3.2. Jamaica Bay WPCPs

The four Jamaica Bay WPCPs are 26th Ward, Coney Island, Jamaica, and Rockaway. The nitrogen control actions at 26th Ward WPCP includes a Basic Step Feed BNR retrofit and separate centrate treatment. No actions are planned to-date for the remaining three Jamaica Bay WPCPs. According to the model TN projections, the Jamaica Bay WPCPs should be able to comply with the maximum monthly TN limit of 54,600 lbs/day by simply maintaining separate centrate treatment at the 26th Ward WPCP but may not be able to comply with the 12-month rolling average TN limit of 45,300 lbs/day even when Basic Step Feed BNR is implemented at 26th Ward. The plant doesn't currently have adequate air to support nitrification and the Aerator Effluent MLSS used in the BioWin model wasn't sufficient for nitrification due to the very high BOD and TKN loadings at the plant. The plant will try to operate at a higher MLSS concentration than that used in the BioWin model and the process air limitations will be addressed in the 26th Ward Plant Upgrade.

There have been no significant changes in either the influent or centrate TN loadings to the Jamaica Bay WPCPs as shown in **Figure 25** and **Figure 26**. There have also been no significant changes in the effluent TN discharges for the Jamaica Bay WPCPs as shown in **Figure 27** and **Figure 28**. The Jamaica Bay WPCPs exceeded the maximum monthly TN permit limit of 54,300 lbs/d six times since January 1996 and achieved a 12-month rolling average TN discharge of 50,800 lbs/d in August 1998.

The only nitrogen control actions planned to-date for the Jamaica Bay area will be implementing Separate Centrate Treatment (3/98) and Basic Step Feed BNR (4/00) at 26th Ward WPCP. There are no nitrogen control actions planned for the other Jamaica Bay WPCPs, as they have the following restraints which currently prevent the implementation of nitrogen control actions:

- The Coney Island WPCP is currently operating at its design flow and would require higher aerator effluent MLSS concentrations to nitrify the wastewater. These MLSS concentrations would result in extremely high solids loadings to the final tanks and based on current data would result in a washout of the biomass.

- The Jamaica WPCP has been having severe problems with final tank settling and the gravity thickeners. The NYCDEP is concerned that an increased sludge age would be detrimental to the final tank and the gravity thickener performance thus resulting in a washout of biosolids and/or not complying with the Process to Significantly Reduce Pathogens (PSRP) requirements.

- The Rockaway WPCP only contributes about 5 percent of the total nitrogen to Jamaica Bay and implementing any nitrogen control actions at the treatment plant would only result in a marginal increase in TN removals.

The NYCDEP will focus on increasing nitrogen removal at the 26th Ward WPCP to enable all Jamaica Bay WPCPs to comply with the TN permit limits. According to the BioWin model, the 26th Ward WPCP cannot achieve year-round nitrogen removal because of insufficient air and too

low of a sludge age based on the operating parameters and wastewater characteristics used in the BioWin model. The plant must replace the air blowers which will be done in the upcoming plant upgrade and in the meantime the plant may be able to comply with SPDES TN limits by increasing the sludge, which is defined below. If the 26th Ward WPCP can increase the sludge age either by operating at an aerator effluent MLSS greater than 1,600 mg/L (used in TN projections) or reducing the BOD & TKN loading to the aeration tanks, the plant should be able to accomplish BNR throughout the year and the Jamaica Bay WPCPs will be able to comply with the TN permit limits.

$$\text{Sludge Age} = \frac{\text{MLSS (mg/L) x Aerator Volume (MG) x 8.34 lbs/gal}}{\text{[RAS MLSS (mg/L) x RAS Flow (MGD)]+[Eff. SS (mg/L) x Eff. Flow (MGD)] x 8.34 lbs/gal}}$$

The NYCDEP has evaluated a number of alternatives listed below. These alternatives involve either centrate relocation and/or modifying the sludge dewatering facility's operations. The NYCDEP is planning to export the sludge from the Owls Head WPCP to a dewatering facility other than 26th Ward WPCP.

1. Exporting sludge from the Owls Head and/or Rockaway WPCP to a Dewatering Facility other than 26th Ward.
2. Discontinue the pumping of Coney Island WPCP's sludge to the 26th Ward WPCP and send the sludge to another dewatering facility via sludge vessels.
3. Importing sludge from the Jamaica WPCP to 26th Ward WPCP, so the centrate stream could get partial treatment in Aeration Tank No. 3.
4. Chemically enhancing separate centrate treatment in Aeration Tank No. 3 to enable full nitrification of the centrate stream as opposed to the 30 to 50 percent nitrification currently being achieved.

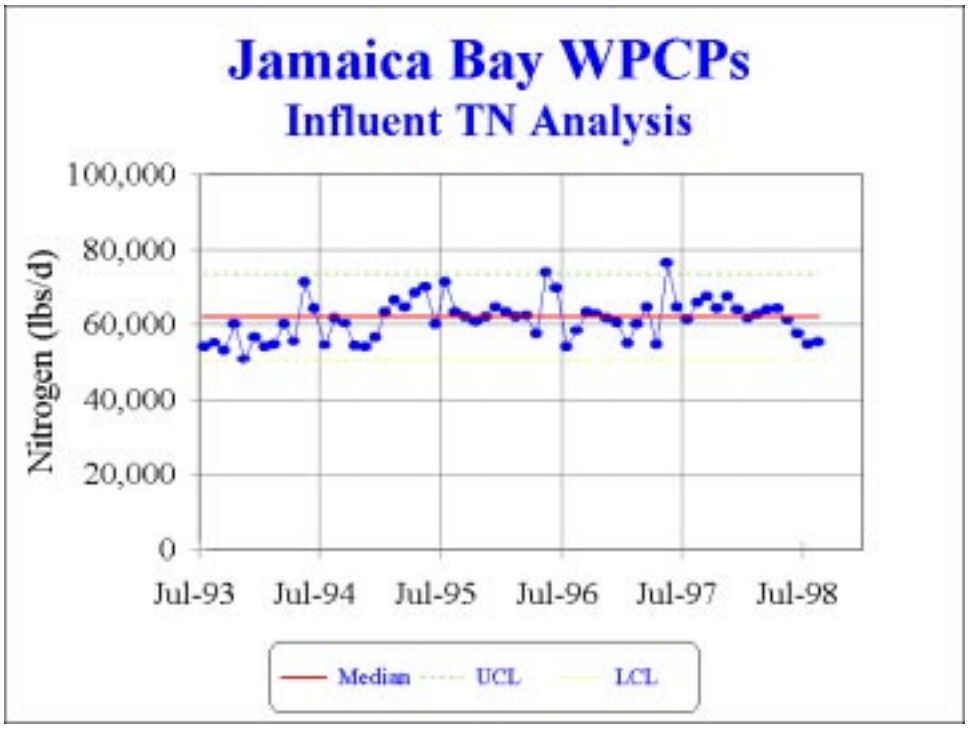

Figure 25

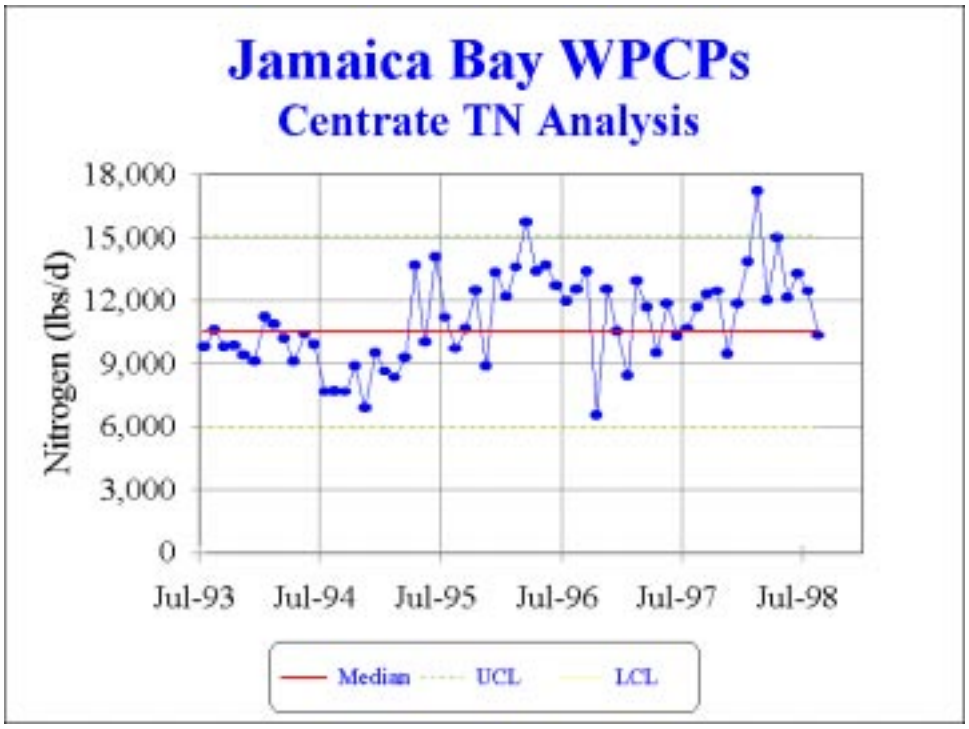

Figure 26

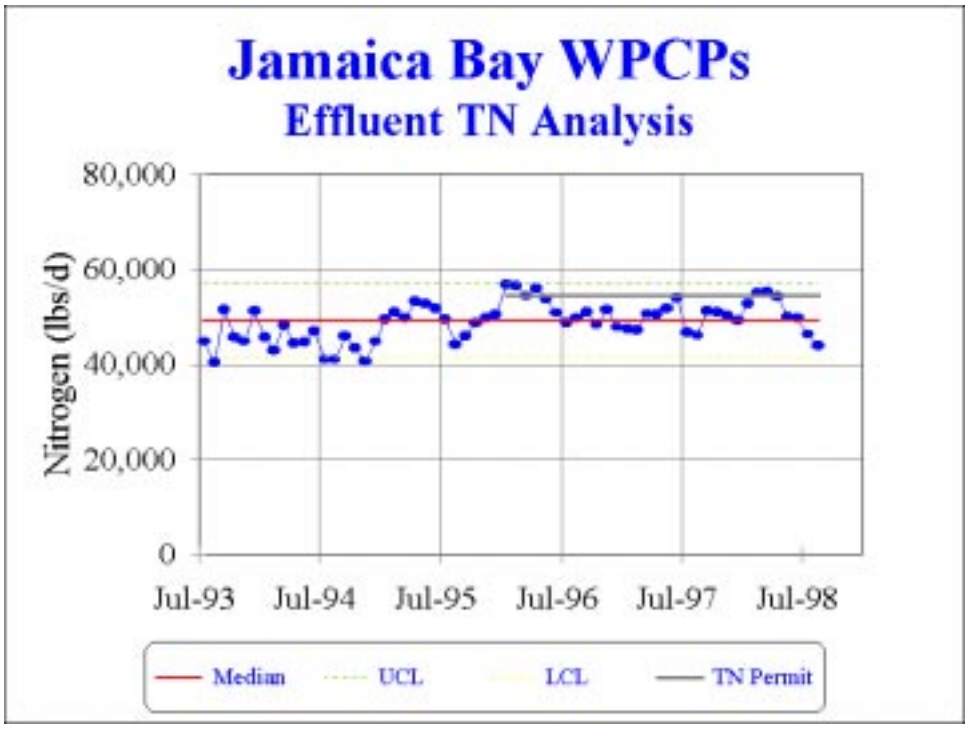

Figure 27

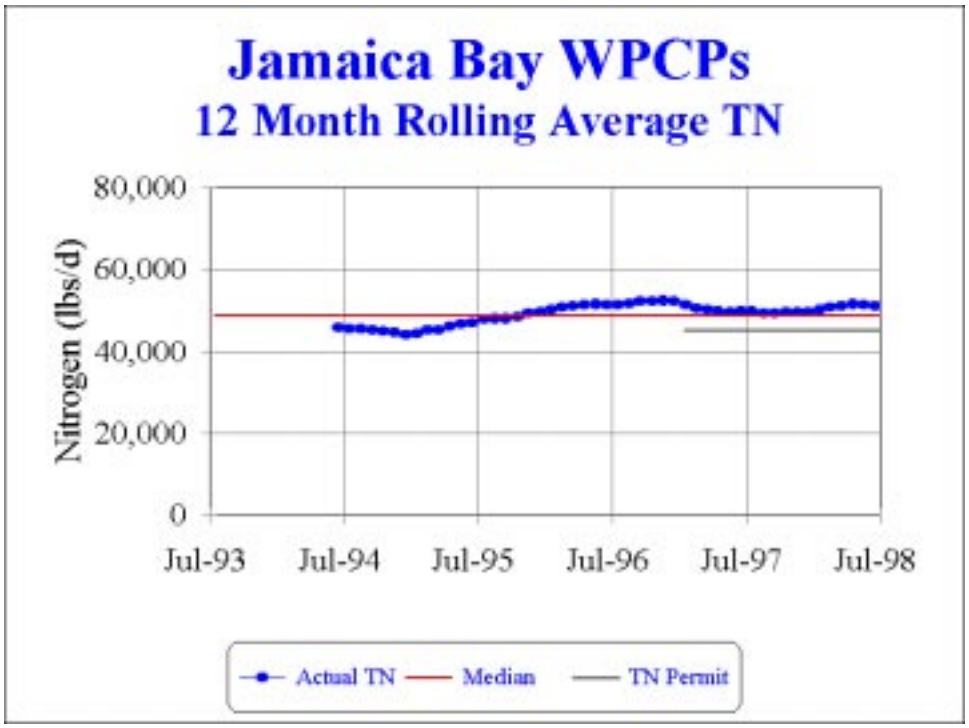

Figure 28

3.2.1. 26th Ward WPCP

Nitrogen Control Actions and Status

The Basic Step Feed BNR retrofit at the 26th Ward WPCP was completed in September 1997; which included the installation of baffles, mixers, and a fine bubble membrane diffuser system. However, the plant will not implement Basic Step Feed BNR until April 2000 when a froth control system is operational. The froth control system was delayed due to some design modifications such as installing a spray hood in each pass as opposed to the previous froth control designs which consisted of installing a chlorine spray hood only in Pass A. The Basic Step Feed BNR retrofit cost about $2,850,000 and the froth control contract was estimated at $887,000.

The plant originally implemented separate centrate treatment in Aerator #3 in June 1996 but had to discontinue this process because the plant was being retrofitted for Basic Step Feed BNR. The plant reimplemented separate centrate treatment in March 1998 with some improvements such as an internal recycle to increase the hydraulic retention time of the process. The nitrified centrate stream is then sent to the head of the plant to give the centrate an opportunity to denitrify.

Plant Performance

There have been no significant changes in the influent TN loading since January 1997 as shown in **Figure 29** and the Centrate TN loading exceeded the Upper Control Limit once since January 1997 as shown in **Figure 30**. The higher than expected centrate TN loading could be attributed to the infrequency of sampling and the random importing of other plant's sludges. The effluent TN values were within an acceptable range since January 1997 as shown on **Figure 31**. The plant will not increase its sludge age for Basic Step Feed BNR before the froth control is operational. The plant attempted to increase its sludge age in the summers of 1993 and 1994 as shown on **Figure 32** but had to reduce the sludge age due to severe frothing problems.

According to the BioWin TN projections, 26th Ward WPCP will only achieve an average TN discharge of 11,190 lbs/d when Basic Step Feed BNR is implemented and this will not be sufficient in enabling the Jamaica Bay WPCPs to comply with the 12-month rolling average TN limit of 45,300 lbs/d. The BioWin model identified two factors that prevent 26th Ward WPCP from being able to biologically remove nitrogen from the wastewater. First, 26th Ward WPCP didn't have sufficient air for nitrification and as a result a more efficient fine bubble membrane diffuser system was installed. However, the old blowers don't have sufficient pressure to overcome the additional headloss associated with a dome diffuser system and the plant still can't supply sufficient air for the process. This problem will be addressed in the upcoming plant upgrade with new blowers being installed. The other factor is that the high BOD & TKN loading at the plant and low MLSS concentration used in the BioWin model (Aerator Effluent = 1,600 mg/L) weren't sufficient in achieving a high enough sludge age for nitrification. Therefore, 26th Ward must either alleviate the blower problem and/or operate at a higher MLSS concentration than that used in the BioWin model to comply with TN permit limits. The NYCDEP has also looked into different TN removal alternatives concentrating on alleviating the centrate TN loading to Jamaica Bay which are listed below on **Table 13.**

Additional Nitrogen Control Actions Considered for Jamaica Bay (Table 13)

Additional Nitrogen Control Actions	Approximate TN Removals (lbs/d)
Send Owls Head WPCP sludge to a Dewatering Facility Other than the 26th Ward WPCP via sludge vessels.	*2,950 lbs/d*
Send Rockaway WPCP sludge to a Dewatering Facility other than the 26th Ward WPCP via sludge vessels.	111 lbs/d
Discontinue pumping sludge from Coney Island WPCP to 26th Ward WPCP and send sludge to another dewatering facility via sludge vessels.	3,030 lbs/d
Import Jamaica's sludge to the 26th Ward Dewatering Facility for Separate Centrate Treatment.	1,250 lbs/d
Export centrate stream from 26th Ward to a water body other than Jamaica Bay via sludge vessels.	8,170 lbs/d
Export centrate stream from Jamaica WPCP to a water body other than Jamaica Bay using sludge vessels.	4,200 lbs/d

In order to ensure compliance with the SPDES permit limit, the NYCDEP is planning to export Owls Head WPCP's liquid sludge to a dewatering facility other than 26th Ward WPCP outside the Jamaica Bay area. The NYCDEP is currently working on a contract to export the Newtown Creek WPCP's digested sludge to a Dewatering Facility outside of the East River which will enable Hunts Point WPCP to dewater sludge from Owls Head WPCP without increasing TN loadings in the Upper East River. The NYCDEP is also looking into exporting by contract the Wards Island WPCP's centrate to the Red Hook WPCP which will provide the alternative to enable Owls Head's sludge to be dewatered at Wards Island WPCP without affecting the TN loading to the Upper East River.

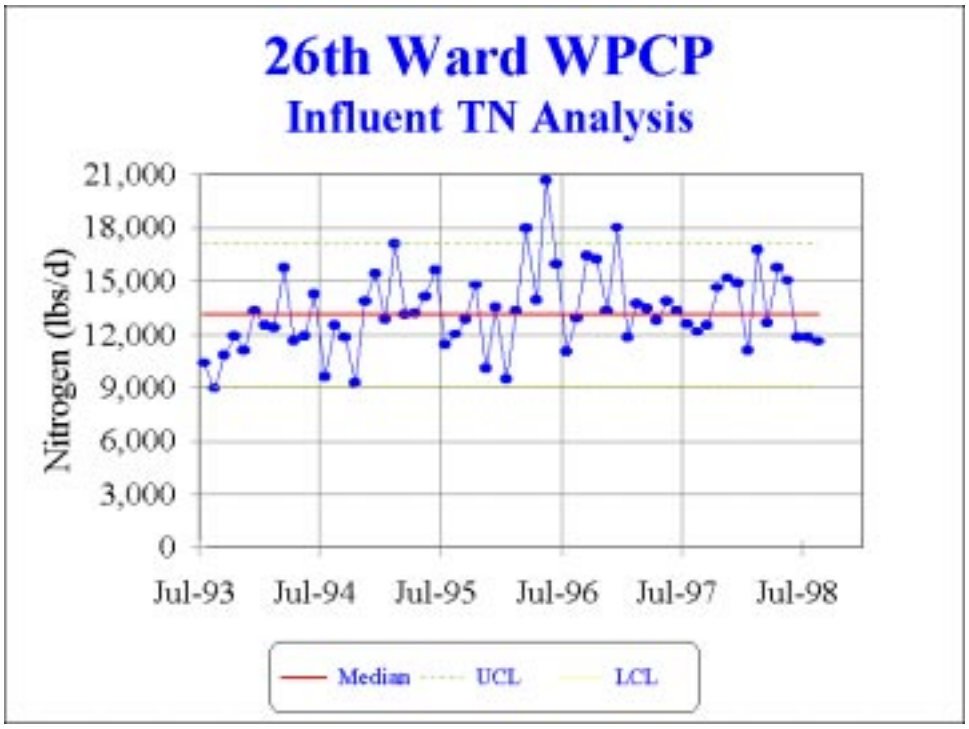

Figure 29

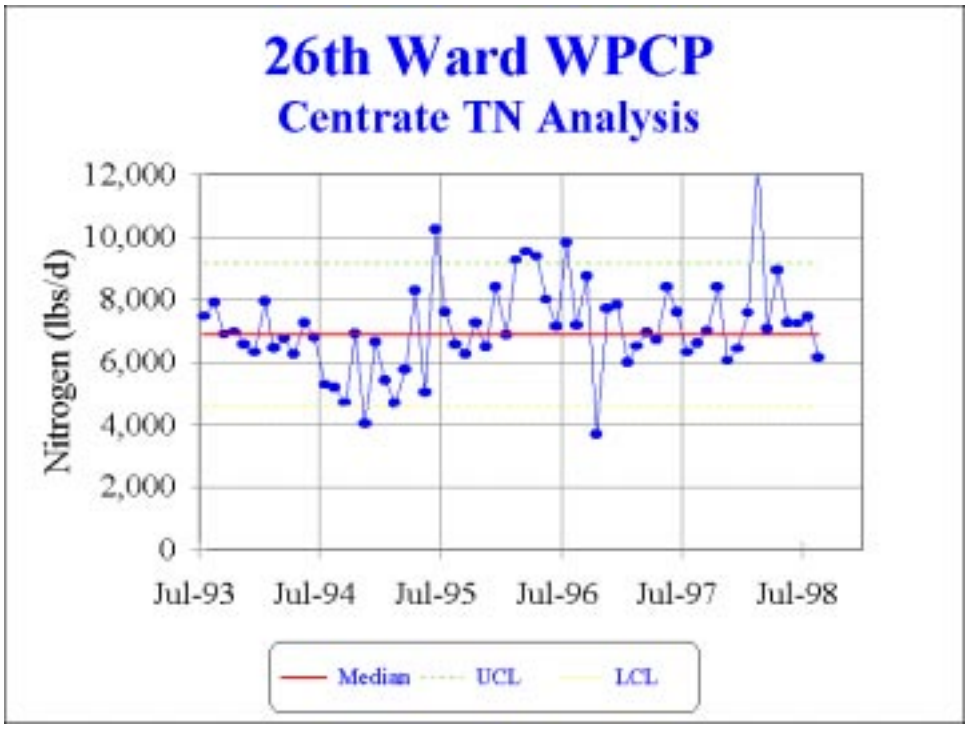

Figure 30

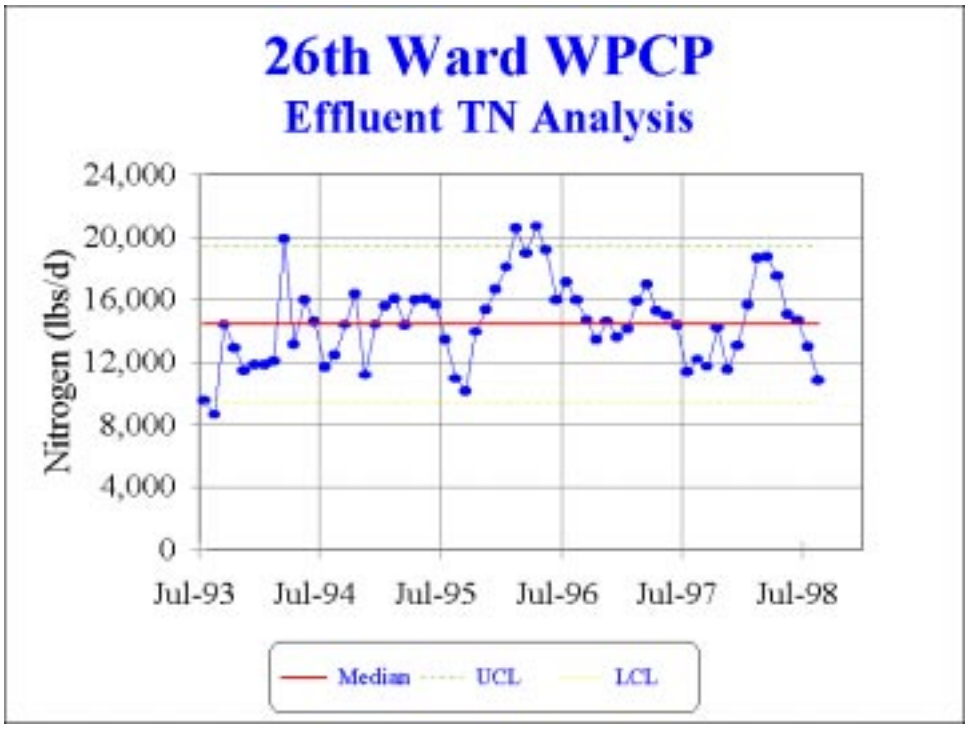

Figure 31

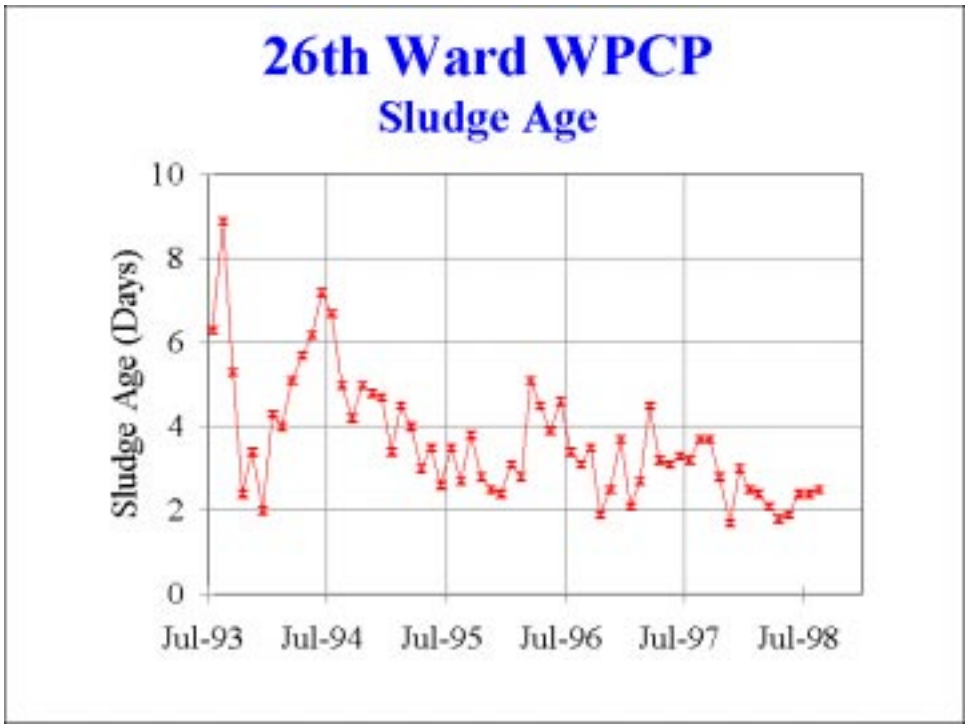

Figure 32

26th Ward WPCP (Table 14)

Original Nitrogen Control Action Plan (FY94):
- Step BNR

Revised Nitrogen Control Action (CY 97):
- Step BNR
- Separate Centrate Treatment in Aeration Tank #3

Operating Conditions

Item	Equipment Summary	Original NCAP (FY94)	Revised NCAP#6 (CY97)	Comments
Process Air	2-17,500 cfm 2<17,500 cfm	40,400 cfm	33,000 cfm	Original NCAP air flow was based on maintaining a DO of 2 mg/L.
% Return Flow	4-12 MGD	50%	32%	Return Rate is limited by frozen bell weirs
Aerator Eff Conc.	NA	2,000 mg/L	1,600 mg/L	Plant should determine the maximum aerator effluent concentration achievable.
RAS Conc.	NA	6,000 mg/L	6,600 mg/L	RAS concentrations were calculated using the following formula: %R = AE / (RAS-AE)
Flow Distribution	NA	33% to B, C, & D passes		Plant must make an attempt to distribute flow evenly to B, C, & D passes

Wastewater Characteristics

Parameter	Original NCAP (FY94)	Revised NCAP #6 (CY97)	Comments
Average Flow	74 MGD	67 MGD	Average flow was used for TN projections in both the original NCAP and the revised NCAP #6.
Dry Flow	-----	61 MGD	
Raw TKN	19.3 mg/L	22.8 mg/L	Original NCAP used raw influent loadings for TN projections
Raw BOD	108 mg/L	143 mg/L	Original NCAP used raw influent loadings for TN projections
PE TKN	24.2 mg/L	32.1 mg/L	Revised NCAP #6 used primary effluent loadings for TN projections
PE BOD	88 mg/L	118 mg/L	Revised NCAP #6 used primary effluent loadings for TN projections
Centrate TN	4,310 lbs/d	7,640 lbs/d	
Eff TKN	15.8 mg/L	19.65 mg/L	
Eff NOx	0 mg/L	.39 mg/L	
Eff TN Discharges	9,751 lbs/d	11,200 lbs/d	Effluent TN discharge were calculated using the total flow.

3.2.2. Coney Island WPCP

Nitrogen Control Actions and Status

There are no nitrogen control actions intended for the Coney Island WPCP. The plant was recently upgraded to full secondary treatment in 1993 and is currently at full treatment capacity. Therefore, it would be difficult for the plant to carry sufficient biomass in the aeration tanks to enable nitrification without overloading the final settling tanks. Coney Island should achieve a TN discharge of 15,420 lbs/d, which was based on the actual TN discharge during Calendar Year 1997.

Plant Performance

The influent TN loading to Coney Island exceeded the Upper Control Limit once in May 1997 as shown in **Figure 33**. It should be noted that the influent TN samples are only taken twice per month and the uncharacteristically high TN measurement was probably not representative of the true monthly TN loadings. The effluent TN loadings slightly exceeded the Upper Control Limit in June 1997 as shown on **Figure 34**. The higher than expected TN discharges were due to the plant cleaning Digester 5 & 6. The digester cleaning consisted of emptying the digester and sending the digested sludge to the head of the plant. The digested sludge contains a high concentration of TKN and was responsible for the slight increase in effluent TN discharges.

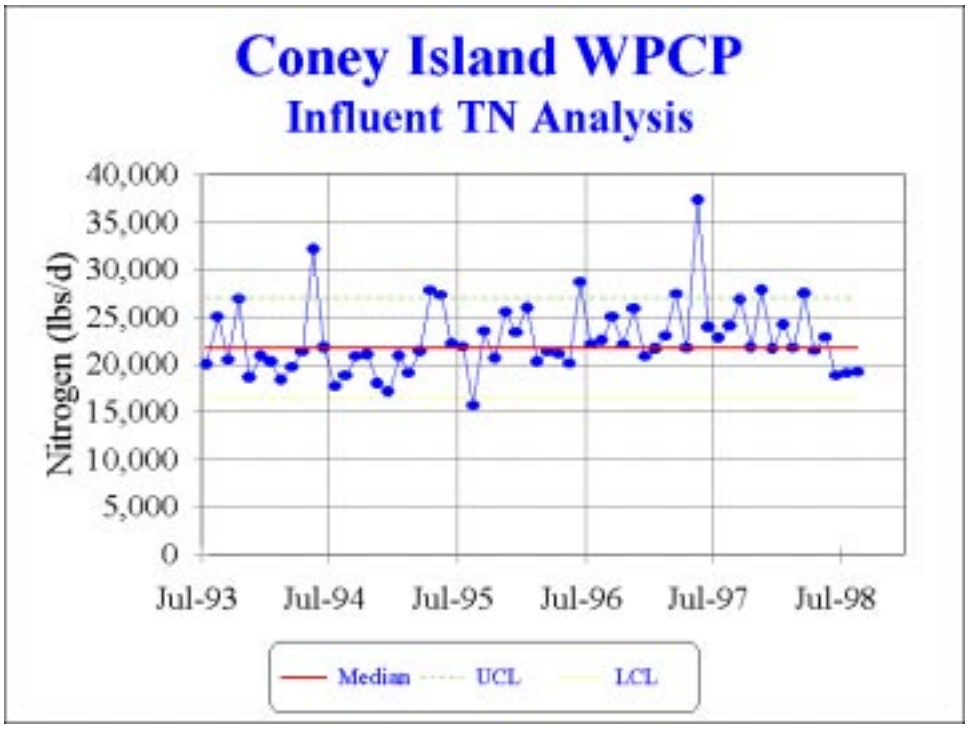

Figure 33

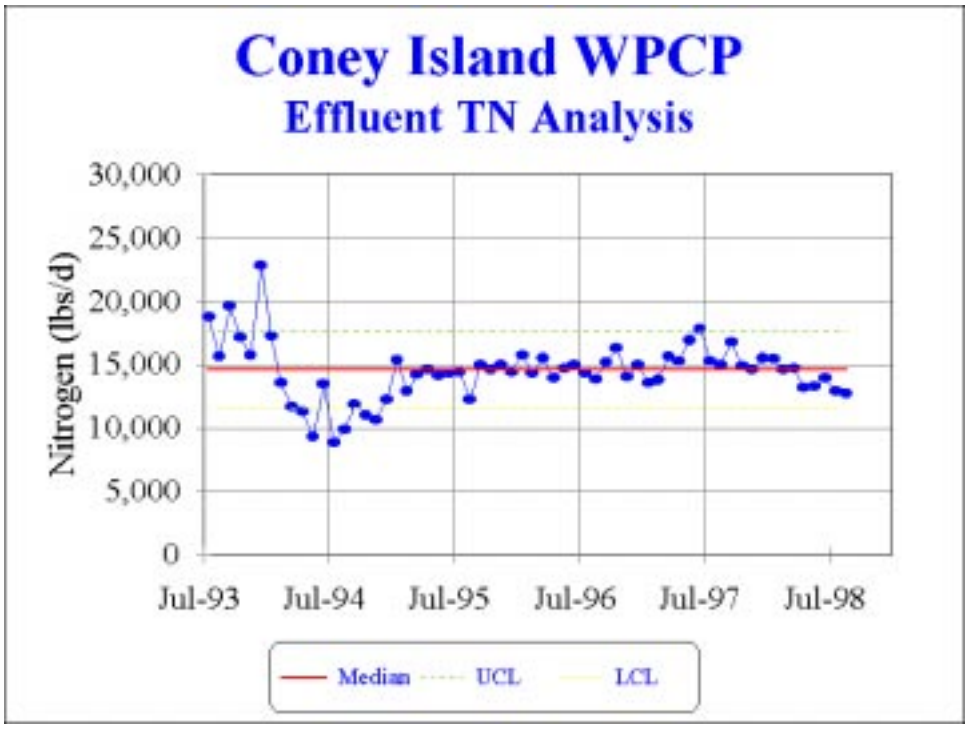

Figure 34

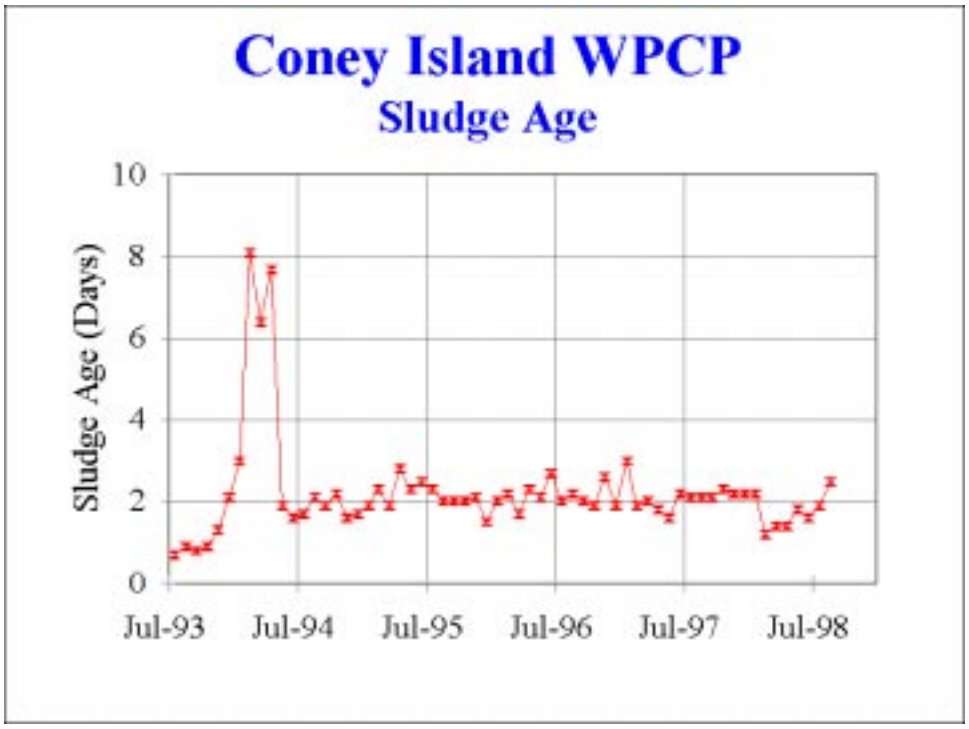
Coney Island WPCP
Sludge Age
Sludge Age (Days)
10
8
6
4
2
0
Jul-93
Jul-94
Jul-95
Jul-96
Jul-97
Jul-98

Figure 35

3.2.3. Jamaica WPCP

Nitrogen Control Actions and Status

The Jamaica WPCP is currently under going a plant stabilization, which involves the installation of new main sewage pumps, constructing new primary tank, refurbishing equipment, and modifying final tanks. No nitrogen control actions are planned for Jamaica WPCP, because the plant cannot achieve a high enough sludge age for BNR due to final settling tank limitations and an extremely high primary effluent BOD loading. The plant also has problems complying with PSRP requirements due to poor gravity thickener performance. Jamaica should achieve a TN discharge of 18,550 lbs/d, which was based on the actual TN discharge during Calendar Year 1997.

Plant Performance

There have been no significant changes in the influent TN loadings **(Figure 36)** and the centrate TN loading exceeded the Upper Control Limit four times since January 1997 **(Figure 37)**. The effluent TN discharges exceeded the Upper Control Limit once since January as shown in **Figure 38**.

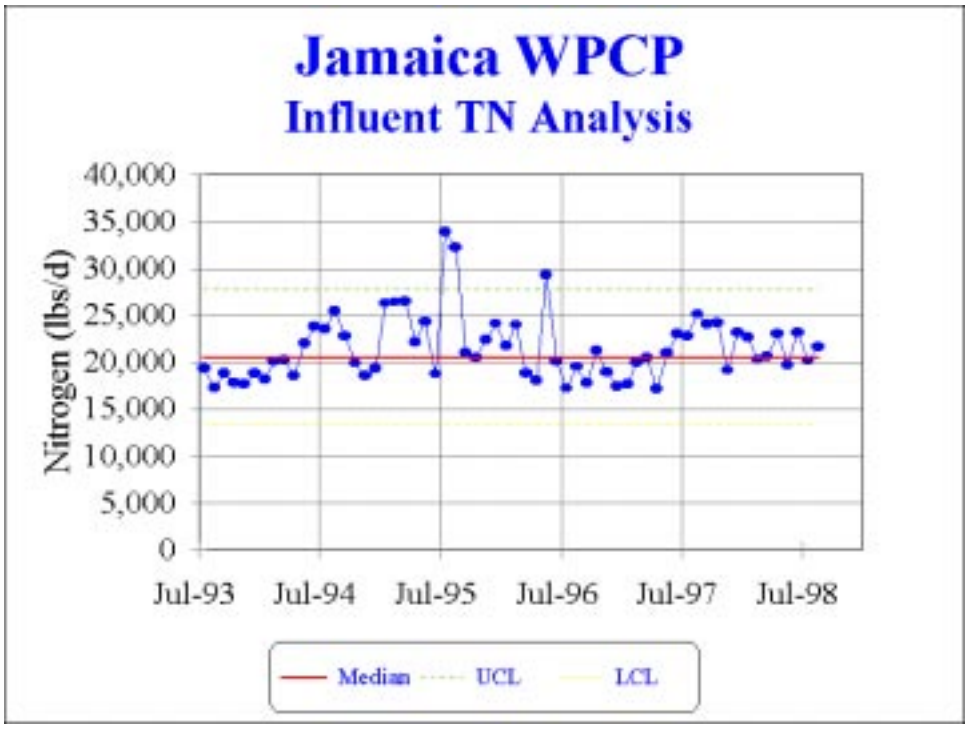

Figure 36

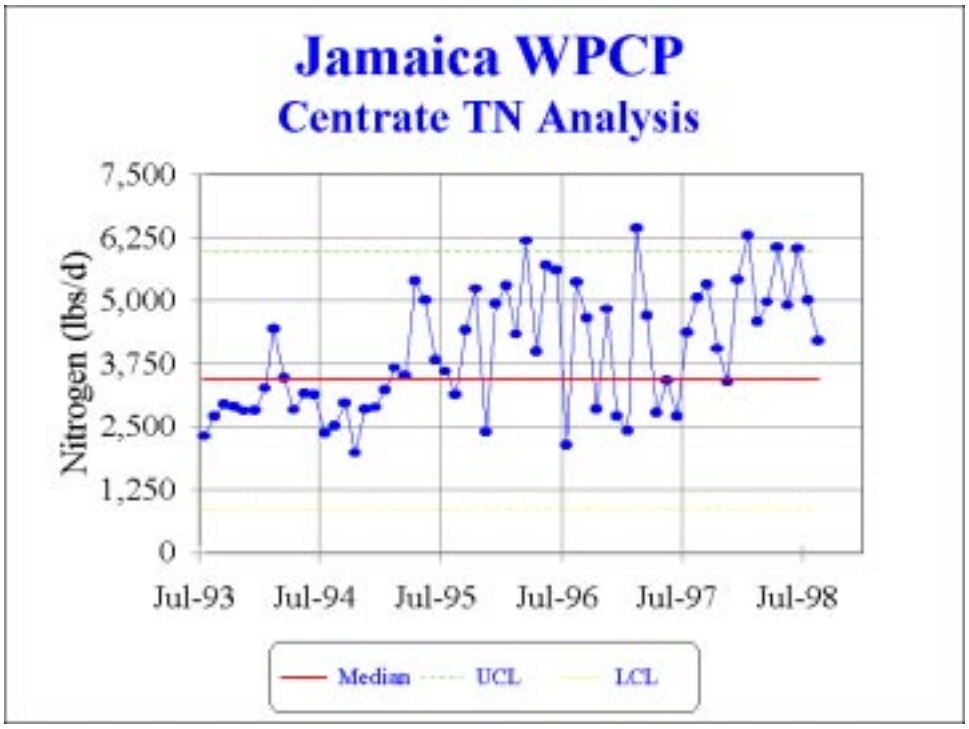

Figure 37

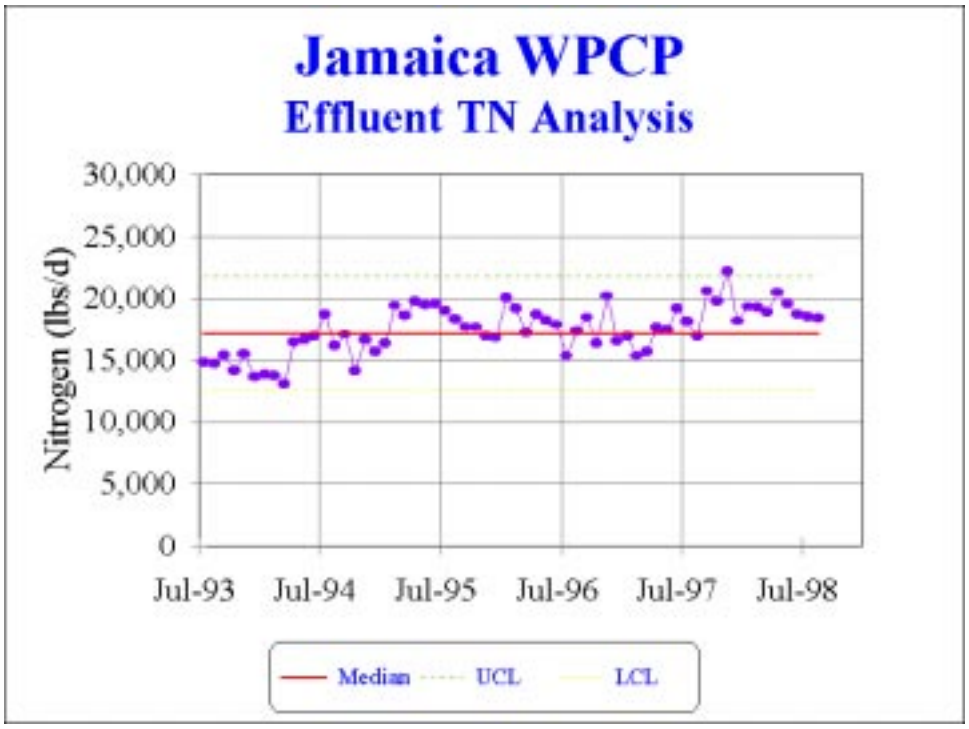

Figure 38

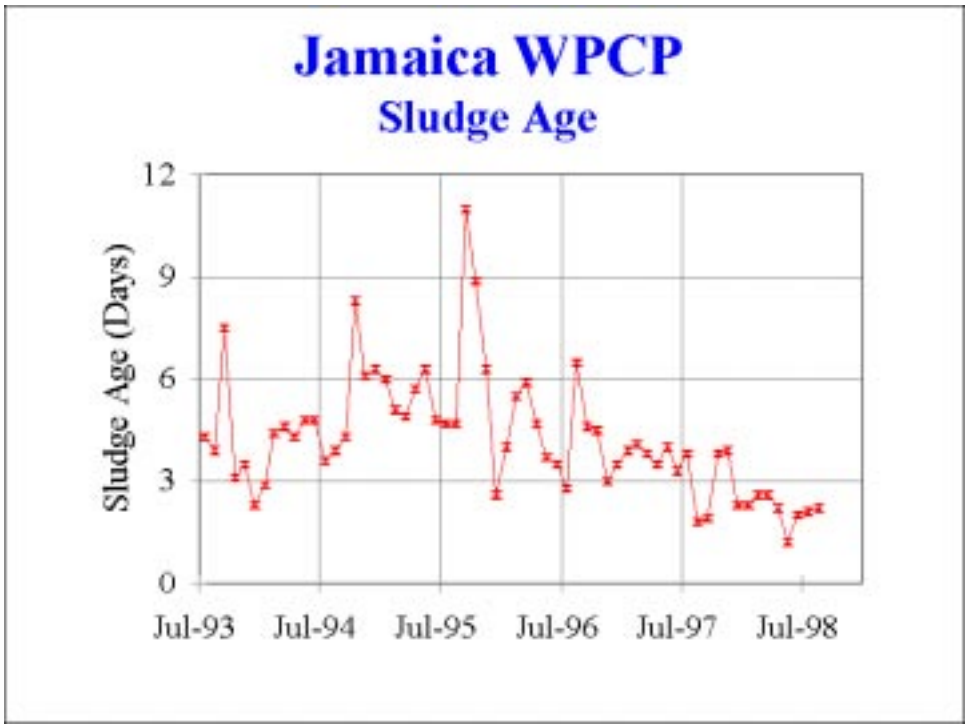

Figure 39

3.1.4. Rockaway WPCP

Nitrogen Control Actions and Status

There are currently no nitrogen control actions planned at Rockaway WPCP. Any nitrogen control actions implemented at Rockaway would just result in marginal gains in TN removals.

Plant Performance

There have been no significant changes in either the influent or effluent TN loadings as shown on **Figure 40** and **Figure 41.** No nitrogen control actions are planned for Rockaway WPCP, because it contributes such a small portion of TN to Jamaica Bay and already accomplishes good TN removals. Any nitrogen control actions implemented at Rockaway would just result in marginal gains in TN removals. Rockaway should achieve a TN discharge of 2,130 lbs/day, which was based on the actual TN discharge during Calendar Year 1997.

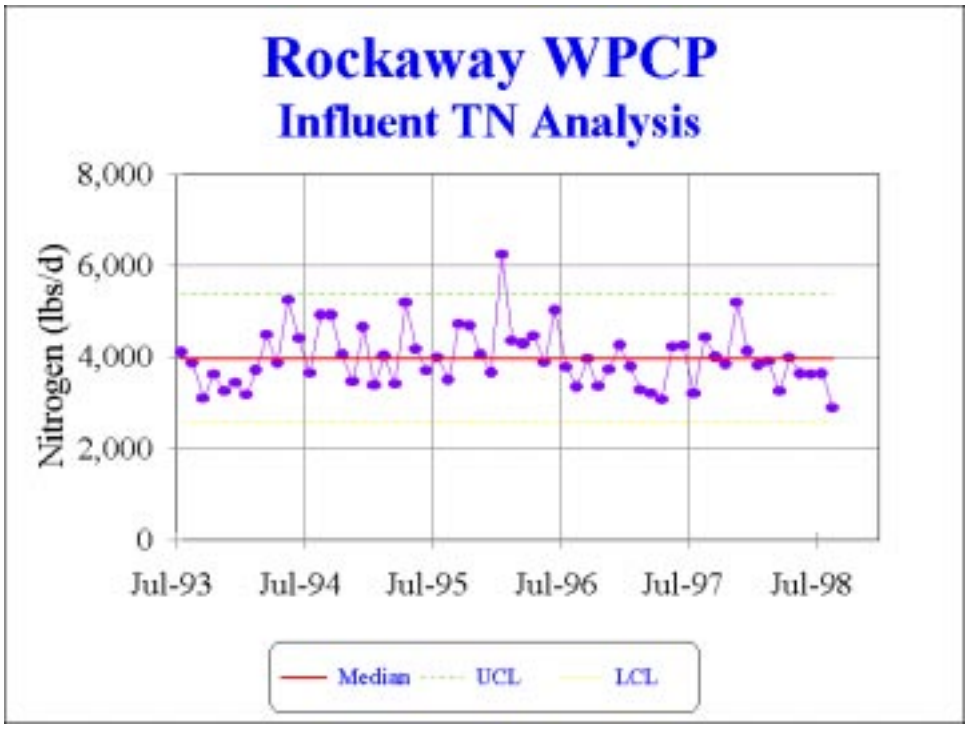

Figure 40

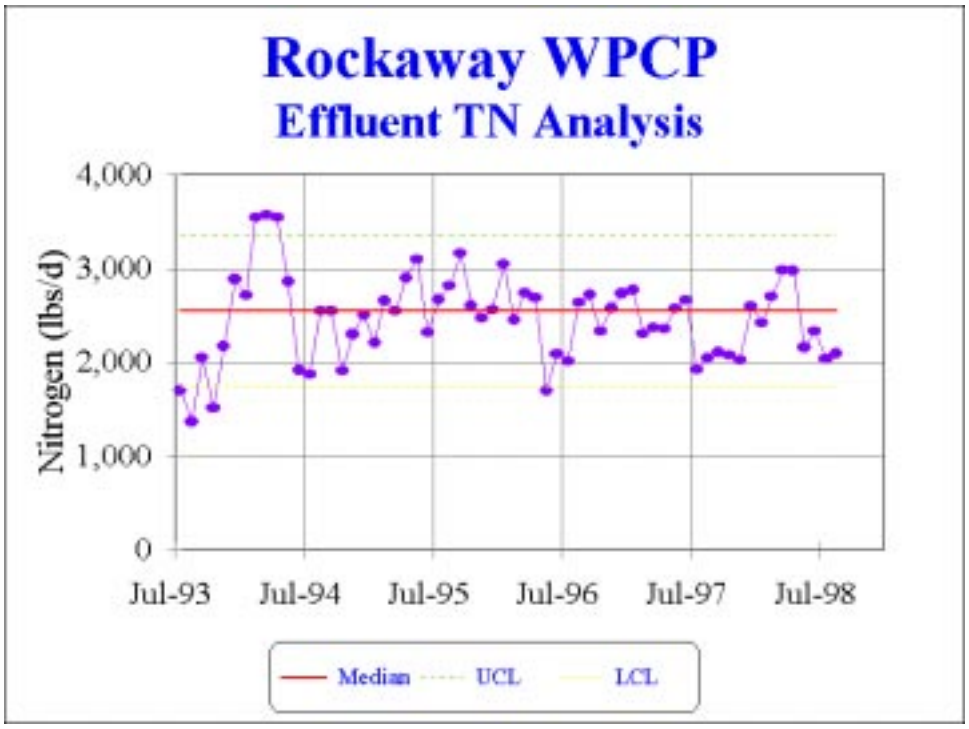

Figure 41

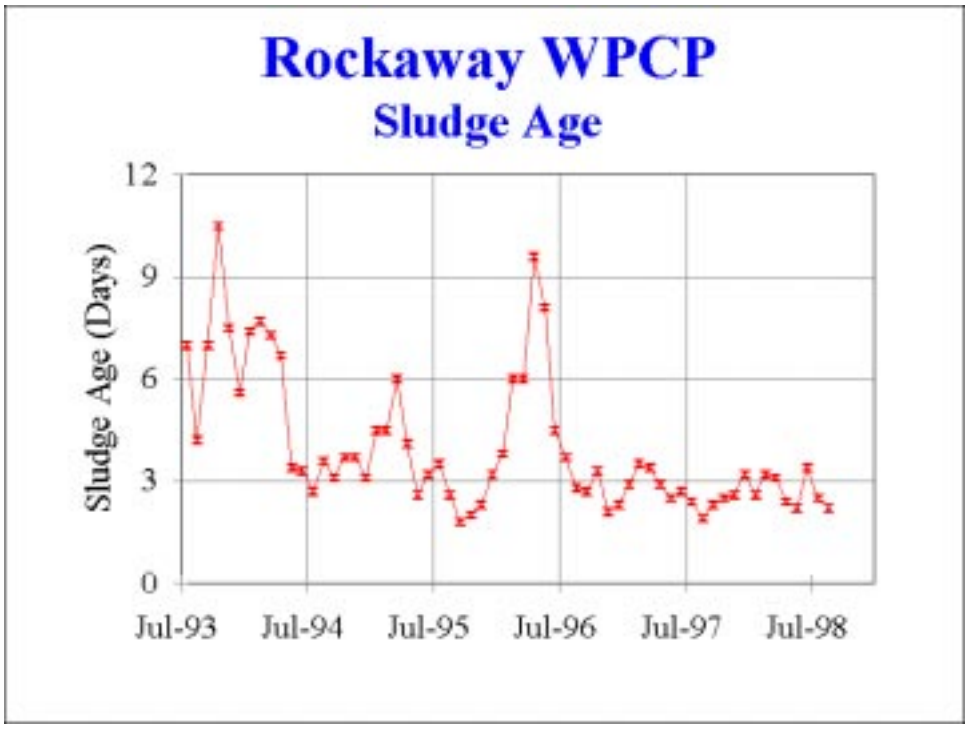
Rockaway WPCP
Sludge Age
Sludge Age (Days)
12
9
6
3
0
Jul-93
Jul-94
Jul-95
Jul-96
Jul-97
Jul-98

Figure 42