mgd
Maximum Monthly	1.99 mgd	1.69 mgd	1.39 mgd
Maximum Daily	3.89 mgd	3.11 mgd	2.34 mgd
Peak Hourly	4.99 mgd	4.02 mgd	3.05 mgd

Plant Capacity Evaluation

The capacity of each major component of the WWTP was evaluated to determine its adequacy for the three future flow scenarios. The table below presents a summary of plant components with insufficient capacity for future flows under the three I&I reduction scenarios.

Plant Components with Insufficient Capacity for Future Flow Scenarios

No I&I Reduction	25% I&I Reduction	50% I&I Reduction
Influent Pumping System	Influent Pumping System	UV Disinfection System
Influent Screens	UV Disinfection System	
Final Clarifiers		
Effluent Filters		
Post Aeration Blowers		
UV Disinfection System		

System Improvement Alternatives for Future Flows

Capital improvements and budgetary capital cost estimates were developed for three system upgrade alternatives to provide capacity for future growth and development. The three system upgrade alternatives correspond to the three future flow scenarios and thus involve varying combinations of plant improvements and sewer system rehabilitation to reduce I&I. The budgetary capital cost estimates for the three system upgrade scenarios are summarized for comparison in the table below.

Budgetary Capital Cost Comparison

System Upgrade Alternative	Budgetary Capital Cost
No I&I Reduction	$4,140,000
25% I&I Reduction	$8,270,000
50% I&I Reduction	$16,760,000

In addition to the three system upgrade alternatives shown in the table above, following its review of the draft Capacity Assurance Report, the Township suggested that a variation of the No I&I Reduction alternative be considered, in which the WWTP would be upgraded assuming No I&I Reduction, but that a fund with a specific dollar amount be established for ongoing I&I reduction efforts (i.e. an I&I “kicker” fund). The primary benefit of this alternative is that it would help ensure that the current flow rates of I&I do not increase in the future as the system continues to age and deteriorate. The specific dollar amount for the I&I kicker fund would be determined at a future date after the debt service for the plant upgrade project is accurately known.

Plant Improvements for Future TP Effluent Limit

To achieve the anticipated future monthly average TP limit of 0.76 mg/L, a coagulant storage and feed system must be installed. Based on recent experience at a nearby authority, it is estimated that the average coagulant feed rate will be approximately 80 gallons per day, resulting in an annual chemical cost of about $82,000 per year. The addition of a coagulant will also increase sludge production, typically by about 20%. An increase in sludge production of 20% if disposed at the current concentration of about 2.4% would increase sludge disposal costs by about $22,000 per year.

Based on the significant cost of sludge disposal, improvements consisting of a new influent screening system (the existing system dilutes the previously thickened sludge) are recommended to increase the concentration of sludge disposed from 2.4% to approximately 5%, thereby reducing sludge disposal costs by approximately 50%.

The total budgetary cost estimate for improvements to achieve the future TP effluent limit of 0.76 mg/L, and to decrease the cost of sludge disposal by approximately 50%, is approximately $1.2 million.

Conclusions and Recommendations

The key conclusions and recommendations resulting from this study are summarized below.

1. The lowest cost alternative to provide sufficient capacity for future growth is the No I&I Reduction alternative. The budgetary capital cost for this alternative is estimated to be approximately $4.1 million, based on construction of a 1.65 million gallon flow equalization tank and related improvements to temporarily store peak wet weather flows such that peak flow are reduced to the same extent as a 25% reduction in I&I.
2. In addition to being more expensive, the alternatives that rely on sewer rehabilitation to reduce I&I have the disadvantage that specific reductions in I&I are difficult to predict and cannot be guaranteed, due to many factors including the migration of I&I that can occur after a portion of the system is rehabilitated.
3. The budgetary capital cost for improvements to comply with the future effluent limitation for TP, together with improvements to reduce annual sludge disposal

costs by approximately 50%, is estimated to be approximately $1.2 million. The annual chemical cost for TP removal is estimated to be approximately $82,000 per year.

4. Without some level of ongoing I&I reduction activities, it is likely that the flow rate of I&I will increase in the future as the wastewater collection system continues to age and deteriorate. Therefore, the recommended alternative is the No I&I Reduction with I&I "kicker" fund alternative. As previously indicated, the dollar amount for the I&I kicker fund should be established at a future date after the debt service for the plant upgrade project is accurately known.
5. It is recommended that the Township proceed with preliminary design of the recommended alternative. The objective of preliminary design is to advance the design to approximately the 30% completion point to facilitate consensus building on the detailed basis for design before proceeding with the preparation of bid-ready contract drawings and specifications. During preliminary design, several different locations to install the flow equalization tank and Phosphorus Control Building, as well as several different types of influent screening systems, influent flow equalization mixing systems and UV disinfection system would be evaluated in detail. Alternative coagulants should also be evaluated.

1.0 INTRODUCTION

The Long Hill Township Wastewater Treatment Plant (WWTP), located on South Warren Avenue in Long Hill Township, has a permitted capacity of 0.9 million gallons per day (mgd). In 2009, the average flow to the WWTP was 1.02 mgd, which is approximately 113% of the permitted capacity. The average flows during 2007 and 2008 were 0.97 and 1.14 mgd, respectively, and thus also above the permitted capacity.

During this three year period, the WWTP achieved compliance with its permit limits. Therefore, it has successfully treated average flows greater than it was designed to treat. However, storm events result in significant increases in flow attributable to infiltration and inflow (I&I), to the extent that the hydraulic capacity of the plant is pushed to its limit. Therefore, at the present time the plant cannot handle increases in average flow as the corresponding increase in wet weather flow would cause the plant's hydraulic capacity to be exceeded.

In recognition of the need for additional capacity to allow for future development and redevelopment, the Township retained T&M Associates in 2005 to perform a Process Analysis and Flow Re-Rating Study (Study). This Study assumed that a 50% reduction in I&I would occur through implementation of I&I remedial measures and that the resulting build-out average and peak flow would be 1.25 mgd and 3.12 mgd, respectively. Based on these assumptions, the study evaluated the existing plant to identify improvements needed to achieve an average and peak flow capacity of 1.25 mgd and 3.12 mgd, respectively. It concluded that $700,000 in Basic Equipment Modifications was needed, and that approximately $800,000 in Additional Items may be needed to comply with certain New Jersey Department of Environmental Protection (NJDEP) requirements, resulting in a total plant upgrade cost between $700,000 and $1.5 million. The cost of achieving a 50% reduction in I&I was not presented.

Following the 2005 Study, the WWTP has pursued a number of activities to identify the sources of I&I and to begin implementing I&I reduction measures, including:

- Smoke testing that indicated there may be cross connections between the storm sewer system and sanitary sewer system in 5 or 6 locations.
- Installation of water-tight manhole cover inserts in approximately 25% of the collection system.
- Dye testing to quantify extent of cross connection in the sewer system (planned).

- Flow monitoring to identify areas of significant I&I (planned).

The Township desires to update the 2005 Study due to the following:

- The assumed 50% reduction in I&I may not be technically achievable or cost effective. For example, while it may be cost effective to remedy major defects in a collection system, such as cross connections between storm and sanitary sewer systems, as well as to implement relative low cost improvements such as the installation of water-tight manhole covers in low-lying areas prone to flooding, it may not be cost effective to remedy hundreds or thousands of minor defects that individually contribute a small amount of I&I but collectively result in significant I&I. In such cases, it may be more cost effective to convey and treat the I&I.

- NJDEP regulations/policies have changed since the 2005 study, specifically with regard to two (2) key parameters: Total Phosphorus (TP) and Nitrate-Nitrogen (NO_3). As a result, the study needs to be updated to consider the impact of achieving compliance with the expected future effluent limitations for these parameters.

- Wastewater flow characteristics may have changed since 2005 and should be updated based on current data.

This Capacity Assurance Report has been prepared to address the above issues by:

- Analyzing three different I&I reduction scenarios; no significant reduction, 25% reduction and 50% reduction.
- Developing budgetary capital cost estimates for WWTP and collection system improvements associated with each I&I reduction scenario, so that the most cost effective approach to providing capacity for future growth can be established.
- Evaluating the impact of complying with expected future effluent limitations for TP and NO_3 for each I&I reduction scenario.
- Evaluating the last 3 years of plant data to assess the current wastewater characteristics and their variability.

2.0 EXISTING FACILITIES

The Long Hill WWTP was originally constructed in the 1930s, and has undergone major updates in 1975, 1984, and 1991. The current facilities provide advanced treatment and consist of an influent pumping system, two (2) static screens, two (2) oxidation ditches, two (2) final clarifiers, four (4) effluent filers of the upflow continuous backwash type, a post aeration system, an ultraviolet disinfection system, and a sludge thickening and storage system. The principal treatment facility components are summarized in Table 1.

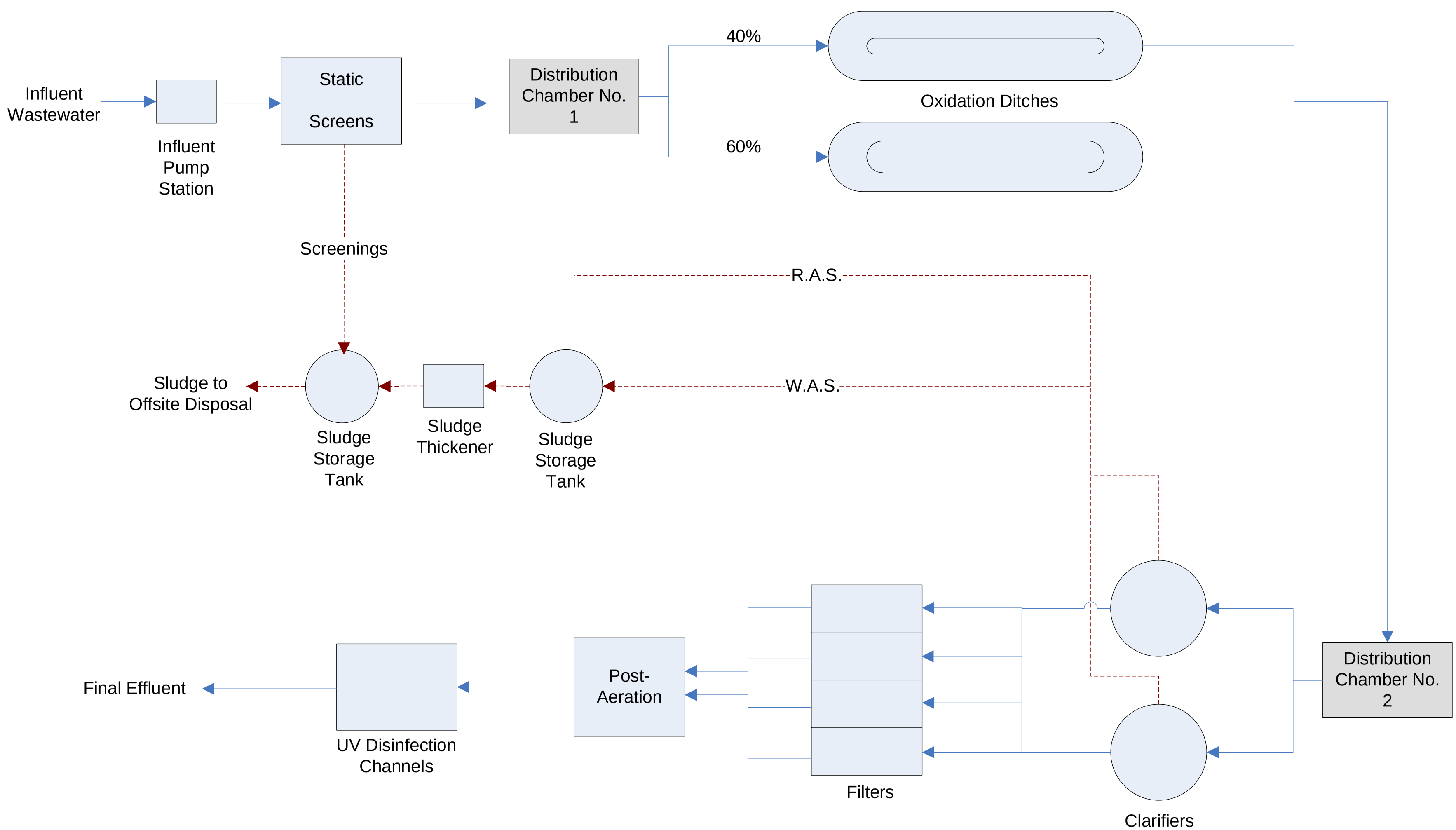
Table 1: Existing Facilities

Unit Process	Component	# of Units	Description
Headworks	Influent Pump Station	1	25-foot deep well with submersible pumps that lift influent 40 feet to static screens.
	Influent Submersible Pumps	4	Varying capacity at 15 hp, 20 hp, and 44 hp.
	Static Screens	2	HS-72BB Hydroscreen back-to-back modules located above Sludge Storage Tank No. 1.
Oxidation Ditches	Distribution Chamber #1	1	Concrete box with wood baffle, (2) aluminum slide gates, and (2) 16" outlet pipes.
	Oxidation Ditch #1	1	Tank volume is approximately 293,000 gallons with dimensions 174'L x 14'W x 12' SWD. (2) 14'L Lakeside brush aerators supply oxygen at a rate of 6.6 lbs O_2/hr/ft of rotator length.
	Oxidation Ditch #2	1	Tank volume is approximately 614,000 gallons with dimensions 165'L x 45'W x 12' SWD. (2) 21' L Envirodyne brush aerators provide oxygen at a rate of 5.85 lbs O_2/hr/ft of rotator length.
Secondary Clarifiers	Distribution Chamber #2	1	Concrete distribution box with (2) 16" outlet pipes.
	Clarifiers	2	50' diameter half bridge clarifiers, with a SWD of 11'8" and a surface area of 3,927 sq. ft each.
	Return Activated Sludge Pumps	4	10 hp RAS pumps with variable frequency drives; each rated for 425 gpm (0.61 mgd) at 25' of head.
	Waste Activated Sludge Pumps	2	WAS pumps are each rated for 470 gpm (0.68 mgd) at 12'of head.
Filters	Continuous Backwash Sand Filters	4	Parkson Dynasand continuous backwash filters; each unit has a filtration area of 150 ft^2.
Post-Aeration	Aeration Tank	1	Concrete tank with two (2) 220 cfm air blowers and 28 coarse bubble diffusers spaced at 2' intervals.
Disinfection	Ultraviolet Disinfection System	1	Fischer & Porter open channel in-line UV disinfection system with 40 modules and 4 lamps per module.
Sludge Handling	Sludge Storage Facilities	2	(2) 25' diameter aerated, concrete tanks with 27' SWD. Total useable storage volume approximately 150,000 gallons. Mechanical thickener located in Digester Building between tanks.

A Site Plan and Flow Schematic are presented in Figures 1 and 2, respectively and show the physical arrangement of treatment facilities and how wastewater flows through the plant.

As shown in Figure 2, after influent wastewater is screened, Flow Distribution Chamber #1 splits the flow between the two oxidation ditches. Similarly, Flow Distribution Box #2 splits the effluent from the oxidation ditches between the two final clarifiers. Final clarifier effluent is then combined prior to further treatment in the sand filters, post aeration tank and ultraviolet disinfection channels prior to being discharged to the Passaic River.

Figure 2. Existing Flow Schematic
Long Hill Township WWTP



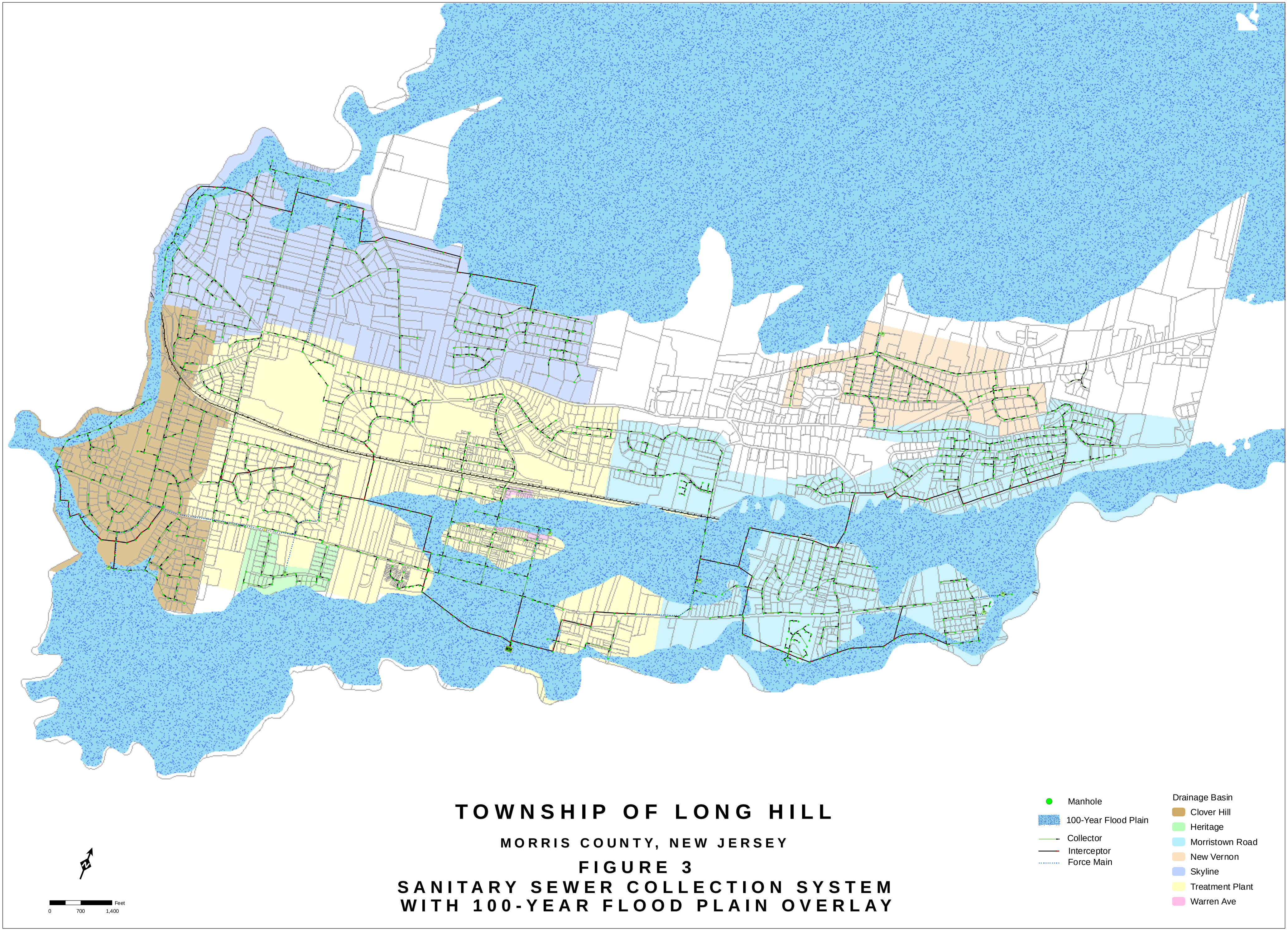
Long Hill Township's sanitary sewer collection system, which delivers wastewater flow to the WWTP, consists of the following components:

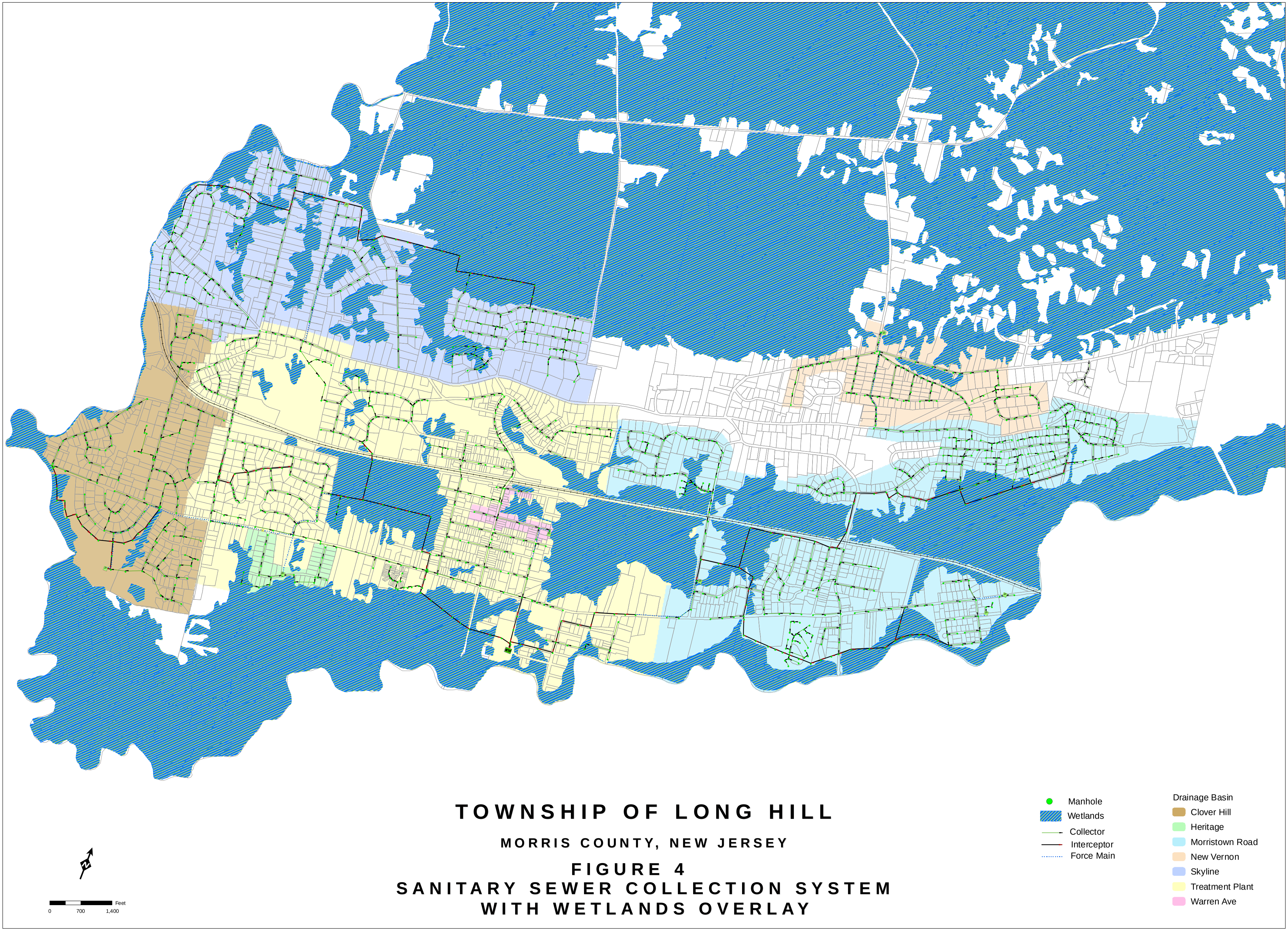
- 286,290 Linear Feet (LF) of Township-owned sanitary sewers:
  - 14,700 LF of 14-inch diameter pipe
  - 8,850 LF of 12-inch diameter pipe
  - 29,440 LF of 10-inch diameter pipe
  - 232,300 LF of 8-inch diameter pipe
- 221,325 LF of privately-owned service lateral pipe
- 1,260 manholes
- 8 pumping stations
- 15,200 LF of force mains

A portion of the system dates to the 1930's and 1940's, which coincided with the date of the original wastewater treatment plant. Significant additions to the collection system occurred in the 1970's, coinciding with the construction-grants era and upgrades to the original WWTP.

Based on discussions with Township personnel, the 8—inch pipe is predominately vitrified clay pipe (VCP) and the larger diameter pipe is predominately asbestos cement pipe (ACP).

A map of the sanitary sewer collection system with 100-year flood plains is presented in Figure 3. A map of the sanitary sewer collection system with wetlands is presented in Figure 4. As indicated, significant portions of the sanitary sewer system are either in or adjacent to flood plains and wetlands.


TOWNSHIP OF LONG HILL
MORRIS COUNTY, NEW JERSEY
FIGURE 3
SANITARY SEWER COLLECTION SYSTEM
WITH 100-YEAR FLOOD PLAIN OVERLAY
Manhole
100-Year Flood Plain
Collector
Interceptor
Force Main
Drainage Basin
Clover Hill
Heritage
Morristown Road
New Vernon
Skyline
Treatment Plant
Warren Ave
Feet
0
700
1,400


Manhole
Wetlands
Collector
Interceptor
Force Main
Drainage Basin
Clover Hill
Heritage
Morristown Road
New Vernon
Skyline
Treatment Plant
Warren Ave
0
700
1,400
Feet
TOWNSHIP OF LONG HILL
MORRIS COUNTY, NEW JERSEY
FIGURE 4
SANITARY SEWER COLLECTION SYSTEM
WITH WETLANDS OVERLAY

3.0 CURRENT AND ANTICIPATED FUTURE EFLUENT LIMITATIONS

The Long Hill WWTP NJPDES Permit (NJ0024465) has an effective date of February 1, 2006, an expiration date of January 31, 2011, and is included in Appendix D for reference. Table 2 summarizes the current key effluent limitations related to plant capacity.

Table 2: Long Hill Township WWTP Current Key Effluent Limitations

Parameter	**Average Month**		**Maximum Weekly**	
Carbonaceous BOD	8 mg/L	27 kg/day	12 mg/L	41 kg/day
TSS	30 mg/L	100 kg/day	45 mg/L	150 kg/day
NH_3-N (May through Oct.)	2 mg/L	6.8 kg/day	3mg/L	10.2 kg/day
NH_3-N (Nov. through April)	34.2 mg/L	116 kg/day	N/A	N/A
Total Phosphorus (May through Oct.)	4.4 mg/L	N/A	N/A	N/A
Total Phosphorus (Nov. through April)	3.7 mg/L	N/A	N/A	N/A
Fecal Coliform	200 col/100 ml	N/A	400 col/100 ml	
Chlorine Produced Oxidants	0.1 mg/L daily maximum		0.1 kg/day daily maximum	
Dissolved Oxygen	6.0 mg/L weekly minimum			
pH	6.0 minimum, 9.0 maximum			

With regard to anticipated future effluent limitations, as a result of the Passaic River Basin Total Maximum Daily Load (TMDL), the long term average total phosphorus (TP) concentration limits for the Passaic River basin dischargers has been determined to be 0.4 mg/L. It is widely anticipated that in order to achieve a long term average effluent concentration of 0.4 mg/L, NJDEP will impose monthly average limits of 0.76 mg/L for all dischargers to the Passaic River, including the Township of Long Hill. Therefore, for purposes of this study, it will be assumed that Long Hill Township's current effluent limitations for Total Phosphorus (TP), as presented in table 2, will be reduced in the future to 0.76 mg/L, most likely upon renewal of the existing NJPDES Permit. Reliably achieving this effluent limit will require capital improvements, as further described in Section 9.

NJDEP has recently begun imposing effluent limitations for nitrate nitrogen based on the 10 mg/L in-stream water quality standard for nitrate nitrogen (NO_3). The expected effluent limitation would be calculated using a simple mass balance model. Based on the current average effluent flow of 1.095 mgd (or 1.69 cfs), an upstream river low flow of 4 cfs (cubic feet per second), and an upstream TP concentration of 1 mg/l, the calculated effluent limit is 31.3 mg/l. Therefore, for purposes of this study, it will be assumed that in the future a NO_3 limit of approximately 31 mg/L will be established. However, since the WWTP's current effluent NO_3 concentration is approximately 15 mg/L, it is anticipated that capital improvements will not be required to comply with this future effluent limit.

4.0 WASTEWATER CHARACTERIZATION

Influent data was obtained from Discharge Monitoring Reports (DMRs) for the years 2007, 2008 and 2009 to characterize the key influent parameters relevant to plant capacity, which are flow, Carbonaceous Biochemical Oxygen Demand (CBOD), Total Suspended Solids (TSS) and Total Phosphorus (TP). Influent ammonia nitrogen (NH_3) and influent Total Kjeldahl Nitrogen (TKN) data are not available, as the NJPDES Permit does not require that the influent wastewater be analyzed for these parameters.

The data was analyzed to determine the average annual, maximum monthly (i.e. highest 30 day average), and maximum daily (i.e. highest 24 hour average) values during each year. The variability in each parameter was characterized by peaking factors, which are calculated as the maximum value divided by the corresponding annual average value.

Table 3 on the following page summarizes the resulting wastewater characterization data during the years 2007, 2008 and 2009, as well as the average for the 3 year period.

Although not reported on the DMRs, the influent peak hourly flow is also a key influent parameter, since it directly impacts the required hydraulic capacity of a wastewater treatment system. To evaluate the peak hourly flow in 2009, hourly data from the plant flow meter was reviewed. The peak hourly flow in 2009 was 3.9 mgd, and occurred on May 7th during a storm that produced approximately 3.2" of rain over five days. This depth of rainfall is between 1- and 2-year frequency 24-hour events for Morris County, New Jersey. Larger rainfall events were also observed during 2007 and 2008; however, since the flow recorder "pegs" at approximately 3.9 mgd, the peak hourly flow associated with larger storm events is not accurately known.

Based on a peak hourly flow of 3.9 mgd in 2009 and a corresponding annual average flow of 1.06 mgd, the resulting peaking factor is 3.67. Based on the uncertainty associated with a flow recorder that pegs at 3.9 mgd, combined with the fact that the storm in 2009 that resulted in a peak flow of 3.9 mgd was relatively modest, it is recommended that a 10% safety factor be applied to the 3.67 peaking factor, resulting in a peaking factor of 4.0.

Table 3: DMR Wastewater Characterization Data Summary 2007, 2008 and 2009

Year	DMR Parameter Description abbrv.	Calculation Type	Average Annual	Maximum Monthly	MM:AA Peaking Factor	Maximum Daily	MD:AA Peaking Factor
2007	Flow, In Conduit or Thru Treatment Plant	Flow (mgd)	0.97	1.60	1.7	2.90	3.0
	BOD, Carbonaceous 5 Day, 20oC	Concentration (mg/L)	175	309	1.8	462	2.6
		Load (kg/d)	566	777	1.4	1,114	2.0
	Solids, Total Suspended	Concentration (mg/L)	264	373	1.4	544	2.1
		Load (kg/d)	858	1,071	1.2	2,241	2.6
	Phosphorus, Total (as P)	Concentration (mg/L)	4.5	6.3	1.4	7.5	1.7
		Load (kg/d)	14.5	20.5	1.4	26.6	1.8
2008	Flow, In Conduit or Thru Treatment Plant	Flow (mgd)	1.14	1.89	1.7	3.90	3.4
	BOD, Carbonaceous 5 Day, 20oC	Concentration (mg/L)	165	224	1.4	285	1.7
		Load (kg/d)	599	724	1.2	977	1.6
	Solids, Total Suspended	Concentration (mg/L)	210	287	1.4	376	1.8
		Load (kg/d)	782	1,091	1.4	1,567	2.0
	Phosphorus, Total (as P)	Concentration (mg/L)	4.3	5.8	1.4	6.9	1.6
		Load (kg/d)	15.3	18.8	1.2	21.8	1.4
2009	Flow, In Conduit or Thru Treatment Plant	Flow (mgd)	1.07	1.60	1.5	3.20	3.0
	BOD, Carbonaceous 5 Day, 20oC	Concentration (mg/L)	145	196	1.4	290	2.0
		Load (kg/d)	541	830	1.5	1,181	2.2
	Solids, Total Suspended	Concentration (mg/L)	165	194	1.2	304	1.8
		Load (kg/d)	615	817	1.3	1,240	2.0
	Phosphorus, Total (as P)	Concentration (mg/L)	4.0	4.9	1.2	5.6	1.4
		Load (kg/d)	14.5	17.8	1.2	20.1	1.4
Overall Average	Flow, In Conduit or Thru Treatment Plant	Flow (mgd)	1.06	1.70	1.6	3.33	3.1
	BOD, Carbonaceous 5 Day, 20oC	Concentration (mg/L)	162	243	1.5	346	2.1
		Load (kg/d)	568	777	1.4	1,090	1.9
	Solids, Total Suspended	Concentration (mg/L)	213	285	1.3	408	1.9
		Load (kg/d)	751	993	1.3	1,683	2.2
	Phosphorus, Total (as P)	Concentration (mg/L)	4.2	5.7	1.3	6.7	1.6
		Load (kg/d)	14.8	19.0	1.3	22.8	1.6

Note: 2009 values include December data from 2007 instead of December 2009 because of a flow meter error during December 2009. The rainfall totals in December 2007 and 2009 were similar.

To establish the current wastewater characteristics for use in this Study, the overall annual average flow of 1.06 mgd presented in Table 3 was adjusted slightly to match the 1.095 mgd current annual average flow provided by Long Hill Township to Morris County for use in the Morris County Wastewater Management Plan. The corresponding maximum monthly, maximum daily and peak hourly flows were calculated utilizing the peaking factors presented in

Table 3. The CBOD, TSS, and TP concentration were held constant, and the corresponding loads were calculated based on the adjusted flows.

As previously indicated, the plant's NJPDES Permit does not require the reporting of the influent concentration of either NH_3 or TKN. Therefore, current concentration of these parameters was estimated based on their typical correlation with influent CBOD (8.8 CBOD:1 NH-3 , 5.5 CBOD:1 TKN).

The resulting Current Wastewater Characteristics are presented in Table 4.

Table 4: Current Wastewater Characteristics

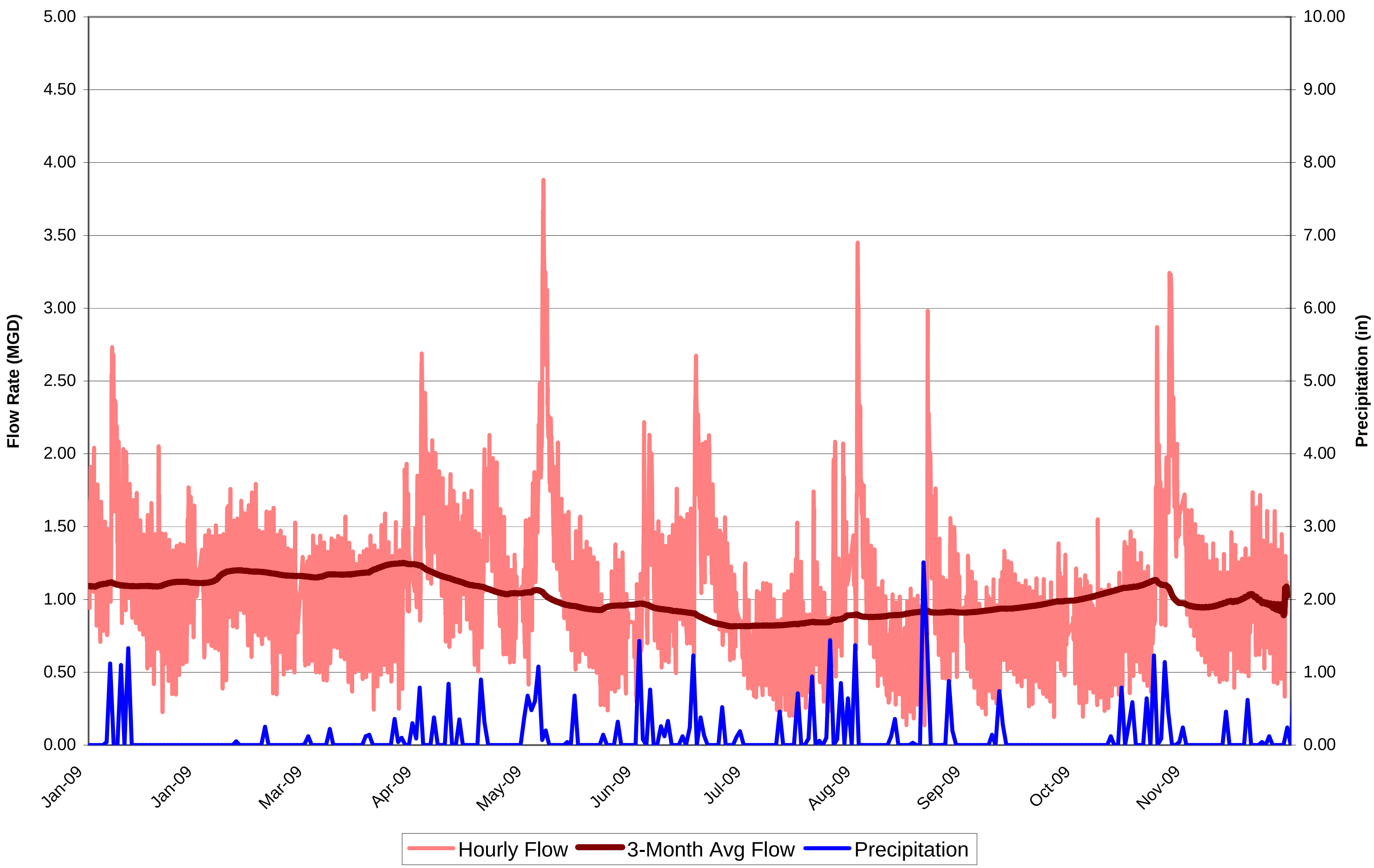
Parameter	Units	Average Annual	Maximum Monthly	MM:AA Peaking Factor	Maximum Daily	MD:AA Peaking Factor	Peak Hourly	MH:AA Peaking Factor
Flow	mgd	1.095	1.75	1.6	3.43	3.1	4.40	4.0
CBOD	mg/l	142	121	-	87	-	-	-
	lb/d	1,294	1,776	1.4	2,494	1.9	-	-
TSS	mg/l	187	155	-	132	-	-	-
	lb/d	1,710	2,265	1.3	3,782	2.2	-	-
TP	mg/l	3.5	2.7	-	1.5	-	-	-
	lb/d	32	39	1.3	44	1.6	-	-
NH_3 – N	mg/l	16	14	-	10	-	-	-
	lb/d	147	202	1.4	283	1.9	-	-
TKN – N	mg/l	26	22	-	16	-	-	-
	lb/d	235	323	1.4	453	1.9	-	-

The concentrations presented are equivalent to the load divided by the flow and do not represent the concentration reported in the DMRs. Concentration and loads are not presented for the peak hourly flow, since the peak hourly flow is only used for hydraulic capacity assessment.

5.0 CURRENT INFILTRATION AND INFLOW

The hourly flows and daily precipitation data from 2009 were analyzed to calculate the existing flow rates of I&I in the Long Hill WWTP sewer system. The hourly flows and daily precipitation are shown in Figure 5. The flow data presented for December is the flow data from December 2007, as a meter malfunction occurred in December 2009. The 2007 data was chosen because the average and peak precipitation observed in December 2009 was very similar to December 2007, and thus would be expected to result in similar wastewater flows.

Figure 5. Long Hill WWTP - 2009 Hourly Flows and Daily Precipitation



To evaluate the current I&I, the flow data was first divided into dry-day flows and wet-day flows. A dry-day was defined as a day in which there was no rainfall and which the five (5) prior days had rainfall amounts less than shown below:

Prior Days	Rainfall (in)
1 day	0.1
3 days	0.4
5 days	1.0

A wet day was any day that did not meet the criteria for a dry-day. The resulting dry day average flows and wet-day average flows during each month in 2009 are presented in Table 5.

Table 5: 2009 Dry-Day and Wet-Day Monthly Average Flows

	Average Flow (mgd)	
Month	Dry-Day	Wet-Day
January	1.11	1.42
February	1.07	1.10
March	0.93	1.00
April	1.01	1.42
May	0.85	1.38
June	0.95	1.23
July	0.61	0.82
August	0.58	1.06
September	0.72	0.79
October	0.71	1.22
November	0.90	1.03
December*	1.22	1.75
Annual Average	0.89	1.18

* December data from 2007 because of a flow meter error during December 2009.

The difference between dry-day average flow and wet-day average flow is the I&I associated with rainfall. The term for this component of I&I is "Rainfall Dependent Infiltration and Inflow" or "RDII".

The total I&I in the system is comprised of two components: RDII and Base Infiltration. Base infiltration is the result of groundwater, rather than rainwater, entering the system. Base infiltration varies from month to month due to seasonal changes in groundwater levels. The lowest dry-day flows are observed during the summer months of July, August, and September when groundwater levels and thus base infiltration are the lowest.

Based on the information presented in Table 5, the summer average dry-day flow in 2009 was equal to 0.64 mgd. Since dry days are not influenced by RDII and summer months have the lowest groundwater levels, the summer average dry-day flow is representative of wastewater flow to the WWTP not impacted by I&I. Based on a current population of 8,777 and a wastewater flow of 0.64 mgd, the resulting wastewater flow per capita is 73 gal/day, which is well within the expected literature range for domestic wastewater flows exclusive of I&I. Therefore, Long Hill Township's current average wastewater flow, exclusive of I&I is estimated to be 0.64 mgd.

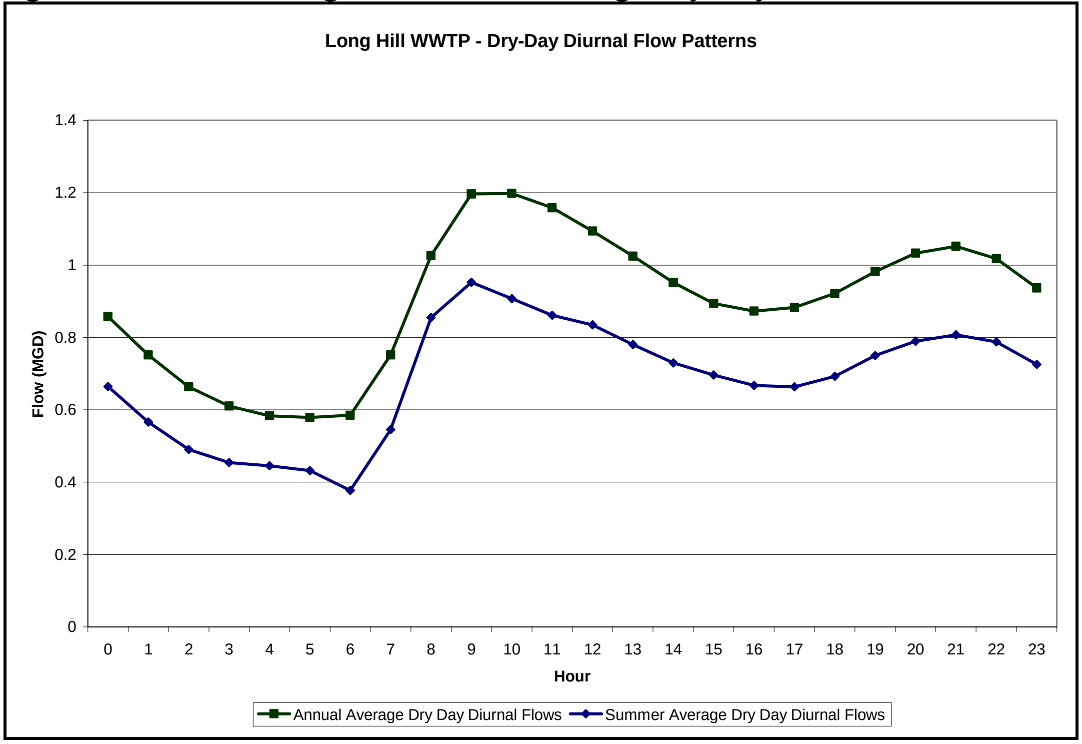
As also shown in Table 5, the average dry-day flow in 2009 was 0.89 mgd. The difference between the annual average dry-day flow of 0.88 mgd and the wastewater flow without I&I of 0.64 mgd, represents the annual average base infiltration rate, which in 2009 was 0.25 mgd (0.89 – 0.64 = 0.25). Flow rates vary on an hourly basis throughout the day. The hourly variation of flow during a 24 hour period is referred to the diurnal flow patter. Figure 6 shows the diurnal flow pattern on a summer dry-day (i.e. not influenced by I&I) as well as the diurnal flow pattern on an annual average dry-day (i.e. influenced by the annual average base infiltration).

In addition to the annual average base infiltration rate of 0.24 mgd, significant RDII also enters the system. As previously indicated, RDII is the extraneous flow that enters a sewer system during and after a rain storm. On a monthly average basis, RDII is equal to the monthly average wet day flow minus the corresponding monthly average dry-day flow.

Table 6 on the following page summarizes the average RDII and Base Infiltration during each month of 2009, as well as the annual average.

As shown in Table 7, on an annual average basis, the 1.07 mgd total flow to the WWTP consisted of 0.64 mgd of wastewater, 0.25 mgd of base infiltration and 0.18 mgd of RDII. Thus, the sum of base infiltration (0.25 mgd) and RDII (0.18 mgd) in 2009 was approximately 40% of the total flow to the WWTP. In addition, approximately 60% of the total I&I was base infiltration, while 40% was RDII.

Figure 6: Annual Average vs. Summer Average Dry-Day Diurnal Flow Patterns



* Note: Average hourly values do not include December data because of a flow meter error

Table 6: 2009 Monthly Average Wastewater Flow, Base Infiltration and RDII (mgd)

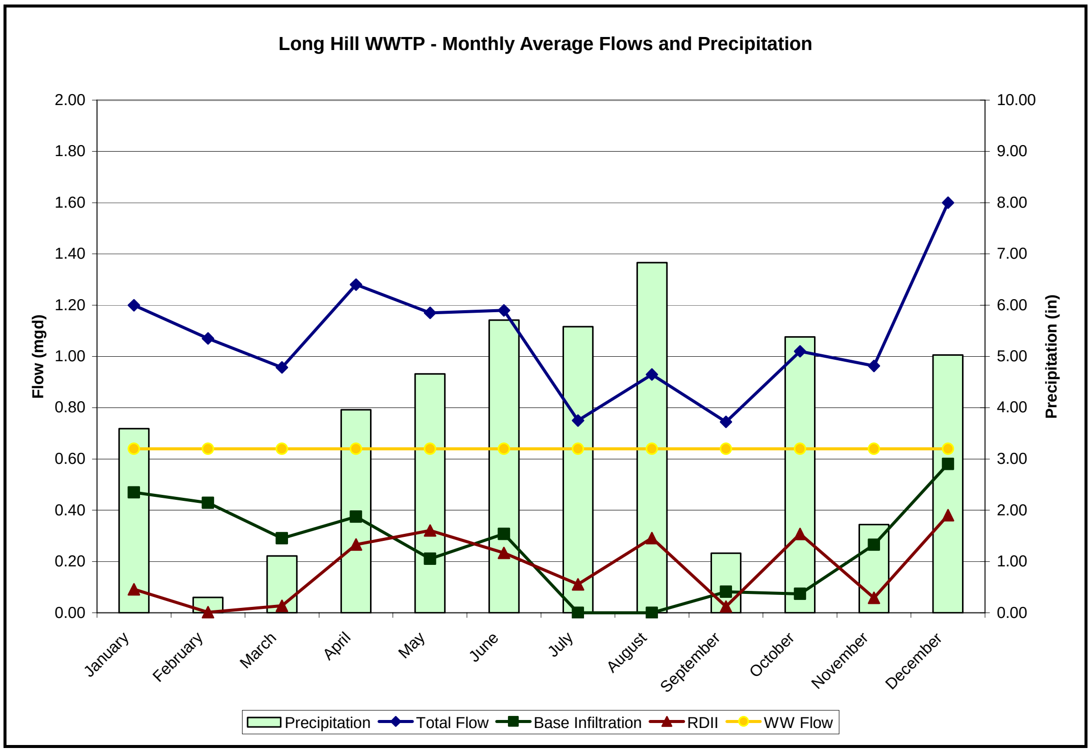
Month	WW Flow	Base Infiltration	RDII	Total
January	0.64	0.47	0.09	1.20
February	0.64	0.43	0.00	1.07
March	0.64	0.29	0.03	0.96
April	0.64	0.37	0.27	1.28
May	0.64	0.21	0.32	1.17
June	0.64	0.31	0.23	1.18
July	0.64	0.00	0.11	0.75
August	0.64	0.00	0.29	0.93
September	0.64	0.08	0.02	0.75
October	0.64	0.07	0.31	1.02
November	0.64	0.27	0.06	0.96
December*	0.64	0.58	0.38	1.60
Average	0.64	0.25	0.18	1.07

Note: December data from 2007 because of a flow meter error during December 2009.

Table 7: I&I Components of Annual Average Flows

Flow Type	Flow Rate (mgd)
Summer Average Dry-Day Flow	0.64
Annual Average Base Infiltration Rate	0.25
Annual Average RDII	0.18
Total Annual Average Flow	1.07

Figure 7 below shows the variation during each month of 2009 in total precipitation, monthly average total plant flow, monthly average base infiltration and monthly average RDII.



* Note: December data from 2007 because of a flow meter error during December 2009.

Figure 7: Breakdown of Monthly Average Flows and Precipitation

As shown in Table 6, Table 7 and Figure 7, on an average annual and monthly average basis, base infiltration contributes more extraneous flow to the sewer system than does RDII. However, this is not the case during peak flow events, as further discussed below.

The highest peak flow during 2009 occurred on May 7th. This event was a result of prolonged rainfall which resulted in 3.2" over a 5-day period. This total rainfall is between 1- and 2-year frequency 24-hour events for Morris County, New Jersey. The maximum day (i.e. maximum 24 hour average flow) flow for this event was 3.2 mgd, while the peak hour flow was 3.9 mgd. The base infiltration and RDII components of these maximum day and peak hourly flows are estimated as follows.

The base infiltration rate during the maximum day and peak hourly flows was estimated by subtracting the summer average dry-day flow (0.64 mgd) from the May 2009 average dry-day flow (0.85 mgd), resulting in a base infiltration rate of 0.21 mgd. The RDII component of maximum day flow was estimated by subtracting the summer average dry-day flow (0.64 mgd) and base infiltration (0.21 mgd) from the total maximum day flow (3.2 mgd), resulting in a maximum day RDII flow of 2.35 mgd. The RDII component of peak hourly flow was estimated by first observing that the peak hourly flow occurred at approximately 9 AM, and using the summer average diurnal flow curve in Figure 4 to determine that the summer average dry-day flow at 9am is approximately 0.96 mgd. The RDII flow was then calculated by subtracting this flow (0.96 mgd) and base infiltration (0.21 mgd) from the peak hourly flow of 3.9 mgd, resulting in a peak hourly RDII flow of 2.74 mgd. This information is summarized in Table 8

Table 8: I&I Components of Peak Flow

Flow Type	Maximum Day (mgd)	Peak Hour (mgd)
Summer Average Dry-Day Flow	0.64	0.96
May Base Infiltration Rate	0.21	0.21
Peak Event RDII	2.35	2.73
Total Peak Event Flow	3.20	3.90

Therefore, based on the information presented in Table 8, the RDII component of maximum day and peak hourly flows is much more significant than base infiltration, accounting for approximately 90% of the total I&I during these events.

6.0 PLANT PERFORMANCE

Existing plant performance was characterized by the effluent concentration and removal efficiency of the key parameters utilized for plant design, i.e. $CBOD_5$, TSS, NH_3-N and TP. From 2007 to 2009, the average annual effluent $CBOD_5$, TSS, NH_3-N, and TP concentrations were 2.3 mg/L, 1.5 mg/L, 0.4 mg/L, and 2.5 mg/l, respectively. The corresponding $CBOD_5$, TSS, NH_3-N, and TP removal efficiencies were 98.6%, 99.3%, 97.8%, and 40.7%, respectively. The data was also analyzed for the maximum monthly average, and maximum daily average concentrations, as presented in Table 9

Table 9: 2007-2009 Effluent Concentrations

Year	DMR Parameter Description abbrv.	Average Annual	Percent Removal	Maximum Monthly	Maximum Daily
2007	BOD, Carbonaceous 5 Day, 20oC	2.4	98.7%	5.0	10.0
	Solids, Total Suspended	2.0	99.2%	6.0	10.0
	Nitrogen, Ammonia Total (as N)**	1.0	94.8%	6.3	12.3
	Phosphorus, Total (as P)	2.7	40.1%	3.9	4.2
2008	BOD, Carbonaceous 5 Day, 20oC	2.2	98.6%	3.0	5.0
	Solids, Total Suspended	1.4	99.3%	4.0	5.0
	Nitrogen, Ammonia Total (as N)	0.1	99.3%	0.4	0.8
	Phosphorus, Total (as P)	2.5	40.8%	4.0	4.4
2009*	BOD, Carbonaceous 5 Day, 20oC	2.2	98.5%	4.7	6.0
	Solids, Total Suspended	1.2	99.3%	2.2	3.0
	Nitrogen, Ammonia Total (as N)	0.1	99.3%	0.3	0.9
	Phosphorus, Total (as P)	2.3	41.1%	3.4	3.5
Average	BOD, Carbonaceous 5 Day, 20oC	2.3	98.6%	4.22	7.00
	Solids, Total Suspended	1.5	99.3%	4.06	6.00
	Nitrogen, Ammonia Total (as N)	0.4	97.8%	2.34	4.66
	Phosphorus, Total (as P)	2.5	40.7%	3.8	4.0

* Note: 2009 values include December data from 2007 because of a flow meter error during December 2009.
** Note: Ammonia percent removal data based on estimated influent concentrations correlated with CBOD.

Based on a comparison of the key effluent limitations presented in Table 2 versus the effluent concentrations presented in Table 9, the existing plant produces effluent concentrations of $CBOD_5$, TSS, NH_3-N, and TP that are significantly below the corresponding effluent limitations. In addition and as previously indicated, the NO_3 effluent concentration in 2009 average 14.7 mg/l, which is much less than the anticipated future effluent limit of approximately 31 mg/L. Therefore, plant upgrades will not be required to achieve the anticipated future NO_3 limit. However, plant upgrades will be required to achieve the expected future TP limit of 0.76 mg/L

7.0 FUTURE FLOW SCENARIOS

Future flows have been estimated for three I&I reduction scenarios: 1) no I&I reduction, 2) 25% I&I reduction, and 3) 50% I&I reduction. The three scenarios are based on the assumption that both base infiltration and RDII are reduced by the same percentage.

7.1 No I&I Reduction

The build-out future average flow was established for the Long Hill Township WWTP in the Interim Draft Wastewater Management Plan (WMP) for Morris County. The WMP specified an existing actual average flow of 1.095 MGD and build-out average flow of 1.242 MGD. Therefore, the projected increase in wastewater flow is 0.147 mgd. The future flows and loads with no I&I reduction were predicted by applying the existing concentrations and peaking factors in Table 4 to the Township's estimated build-out average flow of 1.242 mgd. The resulting future flows and loads are presented in Table 10.

Table 10: Future Flows and Loads without I&I Reduction

Parameter	Units	Average Annual	Maximum Monthly	MM:AA Peaking Factor	Maximum Daily	MD:AA Peaking Factor	Maximum Hourly	MH:AA Peaking Factor
Flow	Mgd	1.242	1.99	1.6	3.89	3.1	4.99	4.0
CBOD	mg/l	142	138	-	87	-	-	-
	lb/d	1,467	2,014	1.4	2,829	1.9	-	-
TSS	mg/l	187	155	-	132	-	-	-
	lb/d	1,940	2,569	1.3	4,290	2.2	-	-
TP	mg/l	3.5	2.7	-	1.7	-	-	-
	lb/d	36	47	1.3	56	1.6	-	-
NH_3 – N	mg/l	16	14	-	9.9	-	-	-
	lb/d	167	229	1.4	321	1.9	-	-
TKN – N	mg/l	26	22	-	15.8	-	-	-
	lb/d	267	366	1.4	514	1.9	-	-

7.2 25% & 50% I&I Reduction

The 25% & 50% I&I reduction scenarios were based on reductions to the total I&I (both base infiltration and RDII). For the annual average, maximum monthly, and maximum daily conditions, the total I&I was calculated as the difference between the total flow and the summer dry-day average flow. Because these are future conditions, the 0.147 mgd increase for build-out conditions was added to the current summer dry-day average flow of 0.64 mgd to yield a future summer dry day average flow of 0.79 mgd. The future summer dry-day flow of 0.79 mgd was then subtracted from the future annual average, maximum monthly and maximum daily flows to estimate the total I&I for the average annual, maximum monthly, and maximum daily flow conditions as 0.46, 1.20, and 3.10 mgd, respectively.

For the peak hourly condition, the total I&I was calculated as the difference between the total flow and the summer dry-day average flow at 9 AM. The 0.147 mgd increase for build-out conditions was added to the current summer dry-day average flow at 9 AM of 0.96 to yield 1.11 mgd. Therefore, the total I&I for the peak hourly flow condition is 3.88 mgd. A summary of the total I&I for the future flow conditions are shown in Table 11, along with the resulting reductions for the 25% and 50% scenarios.

Table 11: Total I&I and Reductions for Future Flow Scenarios

Flow Condition	Total I&I (mgd)	25% Flow Reduction (mgd)	50% Flow Reduction (mgd)
Average Annual	0.46	0.12	0.23
Maximum Monthly	1.20	0.30	0.60
Maximum Daily	3.10	0.78	1.55
Peak Hourly	3.88	0.97	1.94

These reductions were applied to the future flows presented in Table 10 to generate wastewater characteristics for the 25% I&I reduction and 50% I&I reduction scenarios. The loads were not reduced because the reduction in I&I will not lower the quantity of wastewater being delivered to the WWTP. However, the concentrations were adjusted to equal the load divided by the reduced flow. The wastewater characteristics for the 25% I&I reduction and 50% I&I reduction scenarios are presented in Tables 12 and 13, respectively.

Table 12: Future Flows and Loads with 25% I&I Reduction

Parameter	Units	Average Annual	Maximum Monthly	MM:AA Peaking Factor	Maximum Daily	MD:AA Peaking Factor	Maximum Hourly	MH:AA Peaking Factor
Flow	Mgd	1.128	1.69	1.5	3.11	2.8	4.02	3.6
CBOD	mg/l	156	143	-	109	-	-	-
	lb/d	1,467	2,014	1.4	2,829	1.9	-	-
TSS	mg/l	206	182	-	165	-	-	-
	lb/d	1,940	2,569	1.3	4,290	2.2	-	-
TP	mg/l	3.9	3.3	-	2.2	-	-	-
	lb/d	36	47	1.3	56	1.6	-	-
NH_3 - N	mg/l	18	16	-	12	-	-	-
	lb/d	167	229	1.4	321	1.9	-	-
TKN - N	mg/l	28	26	-	20	-	-	-
	lb/d	267	366	1.4	514	1.9	-	-

Table 13: Future Flows and Loads with 50% I&I Reduction

Parameter	Units	Average Annual	Maximum Monthly	MM:AA Peaking Factor	Maximum Daily	MD:AA Peaking Factor	Maximum Hourly	MH:AA Peaking Factor
Flow	mgd	1.014	1.39	1.4	2.34	2.3	3.05	3.0
CBOD	mg/l	173	174	-	145	-	-	-
	lb/d	1,467	2,014	1.4	2,829	1.9	-	-
TSS	mg/l	229	222	-	220	-	-	-
	lb/d	1,940	2,569	1.3	4,290	2.2	-	-
TP	mg/l	4.3	4.0	-	2.9	-	-	-
	lb/d	36	47	1.3	56	1.6	-	-
NH_3 - N	mg/l	19.7	19.8	-	16.5	-	-	-
	lb/d	167	229	1.4	321	1.9	-	-
TKN - N	mg/l	31.5	31.6	-	26.4	-	-	-
	lb/d	267	366	1.4	514	1.9	-	-

A summary of the future annual average, maximum monthly, maximum daily and peak hourly flows under each I&I reduction scenario is presented in table 14.

Table 14: Comparison of Future Flows based on I&I Reduction

Future Flow Condition	No I&I Reduction	25% I&I Reduction	50% I&I Reduction
Annual Average	1.242 mgd	1.128 mgd	1.014 mgd
Maximum Monthly	1.99 mgd	1.69 mgd	1.39 mgd
Maximum Daily	3.89 mgd	3.11 mgd	2.34 mge
Peak Hourly	4.99 mgd	4.02 mgd	3.05 mgd

Based on the flow information summarized in Table 14, and as expected, reduction in I&I has the most significant impact on maximum daily and peak hourly flows.

8.0 PLANT CAPACITY EVALUATION

This section of the report evaluates the adequacy of each major component of the plant under the future flow and load scenarios presented in Tables 10, 12 and 13. To evaluate each treatment component of the plant, detailed flow and mass balances were developed that:

- Present the average and maximum influent flows and loads through the plant.
- Provide physical information regarding each component (such as tank dimensions).
- Identify key sizing/capacity related criteria for each unit process (such as detention time, surface overflow rate, etc.).
- Evaluate conformance with the relevant sizing criteria at average and maximum conditions.
- Generate essential data, such as oxygen requirements and sludge production rates, required to evaluate capacity adequacy.
- Project expected effluent quality for CBOD, TSS and NH_3, based on calibration of existing performance to key process control parameters.
- Enables an evaluation of how changes in key control parameters, such as RAS flow rate, solids retention time, and dissolved oxygen concentration in the oxidation ditches impacts the process.

For evaluation of the oxidation ditches, a kinetic analysis was also performed. The plant components related solely to hydraulic capacity, such as the influent pumps and influent screens, are not presented in the flow and mass balances but rather are discussed separately below. The following key plant components were evaluated:

- Influent Pumping System
- Screening
- Oxidation Ditches
- Final Clarifiers and Return Sludge Pumping System
- Waste Sludge Pumping System
- Effluent Filters
- Post Aeration System
- UV Disinfection System
- Sludge Storage System

8.1 Influent Pumping System

Influent pumping systems are sized to provide "firm capacity" for peak hourly flows. The "firm capacity" is the pumping capacity that exists when one pump is out of service. If the pumping system includes multiple size pumps, the "firm capacity" is the capacity that exists when one of the largest pumps is out of service.

The existing influent pumping station consists of a 25-foot deep well with four (4) submersible pumps that lift the wastewater approximately 40 feet to the influent screens. The following submersible pumps are located at the influent pumping station:

- Pump #1: Flygt Model CP3140 with 15 hp motor
- Pump #2: Flygt Model CP3152 with 20 hp motor
- Pumps #3 & #4: KSB Model KRTK 200-400/226 with 44 hp motors and trimmed impellers

The performance curves for these 3 pump models are presented in Appendix C. During very high flow events, pump #1, #3, and #4 are all in operation, and the observed capacity is nominally greater than 4 mgd. However, since this capacity requires that both of the largest pumps be in operation, it cannot be considered the reliable firm capacity. With one of the largest pumps out of service, the capacity is about 3.4 mgd. Therefore, the firm capacity of the existing influent pumping system is approximately 3. mgd.

Based on the future peak hourly flows summarized in Table 14, the existing firm capacity is sufficient only for the 50% I&I Reduction future flow scenario. Therefore, the influent pumping system will need to be upgraded for both the No I&I Reduction and 25% I&I Reduction future flow scenarios. However, as described in the 2005 Report, if the trimmed impellers in Pumps #3 and #4 are replaced with non-trimmed impellers, the firm capacity, will increase to about 4 mgd, which is sufficient for the 25% I&I Reduction future flow scenario, but not for the No I&I Reduction scenario. Therefore, the extent of influent pumping system improvements will vary by flow scenario as follows:

- No I&I Reduction – Replace Pumps #3 and #4 with larger units
- 25% I&I Reduction – Replace impellers in Pump #3 and #4
- 50% I&I Reduction – No Improvements

8.2 Screening

Influent screens remove debris from the wastewater that could otherwise clog or damage downstream equipment or processes. Influent screens are sized for peak hourly flows. However, unlike an influent pumping system, since the existing screens are static screens without moving parts, it is not necessary to consider the firm capacity to be the capacity that exists with one unit out of service.

The existing influent screening system consists of two HS-72BB Hydroscreens. Each Hydroscreen is comprised of two 72" wide back-to-back wedge wire screen panels, with all panels mounted over the sludge storage tanks. The spacing of the wedge wire on the screen panels is ¾". The manufacturers reported total peak flow capacity of the 4 static screen panels is 4.8 mgd at a TSS concentration of 200 mg/L

Based on the future peak hourly flows summarized in Table 14, the existing capacity is sufficient for both the 25% I&I Reduction and 50% I&I Reduction future flow scenarios, but not for the No I&I Reduction future flow scenario. Therefore, the influent screening system will need to be upgraded for the No I&I Reduction future flow scenario.

It is also noted that the existing static screens present a significant operational problem due to water from the screens being discharged to the thickened sludge holding tank located directly below the screens, which significantly reduces the solids concentration of the thickened sludge resulting in increased sludge transportation and disposal costs. A potential remedy to this problem is discussed in Section 8.9.

8.3 Oxidation Ditches

Oxidation ditches are biological reactors that provide an environment suitable for the growth of microorganisms which remove CBOD and NH_3 from the wastewater. Oxidation ditches, and their associated mechanical aeration equipment, are sized based primarily on two criteria:

1. Aeration equipment capacity sufficient to supply the required oxygen for CBOD and NH_3 removal.
2. Tank volume sufficient to hold the mass of microorganisms needed to remove the CBOD and NH_3 while also providing the appropriate environmental conditions for microorganisms to perform properly.

These criteria are addressed separately below.

8.3.1 Aeration Equipment

When assessing the capacity of aeration equipment, the wastewater oxygen requirement is first calculated based on the pounds of oxygen required per pound of BOD and NH_3 removed. The wastewater oxygen requirement is then converted to a standard oxygen requirement (SOR) based on site specific conditions of temperature, operating dissolved oxygen (DO) concentration, alpha coefficient (i.e. the ratio of wastewater oxygen transfer to clean water oxygen transfer) and beta coefficient (i.e. the salinity correction factor). Aeration devices are then evaluated with respect to their ability to supply the required SOR.

As shown in Table 1, the existing brush-type aerators in Oxidation Ditch No. 1 have an oxygenation capacity of 6.6 lbs/hr per foot of aerator shaft length, while the brush aerators in Oxidation Ditch No. 2 have an oxygenation capacity of 5.85 lbs /hr per foot of aerator shaft length. Based on the total shaft length, the combined oxygenation capacity of all aerators is 430 lbs per hour.

The flow and mass balance evaluations for future flow conditions in Appendix A present the calculated SOR (in pounds per day) for the future annual average, maximum month and maximum daily flows, under the scenarios of No I&I Reduction, 25% I&I Reduction and 50% I&I Reduction. The resulting SORs are then compared to the existing oxygenation capacity of 430 lbs/hour to assess capacity adequacy.

Based on the comparison of calculated future SOR to existing oxygenation capacity, the existing aerators have sufficient capacity for the future annual average, maximum monthly and maximum daily flows under the No I&I Reduction, 25% I&I Reduction, and 50% I&I Reduction scenarios. Therefore, the existing aerators will not require upgrading under any of the future flow scenarios.

8.3.2 Tank Volume

The adequacy of oxidation ditch tank volume is evaluated primarily through the following parameters:

- Volumetric BOD loading, which is the pounds of BOD that enter each 1,000 cubic feet (CF) of tank volume per day.
- Hydraulic detention time, which is the time required for each gallon of wastewater to flow through the tank.

- Solids retention time (SRT), which is the time that each pound of biomass resides in the biological treatment system before it is removed from the system as waste sludge. SRT is the key parameter that controls the type and distribution of microorganisms present in the oxidation ditch, and also controls the floc forming characteristics of the microorganisms thereby directly influencing settling characteristics of the biomass. Thus an appropriate SRT must be selected for a flow and mass balance.

As indicated in Table 1, the volume of Oxidation Ditch No. 1 is 293,000 gallons and the volume of Oxidation Ditch No. 2 is 614,000 gpd. The resulting total volume is 907,000 gallons.

The flow and mass balances evaluations for future flow conditions in Appendix A present the calculated volumetric BOD loading and hydraulic detention time for the future annual average, maximum month and maximum daily flows, under the scenarios of No I&I Reduction, 25% I&I Reduction and 50% Reduction. The resulting volumetric BOD loading and hydraulic detention time are compared to standard sizing criteria from a variety of sources including the NJDEP, 10-States Standards, and Water Environment Federation Manual of Practice No. 8 Design of Municipal Wastewater Treatment Plants. Based on a comparison of the calculated volumetric loading and hydraulic detention time versus standard sizing criteria, the oxidation tank volume is sufficient for all future flows under the scenarios of No I&I Reduction, 25% I&I Reduction and 50% I&I reduction.

With regard to SRT, the flow and mass balance evaluations in Appendix A allow an SRT to be selected, and for the spreadsheet to then calculate the resulting MLSS concentration and mass of sludge wasted per day. For the future flow scenarios, SRTs have been selected based on kinetic analysis to ensure a high level of BOD and NH_3 removal, as validated through current performance operating at similar SRTs. The resulting MLSS concentrations under all future flow scenarios are typical of MLSS concentrations in oxidation ditches, which also indicate that oxidation ditch volume is sufficient for all future flows scenarios. The resulting MLSS concentrations are also used in the assessment of clarifier and return sludge pumping system capacity, as discussed in Section 8.4.

In summary, considering both tank volume and aeration capacity, the existing oxidation ditches are sufficiently sized for all future flow scenarios.

8.4 Final Clarifiers and Return Sludge Pumping System

Final clarifiers are integral components of the biological treatment system as they allow the biomass (i.e. MLSS) that flows out of the oxidation ditches to be settled and thickened for return to the oxidation ditches (by way of the return sludge pumps). They also produce a clarified effluent low in total suspended solid concentration. Final clarifier and return sludge pumping system capacity must be evaluated together, as the capacity of the return sludge pumping system directly impacts clarifier capacity.

Final clarifier capacity is evaluated based on two key criteria:

1. Surface overflow rate, which is the gallons per day of wastewater flow to the final clarifiers divided by the clarifier surface area.
2. Solids loading rate, which is the pounds per day of biomass (i.e. MLSS) applied to the final clarifiers divided by the clarifier surface area.

Surface overflow rate relates to the clarification function of a clarifier while the solids loading rate relates to the thickening function of a clarifier. Failure of either the clarification or thickening function results in overall failure of the clarifier. Therefore, the more stringent of these two criteria determines the overall capacity of the clarifier.

As indicated in Table 1, there are two final clarifiers, each 50 feet in diameter with a sidewater depth of 11'-8". Settled biomass is returned to the oxidation ditches by the return sludge pumping system, which consists of four variable speed pumps, each rated for 425 gpm at 25 feet TDH. The firm capacity (i.e. with 3 of 4 pumps in service) of the pumping system is approximately 1,375 gpm or approximately 2 mgd.

The adequacy of the clarification and thickening functions of the clarifier are evaluated separately below.

8.4.1 Clarification

For clarification to occur, the upflow velocity (i.e. surface overflow rate) of the clarifier must be less than the settling velocity of a typical biomass particle. The flow and mass balance evaluations for future flow conditions in Appendix A present the calculated surface overflow rate for the future annual average, maximum month, maximum daily and peak hourly flows, under the scenarios of No I&I Reduction, 25% I&I Reduction and 50% Reduction. The resulting surface overflow rates are compared to recommended surface overflow rates from a variety of sources including the NJDEP, 10-States Standards, and Water Environment Federation Manual of Practice No. 8 Design of Municipal Wastewater Treatment Plants. Based on a comparison of the calculated surface overflow rate versus the recommended surface overflow rates, the final clarifiers have sufficient clarification capacity for all future flow conditions except the future peak hourly flow under the No I&I Reduction scenario.

8.4.2 Thickening

When thickening failure occurs, biomass will be "washed out" of the clarifier resulting in poor effluent quality and potentially long term disruption in system performance. For proper thickening to occur, the solids loading cannot exceed a maximum rate dictated by the settleability (i.e. SVI) of the MLSS and the underflow rate of the clarifier. The underflow rate is the return sludge flow rate divided by the clarifier surface area. This type of analysis is referred to as a State Point Analysis and is performed using the type of diagram presented in Figure 8 below, which is from the *Manual on the Causes and Control of Activated Sludge Bulking and Foaming, 2nd Edition by Jenkins, Richard and Daigger*.

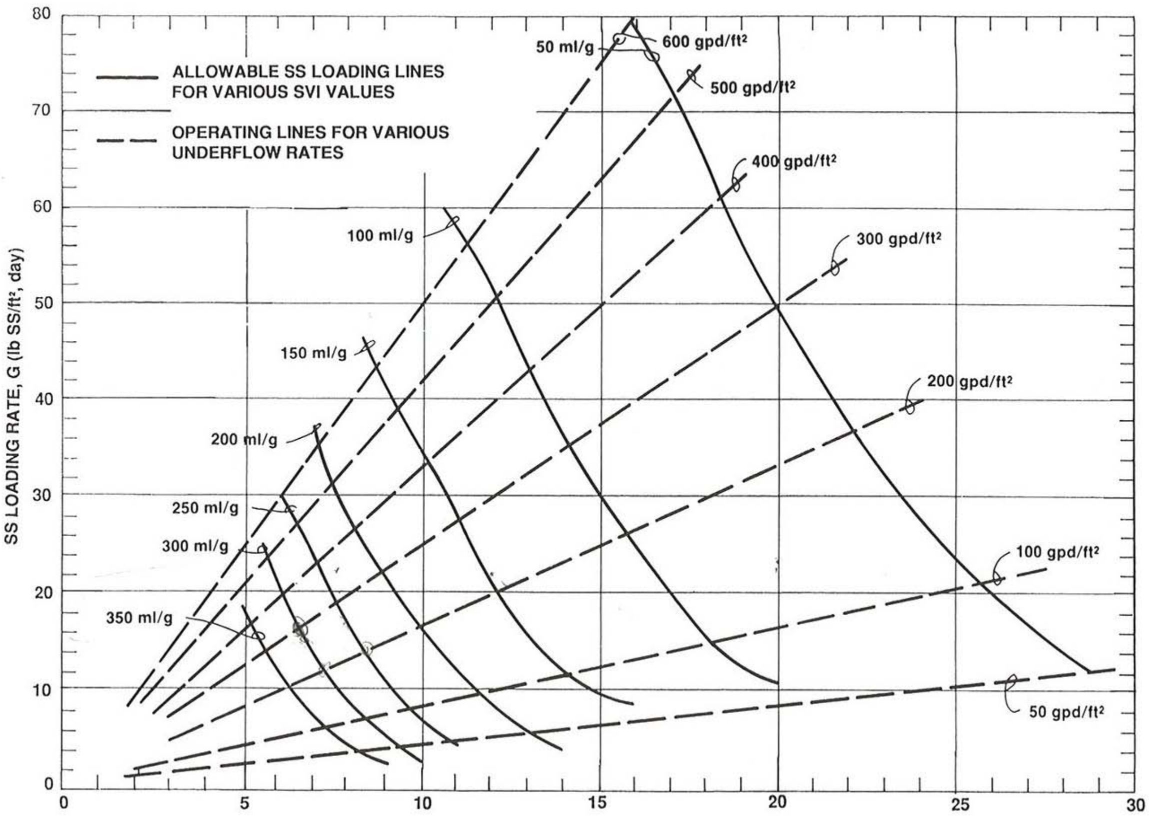


Figure 8 – Clarifier Diagram for State Point Analysis

In Figure 8, the dashed lines are the underflow lines, which represent the return sludge flow rate divided by the clarifier surface area, and the vertical lines are the SVI lines. The intersection of an underflow line with an SVI line established a maximum allowable solids loading rate above which thickening failure will occur. For example, at an underflow rate of 200 gpd/ft^2 and an SVI of 150 ml/g, the maximum allowable solids loading is 20 pounds of MLSS per day per square feet of clarifier surface area.

This diagram was first used to assess thickening capacity under the existing influent flows, typical RAS flow, typical MLSS concentrations, and typical range of SVI values. As indicated in the flow and mass balance evaluation for existing conditions in Appendix A, at the current typical return sludge flow rate of 0.4 mgd, the resulting underflow rate is approximately 100 gpd/ft^2. At a typical SVI ranging between 100 ml/g and 150 ml/g, and by referring to Figure 8, the corresponding maximum allowable solids loading rate is in the range of 11 to 15 pounds per day per square feet. Based on the calculated solids loading rates presented in the flow and mass balance evaluations for existing conditions in Appendix A, this range of maximum allowable solids loading rates is exceeded, and thus thickening failure is expected to occur, about midway between the maximum monthly flow of 1.75 mgd and the maximum daily flow of 3.43 mgd. This flow and mass balance prediction is consistent with reported actual conditions, as the aerators are shutoff as flows approach 3 mgd to settle MLSS in the oxidation ditches to reduce the final clarifier solids loading rate.

To assess the increase in thickening capacity that would result from increased return sludge flow rates, and iterative approach was utilized. The Flow and Mass Balance Evaluations for Future Flow Conditions in Appendix A present clarifier thickening capacity at the following return sludge flow rates, which were determined to be the optimum return sludge flow rates to maximize thickening capacity:

- Annual average return sludge flow rate – 0.6 mgd
- Maximum monthly return sludge flow rate – 1.0 mgd
- Maximum daily return sludge flow rate – 1.4 mgd

As also shown in the Flow and Mass Balance Evaluations, at the capacity-limiting maximum daily flow condition with a return sludge flow rate of 1.4 mgd, the underflow rates is about 350 gpd/ft^2. At SVI's ranging between 100 ml/g and 150 ml/g, the corresponding maximum allowable solids loading rate is in the range of 32 to 38 pounds per day per square feet.

At this increased allowable solids loading capacity, the existing clarifiers have adequate thickening capacity for the future annual average, maximum monthly and maximum daily flows associated with the 25% I&I Reduction and 50% I&I Reduction scenarios, but not for the No I&I Reduction scenario.

In summary, thickening capacity rather than clarification capacity is the capacity limiting criteria for the existing final clarifiers. If the existing return sludge pumping system is operated at an increased flow rate of approximately 1.4 mgd during maximum daily flow conditions (an about 1.0 mgd during maximum monthly flow conditions), the existing clarifiers have sufficient capacity for future flows under the 25% I&I Reduction and 50% I&I Reduction scenarios. However, clarifier capacity is not sufficient for the No I&I Reduction Scenario.

8.5 Waste Sludge Pumping System

Waste sludge pumps are used to remove biomass from the biological treatment system as required to maintain the desired SRT, which as previously indicated is the key process control parameter related to performance.

The existing waste sludge pumping system consists of two variable speed pumps each rated for 470 gpm (0.68 mgd) at 12 feet TDH. The firm capacity of the pumping system, i.e. with one pump out of service, is 470 gpm or 0.68 mgd.

The Flow and Mass Balance Evaluation for Future Flow Conditions in Appendix A present the calculated mass of waste sludge based on the selected SRT, the concentration of waste sludge based on the return sludge flow rate, and the resulting average daily sludge flow in gpd based on the mass and concentration of waste sludge. The maximum waste sludge pumping rate is also presented based on the scenario of pumping 7 days of waste sludge over a 4 day period, at 4 hours per day.

Based on a comparison of the calculated maximum pumping rates presented in the flow and mass balances versus the firm capacity of the waste sludge pumping system, the existing waste sludge pumping system has sufficient capacity for all future flow scenarios.

The flow and mass balances also indicate, as expected, that operating at an increase return sludge flow rate to increase clarifier thickening capacity results in a thinner waste sludge and thus a significant increase in sludge volume.

8.6 Effluent Filters

Effluent filters remove additional suspended solids that are not removed in the final clarifiers, and thereby remove additional effluent particulate BOD associated with the effluent total suspended solids (every 1 mg/L of effluent TSS typically corresponds to an effluent particulate BOD of 0.6 mg/L). Effluent filters are sized based recommended filtration rates during average and peak flow conditions. In addition, the influent TSS concentrations must be below the manufacturer's recommended maximum values.

The existing effluent filters consist of four Dynasand continuous backwash, upflow, deep bed, single media filters, manufactured by Parkson Corporation. Each filter is 11'-8" in height and has inside filter dimensions of 10' wide by 15' long. The filtration area of each filter is 150 square feet for a total filtration area of 600 square feet.

The flow and mass balance evaluations for future flow conditions in Appendix A present the calculated filtration rate for the annual average, maximum monthly, maximum daily and peak hourly flows under the scenarios of No I&I Reduction, 25% I&I Reduction and 50% I&I Reduction. The resulting filtration rates are compared to recommended filtration rates from a variety of sources including the manufacturer, the 10 States Standards, and the M&E Wastewater Engineering Textbook.

Based on a comparison of the calculated filtration rates versus the recommended filtration rates, the existing filters have sufficient capacity for both the 25% I&I Reduction and 50% I&I Reduction future flow scenarios, but not for the No I&I Reduction future flow scenario.

8.7 Post Aeration System

The post aeration system provides additional oxygenation of the filtered effluent so that the NJPDES permit requirement for minimum dissolved oxygen concentration (6 mg/L) can be met. The post aeration system consists of a post aeration tank and a coarse bubble diffuser system that receives air from two blowers, each with a capacity of 220 cfm. Therefore, the firm capacity of the blower system is 220 cfm.

The flow and mass balances for future flow conditions in Appendix A calculate the required blower capacity based on the continued use of coarse bubble diffusers. Based on a comparison of the calculated blower capacity versus the firm capacity of the existing blowers, the blowers/coarse bubble diffusers have sufficient capacity for both the 25% I&I Reduction and 50% I&I Reduction future flow scenarios, but not for the No I&I Reduction future flow scenario.

8.8 UV Disinfection System

The UV disinfection system disinfects the final effluent prior to discharge so the NJDPES permit effluent limitation for fecal coliform organisms can be achieved. UV disinfection systems are designed to deliver a sufficient UV dose to disinfect the wastewater during peak hourly flow conditions. The NJDEP specifically requires that a 125% safety factor be incorporated into the design.

The existing UV disinfection system was manufactured by Fischer and Porter and is a horizontal, open channel configuration. The manufacturer's stated peak flow capacity of the system is 3.6 mgd, exclusive of the safety factor required by NJDEP.

The flow and mass balance evaluations for future flow conditions in Appendix A present the actual safety factor for the future annual average, maximum monthly, maximum daily and peak hourly flows under the scenarios of No I&I Reduction, 25% I&I Reduction and 50% I&I Reduction.

Based on a comparison of the calculated safety factors versus the NJDEP required safety factor, the existing UV disinfection system does not have sufficient capacity for the future peak hourly flows under the No I&I Reduction, 25% I&I Reduction or 50% I&I Reduction Scenarios.

Regardless of this capacity deficiency for future flows, the existing system needs to be replaced and it is no longer supported by the manufacturer and replacement parts are difficult to obtain. In addition, new UV disinfection systems are more energy efficient and easier to maintain than the existing system, which will result in O&M cost savings.

8.9 Sludge Storage

There are two aerated sludge storage tanks, each with a useable volume of approximately 75,000 gallons. Sludge Storage Tank No. 2 receives waste activated sludge by way of the waste activated sludge pumps. Sludge Storage Tank No. 1 is below the static screens and receives thickened waste activated sludge from a mechanical thickener located in the Digester Control Building. As previously indicated in Section 8.2, water discharged from the static screens is directed to Sludge Storage Tank No. 1 resulting in dilution of the thickened sludge. As a result, the thickened sludge concentration of approximately 5% produced by mechanical thickener is reduced to about 2.4% solids prior to disposal, thus more than doubling the quantify of sludge that must be disposed.

As shown in the Flow and Mass Balance Evaluations in Appendix A, the increase in mass of sludge produced at future flows is only about 10% greater than the current mass of sludge produced. The increase in volume of raw waste sludge will depend on the required return sludge flow rate, since this directly impacts the concentration of the raw waste activated sludge. Based on the future optimized return sludge flow rates described in Section 8.4, the increase in raw waste sludge volume will be about 10% on an annual average basis, 50% on a maximum monthly flow basis, and over 200% on a maximum daily flow basis.

Assuming the rate and frequency of thickening increases proportional to the increase in raw waste sludge flow rate, the existing sludge storage tanks have sufficient capacity for future flows under the No I&I Reduction, 25% I&I Reduction or 50% I&I Reduction Scenarios.

However, as further discussed in Section 10.0, improvement to comply with the anticipated future TP limit of 0.76 mg/L can be expected to further increase the mass waste sludge produced by about 20%. As a result, a new screening system is recommended to eliminate the discharge of water into the thickened sludge storage tank thereby reducing the cost of sludge transportation and disposal.

8.10 Summary of Capacity Deficiencies for Future Flow Scenarios

Table 15 presents a summary of plant components with insufficient capacity for future flows, under the scenarios of No I&I Reduction, 25% I&I Reduction and 50% I&I Reduction.

Table 15: Plant Components with Insufficient Capacity for Future Flow Scenarios

No I&I Reduction	25% I&I Reduction	50% I&I Reduction
Influent Pumping System	Influent Pumping System	UV Disinfection System
Influent Screens	UV Disinfection System	
Final Clarifiers		
Effluent Filters		
Post Aeration Blowers		
UV Disinfection System		

Alternatives to address capacity deficiencies are presented in Section 9.0.

9.0 SYSTEM IMPROVEMENT ALTERNATIVES FOR FUTURE FLOWS

Based on the information summarized in Table 15, there are three basic alternatives for system improvements that will enable future development within the sewer service area:

1. Rehabilitate the sanitary sewer system to achieve 25% I&I reduction in combination with upgrading the WWTP to remedy the capacity deficiencies listed in Table 15 for the 25% I&I Reduction scenario.
2. Rehabilitate the sanitary sewer system to achieve 50% I&I reduction in combination with upgrading the WWTP to remedy the capacity deficiencies listed in Table 15 for the 50% I&I reduction scenario.
3. Upgrade the WWTP to remedy the capacity deficiencies listed in Table 15 for the No I&I Reduction scenario.

The specific capital improvements associated with each alternative are presented in the sections that follow.

9.1 25% I&I Reduction Alternative

As discussed in Section 5.0, I&I (both base infiltration and RDII) is a significant component of the total flow to the WWTP, particularly during maximum daily and peak hourly flow events. As a result, even modest decreases in I&I can improve the plant's ability to accept more wastewater. As previously shown in Table 14, compared to the future flow without I&I reduction, a 25% I&I reduction will decrease the maximum daily flow from 3.89 to 3.11 mgd, and will reduce the peak hourly flow from 4.99 to 4.02 mgd. With this significant reduction in maximum daily and peak hourly flow, all existing plant components except the following will have sufficient capacity for future flows:

- Influent pumping system.
- The UV disinfection system – which must be replaced anyway due to its age and condition, and which will benefit the Township by reducing energy and maintenance costs.

To obtain a 25% reduction in I&I will required substantial rehabilitation of the existing sanitary sewer system.

By way of background, various studies have been performed and are currently on-going to identify and reduce the sources of I&I within the collection system. For example, smoke testing was recently performed indicating there may be cross connections between the storm sewer system and sanitary sewer system in 5 or 6 locations. Dye testing is currently planned to quantify the extent of cross connection in these locations, and additional flow monitoring is also planned to identify the specific areas within the collection system that have significant I&I. The Township has also recently installed water-tight manhole cover inserts in approximately 25% of the collection system and rehabilitated a total of 118 manholes in 2002 and 2005.

A Memorandum from Justin Lizza, P.E., Township of Long Hill Engineer, dated October 21, 2008, and the Report by Medina Consultants, dated October 20, 2009, describe the recent efforts to reduce I&I in the sewer system and provide insight into the sources of I&I. The Memorandum notes that Mr. James McGregor, P.E., engaged as a consultant to Long Hill Township, believes that 50% to 70% of the total I&I comes from service laterals that connect houses and businesses to the sanitary mains. The Report by Medina Consultants specifies that repairs that have been conducted to date have focused on manholes that are in low-lying areas and/or that have obvious defects.

Based on review of the work that has been conducted on I&I reduction measures in the service area, along with discussions with Medina Consultants and Township personnel, the following scope of rehabilitation improvements has been developed to achieve an approximate 25% I&I reduction:

- Install cured-in-place (CIP) liners on 50% of the gravity sewers that lie within the 100-year flood plain or wetlands areas. The linear feet of liners that would be required are as follows:
  - 14” – 8,349 LF
  - 12” – 6,136 LF
  - 10” – 4,457 LF
  - 8” – 23,559 LF
- Install CIP liners on all of the service laterals that are within the 100-year flood plain or wetland areas. Although the laterals have not been mapped, the percentage of laterals that lie within the 100-year flood plain or wetland areas would be similar to the percentage of 8” gravity sewers that lie within the 100-year flood plain or wetland areas, or about 20%. The resulting length of CIP liners required for laterals would be 44,265 LF.

- Install CIP lining and water-tight manhole covers on all manholes that have not yet been rehabilitated within the 100-year flood plain or wetland areas (~150 manholes).
- Install water-tight manhole covers on all other manholes that have not yet been rehabilitated (~800 manholes).

Budgetary capital costs for sanitary sewer system rehabilitation improvements were developed based on budgetary unit costs provided by InsituForm for the CIP pipe liners, SWERP for CIP manhole liners, and Campbell Foundry for the water-tight manhole covers, together with a 20% contingency, 15% for engineering, but without contractor overhead and profit, since unit costs for CIP lining incorporate these markups. Information on the sewer rehabilitation products that served as the basis for the budgetary cost estimates is presented in Appendix D.

Budgetary costs for the plant improvements were developed based on budgetary costs from a representative UV equipment manufacturer (Trojan Technologies), budgetary costs for the replacement pump impellers from the 2005 report adjusted for inflation and typical percentages for items such as equipment installation and electrical, together with contractor overhead and profit at 21% (includes mobilization bonds and insurance), a 20% contingency, and 15% for engineering. Product information on the representative UV disinfection system is presented in Appendix E.

The resulting budgetary capital cost estimate, in 2010 dollars, is presented in Table 16 on the following page.

Due to the substantial uncertainties that exist during the study phase of a project, budgetary capital costs estimates should be viewed as ±25% accurate.

In addition, it is important to note that specific reductions in I&I are difficult to predict and cannot be guaranteed, due to many factors including the migration of I&I that can occur after a portion of the system is rehabilitated. Therefore, the scope of improvements required for a 25% reduction in I&I could be greater than assumed for the development of the budgetary capital cost estimate presented above.

Table 16: Budgetary Capital Cost Estimate for 25% I&I Reduction Alternative

Item/Description	*Quantity*	*Unit/Basis*	*Unit Budgetary Cost*	*Item Budgetary Cost*
Sewer Rehabilitation Budgetary Costs				
Pipe CIP Lining - 14"	8,349	LF	$ 42	$ 350,670
Pipe CIP Lining - 12"	6,136	LF	$ 36	$ 220,900
Pipe CIP Lining - 10"	4,457	LF	$ 32	$ 142,639
Pipe CIP Lining - 8"	23,559	LF	$ 30	$ 706,781
Pipe CIP Lining - Laterals	44,265	LF	$ 70	$ 3,098,550
Manhole Covers	800	EA	$ 500	$ 400,000
Manhole - Covers and Lining	150	EA	$ 5,000	$ 750,000
Unit Price & Other Item Subtotal				*$ 5,669,540*
Engineering	15%			$ 850,431
Contingency	20%			$ 1,133,908
Sewer Rehabilitation Budgetary Capital Cost				***$ 7,653,879***
Plant Improvement Budgetary Costs				
Major Equipment & Systems				
Replace Influent Pump Impellers	1	LS	$ 6,000.00	$ 6,000
New UV Disinfection System	1	LS	$ 268,500.00	$ 268,500
Subtotal				*$ 274,500*
Installation	25%			$ 68,625
Major Equipment and Systems Subtotal				*$ 343,125*
Percentage Items				
Electrical	10%			$ 34,313
Contractor OH&P	21%			$ 79,262
Contingency	20%			$ 75,488
Percentage Items Subtotal				*$ 189,062*
Plant Improvement Budgetary Construction Cost				***$ 532,187***
Engineering	15%			$ 79,828
Plant Improvements Budgetary Capital Cost				***$ 612,015***
TOTAL BUDGETARY CAPITAL COST				**$ 8,265,894**

9.2 50% I&I Reduction Alternative

As previously shown in Table 14, compared to the future flow without I&I reduction, a 50% I&I reduction will decrease the maximum daily flow from 3.89 to 2.34 mgd, and will reduce the peak hourly flow from 4.99 to 3.05 mgd. With this significant reduction in maximum daily and peak hourly flow, all existing plant components except the following will have sufficient capacity for future flows:

- The UV disinfection system – which must be replaced anyway due to its age and condition, and which will benefit the Township by reducing energy and maintenance costs.

Based on review of the work that has been conducted on I&I reduction measures in the service area, along with discussions with Medina Consultants and Township personnel, the following scope of rehabilitation improvements has been developed to achieve an approximate 50% I&I reduction:

- Install cured-in-place (CIP) liners on 100% of the gravity sewers that lie within the 100-year flood plain or wetlands areas. The linear feet of liners that would be required are as follows:
    - 14" – 16,699 LF
    - 12" – 12,272 LF
    - 10" – 8,915 LF
    - 8" – 47,119 LF
- Install CIP liners on 50% of the service laterals throughout the sanitary sewer system. The length of CIP liners required for laterals would be 110,663.
- Install CIP lining and water-tight manhole covers on all manholes that have not yet been rehabilitated within the 100-year flood plain or wetland areas (~150 manholes).
- Install water-tight manhole covers on all other manholes that have not yet been rehabilitated (~800 manholes).

Budgetary capital cost estimates for sanitary sewer system improvements and for WWTP improvements were developed using the same methodology described in Section 9.1 for the 25% I&I Reduction Alternative. The resulting budgetary capital cost estimate, in 2010 dollars, for the 50% I&I Reduction Alternative, is presented in Table 17. As previously indicated, budgetary capital cost estimates should be viewed as ±25% accurate.

Table 17: Budgetary Capital Cost Estimate for 50% I&I Reduction Alternative

Item/Description	***Quantity***	***Unit/Basis***	***Unit Budgetary Cost***	***Item Budgetary Cost***
Sewer Rehabilitation Budgetary Costs				
Pipe CIP Lining - 14"	16,699	LF	$ 42	$ 701,340
Pipe CIP Lining - 12"	12,272	LF	$ 36	$ 441,801
Pipe CIP Lining - 10"	8,915	LF	$ 32	$ 285,278
Pipe CIP Lining - 8"	47,119	LF	$ 30	$ 1,413,562
Pipe CIP Lining - Laterals	110,663	LF	$ 70	$ 7,746,375
Manhole Covers	992	EA	$ 500	$ 496,000
Manhole - Covers and Lining	150	EA	$ 5,900	$ 885,000
Unit Price & Other Item Subtotal				*$ 11,969,356*
Engineering	15%			$ 1,795,403
Contingency	20%			$ 2,393,871
Sewer Rehabilitation Budgetary Capital Cost				***$ 16,158,630***
Plant Improvement Costs				
Major Equipment & Systems				
UV Disinfection System	1	LS	$ 268,500.00	$ 268,500
				$ -
Subtotal				*$ 268,500*
Installation	25%			$ 67,125
Major Equipment and Systems Subtotal				*$ 335,625*
Percentage Items				
Electrical	10%			$ 33,563
Contractor Overhead & Profit	21%			$ 77,529
Contingency	20%			$ 73,838
Percentage Items Subtotal				*$ 184,929*
Plant Improvement Budgetary Construction Cost				***$ 520,554***
Engineering	15%			$ 78,083
Plant Improvements Budgetary Capital Cost				***$ 598,638***
TOTAL BUDGETARY CAPITAL COST				**$ 16,757,268**

By comparing the budgetary capital cost estimate presented above to the budgetary capital cost estimate presented in Table 16, the 25% I&I reduction alternative is a much more cost effective approach to providing capacity for future growth than the 50% I&I reduction alternative.

9.3 No I&I Reduction Alternative

As previously shown in Table 14, without I&I reduction measures to reduce flows to the plant, the following components of the plant will need to be upgraded to provide sufficient capacity for future flows:

- Influent pumping system
- Influent screens
- Final clarifiers
- Effluent filters
- Post aeration blowers
- UV disinfection system - which must be replaced anyway due to its age and condition, and which will benefit the Township by reducing energy and maintenance costs.

While it would be technically feasible to upgrade each of these plant components, including construction of a third final clarifier and additional effluent filter, based on Omni's experience, a more cost effective approach would be to construct an influent flow equalization tank to capture and temporarily store peak flow such that the maximum daily and peak hourly flows are reduced to the same degree as achieved by a 25% reduction in I&I. Under this approach, the following improvements would be required to provide sufficient capacity for future flows:

- New influent flow equalization tank (including mixing system and comminutor to grind debris entering the tank.
- Influent pumping system upgrade (replace pumps 3 and 4)
- New UV disinfection system

Regarding sizing of the influent flow equalization tank, the observed 2009 hourly flows shown in Figure 5 were used to model how large a flow equalization tank would need to be in order to achieve the same flow reductions as a 25% reduction in I&I. Since the maximum daily flow during 2009 was 2.90 mgd versus the future maximum daily flow of 3.89 mgd, all flows were multiplied by 1.34 (i.e. the ratio of 3.89 to 2.90) in order to simulate the pattern of hourly flow associated with the future maximum daily flow of 3.89 mgd.

A spreadsheet model was setup to calculate excess flow on an hourly basis over the desired maximum daily flow of 3.11 mgd. The excess flow was then cumulated into a storage volume until the flow into the plant was lower than 3.11 mgd. At flows lower than 3.11 mgd, the storage tank was allowed to empty at a rate of 0.25 mgd. This resulted in a peak daily flow through the WWTP of 3.12 mgd and a peak hourly flow through the WWTP of 3.36 mgd. In order to achieve these flow conditions, a flow equalization tank storage volume of approximately 1.65 million gallons is needed. The lowest cost option for constructing a tank of this volume is to utilize a wire-wound, prestressed concrete storage tank, of the type constructed by Natgun and Preload. Tank dimensions would be approximately 90' diameter with a 35' side water depth.

A budgetary capital cost estimates for WWTP improvements was developed using the same methodology described in Section 9.1 for the WWTP improvements associated with the 25% I&I Reduction Alternative. The resulting budgetary capital cost estimate, in 2010 dollars, for the No I&I Reduction Alternative, is presented in Table 18.

A conceptual flow schematic showing how the equalization tank would be incorporated into the plant is presented as Figure 9. This schematic does not include new influent screens, as will be further discussed in Section 10.0.

A conceptual site plan showing a possible location for the tank is presented as Figure 10.

Table 18: Budgetary Capital Cost Estimate for No I&I Reduction Alternative

Item/Description	***Quantity***	***Unit/Basis***	***Unit Budgetary Cost***	***Item Budgetary Cost***
Plant Improvement Budgetary Costs				
Major Equipment & Systems				
Flow Equalization Tank (installed	1	LS	$ 1,265,000	$ 1,265,000
Comminutor	1	LS	$ 20,000	$ 20,000
Jet Mix System	1	LS	$ 150,000	$ 150,000
Replace Influent Pump 3 and 4	2	LS	$ 35,000	$ 70,000
UV Disinfection System	1	LS	$ 268,500	$ 268,500
Subtotal				*$ 1,773,500*
Installation (excluding EQ Tank)	25%			$ 127,125
Major Equipment and Systems Subtotal				*$ 1,900,625*
Foundations				
Flow Eq Tank Foundation (Piles)	6,500	SF	$ 22.00	$ 143,000
Buildings/Foundations Subtotal				*$ 143,000*
Percentage Items				
Civil/Site	5%			$ 102,181
Piping	5%			$ 102,181
Electrical	10%			$ 204,363
Instrumentation & Controls	5%			$ 102,181
Contractor OH&P	21%			$ 536,452
Contingency	20%			$ 510,906
Percentage Items Subtotal				*$ 1,558,264*
Plant Improvements Budgetary Construction Cost				***$ 3,601,889***
Engineering	15%			$ 540,283
TOTAL BUDGETARY CAPITAL COST				**$ 4,142,172**

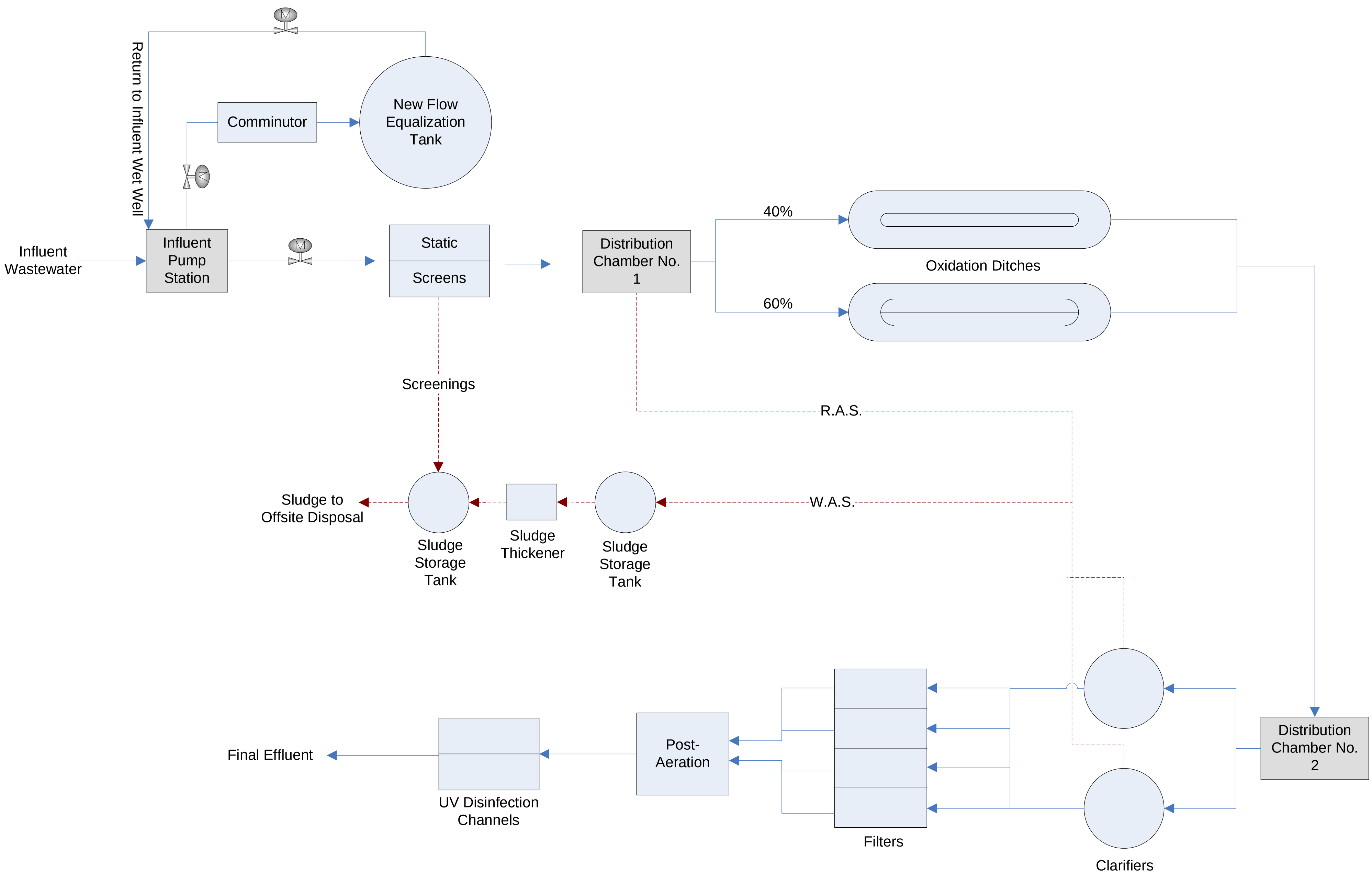
9.4 Budgetary Capital Cost Comparison

The budgetary capital cost estimates for the three alternatives for providing sufficient capacity to provide for future growth are summarized in Table 19.

Table 19: Budgetary Capital Cost Comparison

Alternative	**Budgetary Capital Cost**
No I&I Reduction	$4,140,000
25% I&I Reduction	$8,270,000
50% I&I Reduction	$16,760,000

Figure 9. Flow Equalization Conceptual Flow Schematic
Long Hill Township WWTP



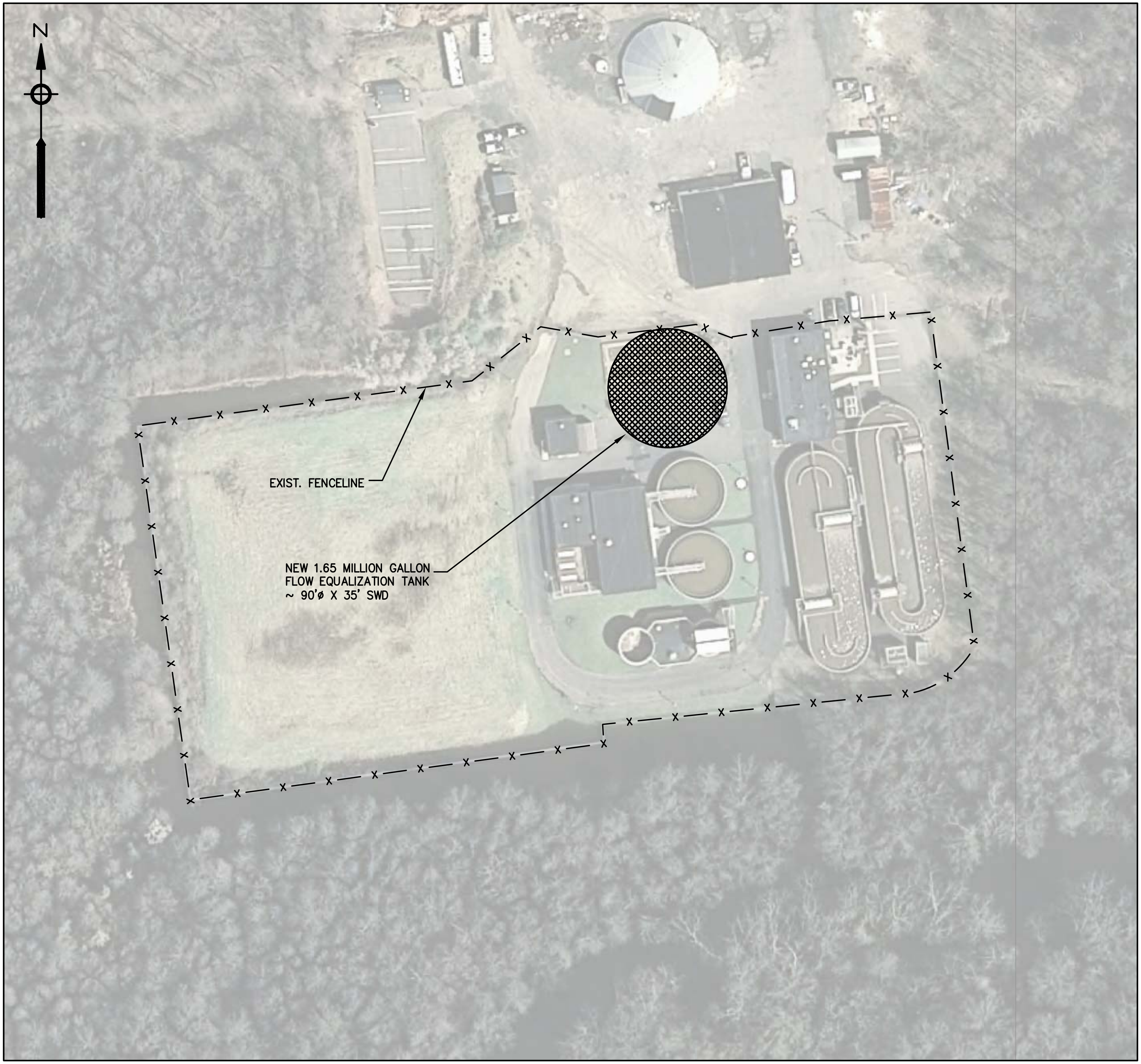


Figure 10
Flow Equalization Concept Plan

Long Hill WWTP
Township of Long Hill
Morris County, NJ

0 50 100
SCALE 1" = 100' FEET

March 18, 2010

OMNI ENVIRONMENTAL LLC
321 WALL STREET
PRINCETON, NJ 08540
PH: (609) 924-8821
FAX: (609) 924-8831

By comparing the budgetary capital cost estimates presented in Table 19, it is evident that the No I&I Reduction Alternative is the lowest cost approach to providing sufficient capacity for future flows. In addition to being the lowest cost, the effectiveness of a flow equalization tank in reducing peak flows can be much more accurately predicted than the peak flow reduction estimated to occur through sewer rehabilitation.

10.0 PLANT IMPROVEMENTS FOR FUTURE TP EFFLUENT LIMITS

As described in Section 3.0, it is anticipated that a monthly average TP limit of 0.76 mg/L will be imposed in the near future, most likely in conjunction with the next NJPDES Permit renewal. A 0.76 mg/L limit is significantly more stringent than the existing TP effluent limitation, which will necessitate that capital improvements be implemented.

Phosphorus can be removed biologically or chemically. However, biological phosphorus removal (BPR) alone cannot reliably achieve an effluent limitation of 0.76 mg/L. While a portion of the phosphorus can be removed through BPR and the balance through chemical phosphorus removal, the existing oxidation ditches do not have sufficient volume for operation in a BPR mode. Therefore, chemical phosphorus removal alone will be required.

To accomplish chemical phosphorus removal, a coagulant is added to the wastewater which causes soluble phosphorus (orthophosphate) to precipitate and to be removed from the wastewater as a solid. This can be achieved through a variety of add-on processes, such as Cambridge Water Technology’s CoMag® process, Blue Water Technology’s Blue PRO® reactive filter, and high rate tertiary clarification processes with chemical addition, such as Kruger’s Actiflo® micro-sand enhanced clarification process. However, to achieve reliable compliance with a 0.76 mg/L effluent limitation, none of these expensive add-on processes are required; rather, chemical addition upstream in Division Box B upstream of the final clarifiers will be sufficient.

The optimum coagulant should be determined through a site-specific evaluation of alternatives. The evaluation should include jar testing and related analysis based on a comprehensive list of criteria, including performance, chemical cost, sludge production, alkalinity consumption, and increase in TDS concentration. Full scale demonstration testing is also normally recommended to verify design and operational parameters estimated through jar testing.

For the purposes of this study, it will be assumed that Polyaluminun Chloride (PACL) will be utilized as the coagulant. PACL offers a number of advantages over alum or ferric chloride, including reduced alkalinity consumption and a reduced increase in sludge production.

Based on recent experience at a nearby authority, it is estimated that the average feed rate of PACL will be approximately 80 gallons per day. At a current bulk cost of $2.80 per gallon, the corresponding annual chemical cost would be about $82,000 per year. Based on a typical storage volume of 30 days, and pending testing to confirm dose, two 1,500 gallon storage tanks are anticipated, together with chemical feed pumps, which will need to be located in a building (for freeze protection) with spill containment. To minimize cost, a pre-engineered metal building will be assumed.

The addition of a coagulant will also increase sludge production, typically by about 20%. An increase in sludge production of 20% if disposed at the current concentration of about 2.4% would increase sludge disposal costs by about $22,000 per year, as further described below.

During 2009, a total of 1,604,000 gallons of sludge was removed from the plant at an average concentration of 2.38%. Based on the current transportation cost of $0.0299/gal and current disposal cost of $0.39/gal, the annual cost for sludge disposal in 2009 was approximately $110,500. With the expected 20% increase in sludge production, the annual cost for transportation and disposal (in 2009 dollars) will increase to about $133,000 per year.

With the installation of a new influent screening system to eliminate the current dilution of thickened sludge caused by the static screens, sludge would be disposed at a concentration of about 5% solids. Assuming 5% solids, the annual cost for disposal would decrease from about $133,000 per year to about $64,000 per year, thus reducing annual costs by about $69,000 per year.

The cost for an appropriately sized below grade screen system with vertical lifts to convey compacted screenings above grade is approximately $500,000, resulting in a payback period for this investment of approximately 7 years, less if the thickened sludge solids concentration is greater than 5%. Therefore, it is recommended that a new influent screening system be implemented in conjunction with a coagulant storage and feed system for chemical phosphorus removal.

Budgetary costs for the phosphorus removal improvements were developed based on budgetary costs from a representative chemical storage tank manufacturer (Snyder), budgetary costs from a representative below grade fine screen manufacturer (Huber), typical unit costs for a pre-engineered metal building, and percentages for items such as equipment installation, site work, piping, equipment installation and electrical, together with contractor overhead and profit at 21% (includes mobilization bonds and insurance), a 20% contingency, and 15% for engineering. Product information on the representative UV disinfection system is presented in Appendix E. The resulting budgetary capital cost estimate, in 2010 dollars, is presented in Table 20.

Table 20: Budgetary Capital Cost Estimate for Future TP Effluent Limitations

Item/Description	*Quantity*	*Unit/Basis*	*Unit Budgetary Cost*	*Item Budgetary Cost*
Plant Improvement Budgetary Costs				
Major Equipment & Systems				
PACL Storage Tanks	2	EA	$ 2,000	$ 4,000
PACL Feed System	1	LS	$ 20,000	$ 20,000
Screens - Precast Vault	1	EA	$ 45,000	$ 45,000
Screens - Excavation & Backfill	1,200	CY	$ 35	$ 42,000
Screens - Enclosure	1	EA	$ 50,000	$ 50,000
Pumping Station Screens	2	EA	$ 90,000	$ 180,000
				$ -
Subtotal				*$ 341,000*
Installation	25%			$ 85,250
Major Equipment and Systems Subtotal				*$ 426,250*
Building				
Pre-Engineered Building	900	SF	$ 150.00	$ 135,000
				$ -
Building Subtotal				*$ 135,000*
Percentage Items				
Civil/Site	7%			$ 39,288
Piping and Valves	10%			$ 56,125
Electrical	10%			$ 56,125
Instrumentation & Controls	5%			$ 28,063
Contractor Overhead & Profit	21%			$ 155,579
Contingency	20%			$ 148,170
Percentage Items Subtotal				*$ 483,349*
Plant Improvements Budgetary Construction Cost				***$ 1,044,599***
Engineering	15%			$ 156,690
TOTAL BUDGETARY CAPITAL COST				**$ 1,201,288**

A conceptual flow schematic and site plan are presented as Figures 11 and 12, and include the improvements for the No I&I Reduction Alternative.

Figure 11. Plant Improvements Conceptual Flow Schematic
Long Hill Township WWTP

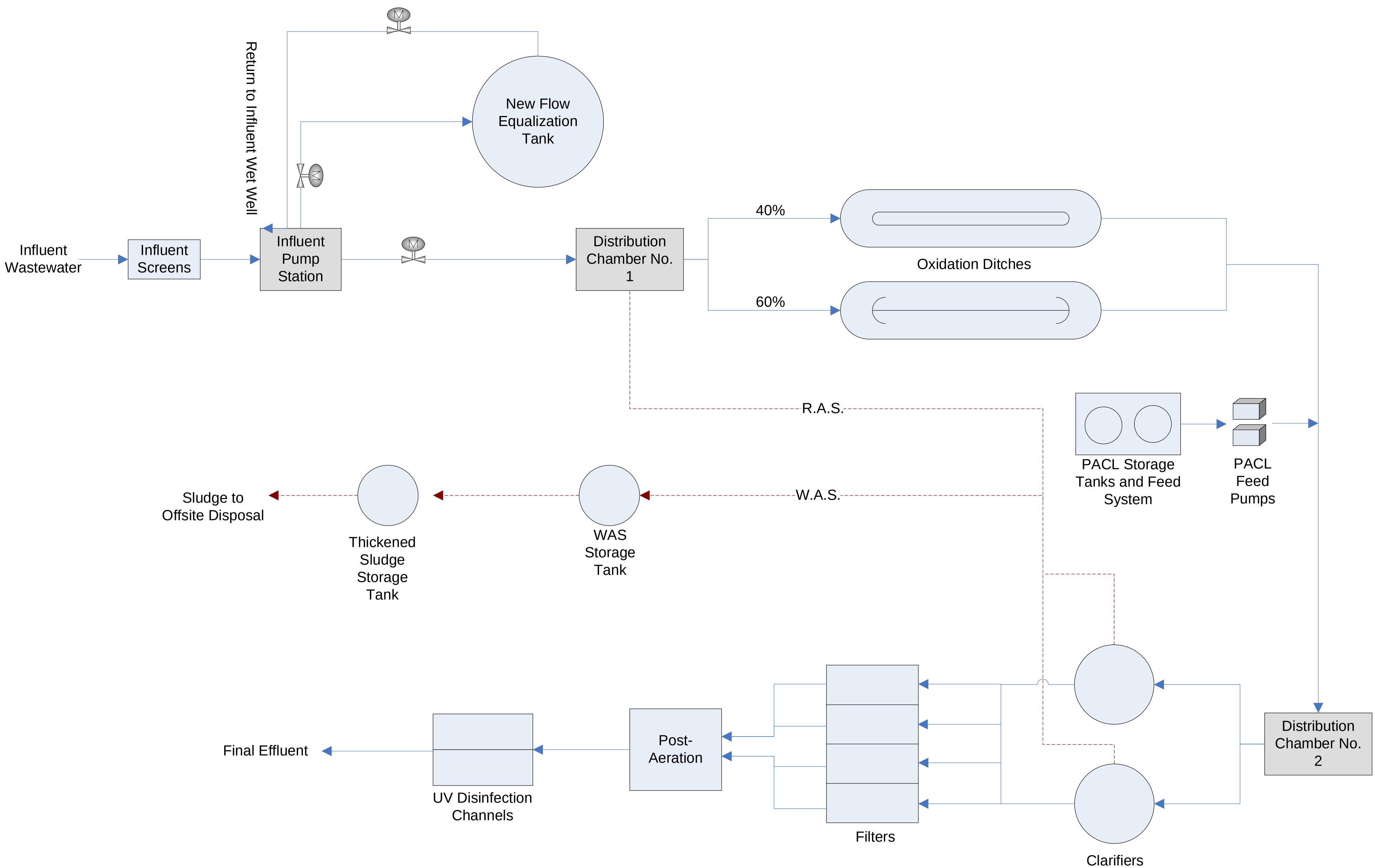


Figure 12
Plant Improvements Concept Plan

Long Hill WWTP
Township of Long Hill
Morris County, NJ

0 50 100
SCALE 1" = 100' FEET

June 30, 2010

OMNI ENVIRONMENTAL LLC
321 WALL STREET
PRINCETON, NJ 08540
PH: (609) 924-8821
FAX: (609) 924-8831

11.0 CONCLUSIONS AND RECOMMENDATIONS

The key conclusions and recommendations resulting from this study are:

1. The lowest cost alternative to provide sufficient capacity for future growth is the No I&I Reduction Alternative.
2. The budgetary capital cost estimate for the No I&I Reduction alternative is approximately $4.1 million in 2010 dollars, based on implementation of the following plant improvements:
   a. A 1.65 million gallon flow equalization tank to temporarily store peak wet weather flows such that the maximum daily and peak hourly flows are reduced to the same extent as a 25% reduction in I&I.
   b. A mixing system for the flow equalization tank, so that solids are kept in suspension.
   c. Replacement of Influent Pumps #3 and #4 with larger units.
   d. A new UV disinfection system, which in addition to providing sufficient capacity, will reduce energy and maintenance costs.
3. In addition to being more expensive than the No Action Alternative, the alternatives that involve sewer rehabilitation have the disadvantage that specific reductions in I&I are difficult to predict and cannot be guaranteed, due to many factors including the migration of I&I that can occur after a portion of the system is rehabilitated.
4. It is anticipated that in the near future NJDEP will impose a Nitrate-Nitrogen (NO_3) limit of approximately 31 mg/L. However, since the WWTP's current effluent NO_3 concentration is approximately 15 mg/L, it is anticipated that capital improvements will not be required to comply with this future effluent limit.
5. It is anticipated that in the near future NJDEP will reduce the current Total Phosphorus (TP) effluent limit to 0.76 mg/L. Reliably achieving this effluent limit will require capital improvements to implement a coagulant storage and feed system for precipitation of soluble TP.
6. Pending a recommended site-specific evaluation of alternative coagulants, the budgetary annual chemical cost is estimated to be approximately $82,000 per year.

7. Coagulant addition will increase sludge generation, typically by approximately 20%. With a 20% increase in sludge production, and assuming that sludge continues to be removed at the 2009 average concentration of approximately 2.4%, the annual cost for sludge disposal will increase from approximately $110,500/year to approximately $133,000 per year.
8. Replacement of the existing static screens with a new influent screening system would enable sludge to be disposed at a concentration of approximately 5% solids. Assuming 5% solids, the annual cost for disposal would decrease from about $133,000 per year to about $64,000 per year, thus reducing annual costs by about $69,000 per year. Therefore, it is recommended that a new influent screening system be installed in conjunction with a coagulant storage and feed system.
9. The budgetary capital cost estimate to implement a coagulant storage and feed system together with a new influent screening system is approximately $1.2 million in 2010 dollars.
10. Without some level of ongoing I&I reduction activities, it is likely that the flow rate of I&I will increase in the future as the wastewater collection system continues to age and deteriorate. Therefore, the recommended alternative is the No I&I Reduction with I&I "kicker" fund alternative. The dollar amount for the I&I kicker fund should be established at a future date after the debt service for the plant upgrade project is accurately known.
11. It is recommended that the Township proceed with preliminary design of the recommended plant improvements. The objective of preliminary design is to advance the design to approximately the 30% completion point to facilitate consensus building on the detailed basis for design before proceeding with the preparation of bid-ready contract drawings and specifications. During preliminary design, several different site locations to install the flow equalization tank and Phosphorus Control Building, as well as several different types of influent screening systems, influent flow equalization mixing systems and UV disinfection system would be evaluated in detail. Alternative coagulants should also be evaluated.

APPENDIX A

Flow and Mass Balance Evaluations – Existing and Future Flow Scenarios

LONG HILL TOWNSHIP WWTP
FLOW AND MASS BALANCE EVALUATION
EXISTING FLOW CONDITIONS

	UNITS	ANNUAL AVERAGE DAY	MAXIMUM MONTH	MAXIMUM DAY	PEAK HOURLY FLOW
INFLUENT FLOWS & LOADS					
Influent Flow	mgd	1.10	1.75	3.43	4.40
Influent TSS Concentration	mg/l	187	155	132	
Influent TSS Load	lbs/day	1,710	2,265	3,782	
Influent BOD Concentration	mg/l	142	121	87	
Influent BOD Load	lbs/day	1,294	1,776	2,494	
Influent TKN Concentration	mg/l	26	22	16	
Influent TKN Load	lbs/day	235	323	453	
INFLUENT + RECYCLE FLOWS & LOADS					
Influent Flow	mgd	1.15	1.84	3.54	4.54
Influent TSS Concentration	mg/l	358	318	604	
Influent TSS Load	lbs/day	1793	2390	4200	
Influent BOD Concentration	mg/l	244	219	370	
Influent BOD Load	lbs/day	1343	1851	2745	
Influent TKN Concentration	mg/l	26	24	19	
Influent TKN Load	lbs/day	235	324	456	
OXIDATION CHANNELS					
Influent Flow	mgd	1.15	1.84	3.54	4.54
Influent TSS	lbs/day	1793	2390	4200	
Influent TSS	mg/l	358	318	604	
Influent BOD	lbs/day	1343	1851	2745	
Influent BOD	mg/l	244	219	370	
Influent TKN	lbs/day	235	324	456	
Influent TKN	mg/l	26	24	19	
Total Volume Installed	ft^3	121,249	121,249	121,249	121,249
Total Volume Installed	gals	907,000	907,000	907,000	907,001
Total Volume in Service	ft^3	121,249	121,249	121,249	121,249
Total Volume in Service	gals	907,000	907,000	907,000	907,001
Typical Design Criteria					
Hydraulic D.T. @ Design Flow (NJDEP)	hrs	7.5	7.5	N/A	N/A
Hydraulic D.T. @ Design Flow (WEF)	hrs	8-36	8-36	N/A	N/A
BOD Loading @ Design Flow(NJDEP)	lb/Kcf/day	38	38	N/A	N/A
BOD Loading @ Design Flow(10 STATES)	lb/Kcf/day	15	15	N/A	N/A
BOD Loading @ Design Flow(WEF)	lb/Kcf/day	5-30	5-30	N/A	N/A
Solids Retention Time @ Design Flow (WEF)	days	10-30	10-30	N/A	N/A
F/MLVSS Ratio at Desgin Flow (M&E Wastewater Engineerin Text)		0.04-0.1	0.04- 0.1	N/A	N/A
Actual Hydraulic Detention Time	hrs	18.9	11.8	6.2	4.80
Actual BOD Loading	lb/Kcf/day	11	15	23	
Solids Retention Time	days	20	16	12	
MLSS	mg/l	2,539	2,820	3,231	
MLSS	lbs	19,204	21,334	24,440	
Percent MLVSS	%	75%	75%	75%	
MLVSS	lbs	14,403	16,001	18,330	
F/MLSS		0.07	0.09	0.11	
F/MLVSS		0.09	0.12	0.15	
Sludge Production/lb BOD Removed	lb/lb	0.70	0.70	0.70	
Biological Waste Sludge Production	lbs/day	893	1,207	1,653	
OXYGEN REQUIREMENTS					
Oxygen Required/BOD	lb/lb	1.3	1.3	1.3	
Influent TKN	mg/l	26	24	19	
Influent TKN	lbs/day	235	324	456	
Effluent NH3	mg/l	0.41	2.00	3.00	
Effluent NH3	lbs/day	4	31	88	
Oxygen Required/TKN	lbs/day	4.57	4.57	4.57	
Carbonaceous Oxygen Demand	lbs/day	1,658	2,242	3,070	
Nitrogenous Oxygen Demand	lbs/day	1,058	1,341	1,680	
Actual Oxygen Requirement (AOR)	lbs/day	2,716	3,584	4,750	
Operating DO	mg/l	2.0	2.0	1.5	
Water Temperature	°C	25	25	25	
Saturation DO	mg/l	8.02	8.02	8.02	
alpha		0.80	0.80	0.80	
beta		0.98	0.98	0.98	
Standard Oxygen Requirement (SOR)	lbs/day	4,672	6,165	7,530	
Standard Oxygen Requirement (SOR)	lbs/hr	195	257	314	
Oxidation Ditch #1 Brush Aerator Capacity @ 6.6 lb//hr/ft of shaft	lbs/hr	185	185	185	
Oxidation Ditch #2 Brush Aerator Capacity @ 5.85 lb/hr/ft of shaft	lbs/hr	245	245	245	
Total Oxidaiton Ditch Brush Aerator Capactiy	lbs/hr	430.00	430.00	430.00	

LONG HILL TOWNSHIP WWTP
FLOW AND MASS BALANCE EVALUATION
EXISTING FLOW CONDITIONS

	UNITS	ANNUAL AVERAGE DAY	MAXIMUM MONTH	MAXIMUM DAY	PEAK HOURLY FLOW
FINAL CLARIFIERS					
Number of Tanks Installed		2	2	2	2
Number of Tank in Service		2	2	2	2
Clarifier Diameter	ft	50	50	50	50
Clarifer Depth	ft	11.66	11.66	11.66	11.66
Area per Clarifier	sf	1,963	1,963	1,963	1,963
Total Area in Service	sf	3,927	3,927	3,927	3,927
Volume per Clarifier	cf	22,894	22,894	22,894	22,894
Total Volume in Service	cf	45,789	45,789	45,789	45,789
Volume per Clarifier	gals	171,273	171,273	171,273	171,273
Total Volume in Service	gals	342,545	342,545	342,545	342,545
Design Criteria:					
Overflow Rate @ Design Flow (NJDEP)	gpd/sf	<1000	<1000	N/A	N/A
Overflow Rate @ Peak Flow (10 STATES)	gpd/sf	N/A	N/A	<1,000	<1,000
Overflow Rate @ Avg & Peak (WEF)	gpd/sf	400-700	400-700	1000-1600	1000-1600
Solids Loading Rate (10 STATES)	lbs/sf day	N/A	N/A	<35	N/A
Solids Loading Rate (WEF) *Solids Flux Analysis	lbs/sf day	SF*	SF*	SF	
Solids Loading Rate (M&E Wastewater Engineering Text)	lbs/sf day	12-24	12-24	<34	N/A
RAS Flow % of Influent Flow (M&E Wastewater Engineering Text)	%	75 to 150	75 to 150	N/A	N/A
Solids Flux Capacity at RAS flow and SVI between 100 and 150	lbs/sf day	11 to 15	11 to 15	11 to 15	
Actual Overflow Rate	gpd/sf	294	470	900	1,155
Actual Solids Loading	lbs/sf day	8	13	26	
RAS Pumping System Capacity	mgd	2	2	2	
RAS Flow	mgd	0.40	0.40	0.40	
Underflow Rate (RAS flow divided by clarifer surface area)	gpd/sf	101.86	101.86	101.86	
RAS % of Influent Flow	%	35%	22%	11%	
RASS	mg/l	8,823	14,360	26,447	
RASS	lbs/day	29,081	47,331	87,170	
MLSS	mg/l	2,539	2,820	3,231	
Total Flow (Plant + RAS)	mgd	1.50	2.15	3.83	
MLSS Load	lbs/day	31,654	50,622	103,191	
WAS Production	lbs/day	893	1,207	1,653	
WAS Solids Content	mg/l	8,823	14,360	26,447	
WAS Solids Content	%	0.88%	1.44%	2.64%	
WAS Flow	mgd	0.012	0.010	0.007	
WAS Flow	gpd	12,135	10,080	7,496	
Clarifier Effluent Flow	mgd	1.15	1.84	3.54	4.54
Clarifier Effluent TSS	mg/l	10.00	12.00	20.00	20
Clarifier Effluent TSS	lb/day	96.13	184.58	589.75	
Clarifier Effluent TSS	kg/day	44	84	268	
Clarifier Effluent BOD	mg/l	7.00	8.20	13.00	
Clarifier Effluent BOD	lb/day	67	126	383	
Clarifier Effluent BOD	kg/day	31	57	174	
Clarifier Effluent NH3	mg/l	0.41	2.00	3.00	
Clarifier Effluent NH3	lb/day	4	31	88	
Clarifier Effluent NH3	kg/day	2	14	40	
FILTERS					
Number of Continuous Backwash Filters		4	4	4	4
Total surface area per filter	SF	150	150	150	150
Total Filter Surface Area	SF	600	600	600	600
Design Criteria					
Filtration Rate (10 States)	gpm/sf	N/A	N/A	N/A	<5
Filtration Rate (M&E Wastewater Engineering Test)	gpm/sf	2	2	<5	<5
Filtration Rate (Manufacturer)	gpm/sf	2 to 3	2 to 3	<5	<5
Maximum TSS concentration (Manufacturer)	mg/L	20 to 30	20 to 30	20 to 30	20 to 30
Actual Filtration Rate	gpm/sf	1.33	2.13	4.09	5.25
Recycle Flow:					
Backwash flow % of Forward Flow	%	5	5	3	3
Backwash flow	mgd	0.06	0.09	0.11	0.14
Backwash TSS	mg/l	171	163	472	
Backwash TSS	lbs/day	82	125	418	
Backwash BOD	mg/l	102	98	283	
Backwash BOD	lbs/day	49	75	251	
Backwash TKN	mg/l	0.4	2.0	3.0	
Backwash TKN	lbs/day	0.2	1.5	2.7	
Effluent Flow	mgd	1.10	1.75	3.43	4.40
Effluent TSS	mg/l	1.53	4.06	6.00	
Effluent TSS	lb/day	13.98	59.28	171.62	
Effluent TSS	kg/day	6	27	78	
Effluent BOD	mg/l	2.28	4.22	7.00	
Effluent BOD	lb/day	21	62	200	
Effluent BOD	kg/day	9	28	91	
Effluent NH3	mg/l	0.41	2.00	3.00	
Effluent NH3	lb/day	4	29	86	
Effluent NH3	kg/day	2	13	39	

LONG HILL TOWNSHIP WWTP
FLOW AND MASS BALANCE EVALUATION
EXISTING FLOW CONDITIONS

	UNITS	ANNUAL AVERAGE DAY	MAXIMUM MONTH	MAXIMUM DAY	PEAK HOURLY FLOW
POST AERATION SYSTEM					
Number of Tanks Installed		2	2	2	2
Volume per Tank	cf	3,151	3,151	3,151	3,151
Total Volume	cf	6,302	6,302	6,302	6,302
Total Volume	gal	47,145	47,145	47,145	47,145
Hydaulic Detention Time	hrs	1.0	0.6	0.3	0.3
D.O. concentration of filtered effluent	mg/L	1	1	1.5	1.5
Desired D.O.concentraiton of final effluent	mg/L	7.0	7.0	6.5	6.5
Acutal Oxygen Requirement	lb/day	55	88	143	184
Water temperature	degrees C	25	25	25	25
Saturation DO	mg/L	8.02	8.02	8.02	8.02
alpha		0.80	0.80	0.80	0.80
beta		0.95	0.95	0.95	0.95
Standard Oxygen Requirement	lb/day	341	546	551	707
Diffuser type		coarse	coarse	coarse	coarse
Oxygen transfer efficiency	%	12.00	12.00	12.00	12.00
Oxygen required	lb/day	2,845	4,552	4,590	5,889
Oxygen content of air	%	23.00	23.00	23.00	23.00
Weight of oxygen	lb/cf	0.017	0.017	0.017	0.017
Total air required	cf/day	167,344	267,771	270,005	346,401
Required blower capacity	cfm	116	186	188	241
Blower capacity	cfm	220	220	220	220
UV DISINFECTION					
# of Lamp Rack Assemblies		40	40	40	40
Lamps per Assembly		4	4	4	4
# of Channels		2	2	2	2
Channel Width	ft	23.75	23.75	23.75	23.75
Manufacturer's stated capactiy	mgd	3.6	3.6	3.6	3.6
NJDEP Required Safety Factor	%	125	125	125	125
Actual Safety Factor based on flow				102%	79%
SOLIDS PRODUCTION SUMMARY					
WAS Production	lbs/day	893	1,207	1,653	
WAS Solids Content	%	0.88%	1.44%	2.64%	
WAS Flow	gpd	12,135	10,080	7,496	
TOTAL SLUDGE FLOW TO STORAGE					
Total Sludge Production	lbs/day	893	1,207	1,653	
Sludge Solids Content	%	0.88%	1.44%	2.64%	
Daily Average Sludge Flow	gpd	12,135	10,080	7,496	
Maximum Wastte Sludge Pumping Rate	gpm	88	74	55	

LONG HILL TOWNSHIP WWTP
FLOW AND MASS BALANCE EVALUATION
FUTURE FLOW CONDITIONS WITHOUT I&I REDUCTION

	UNITS	ANNUAL AVERAGE DAY	MAXIMUM MONTH	MAXIMUM DAY	PEAK HOURLY FLOW
INFLUENT FLOWS & LOADS					
Influent Flow	mgd	1.24	1.99	3.89	4.99
Influent TSS Concentration	mg/l	187	155	132	
Influent TSS Load	lbs/day	1,940	2,569	4,290	
Influent BOD Concentration	mg/l	142	138	87	
Influent BOD Load	lbs/day	1,467	2,014	2,829	
Influent TKN Concentration	mg/l	26	22	16	
Influent TKN Load	lbs/day	267	366	514	
INFLUENT + RECYCLE FLOWS & LOADS					
Influent Flow	mgd	1.31	2.09	4.01	5.15
Influent TSS Concentration	mg/l	358	318	604	
Influent TSS Load	lbs/day	2033	2711	4764	
Influent BOD Concentration	mg/l	244	235	370	
Influent BOD Load	lbs/day	1523	2099	3114	
Influent TKN Concentration	mg/l	26	24	19	
Influent TKN Load	lbs/day	267	368	517	
OXIDATION CHANNELS					
Influent Flow	mgd	1.31	2.09	4.01	5.15
Influent TSS	lbs/day	2033	2711	4764	
Influent TSS	mg/l	358	318	604	
Influent BOD	lbs/day	1523	2099	3114	
Influent BOD	mg/l	244	235	370	
Influent TKN	lbs/day	267	368	517	
Influent TKN	mg/l	26	24	19	
Total Volume Installed	ft^3	121,249	121,249	121,249	121,249
Total Volume Installed	gals	907,000	907,000	907,000	907,001
Total Volume in Service	ft^3	121,249	121,249	121,249	121,249
Total Volume in Service	gals	907,000	907,000	907,000	907,001
Typical Design Criteria					
Hydraulic D.T. @ Design Flow (NJDEP)	hrs	7.5	7.5	N/A	N/A
Hydraulic D.T. @ Design Flow (WEF)	hrs	8-36	8-36	N/A	N/A
BOD Loading @ Design Flow(NJDEP)	lb/Kcf/day	38	38	N/A	N/A
BOD Loading @ Design Flow(10 STATES)	lb/Kcf/day	15	15	N/A	N/A
BOD Loading @ Design Flow(WEF)	lb/Kcf/day	5-30	5-30	N/A	N/A
Solids Retention Time @ Design Flow (WEF)	days	10-30	10-30	N/A	N/A
F/MLVSS Ratio at Desgin Flow (M&E Wastewater Engineerin Text)		0.04-0.1	0.04- 0.1	N/A	N/A
Actual Hydraulic Detention Time	hrs	16.7	10.4	5.4	4.23
Actual BOD Loading	lb/Kcf/day	13	17	26	
Solids Retention Time	days	20	18	12	
MLSS	mg/l	2,880	3,599	3,665	
MLSS	lbs	21,783	27,223	27,721	
Percent MLVSS	%	75%	75%	75%	
MLVSS	lbs	16,337	20,418	20,790	
F/MLSS		0.07	0.08	0.11	
F/MLVSS		0.09	0.10	0.15	
Sludge Yield (lb WAS/lb BOD removed)	lb/lb	0.70	0.70	0.70	
Biological Waste Sludge Production	lbs/day	1,013	1,369	1,875	
OXYGEN REQUIREMENTS					
Oxygen Required/BOD	lb/lb	1.3	1.3	1.3	
Influent TKN	mg/l	26	24	19	
Influent TKN	lbs/day	267	368	517	
Effluent NH3	mg/l	0.41	2.00	3.00	
Effluent NH3	lbs/day	4	35	100	
Oxygen Required/TKN	lbs/day	4.57	4.57	4.57	
Carbonaceous Oxygen Demand	lbs/day	1,881	2,543	3,483	
Nitrogenous Oxygen Demand	lbs/day	1,200	1,522	1,905	
Actual Oxygen Requirement (AOR)	lbs/day	3,081	4,065	5,388	
Operating DO	mg/l	2.0	2.0	1.5	
Water Temperature	°C	25	25	25	
Saturation DO	mg/l	8.02	8.02	8.02	
alpha		0.80	0.80	0.80	
beta		0.98	0.98	0.98	
Standard Oxygen Requirement (SOR)	lbs/day	5,300	6,993	8,541	
Standard Oxygen Requirement (SOR)	lbs/hr	221	291	356	
Oxidation Ditch #1 Brush Aerator Capacity @ 6.6 lb//hr/ft of shaft	lbs/hr	185	185	185	
Oxidation Ditch #2 Brush Aerator Capacity @ 5.85 lb/hr/ft of shaft	lbs/hr	245	245	245	
Total Oxidaiton Ditch Brush Aerator Capactiy	lbs/hr	430.00	430.00	430.00	

LONG HILL TOWNSHIP WWTP
FLOW AND MASS BALANCE EVALUATION
FUTURE FLOW CONDITIONS WITHOUT I&I REDUCTION

	UNITS	ANNUAL AVERAGE DAY	MAXIMUM MONTH	MAXIMUM DAY	PEAK HOURLY FLOW
FINAL CLARIFIERS					
Number of Tanks Installed		2	2	2	2
Number of Tank in Service		2	2	2	2
Clarifier Diameter	ft	50	50	50	50
Clarifer Depth	ft	11.66	11.66	11.66	11.66
Area per Clarifier	sf	1,963	1,963	1,963	1,963
Total Area in Service	sf	3,927	3,927	3,927	3,927
Volume per Clarifier	cf	22,894	22,894	22,894	22,894
Total Volume in Service	cf	45,789	45,789	45,789	45,789
Volume per Clarifier	gals	171,273	171,273	171,273	171,273
Total Volume in Service	gals	342,545	342,545	342,545	342,545
Design Criteria:					
Overflow Rate @ Design Flow (NJDEP)	gpd/sf	<1000	<1000	N/A	N/A
Overflow Rate @ Peak Flow (10 STATES)	gpd/sf	N/A	N/A	<1,000	<1,000
Overflow Rate @ Avg & Peak (WEF)	gpd/sf	400-700	400-700	1000-1600	1000-1600
Solids Loading Rate (10 STATES)	lbs/sf day	N/A	N/A	<35	N/A
Solids Loading Rate (WEF) *Solids Flux Analysis	lbs/sf day	SF*	SF*	SF	
Solids Loading Rate (M&E Wastewater Engineering Text)	lbs/sf day	12-24	12-24	<34	N/A
RAS Flow % of Influent Flow (M&E Wastewater Engineering Text)	%	75 to 150	75 to 150	N/A	N/A
Solids Flux Capacity at RAS flow and SVI between 100 and 150	lbs/sf day	15 to 20	24 to 30	32 to 38	
Actual Overflow Rate	gpd/sf	333	533	1,021	1,310
Actual Solids Loading	lbs/sf day	11	23	41	
RAS Pumping System Capacity	mgd	2	2	2	
RAS Flow	mgd	0.6	1.0	1.4	
Underflow Rate (RAS flow divided by clarifer surface area)	gpd/sf	152.79	254.65	356.51	
RAS % of Influent Flow	%	46%	48%	35%	
RASS	mg/l	8,374	10,463	12,431	
RASS	lbs/day	41,403	86,216	143,402	
MLSS	mg/l	2,880	3,599	3,665	
Total Flow (Plant + RAS)	mgd	1.84	2.99	5.29	
MLSS Load	lbs/day	44,237	89,664	161,679	
WAS Production	lbs/day	1,013	1,369	1,875	
WAS Solids Content	mg/l	8,374	10,463	12,431	
WAS Solids Content	%	0.84%	1.05%	1.24%	
WAS Flow	mgd	0.015	0.016	0.018	
WAS Flow	gpd	14,501	15,692	18,088	
Clarifier Effluent Flow	mgd	1.31	2.09	4.01	5.15
Clarifier Effluent TSS	mg/l	10.00	12.00	20.00	20
Clarifier Effluent TSS	lb/day	109.03	209.36	668.92	
Clarifier Effluent TSS	kg/day	49	95	303	
Clarifier Effluent BOD	mg/l	7.00	8.20	13.00	
Clarifier Effluent BOD	lb/day	76	143	435	
Clarifier Effluent BOD	kg/day	35	65	197	
Clarifier Effluent NH3	mg/l	0.41	2.00	3.00	
Clarifier Effluent NH3	lb/day	4	35	100	
Clarifier Effluent NH3	kg/day	2	16	46	
FILTERS					
Number of Continuous Backwash Filters		4	4	4	4
Total surface area per filter	SF	150	150	150	150
Total Filter Surface Area	SF	600	600	600	600
Design Criteria					
Filtration Rate (10 States)	gpm/sf	N/A	N/A	N/A	<5
Filtration Rate (M&E Wastewater Engineering Test)	gpm/sf	2	2	<5	<5
Filtration Rate (Manufacturer)	gpm/sf	2 to 3	2 to 3	<5	<5
Maximum TSS concentration (Manufacturer)	mg/L	20 to 30	20 to 30	20 to 30	20 to 30
Actual Filtration Rate	gpm/sf	1.51	2.42	4.64	5.95
Recycle Flow:					
Backwash flow % of Forward Flow	%	5	5	3	3
Backwash flow	mgd	0.07	0.10	0.12	0.15
Backwash TSS	mg/l	171	163	472	
Backwash TSS	lbs/day	93	142	474	
Backwash BOD	mg/l	102	98	283	
Backwash BOD	lbs/day	56	85	285	
Backwash TKN	mg/l	0.4	2.0	3.0	
Backwash TKN	lbs/day	0.2	1.7	3.0	
Effluent Flow	mgd	1.24	1.99	3.89	4.99
Effluent TSS	mg/l	1.53	4.06	6.00	
Effluent TSS	lb/day	15.86	67.24	194.66	
Effluent TSS	kg/day	7	30	88	
Effluent BOD	mg/l	2.28	4.22	7.00	
Effluent BOD	lb/day	24	70	227	
Effluent BOD	kg/day	11	32	103	
Effluent NH3	mg/l	0.41	2.00	3.00	
Effluent NH3	lb/day	4	33	97	
Effluent NH3	kg/day	2	15	44	

LONG HILL TOWNSHIP WWTP
FLOW AND MASS BALANCE EVALUATION
FUTURE FLOW CONDITIONS WITHOUT I&I REDUCTION

	UNITS	ANNUAL AVERAGE DAY	MAXIMUM MONTH	MAXIMUM DAY	PEAK HOURLY FLOW
POST AERATION SYSTEM					
Number of Tanks Installed		2	2	2	2
Volume per Tank	cf	3,151	3,151	3,151	3,151
Total Volume	cf	6,302	6,302	6,302	6,302
Total Volume	gal	47,145	47,145	47,145	47,145
Hydaulic Detention Time	hrs	0.9	0.6	0.3	0.2
D.O. concentration of filtered effluent	mg/L	1	1	1.5	1.5
Desired D.O.concentraiton of final effluent	mg/L	7.0	7.0	6.5	6.5
Acutal Oxygen Requirement	lb/day	62	100	162	208
Water temperature	degrees C	25	25	25	25
Saturation DO	mg/L	8.02	8.02	8.02	8.02
alpha		0.80	0.80	0.80	0.80
beta		0.95	0.95	0.95	0.95
Standard Oxygen Requirement	lb/day	387	620	625	802
Diffuser type		coarse	coarse	coarse	coarse
Oxygen transfer efficiency	%	12.00	12.00	12.00	12.00
Oxygen required	lb/day	3,227	5,163	5,206	6,679
Oxygen content of air	%	23.00	23.00	23.00	23.00
Weight of oxygen	lb/cf	0.017	0.017	0.017	0.017
Total air required	cf/day	189,810	303,718	306,252	392,904
Required blower capacity	cfm	132	211	213	273
Blower capacity	cfm	220	220	220	220
UV DISINFECTION					
# of Lamp Rack Assemblies		40	40	40	40
Lamps per Assembly		4	4	4	4
# of Channels		2	2	2	2
Channel Width	ft	23.75	23.75	23.75	23.75
Manufacturer's stated capactiy	mgd	3.6	3.6	3.6	3.6
NJDEP Required Safety Factor	%	125	125	125	125
Actual Safety Factor based on flow				90%	70%
SOLIDS PRODUCTION SUMMARY					
WAS Production	lbs/day	1,013	1,369	1,875	
WAS Solids Content	%	0.84%	1.05%	1.24%	
WAS Flow	gpd	14,501	15,692	18,088	
TOTAL SLUDGE FLOW TO STORAGE					
Total Sludge Production	lbs/day	1,013	1,369	1,875	
Sludge Solids Content	%	0.84%	1.05%	1.24%	
Daily Average Sludge Flow	gpd	14,501	15,692	18,088	
Maximum Wastte Sludge Pumping Rate	gpm	106	114	132	

LONG HILL TOWNSHIP WWTP
FLOW AND MASS BALANCE EVALUATION
FUTURE FLOW CONDITIONS WITH 25% TOTAL I&I REDUCTION

	UNITS	ANNUAL AVERAGE DAY	MAXIMUM MONTH	MAXIMUM DAY	PEAK HOURLY FLOW
INFLUENT FLOWS & LOADS					
Influent Flow	mgd	1.13	1.69	3.11	4.02
Influent TSS Concentration	mg/l	206	182	165	
Influent TSS Load	lbs/day	1,940	2,569	4,290	
Influent BOD Concentration	mg/l	156	143	109	
Influent BOD Load	lbs/day	1,467	2,014	2,829	
Influent TKN Concentration	mg/l	28	26	20	
Influent TKN Load	lbs/day	267	366	514	
INFLUENT + RECYCLE FLOWS & LOADS					
Influent Flow	mgd	1.19	1.78	3.21	4.14
Influent TSS Concentration	mg/l	377	345	637	
Influent TSS Load	lbs/day	2025	2689	4669	
Influent BOD Concentration	mg/l	258	241	392	
Influent BOD Load	lbs/day	1518	2086	3057	
Influent TKN Concentration	mg/l	28	28	23	
Influent TKN Load	lbs/day	267	368	517	
OXIDATION CHANNELS					
Influent Flow	mgd	1.19	1.78	3.21	4.14
Influent TSS	lbs/day	2025	2689	4669	
Influent TSS	mg/l	377	345	637	
Influent BOD	lbs/day	1518	2086	3057	
Influent BOD	mg/l	258	241	392	
Influent TKN	lbs/day	267	368	517	
Influent TKN	mg/l	28	28	23	
Total Volume Installed	ft^3	121,249	121,249	121,249	121,249
Total Volume Installed	gals	907,000	907,000	907,000	907,001
Total Volume in Service	ft^3	121,249	121,249	121,249	121,249
Total Volume in Service	gals	907,000	907,000	907,000	907,001
Typical Design Criteria					
Hydraulic D.T. @ Design Flow (NJDEP)	hrs	7.5	7.5	N/A	N/A
Hydraulic D.T. @ Design Flow (WEF)	hrs	8-36	8-36	N/A	N/A
BOD Loading @ Design Flow(NJDEP)	lb/Kcf/day	38	38	N/A	N/A
BOD Loading @ Design Flow(10 STATES)	lb/Kcf/day	15	15	N/A	N/A
BOD Loading @ Design Flow(WEF)	lb/Kcf/day	5-30	5-30	N/A	N/A
Solids Retention Time @ Design Flow (WEF)	days	10-30	10-30	N/A	N/A
F/MLVSS Ratio at Desgin Flow (M&E Wastewater Engineerin Text)		0.04-0.1	0.04- 0.1	N/A	N/A
Actual Hydraulic Detention Time	hrs	18.3	12.3	6.8	5.25
Actual BOD Loading	lb/Kcf/day	13	17	25	
Solids Retention Time	days	20	18	12	
MLSS	mg/l	2,865	3,562	3,560	
MLSS	lbs	21,669	26,944	26,931	
Percent MLVSS	%	75%	75%	75%	
MLVSS	lbs	16,251	20,208	20,199	
F/MLSS		0.07	0.08	0.11	
F/MLVSS		0.09	0.10	0.15	
Sludge Yield (lb WAS/lb BOD removed)	lb/lb	0.70	0.70	0.70	
Biological Waste Sludge Production	lbs/day	1,014	1,375	1,896	
OXYGEN REQUIREMENTS					
Oxygen Required/BOD	lb/lb	1.3	1.3	1.3	
Influent TKN	mg/l	28	28	23	
Influent TKN	lbs/day	267	368	517	
Effluent NH3	mg/l	0.41	2.00	3.00	
Effluent NH3	lbs/day	4	30	80	
Oxygen Required/TKN	lbs/day	4.57	4.57	4.57	
Carbonaceous Oxygen Demand	lbs/day	1,883	2,554	3,522	
Nitrogenous Oxygen Demand	lbs/day	1,201	1,544	1,994	
Actual Oxygen Requirement (AOR)	lbs/day	3,085	4,099	5,516	
Operating DO	mg/l	2.0	2.0	1.5	
Water Temperature	°C	25	25	25	
Saturation DO	mg/l	8.02	8.02	8.02	
alpha		0.80	0.80	0.80	
beta		0.98	0.98	0.98	
Standard Oxygen Requirement (SOR)	lbs/day	5,307	7,052	8,743	
Standard Oxygen Requirement (SOR)	lbs/hr	221	294	364	
Oxidation Ditch #1 Brush Aerator Capacity @ 6.6 lb//hr/ft of shaft	lbs/hr	185	185	185	
Oxidation Ditch #2 Brush Aerator Capacity @ 5.85 lb/hr/ft of shaft	lbs/hr	245	245	245	
Total Oxidaiton Ditch Brush Aerator Capactiy	lbs/hr	430.00	430.00	430.00	

LONG HILL TOWNSHIP WWTP
FLOW AND MASS BALANCE EVALUATION
FUTURE FLOW CONDITIONS WITH 25% TOTAL I&I REDUCTION

	UNITS	ANNUAL AVERAGE DAY	MAXIMUM MONTH	MAXIMUM DAY	PEAK HOURLY FLOW
FINAL CLARIFIERS					
Number of Tanks Installed		2	2	2	2
Number of Tank in Service		2	2	2	2
Clarifier Diameter	ft	50	50	50	50
Clarifer Depth	ft	11.66	11.66	11.66	11.66
Area per Clarifier	sf	1,963	1,963	1,963	1,963
Total Area in Service	sf	3,927	3,927	3,927	3,927
Volume per Clarifier	cf	22,894	22,894	22,894	22,894
Total Volume in Service	cf	45,789	45,789	45,789	45,789
Volume per Clarifier	gals	171,273	171,273	171,273	171,273
Total Volume in Service	gals	342,545	342,545	342,545	342,545
Design Criteria:					
Overflow Rate @ Design Flow (NJDEP)	gpd/sf	<1000	<1000	N/A	N/A
Overflow Rate @ Peak Flow (10 STATES)	gpd/sf	N/A	N/A	<1,000	N/A
Overflow Rate @ Avg & Peak (WEF)	gpd/sf	400-700	400-700	1000-1600	N/A
Solids Loading Rate (10 STATES)	lbs/sf day	N/A	N/A	<35	N/A
Solids Loading Rate (WEF) *Solids Flux Analysis	lbs/sf day	SF*	SF*	SF	
Solids Loading Rate (M&E Wastewater Engineering Text)	lbs/sf day	12-24	12-24	<34	N/A
RAS Flow % of Influent Flow (M&E Wastewater Engineering Text)	%	75 to 150	75 to 150	N/A	N/A
Solids Flux Capacity at RAS flow and SVI between 100 and 150	lbs/sf day	15 to 20	24 to 30	32 to 38	
Actual Overflow Rate	gpd/sf	302	452	817	1,055
Actual Solids Loading	lbs/sf day	11	20	34	
RAS Pumping System Capacity	mgd	2	2	2	
RAS Flow	mgd	0.60	1.00	1.40	
Underflow Rate (RAS flow divided by clarifer surface area)	gpd/sf	152.79	254.65	356.51	
RAS % of Influent Flow	%	51%	56%	44%	
RASS	mg/l	7,787	9,274	10,263	
RASS	lbs/day	38,501	76,419	118,393	
MLSS	mg/l	2,865	3,562	3,560	
Total Flow (Plant + RAS)	mgd	1.73	2.69	4.51	
MLSS Load	lbs/day	41,281	79,821	134,032	
WAS Production	lbs/day	1,014	1,375	1,896	
WAS Solids Content	mg/l	7,787	9,274	10,263	
WAS Solids Content	%	0.78%	0.93%	1.03%	
WAS Flow	mgd	0.016	0.018	0.022	
WAS Flow	gpd	15,615	17,783	22,154	
Clarifier Effluent Flow	mgd	1.19	1.78	3.21	4.14
Clarifier Effluent TSS	mg/l	10.00	12.00	20.00	20
Clarifier Effluent TSS	lb/day	99.02	177.72	535.47	
Clarifier Effluent TSS	kg/day	45	81	243	
Clarifier Effluent BOD	mg/l	7.00	8.20	13.00	
Clarifier Effluent BOD	lb/day	69	121	348	
Clarifier Effluent BOD	kg/day	31	55	158	
Clarifier Effluent NH3	mg/l	0.41	2.00	3.00	
Clarifier Effluent NH3	lb/day	4	30	80	
Clarifier Effluent NH3	kg/day	2	13	36	
FILTERS					
Number of Continuous Backwash Filters		4	4	4	4
Total surface area per filter	SF	150	150	150	150
Total Filter Surface Area	SF	600	600	600	600
Design Criteria					
Filtration Rate (10 States)	gpm/sf	N/A	N/A	N/A	<5
Filtration Rate (M&E Wastewater Engineering Test)	gpm/sf	2	2	<5	<5
Filtration Rate (Manufacturer)	gpm/sf	2 to 3	2 to 3	<5	<5
Maximum TSS concentration (Manufacturer)	mg/L	20 to 30	20 to 30	20 to 30	20 to 30
Actual Filtration Rate	gpm/sf	1.37	2.06	3.72	4.80
Recycle Flow:					
Backwash flow % of Forward Flow	%	5	5	3	3
Backwash flow	mgd	0.06	0.09	0.10	0.12
Backwash TSS	mg/l	171	163	472	
Backwash TSS	lbs/day	85	121	380	
Backwash BOD	mg/l	102	98	283	
Backwash BOD	lbs/day	51	72	228	
Backwash TKN	mg/l	0.4	2.0	3.0	
Backwash TKN	lbs/day	0.2	1.5	2.4	
Effluent Flow	mgd	1.13	1.69	3.11	4.02
Effluent TSS	mg/l	1.53	4.06	6.00	
Effluent TSS	lb/day	14.40	57.07	155.82	
Effluent TSS	kg/day	7	26	71	
Effluent BOD	mg/l	2.28	4.22	7.00	
Effluent BOD	lb/day	21	59	182	
Effluent BOD	kg/day	10	27	82	
Effluent NH3	mg/l	0.41	2.00	3.00	
Effluent NH3	lb/day	4	28	78	
Effluent NH3	kg/day	2	13	35	

LONG HILL TOWNSHIP WWTP
FLOW AND MASS BALANCE EVALUATION
FUTURE FLOW CONDITIONS WITH 25% TOTAL I&I REDUCTION

	UNITS	ANNUAL AVERAGE DAY	MAXIMUM MONTH	MAXIMUM DAY	PEAK HOURLY FLOW
POST AERATION SYSTEM					
Number of Tanks Installed		2	2	2	2
Volume per Tank	cf	3,151	3,151	3,151	3,151
Total Volume	cf	6,302	6,302	6,302	6,302
Total Volume	gal	47,145	47,145	47,145	47,145
Hydaulic Detention Time	hrs	1.0	0.7	0.4	0.3
D.O. concentration of filtered effluent	mg/L	1	1	1.5	1.5
Desired D.O.concentraiton of final effluent	mg/L	7.0	7.0	6.5	6.5
Acutal Oxygen Requirement	lb/day	56	84	130	168
Water temperature	degrees C	25	25	25	25
Saturation DO	mg/L	8.02	8.02	8.02	8.02
alpha		0.80	0.80	0.80	0.80
beta		0.95	0.95	0.95	0.95
Standard Oxygen Requirement	lb/day	352	526	500	646
Diffuser type		coarse	coarse	coarse	coarse
Oxygen transfer efficiency	%	12.00	12.00	12.00	12.00
Oxygen required	lb/day	2,930	4,383	4,168	5,380
Oxygen content of air	%	23.00	23.00	23.00	23.00
Weight of oxygen	lb/cf	0.017	0.017	0.017	0.017
Total air required	cf/day	172,377	257,808	245,154	316,466
Required blower capacity	cfm	120	179	170	220
Blower capacity	cfm	220	220	220	220
UV DISINFECTION					
# of Lamp Rack Assemblies		40	40	40	40
Lamps per Assembly		4	4	4	4
# of Channels		2	2	2	2
Channel Width	ft	23.75	23.75	23.75	23.75
Manufacturer's stated capactiy	mgd	3.6	3.6	3.6	3.6
NJDEP Required Safety Factor	%	125	125	125	125
Actual Safety Factor based on flow				112%	87%
SOLIDS PRODUCTION SUMMARY					
WAS Production	lbs/day	1,014	1,375	1,896	
WAS Solids Content	%	0.78%	0.93%	1.03%	
WAS Flow	gpd	15,615	17,783	22,154	
TOTAL SLUDGE FLOW TO STORAGE					
Total Sludge Production	lbs/day	1,014	1,375	1,896	
Sludge Solids Content	%	0.78%	0.93%	1.03%	
Daily Average Sludge Flow	gpd	15,615	17,783	22,154	
Maximum Wastte Sludge Pumping Rate	gpm	114	130	162	

LONG HILL TOWNSHIP WWTP
FLOW AND MASS BALANCE EVALUATION
FUTURE FLOW CONDITIONS WITH 50% TOTAL I&I REDUCTION

	UNITS	ANNUAL AVERAGE DAY	MAXIMUM MONTH	MAXIMUM DAY	PEAK HOURLY FLOW
INFLUENT FLOWS & LOADS					
Influent Flow	mgd	1.01	1.39	2.34	3.05
Influent TSS Concentration	mg/l	229	222	220	
Influent TSS Load	lbs/day	1,940	2,569	4,290	
Influent BOD Concentration	mg/l	173	174	145	
Influent BOD Load	lbs/day	1,467	2,014	2,829	
Influent TKN Concentration	mg/l	32	32	26	
Influent TKN Load	lbs/day	267	366	514	
INFLUENT + RECYCLE FLOWS & LOADS					
Influent Flow	mgd	1.07	1.46	2.41	3.14
Influent TSS Concentration	mg/l	400	385	692	
Influent TSS Load	lbs/day	2016	2668	4575	
Influent BOD Concentration	mg/l	276	272	428	
Influent BOD Load	lbs/day	1513	2073	3000	
Influent TKN Concentration	mg/l	32	34	29	
Influent TKN Load	lbs/day	267	367	516	
OXIDATION CHANNELS					
Influent Flow	mgd	1.07	1.46	2.41	3.14
Influent TSS	lbs/day	2016	2668	4575	
Influent TSS	mg/l	400	385	692	
Influent BOD	lbs/day	1513	2073	3000	
Influent BOD	mg/l	276	272	428	
Influent TKN	lbs/day	267	367	516	
Influent TKN	mg/l	32	34	29	
Total Volume Installed	ft^3	121,249	121,249	121,249	121,249
Total Volume Installed	gals	907,000	907,000	907,000	907,001
Total Volume in Service	ft^3	121,249	121,249	121,249	121,249
Total Volume in Service	gals	907,000	907,000	907,000	907,001
Typical Design Criteria					
Hydraulic D.T. @ Design Flow (NJDEP)	hrs	7.5	7.5	N/A	N/A
Hydraulic D.T. @ Design Flow (WEF)	hrs	8-36	8-36	N/A	N/A
BOD Loading @ Design Flow(NJDEP)	lb/Kcf/day	38	38	N/A	N/A
BOD Loading @ Design Flow(10 STATES)	lb/Kcf/day	15	15	N/A	N/A
BOD Loading @ Design Flow(WEF)	lb/Kcf/day	5-30	5-30	N/A	N/A
Solids Retention Time @ Design Flow (WEF)	days	10-30	10-30	N/A	N/A
F/MLVSS Ratio at Desgin Flow (M&E Wastewater Engineerin Text)		0.04-0.1	0.04- 0.1	N/A	N/A
Actual Hydraulic Detention Time	hrs	20.4	14.9	9.0	6.93
Actual BOD Loading	lb/Kcf/day	12	17	25	
Solids Retention Time	days	20	18	12	
MLSS	mg/l	2,849	3,525	3,456	
MLSS	lbs	21,555	26,665	26,142	
Percent MLVSS	%	75%	75%	75%	
MLVSS	lbs	16,166	19,999	19,607	
F/MLSS		0.07	0.08	0.11	
F/MLVSS		0.09	0.10	0.15	
Sludge Yield (lb WAS/lb BOD removed)	lb/lb	0.70	0.70	0.70	
Biological Waste Sludge Production	lbs/day	1,015	1,382	1,917	
OXYGEN REQUIREMENTS					
Oxygen Required/BOD	lb/lb	1.3	1.3	1.3	
Influent TKN	mg/l	32	34	29	
Influent TKN	lbs/day	267	367	516	
Effluent NH3	mg/l	0.41	2.00	3.00	
Effluent NH3	lbs/day	4	24	60	
Oxygen Required/TKN	lbs/day	4.57	4.57	4.57	
Carbonaceous Oxygen Demand	lbs/day	1,886	2,566	3,561	
Nitrogenous Oxygen Demand	lbs/day	1,203	1,567	2,083	
Actual Oxygen Requirement (AOR)	lbs/day	3,089	4,133	5,643	
Operating DO	mg/l	2.0	2.0	1.5	
Water Temperature	°C	25	25	25	
Saturation DO	mg/l	8.02	8.02	8.02	
alpha		0.80	0.80	0.80	
beta		0.98	0.98	0.98	
Standard Oxygen Requirement (SOR)	lbs/day	5,314	7,111	8,946	
Standard Oxygen Requirement (SOR)	lbs/hr	221	296	373	
Oxidation Ditch #1 Brush Aerator Capacity @ 6.6 lb//hr/ft of shaft	lbs/hr	185	185	185	
Oxidation Ditch #2 Brush Aerator Capacity @ 5.85 lb/hr/ft of shaft	lbs/hr	245	245	245	
Total Oxidaiton Ditch Brush Aerator Capactiy	lbs/hr	430.00	430.00	430.00	

LONG HILL TOWNSHIP WWTP
FLOW AND MASS BALANCE EVALUATION
FUTURE FLOW CONDITIONS WITH 50% TOTAL I&I REDUCTION

	UNITS	ANNUAL AVERAGE DAY	MAXIMUM MONTH	MAXIMUM DAY	PEAK HOURLY FLOW
FINAL CLARIFIERS					
Number of Tanks Installed		2	2	2	2
Number of Tank in Service		2	2	2	2
Clarifier Diameter	ft	50	50	50	50
Clarifer Depth	ft	11.66	11.66	11.66	11.66
Area per Clarifier	sf	1,963	1,963	1,963	1,963
Total Area in Service	sf	3,927	3,927	3,927	3,927
Volume per Clarifier	cf	22,894	22,894	22,894	22,894
Total Volume in Service	cf	45,789	45,789	45,789	45,789
Volume per Clarifier	gals	171,273	171,273	171,273	171,273
Total Volume in Service	gals	342,545	342,545	342,545	342,545
Design Criteria:					
Overflow Rate @ Design Flow (NJDEP)	gpd/sf	<1000	<1000	N/A	N/A
Overflow Rate @ Peak Flow (10 STATES)	gpd/sf	N/A	N/A	<1,000	N/A
Overflow Rate @ Avg & Peak (WEF)	gpd/sf	400-700	400-700	1000-1600	N/A
Solids Loading Rate (10 STATES)	lbs/sf day	N/A	N/A	<35	N/A
Solids Loading Rate (WEF) *Solids Flux Analysis	lbs/sf day	SF*	SF*	SF	
Solids Loading Rate (M&E Wastewater Engineering Text)	lbs/sf day	12-24	12-24	<34	N/A
RAS Flow % of Influent Flow (M&E Wastewater Engineering Text)	%	75 to 150	75 to 150	N/A	N/A
Solids Flux Capacity at RAS flow and SVI between 100 and 150	lbs/sf day	15 to 20	24 to 30	32 to 38	
Actual Overflow Rate	gpd/sf	272	372	614	800
Actual Solids Loading	lbs/sf day	10	18	27	
RAS Pumping System Capacity	mgd	2	2	2	
RAS Flow	mgd	0.60	1.00	1.40	
Underflow Rate (RAS flow divided by clarifer surface area)	gpd/sf	152.79	254.65	356.51	
RAS % of Influent Flow	%	56%	69%	58%	
RASS	mg/l	7,206	8,108	8,214	
RASS	lbs/day	35,629	66,814	94,759	
MLSS	mg/l	2,849	3,525	3,456	
Total Flow (Plant + RAS)	mgd	1.61	2.39	3.74	
MLSS Load	lbs/day	38,353	70,162	107,736	
WAS Production	lbs/day	1,015	1,382	1,917	
WAS Solids Content	mg/l	7,206	8,108	8,214	
WAS Solids Content	%	0.72%	0.81%	0.82%	
WAS Flow	mgd	0.017	0.020	0.028	
WAS Flow	gpd	16,895	20,430	27,986	
Clarifier Effluent Flow	mgd	1.07	1.46	2.41	3.14
Clarifier Effluent TSS	mg/l	10.00	12.00	20.00	20
Clarifier Effluent TSS	lb/day	89.01	146.07	402.02	
Clarifier Effluent TSS	kg/day	40	66	182	
Clarifier Effluent BOD	mg/l	7.00	8.20	13.00	
Clarifier Effluent BOD	lb/day	62	100	261	
Clarifier Effluent BOD	kg/day	28	45	119	
Clarifier Effluent NH3	mg/l	0.41	2.00	3.00	
Clarifier Effluent NH3	lb/day	4	24	60	
Clarifier Effluent NH3	kg/day	2	11	27	
FILTERS					
Number of Continuous Backwash Filters		4	4	4	4
Total surface area per filter	SF	150	150	150	150
Total Filter Surface Area	SF	600	600	600	600
Design Criteria					
Filtration Rate (10 States)	gpm/sf	N/A	N/A	N/A	<5
Filtration Rate (M&E Wastewater Engineering Test)	gpm/sf	2	2	<5	<5
Filtration Rate (Manufacturer)	gpm/sf	2 to 3	2 to 3	<5	<5
Maximum TSS concentration (Manufacturer)	mg/L	20 to 30	20 to 30	20 to 30	20 to 30
Actual Filtration Rate	gpm/sf	1.24	1.69	2.79	3.64
Recycle Flow:					
Backwash flow % of Forward Flow	%	5	5	3	3
Backwash flow	mgd	0.05	0.07	0.07	0.09
Backwash TSS	mg/l	171	163	472	
Backwash TSS	lbs/day	76	99	285	
Backwash BOD	mg/l	102	98	283	
Backwash BOD	lbs/day	46	59	171	
Backwash TKN	mg/l	0.4	2.0	3.0	
Backwash TKN	lbs/day	0.2	1.2	1.8	
Effluent Flow	mgd	1.01	1.39	2.34	3.05
Effluent TSS	mg/l	1.53	4.06	6.00	
Effluent TSS	lb/day	12.95	46.91	116.99	
Effluent TSS	kg/day	6	21	53	
Effluent BOD	mg/l	2.28	4.22	7.00	
Effluent BOD	lb/day	19	49	136	
Effluent BOD	kg/day	9	22	62	
Effluent NH3	mg/l	0.41	2.00	3.00	
Effluent NH3	lb/day	3	23	58	
Effluent NH3	kg/day	2	10	27	

LONG HILL TOWNSHIP WWTP
FLOW AND MASS BALANCE EVALUATION
FUTURE FLOW CONDITIONS WITH 50% TOTAL I&I REDUCTION

	UNITS	ANNUAL AVERAGE DAY	MAXIMUM MONTH	MAXIMUM DAY	PEAK HOURLY FLOW
POST AERATION SYSTEM					
Number of Tanks Installed		2	2	2	2
Volume per Tank	cf	3,151	3,151	3,151	3,151
Total Volume	cf	6,302	6,302	6,302	6,302
Total Volume	gal	47,145	47,145	47,145	47,145
Hydaulic Detention Time	hrs	1.1	0.8	0.5	0.4
D.O. concentration of filtered effluent	mg/L	1	1	1.5	1.5
Desired D.O.concentraiton of final effluent	mg/L	7.0	7.0	6.5	6.5
Acutal Oxygen Requirement	lb/day	51	69	98	127
Water temperature	degrees C	25	25	25	25
Saturation DO	mg/L	8.02	8.02	8.02	8.02
alpha		0.80	0.80	0.80	0.80
beta		0.95	0.95	0.95	0.95
Standard Oxygen Requirement	lb/day	316	432	375	490
Diffuser type		coarse	coarse	coarse	coarse
Oxygen transfer efficiency	%	12.00	12.00	12.00	12.00
Oxygen required	lb/day	2,634	3,602	3,129	4,080
Oxygen content of air	%	23.00	23.00	23.00	23.00
Weight of oxygen	lb/cf	0.017	0.017	0.017	0.017
Total air required	cf/day	154,945	211,899	184,056	240,028
Required blower capacity	cfm	108	147	128	167
Blower capacity	cfm	220	220	220	220
UV DISINFECTION					
# of Lamp Rack Assemblies		40	40	40	40
Lamps per Assembly		4	4	4	4
# of Channels		2	2	2	2
Channel Width	ft	23.75	23.75	23.75	23.75
Manufacturer's stated capactiy	mgd	3.6	3.6	3.6	3.6
NJDEP Required Safety Factor	%	125	125	125	125
Actual Safety Factor based on flow				149%	115%
SOLIDS PRODUCTION SUMMARY					
WAS Production	lbs/day	1,015	1,382	1,917	
WAS Solids Content	%	0.72%	0.81%	0.82%	
WAS Flow	gpd	16,895	20,430	27,986	
TOTAL SLUDGE FLOW TO STORAGE					
Total Sludge Production	lbs/day	1,015	1,382	1,917	
Sludge Solids Content	%	0.72%	0.81%	0.82%	
Daily Average Sludge Flow	gpd	16,895	20,430	27,986	
Maximum Wastte Sludge Pumping Rate	gpm	123	149	204	

APPENDIX B

NJPDES Permit

LHIL 00080

State of New Jersey

Richard J. Codey
Acting Governor

Department of Environmental Protection

Division of Water Quality
P.O. Box 029 Trenton, NJ 08625-0029
Phone: (609) 633-3869
Fax: (609) 984-7938

Bradley M. Campbell
Commissioner

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

DEC 22 2005

MARIO BONACCORSO
WASTEWATER SUPERINTENDENT
LONG HILL TWP
915 VALLEY RD
GILLETTE, NJ 07933

RECEIVED
DEC 27 2005
T & M ASSOCIATES

Re: Final Surface Water Renewal Permit Action
Category: A -Sanitary Wastewater
NJPDES Permit No. NJ0024465
LONG HILL TOWNSHIP OF STP
Long Hill Twp, Morris County

Dear Mr. Bonaccorso:

Enclosed is a **final** New Jersey Pollutant Discharge Elimination System (NJPDES) permit action identified above which has been issued in accordance with N.J.A.C. 7:14A.

A summary of the significant and relevant comments received on the draft action during the public comment period, the Department's responses, and an explanation of any changes from the draft action have been included in the Response to Comments document attached hereto as per N J.A.C. 7:14A-15.16.

Any requests for an adjudicatory hearing shall be submitted in writing by certified mail, or by other means which provide verification of the date of delivery to the Department, within 30 days of receipt of this Surface Water Renewal Permit Action in accordance with N.J.A.C. 7:14A-17.2. You may also request a stay of any contested permit condition as per N.J.A.C. 7:14A-17.6 et seq. The adjudicatory hearing request must be accompanied by a completed Adjudicatory Hearing Request Form; the stay request must be accompanied by a completed Stay Request Form (forms enclosed).

All monitoring shall be conducted in accordance with 1) the Department's "Field Sampling Procedures Manual" applicable at the time of sampling (N.J.A.C. 7:14A-6.5(b)4), and/or 2) the method approved by the Department in Part IV of the permit. The Field Sampling Procedures Manual is available through Maps and Publications Sales Office; Bureau of Revenue, PO Box 417, Trenton, New Jersey 08625, at (609) 777-1038.

As a result of this permit action, your monitoring report forms have been changed. Enclosed with this permit are the new monitoring report forms (MRFs). Beginning the effective date of the permit, please use the new MRFs. Questions regarding the new forms shall be directed to this Bureau for further clarification.

Questions or comments regarding the final action should be addressed to Margaret Elsishans at (609) 633-3869.

Sincerely,

Howard B. Tompkins, Chief
Bureau of Point Source Permitting Region 1

Enclosures

cc: Permit Distribution List

Masterfile #: 37649; PI #: 46757

Fncv_dsw.rtf

FACILITY SUBMITTALS

1. GDR - General Discharge Requirements

Task Description	Actual Due Date
Submit a Complete Permit Renewal Application	07/04/2010

2. A - Sanitary Wastewater

Task Description	Actual Due Date
Local Ordinance	03/02/2006
Certification of Operations and Maintenance (O&M) Manual Preparation	04/01/2006
Submit an Acute Whole Effluent Toxicity Test Report	07/26/2006
Submit a chronic whole effluent toxicity test report	07/26/2006
Compliance Schedule Progress Report	01/01/2007
Submit an Acute Whole Effluent Toxicity Test Report	01/26/2007
Submit a chronic whole effluent toxicity test report	01/26/2007
Conduct Local Limits Evaluation	07/01/2007
Submit an Acute Whole Effluent Toxicity Test Report	07/26/2007
Submit a chronic whole effluent toxicity test report	07/26/2007
Annual Pretreatment Program Report	08/01/2007
Compliance Schedule Progress Report	01/01/2008
Submit an Acute Whole Effluent Toxicity Test Report	01/26/2008
Submit a chronic whole effluent toxicity test report	01/26/2008
Submit an Acute Whole Effluent Toxicity Test Report	07/26/2008
Submit a chronic whole effluent toxicity test report	07/26/2008
Annual Pretreatment Program Report	08/01/2008
Compliance Schedule Progress Report	01/01/2009
Submit an Acute Whole Effluent Toxicity Test Report	01/26/2009
Submit a chronic whole effluent toxicity test report	01/26/2009
Submit an Acute Whole Effluent Toxicity Test Report	07/26/2009
Submit a chronic whole effluent toxicity test report	07/26/2009
Annual Pretreatment Program Report	08/01/2009
Compliance Schedule Progress Report	01/01/2010
Submit an Acute Whole Effluent Toxicity Test Report	01/26/2010
Submit a chronic whole effluent toxicity test report	01/26/2010
Submit an Acute Whole Effluent Toxicity Test Report	07/26/2010
Submit a chronic whole effluent toxicity test report	07/26/2010
Annual Pretreatment Program Report	08/01/2010

ADJUDICATORY HEARING REQUEST CHECKLIST AND TRACKING FORM FOR INDIVIDUAL NJPDES PERMITS*

I. Permit Being Appealed:

Facility Name: LONG HILL TOWNSHIP OF STP
Masterfile Number: 37649
Program Interest (PI) Number: 46757

Issuance Date of Final Permit Decision: 12/22/2005
Permit Number: NJ0024465

II. Person Requesting Hearing:

____
Name/Organization

____

____

____
Address

____
Telephone Number

____
Name of Attorney (if applicable)

____

____

____
Address of Attorney

____
Telephone Number of Attorney

III. Status of Person Requesting Hearing (Check One):

_____ Permittee under the permit number identified above.
Complete A. and C. through I. of Section IV. below

_____ Person seeking consideration as a party to the action.
Complete B. through I. of Section IV. below

IV. Include the following information as part of your request:

A. If you are a permittee under the permit number identified above:

1. For the Office of Legal Affairs only, a copy of the permit clearly indicating the permit number and issuance date;
2. A list of the specific contested permit condition(s) and the legal or factual question(s) at issue for each condition, including the basis of any objection;
3. The relevance of the legal and/or factual issues to the permit decision;
4. Suggested revised or alternative permit conditions and how they meet the requirements of the State or Federal Act; and
5. Information supporting the request or other written documents relied upon to support the request, unless this information is already in the administrative record (in which case, such information shall be specifically referenced in the request).

B. If you are a person seeking consideration as a party to the action:
1. A statement setting forth each legal or factual question alleged to be at issue;
2. A statement setting forth the relevance of the legal or factual issue to the permit decision, together with a designation of the specific factual areas to be adjudicated;
3. A clear and concise factual statement of the nature and scope of your interest which meets the criteria set forth at N.J.A.C. 7:14A-17.3(c)4;
4. A statement that, upon motion by any party granted by the administrative law judge, or upon order of the administrative law judge's initiative, you shall make yourself, all persons you represent, and all of your officers, directors, employees, consultants, and agents available to appear and testify at the administrative hearing, if granted;
5. Specific references to the contested permit conditions, as well as suggested revised or alternative permit conditions, including permit denials, which, in your judgment, would be required to implement the purposes of the State Act;
6. Identification of the basis for any objection to the application of control or treatment technologies, if identified in the basis or fact sheets, and the alternative technologies or combination of technologies which, in your judgment, are necessary to satisfy the requirements of the State Act;

C. The date you received notification of the final permit decision;

D. The names and addresses of all persons whom you represent;

E. A statement as to whether you raised each legal and factual issue during the public comment period in accordance with N.J.A.C. 7:14A-15.13;

F. An estimate of the amount of time required for the hearing;

G. A request, if necessary, for a barrier-free hearing location for disabled persons;

H. A clear indication of any willingness to negotiate a settlement with the Department prior to the Department's processing of your hearing request to the Office of Administrative Law; and

I. This form, completed, signed and dated with all of the information listed above, including attachments, to:
1. Office of Legal Affairs
ATTENTION: Adjudicatory Hearing Requests
Department of Environmental Protection
401 East State Street
PO Box 402, Trenton, New Jersey 08625-0402
2. Howard B. Tompkins, Chief,
Bureau of Point Source Permitting – Region 1
Department of Environmental Protection
401 East State Street
PO Box 029, Trenton, New Jersey 08625-0029
3. Any other person named on the permit (if you are a permittee under that permit).
4. The permittee(s) (if you are a person seeking consideration as a party to the action).

V. Signature: ______________________ Date: __________

Margaret Elsishans, Bureau of Point Source Permitting – Region 1

*For NJPDES permits, the procedures for requesting an adjudicatory hearing on a final permit decision and for the Department's evaluation and processing of such requests are set forth in N.J.A.C. 7:14A-17.

STAY REQUEST AND TRACKING FORM

I. Permit Containing Condition(s) to Be Stayed:

Facility Name: LONG HILL TOWNSHIP OF STP
Masterfile Number: 37649
Program Interest (PI) Number: 46757

Issuance Date of Final Permit Decision	Permit Number
12/22/2005	NJ0024465

II. Person Requesting the Stay(s):

Name/Organization	Name of Attorney (if applicable)
Address	Address of Attorney
Telephone Number	Telephone Number of Attorney

N.J.A.C. 7:14A-17.6 provides for stays of contested permit conditions. In order for the Department to consider a request for stay, the person making the request must submit a written request to the Department by certified mail or other means which provides verification of the date of delivery. In the request for a stay of each permit condition, a written evaluation must be submitted which addresses each of the factors at N.J.A.C. 7:14A-17.6(c). Briefly stated, these factors include: 1) the permittee's ability to comply with the permit condition using existing treatment facilities, 2) the permittee's ability to comply with the permit condition by implementing low cost short-term modifications to the existing treatment facility, 3) the level of pollutant control actually achieved using short term modifications, 4) the cost to comply with the condition and 5) the environmental impacts granting a stay will have on the receiving waterbody.

This completed stay request form, along with the evaluations mentioned above, shall be submitted to both Howard B. Tompkins, Chief, Bureau of Point Source Permitting Region 1, Division of Water Quality, Department of Environmental Protection, PO Box 029, Trenton, New Jersey, 08625-0029 and the Office of Legal Affairs, Department of Environmental Protection, PO Box 402, Trenton, New Jersey 08625-0402. A person seeking consideration as party to the action who has requested an adjudicatory hearing in accordance with N.J.A.C. 7:14A-17.2 may also request a stay provided notice of the request is also provided to the permittee(s).

Signature: ______________________ Date: ____________

*For NJPDES permits, the procedures for requesting a stay of a final permit condition and for the Department's evaluation and processing of such requests are set forth in N.J.A.C. 7:14A-17.

Table of Contents

This permit package contains the items checked below:

New Jersey Department of Environmental Protection
Division of Water Quality
Bureau of Point Source Permitting – Region 1

RESPONSE TO COMMENTS

Comments were received on the NJPDES draft Surface Water Renewal Permit Action No. NJ0024465 issued September 6, 2005. The thirty (30) day public comment period began on September 7, 2005 when the Public Notice was published in the *DEP Bulletin*. It ended on October 7, 2005. The following person commented during the public comment period:

A. Justin J. Lizza, Jr., P.E., Township Engineer/Director of Public Works, Township of Long Hill in a letter dated October 6, 2005.

A summary of the timely and significant comments received, the New Jersey Department of Environmental Protection's (Department) responses to these comments, and an explanation of any changes from the draft action have been included below:

1. **COMMENT**: 6-Hour Composite Sample – The Permit Summary Table indicates 6-hour composite samples will be required for 5-day Carbonaceous Biochemical Oxygen Demand (CBOD $_5$), Total Suspended Solids (TSS), and a number of other parameters. We understand that regulations state that 6-hour composites be obtained for facilities rated at less than 1 MGD. However, it is our understanding the purpose of this regulation is to obtain representative samples from small facilities which may have little or no night time flow. In the case of Long Hill Township, with a permitted capacity of 0.9 MGD, the wastewater treatment facility operates with flow on a 24-hour basis. It is our opinion a 24-hour composite sample will be more representative of the overall performance of the facility. We request this requirement be modified to allow for 24-hour composite samples.

   RESPONSE: The Department acknowledges that there may be flow at the facility 24 hours a day. However, the Department is required to include in a permit the "minimal requirement" of 6 hour composite sampling for facilities with a flow that falls between the range of >0.5 MGD to 1.0 MGD as per N.J.A.C. 7:14A-14.2 (a) Table 14-4. This does not preclude the discharger from electing to do 24-hour composite sampling, which as indicated in the comment, would provide a more representative sample in this case. Therefore, while there has been no change made to the Final Permit with regard to sample type, the Department would certainly accept a 24-hour composite sample in lieu of a 6-hour one, as per N.J.A.C. 7:14A-6.8(e). Also, such a change would not be a violation of the permit or the NJPDES regulations.

2. **COMMENT**: Copper and Zinc – The draft permit Fact Sheet (11 of 22) proposes stringent daily maximum limits for zinc (101.4 ug/L) and copper (11.5 ug/L). These limits have been applied as end-of-pipe limitations to Long Hill because the receiving stream has been listed as having water quality violations. It should be noted the water quality violations are not due to any discharges from the Long Hill facility.

   A previous industrial waste survey found no industrial/commercial discharges of these metals in the Township and their presence is due to background concentrations present in the domestic water supply. Testing indicates tap water contains zinc in concentrations as high as 611 ug/L and copper as high as 296 ug/L. It should be noted that copper is within New Jersey and the E.P.A. National Primary Drinking Water Standards (1300 ug/L) and zinc is within New Jersey and the E.P.A. National Secondary Drinking Water Standard (5000 ug/L). The source of these contaminants is not under the control of the Township which does not have the authority to regulate the water purveyor, the New Jersey American Water Company, nor is it feasible to regulate all domestic discharges (households) within the Township for these parameters, especially since the potable water meets drinking water standards.

Effluent testing at the wastewater treatment plant indicated that copper was measured in excess of the N.J.D.E.P. proposed permit limit only one time, in January 2000, over 5 years ago. All other copper readings were either below the limit of detection or at levels ranging up to 7 ug/L. Zinc has been measured in the effluent over the past 5 years at levels ranging from 1 ug/L to a high of 148 ug/L. Given the background levels present in tap water, this indicates that copper and zinc are being reduced in the wastewater effluent to low levels.

The conventional method for removal of heavy metals from wastewater consists of a pH adjustment to convert the dissolved metal to an insoluble precipitate followed by removal through settling and filtration. The treatment facility at Long Hill operates within the pH range required by its permit and utilizes settling tanks followed by sand filters for solids removal. This process reduces levels of copper and zinc, however, there are limits below which copper and zinc cannot be removed by conventional methods.

The proposed permit limits are near or below the theoretical solubility concentrations for copper and zinc where, at any pH, the metal exists only in dissolved form and no precipitation occurs and no metal removal takes place. For example, the theoretical minimum solubility of zinc is approximately 104 ug/L * which is higher than the proposed limit of 101.4 ug/L. To achieve the stringent limits proposed, it will be necessary to utilize highly technical wastewater treatment processes such as reverse osmosis. Addition of such processes would be extremely costly to the Township rate-payers and is not practical on the scale of the treatment facility at Long Hill.

The Township of Long Hill requests the proposed limits for copper and zinc be removed from the draft permit and the requirement changed to monitor and report only. The justification for this request is summarized as follows:

The only sources of copper and zinc are from domestic water supplies which currently meet drinking water standards.

The Township has no authority to regulate the source (New Jersey American Water Company) of the exceedance nor is it feasible to regulate discharge from every household.

The high cost to implement technical treatment systems will have an adverse impact on rate-payers and the economy of the Township.

The total amounts of toxic metals to be removed by the proposed limitations are minimal and there will be only a negligible impact on water quality in the receiving stream.

There has been no demonstration of a reasonable relationship between the cost of treatment and the benefits to the receiving stream.

RESPONSE: As explained in the Fact Sheet beginning on page 11 under Section B.16, since copper and zinc are listed on the *New Jersey 2004 Integrated Water Quality Monitoring and Assessment Report* an end-of-pipe effluent limitation is required since these parameters are detected in the effluent. End-of-pipe effluent limitations for pollutants identified in the report for a specific water body segment can only be

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* Ayres, Davis, Gietka – Removing Heavy Metals from Wastewater, University of Maryland, Engineering Research Center Report, August 1994, p. 13.

modified or removed from the permit under a very limited number of circumstances. This would include, (1) if the pollutant were to be removed from the report through the public review process as a result of new ambient data, (2) data is provided to the Department which proves that the pollutant is no longer being discharged in quantifiable amounts in the effluent. (3) a site-specific translator, developed in accordance with a Department approved work plan, justifies the modification of the limitation, or (4) site-specific hardness data, collected in accordance with a Department approved work plan, justifies the modification of the limitation. Please refer to Part IV Section G.3. for details regarding submission of the above referenced optional information.

The Surface Water Quality Standards found at N.J.A.C. 7:9B et seq., specifically, the acute and chronic aquatic criteria are the basis for the effluent limitations, not New Jersey and/or E.P.A. National Primary Drinking Water Standards and/or National Secondary Drinking Water Standards. Also, the CWEA does not contain any provisions for excluding pollutants from being regulated that are in part, or even essentially entirely, from other than industrial sources. With regard to the cost issue, it would be incumbent on the discharger to provide detailed information as to a cost analysis if the intention is to make a case that treatment is too expensive. Please note however, that all other possible solutions need to be evaluated before the Department would consider the cost issue. Therefore, there has been no change made to the Final Permit.

3. **COMMENT**: Cyanide – Testing over the last five years has measured cyanide only in very low levels. In nearly 40% of the samples, cyanide was undetected and in the remaining samples levels reached a high of only 9 ug/L. This is well below the "enforceable quantification limit" of 40 ug/L. The proposed water quality based effluent limitation has been set in the draft permit at 5.2 ug/L with a comment that the permittee must only comply with the enforceable quantification limit as a daily maximum.

A review of a recent industrial waste survey reported to N.J.D.E.P. indicates that no industrial discharges were detected in the Township. Subsequently, one survey report was received from Mitronics Products, Inc., 239 Morristown Road, Gillette, NJ 07933, involving a silver and nickel plating operation. This facility has been visited by Long Hill Township representatives and it has been verified no cyanide is utilized in its processes.

There are no users of cyanide within the system and the measurements of cyanide were either undetected or at levels well below the enforceable quantification limit. The toxic compound has been shown to be present in negligible amounts and no relationship between the cost of treatment and the benefits to the receiving water body have been demonstrated. It should be noted that cyanide is within the New Jersey and the E.P.A. National Primary Drinking Water Standards (200 ug/L). Long Hill Township therefore requests the draft permit be modified to remove the limit and provide monitoring and reporting only.

RESPONSE: The Department included an "enforceable quantification limit" of 40 ug/L since the end-of-pipe limitation of 5.2 ug/L is below the recommended quantification limit of New Jersey Certified laboratories for cyanide (40 ug/L). Therefore, the 40 ug/L is substituted for the actual end-of-pipe limit for compliance purposes.

As explained in the Fact Sheet beginning on page 11 under Section B.16, since cyanide is listed on the *New Jersey 2004 Integrated Water Quality Monitoring and Assessment Report* an end-of-pipe effluent limitation is required since this parameter is detected in the effluent. If the permittee would like to determine if this limit can be removed or modified, the Department has provided guidelines in Part IV, G.3 for such actions pertaining to cyanide. Also, see the response to comment 2 which addresses some of the same issues.

The Surface Water Quality Standards found at N.J.A.C. 7:9B et seq. apply to surface water discharges and not New Jersey and/or E.P.A. National Primary Drinking Water Standards. Also, the CWEA does not contain any provisions for excluding pollutants from being regulated that are in part, or even essentially entirely, from other than industrial sources. Therefore, there has been no change made to the Final Permit.

4. COMMENT: Whole Effluent Toxicity (WET) – In the draft permit fact sheet (page 10 of 22) N.J.D.E.P. states that although "WET was found in quantifiable amounts in the effluent… the discharge was not found to cause or have a reasonable potential to cause an exceedance of the chronic interpretation of the narrative criteria for WET identified in the surface water quality standards." It further states that no new chronic water quality based effluent limit has been calculated for this permit action and that monitoring and reporting requirement only is being imposed for effluent toxicity. However, the fact sheet Permit Summary Table (page 10 of 22) provides initial, interim and final limits of 50% for acute toxicity, LC50. In view of the finding that there is no reasonable potential to cause an exceedance, Long Hill Township requests this permit limit be removed and revised to provide monitoring and reporting only.

RESPONSE: Concerning the acute limit of an LC50 ≥ 50%, the Department is complying with regulatory requirements to include the effluent standard minimum acute limit in the permit when a more stringent limit is not determined to be necessary. As per N.J.A.C. 7:14A-13.21(b)1 and, specifically, N.J.A.C. 7:9-5.7(a), at a minimum, an effluent shall not be more toxic than an LC50 ≥ 50%. To ensure that this minimum toxicity limit is being met, the Department has included the LC50 ≥ 50% limit in the permit. Therefore, no change has been made to the Final Permit.

NEW JERSEY POLLUTANT DISCHARGE ELIMINATION SYSTEM

The New Jersey Department of Environmental Protection hereby grants you a NJPDES permit for the facility/activity named in this document. This permit is the regulatory mechanism used by the Department to help ensure your discharge will not harm the environment. By complying with the terms and conditions specified, you are assuming an important role in protecting New Jersey's valuable water resources. Your acceptance of this permit is an agreement to conform with all of its provisions when constructing, installing, modifying, or operating any facility for the collection, treatment, or discharge of pollutants to waters of the state. If you have any questions about this document, please feel free to contact the Department representative listed in the permit cover letter. Your cooperation in helping us protect and safeguard our state's environment is appreciated.

Permit Number: NJ0024465

Final: Surface Water Renewal Permit Action

Permittee:
LONG HILL TWP
915 VALLEY RD
GILLETTE, NJ 07933

Co-Permittee:

Property Owner:
LONG HILL TWP
915 VALLEY RD
GILLETTE, NJ 07933

Location Of Activity:
LONG HILL TOWNSHIP OF STP
WARREN AVE-SOUTH OF VALLEY RD
1223 VALLEY RD
STIRLING, NJ 07980

Authorization(s) Covered Under This Approval	Issuance Date	Effective Date	Expiration Date
A -Sanitary Wastewater	12/22/05	2/1/06	1/31/2011

By Authority of:
Commissioner's Office

DEP AUTHORIZATION
Howard B. Tompkins, Chief
Bureau of Point Source Permitting – Region 1
Division of Water Quality

(Terms, conditions and provisions attached hereto)

fcp_sw.rtf

PART I
GENERAL REQUIREMENTS:
NJPDES

A. General Requirements of all NJPDES Permits

1. Requirements Incorporated by Reference

a. The permittee shall comply with all conditions set forth in this permit and with all the applicable requirements incorporated into this permit by reference. The permittee is required to comply with the regulations, including those cited in paragraphs b. through e. following, which are in effect as of the effective date of the final permit.

b. General Conditions

Penalties for Violations	N.J.A.C. 7:14-8.1 et seq.
Incorporation by Reference	N.J.A.C. 7:14A-2.3
Toxic Pollutants	N.J.A.C. 7:14A-6.2(a)4i
Duty to Comply	N.J.A.C. 7:14A-6.2(a)1 & 4
Duty to Mitigate	N.J.A.C. 7:14A-6.2(a)5 & 11
Inspection and Entry	N.J.A.C. 7:14A-2.11(e)
Enforcement Action	N.J.A.C. 7:14A-2.9
Duty to Reapply	N.J.A.C. 7:14A-4.2(e)3
Signatory Requirements for Applications and Reports	N.J.A.C. 7:14A-4.9
Effect of Permit/Other Laws	N.J.A.C. 7:14A-6.2(a)6 & 7 & 2.9(c)
Severability	N.J.A.C. 7:14A-2.2
Administrative Continuation of Permits	N.J.A.C. 7:14A-2.8
Permit Actions	N.J.A.C. 7:14A-2.7(c)
Reopener Clause	N.J.A.C. 7:14A-6.2(a)10
Permit Duration and Renewal	N.J.A.C. 7:14A-2.7(a) & (b)
Consolidation of Permit Process	N.J.A.C. 7:14A-15.5
Confidentiality	N.J.A.C. 7:14A-18.2 & 2.11(g)
Fee Schedule	N.J.A.C. 7:14A-3.1
Treatment Works Approval	N.J.A.C. 7:14A-22 & 23

c. Operation And Maintenance

Need to Halt or Reduce not a Defense	N.J.A.C. 7:14A-2.9(b)
Proper Operation and Maintenance	N.J.A.C. 7:14A-6.12

d. Monitoring And Records

Monitoring	N.J.A.C. 7:14A-6.5
Recordkeeping	N.J.A.C. 7:14A-6.6
Signatory Requirements for Monitoring Reports	N.J.A.C. 7:14A-6.9

e. Reporting Requirements

Planned Changes	N.J.A.C. 7:14A-6.7
Reporting of Monitoring Results	N.J.A.C. 7:14A-6.8
Noncompliance Reporting	N.J.A.C. 7:14A-6.10 & 6.8(h)
Hotline/Two Hour & Twenty-four Hour Reporting	N.J.A.C. 7:14A-6.10(c) & (d)
Written Reporting	N.J.A.C. 7:14A-6.10(e) &(f) & 6.8(h)
Duty to Provide Information	N.J.A.C. 7:14A-2.11, 6.2(a)14 & 18.1
Schedules of Compliance	N.J.A.C. 7:14A-6.4
Transfer	N.J.A.C. 7:14A-6.2(a)8 & 16.2

PART II

GENERAL REQUIREMENTS: DISCHARGE CATEGORIES

A. Additional Requirements Incorporated By Reference

1. Requirements for Discharges to Surface Waters

a. In addition to conditions in Part I of this permit, the conditions in this section are applicable to activities at the permitted location and are incorporated by reference. The permittee is required to comply with the regulations which are in effect as of the effective date of the final permit.

  i. Surface Water Quality Standards N.J.A.C. 7:9B-1

  ii. Water Quality Management Planning Regulations N.J.A.C. 7:15

B. General Conditions

1. Scope

a. The issuance of this permit shall not be considered as a waiver of any applicable federal, state, and local rules, regulations and ordinances.

2. Permit Renewal Requirement

a. Permit conditions remain in effect and enforceable until and unless the permit is modified, renewed or revoked by the Department.

b. Submit a complete permit renewal application: 180 days before the Expiration Date.

3. Notification of Non-Compliance

a. The permittee shall notify the Department of all non-compliance when required in accordance with N.J.A.C. 7:14A-6.10 by contacting the DEP HOTLINE at 1-877-WARNDEP (1-877-927-6337).

b. The permittee shall submit a written report as required by N.J.A.C. 7:14A-6.10 within five days.

4. Notification of Changes

a. The permittee shall give written notification to the Department of any planned physical or operational alterations or additions to the permitted facility when the alteration is expected to result in a significant change in the permittee's discharge and/or residuals use or disposal practices including the cessation of discharge in accordance with N.J.A.C. 7:14A-6.7.

b. Prior to any change in ownership, the current permittee shall comply with the requirements of N.J.A.C. 7:14A-16.2, pertaining to the notification of change in ownership.

5. Access to Information

a. The permittee shall allow an authorized representative of the Department, upon the presentation of credentials, to enter upon a person's premises, for purposes of inspection, and to access / copy any records that must be kept under the conditions of this permit.

6. Residuals Management

a. The permittee shall comply with land-based sludge management criteria and shall conform with the requirements for the management of residuals and grit and screenings under N.J.A.C. 7:14A-6.15(a), which includes:

i. Standards for the Use or Disposal of Residual, N.J.A.C. 7:14A-20;

ii. Section 405 of the Federal Act governing the disposal of sludge from treatment works treating domestic sewage;

iii. The Solid Waste Management Act, N.J.S.A. 13:1E-1 et seq., and the Solid Waste Management Rules, N.J.A.C. 7:26;

iv. The Sludge Quality Assurance Regulations, N.J.A.C. 7:14C;

v. The Statewide Sludge Management Plan promulgated pursuant to the Water Quality Planning Act, N.J.S.A. 58:11A-1 et seq., and the Solid Waste Management Act, N.J.S.A. 13:1E-1 et seq.; and

vi. The provisions concerning disposal of sewage sludge and septage in sanitary landfills set forth at N.J.S.A. 13:1E-42 and the Statewide Sludge Management Plan.

vii. Residual that is disposed in a municipal solid waste landfill unit shall meet the requirements in 40 CFR Part 258 and/or N.J.A.C. 7:26 concerning the quality of residual disposed in a municipal solid waste landfill unit. (That is, passes the Toxicity Characteristic Leaching Procedure and does not contain "free liquids" as defined at N.J.A.C. 7:14A-1.2.)

b. If any applicable standard for residual use or disposal is promulgated under section 405(d)of the Federal Act and Sections 4 and 6 of the State Act and that standard is more stringent than any limitation on the pollutant or practice in the permit, the Department may modify or revoke and reissue the permit to conform to the standard for residual use or disposal.

c. The permittee shall make provisions for storage, or some other approved alternative management strategy, for anticipated downtimes at a primary residual management alternative. The permittee shall not be permitted to store residual beyond the capacity of the structural treatment and storage components of the treatment works. N.J.A.C. 7:14A-20.8(a) and N.J.A.C. 7:26 provide for the temporary storage of residuals for periods not exceeding six months, provided such storage does not cause pollutants to enter surface or ground waters of the State. The storage of residual for more than six months is not authorized under this permit. However, this prohibition does not apply to residual that remains on the land for longer than six months when the person who prepares the residual demonstrates that the land on which the residual remains is not a surface disposal site or landfill. The demonstration shall explain why residual must remain on the land for longer than six months prior to final use or disposal, discuss the approximate time period during which the residual shall be used or disposed and provide documentation of ultimate residual management arrangements. Said demonstration shall be in writing, be kept on file by the person who prepares residual, and submitted to the Department upon request.

d. The permittee shall comply with the appropriate adopted District Solid Waste or Sludge Management Plan (which by definition in N.J.A.C. 7:14A-1.2 includes Generator Sludge Management Plans), unless otherwise specifically exempted by the Department.

e. The preparer must notify and provide information necessary to comply with the N.J.A.C. 7:14A-20 land application requirements to the person who applies bulk residual to the land. This shall include, but not be limited to, the applicable recordkeeping requirements and certification statements of 40 CFR 503.17 as referenced at N.J.A.C 7:14A-20.7(j).

f. The preparer who provides biosolids to another person who further prepares the biosolids for application to the land must provide this person with notification and information necessary to comply with the N.J.A.C. 7:14A-20 land application requirements.

g. Any person who prepares bulk residual in New Jersey that is applied to land in a State other than New Jersey shall comply with the requirement at N.J.A.C. 7:14A-20.7(b)1.ix and/or 20.7(b)1.x, as applicable, to provide written notice to the Department and to the permitting authority for the State in which the bulk residual is proposed to be applied.

7. Operator Certification

a. Pursuant to N.J.A.C. 7:10A-1.1 et seq. every wastewater system not exempt pursuant to N.J.A.C. 7:10A-1.1(b) requires a licensed operator. The operator of a system shall meet the Department's requirements pursuant to N.J.A.C. 7:10A-1.1 and any amendments. The name of the proposed operator, where required shall be submitted to the Department at the address below, in order that his/her qualifications may be determined prior to initiating operation of the treatment works.

   i. Notifcations shall be submitted to:
      NJDEP
      Examination and Licensing Unit
      P.O. Box 417
      Trenton, New Jersey 08625
      (609)777-1012

b. The permittee shall notify the Department of any changes in licensed operator within two weeks of the change.

8. Operation Restrictions

a. The operation of a waste treatment or disposal facility shall at no time create: (a) a discharge, except as authorized by the Department in the manner and location specified in Part III of this permit; (b) any discharge to the waters of the state or any standing or ponded condtion for water or waste, except as specifically authorized by a valid NJPDES permit.

Table of Contents

This permit package contains the items checked below:

PART III
LIMITS AND MONITORING REQUIREMENTS

MONITORED LOCATION:	RECEIVING STREAM:	STREAM CLASSIFICATION:	DISCHARGE CATEGORY(IES):
001A Sanitary Outfall	Passaic River	FW2-NT(C2)	A - Sanitary Wastewater

Location Description

The influent monitoring location shall be before any treatment, other than degritting, and before the addition of any internal waste streams. The effluent monitoring location shall be after the last treatment step at the effluent weir prior to entering the Passaic River at Latitude: 40 degrees 39 minutes 49.3 seconds and Longitude: 74 degrees 29 minutes 24.8 seconds.

Contributing Waste Types

Sanitary

Surface Water DMR Reporting Requirements:

Submit a Monthly DMR: within twenty-five days after the end of every month beginning from the effective date of the permit (EDP).

Comments:

Refer to Part IV Section E.2. for the applicability of the discharge limitations and phase effective dates.

Table III - A - 1: Surface Water DMR Limits and Monitoring Requirements

PHASE: 1-"Initial" **PHASE Start Date:** 02/01/2006 **PHASE End Date:** 01/31/2009

Parameter	Sample Point	Limit	Limit	Units	Limit	Limit	Limit	Units	Frequency	Sample Type
Flow, In Conduit or Thru Treatment Plant	Effluent Gross Value	REPORT Monthly Average	REPORT Daily Maximum	MGD	*****	*****	*****	*****	Continuous	Continuous
January thru December	QL	***	***		***	***	***			
pH	Raw Sew/influent	*****	*****	*****	REPORT Instant Minimum	*****	REPORT Instant Maximum	SU	1/Day	Grab
January thru December	QL	***	***		***	***	***			
pH	Effluent Gross Value	*****	*****	*****	6.0 Instant Minimum	*****	9.0 Instant Maximum	SU	1/Day	Grab
January thru December	QL	***	***		***	***	***			
Solids, Total Suspended	Raw Sew/influent	*****	*****	*****	*****	REPORT Monthly Average	REPORT Weekly Average	MG/L	3/Month	6 Hour Composite
January thru December	QL	***	***		***	***	***			

Surface Water DMR Reporting Requirements:
Submit a Monthly DMR: within twenty-five days after the end of every month beginning from the effective date of the permit (EDP).

Comments:
Refer to Part IV Section E.2. for the applicability of the discharge limitations and phase effective dates.

Table III - A - 1: Surface Water DMR Limits and Monitoring Requirements

PHASE: 1-"Initial" **PHASE Start Date:** 02/01/2006 **PHASE End Date:** 01/31/2009

Parameter	Sample Point	Limit	Limit	Units	Limit	Limit	Limit	Units	Frequency	Sample Type
Solids, Total Suspended	Effluent Gross Value	100 Monthly Average	150 Weekly Average	KG/DAY	*****	30 Monthly Average	45 Weekly Average	MG/L	3/Month	6 Hour Composite
January thru December	QL	***	***		***	***	***			
Solids, Total Suspended	Percent Removal	*****	*****	*****	85 Monthly Av Minimum	*****	*****	PERCENT	3/Month	Calculated
January thru December	QL	***	***		***	***	***			
Oil and Grease	Effluent Gross Value	*****	*****	*****	*****	10 Monthly Average	15 Instant Maximum	MG/L	1/Quarter	Grab
January thru December	QL	***	***		***	***	***			
Nitrogen, Ammonia Total (as N)	Effluent Gross Value	6.8 Monthly Average	10.2 Weekly Average	KG/DAY	*****	2 Monthly Average	3 Weekly Average	MG/L	3/Month	6 Hour Composite
May thru October	QL	***	***		***	***	***			
Nitrogen, Ammonia Total (as N)	Effluent Gross Value	REPORT Monthly Average	REPORT Daily Maximum	KG/DAY	*****	REPORT Monthly Average	REPORT Daily Maximum	MG/L	3/Month	6 Hour Composite
November thru April	QL	***	***		***	***	***			
Nitrogen, Nitrate Total (as N)	Effluent Gross Value	REPORT Monthly Average	REPORT Daily Maximum	KG/DAY	*****	REPORT Monthly Average	REPORT Daily Maximum	MG/L	1/6 Months	6 Hour Composite
January thru December	QL	***	***		***	***	***			
Coliform, Fecal General	Effluent Gross Value	*****	*****	*****	*****	200 Monthly Geo Avg	400 Weekly Geometric	#/100ML	2/Month	Grab
January thru December	QL	***	***		***	***	***			

Surface Water DMR Reporting Requirements:
Submit a Monthly DMR: within twenty-five days after the end of every month beginning from the effective date of the permit (EDP).

Comments:
Refer to Part IV Section E.2. for the applicability of the discharge limitations and phase effective dates.

Table III - A - 1: Surface Water DMR Limits and Monitoring Requirements

PHASE: 1-"Initial" **PHASE Start Date:** 02/01/2006 **PHASE End Date:** 01/31/2009

Parameter	Sample Point	Limit	Limit	Units	Limit	Limit	Limit	Units	Frequency	Sample Type
BOD, Carbonaceous 5 Day, 20oC	Raw Sew/influent	*****	*****	*****	*****	REPORT Monthly Average	REPORT Weekly Average	MG/L	3/Month	6 Hour Composite
January thru December	QL	***	***		***	***	***			
BOD, Carbonaceous 5 Day, 20oC	Effluent Gross Value	27 Monthly Average	41 Weekly Average	KG/DAY	*****	8 Monthly Average	12 Weekly Average	MG/L	3/Month	6 Hour Composite
January thru December	QL	***	***		***	***	***			
BOD, Carbonaceous 5 Day, 20oC	Percent Removal	*****	*****	*****	85 Monthly Av Minimum	*****	*****	PERCENT	3/Month	Calculated
January thru December	QL	***	***		***	***	***			
LC50 Stat 96hr Acu Pimephales	Effluent Gross Value	*****	*****	*****	50 Report Per Minimum	*****	*****	%EFFL	1/6 Months	Composite
January thru December	QL	***	***		***	***	***			
IC25 Statre 7day Chr Pimephales	Effluent Gross Value	*****	*****	*****	REPORT Report Per Minimum	*****	*****	%EFFL	1/6 Months	Composite
January thru December	QL	***	***		***	***	***			
Chlorine Produced Oxidants	Effluent Gross Value	REPORT Monthly Average	REPORT Daily Maximum	KG/DAY	*****	REPORT Monthly Average	REPORT Daily Maximum	MG/L	1/Year	Grab
January thru December	RQL	***	***		***	0.1	0.1			
Temperature, oC	Raw Sew/influent	*****	*****	*****	REPORT Instant Minimum	REPORT Monthly Average	REPORT Instant Maximum	DEG.C	1/Day	Grab
January thru December	QL	***	***		***	***	***			

Surface Water DMR Reporting Requirements:
Submit a Monthly DMR: within twenty-five days after the end of every month beginning from the effective date of the permit (EDP).

Comments:
Refer to Part IV Section E.2. for the applicability of the discharge limitations and phase effective dates.

Table III - A - 1: Surface Water DMR Limits and Monitoring Requirements

PHASE: 1-"Initial" **PHASE Start Date:** 02/01/2006 **PHASE End Date:** 01/31/2009

Parameter	Sample Point	Limit	Limit	Units	Limit	Limit	Limit	Units	Frequency	Sample Type
Temperature, oC	Effluent Gross Value	*****	*****	*****	REPORT Instant Minimum	REPORT Monthly Average	REPORT Instant Maximum	DEG.C	1/Day	Grab
January thru December	QL	***	***		***	***	***			
Oxygen, Dissolved (DO)	Effluent Gross Value	*****	*****	*****	*****	6 Weekly Av Minimum	*****	MG/L	3/Month	Grab
January thru December	QL	***	***		***	***	***			
Phosphorus, Total (as P)	Raw Sew/influent	*****	*****	*****	*****	REPORT Monthly Average	REPORT Weekly Average	MG/L	3/Month	6 Hour Composite
January thru December	QL	***	***		***	***	***			
Phosphorus, Total (as P)	Effluent Gross Value	REPORT Monthly Average	REPORT Weekly Average	KG/DAY	*****	4.4 Monthly Average	REPORT Weekly Average	MG/L	3/Month	6 Hour Composite
May thru October	QL	***	***		***	***	***			
Phosphorus, Total (as P)	Effluent Gross Value	REPORT Monthly Average	REPORT Weekly Average	KG/DAY	*****	3.7 Monthly Average	REPORT Weekly Average	MG/L	3/Month	6 Hour Composite
November thru April	QL	***	***		***	***	***			
Cyanide, Total (as CN)	Effluent Gross Value	REPORT Monthly Average	REPORT Daily Maximum	GR/DAY	*****	REPORT Monthly Average	REPORT Daily Maximum	UG/L	1/Month	6 Hour Composite
January thru December	RQL	***	***		***	40	40			
Nickel, Total Recoverable	Effluent Gross Value	REPORT Monthly Average	REPORT Daily Maximum	GR/DAY	*****	REPORT Monthly Average	REPORT Daily Maximum	UG/L	1/Quarter	6 Hour Composite
January thru December	RQL	***	***		***	10	10			

Surface Water DMR Reporting Requirements:

- Submit a Monthly DMR: within twenty-five days after the end of every month beginning from the effective date of the permit (EDP).

Comments:

Refer to Part IV Section E.2. for the applicability of the discharge limitations and phase effective dates.

Table III - A - 1: Surface Water DMR Limits and Monitoring Requirements

PHASE: 1-"Initial" **PHASE Start Date:** 02/01/2006 **PHASE End Date:** 01/31/2009

Parameter	Sample Point	Limit	Limit	Units	Limit	Limit	Limit	Units	Frequency	Sample Type
Zinc, Total Recoverable	Effluent Gross Value	REPORT Monthly Average	REPORT Daily Maximum	GR/DAY	*****	REPORT Monthly Average	REPORT Daily Maximum	UG/L	1/Month	6 Hour Composite
January thru December	RQL	***	***		***	30	30			
Copper, Total Recoverable	Effluent Gross Value	REPORT Monthly Average	REPORT Daily Maximum	GR/DAY	*****	REPORT Monthly Average	REPORT Daily Maximum	UG/L	1/Month	6 Hour Composite
January thru December	RQL	***	***		***	10	10			

Table III - A - 2: Surface Water DMR Limits and Monitoring Requirements

PHASE: 2-"Interim" **PHASE Start Date:** 02/01/2009 **PHASE End Date:** 12/31/2010

Parameter	Sample Point	Limit	Limit	Units	Limit	Limit	Limit	Units	Frequency	Sample Type
Flow, In Conduit or Thru Treatment Plant	Effluent Gross Value	REPORT Monthly Average	REPORT Daily Maximum	MGD	*****	*****	*****	*****	Continuous	Continuous
January thru December	QL	***	***		***	***	***			
pH	Raw Sew/influent	*****	*****	*****	REPORT Instant Minimum	*****	REPORT Instant Maximum	SU	1/Day	Grab
January thru December	QL	***	***		***	***	***			
pH	Effluent Gross Value	*****	*****	*****	6.0 Instant Minimum	*****	9.0 Instant Maximum	SU	1/Day	Grab
January thru December	QL	***	***		***	***	***			

Surface Water DMR Reporting Requirements:
Submit a Monthly DMR: within twenty-five days after the end of every month beginning from the effective date of the permit (EDP).

Comments:
Refer to Part IV Section E.2. for the applicability of the discharge limitations and phase effective dates.

Table III - A - 2: Surface Water DMR Limits and Monitoring Requirements

PHASE: 2-"Interim" **PHASE Start Date:** 02/01/2009 **PHASE End Date:** 12/31/2010

Parameter	Sample Point	Limit	Limit	Units	Limit	Limit	Limit	Units	Frequency	Sample Type
Solids, Total Suspended	Raw Sew/influent	*****	*****	*****	*****	REPORT Monthly Average	REPORT Weekly Average	MG/L	3/Month	6 Hour Composite
January thru December	QL	***	***		***	***	***			
Solids, Total Suspended	Effluent Gross Value	100 Monthly Average	150 Weekly Average	KG/DAY	*****	30 Monthly Average	45 Weekly Average	MG/L	3/Month	6 Hour Composite
January thru December	QL	***	***		***	***	***			
Solids, Total Suspended	Percent Removal	*****	*****	*****	85 Monthly Av Minimum	*****	*****	PERCENT	3/Month	Calculated
January thru December	QL	***	***		***	***	***			
Oil and Grease	Effluent Gross Value	*****	*****	*****	*****	10 Monthly Average	15 Instant Maximum	MG/L	1/Quarter	Grab
January thru December	QL	***	***		***	***	***			
Nitrogen, Ammonia Total (as N)	Effluent Gross Value	6.8 Monthly Average	10.2 Weekly Average	KG/DAY	*****	2 Monthly Average	3 Weekly Average	MG/L	3/Month	6 Hour Composite
May thru October	QL	***	***		***	***	***			
Nitrogen, Ammonia Total (as N)	Effluent Gross Value	116 Monthly Average	REPORT Daily Maximum	KG/DAY	*****	34.2 Monthly Average	REPORT Daily Maximum	MG/L	3/Month	6 Hour Composite
November thru April	QL	***	***		***	***	***			
Nitrogen, Nitrate Total (as N)	Effluent Gross Value	REPORT Monthly Average	REPORT Daily Maximum	KG/DAY	*****	REPORT Monthly Average	REPORT Daily Maximum	MG/L	1/6 Months	6 Hour Composite
January thru December	QL	***	***		***	***	***			

Surface Water DMR Reporting Requirements:

Submit a Monthly DMR: within twenty-five days after the end of every month beginning from the effective date of the permit (EDP).

Comments:

Refer to Part IV Section E.2. for the applicability of the discharge limitations and phase effective dates.

Table III - A - 2: Surface Water DMR Limits and Monitoring Requirements

PHASE: 2-"Interim" **PHASE Start Date:** 02/01/2009 **PHASE End Date:** 12/31/2010

Parameter	Sample Point	Limit	Limit	Units	Limit	Limit	Limit	Units	Frequency	Sample Type
Coliform, Fecal General	Effluent Gross Value	*****	*****	*****	*****	200 Monthly Geo Avg	400 Weekly Geometric	#/100ML	2/Month	Grab
January thru December	QL	***	***		***	***	***			
BOD, Carbonaceous 5 Day, 20oC	Raw Sew/influent	*****	*****	*****	*****	REPORT Monthly Average	REPORT Weekly Average	MG/L	3/Month	6 Hour Composite
January thru December	QL	***	***		***	***	***			
BOD, Carbonaceous 5 Day, 20oC	Effluent Gross Value	27 Monthly Average	41 Weekly Average	KG/DAY	*****	8 Monthly Average	12 Weekly Average	MG/L	3/Month	6 Hour Composite
January thru December	QL	***	***		***	***	***			
BOD, Carbonaceous 5 Day, 20oC	Percent Removal	*****	*****	*****	85 Monthly Av Minimum	*****	*****	PERCENT	3/Month	Calculated
January thru December	QL	***	***		***	***	***			
LC50 Stat 96hr Acu Pimephales	Effluent Gross Value	*****	*****	*****	50 Report Per Minimum	*****	*****	%EFFL	1/6 Months	Composite
January thru December	QL	***	***		***	***	***			
IC25 Statre 7day Chr Pimephales	Effluent Gross Value	*****	*****	*****	REPORT Report Per Minimum	*****	*****	%EFFL	1/6 Months	Composite
January thru December	QL	***	***		***	***	***			
Chlorine Produced Oxidants	Effluent Gross Value	REPORT Monthly Average	REPORT Daily Maximum	KG/DAY	*****	REPORT Monthly Average	REPORT Daily Maximum	MG/L	1/Year	Grab
January thru December	RQL	***	***		***	0.1	0.1			

Surface Water DMR Reporting Requirements:
Submit a Monthly DMR: within twenty-five days after the end of every month beginning from the effective date of the permit (EDP).

Comments:
Refer to Part IV Section E.2. for the applicability of the discharge limitations and phase effective dates.

Table III - A - 2: Surface Water DMR Limits and Monitoring Requirements

PHASE: 2-"Interim" **PHASE Start Date:** 02/01/2009 **PHASE End Date:** 12/31/2010

Parameter	Sample Point	Limit	Limit	Units	Limit	Limit	Limit	Units	Frequency	Sample Type
Temperature, oC	Raw Sew/influent	*****	*****	*****	REPORT Instant Minimum	REPORT Monthly Average	REPORT Instant Maximum	DEG.C	1/Day	Grab
January thru December	QL	***	***		***	***	***			
Temperature, oC	Effluent Gross Value	*****	*****	*****	REPORT Instant Minimum	REPORT Monthly Average	REPORT Instant Maximum	DEG.C	1/Day	Grab
January thru December	QL	***	***		***	***	***			
Oxygen, Dissolved (DO)	Effluent Gross Value	*****	*****	*****	*****	6 Weekly Av Minimum	*****	MG/L	3/Month	Grab
January thru December	QL	***	***		***	***	***			
Phosphorus, Total (as P)	Raw Sew/influent	*****	*****	*****	*****	REPORT Monthly Average	REPORT Weekly Average	MG/L	3/Month	6 Hour Composite
January thru December	QL	***	***		***	***	***			
Phosphorus, Total (as P)	Effluent Gross Value	REPORT Monthly Average	REPORT Weekly Average	KG/DAY	*****	4.4 Monthly Average	REPORT Weekly Average	MG/L	3/Month	6 Hour Composite
May thru October	QL	***	***		***	***	***			
Phosphorus, Total (as P)	Effluent Gross Value	REPORT Monthly Average	REPORT Weekly Average	KG/DAY	*****	3.7 Monthly Average	REPORT Weekly Average	MG/L	3/Month	6 Hour Composite
November thru April	QL	***	***		***	***	***			
Cyanide, Total (as CN)	Effluent Gross Value	REPORT Monthly Average	REPORT Daily Maximum	GR/DAY	*****	REPORT Monthly Average	REPORT Daily Maximum	UG/L	1/Month	6 Hour Composite
January thru December	RQL	***	***		***	40	40			

Surface Water DMR Reporting Requirements:
Submit a Monthly DMR: within twenty-five days after the end of every month beginning from the effective date of the permit (EDP).

Comments:
Refer to Part IV Section E.2. for the applicability of the discharge limitations and phase effective dates.

Table III - A - 2: Surface Water DMR Limits and Monitoring Requirements

PHASE: 2-"Interim" **PHASE Start Date:** 02/01/2009 **PHASE End Date:** 12/31/2010

Parameter	Sample Point	Limit	Limit	Units	Limit	Limit	Limit	Units	Frequency	Sample Type
Nickel, Total Recoverable	Effluent Gross Value	REPORT Monthly Average	REPORT Daily Maximum	GR/DAY	*****	REPORT Monthly Average	REPORT Daily Maximum	UG/L	1/Quarter	6 Hour Composite
January thru December	RQL	***	***		***	10	10			
Zinc, Total Recoverable	Effluent Gross Value	REPORT Monthly Average	REPORT Daily Maximum	GR/DAY	*****	REPORT Monthly Average	REPORT Daily Maximum	UG/L	1/Month	6 Hour Composite
January thru December	RQL	***	***		***	30	30			
Copper, Total Recoverable	Effluent Gross Value	REPORT Monthly Average	REPORT Daily Maximum	GR/DAY	*****	REPORT Monthly Average	REPORT Daily Maximum	UG/L	1/Month	6 Hour Composite
January thru December	RQL	***	***		***	10	10			

Table III - A - 3: Surface Water DMR Limits and Monitoring Requirements

PHASE: 3-"Final" **PHASE Start Date:** 01/01/2011 **PHASE End Date:**

Parameter	Sample Point	Limit	Limit	Units	Limit	Limit	Limit	Units	Frequency	Sample Type
Flow, In Conduit or Thru Treatment Plant	Effluent Gross Value	REPORT Monthly Average	REPORT Daily Maximum	MGD	*****	*****	*****	*****	Continuous	Continuous
January thru December	QL	***	***		***	***	***			
pH	Raw Sew/influent	*****	*****	*****	REPORT Instant Minimum	*****	REPORT Instant Maximum	SU	1/Day	Grab
January thru December	QL	***	***		***	***	***			

Surface Water DMR Reporting Requirements:

- Submit a Monthly DMR: within twenty-five days after the end of every month beginning from the effective date of the permit (EDP).

Comments:

Refer to Part IV Section E.2. for the applicability of the discharge limitations and phase effective dates.

Table III - A - 3: Surface Water DMR Limits and Monitoring Requirements

PHASE: 3-"Final" **PHASE Start Date:** 01/01/2011 **PHASE End Date:**

Parameter	Sample Point	Limit	Limit	Units	Limit	Limit	Limit	Units	Frequency	Sample Type
pH	Effluent Gross Value	*****	*****	*****	6.0 Instant Minimum	*****	9.0 Instant Maximum	SU	1/Day	Grab
January thru December	QL	***	***		***	***	***			
Solids, Total Suspended	Raw Sew/influent	*****	*****	*****	*****	REPORT Monthly Average	REPORT Weekly Average	MG/L	3/Month	6 Hour Composite
January thru December	QL	***	***		***	***	***			
Solids, Total Suspended	Effluent Gross Value	100 Monthly Average	150 Weekly Average	KG/DAY	*****	30 Monthly Average	45 Weekly Average	MG/L	3/Month	6 Hour Composite
January thru December	QL	***	***		***	***	***			
Solids, Total Suspended	Percent Removal	*****	*****	*****	85 Monthly Av Minimum	*****	*****	PERCENT	3/Month	Calculated
January thru December	QL	***	***		***	***	***			
Oil and Grease	Effluent Gross Value	*****	*****	*****	*****	10 Monthly Average	15 Instant Maximum	MG/L	1/Quarter	Grab
January thru December	QL	***	***		***	***	***			
Nitrogen, Ammonia Total (as N)	Effluent Gross Value	6.8 Monthly Average	10.2 Weekly Average	KG/DAY	*****	2 Monthly Average	3 Weekly Average	MG/L	3/Month	6 Hour Composite
May thru October	QL	***	***		***	***	***			
Nitrogen, Ammonia Total (as N)	Effluent Gross Value	116 Monthly Average	REPORT Daily Maximum	KG/DAY	*****	34.2 Monthly Average	REPORT Daily Maximum	MG/L	3/Month	6 Hour Composite
November thru April	QL	***	***		***	***	***			

Surface Water DMR Reporting Requirements:
Submit a Monthly DMR: within twenty-five days after the end of every month beginning from the effective date of the permit (EDP).

Comments:
Refer to Part IV Section E.2. for the applicability of the discharge limitations and phase effective dates.

Table III - A - 3: Surface Water DMR Limits and Monitoring Requirements

PHASE: 3-"Final" **PHASE Start Date:** 01/01/2011 **PHASE End Date:**

Parameter	Sample Point	Limit	Limit	Units	Limit	Limit	Limit	Units	Frequency	Sample Type
Nitrogen, Nitrate Total (as N)	Effluent Gross Value	REPORT Monthly Average	REPORT Daily Maximum	KG/DAY	*****	REPORT Monthly Average	REPORT Daily Maximum	MG/L	1/6 Months	6 Hour Composite
January thru December	QL	***	***		***	***	***			
Coliform, Fecal General	Effluent Gross Value	*****	*****	*****	*****	200 Monthly Geo Avg	400 Weekly Geometric	#/100ML	2/Month	Grab
January thru December	QL	***	***		***	***	***			
BOD, Carbonaceous 5 Day, 20oC	Raw Sew/influent	*****	*****	*****	*****	REPORT Monthly Average	REPORT Weekly Average	MG/L	3/Month	6 Hour Composite
January thru December	QL	***	***		***	***	***			
BOD, Carbonaceous 5 Day, 20oC	Effluent Gross Value	27 Monthly Average	41 Weekly Average	KG/DAY	*****	8 Monthly Average	12 Weekly Average	MG/L	3/Month	6 Hour Composite
January thru December	QL	***	***		***	***	***			
BOD, Carbonaceous 5 Day, 20oC	Percent Removal	*****	*****	*****	85 Monthly Av Minimum	*****	*****	PERCENT	3/Month	Calculated
January thru December	QL	***	***		***	***	***			
LC50 Stat 96hr Acu Pimephales	Effluent Gross Value	*****	*****	*****	50 Report Per Minimum	*****	*****	%EFFL	1/6 Months	Composite
January thru December	QL	***	***		***	***	***			
IC25 Statre 7day Chr Pimephales	Effluent Gross Value	*****	*****	*****	REPORT Report Per Minimum	*****	*****	%EFFL	1/6 Months	Composite
January thru December	QL	***	***		***	***	***			

Surface Water DMR Reporting Requirements:
Submit a Monthly DMR: within twenty-five days after the end of every month beginning from the effective date of the permit (EDP).

Comments:
Refer to Part IV Section E.2. for the applicability of the discharge limitations and phase effective dates.

Table III - A - 3: Surface Water DMR Limits and Monitoring Requirements

PHASE: 3-"Final" **PHASE Start Date:** 01/01/2011 **PHASE End Date:**

Parameter	Sample Point	Limit	Limit	Units	Limit	Limit	Limit	Units	Frequency	Sample Type
Chlorine Produced Oxidants	Effluent Gross Value	REPORT Monthly Average	REPORT Daily Maximum	KG/DAY	*****	REPORT Monthly Average	REPORT Daily Maximum	MG/L	1/Year	Grab
January thru December	RQL	***	***		***	0.1	0.1			
Temperature, oC	Raw Sew/influent	*****	*****	*****	REPORT Instant Minimum	REPORT Monthly Average	REPORT Instant Maximum	DEG.C	1/Day	Grab
January thru December	QL	***	***		***	***	***			
Temperature, oC	Effluent Gross Value	*****	*****	*****	REPORT Instant Minimum	REPORT Monthly Average	REPORT Instant Maximum	DEG.C	1/Day	Grab
January thru December	QL	***	***		***	***	***			
Oxygen, Dissolved (DO)	Effluent Gross Value	*****	*****	*****	*****	6 Weekly Av Minimum	*****	MG/L	3/Month	Grab
January thru December	QL	***	***		***	***	***			
Phosphorus, Total (as P)	Raw Sew/influent	*****	*****	*****	*****	REPORT Monthly Average	REPORT Weekly Average	MG/L	3/Month	6 Hour Composite
January thru December	QL	***	***		***	***	***			
Phosphorus, Total (as P)	Effluent Gross Value	REPORT Monthly Average	REPORT Weekly Average	KG/DAY	*****	4.4 Monthly Average	REPORT Weekly Average	MG/L	3/Month	6 Hour Composite
May thru October	QL	***	***		***	***	***			
Phosphorus, Total (as P)	Effluent Gross Value	REPORT Monthly Average	REPORT Weekly Average	KG/DAY	*****	3.7 Monthly Average	REPORT Weekly Average	MG/L	3/Month	6 Hour Composite
November thru April	QL	***	***		***	***	***			

Surface Water DMR Reporting Requirements:
Submit a Monthly DMR: within twenty-five days after the end of every month beginning from the effective date of the permit (EDP).

Comments:
Refer to Part IV Section E.2. for the applicability of the discharge limitations and phase effective dates.

Table III - A - 3: Surface Water DMR Limits and Monitoring Requirements

PHASE: 3-"Final" **PHASE Start Date:** 01/01/2011 **PHASE End Date:**

Parameter	Sample Point	Limit	Limit	Units	Limit	Limit	Limit	Units	Frequency	Sample Type
Cyanide, Total (as CN)	Effluent Gross Value	REPORT Monthly Average	17.7 Daily Maximum	GR/DAY	*****	REPORT Monthly Average	5.2 Daily Maximum	UG/L	1/Month	6 Hour Composite
January thru December	RQL	***	136		***	40	40			
Nickel, Total Recoverable	Effluent Gross Value	REPORT Monthly Average	REPORT Daily Maximum	GR/DAY	*****	REPORT Monthly Average	REPORT Daily Maximum	UG/L	1/Quarter	6 Hour Composite
January thru December	RQL	***	***		***	10	10			
Zinc, Total Recoverable	Effluent Gross Value	REPORT Monthly Average	346 Daily Maximum	GR/DAY	*****	REPORT Monthly Average	101.4 Daily Maximum	UG/L	1/Month	6 Hour Composite
January thru December	RQL	***	***		***	30	30			
Copper, Total Recoverable	Effluent Gross Value	REPORT Monthly Average	39 Daily Maximum	GR/DAY	*****	REPORT Monthly Average	11.5 Daily Maximum	UG/L	1/Month	6 Hour Composite
January thru December	RQL	***	***		***	10	10			

Surface Water WCR - Semi Annual Reporting Requirements:

Submit a Semi-Annual WCR: within twenty-five days after the end of every 6 month monitoring period beginning from the effective date of the permit (EDP).

Table III - A - 4: Surface Water WCR - Semi Annual Limits and Monitoring Requirements

PHASE: Final **PHASE Start Date:** 02/01/2006 **PHASE End Date:**

Parameter	Sample Point	Compliance Quantity	Units	Sample Type	Monitoring Period
Chloride (as Cl)	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
Chromium Trivalent (as Cr) Total Recov.	Effluent Gross Value	REPORT RQL = 8	UG/L	6 Hour Composite	January thru December
Arsenic, Total Recoverable (as As)	Effluent Gross Value	REPORT RQL = 8	UG/L	6 Hour Composite	January thru December
Selenium, Total Recoverable	Effluent Gross Value	REPORT RQL = 10	UG/L	6 Hour Composite	January thru December
Thallium, Total Recoverable	Effluent Gross Value	REPORT RQL = 10	UG/L	6 Hour Composite	January thru December
Barium, Total Recoverable (as Ba)	Effluent Gross Value	REPORT RQL = 20	UG/L	6 Hour Composite	January thru December
Silver, Total Recoverable	Effluent Gross Value	REPORT RQL = 2	UG/L	6 Hour Composite	January thru December
Cadmium, Total Recoverable	Effluent Gross Value	REPORT RQL = 4	UG/L	6 Hour Composite	January thru December
Lead, Total Recoverable	Effluent Gross Value	REPORT RQL = 10	UG/L	6 Hour Composite	January thru December
Chromium, Total Recoverable	Effluent Gross Value	REPORT RQL = 10	UG/L	6 Hour Composite	January thru December
Antimony, Total Recoverable	Effluent Gross Value	REPORT RQL = 20	UG/L	6 Hour Composite	January thru December
Mercury Total Recoverable	Effluent Gross Value	REPORT RQL = 1	UG/L	6 Hour Composite	January thru December
Chromium, Hexavalent Tot Recoverable	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
Acenaphthylene	Effluent Gross Value	REPORT RQL = 10	UG/L	6 Hour Composite	January thru December
Acenaphthene	Effluent Gross Value	REPORT RQL = 9.5	UG/L	6 Hour Composite	January thru December

Surface Water WCR - Semi Annual Reporting Requirements:

- Submit a Semi-Annual WCR: within twenty-five days after the end of every 6 month monitoring period beginning from the effective date of the permit (EDP).

Table III - A - 4: Surface Water WCR - Semi Annual Limits and Monitoring Requirements

PHASE: Final **PHASE Start Date:** 02/01/2006 **PHASE End Date:**

Parameter	Sample Point	Compliance Quantity	Units	Sample Type	Monitoring Period
Anthracene	Effluent Gross Value	REPORT RQL = 10	UG/L	6 Hour Composite	January thru December
Benzo(b)fluoranthene (3,4-benzo)	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
Benzo(k)fluoranthene	Effluent Gross Value	REPORT RQL = 20	UG/L	6 Hour Composite	January thru December
Benzo(a)pyrene	Effluent Gross Value	REPORT RQL = 20	UG/L	6 Hour Composite	January thru December
Bis(2-chloroethyl) ether	Effluent Gross Value	REPORT RQL = 10	UG/L	6 Hour Composite	January thru December
Bis(2-chloroethoxy) methane	Effluent Gross Value	REPORT RQL = 26.5	UG/L	6 Hour Composite	January thru December
Bis (2-chloroiso-propyl) ether	Effluent Gross Value	REPORT RQL = 10	UG/L	6 Hour Composite	January thru December
Butyl benzyl phthalate	Effluent Gross Value	REPORT RQL = 20	UG/L	6 Hour Composite	January thru December
Chrysene	Effluent Gross Value	REPORT RQL = 20	UG/L	6 Hour Composite	January thru December
Diethyl phthalate	Effluent Gross Value	REPORT RQL = 10	UG/L	6 Hour Composite	January thru December
Dimethyl phthalate	Effluent Gross Value	REPORT RQL = 10	UG/L	6 Hour Composite	January thru December
1,2-Diphenyl-hydrazine	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
Fluoranthene	Effluent Gross Value	REPORT RQL = 10	UG/L	6 Hour Composite	January thru December
Fluorene	Effluent Gross Value	REPORT RQL = 10	UG/L	6 Hour Composite	January thru December
Hexachlorocyclo-pentadiene	Effluent Gross Value	REPORT RQL = 10	UG/L	6 Hour Composite	January thru December

Surface Water WCR - Semi Annual Reporting Requirements:

Submit a Semi-Annual WCR: within twenty-five days after the end of every 6 month monitoring period beginning from the effective date of the permit (EDP).

Table III - A - 4: Surface Water WCR - Semi Annual Limits and Monitoring Requirements

PHASE: Final **PHASE Start Date:** 02/01/2006 **PHASE End Date:**

Parameter	Sample Point	Compliance Quantity	Units	Sample Type	Monitoring Period
Hexachloroethane	Effluent Gross Value	REPORT RQL = 10	UG/L	6 Hour Composite	January thru December
Indeno(1,2,3-cd)-pyrene	Effluent Gross Value	REPORT RQL = 20	UG/L	6 Hour Composite	January thru December
Isophorone	Effluent Gross Value	REPORT RQL = 10	UG/L	6 Hour Composite	January thru December
N-nitrosodi-n-propylamine	Effluent Gross Value	REPORT RQL = 20	UG/L	6 Hour Composite	January thru December
N-nitrosodiphenyl-amine	Effluent Gross Value	REPORT RQL = 20	UG/L	6 Hour Composite	January thru December
N-nitrosodimethyl-amine	Effluent Gross Value	REPORT RQL = 20	UG/L	6 Hour Composite	January thru December
Nitrobenzene	Effluent Gross Value	REPORT RQL = 10	UG/L	6 Hour Composite	January thru December
Phenanthrene	Effluent Gross Value	REPORT RQL = 10	UG/L	6 Hour Composite	January thru December
Pyrene	Effluent Gross Value	REPORT RQL = 20	UG/L	6 Hour Composite	January thru December
Benzo(ghi)perylene	Effluent Gross Value	REPORT RQL = 20	UG/L	6 Hour Composite	January thru December
Benzo(a)anthracene	Effluent Gross Value	REPORT RQL = 10	UG/L	6 Hour Composite	January thru December
1,2-Dichlorobenzene	Effluent Gross Value	REPORT RQL = 9	UG/L	6 Hour Composite	January thru December
1,2,4-Trichloro-benzene	Effluent Gross Value	REPORT RQL = 10	UG/L	6 Hour Composite	January thru December
Dibenzo(a,h) anthracene	Effluent Gross Value	REPORT RQL = 20	UG/L	6 Hour Composite	January thru December
1,3-Dichlorobenzene	Effluent Gross Value	REPORT RQL = 9	UG/L	6 Hour Composite	January thru December

Surface Water WCR - Semi Annual Reporting Requirements:

Submit a Semi-Annual WCR: within twenty-five days after the end of every 6 month monitoring period beginning from the effective date of the permit (EDP).

Table III - A - 4: Surface Water WCR - Semi Annual Limits and Monitoring Requirements

PHASE: Final **PHASE Start Date:** 02/01/2006 **PHASE End Date:**

Parameter	Sample Point	Compliance Quantity	Units	Sample Type	Monitoring Period
1,4-Dichlorobenzene	Effluent Gross Value	REPORT RQL = 20	UG/L	6 Hour Composite	January thru December
2-Chloronaphthalene	Effluent Gross Value	REPORT RQL = 9.5	UG/L	6 Hour Composite	January thru December
Di-n-octyl Phthalate	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
2,4-Dinitrotoluene	Effluent Gross Value	REPORT RQL = 10	UG/L	6 Hour Composite	January thru December
2,6-Dinitrotoluene	Effluent Gross Value	REPORT RQL = 9.5	UG/L	6 Hour Composite	January thru December
3,3'-Dichloro-benzidine	Effluent Gross Value	REPORT RQL = 60	UG/L	6 Hour Composite	January thru December
4-Bromophenyl phenyl ether	Effluent Gross Value	REPORT RQL = 9.5	UG/L	6 Hour Composite	January thru December
Naphthalene	Effluent Gross Value	REPORT RQL = 8	UG/L	6 Hour Composite	January thru December
Bis(2-ethylhexyl) phthalate	Effluent Gross Value	REPORT RQL = 30	UG/L	6 Hour Composite	January thru December
Di-n-butyl phthalate	Effluent Gross Value	REPORT RQL = 20	UG/L	6 Hour Composite	January thru December
Benzidine	Effluent Gross Value	REPORT RQL = 50	UG/L	6 Hour Composite	January thru December
Malathion	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
Demeton	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
Hexachlorobenzene	Effluent Gross Value	REPORT RQL = 10	UG/L	6 Hour Composite	January thru December
Hexachlorobutadiene	Effluent Gross Value	REPORT RQL = 10	UG/L	6 Hour Composite	January thru December

Surface Water WCR - Semi Annual Reporting Requirements:

Submit a Semi-Annual WCR: within twenty-five days after the end of every 6 month monitoring period beginning from the effective date of the permit (EDP).

Table III - A - 4: Surface Water WCR - Semi Annual Limits and Monitoring Requirements

PHASE: Final **PHASE Start Date:** 02/01/2006 **PHASE End Date:**

Parameter	Sample Point	Compliance Quantity	Units	Sample Type	Monitoring Period
Mirex	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
1,3-Dichloropropene	Effluent Gross Value	REPORT RQL = 7	UG/L	Grab	January thru December
1,2,4,5-Tetrachloro-benzene	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
N-nitrosodiethyl-amine	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
N-nitrosopyrrolidine	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
Carbon Tetrachloride	Effluent Gross Value	REPORT RQL = 6	UG/L	Grab	January thru December
1,2-Dichloroethane	Effluent Gross Value	REPORT RQL = 3	UG/L	Grab	January thru December
Bromoform	Effluent Gross Value	REPORT RQL = 8	UG/L	Grab	January thru December
Chloroform	Effluent Gross Value	REPORT RQL = 5	UG/L	Grab	January thru December
Toluene	Effluent Gross Value	REPORT RQL = 6	UG/L	Grab	January thru December
Benzene	Effluent Gross Value	REPORT RQL = 7	UG/L	Grab	January thru December
Acrolein	Effluent Gross Value	REPORT RQL = 50	UG/L	Grab	January thru December
Acrylonitrile	Effluent Gross Value	REPORT RQL = 50	UG/L	Grab	January thru December
Chlorobenzene	Effluent Gross Value	REPORT RQL = 6	UG/L	Grab	January thru December
Chlorodibromomethane	Effluent Gross Value	REPORT RQL = 6	UG/L	Grab	January thru December

Surface Water WCR - Semi Annual Reporting Requirements:
Submit a Semi-Annual WCR: within twenty-five days after the end of every 6 month monitoring period beginning from the effective date of the permit (EDP).

Table III - A - 4: Surface Water WCR - Semi Annual Limits and Monitoring Requirements

PHASE: Final **PHASE Start Date:** 02/01/2006 **PHASE End Date:**

Parameter	Sample Point	Compliance Quantity	Units	Sample Type	Monitoring Period
Ethylbenzene	Effluent Gross Value	REPORT RQL = 6	UG/L	Grab	January thru December
Methyl Bromide	Effluent Gross Value	REPORT RQL = 9	UG/L	Grab	January thru December
Methyl Chloride	Effluent Gross Value	REPORT RQL = 10	UG/L	Grab	January thru December
Methylene Chloride	Effluent Gross Value	REPORT RQL = 6	UG/L	Grab	January thru December
Tetrachloroethylene	Effluent Gross Value	REPORT RQL = 9	UG/L	Grab	January thru December
Trichlorofluoro-methane	Effluent Gross Value	REPORT RQL = 5	UG/L	Grab	January thru December
1,1-Dichloroethane	Effluent Gross Value	REPORT RQL = 23.5	UG/L	Grab	January thru December
1,1-Dichloroethylene	Effluent Gross Value	REPORT RQL = 6	UG/L	Grab	January thru December
1,1,1-Trichloro-ethane	Effluent Gross Value	REPORT RQL = 6	UG/L	Grab	January thru December
1,1,2-Trichloro-ethane	Effluent Gross Value	REPORT RQL = 6	UG/L	Grab	January thru December
1,1,2,2-Tetrachloro-ethane	Effluent Gross Value	REPORT RQL = 10	UG/L	Grab	January thru December
1,2-Dichloropropane	Effluent Gross Value	REPORT RQL = 5	UG/L	Grab	January thru December
1,2-trans-Dichloro-ethylene	Effluent Gross Value	REPORT RQL = 4	UG/L	Grab	January thru December
2-Chloroethyl Vinyl Ether (Mixed)	Effluent Gross Value	REPORT	UG/L	Grab	January thru December
Bromodichloromethane	Effluent Gross Value	REPORT RQL = 5	UG/L	Grab	January thru December

Surface Water WCR - Semi Annual Reporting Requirements:

Submit a Semi-Annual WCR: within twenty-five days after the end of every 6 month monitoring period beginning from the effective date of the permit (EDP).

Table III - A - 4: Surface Water WCR - Semi Annual Limits and Monitoring Requirements

PHASE: Final **PHASE Start Date:** 02/01/2006 **PHASE End Date:**

Parameter	Sample Point	Compliance Quantity	Units	Sample Type	Monitoring Period
Vinyl Chloride	Effluent Gross Value	REPORT RQL = 10	UG/L	Grab	January thru December
Trichloroethylene	Effluent Gross Value	REPORT RQL = 5	UG/L	Grab	January thru December
Methoxychlor	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
N-Nitrosodi-n-butylamine	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
Chloroethane	Effluent Gross Value	REPORT	UG/L	Grab	January thru December
Asbestos (Fibrous)	Effluent Gross Value	REPORT	FIBERS/L	6 Hour Composite	January thru December
Parachloro-m-cresol	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
Parathion	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
Phenols	Effluent Gross Value	REPORT	UG/L	Grab	January thru December
2,4,5-Trichloro-phenol	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
Delta BHC, Total (ug/l)	Effluent Gross Value	REPORT RQL = 0.02	UG/L	6 Hour Composite	January thru December
Endosulfan Sulfate	Effluent Gross Value	REPORT RQL = 0.08	UG/L	6 Hour Composite	January thru December
Beta Endosulfan	Effluent Gross Value	REPORT RQL = 0.04	UG/L	6 Hour Composite	January thru December
Alpha Endosulfan	Effluent Gross Value	REPORT RQL = 0.02	UG/L	6 Hour Composite	January thru December
Endrin Aldehyde	Effluent Gross Value	REPORT RQL = 0.1	UG/L	6 Hour Composite	January thru December

Surface Water WCR - Semi Annual Reporting Requirements:

Submit a Semi-Annual WCR: within twenty-five days after the end of every 6 month monitoring period beginning from the effective date of the permit (EDP).

Table III - A - 4: Surface Water WCR - Semi Annual Limits and Monitoring Requirements

PHASE: Final **PHASE Start Date:** 02/01/2006 **PHASE End Date:**

Parameter	Sample Point	Compliance Quantity	Units	Sample Type	Monitoring Period
PCB-1016 (Arochlor 1016)	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
2,3,7,8-Tetrachloro-dibenzo-p-dioxin	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
4,4'-DDT(p,p'-DDT)	Effluent Gross Value	REPORT RQL = 0.06	UG/L	6 Hour Composite	January thru December
4,4'-DDD(p,p'-DDD)	Effluent Gross Value	REPORT RQL = 0.04	UG/L	6 Hour Composite	January thru December
4,4'-DDE(p,p'-DDE)	Effluent Gross Value	REPORT RQL = 0.04	UG/L	6 Hour Composite	January thru December
Aldrin	Effluent Gross Value	REPORT RQL = 0.04	UG/L	6 Hour Composite	January thru December
Alpha BHC	Effluent Gross Value	REPORT RQL = 0.02	UG/L	6 Hour Composite	January thru December
Beta BHC	Effluent Gross Value	REPORT RQL = 0.04	UG/L	6 Hour Composite	January thru December
Gamma BHC (lindane),	Effluent Gross Value	REPORT RQL = 0.03	UG/L	6 Hour Composite	January thru December
Chlordane	Effluent Gross Value	REPORT RQL = 0.2	UG/L	6 Hour Composite	January thru December
Dieldrin	Effluent Gross Value	REPORT RQL = 0.03	UG/L	6 Hour Composite	January thru December
Endosulfans, Total (alpha and beta)	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
Endrin	Effluent Gross Value	REPORT RQL = 0.04	UG/L	6 Hour Composite	January thru December
Toxaphene	Effluent Gross Value	REPORT RQL = 1	UG/L	6 Hour Composite	January thru December
Heptachlor	Effluent Gross Value	REPORT RQL = 0.02	UG/L	6 Hour Composite	January thru December

Surface Water WCR - Semi Annual Reporting Requirements:
Submit a Semi-Annual WCR: within twenty-five days after the end of every 6 month monitoring period beginning from the effective date of the permit (EDP).

Table III - A - 4: Surface Water WCR - Semi Annual Limits and Monitoring Requirements

PHASE: Final **PHASE Start Date:** 02/01/2006 **PHASE End Date:**

Parameter	Sample Point	Compliance Quantity	Units	Sample Type	Monitoring Period
Heptachlor Epoxide	Effluent Gross Value	REPORT RQL = 0.4	UG/L	6 Hour Composite	January thru December
PCB-1221 (Arochlor 1221)	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
PCB-1232 (Arochlor 1232)	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
PCB-1242 (Arochlor 1242)	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
PCB-1248 (Arochlor 1248)	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
PCB-1254 (Arochlor 1254)	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
PCB-1260 (Arochlor 1260)	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
Polychlorinated Biphenyls (PCBs)	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
Chlorpyrifos	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
2-Chlorophenol	Effluent Gross Value	REPORT RQL = 20	UG/L	6 Hour Composite	January thru December
2-Nitrophenol	Effluent Gross Value	REPORT RQL = 18	UG/L	6 Hour Composite	January thru December
2,4-Dichlorophenol	Effluent Gross Value	REPORT RQL = 10	UG/L	6 Hour Composite	January thru December
2,4-Dimethylphenol	Effluent Gross Value	REPORT RQL = 13.5	UG/L	6 Hour Composite	January thru December
2,4-Dinitrophenol	Effluent Gross Value	REPORT RQL = 40	UG/L	6 Hour Composite	January thru December
2,4,6-Trichloro-phenol	Effluent Gross Value	REPORT RQL = 20	UG/L	6 Hour Composite	January thru December

Surface Water WCR - Semi Annual Reporting Requirements:
Submit a Semi-Annual WCR: within twenty-five days after the end of every 6 month monitoring period beginning from the effective date of the permit (EDP).

Table III - A - 4: Surface Water WCR - Semi Annual Limits and Monitoring Requirements

PHASE: Final **PHASE Start Date:** 02/01/2006 **PHASE End Date:**

Parameter	Sample Point	Compliance Quantity	Units	Sample Type	Monitoring Period
4-Chlorophenyl phenyl ether	Effluent Gross Value	REPORT RQL = 21	UG/L	6 Hour Composite	January thru December
4-Nitrophenol	Effluent Gross Value	REPORT RQL = 12	UG/L	6 Hour Composite	January thru December
4,6-Dinitro-o-cresol	Effluent Gross Value	REPORT RQL = 60	UG/L	6 Hour Composite	January thru December
Phenol Single Compound	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
Pentachlorophenol	Effluent Gross Value	REPORT RQL = 30	UG/L	6 Hour Composite	January thru December
Pentachlorobenzene	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
Sulfide-Hydrogen Sulfide(undissociat)	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December
Guthion	Effluent Gross Value	REPORT	UG/L	6 Hour Composite	January thru December

MONITORED LOCATION: SL2A SQAR Aerobic Digester

DISCHARGE CATEGORY(IES): A - Sanitary Wastewater

Location Description

SQAR samples shall be collected from the sludge being discharged from the aerobic digester. Said samples shall be representative of the chemical and physical characteristics of sludge leaving the treatment plant for use or disposal. Note: monthly residuals production WCRs will end and be replaced by the annual residuals production WCR at the beginning of the calendar year after the effective date of the permit.

Contributing Waste Types

Dom Residual-Other

Residuals DMR Reporting Requirements:

Submit a Semi-Annual DMR: due 60 calendar days after the end of each calendar six months.

Table III - B - 1: Residuals DMR Limits and Monitoring Requirements

PHASE: Final **PHASE Start Date:** 02/01/2006 **PHASE End Date:**

Parameter	Sample Point	Limit	Limit	Units	Limit	Limit	Limit	Units	Frequency	Sample Type
Solids, Total	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	%TS	1/6 Months	Composite
January thru December	QL	***	***		***	***	***			
Nitrate Nitrogen, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/6 Months	Composite
January thru December	QL	***	***		***	***	***			
Nitrogen, Kjeldahl Total, Dry Wt	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/6 Months	Composite
January thru December	QL	***	***		***	***	***			
Potassium Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/6 Months	Composite
January thru December	QL	***	***		***	***	***			

Residuals DMR Reporting Requirements:
Submit a Semi-Annual DMR: due 60 calendar days after the end of each calendar six months.

Table III - B - 1: Residuals DMR Limits and Monitoring Requirements

PHASE: Final **PHASE Start Date:** 02/01/2006 **PHASE End Date:**

Parameter	Sample Point	Limit	Limit	Units	Limit	Limit	Limit	Units	Frequency	Sample Type
Nitrogen, Ammonia Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/6 Months	Composite
January thru December	QL	***	***		***	***	***			
Calcium Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/6 Months	Composite
January thru December	QL	***	***		***	***	***			
Molybdenum Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/6 Months	Composite
January thru December	QL	***	***		***	***	***			
Phosphorus Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/6 Months	Composite
January thru December	QL	***	***		***	***	***			
Arsenic, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/6 Months	Composite
January thru December	QL	***	***		***	***	***			
Selenium, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/6 Months	Composite
January thru December	QL	***	***		***	***	***			
Copper, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/6 Months	Composite
January thru December	QL	***	***		***	***	***			

Residuals DMR Reporting Requirements:
Submit a Semi-Annual DMR: due 60 calendar days after the end of each calendar six months.

Table III - B - 1: Residuals DMR Limits and Monitoring Requirements

PHASE: Final **PHASE Start Date:** 02/01/2006 **PHASE End Date:**

Parameter	Sample Point	Limit	Limit	Units	Limit	Limit	Limit	Units	Frequency	Sample Type
Beryllium Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/6 Months	Composite
January thru December	QL	***	***		***	***	***			
Cadmium, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/6 Months	Composite
January thru December	QL	***	***		***	***	***			
Zinc, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/6 Months	Composite
January thru December	QL	***	***		***	***	***			
Lead, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/6 Months	Composite
January thru December	QL	***	***		***	***	***			
Nickel, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/6 Months	Composite
January thru December	QL	***	***		***	***	***			
Mercury, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/6 Months	Composite
January thru December	QL	***	***		***	***	***			

Residuals DMR Reporting Requirements:
Submit a Semi-Annual DMR: due 60 calendar days after the end of each calendar six months.

Table III - B - 1: **Residuals DMR Limits and Monitoring Requirements**

PHASE: Final **PHASE Start Date:** 02/01/2006 **PHASE End Date:**

Parameter	Sample Point	Limit	Limit	Units	Limit	Limit	Limit	Units	Frequency	Sample Type
Chromium, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/6 Months	Composite
January thru December	QL	***	***		***	***	***			

Residuals WCR - Annual Reporting Requirements:
Submit an Annual WCR: due 60 calendar days after the end of each calendar year.

Table III - B - 3: **Residuals WCR - Annual Limits and Monitoring Requirements**

PHASE: Final **PHASE Start Date:** 02/01/2006 **PHASE End Date:**

Parameter	Sample Point	Compliance Quantity	Units	Sample Type	Monitoring Period
Sludge Landfilled	Residuals	REPORT	DMT/YR	Calculated	January thru December
Sludge Land Applied	Residuals	REPORT	DMT/YR	Calculated	January thru December
Sludge Disposed Out-of-State	Residuals	REPORT	DMT/YR	Calculated	January thru December
Amt Sludge Rmvd, Wet Cubic Yards	Residuals	REPORT	WCY/YR	Calculated	January thru December

Residuals WCR - Annual Reporting Requirements:

Submit an Annual WCR: due 60 calendar days after the end of each calendar year.

Table III - B - 3: Residuals WCR - Annual Limits and Monitoring Requirements

PHASE: Final **PHASE Start Date:** 02/01/2006 **PHASE End Date:**

Parameter	Sample Point	Compliance Quantity	Units	Sample Type	Monitoring Period
Amt Sludge Rmvd, Wet Metric Tons	Residuals	REPORT	WMT/YR	Calculated	January thru December
Amt Sludge Rmvd, Gallons	Residuals	REPORT	GAL/YEAR	Calculated	January thru December
Sludge Bene Use Out-of-State	Residuals	REPORT	DMT/YR	Calculated	January thru December
Sludge Surface Disposed	Residuals	REPORT	DMT/YR	Calculated	January thru December
Total Amount of Sludge Removed	Residuals	REPORT	DMT/YR	Calculated	January thru December
Sludge Incinerated	Residuals	REPORT	DMT/YR	Calculated	January thru December
Sludge Disposed-Other Methods	Residuals	REPORT	DMT/YR	Calculated	January thru December
Solids, Total	Residuals	REPORT	%TS	Composite	January thru December

Residuals WCR - Monthly Reporting Requirements:
Submit a Monthly WCR: due 60 calendar days after the end of each calendar month.

Table III - B - 4: Residuals WCR - Monthly Limits and Monitoring Requirements

PHASE: Final **PHASE Start Date:** 02/01/2006 **PHASE End Date:** 12/31/2006

Parameter	Sample Point	Compliance Quantity	Units	Sample Type	Monitoring Period
Sludge Landfilled	Residuals	REPORT	DMT/MO	Calculated	January thru December
Sludge Land Applied	Residuals	REPORT	DMT/MO	Calculated	January thru December
Sludge Disposed Out-of-State	Residuals	REPORT	DMT/MO	Calculated	January thru December
Amt Sludge Rmvd, Wet Cubic Yards	Residuals	REPORT	WCY/MO	Calculated	January thru December
Amt Sludge Rmvd, Wet Metric Tons	Residuals	REPORT	WMT/MO	Calculated	January thru December
Amt Sludge Rmvd, Gallons	Residuals	REPORT	GAL/MON	Calculated	January thru December
Sludge Bene Use Out-of-State	Residuals	REPORT	DMT/MO	Calculated	January thru December
Sludge Surface Disposed	Residuals	REPORT	DMT/MO	Calculated	January thru December
Total Amount of Sludge Removed	Residuals	REPORT	DMT/MO	Calculated	January thru December
Sludge Incinerated	Residuals	REPORT	DMT/MO	Calculated	January thru December
Sludge Disposed-Other Methods	Residuals	REPORT	DMT/MO	Calculated	January thru December
Sludge/Septage Rcvd Offsite Srces Wet MT	Residuals	REPORT	WMT/MO	Calculated	January thru December
Sludge/Septage Rcvd Offsite Srces Gals	Residuals	REPORT	GAL/MON	Calculated	January thru December
Sludge/Septage Rcvd Offsite Srces Wt Yd3	Residuals	REPORT	WCY/MO	Calculated	January thru December

Residuals WCR - Monthly Reporting Requirements:
Submit a Monthly WCR: due 60 calendar days after the end of each calendar month.

Table III - B - 4: **Residuals WCR - Monthly Limits and Monitoring Requirements**

PHASE: Final **PHASE Start Date:** 02/01/2006 **PHASE End Date:** 12/31/2006

Parameter	Sample Point	Compliance Quantity	Units	Sample Type	Monitoring Period
Solids, Total	Residuals	REPORT	%TS	Composite	January thru December

Residuals Transfer Reporting Requirements:

Submit a Monthly RTR: due 60 calendar days after the end of each calendar month.

PART IV

SPECIFIC REQUIREMENTS: NARRATIVE

Sanitary Wastewater

A. MONITORING REQUIREMENTS

1. Standard Monitoring Requirements

a. Each analysis required by this permit shall be performed by a New Jersey Certified Laboratory that is certified to perform that analysis.

b. The Permittee shall perform all water/wastewater analyses in accordance with the analytical test procedures specified in 40 CFR 136, unless other test procedures have been approved by the Department in writing or as otherwise specified in the permit.

c. The permittee shall utilize analytical methods that will ensure compliance with the Quantification Levels (QLs) listed in PART III. QLs include, but are not limited to, Recommended Quantification Levels (RQLs) and Method Detection Levels (MDLs). If the permittee and/or contract laboratory determines that the QLs achieved for any pollutant(s) generally will not be as sensitive as the QLs specified in PART III, the permittee must submit a justification of such to the Bureau of Point Source Permitting Region 1. For limited parameters with no QL specified, the sample analysis shall use a detection level at least as sensitive as the effluent limit.

d. All sampling shall be conducted in accordance with the Department's Field Sampling Procedures Manual, or an alternate method approved by the Department in writing.

e. All monitoring shall be conducted as specified in Part III.

f. All sample frequencies expressed in Part III are minimum requirements. Any additional samples taken consistent with the monitoring and reporting requirements contained herein shall be reported on the Monitoring Report Forms.

g. Annual and semi-annual wastewater testing shall be conducted in a different quarter of each year so that tests are conducted in each of the four permit quarters of the permit cycle. Testing may be conducted during any month of the permit quarters.

h. Any influent, effluent, and sludge sampling for toxic pollutant analyses shall be collected concurrently.

i. The permittee shall perform all residual analyses in accordance with the analytical test procedures specified in 40 CFR 503.8 and the Sludge Quality Assurance Regulations (N.J.A.C. 7:14C) unless other test procedures have been approved by the Department in writing or as otherwise specified in the permit.

B. RECORDKEEPING

1. Standard Recordkeeping Requirements

a. The permittee shall retain records of all monitoring information, including 1) all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation (if applicable), 2) copies of all reports required by this NJPDES permit, 3) all data used to complete the application for a NJPDES permit, and 4) monitoring information required by the permit related to the permittee's residual use and/or disposal practices, for a period of at least 5 years, or longer as required by N.J.A.C. 7:14A-20, from the date of the sample, measurement, report, application or record.

b. Records of monitoring information shall include 1) the date, locations, and time of sampling or measurements, 2) the individual(s) who performed the sampling or measurements, 3) the date(s) the analyses were performed, 4) the individual(s) who performed the analyses, 5) the analytical techniques or methods used, and 6) the results of such analyses.

C. REPORTING

1. Standard Reporting Requirements

a. The permittee shall submit all required monitoring results to the Department on the forms provided to them. The Monitoring Report Forms (MRFs) may be provided to the permittee in either a paper format or in an electronic file format. Unless otherwise noted, all requirements below pertain to both paper and electronic formats.

b. Any MRFs in paper format shall be submitted to the following addresses:

   i. NJDEP
   Division of Water Quality
   Bureau of Permit Management
   P.O. Box 029
   Trenton, New Jersey 08625-0029

   ii. (if requested by the Water Compliance and Enforcement Bureau)
   NJDEP: Northern Bureau of Water Compliance and Enforcement
   7 Ridgedale Avenue
   Cedar Knolls, New Jersey 07927-1112

c. Any electronic data submission shall be in accordance with the guidelines and provisions outlined in the Department's Electronic Data Interchange (EDI) agreement with the permittee. Paper copies must be available for on-site inspection by DEP personnel or provided to the DEP upon written request.

d. All monitoring report forms shall be certified by the highest ranking official having day-to-day managerial and operational responsibilities for the discharging facility.

e. The highest ranking official may delegate responsibility to certify the monitoring report forms in his or her absence. Authorizations for other individuals to sign shall be made in accordance with N.J.A.C. 7:14A-4.9(b).

f. Monitoring results shall be submitted in accordance with the current Discharge Monitoring Report Manual and any updates thereof.

g. If monitoring for a parameter is not required in a monitoring period, the permittee must report "CODE=N" for that parameter.

h. If there are no discharge events during an entire monitoring period, the permittee must notify the Department when submitting the monitoring results. This is accomplished by placing a check mark in the "No Discharge this monitoring period" box on the paper or electronic verson of the monitoring report submittal form.

D. SUBMITTALS

1. Standard Submittal Requirements

a. The permittee shall prepare/update the Operation and Maintenance (O&M) Manual including an emergency plan in accordance with requirements of N.J.A.C. 7:14A-6.12(c).

b. Submit a certification that an Operations and Maintenance (O&M) Manual has been prepared: within 90 days from the effective date of the permit (EDP).

c. The permittee shall amend the Operation & Maintenance Manual whenever there is a change in the treatment works design, construction, operations or maintenance which substantially changes the treatment works operations and maintenance procedures.

2. Compliance Schedule Progress Reports

a. In accordance with N.J.A.C. 7:14A-6.4(a), a schedule of compliance has been included for winter ammonia, copper, zinc and cyanide, including interim deadlines for annual progress reports that outline the progress towards compliance with the conditions of the permit.

   i. Submit a Compliance Schedule Progress Report: within 12 months from the effective date of the permit (EDP) for winter ammonia, copper, zinc and cyanide.

   ii. Submit a Compliance Schedule Progress Report: within 24 months from the effective date of the permit (EDP) for winter ammonia, copper, zinc and cyanide.

   iii. Submit a Compliance Schedule Progress Report: within 36 months from the effective date of the permit (EDP) for copper, zinc and cyanide.

   iv. Submit a Compliance Schedule Progress Report: within 48 months from the effective date of the permit (EDP) for copper, zinc and cyanide.

b. The compliance schedule progress report(s) shall be submitted to the following Departmental entities:

   i. NJDEP: Division of Water Quality
   Bureau of Point Source Permitting Region 1
   P.O. Box 029
   Trenton, New Jersey 08625.

   ii. NJDEP: Northern Bureau of Water Compliance and Enforcement
   7 Ridgedale Avenue
   Cedar Knolls, New Jersey 07927-1112

3. Enterococci/Fecal Coliform Report

a. The Enterococci/Fecal coliform report shall consist of the complete set of individual split sample fecal coliform and enterococci data values collected over a five (5) year period.

b. Submit the enterococci data summary report: within 60 days from the effective date of the permit (EDP).

i. The permittee shall submit both hardcopy and electronic versions of the data summary report to the Department. The data submitted in the electronic version shall be displayed in a spread sheet format (i.e. Microsoft Excel, Microsoft Access, etc...) and submitted on a 3.5" diskette or CD-ROM.

c. Hardcopy and electronic copies of the data summary report shall be submitted to the following Departmental entities:.

i. NJDEP: Division of Water Quality
Bureau of Point Source Permitting - Region 1
P.O. Box 029
Trenton, New Jersey 08625.

ii. NJDEP: Water Quality Monitoring and Standards Element
Bureau of Water Quality Standards and Assessment
P.O. Box 409
Trenton, New Jersey 08625-0409.

E. FACILITY MANAGEMENT

1. Discharge Requirements

a. The permittee shall discharge at the location(s) specified in PART III of this permit.

b. The permittee shall not discharge foam or cause foaming of the receiving water that 1) forms objectionable deposits on the receiving water, 2) forms floating masses producing a nuisance, or 3) interferes with a designated use of the waterbody.

c. The permittee's discharge shall not produce objectionable color or odor in the receiving stream.

d. The discharge shall not exhibit a visible sheen.

e. When quantification levels (QL) and effluent limits are both specified for a given parameter in Part III, and the QL is less stringent than the effluent limit, effluent compliance will be determined by comparing the reported value against the QL.

f. When an average of three (3) consecutive rolling monthly average values of the committed flow (actual flow and approved allocated flow) reaches or exceeds 80% of 0.9 MGD (the permitted capacity of the facility), the permittee shall:.

i. Develop a Capacity Assurance Program (CAP) in accordance with N.J.A.C. 7:14A-22.16.

ii. For more information concerning the CAP, please contact the Bureau of Engineering and Construction Permitting North at (609) 292-6894.

iii. Contact the Division of Watershed Management to discuss whether an amendment to the Water Quality Management Plan (WQMP) or Wastewater Management Plan (WMP) will be necessary.

2. Applicability of Discharge Limitations and Effective Dates

a. Surface Water Discharge Monitoring Report (DMR) Form Requirements

i. This permit includes multiple phases for DSN001A.

The "Initial" limitation and monitoring conditions are effective from the effective date of the permit (EDP) until EDP + 36 months. "Interim" limitation and monitoring conditions are effective from the EDP until EDP + 59 months. "Final" limitation and monitoring conditions become effective on EDP + 59 months.

The final effluent limitations for winter ammonia become effective on EDP + 36 months. The final effluent limitations for Copper, Cyanide, and Zinc become effective on EDP + 59 months.

b. Wastewater Characterization Report (WCR) Form Requirements

i. The final effluent monitoring conditions contained in PART III for DSN001A apply for the full term of this permit action.

3. **Operation, Maintenance and Emergency conditions**

a. The permittee shall operate and maintain treatment works and facilities which are installed or used by the permittee to achieve compliance with the terms and conditions of this permit as specified in the Operation & Maintenance Manual.

b. The permittee shall develop emergency procedures to ensure effective operation of the treatment works under emergency conditions in accordance with N.J.A.C. 7:14A-6.12(d).

i. For more information concerning the CAP, please contact the Bureau of Engineering and Construction Permitting South at (609) 984-6840.

4. **Toxicity Testing Requirements-Acute Whole Effluent Toxicity**

a. The permittee shall conduct toxicity tests on its wastewater discharge in accordance with the provisions in this section. Such testing will determine if appropriately selected effluent concentrations adversely affect the test species.

b. Acute toxicity tests shall be conducted using the test species and method identified in Part III of this permit.

c. Any test that does not meet the specifications of N.J.A.C. 7:18, laboratory certification regulations, must be repeated within 30 days of the completion of the initial test. The repeat test shall not replace subsequent testing required in Part III.

d. The permittee shall collect and analyze the concentration of ammonia-N in the effluent on the day a sample is collected for WET testing. This result is to be reported on the Biomonitoring Report Form.

e. The permittee shall resubmit an Acute Methodology Questionnaire within 60 days of any change in laboratory.

f. Submit an acute whole effluent toxicity test report: within twenty-five days after the end of every 6 month monitoring period beginning from the effective date of the permit (EDP). The permittee shall submit toxicity test results on appropriate forms.

g. Test reports shall be submitted to:
New Jersey Department of Environmental Protection
Division of Water Quality, Bureau of Point Source Permitting Region 1
P.O. Box 029
Trenton, New Jersey 08625

5. Toxicity Testing Requirements-Chronic Whole Effluent Toxicity

a. The permittee shall conduct toxicity tests on its wastewater discharge in accordance with the provisions in this section. Such testing will determine if appropriately selected effluent concentrations adversely affect the test species.

b. Chronic toxicity tests shall be conducted using the test species and method identified in Part III of this permit.

c. Any test that does not meet the specifications contained in the Department's "Chronic Toxicity Testing Specifications for Use in the NJPDES Program" document must be repeated within 30 days of the completion of the initial test. The repeat test shall not replace subsequent testing required in Part III.

d. The permittee shall collect and analyze the concentration of ammonia-N in the effluent on the day a sample is collected for WET testing. This result is to be reported on the Biomonitoring Report Form.

e. IC25 - Inhibition Concentration - Concentration of effluent which has an inhibitory effect on 25% of the test organisms for the monitored effect, as compared to the control (expressed as percent effluent).

f. Test results shall be expressed as the IC25 for each test endpoint. Where a chronic toxicity testing endpoint yields IC25's from more than one test endpoint, the most sensitive endpoint will be used to evaluate effluent toxicity.

g. The permittee shall resubmit a Chronic Methodology Questionnaire within 60 days of any change in laboratory.

h. Submit a chronic whole effluent toxicity test report: within twenty-five days after the end of every 6 month monitoring period beginning from the effective date of the permit (EDP). The permittee shall submit toxicity test results on appropriate forms.

i. Test reports shall be submitted to:
New Jersey Department of Environmental Protection
Division of Water Quality, Bureau of Point Source Permitting Region 1
P.O. Box 029
Trenton, New Jersey 08625

6. Toxicity Reduction Implementation Requirements (TRIR)

a. The permittee shall initiate a tiered toxicity investigation if two out of six consecutive WET tests demonstrate that the effluent does not comply or will not comply with the toxicity limit specified in Part III of this permit.

   i. If the exceedence of the toxicity limit is directly caused by a documented facility upset, or other unusual event which has been identified and appropriately remedied by the permittee, the toxicity test data collected during the event may be eliminated when determining the need for initiating a TRIR upon written Department approval.

b. The permittee shall begin toxicity characterization within 30 days of the end of the monitoring period when the second toxicity test exceeds the toxicity limits in Part III. The monitoring frequency for toxicity testing shall be increased to semi-monthly (i.e. every two months). Up to 12 additional tests may be required.

   i. The permittee may return to the toxicity testing frequency specified in Part III if four consecutive toxicity tests conducted during the Toxicity Characterization do not exceed the toxicity limit.

ii. If two out of any six consecutive, acceptable tests again exceed the toxicity limit in Part III, the permittee shall repeat Toxicity Reduction Implementation Requirements.

c. The permittee shall initiate a preliminary toxicity identification (PTI) upon the fourth exceedence of the toxicity limit specified in Part III during toxicity characterization.

i. The permittee may return to the monitoring frequency specified in PART III while conducting the PTI. If more frequent WET testing is performed during the PTI, the permittee submit all biomonitoring reports to the DEP and report the results for the most sensitive species on the DMR.

ii. As appropriate, the PTI shall include:
(1) treatment plant performance evaluation,
(2) pretreatment program information,
(3) evaluation of ammonia and chlorine produced oxidants levels and their effect on the toxicity of the discharge,
(4) evaluation of chemical use and processes at the facility, and
(5) an evaluation of incidental facility procedures such as floor washing, and chemical spill disposal which may contribute to effluent toxicity.

iii. If the permittee demonstrates that the cause of toxicity is the chlorine added for disinfection or the ammonia concentration in the effluent and the chlorine and/or ammonia concentrations are below the established water quality based effluent limitation for chlorine and/or ammonia, the permittee shall identify the procedures to be used in future toxicity tests to account for chlorine and/or ammonia toxicity in their preliminary toxicity identification report.

iv. The permittee shall submit a Preliminary Toxicity Identification Notification within 15 months of triggering TRIR. This notification shall include a determination that the permittee intends to demonstrate compliance OR plans to initiate a CTI.

d. The permittee must demonstrate compliance with the WET limitation in four consecutive WET tests to satisfy the requirements of the Toxicity Reduction Investigation Requirements. After successful completion, the permittee may return to the WET monitoring frequency specified in PART III.

e. The permittee shall initiate a Comprehensive Toxicity Investigation (CTI) if the PTI does not identify the cause of toxicity and a demonstration of consistent compliance with the toxicity limit in Part III can not be made.

i. The permittee shall develop a project study plan identifying the party or parties responsible for conducting the comprehensive evaluation, establish a schedule for completing the study, and a description of the technical approach to be utilized.

ii. If the permittee determines that the PTI has failed to demonstrate consistent compliance with the toxicity limit in Part III , a Comprehensive Toxicity Investigation Workplan must be prepared and submitted within 90 days.

iii. The permittee shall summarize the data collected and the actions taken in CTI Quarterly Reports. The reports shall be submitted within 30 calendar days after the end of each quarter.

iv. The permittee shall submit a Final CTI Report 90 calendar days after the last quarterly report. The final CTI report shall include the corrective actions identified to reduce toxicity and a schedule for implementing these corrective actions.

f. Upon receipt of written approval from the Department of the corrective action schedule, the permittee shall implement those corrective actions consistent with that schedule.

i. The permittee shall satisfy the requirements of the Toxicity Reduction Implementation Requirements and return to the original toxicity monitoring frequency after corrective actions are implemented and the permittee demonstrates consistent compliance with the toxicity limit in Part III in four consecutive toxicity tests.

ii. If the implemented corrective measures do not result in consistent compliance with the toxicity limit in Part III, the permittee shall submit a plan for resuming the CTI.

g. Optional Instream Study

i. The permittee may conduct an instream study prior to initiating a CTI after completing the PTI which was unsuccessful in identifying and remediating effluent toxicity.

ii. The study shall, at a minimum include an evaluation of the major stream communities including but not limited to: Benthics, fish, phytoplankton and periphyton, shall be performed at or near 7Q10 flow conditions and shall address seasonal community structure and system function. The study shall evaluate measures of growth, reproduction and incidences of diseases.

iii. The permittee electing to conduct an instream study shall submit a project work plan to the Department for approval prior to initiating the study.

iv. The permittee shall satisfy the requirements of the Instream study and return to the original toxicity monitoring frequency after corrective actions are implemented and the permittee demonstrates consistent compliance with the next four consecutive toxicity tests.

F. INDUSTRIAL PRETREATMENT PROGRAM REQUIREMENTS

1. Requirement to Identify and Locate Industrial Users

a. The Permittee shall identify all indirect users which meet the significant indirect user definition in N.J.A.C. 7:14A-1.2 or have reasonable potential to:

i. interfere with attainment of the effluent limitations contained in the permittee's NJPDES permit

ii. pass through the treatment works and impair the water quality of the receiving stream; or

iii. affect sludge quality so as to interfere with the use or management of the municipal sludge

2. Notification Requirements

a. The permittee shall provide adequate notice to the NJDEP, Division of Water Quality, Bureau of Pretreatment and Residuals, of the name, address, telephone number and facility contact of all:

i. new SIUs at the time the proposed user applies to the permittee for connection to the permittee's system,

ii. any substantial change or proposed change in the volume or character of pollutants being introduced into the POTW by existing SIUs, or

iii. any substantial change or proposed change in the volume or character of pollutants being introduced into the POTW by a user that causes the user to become an SIU.

b. For purposes of this subsection, adequate notice shall include information on the quality and quantity of effluent introduced into the POTW and any anticipated impact of such change on the quantity or quality of effluent to be discharged from the POTW.

3. Requirement to Develop Local Limits

a. The permittee shall perform a headworks analysis in order to develop local limits or demonstrate that local limits are not necessary. The headworks analysis and, if necessary, development of local limits shall:

   i. be conducted in accordance with the Guidance Manual on the Development and Implementation of Local Discharge Limitations under the Pretreatment Program (December 1987, USEPA Office of Water Enforcement), including all supplements and amendments thereto, including: identifying the sources and pollutants which should be limited in order to address environmental protection criteria of paragraph ii.; characterizing industrial discharges; reviewing applicable environmental protection criteria and pollutant effects data; monitoring of IU discharges, POTW collection system and treatment plant; and calculating local limits for the identified pollutants of concern;

   ii. ensure compliance with the following minimum environmental protection criteria: the numerical effluent limitations in the Part III; The local agency's process inhibition and upset criteria; the local agency's worker health and safety protection criteria; the sludge quality criteria for a chosen method(s) of sludge management; and the limitations in the local agency's Air Pollution Control permit, where applicable.

b. The permittee shall conduct a Local Limits Evaluation: within 18 months from the effective date of this document.

4. Submittal Requirements

a. Submit the Local Ordinance: within 60 days from the effective date of the permit (EDP).

b. The permittee shall submit updates to its Local Sewer Use Ordinance within 30 days of modification.

c. The permittee shall prepare a Pretreatment Program Report which consists of a listing of all indirect users which meet the significant indirect user definition in N.J.A.C. 7:14A-1.2. The report shall include the name, address, and type of business for each facility.

d. If there are no Significant Indirect Users discharging into its treatment works, the Pretreatment Program Report may take the form of a letter noting such.

e. Submit the Annual Pretreatment Program Report: by August 1 of each year beginning from the effective date of the permit (EDP).

f. The reports shall be submitted to: NJDEP, Bureau of Pretreatment and Residuals, 401 East State Street, P. O. Box 029, Trenton, NJ. 08625-0029

G. CONDITIONS FOR MODIFICATION

1. Notification requirements

a. The permittee may request a minor modification for a reduction in monitoring frequency for a non-limited parameter when four consecutive test results of "not detected" have occurred using the specified QL.

2. Causes for modification

a. The Department may modify or revoke and reissue any permit to incorporate 1) any applicable effluent standard or any effluent limitation, including any effluent standards or effluent limitations to control the discharge of toxic pollutants or pollutant parameters such as acute or chronic whole effluent toxicity and chemical specific toxic parameters, 2) toxicity reduction requirements, or 3) the implementation of a TMDL or watershed management plan adopted in accordance with N.J.A.C. 7:15-7.

b. The permittee may request a minor modification to eliminate the monitoring requirements associated with a discharge authorized by this permit when the discharge ceases due to changes at the facility.

3. Removal or Modification of Final WQBEL or End-of-Pipe Criteria Limits for Chemical Specific Toxic Pollutants

a. The Department will consider proposing to remove or modify a newly imposed final water quality based toxic pollutant effluent limitation from the permit if any or all of the information in item "b" below is submitted for Departmental review and consideration.

b. Items that will be considered include, but are not limited to:

i. Submission of additional effluent data (minimum of two consecutive years of monthly data) using an approved quantification level equal to or better than the Department's Recommended Quantification Level (RQL).

ii. Acceptable site specific ambient data (e.g. hardness, pollutant specific data) collected in accordance with a NJDEP approved work plan.

iii. Acceptable site specific criteria or translators are developed in accordance with a NJDEP approved work plan.

iv. Updated 1Q10, 7Q10, 75th percentile, and/or other appropriate stream flow values where applicable.

v. Updated regulatory mixing zone dilution factors where applicable.

c. All studies require a NJDEP approved workplan that shall be submitted to the Department for approval on or before the effective date of the permit (EDP) + 6 months.

d. All final study reports and/or additional information shall be submitted to the Department on or before EDP + 36 months.

e. The Department will review all submitted information and will either propose a major permit modification to remove or modify the final WQBEL(s) or deny the modification request.

H. Custom Requirement

a. Existing Facility & Equipment Operating Requirements.

i. In accordance with the requirements of the amendment to the Northeast Water Quality Management Plan adopted on August 18, 1994, dischargers to the Passaic River Basin above Little Falls (that are identified on the list in said amendment) that have temporary or final seasonal ammonia effluent limitations are required to operate all phases of their treatment process (existing facility and equipment), necessary to treat anticipated flows, year round (unless specific units are explicitly exempted by the Department) in order to minimize the amount of ammonia being discharged to the greatest extent practicable, even if less stringent winter season ammonia effluent limitations are incorporated through a final permit action. This permittee is identified on the previously cited list and is therefore required to comply with this permit condition.

APPENDIX A:

CHRONIC TOXICITY TESTING SPECIFICATIONS

FOR USE IN THE NJPDES PERMIT PROGRAM

Version 2.1

May 1997

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Notice: Mention of trade names or commercial products do not constitute endorsement or recommendation for use.

I. AUTHORITY AND PURPOSE

These methods specifications for the conduct of whole effluent chronic toxicity testing are established under the authority of the NJPDES permitting program, N.J.A.C. 7:14A-6.5(a)2 and 40 CFR 136, for discharges to waters of the State. The methods referenced herein are included by reference in 40 CFR 136, Table 1.A. and, therefore, constitute approved methods for chronic toxicity testing. The information contained herein serves to clarify testing requirements not sufficiently clarified in those methods documents and also serves to outline and implement the interlaboratory Standard Reference Toxicant Program until a formal laboratory certification program is established under N.J.A.C. 7:18. As such these methods are intended to be used to determine compliance with discharge permits issued under the authority of the NJPDES permit program. Tests are to be conducted in accordance with the general conditions and test organism specific method specifications contained in this document. All other conditions and specifications can be found in 40 CFR 136 and USEPA methodologies.

Until a subchapter on chronic toxicity testing within the regulations governing the certification of laboratories and environmental measurements (N.J.A.C. 7:18) becomes effective, tests shall be conducted in conformance with the methodologies as designated herein and contained in 40 CFR 136. The laboratory performing the testing shall be within the existing acute toxicity testing laboratory certification program established under N.J.A.C. 7:18, as required by N.J.A.C. 7:9B-1.5(c)5.

Testing shall be in conformance with the subchapter on chronic toxicity testing within the N.J.A.C. 7:18 when such regulations become effective. The laboratory performing the toxicity testing shall be within the chronic toxicity testing laboratory certification program to be established under that subchapter, when it becomes effective.

These methods are incorporated into discharge permits as enforceable permit conditions. Each discharge permit will specify in Part IV of the permit, the test species specific methods from this document that will be required under the terms of the discharge permit. Although the test species specific methods for each permit are determined on a case-by-case basis, the purpose of this methods document is to assure consistency among dischargers and to provide certified laboratories with information on the universe of tests to be utilized so that they can make the necessary preparations, including completing the required Standard Reference Toxicant testing. Please note that these methodologies are required for compliance testing only. Facilities and/or laboratories conducting testing under the requirements of a Toxicity Identification Evaluation or for informational purposes are not bound by these methods.

This document constitutes the second version of the NJDEP's interim chronic methodologies. This version contains no significant changes to the test methods themselves. However, in keeping with the Department's continued emphasis on good laboratory practices and quality control, the areas addressing the Standard Reference Toxicant Program, data analysis and data reporting, have been significantly revised.

II. GENERAL CONDITIONS

A. LABORATORY SAFETY, GLASSWARE, ETC.

All safety procedures, glassware cleaning procedures, etc., shall be in conformance with 40 CFR 136 and USEPA's "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms," "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms" and N.J.A.C. 7:18.

B. TEST CONCENTRATIONS / REPLICATES

All testing is to be performed with a minimum of five effluent concentrations plus a dilution water control. A second reference water control is optional when a dilution water other than culture water is used. The use of both a 0.5 or 0.75 dilution factor is acceptable for the selection of test concentrations. If hypothesis testing will be used to determine the test endpoint, one effluent concentration shall be the chronic permit limitation, unless the existing data for the discharge indicate that the NOEC is expected to be significantly less than the permit limit. The use of the 0.5 dilution factor may require more than five dilutions to cover the entire range of effluent concentrations as well as the chronic permit limit, since the permit limit will often not be one of the nominal concentrations in a 0.5 dilution series. In such an instance, the 0.5 dilution series may be altered by including an additional test concentration equal to the permit limit in the dilution series, or by changing the concentration closest to the permit toxicity limit to be equal to that limit. The Department recommends the use of the 0.75 dilution factor using Table 1.0 to determine test concentrations. That table establishes test concentrations based on the chronic toxicity limitation.

For either the 0.5 or 0.75 dilution factor, there shall be at least one test concentration above the permit limitation and at least three test concentrations below the permit limit along with the dilution water control unless the permit limitation prohibits such (e.g., limitations greater than 75% effluent). An effort shall be made to bracket the anticipated test result.

To use Table 1.0, locate the permit limit in column 4. The dilution series becomes the row that corresponds to the permit limit in column 4. For example, a permit limit of 41 would require a dilution series of the dilution water control, 17%, 23%, 31%, 41% and 55% effluent.

The number of replicates used in the test must, at a minimum, satisfy the specifications of the applicable methods contained herein. Increased data sensitivity can be obtained by increasing the number of replicates equally among test concentrations and thus an increased number of replicates is acceptable. Further, the use of nonparametric statistical analysis requires a minimum of four replicates per test concentration. If the data for any particular test is not conducive to parametric analyses and if less than four replicates were included, the test may not be considered acceptable for compliance purposes.

The use of single concentration tests consisting of the permit limitation as a concentration and a control is not permitted for compliance purposes, but may be used by a permittee in the conduct of a Toxicity Investigation Evaluation (TIE) or for information gathering purposes. Such a test would be considered a "pass" if there was no significant difference in test results, using hypothesis testing methods.

Table 1.0: 0.75 DILUTION SERIES INDEXED BY PERMIT LIMIT

				Permit Limit						Permit Limit	
Col #	1	2	3	4	5	Col #	1	2	3	4	5
	0.4	0.6	0.8	1	1.3		22	29	38	51	68
	0.8	1.1	1.5	2	2.7		22	29	39	52	69
	1.3	1.7	2.3	3	4		22	30	40	53	71
	1.7	2.3	3	4	5.3		23	30	41	54	72
	2.1	2.8	3.8	5	6.7		23	31	41	55	73
	2.5	3.4	4.5	6	8		24	32	42	56	75
	3	4	5	7	9		24	32	43	57	76
	3	5	6	8	11		24	33	44	58	77
	4	5	7	9	12		25	33	44	59	79
	4	6	8	10	13		25	34	45	60	80
	5	6	8	11	15		26	34	46	61	81
	5	7	9	12	16		26	35	47	62	83
	5	7	10	13	17		27	35	47	63	84
	6	8	11	14	19		27	36	48	64	85
	6	8	11	15	20		27	37	49	65	87
	7	9	12	16	21		28	37	50	66	88
	7	10	13	17	23		28	38	50	67	89
	8	10	14	18	24		29	38	51	68	91
	8	11	14	19	25		29	39	52	69	92
	8	11	15	20	27		30	39	53	70	93
	9	12	16	21	28		30	40	53	71	95
	9	12	17	22	29		30	41	54	72	96
	10	13	17	23	31		31	41	55	73	97
	10	14	18	24	32		31	42	56	74	99
	11	14	19	25	33		32	42	56	75	100
	11	15	20	26	35	24	32	43	57	76	
	11	15	20	27	36	24	32	43	58	77	
	12	16	21	28	37	25	33	44	59	78	
	12	16	22	29	39	25	33	44	59	79	
	13	17	23	30	40	25	34	45	60	80	
	13	17	23	31	41	26	34	46	61	81	
	14	18	24	32	43	26	35	46	62	82	
	14	19	25	33	44	26	35	47	62	83	
	14	19	26	34	45	27	35	47	63	84	
	15	20	26	35	47	27	36	48	64	85	
	15	20	27	36	48	27	36	48	65	86	
	16	21	28	37	49	28	37	49	65	87	
	16	21	29	38	51	28	37	50	66	88	
	16	22	29	39	52	28	38	50	67	89	
	17	23	30	40	53	28	38	51	68	90	
	17	23	31	41	55	29	38	51	68	91	
	18	24	32	42	56	29	39	52	69	92	
	18	24	32	43	57	29	39	52	70	93	
	19	25	33	44	59	30	40	53	71	94	
	19	25	34	45	60	30	40	53	71	95	
	19	26	35	46	61	30	41	54	72	96	
	20	26	35	47	63	31	41	55	73	97	
	20	27	36	48	64	31	41	55	74	98	
	21	28	37	49	65	31	42	56	74	99	
	21	28	38	50	67	32	42	56	75	100	

* Select the dilution series by finding the row which contains the permit limit in column #4.
NOTE: All values are in units of "% effluent" not toxic units.

C. DILUTION WATER

1. Marine and Estuarine Waters

A high quality natural water, such as the Manasquan River Inlet is strongly recommended as the dilution water source for chronic toxicity testing with marine and estuarine organisms. The use of the receiving water as the dilution water source is not required. Saline waters prepared with hypersaline brine and deionized water may also be used as dilution water. Hypersaline brines shall be prepared from a high quality natural seawater and shall not exceed a concentration of 100 ppt. The type of a dilution water for a permittee may not be changed without the prior approval of the Department.

The standard test salinity shall be 25 ppt, except for *Champia parvula,* which shall be tested at 30 ppt. Since most effluents are freshwater based, in most cases it will be necessary to adjust the salinity of the test concentrations to the standard test salinity.

2. Fresh Waters

A high quality natural water, such as Round Valley Reservoir (if access is allowed) or Lake Hopatcong, is strongly recommended as the dilution water source for chronic toxicity testing with freshwater organisms. It is not required to perform the toxicity testing with the receiving water as dilution water. Tests performed with a reconstituted water or up to 20% Diluted Mineral Water (DMW) as dilution water is acceptable. For testing with *Ceriodaphnia dubia*, the addition of 5 µg/l selenium (2 µg/l selenium with natural water) and 1 µg/l vitamin B12 is recommended (Keating and Dagbusan, 1984: Keating, 1985 and 1988). The source of a dilution water for a permittee may not be changed without the prior approval of the Department. Reconstituted water and DMW should be prepared with Millipore Super Q^R or equivalent, meet the requirements of N.J.A.C. 7:18-6 and should be aerated a minimum of 24 hrs prior to use, but not supersaturated.

D. EFFLUENT SAMPLE COLLECTION

Effluent samples shall be representative of the discharge being regulated. For each discharge serial number (DSN), the effluent sampling location shall be the same as that specified in the NJPDES permit for other sampling parameters unless an alternate sampling point is specified in the NJPDES discharge permit. For industrial dischargers with a combined process/sanitary waste stream, effluent sampling shall be after chlorination, unless otherwise designated in the permit.

For continuous discharges, effluent sampling shall consist of 24 hour composite samples consisting either of equal volumes taken once every hour or of a flow-proportionate composite sample, unless otherwise approved by the Department. At a minimum, three samples shall be collected as specified above, one every other day. The first sample shall be used for test initiation and the first renewal. The second sample for the next two renewals. The third sample shall be used for the final three renewals. For the *Champia* and *Selenastrum* tests, a single sample shall be collected not more than 24 hours prior to test initiation. No effluent sample shall be over 72 hours old at the time of its use to initiate or renew solutions in a test. It is acceptable to collect samples more frequently for chronic WET testing and if samples are collected daily for acute toxicity testing conducted concurrently, available samples may be used to renew the test solutions as appropriate.

For all other types of discharges, effluent sampling shall be conducted according to specifications contained within the discharge permit, methodology questionnaire or as otherwise specified by the Department. The use of grab samples or other special sampling procedures will be based on time of occurrence and duration of intermittent discharge events.

If a municipal discharger has concerns that the concentrations of ammonia and/or chlorine in an effluent are adequate to cause violations of the permit limit for chronic toxicity testing, the permittee should conduct analyses, as specified in USEPA's toxicity investigation methods documents, to illustrate the relationship between chronic effluent toxicity and chlorine and/or ammonia as applicable. This data may then be submitted to the Department as justification for a request to use modified test procedures, which account for ammonia and/or chlorine toxicity, in future chronic toxicity tests. The Department may, where adequate justification exists, permit the adjustment of these pollutants in the effluent sample if discharge limits for these pollutants are contained in the NJPDES permit and those permit limitations are adequate for the protection of water quality. Any proposed modified test procedures to adjust effluent chlorine and/or ammonia shall be approved by the Department prior to use of those test procedures for any compliance testing.

Except for filtration through a 2 mm or larger screen or an adjustment to the standard test salinity, no other adjustments to the effluent sample shall be made without prior written approval by the Department. Aeration of samples prior to test start shall be minimized where possible and samples shall not be aerated where adequate saturation exists to maintain dissolved oxygen.

E. PHYSICAL CHEMICAL MEASUREMENTS

At a minimum, the physical chemical measurements shall be as follows:

- pH and dissolved oxygen shall be measured at the beginning and end of each 24 hour exposure period, in at least one chamber, of the high, medium and low test concentrations and the control. In order to ensure that measurements for these parameters are representative of the test concentrations during the test, measurements for these parameters should be taken in an additional replicate chamber for such concentrations which contains no test organisms, but is subject to the same test conditions.

- Temperature shall either be monitored continuously, measured daily in at least two locations in the environmental control system, or measured at the beginning of each 24 hr exposure period in at least one replicate for each treatment.

- Salinity shall be measured in all salt water tests at the beginning of each 24 hour exposure period, in at least one replicate for each treatment.

- For all freshwater tests, alkalinity, hardness and conductivity shall be measured in each new sample (100% effluent) and control.

- Nitrite, nitrate and ammonia shall be measured in the control before each renewal in the mysid test only.

- For samples of discharges where concentrations of ammonia and/or chlorine are known or are suspected to be sufficient to cause toxicity, it is recommended that the concentrations of these pollutants be determined and submitted with the standardized report form. The laboratory is advised to consult with the permittee to determine if these parameters should be measured in the effluent. Where such measurements are deemed appropriate, measurements shall be conducted at the beginning of each 24 hour exposure period. Also, since a rise in the test pH can affect the toxicity of ammonia in the effluent, analysis of ammonia during the test may be appropriate if a rise in pH is accompanied by a significant increase in mortality.

F. STATISTICS

The use of both hypothesis testing techniques and point estimate techniques are currently in use by the Department or by permittees for compliance purposes. The NJPDES permit should be checked to determine which type of analysis is required and appropriate for each specific facility. It is not acceptable to simply evaluate any data by "visual data review" unless in the analysis of survival data, no mortality occurred in the test. All data sets must be appropriately statistically evaluated.

For hypothesis testing techniques, statistical analysis shall follow the protocols in USEPA (1988, 1989) to evaluate adverse effects. A significance level of 0.05 shall be utilized to evaluate such effects. Use of a protocol not contained in these documents must be accompanied by a reference and explanation addressing its applicability to the particular data set. Please note the following when evaluating data using hypothesis testing techniques.

Special attention should be given to the omission and inclusion of a given replicate in the analysis of mysid fecundity data (USEPA 1994, p. 275) and *Ceriodaphnia* reproduction data (USEPA 1994, page 174).

Determination of acceptability criteria and average individual dry weight for the growth endpoints must follow the specifications in the applicable documents (e.g., p.84 for saltwater methods document.)

Use of nonparametric statistical analyses requires a minimum of four replicates per test concentration. If the data for any particular test are not conducive to parametric analyses and if less than four replicates were included, the test may not be acceptable to the Department.

Where hypothesis testing is used for compliance purposes, if the results of hypothesis testing indicate that a deviation from the dose response occurs such that two test concentrations are deemed statistically significant from the control but an intermediate test concentration is not, the test is deemed unacceptable and cannot be used for compliance testing purposes.

For point estimate techniques, statistical analysis should follow the protocol contained in "A Linear Interpolation Method for Sublethal Toxicity: The Inhibition Concentration (ICp) Approach (Version 2.0), July 1993, National Effluent Toxicity Assessment Center Technical Report 03-93." Copies of the program can be obtained by contacting the Department. The linear interpolation estimate ICp values and not the bootstrap mean ICp, shall be reported for permit compliance purposes. The ICp value reported on the Discharge Monitoring Report shall be rounded off as specified in the Department's "Discharge Monitoring Report (DMR) Instruction Manual, December 1993." IC25 values shall be reported under the parameter code listed as "NOEC" on the DMR, until the DMR's are adjusted accordingly.

If the result reported by the ICp method is greater than the highest concentration tested, the test result is reported as "greater than C" where "C" is the highest tested concentration. If the ICp is lower than the lowest concentration tested, the test result is reported as "less than C" where "C" is the lowest tested concentration.

If separate NOEC's/IC25's can be calculated from multiple test endpoints, for example a reproductive endpoint and a growth endpoint, the lowest NOEC/IC25 value expressed in units of "% effluent" will be used to determine permit compliance and should, therefore, be reported as the NOEC/IC25 value for the test. If the NOEC value for growth and/or reproduction is not lower than that for survival, the NOEC/IC25 value reported for the test shall be as survival. For saltwater tests, where additional controls are used in a test (i.e. brine and/or artificial sea salt control), a T-test shall be used to determine if there is a significant difference between the original test control and the additional controls. If there is a significant difference between any of the controls, the test may be deemed unacceptable and if so, will not be used for permit compliance.

III. TEST ACCEPTABILITY CRITERIA

Any test that does not meet these acceptability criteria will not be used by the Department for any purpose and must be repeated as soon as practicable, with a freshly collected sample.

1. Tests must be performed by a laboratory approved for the conduct of chronic toxicity tests and certified for acute toxicity testing under N.J.A.C. 7:18.

2. Test results may be rejected due to inappropriate sampling, including the use of less than three effluent samples in a test and/or use of procedures not specified in a permit or methodology questionnaire, use of frozen or unrefrigerated samples or unapproved pretreatment of an effluent sample.

3. Controls shall meet the applicable performance criteria specified in the Table 2.0 and in the individual method specifications contained herein.

4. Acceptable and applicable Standard Reference Toxicant Data must be available for the test.

5. No unapproved deviations from the applicable test methodology may be present.

6. When using hypothesis testing techniques, a deviation from the dose response as explained in the statistical portion of this document shall not be present in the data.

Table 2.0: CONTROL PERFORMANCE

TEST ORGANISM	MINIMUM SURVIVAL	MINIMUM WEIGHT GAIN	MINIMUM FECUNDITY/ REPRODUCTION
Pimephales promelas	80%	0.25 mg avg	N/A
Ceriodaphnia dubia	80%	N/A	Average of ≥15 young per surviving female
Selenastrum capricornutum	Density ≥2x10^{5}cells/ml	N/A	Variability in controls not to exceed 20%.
Cyprinodon variegatus	80%	0.60 mg (unpreserved) avg 0.50 mg (preserved) avg	N/A
Menidia beryllina	80%	0.50 mg (unpreserved) avg 0.43 mg (preserved) avg	N/A
Mysidopsis bahia	80%	0.2 mg per mysid avg	egg production by 50% of control females if fecundity is used as an endpoint.
Champia parvula	100%	N/A	≥10 cystocarps per plant Plants in controls and lower test concentrations shall not fragment so that individual plants cannot be identified.

THE DETERMINATION OF A TEST AS UNACCEPTABLE DOES NOT RELIEVE THE FACILITY FROM MONITORING FOR THAT MONITORING PERIOD

IV. STANDARD REFERENCE TOXICANT TESTING

All chronic testing shall be accompanied by testing with a Standard Reference Toxicant (SRT) as a part of each laboratory's internal quality control program. Such a testing program should be consistent with the quality assurance/quality control protocols described in the USEPA chronic testing manuals. Laboratories may utilize the reference toxicant of their choice and toxicants such as cadmium chloride, potassium chloride, sodium dodecyl sulfate and copper sulfate are all acceptable. However, Potassium chloride has been chosen by several laboratories and is recommended by the Department. The concentration of the reference toxicant shall be verified by chemical analysis in the low and high test concentrations once each year or every 12 tests, whichever is less. It is not necessary to run SRT tests, for all species using the same SRT.

A. INITIAL STANDARD REFERENCE TOXICANT (SRT) TESTING REQUIREMENTS

At a minimum, this testing shall include an initial series of at least five SRT tests for each test species method. Acceptable SRT testing for chronic toxicity shall be performed utilizing the short term chronic toxicity test methods as specified herein. Reference toxicant tests utilizing acute toxicity testing methods, or any method other than those contained in this document are not acceptable. The laboratory should forward results of the initial SRT testing, including control charts, the name of the reference toxicant utilized, the supplier and appropriate chemical analysis of the toxicant to either address listed in the reporting requirements section herein. The initial series of a least five SRT tests for a specific test species method shall be completed and approved in writing by the Department prior to the conduct of any chronic toxicity testing for compliance purposes.

B. SUBSEQUENT SRT TESTING REQUIREMENTS

After receiving the initial approval from the Department to conduct chronic toxicity tests for compliance purposes, subsequent SRT testing shall be conducted as follows:

1. Where organisms used in testing are cultured at the testing laboratory, SRT testing should be conducted once per month for each species/method.

2. Where the laboratory purchases organisms from a laboratory certified in New Jersey for the conduct of acute toxicity testing and approved for the conduct of chronic toxicity testing for the test organism in question (i.e. the "supplier laboratory"), SRT data provided by the "supplier laboratory" for each lot of organisms purchased is acceptable as long as the SRT test result falls within the control limits of the control chart established by the "supplier laboratory" for that organism. The laboratory using purchased organisms is responsible for the results of any compliance tests they perform.

3. A testing laboratory purchasing organisms from a supplier laboratory must still perform SRT testing on a quarterly basis at a minimum, for each species they test with, in order to adequately document their own interlaboratory precision.

4. If a testing laboratory purchasing organisms elects not to use the SRT data from a "supplier laboratory" or such data is unavailable or where organisms are purchased from another organism supplier, the testing laboratory must conduct SRT testing on each lot of organisms purchased.

5. For industrial laboratories certified under N.J.A.C. 7:18 to conduct acute toxicity tests, only the SRT testing conditions specified in 2. through 4. above apply. Where that laboratory/facility cultures their own test organisms, the frequency of SRT testing required will be determined on a case by case basis, based on the frequency of testing for that facility.

NOTE: Based on these requirements, SRT data are considered applicable to a compliance test when the SRT test results are acceptable and the SRT test is conducted within 30 days of the compliance test, for the test species and SRT in question. Therefore, it is not necessary for an approved laboratory to run an SRT test every month if the laboratory is not conducting compliance tests for a particular species.

C. CHANGING OF AN ESTABLISHED REFERENCE TOXICANT

The SRT used for any species by a laboratory may be changed at any time provided that the following conditions have been satisfied:

1. A series of at least three reference toxicant tests are conducted with the new reference toxicant and the results of those tests are identified as satisfactory, in writing, by the Department.

2. Laboratories must continue using the already approved SRT in their ongoing QA/QC program, until such time as the letter referenced above, is received by the laboratory.

D. CONTROL CHARTS

Control charts shall be established from SRT test results in accordance with the procedures outlined in the USEPA methods documents. Control charts shall be constructed using IC25's using the following methods:

1. The upper and lower control limits shall be calculated by determining +/- two standard deviations above and below the mean.

2. SRT test results which exhibit an IC25 that is greater than the highest concentration tested or less than the lowest concentration tested (i.e. a definitive endpoint cannot be determined), shall not be used to establish control charts.

3. SRT tests which do not meet the acceptability criteria for a specific species shall not be used to establish control charts.

4. All values used in the control charts should be as nominal concentrations. However, the control charts shall be accompanied by a chart tabulating the test results as measured concentrations.

5. An outlier (i.e. values which fall outside the upper and lower control limits) should be included on the control chart unless it is determined that the outlier was caused by factors not directly related to the test organisms (e.g., test concentration preparation) as the source of variability would not be directly applicable to effluent tests. In such case, the result and explanation shall be reported to the Department within 30 days of the completion of the SRT test.

The control chart established for the initial series of SRT data submitted will be used by the laboratory and the Department to determine outliers from SRT test results reported in the "NJPDES Biomonitoring Report Form - Chronic Toxicity Test" submitted by the permittees for the test species. These initial control limits will remain unchanged until twenty SRT tests have been completed by the laboratory.

The following procedures shall be used for continually updating control charts after twenty acceptable SRT tests have been completed:

1. Once a laboratory has completed twenty acceptable SRT tests for a test species, the upper and lower control limits shall be recalculated with those twenty values.

2. For each successive SRT test conducted after these first twenty tests, a moving average shall be calculated and the control limits reevaluated using the last twenty consecutive test results.

3. The upper and lower control limits shall be reported on the "NJPDES Biomonitoring Report Form - Chronic Toxicity Tests" along with the SRT test result.

E. UNACCEPTABLE SRT TEST RESULTS

If a laboratory produces any SRT test results which are outside the established upper and lower control limits for a test species at a frequency greater than one test in any ten tests, a report shall be forwarded to the Department at the address contained herein. This report shall include any identified problem which caused the values to fall outside the expected range and the corresponding actions that have been taken by the laboratory. The Department may not accept or may require repeat testing for any toxicity testing that may have been affected by such an occurrence.

If a laboratory produces two consecutive SRT test results or three out of any ten test results which are outside the established upper and lower limits for a specific test species, the laboratory shall be unapproved to conduct chronic toxicity tests for compliance purposes for that test species. Reapproval shall be contingent upon the laboratory producing SRT test results within the established upper and lower control limits for that test species in two consecutive SRT tests. If one or both of those test results again fall outside the established control levels, the laboratory is unapproved for that test species until five consecutive test results within the established upper and lower control limits are submitted and approved by the Department.

F. ANNUAL SUBMITTALS

Control charts shall be forwarded to the Department on an annual basis, on the anniversary of approval for the test species.

The Department may request, at any time, any information which is essential in the evaluation of SRT results and/or compliance data.

V. TEST CANCELLATION / RESCHEDULING EVENTS

A lab may become aware of QA problems during or immediately following a test that will prevent data from being submitted or a lab may be unable to complete a tests due to sample collection or shipping problems. If for any reason a chronic toxicity test is initiated and then prematurely ended by the laboratory or at the request of the permittee, the laboratory shall submit the form entitled "Chronic Whole Effluent Toxicity Testing Test Cancellation / Rescheduling Event Form" contained herein. This form shall be used to detail the reason for prematurely ending the test. This completed form and any applicable raw data sheets shall be submitted to the appropriate biomonitoring program at the address above within 30 days of the cessation of the test.

Tests are considered to be initiated once test organisms have been added to all test chambers.

Submission of this form does not relieve the facility from monitoring for that monitoring period.

VI. REPORTING

The report form entitled "NJPDES Biomonitoring Report Form - Chronic Toxicity Tests" should be used to report the results of all NJPDES chronic compliance biomonitoring tests. Laboratory facsimiles are acceptable but must contain all information included on any recent revisions of the form by the Department. Statistical printouts and raw data sheets for all endpoints analyzed shall be included with the report submitted to the Department. Two copies of all chronic toxicity test report forms shall be submitted to the following address as applicable:

Bureau of Point Source Permitting Region 1 **OR**
Bureau of Point Source Permitting Region 2 (as indicated in the cover letter)

New Jersey Department of Environmental Protection
Division of Water Quality
PO Box 29
Trenton, NJ 08625-0029

It is not necessary to attach a copy of a test report form to the Discharge Monitoring Report (DMR) form when submitting this form to the Department. However, the results of all chronic toxicity tests conducted for compliance purposes must be reported on the DMR form under the appropriate parameter code in the monitoring period in which the test was conducted.

VII. METHOD SPECIFICATIONS

The following method specifications shall be followed as specified in the NJPDES permit. Any changes to these methods will not be considered acceptable unless they are approved in writing by the Department, prior to their use.

A. Fathead Minnow (*Pimephales promelas*), Larval Survival and Growth Test, method 1000.0
B. *Ceriodaphnia dubia*, Survival and Reproduction Test, method 1002.0
C. Algal, (*Selenastrum capricornutum*), Growth Test, method 1003.0
D. Sheepshead Minnow (*Cyprinodon variegatus*), Larval Survival and Growth Test, method 1005.0
E. Inland Silverside (*Menidia beryllina*), Larval Survival and Growth Test, method 1006.0
F. *Mysidopsis bahia*, Survival, Growth, and Fecundity Test, method 1007.0
G. *Champia parvula*, Sexual Reproduction Test, method 1009.0

VIII. REFERENCES

1. Keating, K. 1985. The influence of Vitamin B12 deficiency on the reproduction of Daphnia pulex Leydig (Cladocera). J. Crustacean Biology 5:130-136.

2. Keating, K. 1988. N.J.D.E.P. Project C29589, Fiscal 1988 Third Quarter Summary Report. Producing Nutritionally Competent Daphnids for Use in Bioassay. 44p.

3. Keating, K., and B. Dagbusan. 1984. Effect of selenium deficiency on cuticle integrity in Cladocera (Crustacea). Proc. Natl. Acad. Sci. USA 81:3433-3437.

4. NJDEP, 1993. Discharge Monitoring Report (DMR) Instruction Manual.

5. USEPA. 1994. Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms. EPA-600/4-91-003. July 1994. Second Edition.

6. USEPA. 1994. Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. EPA/600/4-91/002. July 1994. Third Edition.

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
PO Box 29
TRENTON, NEW JERSEY 08625-0029
BIOMONITORING PROGRAM

CHRONIC WHOLE EFFLUENT TOXICITY TESTING
TEST CANCELLATION / RESCHEDULING EVENT FORM

THIS FORM IS TO BE COMPLETED AND SUBMITTED TO THE DEPARTMENT DIRECTLY BY THE LABORATORY CONDUCTING CHRONIC TOXICITY TESTS WHENEVER A CHRONIC TOXICITY TEST IS PREMATURELY ENDED FOR ANY REASON

NJPDES No.: ______________________

FACILITY NAME: ____

LOCATION: ____

CONTACT: ____________________________ PHONE: ______________________

CANCELLATION EVENT:

LABORATORY NAME / NUMBER: ______________________________________

CONTACT: ______________________________________

TEST START DATE: _____/_____/_____ TEST END DATE: _____/_____/_____

REASON FOR CANCELLATION: ______________________________________

____

____

____

____

____

EFFLUENT SAMPLING:

SAMPLING POINT / DESCRIPTION OF SAMPLING SITE: ______________________

____

SAMPLING INITIATED: DATE: ___/___/___ TIME: __________

SAMPLING ENDED: DATE: ___/___/___ TIME: __________

NUMBER OF EFFLUENT SAMPLES COLLECTED: ______________

SAMPLE TYPE (GRAB/COMPOSITE): ______________________

RECEIVED IN LAB BY/FROM: ______________________________________

____

METHOD OF SHIPMENT: ______________________________________

(ALL APPLICABLE RAW DATA SHEETS MUST BE ATTACHED)

c: Permittees authorized agent.

APPENDIX C

Influent Pump Curves

FLYGT	# PERFORMANCE CURVE	PRODUCT: CP3140.180	TYPE: HT
DATE: 2002-02-04	PROJECT:	CURVE NO: 63-480-00-3855	ISSUE: 1

	1/1-LOAD	3/4-LOAD	1/2-LOAD
MOTOR COS PHI	0.85	0.81	0.72
MOTOR EFFICIENCY	84.0 %	84.5 %	83.5 %
GEAR EFFICIENCY	---	---	---

MOTOR SHAFT POWER	15	hp
STARTING CURRENT ...	105	A
RATED CURRENT ...	20	A
RATED SPEED	1745	rpm
TOT.MOM.OF INERTIA ...	---	
NO. OF BLADES	1	

COMMENTS: NEVA CLOG

INLET/OUTLET: - /100 mm

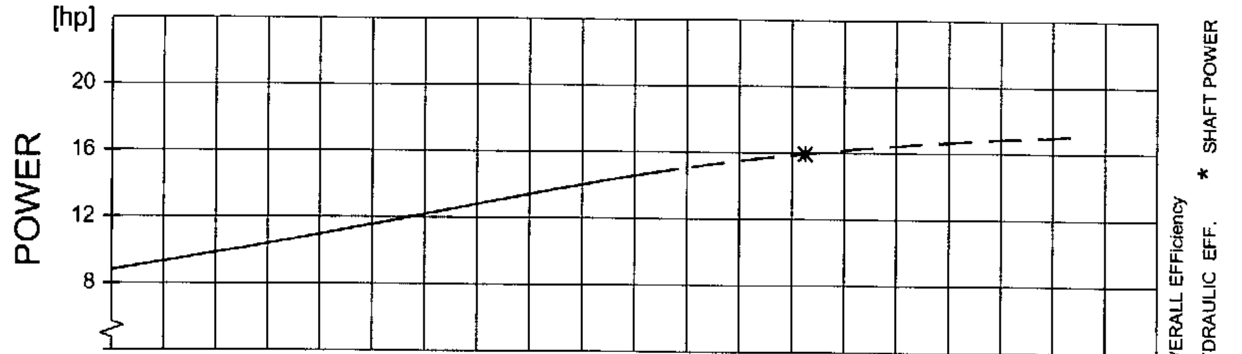
IMP. THROUGHLET: 76 mm

IMPELLER DIAMETER: 265 mm

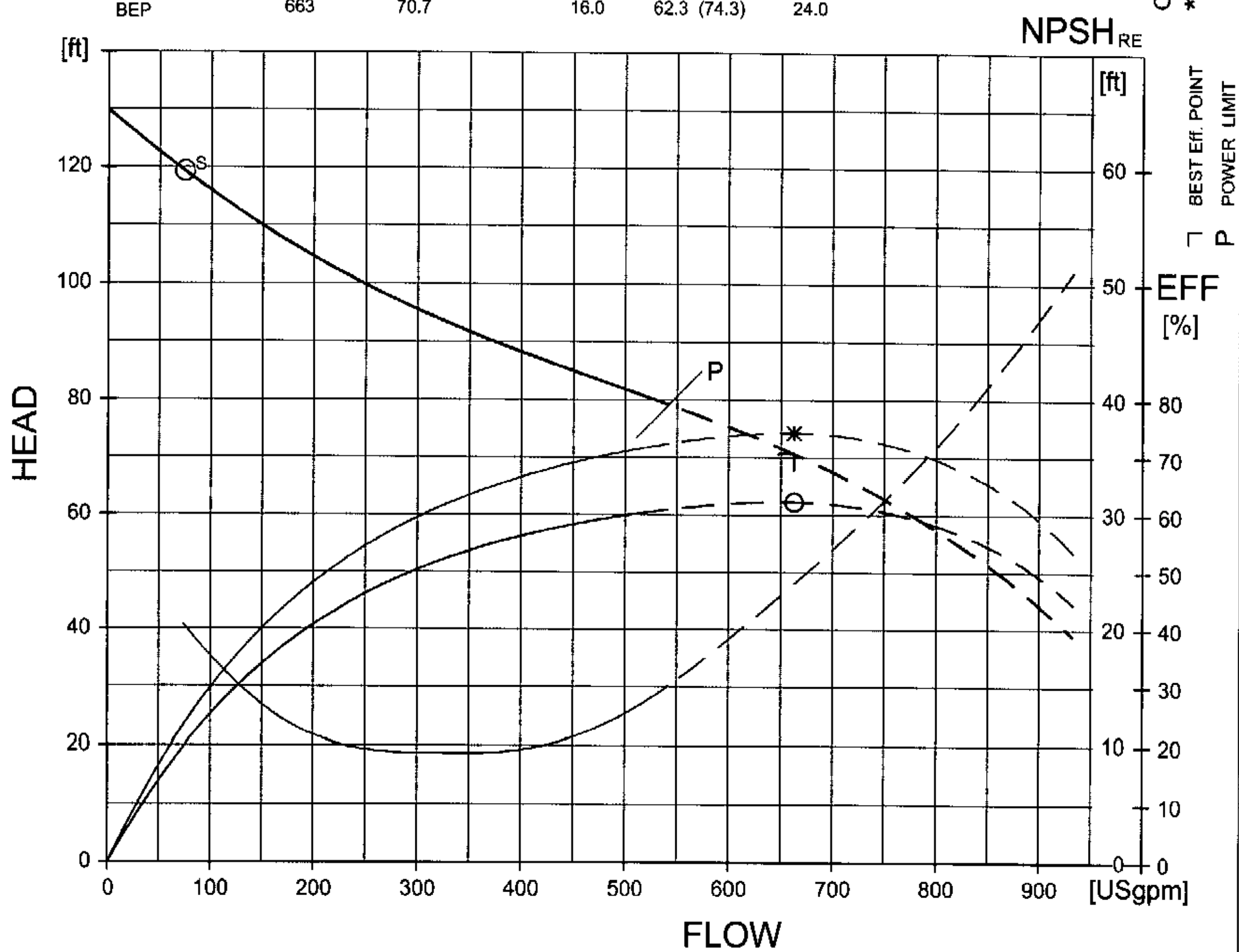
MOTORTYPE	STATOR	REV
25-11-4AA	12YSER	10

FREQ.	PHASES	VOLTAGE	POLES
60 Hz	3	460 V	4

GEARTYPE	RATIO
---	---



DUTY POINTs :	FLOW[USgpm]	HEAD[ft]	POWER [hp]	EFF. [%]	NPSH[ft]
BEP	663	70.7	16.0	62.3 (74.3)	24.0



S: RISK OF SEDIMENTATION AT VELOCITY BELOW 0.6 m/s
(Point (S) show risk in a 100 mm pipe)

CURVES SHOW PERFORMANCE WITH CLEAR COLD WATER

FLYGT | CURVE

PERFORMANCE CURVE

PRODUCT	TYPE
CP3152.181	HT

DATE	PROJECT	CURVE NO	ISSUE
2009-08-21	FLYGT US Catalog	63-454-00-5360	4

	1/1-LOAD	3/4-LOAD	1/2-LOAD
POWER FACTOR	0.84	0.79	0.69
EFFICIENCY	87.0 %	87.0 %	86.0 %
MOTOR DATA	---	---	---

RATED POWER	20	hp
STARTING CURRENT ...	142	A
RATED CURRENT ...	26	A
RATED SPEED	1750	rpm
TOT.MOM.OF INERTIA ...	0.24	kgm2
NO. OF BLADES	1	

IMPELLER DIAMETER: 275 mm

MOTOR #	STATOR	REV
25-15-4AA	12YSER	11

FREQ.	PHASES	VOLTAGE	POLES
60 Hz	3	460 V	4

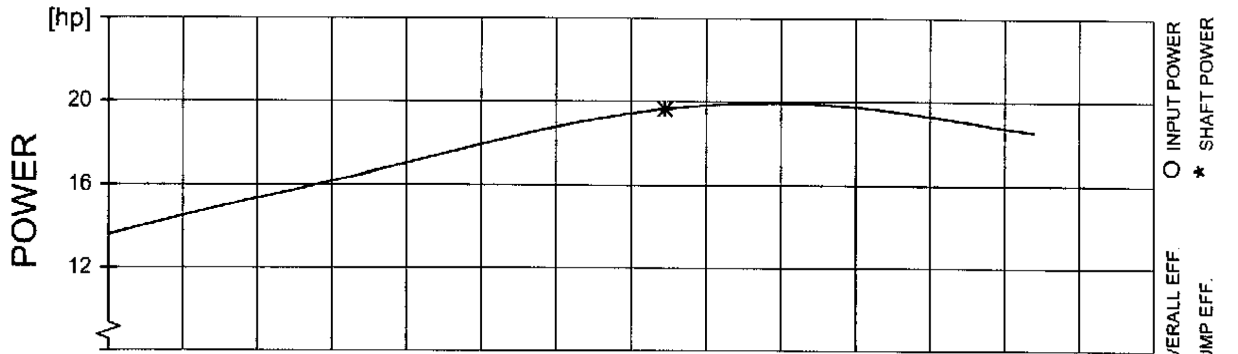
GEARTYPE	RATIO
---	---

COMMENTS

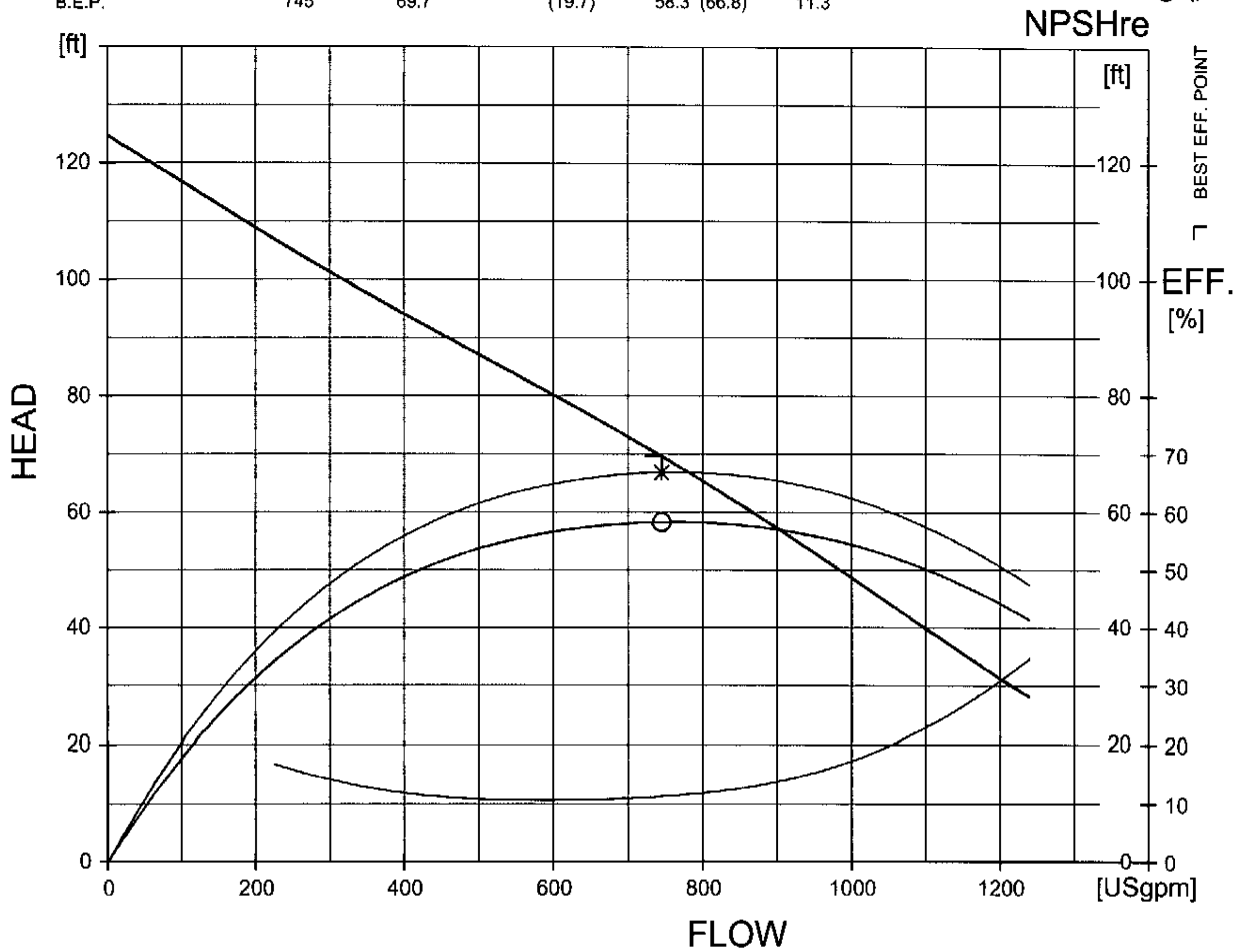
NEMA Code Letter: G

INLET/OUTLET: -/ 4 inch

IMP. THROUGHLET: 3.0 inch



DUTY-POINT	FLOW[USgpm]	HEAD[ft]	POWER [hp]	EFF. [%]	NPSHre[ft]
B.E.P.	745	69.7	(19.7)	58.3 (66.8)	11.3



FLYPS 3.1.6.3 (20060531)

NPSHre = NPSH3% + min. operational margin

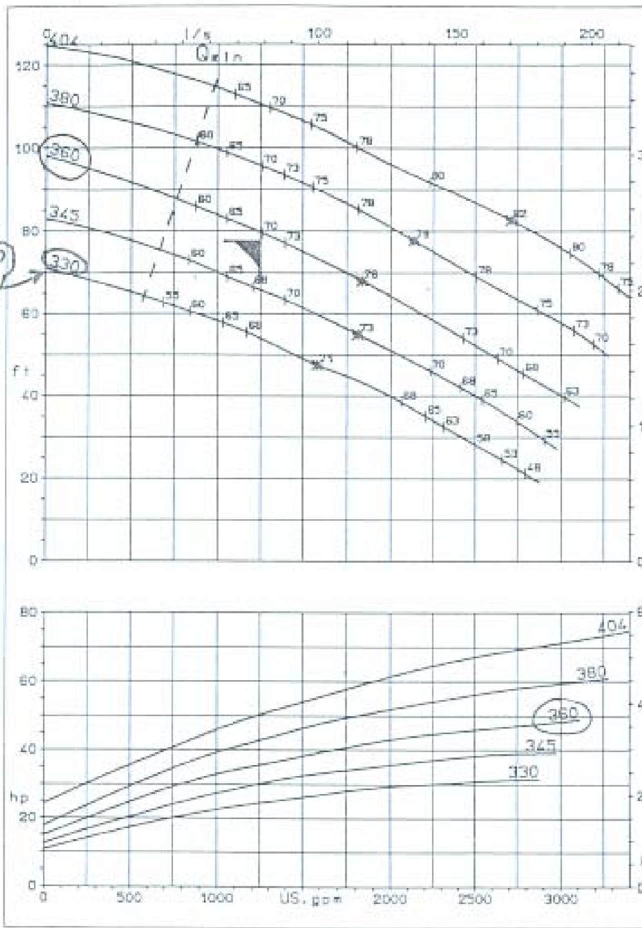
Performance with clear water and ambient temp 40 °C

CURVE

KSB

Pump Type	Nominal speed:	Impeller Type:
KRTU ... K 200-400	6 pole / 1160 rpm	Non-clogging three port
	Discharge size: 8″ (200 mm)	Free passage: 3 1/8″ (80 mm)

TRIMMED TO 330 6/2/92



Cast iron
NORIHARD®
NORIDUR®
NORIDUR/NORILOY®
(materials → 0.14)

KSB Inc.
4415 Sarellen Road
Richmond, VA 23231
CERTIFIED BY: Alex Rastorguyeff
DATE 5/6/92
KSBINC Richmond VA

*Serial #547411/1-2

Performance curves are based on tests with clear water at ambient temperature.

Pump selection (→ 11.1)

US.gpm, ft	see upper diagram →	curve with impeller code
impeller code, US.gpm	see lower diagram →	bhp at duty point
hp, pump type, temp.	see table →	motor symbol

Pump designation e.g.

Pump Type	Impeller Type	Pump size	Motor symbol	Impeller code
KRTU	K	200-400	/ 158	(330)

Suitable motorsizes (motor data see separate List → 8.15–8.21)

Motor Symbol	Nom. motor rating P_2 hp	Temp. of pumped media ≤ °F for Pump Type: wet KRTU	KRT	dry KRTB
156	34.0[3])	86	–	–
	27.0[3])	104	86	–
	27.0[3])	149	86	–
	23.0[3])	104	104	86
	23.0[3])	149	104	86
188	39.0	86	–	–
	34.0	130	86	–
	34.0	149	86	–
	28.0	140	104	86
	28.0	158	104	86

Motor Symbol	Nom. motor rating P_2 hp	Temp. of pumped media ≤ °F for Pump Type: wet KRTU	KRT	dry KRTB
226	[illegible]	86	–	–
	44.0	149	86	–
	34.0	122	104	86
	34.0	158	104	86
308	54.0	113	–	–
	54.0	140	86	–
	45.0	130	104	86
	45.0[3])	158	104	86

Motor Symbol	Nom. motor rating P_2 hp	Temp. of pumped media ≤ °F for Pump Type: wet KRTU	KRT	dry KRTB
378	[illegible]	86	–	–
	64.0	122	86	–
	62.0	130	104	86
450	86.0[3])	86	–	–
	71.0[3])	130	86	–
	64.0[1])	122	104	86
	64.0[3])	149	104	86

Motor Symbol	Nom. motor rating P_2 hp	Temp. of pumped media ≤ °F for Pump Type: wet KRTU	KRT	dry KRTB
556	112.0[3])	86	–	–
	83.0[3])	122	86	–
	77.0[3])	140	104	86

[1]) applicable for 230, 460, 575 V [1]) applicable for 460, 575 V [3]) 200 and 230 V on request

APPENDIX D

Manufacturer's Information on Sewer Rehabilitation Products

Insituform® CIPP

Affordable, reliable and non-disruptive solutions for sewer pipe reconstruction.

Insituform®

Insituform® CIPP

Affordable, reliable and non-disruptive solutions for sewer pipe reconstruction.

Our trenchless solution

The Insituform® process can be used to rehabilitate sanitary sewers, storm sewers and force mains. Insituform® cured-in-place pipe (CIPP) is a jointless, seamless, pipe-within-a-pipe with the capability to rehabilitate pipes ranging in diameter from 6 to 96 inches.

Insituform® CIPP addresses your top concerns:

Infiltration reduction. Water entering your sewer system through cracks, holes and joint failures can overload your treatment facilities, especially during wet weather. Insituform® CIPP can significantly reduce this infiltration. In dry climates, roots find the sewer system an attractive source of water and nutrients. Entering through pipe defects, roots create blockages and overflows. Insituform® CIPP contains your flow within the pipe while keeping external water and roots out.

Structural integrity. Insituform® CIPP restores structural integrity to your damaged sewer pipes. The design models used, independent test results and over 35 years of service all confirm that Insituform® CIPP is a structural product with a 100-year design life.

Increased flow capacity. Insituform® CIPP provides the least cross-sectional reduction of all methods used to rehabilitate pipes. There are no joints or seams that can separate over time and the smooth, jointless interior provides excellent abrasion resistance and typically improves flow capacity.

Affordability. The Insituform® CIPP process is usually less expensive than conventional dig and replace methods of sewer repair. When you consider the lost business revenues, traffic congestion and social costs associated with other methods, your savings are immeasurable.

Installation flexibility. Insituform offers flexibility in both the method of installation and the cure process. Insituform® CIPP can be inverted with either air or water, or pulled into place. The cure can be done with steam or hot water. All processes are consistent with nationally recognized standards and Insituform's own ISO-certified quality control program. Since each job is unique, we apply the most cost effective, technically optimal solution to solve your pipeline rehabilitation problem.

Insituform® CIPP is the best choice for trenchless rehabilitation.

Insituform superior processes

Since inventing CIPP over 35 years ago, Insituform has developed the highest quality manufacturing and installation systems in the trenchless industry.

As a vertically integrated company, we take responsibility for R&D, manufacturing, installation and service. Our systems are designed to produce consistency and high performance in our products and services.

Manufacturing

Insituform's patented manufacturing techniques ensure that our tubes are constructed for optimal long-term performance. During the manufacturing process, each tube goes through 25 separate quality checks.

Wet out

Insituform's patented serial vacuum impregnation process ensures that Insituform® CIPP achieves the required strength, enables wet out of any length, diameter or thickness and allows a faster wet out in less space, saving on time and cost.

Insituform's wet out facilities utilize environmentally friendly methods and equipment. In fact, Insituform has been recognized by the United States' Environmental Protection Agency for efforts at its various wet out facilities to protect the environment.

Installation

Every Insituform installation is completed using our own safety-certified crews who follow strict safety procedures and documented work practices in accordance with the company's ISO: 9000 certified quality program. Each crew is equipped with highly specialized equipment, backup resources and engineering support.

Insituform's advanced installation methods include air invert steam cure (AISC), which reduces energy usage on a job site by approximately 95 percent.

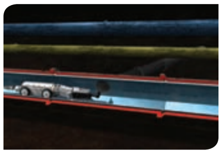
The Insituform® CIPP Installation Process

Step 1:

A resin-saturated, coated felt tube is inverted (shown) or pulled into a damaged pipe.

Step 2:

Hot water or steam is used to cure the resin and form a tight-fitting, jointless and corrosion-resistant replacement pipe.



Step 3:

Service laterals are restored internally with robotically controlled cutting devices and the rehabilitated pipe is inspected by closed-circuit TV.

The Insituform® CIPP Technical Envelope	
Diameter Range	6 in. – 96 in.
pH Range	.5 – 10.5
Effluent Temperature	up to 140° F
Pipe Condition – Fully Deteriorated	Yes
Pipe Condition – Partially Deteriorated	Yes
Bends	Yes
Offset Joints	Yes
Diameter Changes	Yes, without manhole access
Thickness Changes	Yes, without manhole access
Typical Shot Length	200 ft.– 1000 ft.
Host Pipe Shape	All Shapes
Host Pipe Material	All Materials

This table refers to general purpose municipal sewer CIPP projects. Insituform can provide products that extend beyond these parameters through our engineering group. Please contact your local representative at 800-234-2992 for assistance with applications extending beyond this technical envelope.

Insituform®

Insituform Technologies, Inc.
17988 Edison Avenue, Chesterfield, MO 63005
www.insituform.com 800-234-2992

PERMACAST

SPIN-CAST STRUCTURAL MANHOLE LINING

BRICK MANHOLE BEFORE REHABILITATION

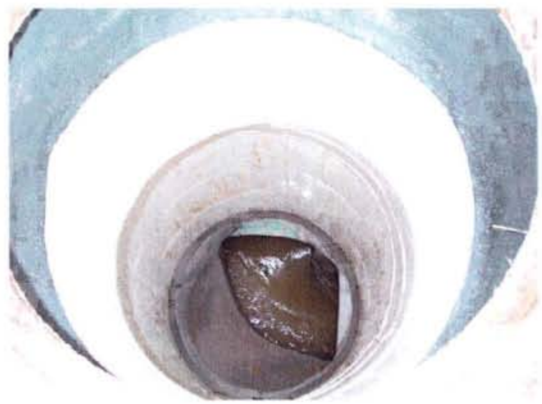
PNEUMATIC SPIN CAST APPLICATION OF REHABILITATION MORTAR

PERMACAST REHABILITATED MANHOLE

PERMAFORM

NO-DIG MANHOLE REPLACEMENT

SEVERELY DETERIORATED CONCRETE MANHOLE



NEW 4" THICK CONCRETE MANHOLE IS FORMED AND-POURED WITH INTEGRATED T-LOCK PVC LINER

Sewer
& Water
Evaluation
& Rehabilitation
Procedures

SWERP INC.

1-800-50-SWERP

SAUEREISEN

High Performance Linings

DETERIORATING WET WELL PRIOR TO LINER INSTALLATION

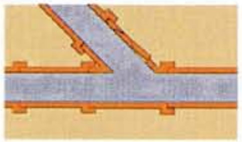
WET WELL AFTER 210 RS POLYMER EPOXY LINER INSTALLATION

SWERP HAS BEEN SPECIALIZING IN TRENCHLESS REHABILITATION SOLUTIONS FOR OVER 20 YEARS. TECHNICAL DATA AND SPECIFICATIONS ARE AVAILABLE FOR ALL MANHOLE AND PIPELINE REHABILITATION SYSTEMS SHOWN.

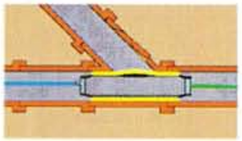
PLEASE CALL FOR MORE INFORMATION.

Easy Liner LLC — NO DIG PIPE REHABILITATION TECHNOLOGY

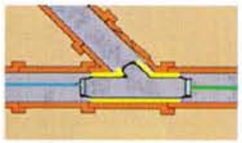
SADDLE LINER SYSTEM FOR LATERAL REHABILITATION



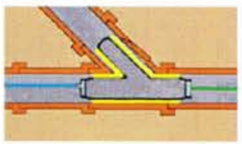
Project begins to repair the defective pipe junction.



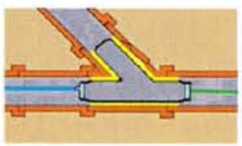
A bladder assembly is pulled into position and connected to an air compressor.



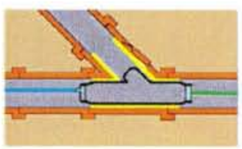
The main line bladder assembly is inflated to conform to the pipe junction. The lateral bladder is then inflated to extend into the lateral.



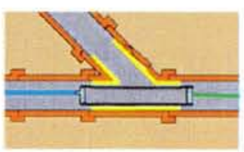
Once the lateral bladder is fully extended, the bladder is fully inflated to conform to the pipe junction.



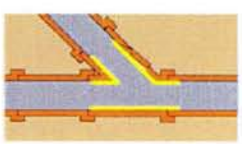
The fully inflated assembly is left to allow the treatment to cure and patch the defective pipe junction.



Once cured, the lateral bladder is deflated allowing the assembly to be removed from the lateral pipe junction.

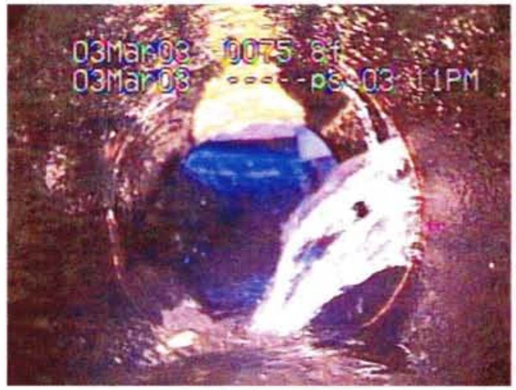


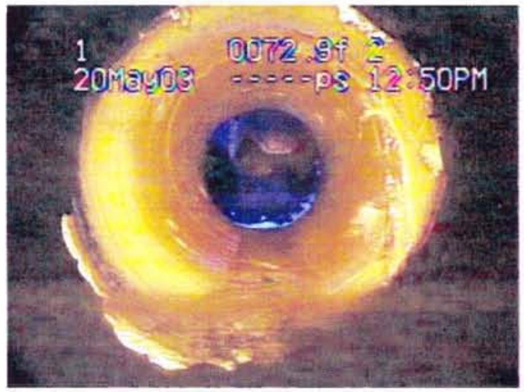
The main line bladder is deflated, and the assembly is extracted using the winch.



The result is a patched pipe junction.

CURED IN PLACE MAIN/LATERAL PIPELINING AND POINT REPAIRS





SEWER & WATER EVALUATION & REHABILITATION PROCEDURES

SWERP INCORPORATED

INNOVATORS IN TRENCHLESS TECHNOLOGY SOLUTIONS

2215 MANOR ROAD

LAFAYETTE HILL, PA 19444

1-800-50-SWERP

Poly-Triplex® Technologies

Cured In Place Manhole Liner

BRICK MANHOLE BEFORE LINER INSTALLATION

LINER IS INSTALLED AND STEAM CURED UNDER PRESSURE

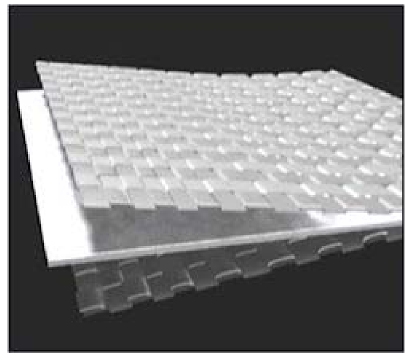
AFTER LINER INSTALLATION AND FLOW CHANNEL REINSTATEMENT

Poly-Triplex® Technologies

One Hundred Years of structural integrity providing a legacy of protection.

Product Overview

The patented Poly-Triplex® Liner System is a cured-in-place structural liner that is designed to provide one hundred years of structural integrity and a legacy of protection for your collection system.



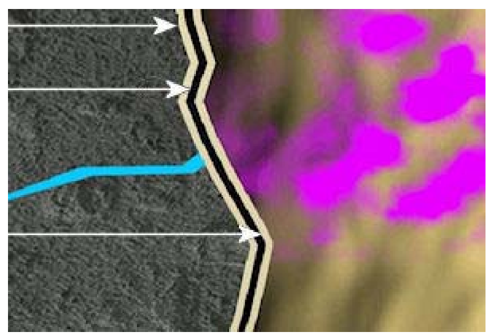
Utility departments and engineering firms over the U.S. and Canada rely on our Poly-Triplex system to rehabilitate varying types of structures from sewer manholes and pump stations to catch basins and corrugated culvert pipe. The liner and installation process results in a cured-in-place structural liner that provides a water and chemical barrier to further deterioration and infiltration. The liner becomes an integrated composite bonded to the host structure. Because of the liner's excellent structural properties it can be used in extremely deteriorated conditions. Because of its non-porous properties, it can be installed in structures with active infiltration.

Poly-Triplex is a three-layered fiberglass and epoxy system that contains a vital internal non-porous membrane. Once saturated at the jobsite, the liner is cured-in-place using our patented system of air pressure and steam, forming a unified composite bonded to the host structure. The process uses the existing structure as a mold and the liner is pressurized into the pores, cracks and crevices of the structure surface.

The resin bond prevents the liner from being pushed off from groundwater infiltration. The Internal non-porous membrane, encapsulated in the center of the composite, eliminates pinholes and provides a permanent barrier to gas penetration through the liner, halting chemical attack of the host structure, as well as providing a permanent barrier to prevent infiltration of groundwater into the collection system.

Cured in Place Structural Liner Components

Poly-Triplex® Liner design uses three layers of structural materials that are comprised of five separate components.



Layer #1 – Structural Fiberglass
This component is saturated with 100% solids epoxy resin and bonds to the host structure.

Layer #2 – Non-Porous Inner Membrane
This layer contains 3 critical components, one non-porous membrane with felt fibers embedded on both sides, creating a mechanical bonded between the membrane and the other materials. This layer is the most vital part of the rehabilitation process, eliminating any pinholes, thereby providing a permanent barrier to infiltration, ex-filtration and gas penetration.

Layer #3 – Structural Fiberglass
This component is saturated with epoxy resins and once cured, provides protection to the internal non-porous membrane and provides a smooth interior surface to the lined structure.

Site Map | 850-547-9999

One Hundred Years of structural integrity providing a legacy of protection.

Home About Us Product and Process Applications Quality and Value Case Studies Industry Resources Contact

Product Installation

Process Overview

The Poly-Triplex installation process is like none other you'll find in the industry. Using the existing structure as a mold, we can complete the installation without the need for excavation and disruption, in 4-6 hours for most cases. The liners are fabricated and resins are blended in our 23,000 square foot manufacturing facility. Our liners consist of three primary layers and they are custom fabricated to fit each structure. The three layers include: one non-permeable inner membrane embedded on both sides with special polyester fibers, layered between two layers of structural fiberglass saturated with epoxy resin. The liners are engineered in several standard liner weights to address varying structural conditions within the structures. The custom manufactured liners are cured-in-place with a patented system of air pressure and steam.

Each custom manufactured Poly-Triplex liner is saturated at the jobsite with a two-part epoxy resin system that will bond to wet or dry surfaces. The liner is then lowered into place with a crane or lifting device. The Poly-Triplex liner is aligned so that it will contour to the shape of the host structure.

The liner is typically cured by applying approximately 500-1,000 pounds per square foot of pressure with the injection of steam set at approximately 300 degrees. This causes the removable inflation bladder to fully expand, forcing the liner to conform to the contours of the structure surface, stopping all active infiltration. In certain cases where the typical method of installation is not appropriate, the Poly-Triplex system may be cured in an ambient temperature environment or under hydrostatic pressure.

Manhole and catch basin installations typically take four to six hours to complete. Depending on site & structure size, conditions and location, one three-man installation crew can line two structures per day with one installation truck.

After curing is complete, the bladder is removed, leaving the laminated composite liner system that is fully bonded to the existing structure, permanently stopping further deterioration, infiltration and ex-filtration.

After the bladder is removed, pipes are reopened with a reciprocal saw or offset grinder. The sub-floor is removed and the liner is trimmed at the invert channel. In this particular case, as photo above shows, the sewage has continued to flow throughout the entire lining process with no disruption.

Pump Station and wet well installations are primarily the same as for manholes. Structure is empty and free of all mechanicals and cleaned with high pressure hydro-blasting with a rotating pencil tipped nozzle. The liner's bottom disk section is saturated and positioned on the floor and approximately 6 inches up the wall. The liner is then saturated and lowered into the structure with the wall section overlapping the floor section a total of approximately 12 inches. Liner is typically cured in place under air pressure. Steam heat is injected to expedite the curing process. Rectangular structures may be lined using Poly-Triplex overlapping panels and cured as a monolithic structure. Pump Station rehabilitation usually can be completed within a 12-24 hour period, significantly minimizing bypass pumping operations.

Culvert and large diameter pipe lining is completed using a pull-through method of installation. Liner is saturated at the jobsite with an appropriate resin system. Liner and inflation bladder are typically encapsulated inside a durable reinforced vinyl skin, and then pulled through using a winch and cable system. Liner is then inflated and pressurized into place. Water and steam are injected facilitate the curing process. Once cured, the bladder is removed and structure is completely lined from end to end. In the case of longer runs, the liner may be installed in two or more overlapping sections. Typical culverts can be completed usually within a 12-24 hour period, with little or no disruption of highway traffic.

APPENDIX E

Manufacturer's Information on WWTP Upgrade Equipment

Wire-wound Concrete Tanks
Established 1929

Natgun Corporation
2675 Morgantown Road, Suite 2401
Reading, Pennsylvania 19607
Telephone: 610-856-5010
Facsimile: 610-856-5011

March 16, 2010

Mr. Brian J. Friedlich, Senior Engineer
Omni Environmental LLC
Research Park
321 Wall Street
Princeton, New Jersey 08540

Reference: Long Hill, New Jersey Wastewater Treatment Plant – Equalization Tank

Dear Mr. Friedlich:

Thank you for your interest in prestressed concrete tanks. Based on 2009 construction costs, a suitable budget-estimating figure for a 1.75 MG wire-wound, prestressed concrete storage tank with approximate dimensions of 92.25' diameter by 35.0' side water depth is $1,065,000.00.

The budget estimating figure includes the tank complete including the foundation, hatch, vent, and overflow. If a 2' thick structural floor on piles is required, please assume an additional $200,000. It does not include site work or additional tank accessories. We suggest a contingency of $50,000 for optional assumed appurtenances such as ladders, manway and handrail. Local, state, and federal taxes, if applicable, are not included in the above price.

The above tank is designed and constructed in accordance with AWWA standard D110, Type III, precast concrete walls with steel diaphragm, wire prestressing, and freestanding concrete dome roof.

To assist in developing the contract documents Natgun can provide the following information:

1. Preliminary design drawings and calculations in electronic format
2. Complete performance specification in electronic format
3. Geotechnical requirements for wire-wound concrete tanks and geotechnical report review
4. Value engineering from our Engineering and Estimating departments
5. Site layout and estimated site work cost from our Estimating Department

6. Review of preliminary drawings and specifications to provide updated tank and site work budget estimates

The above services will assist in providing a quality project with complete budgeting information and minimal questions at bid time.

Thank you for this opportunity to be of service. Please feel free to contact me if you have any questions or if I can be of any further assistance.

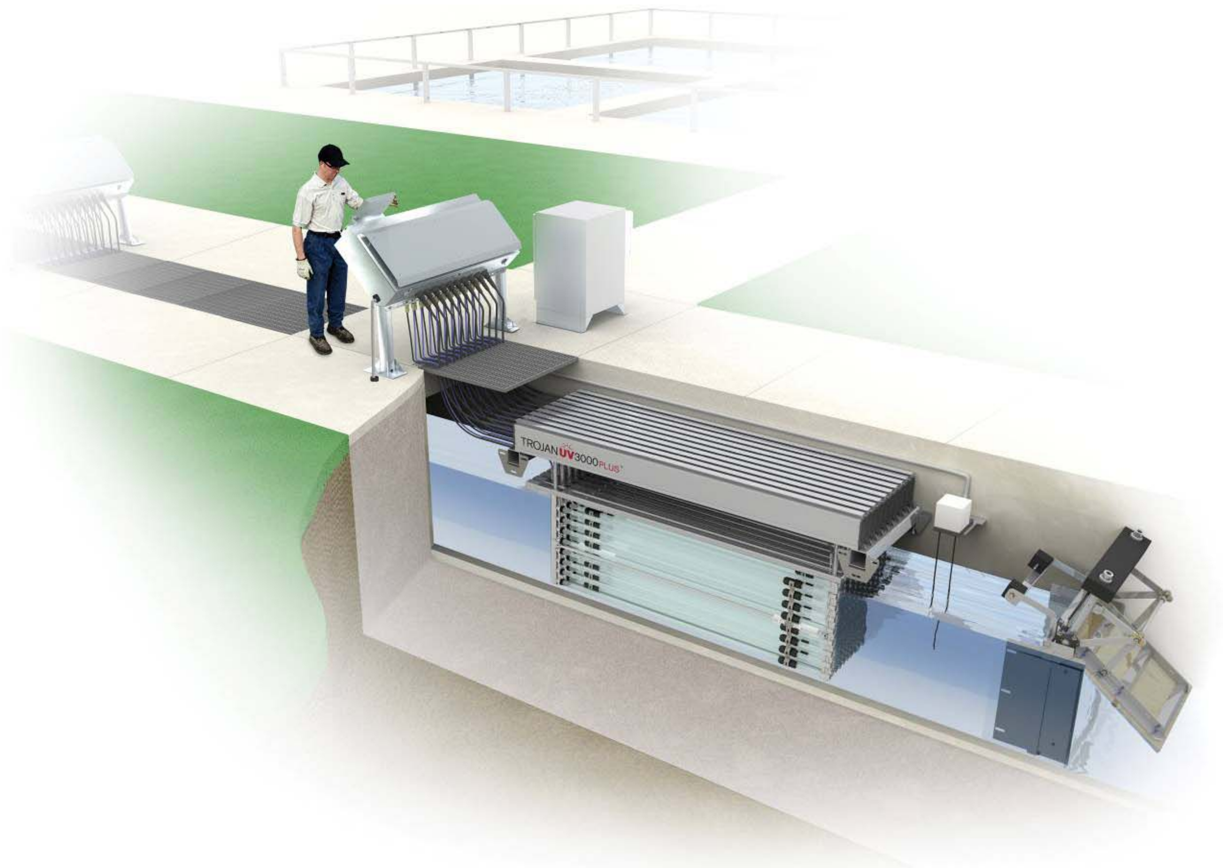
Respectfully,
NATGUN CORPORATION

Jason North,
Regional Manager

JN/smr

TROJANUV3000PLUS™

PROPOSAL FOR LONG HILL, NJ
QUOTE: LJU2172G
March 16, 2010



The TrojanUV3000Plus™ is operating in **over 750** municipal wastewater plants around the world.
Disinfecting **over 7 billion** gallons a day, the TrojanUV3000Plus™ has become
the reference standard in the industry.

March 16, 2010

Attention: Brian Friedlich – OMNI Environmental

In response to your request, we are pleased to provide the following TrojanUV3000Plus™ proposal for the **Long Hill** project.

The TrojanUV3000Plus™ has been shown in over 750 installations to provide dependable performance, simplified maintenance, and superior electrical efficiency. As explained in this proposal, the system incorporates innovative features to reduce O&M costs, including variable output electronic ballasts to provide dimming capability and Trojan's revolutionary ActiClean™ system – the industry's only online chemical and mechanical quartz sleeve cleaning system. All Trojan installations are supported by a global network of certified Service Representatives providing local service and support.

Please do not hesitate to call us if you have any questions regarding this proposal. Thank you for the opportunity to quote the TrojanUV3000Plus™ and we look forward to working with you on this project.

With best regards,

Carl McDonald
3020 Gore Road
London, Ontario N5V 4T7
(519) 457 – 3400 ext. 2234
cmcdonald@trojanuv.com

Local Representative:
Chris Burde
GA Fleet Associates
55 Calvert Street
Harrison, NY
914-835-4000

DESIGN CRITERIA

LONG HILL VALLEY

Peak Design Flow:	**4.02 MGD**
UV Transmittance:	**55%** (minimum)
Total Suspended Solids:	**30 mg/l** (30 Day Average, grab sample)
Disinfection Limit:	**200 fecal coliform per 100 ml** (based on a 30 day Geometric Mean of consecutive daily grab samples)
Design Dose:	**>30,000 µWs/cm^2** (Proven by independent, in-field bioassay validation)
Validation Factors:	End of lamp life factor (Low-Pressure Amalgam Lamps) Fouling factor (ActiClean™ Chemical / Mechanical Cleaning System)
Over Design:	**125%** (New Jersey State Standard)

TROJANUV3000PLUS™

DESIGN SUMMARY

QUOTE: LJU2172G

Based on the above design criteria, the TrojanUV3000Plus™ proposed consists of:

CHANNEL (Please reference Trojan layout drawings for details.)	
Number of Channels:	**1**
Approximate Channel Length Required:	**30 ft**
Channel Width Based on Number of UV Modules:	**24 in**
Channel Depth Recommended for UV Module Access:	**48 in**
UV MODULES	
Total Number of Banks:	**2**
Number of Modules per Bank:	**8**
Number of Lamps per Module:	**6**
Total Number of UV Lamps:	**96**
Maximum Power Draw:	**24 kW**
UV PANELS	
Power Distribution Center Quantity:	**2**
System Control Center Quantity:	**1**
MISCELLANEOUS EQUIPMENT	
Level Controller Quantity:	**1**
Type of Level Controller:	**Weighted Gate (ALC)**
Automatic Chemical / Mechanical Cleaning:	**Trojan ActiClean™**
UV Module Lifting Device:	**By Others**
Standard Spare Parts / Safety Equipment:	**6 Lamps, 6 Sleeves & 3 Ballasts**
ELECTRICAL REQUIREMENTS	

1. Each Power Distribution Center requires an electrical supply of one (1) 480 Volts, 3 phase, 4 wire (plus ground), 14.7 kVA.
2. The Hydraulic System Center requires an electrical power supply that is powered from the Power Distribution Center.
3. The System Control Center requires an electrical supply of one (1) 120 Volts, 1 phase, 2 wire (plus ground), 15 Amps.
4. Electrical disconnects required per local code are not included in this proposal.

COMMERCIAL INFORMATION

Total Capital Cost: $268,500 (US$)

This price excludes any taxes that may be applicable and is valid for 90 days from the date of this letter.

OPERATING COST ESTIMATE

Operating Conditions

Average Flow: **1.24 MGD**
Yearly Usage: **8750 hours**
UV Transmittance: **55%**

Power Requirements		Lamp Replacement	
Average Power Draw:	**7.2 kW**	Number lamps per year:	**36**
Cost per kW hour:	**$0.05**	Price per lamp:	**$260**
Annual Power Cost:	**$3,150**	**Annual Lamp Replacement Cost:**	**$9,360**
Total Annual O&M Cost: $12,510			

This cost estimate is based on the average flow and UV transmittance listed above. Actual operating costs may be lower due to the TrojanUV3000Plus™ automatic dose pacing control system. As UV demand decreases, by a change in operating conditions, the power level of the lamps decreases accordingly. The dose pacing system minimizes equipment power levels while the target UV dose is maintained to ensure disinfection at all times.

EQUIPMENT WARRANTEES

1. Trojan Technologies warrants all components of the system (excluding UV lamps) against faulty workmanship and materials for a period of 12 months from date of start-up or 18 months after shipment, which ever comes first.
2. UV lamps purchased are warranted for 12,000 hours of operation or 3 years from shipment, whichever comes first. The warranty is pro-rated after 9,000 hours of operation. This means that if a lamp fails prior to 9,000 hours of use, a new lamp is provided at no charge.
3. Electronic ballasts are warranted for 5 years, pro-rated after 1 year.

TROJANUV3000PLUS™

WASTEWATER DISINFECTION

TROJANUV3000PLUS™

The Reference Standard in UV

Proven, chemical-free disinfection from the industry leader

Trojan Technologies is an ISO 9001: 2000 registered company that has set the standard for proven UV technology and ongoing innovation for more than 25 years. With unmatched scientific and technical expertise, and a global network of water treatment specialists, representatives and technicians, Trojan is trusted more than any other firm as the best choice for municipal UV solutions. Trojan has the largest UV installation base – over 4,000 municipal installations worldwide – and almost one in five North American wastewater treatment plants rely on our proven, chemical-free disinfection solutions.

The TrojanUV3000Plus™ is one of the reasons why. This highly flexible system has demonstrated its effective, reliable performance around the world in over 400 installations. It is well suited to wastewater disinfection applications with a wide range of flow rates, including challenging effluent such as combined sewer overflows, primary and tertiary wastewater reclamation and reuse.

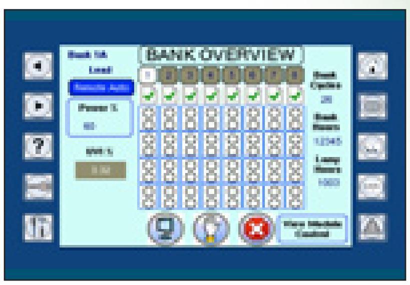
Following a review with Plant Operators and Engineers, the proven infrastructure of the TrojanUV3000Plus™ has been refined to make it even more operator-friendly. The result is more dependable performance, simplified maintenance, and maximized UV lamp output at end-of-lamp life. It also incorporates innovative features to reduce O&M costs, including variable output electronic ballasts and Trojan's revolutionary ActiClean™ system – the industry's only chemical/mechanical sleeve cleaning system.

TROJANUV3000PLUS™

Designed for efficient, reliable performance

System Control Center (SCC)

The SCC monitors and controls all UV functions, including dose pacing – the automatic, flow-based program that ensures proper disinfection levels while conserving power and extending lamp life. The microprocessor-based SCC is integrated onto one Power Distribution Center, and features a user-friendly, touch-screen HMI display with weatherproof cover, and Modbus Ethernet SCADA connectivity. For systems treating larger flows, or where more sophisticated control is desired, a PLC-based System Control Center is available. It features a separate wall-mount panel with colour, touch-screen HMI, Ethernet/IP SCADA connectivity, automatic slide/sluice gate control for multiple channels, and integrated Flash memory trend logging (flow, power, UVT, dose).



Alarms

Extensive alarm reporting system ensures fast, accurate diagnosing of system process and maintenance alarms. Programmable control software can generate unique alarms for individual applications.

Power Distribution Center (PDC)

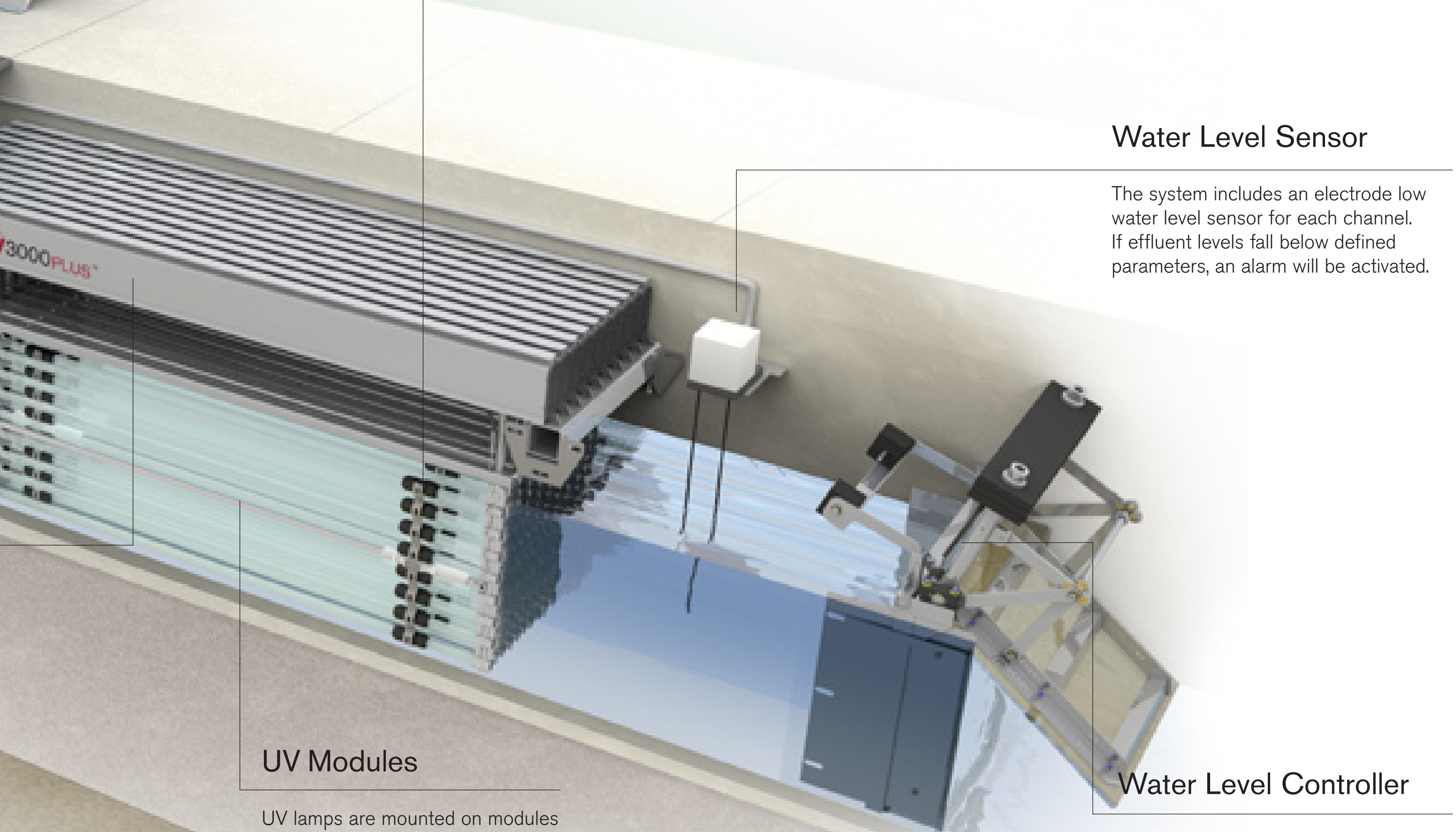
The PDC powers each bank of modules. Its ergonomic, angled design provides easy access to module power cables and hoses for the ActiClean™ cleaning system. The robust stainless steel enclosure is mounted across the channel, with module fuses and interlock relays visually aligned with module receptacles for fast diagnostics. Modules are individually overload protected for safety. Like all TrojanUV3000Plus™ components, the PDC can be installed outdoors and requires no shelter or air conditioning.

UV Intensity Sensor

The UV intensity sensor continually monitors UV lamp output. The ActiClean™ system automatically cleans the sensor sleeve every time lamp sleeves are cleaned.

Electronic Ballasts

The variable-output (60 - 100% power) electronic ballast is mounted in its own TYPE 6P (IP67) rated enclosure within the module frame. Features “quick connect” electrical connections. Cooling is by convection.



ActiClean™ Cleaning System

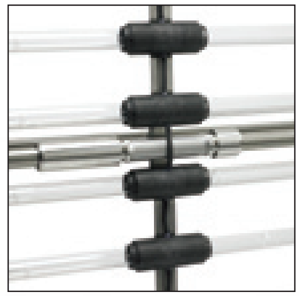
The system consists of two components:

1. Hydraulic System Center (HSC)

The HSC actuates the ActiClean™ cleaning system, and is mounted close to the channel in a stainless steel enclosure. It contains the pump, valves and ancillary equipment required to operate the cleaning system, and links to the extend/retract hoses of the module wiper drives via a manifold located on the underside of the PDC.

2. ActiClean™ Wiper Assembly

A submersible wiper drive on each UV module drives the wiper carriage assembly along the module. Attached wiper canisters surround the quartz sleeves, and are filled with Trojan's ActiClean™ Gel. The gel uses food grade ingredients and contacts the lamp sleeves between the two wiper seals. Cleaning takes place while the lamps are submerged and while they are operating.



Water Level Sensor

The system includes an electrode low water level sensor for each channel. If effluent levels fall below defined parameters, an alarm will be activated.

UV Modules

UV lamps are mounted on modules installed in open channels. The lamps are enclosed in quartz sleeves, and positioned horizontally and parallel to water flow. A bank is made up of multiple modules placed in parallel. All ballast and lamp wiring runs inside the module frame.

Water Level Controller

A fixed weir, motorized weir gate, or Automatic Level Control gate (shown), is required in the channel to maintain the appropriate water level over the lamps. Trojan engineers will work with you to select the appropriate level control device for your application.

Key Benefits

TrojanUV3000Plus™

Increased operator, community and environmental safety. The TrojanUV3000Plus™ uses environmentally-friendly ultraviolet light – the safest alternative for wastewater disinfection. No disinfection by-products are created, and no chemicals must be transported, stored or handled.

Well suited to changing regulations. Trojan UV systems do not have any negative impact on receiving waters and do not produce disinfection by-products, making them a strategic, long-term choice as regulations become increasingly stringent.

Most efficient UV system available versus competitive low-pressure, high-output (LPHO) or amalgam lamp-based systems.

Reduces operating costs by as much as 30% per year. Long-lasting amalgam lamps and variable-output ballasts optimize UV output to meet wastewater conditions and maximize system efficiency versus competitive UV systems.

Proven disinfection based on actual dose delivery testing (bioassay validation), and over 400 TrojanUV3000Plus™ installations worldwide. Real-world, field performance data eliminates sizing assumptions resulting from theoretical dose calculations.

Dual-action sleeve cleaning system improves performance and reduces labor costs. Automatic ActiClean™ chemical/mechanical cleaning system maintains sleeve transmittance of at least 95%, and works online – eliminating the need to remove modules from the channel.

Reduced installation costs. The compact TrojanUV3000Plus™ can be retrofitted into existing chlorine contact tanks, and comes pre-tested, pre-assembled and pre-wired to minimize installation costs.

Outdoor installation flexibility. The entire TrojanUV3000Plus™ system can be installed outdoors, eliminating the need and costs of a building, shelter, and air conditioning for ballast cooling.

Guaranteed performance and comprehensive warranty. Trojan systems include a Lifetime Performance Guarantee, the best lamp warranty in the industry, and use lamps from multiple approved suppliers. Ask for details.

ActiClean™ Dual-Action, Automatic Cleaning System

Chemical/mechanical cleaning system eliminates sleeve fouling

Benefits:

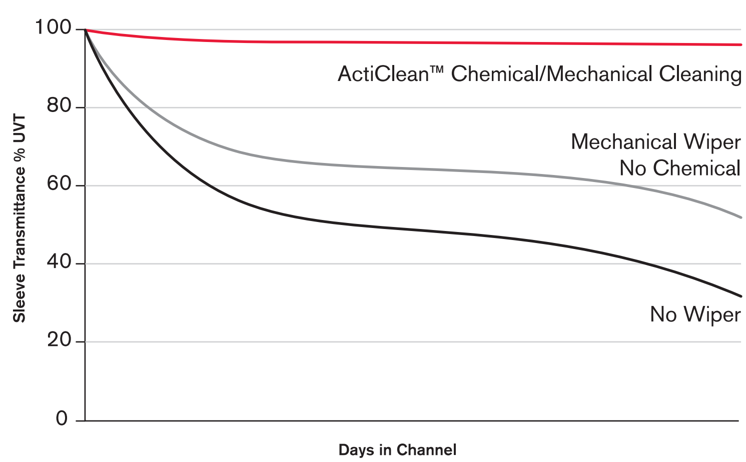
- Cleans 50% more effectively than mechanical wiping alone
- Improves lamp performance for more reliable dose delivery
- Elimination of fouling factor reduces equipment sizing requirements and power consumption
- Automatic, online cleaning reduces O&M costs associated with manual cleaning
- Combination of chemical and mechanical cleaning action removes deposits on quartz lamp and sensor sleeves much more effectively than mechanical wiping alone
- Innovative wiper design incorporates a small quantity of ActiClean™ Gel for superior, dual-action cleaning
- Cleans automatically while the lamps are disinfecting. There's no need to shut down the system, remove or bypass lamp modules for routine cleaning
- Proven in hundreds of systems around the world, including use in plants where heavy fouling had previously prohibited the use of UV disinfection technology
- ActiClean™ can be added to an installed TrojanUV3000Plus™ not originally equipped with a cleaning system

ActiClean™ Gel is Safe to Handle

- ActiClean™ Gel is comprised of food-grade ingredients
- Quick connect on cleaning system allows for easy refill of gel solution
- Lubricating action of ActiClean™ Gel maximizes life of wiper seals

The dual-action, chemical/mechanical cleaning with the ActiClean™ system provides superior sleeve cleaning and reduces maintenance costs. Fouling and residue build-up on quartz sleeves reduces system efficiency. ActiClean™ maintains at least 95% transmittance, ensuring sleeves are clean and the system is consistently delivering accurate dosing while reducing power consumption.

Efficacy of Cleaning Technologies to Control Sleeve Fouling



NSF International

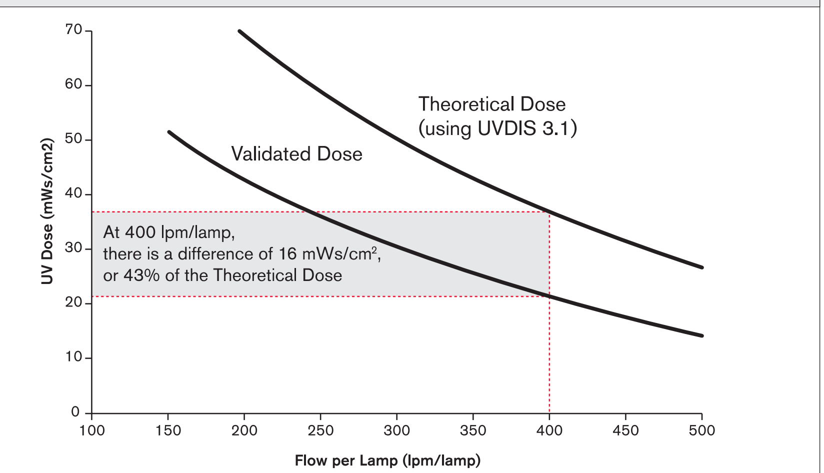
Regulatory-Endorsed Bioassay Validation

Real-world testing ensures accurate dose delivery

Benefits:

- Performance data is generated from actual field testing over a range of flow rates, effluent quality, and UVTs
- Provides physical verification that system will perform as expected; ensures public and environmental safety
- Provides accurate assessment of equipment sizing needs
- The TrojanUV3000Plus™ has been thoroughly validated through real-world bioassay testing under a wide range of operating conditions
- In-field bioassay testing offers the peace of mind and improved public and environmental safety of verified dose delivery – not theoretical calculations
- The USEPA has endorsed bioassays as the standard for assessment and comparison of UV technologies
- The disinfection performance ratings for the TrojanUV3000Plus™ are proof that what you see is what you actually get

Field Validated Dose vs. Theoretical Dose at 65% UVT
(Before Fouling & Lamp Aging Are Taken into Account)



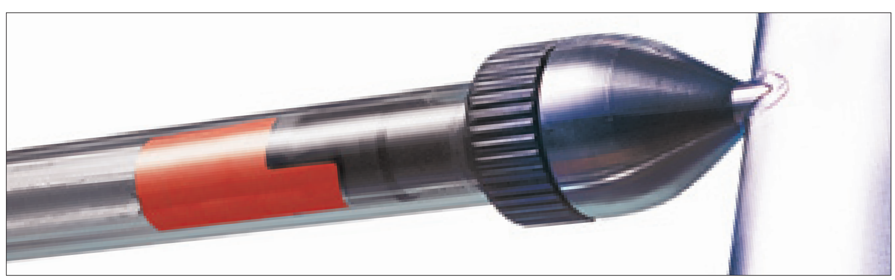
This shows the validated dose of an actual working system and the theoretical dose calculated using UVDIS. Note that the UVDIS 3.1 dose calculation overestimates the system performance.

Amalgam Lamps Require Less Energy

Require fewer lamps and reduce O&M costs

Benefits:

- Draw less energy than competitive high-output systems – only 250 Watts per lamp
- Stable UV output over a wide range of water temperatures
- Fewer lamps are required to deliver the required dose, which reduces O&M costs
- Can treat lower quality wastewater such as primary effluents, combined sewer overflows, and storm water
- Fewer lamps allow systems to be located in compact spaces, reducing installation costs



Trojan's high efficiency amalgam lamps generate stable UV output in a wide range of water temperatures.

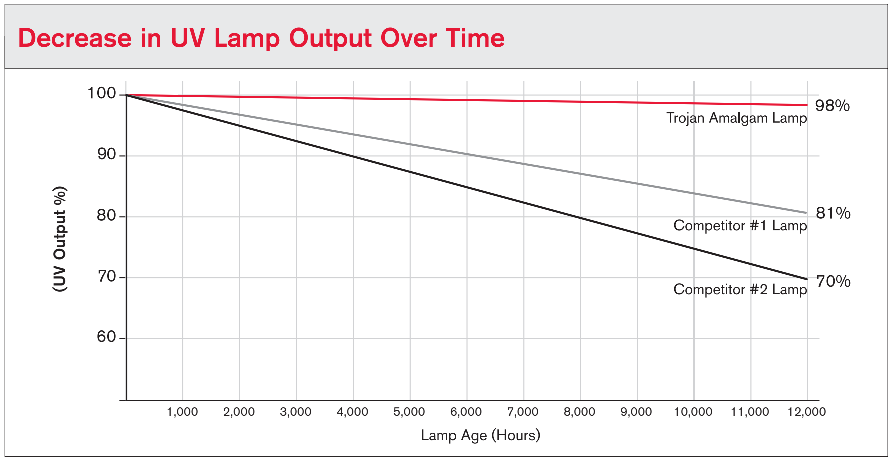
- Trojan's amalgam lamps produce significantly higher UV output than conventional low-output lamps
- Fast and simple lamp changeouts; replacing a 50-lamp system takes less than two hours and requires no tools
- The lamps are sealed inside heavy-duty quartz sleeves by Trojan's multi-seal system, maintaining a watertight barrier around the internal wiring while individually isolating each lamp and the module frame
- Lamps are pre-heated for reliable startup

Amalgam Lamps Maintain Maximum UV Output

Trojan lamps deliver 98% of full UV output after more than one year of use

Benefits:

- Trojan's high efficiency, amalgam lamps deliver the most consistent UV output over their 15 month lamp life
- Trojan lamps have 20% less decline in UV output after 12,000 hours of use compared to competitive UV lamps
- Validated performance data assures you of reliable dose delivery and prolonged lamp life



The lamps used on the TrojanUV3000Plus™ system have been independently validated to maintain 98% of original output after 12,000 hours (15 months) of operation.

Open-Channel Architecture Designed for Outdoor Installation

Cost-effective to install and expand

Benefits:

- Compact, open-channel design allows cost-effective installation in existing effluent channels and chlorine tank basins
- System can be installed outdoors to reduce capital costs – no building, shelter or air conditioning is required
- Gravity-fed design eliminates costs of pressurized vessels, piping and pumps
- Scalable architecture allows precise sizing – reduces capital and O&M costs associated with oversizing
- Modular design is readily expandable to meet new regulatory or capacity requirements
- Trojan's thorough design approach ensures that effluent quality, upstream treatment processes, and O&M needs are addressed in system configurations
- Horizontal lamp mounting delivers optimal hydraulic performance. Induces turbulence and dispersion, maximizing wastewater exposure to UV output

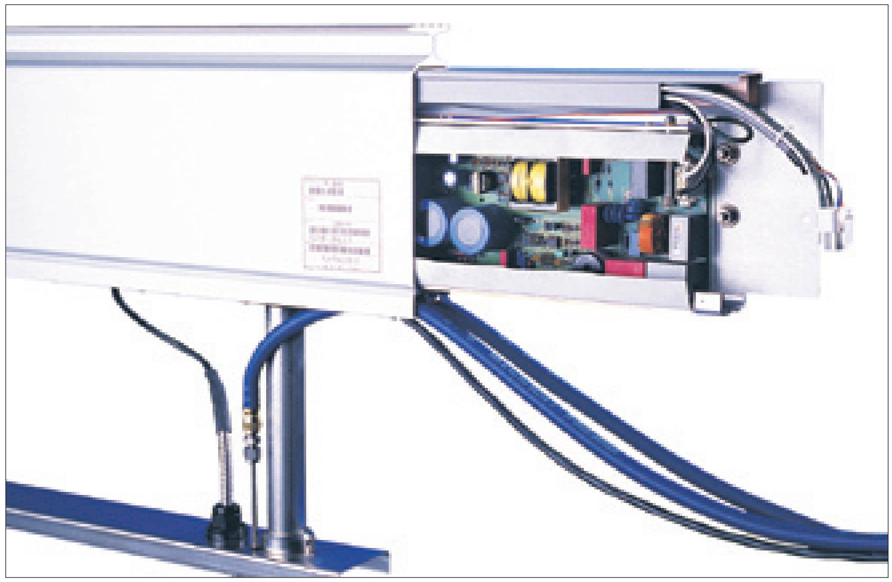
The TrojanUV3000Plus™ system delivers flexibility and cost savings through its simple installation in existing channels and chlorine contact tanks. The system can be situated outdoors with no additional building, shelter or cooling requirements.

Advanced, Self-Contained UV Module

Dramatically reduces footprint size and eliminates costs of air conditioning

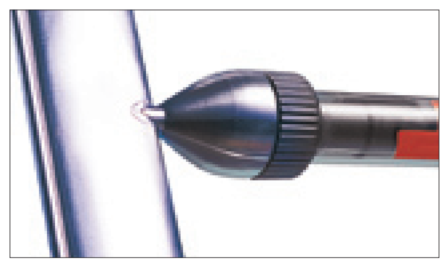
Benefits:

- Lamps are protected in a fully submersible, 316 stainless steel frame
- Waterproof module frame protects cables from effluent, debris fouling and UV light
- Electronic ballasts are housed right in the module, reducing the system footprint, minimizing installation time and costs, and eliminating the need for separate external cabinets
- Ballast enclosures are rated 6P (air/water tight)
- Module leg and lamp connector have a hydrodynamic profile to reduce headloss
- The variable-output, electronic ballast is mounted in an enclosure integrated within the module frame
- Wiring is pre-installed and factory-tested



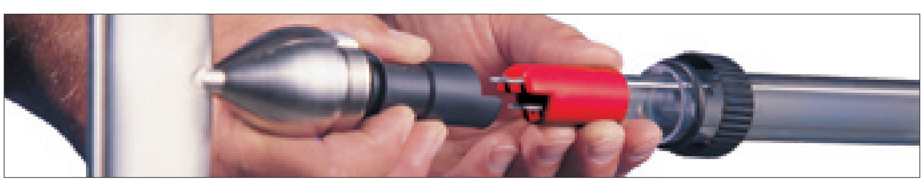
Module-mounted ballasts allow for compact installation, convection cooling, and protect wires and cables from exposure to effluent and UV light.

- Cooling ballasts by convection eliminates costs associated with air conditioning and forced-air cooling



Module leg and lamp connector have a hydrodynamic profile to reduce headloss and potential for debris fouling.

Designed for Easy Maintenance



Trojan UV lamps are easily replaced in minutes without the need for tools.

- TrojanUV3000Plus™ lamps are warranted for 12,000 hours
- Modular design allows for maintenance on one module without disrupting disinfection performance
- Maintenance limited to replacing lamps and cleaning solution
- Automated ActiClean™ cleaning system reduces manual labor associated with cleaning sleeves

Quick connect allows for easy refill of ActiClean™ Gel.

TROJANUV3000PLUS™

System Specifications

System Characteristics	TrojanUV3000Plus™
Typical Applications	Wide range of wastewater treatment plants
Lamp Type	High-efficiency Amalgam
Ballast Type	Electronic, variable output (60 to 100% power)
Input Power Per Lamp	250 Watts
Lamp Configuration	Horizontal, parallel flow
Module Configuration	4, 6 or 8 lamps per module
Level Control Device Options	ALC, fixed weir or motorized weir gate
Water Level Sensor	1 electrode low water level sensor per channel
Enclosure Ratings:	
Module Frame / Ballast Enclosure	TYPE 6P (IP67) / TYPE 6P (IP68)
All Other Enclosures	TYPE 4X (IP56)
Ballast Cooling Method	Convection; no air conditioning or forced air required
Installation Location	Indoor or outdoor
Sleeve Cleaning System:	
ActiClean™ Cleaning System	Optional Automatic Chemical/Mechanical Cleaning System
ActiClean™ Cleaning Gel	Non-corrosive, operator-friendly
Recommended Fouling Factor	1.0
System Control Center:	
Controller	Microprocessor or PLC-based
Analog Inputs (Typical)	Flow (4-20 mA) and UVT (4-20 mA)
Discrete Outputs (Typical)	Bank status, common alarms and SCADA communication
Maximum Distance from UV Channel	500 ft. (152 m)
Electrical Requirements:	
Power Distribution Center	208Y/120V, 3 phase, 4 wire + GND, 60 Hz (Max. 8 modules per PDC) 480Y/277V, 3 phase, 4 wire + GND, 60 Hz 380Y/220V, 3 phase, 4 wire + GND, 50/60 Hz 400Y/230V, 3 phase, 4 wire + GND, 50/60 Hz 415Y/240V, 3 phase, 4 wire + GND, 50/60 Hz
System Control Center (stand alone)	120V, single phase, 2 wire + GND, 60 Hz, 1.8 kVA 220/230/240V, single phase, 2 wire + GND, 50/60 Hz, 1.8kVA
Hydraulic System Center (for ActiClean™)	208V, 3 phase, 3 wire + GND, 60 Hz 380/400/415 V, 3 phase, 3 wire + GND, 50/60 Hz 480 V, 3 phase, 3 wire + GND, 60 Hz or 2.5kVA HSC powered from PDC
Water Level Sensor	24VDC powered from PDC

Find out how your wastewater treatment plant can benefit from the TrojanUV3000Plus™ – call us today.

Head Office (Canada)
3020 Gore Road
London, Ontario, Canada N5V 4T7
Telephone: (519) 457-3400
Fax: (519) 457-3030

www.trojanuv.com

Trojan UV Technologies UK Limited (UK): +44 1905 77 11 17
Trojan Technologies (The Netherlands): +31 70 391 3020
Trojan Technologies (France): +33 1 6081 0516
Trojan Technologies Espana (Spain): +34 91 564 5757
Trojan Technologies Deutschland GmbH (Germany): +49 6024 634 75 80
Hach/Trojan Technologies (China): 86-10-65150290

Products in this brochure may be covered by one or more of the following patents:
U.S. 4,872,980; 5,006,244; 5,418,370; RE 36,896; 6,342,188; 6,635,613; 6,646,269; 6,663,318; 6,719,491; 6,830,697; 7,018,975
Can. 1,327,877; 2,117,040; 2,239,925
Other patents pending.

MWW-003 (0107) TROW-1040

TROJANUV
WATER CONFIDENCE™

Hycor® ThickTech™

Rotary Drum Thickener

Woven wire mesh for impressive water release

High output solids content

98% plus recovery of solids

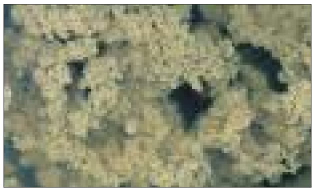
The Hycor® ThickTech™ Rotary Drum Thickener (RDT) is a sludge-thickening system that is setting new standards for volume reduction. The thickener commonly reduces sludges by 90% with a 98% capture rate. The ThickTech system is quite compact and requires less floor space than other thickeners. It is economical to operate with low horsepower and water consumption.

The ThickTech RDT increases digester capacity, reduces hauling costs and can be used as a pre-thickener to increase capacity of other dewatering equipment.

The patented ThickTech system is performance proven for applications in municipal water and wastewater treatment plants, industrial facilities and pulp and paper mills. It is fabricated of stainless steel and engineered to provide years of reliable service. The system utilizes a low shear floc tank, followed by dewatering with a high performance rotary drum screen.

Low Shear Flocculation

The ThickTech system is designed to achieve flocculation with a minimal amount of expensive chemicals. The floc tank has tangential inlet and outlet openings to maximize flocculation by reducing shear from turbulence. This design creates a gentle swirl that combines the sludge with the polymer. This swirling motion also increases the overall sludge detention time for floc development. A specially designed impeller maintains the swirl without breaking down the flocs.



Staged Dewatering Through Screening

Dewatering takes place along a multi-zone drum cylinder. The zones

can have different size mesh media to augment capture efficiency as the sludge moves along the length of the cylinder. Finer mesh is generally used in the feed end where material is thinner, while downstream zones have larger openings to enhance removal of water. Rings with adjustable ports control detention time in each zone. The result is high capture efficiencies – as much as 98% – without sacrificing high inlet flow rates. High capture efficiency alone can substantially reduce polymer usage.

Operator Friendly

The ThickTech™ RDT was designed with ease of operation and maintenance in mind. Once the system is set, only periodic checks are required. If ever needed, the cylinder screens are easy to replace. A spray bar with a manually operated cleaning system runs the entire length of the cylinder. The orifices in the spray bar become progressively smaller to minimize rewetting the thickened sludge. The spray nozzles can be cleaned quickly by simply turning a handwheel.

The reasons why ThickTech is your best choice quickly add up: low installed cost, high capture, simple operation, low polymer cost, low energy consumption and minimal water.

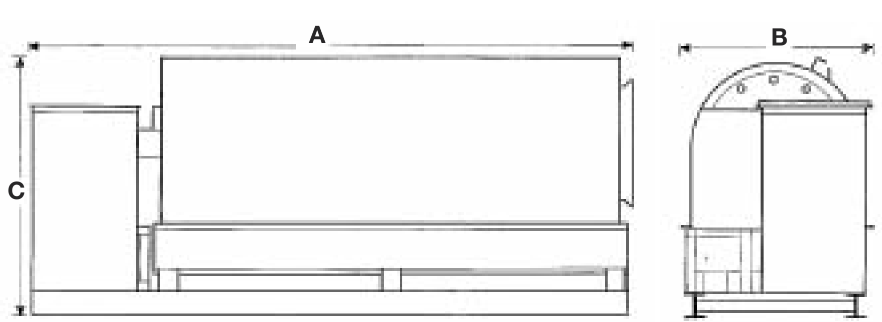
The ThickTech™ RDT standard

- Throughput:
  Up to 400 GPM/unit
- Output solids content:
  7% to 12%
- Return water quality:
  98%+ recovery of solids
- Polymer usage:
  Approximately
  $10/ton of dry sludge
- Operation:
  Simple, maintenance-free

Dimensions

Model	A length	B width	C height	weight
RDT-25	78	32	38	1000
RDT-50	111	42	61	1400
RDT-100	142	49	66	2500
RDT-150	166	49	66	3000
RDT-200	182	61	84	6500
RDT-300	206	61	84	7000
RDT-400	276	66	84	7500

All dimensions, in inches or pounds, are approximate and not intended to take the place of engineered specs.



Parkson
Treating Water Right

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ISO 9001:2008 Certified
Quality Management System

www.parkson.com
technology@parkson.com

1.888.PARKSON
1.954.974.6610

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