APPENDICES

A. Department's April 1, 2008 review of Bristol Township's 2006 Chapter 94 Report.

B. Bristol Township's October 2006 Report entitled, "Evaluation of Existing Bristol Township Sanitary Sewer Facilities."

C. "Water and Waste System Operator's Certification Act ("Act 11").

D. [Intentionally Left Blank]

E. Enforcement Response Plan.

F. Table of Deliverables

Appendix A

Pennsylvania Department of Environmental Protection

2 East Main Street
Norristown, PA 19401

Southeast Regional Office

Phone: 484-250-5970
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April 1, 2008

Mr. Jeff Bartlett
Managing Director
Bristol Township
2501 Bath Road
Bristol, PA 19007

Re: Chapter 94 Annual Report
Bristol Township Treatment Plant
NPDES Permit No. PA0026450
Bristol Township
Bucks County

Dear Mr. Bartlett:

The Department of Environmental Protection ("Department") originally sent this letter to the Lower Bucks County Joint Municipal Authority in error. This letter is being sent to you as originally intended, regarding the review of Bristol Township's 2006 Chapter 94 Report.

A review of your 2006 Annual Wasteload Management Report ("Report") submitted pursuant to Chapter 94 of the Department's rules and regulations has been completed. As conveyed to Bristol Township by the Department during a conference call with the Environmental Protection Agency (EPA) on February 14, 2008, your 2006 Report indicates that your Wastewater Treatment Plant ("Plant") is hydraulically and organically overloaded. In addition, five pumping stations within Lower Bucks County Joint Municipal Authority's ("Authority") collection and conveyance system are also hydraulically overloaded.

Your Report stated that the monthly average flow at the plant exceeded the hydraulic design capacity of 3.0 million gallons per day (MGD) during the months of November and December 2006 as well as during the months of January and February 2007. A subsequent review of the Plant's 2007 Discharge Monitoring Reports (DMRs) revealed that the monthly average flow at the Plant also exceeded the hydraulic design capacity in March, April, and May 2007. In addition, the Plant's influent organic loading exceeded its permitted influent loading of 3,950 pounds per day (lbs/day) during the months of April, July, and September 2006. Regarding the Authority's pumping stations, the Silver Lake, Palmer Avenue, Delaware Avenue, College Park, and Beaver Dam Road stations were noted as not being able to handle peak influent flows without the backup pump coming online. As such, it will be necessary for the Authority, as the permittee, to comply with Sections 94.21 and 94.22 of Chapter 94 as follows:

1. Prohibit new connections to the overloaded sewerage facilities except as approved by the permittee under the standards for granting exceptions contained in Sections 94.55 and 94.57 (relating to building permit issued prior to ban, replacement of a discharge, and other exceptions). No building permit may be issued by a governmental entity which may result in a connection to overloaded sewerage facilities or increase the load to those sewerage facilities from an existing connection. The permittee shall retain records of exceptions granted and make the records available to the Department upon request.

2. Immediately begin work for the planning, design, financing, construction and operation of the sewerage facilities that may be necessary to provide required capacities to meet anticipated demands for a reasonable time in the future and resulting in a project that is consistent with the applicable official plans approved under the Pennsylvania Sewage Facilities Act (35 P.S. Sections 750.1 and 750.20) and the regulations thereunder in Chapter 71 (relating to administration of the sewage facilities planning program) and consistent with the requirements of the Department and the federal government regarding areawide planning and sewerage facilities.

3. Submit to the Regional Office, for the review and approval of the Department, a written Corrective Action Plan (CAP) to be submitted with the annual report or within 90 days of notification of the Department's determination of overload, setting forth the actions to be taken to reduce the overload and to provide the needed additional capacity. The written CAP shall include, but not be limited to, limitations on and a program for control of new connections to the overloaded sewerage facilities and a schedule showing the dates each step toward compliance with paragraph 2 shall be completed.

The Department would like to note the following regarding items in the Report that should be addressed with the submittal of the Authority's 2007 Municipal Wasteload Management Report or with the submittal of your CAP:

1. The 2006 Report did not contain a line graph illustrating the hydraulic or organic projections for the next 5 years, a discussion of the data used for these projections, or a copy of the data, as required by Chapter 94, Section 94.12(a)(1)(2) and (3).

2. The Report discussed that the influent sampler, located near the Control Building, has been repaired yet continues to produce unrepresentative influent wastewater samples. Please indicate when the influent sampler will be replaced, and describe the type of sampler to be installed.

3. As indicated in the Report, the head measuring device and transmitter have been removed from the influent channel to the wet well, where a 12-inch parshall flume is used for influent flow measurement. Please explain when this equipment was removed and how influent flows have been and will continue to be taken. Also, please indicate when the devices are to be replaced.

Please submit the information requested above, as well as a Corrective Action Plan (CAP) and Connection Management Plan (CMP) within 90 days of the date of this letter.

If you should have any questions regarding this letter or the Chapter 94 program, please call Ms. Dana Walker of my staff at 484-250-5881.

Sincerely,

Jenifer Fields, P.E.
Regional Manager
Water Management

cc: Mr. Smith - EOM Consultants
Ms. McFadden - Environmental Protection Agency
Ms. Fields
Mr. O'Neil
Mr. Goldberg
Mr. Gelles - Office of Chief Counsel
Mr. Dudley
Mr. Cleaver
Planning Section
Re 30 (GJE08WQ)087-5

Appendix B

EVALUATION OF THE EXISTING BRISTOL TOWNSHIP SANITARY SEWER FACILITIES

BRISTOL TOWNSHIP

OCTOBER 2006

CONSULTANTS

a Bursich company

EVALUATION OF THE EXISTING BRISTOL TOWNSHIP SANITARY SEWER FACILITIES

TABLE OF CONTENTS

EVALUATION OF THE EXISTING
BRISTOL TOWNSIP SANITARY SEWER FACILITIES

1.0 Background

The purpose of this report is to evaluate the existing sanitary sewer facilities that are owned by the Bristol Township Authority and operated and maintained by Bristol Township and make recommendations for a five (5) year Capital Improvement Plan.

Figure No. 1 shows the sanitary sewer facilities owned by the Authority, which includes approximately 65 miles of sewer main and interceptor sewers ranging in size from 8" to 36", eighteen (18) pumping stations and a two (2) stage trickling filter treatment plant that currently has a maximum monthly flow rated capacity of 3.0 MGD. The effluent is discharged to the Delaware River via a 36" outfall sewer with a submerged orifice discharge manifold. The discharge to the Delaware River is permitted under NPDES Permit No. PA0026450.

The current influent limitations contained in the discharge permit are shown in Appendix A. The permit expires January 7, 2007 and the Township has submitted an application to the Department of Environmental Resources for the renewal of the NPDES permit.

The majority of the wastewater produced in the collection system is transported to and treated at the Authority's treatment plant. However, some of the wastewater is conveyed to the Authority's Palmer Avenue Pump Station which discharges the flow directly to the Lower Bucks Joint Municipal Authority's treatment plant for treatment and disposal. Another portion of the wastewater is conveyed to the Authority's Silver Lake Pump Station and a portion of the flow from the station is diverted to the Bristol Borough's collection system for treatment and disposal at the Borough's plant. Lastly, a portion of the wastewater is discharged either to the Falls Township's interceptor for conveyance to the Bucks County Water and Sewer Authority's (BCWSA) interceptor or discharged directly to the BCWSA interceptor for conveyance and treatment at the City of Philadelphia's Northeast Sewage Treatment Plant.

2.0 Description Of Existing Treatment Plant

The original treatment plant was constructed in 1963 and had a rated capacity of 2.25 MGD. The facilities provided were as follows:

- Influent pump station
- Two (2) Primary Clarifiers
- One (1) Distribution Chamber
- Two (2) Trickling Filters with rock media operating in a semi-series mode
- Two (2) Final Clarifiers
- Two (2) Chlorine Contact Tanks
- Recirculation Pump Station
- 1100 Feet of 36" RCP outfall sewer with a submerged discharge to the Delaware River
- Two (2) Anaerobic Digesters with floating covers and Operations Building

- Control Building housing the following items:

    - Influent Pumps and Controls
    - Influent Wet Well with Comminutor
    - Two (2) Vacuum Filters
    - Chlorine Room
    - Chemical Storage Room
    - Primary Sludge Pumps
    - Two (2) Vacuum Filter and Associated Pumps and Conveyors
    - Chemical Makeup Equipment for Sludge Conditioning
    - Office
    - Small Laboratory Toilet and Locker Room
    - Water Pit
    - Sludge Well
    - Boiler Room
    - Standby Generator

From 1983 to 1989, the following additions or modifications were made to the treatment plant:

- Replacement of rock media in the Trickling Filters with synthetic plastic media
- Replacement of existing Rotary Distributors and change in operation of trickling filters from semi-series to parallel
- Installation of automatic filter screen and Grit Chamber upstream of the Primary Clarifiers
- Installation of Effluent Meter Chamber with Doppler type meter upstream of the Chlorine Contact Tanks
- Installation of two (2) trickling filter towers with associated lift pumps
- Replacement of Digester covers, piping, valves, boiler control panel and gas handling equipment. The Primary Digester floating cover was provided with a gas recirculation system for mixing the tank contents. The Secondary Digester was provided with a gas holder type floating cover.
- The existing two (2) 18" Primary Clarifier gate valves were replaced with 18" ball valves. At the same time, the 18" bypass line downstream of these valves was cut and capped. <u>As a result, the bypassing of raw sewage directly to the Chlorine Contact Tanks is no longer possible</u>.
- Installation of Stormwater collection system to solve ponding problems at the site. Stormwater is discharged to the 36" outfall sewer.
- Telescopic valve pits with mixers were added to each Primary Clarifier to allow for control of the concentration of sludge that is pumped to the digesters

In 1994, the two (2) existing Vacuum Filters and associated equipment were removed and replaced with one (1) centrifuge. The existing conveyor that transports the sludge to the receptacle located outside the Control Building was not replaced. Appendix B provides detailed information about the equipment at the treatment plant.

3.0 Evaluation of and Recommendations for the Treatment Plant Facilities

3.1 General

Several visits were recently made to the treatment plant to observe the condition and operation of the existing treatment facilities. The purpose of this evaluation is to identify significant or potentially significant problems that either exist or might develop in the near future. An in depth discussion of maintenance and preventative maintenance practices at the treatment plant will not be discussed in this report. However, a brief discussion of this item will be addressed. Figure No. 2 shows the treatment units and yard piping at the Authority's treatment plant.

3.2 Maintenance

A significant number of the equipment manufacturers' operation and maintenance manuals are not present at the plant site. In addition, no formal operation and maintenance manual for the overall treatment plant has been prepared.

Most of the employees at the treatment plant have been recently hired and, as a result, they could not describe the past preventive maintenance or maintenance practices. It appears the Policy in place was that if something broke and it was considered important, it would be fixed. If the item was not considered important, it was not fixed or replaced. Lastly, there is no plan in place and the associated budgeting to replace equipment that is approaching the end of its useful life.

3.3 Influent Sampler

Located near the Control Building and adjacent to the first manhole upstream from the wet well for the three influent pumps is a small masonry building that houses the influent sampler. The sampler has been repaired several times and continues to produce samples that do not appear to be representative of the characteristics of the influent wastewater. Samples that are not representative can result in NPDES Permit violations for percent removal of BOD and suspended solids, make it difficult to evaluate plant performance, distort the actual loadings to the plant and do not produce reliable results for use in the Pretreatment Program or the establishment of local discharge limits.

It is noted that in addition to the raw wastewater, the digester supernatant and overflow pipe is also tributary to the sampling manhole. A piped digester overflow rarely occurs because of a high level alarm and the operator does not withdraw supernatant on the days that the wastewater is being sampled. As a result, the sample obtained from this location is representative of the raw influent wastewater.

It is recommended that the influent sampler be replaced with the same type as was recently purchased for the effluent sampler.

3.4 Influent Wet Well

A. The influent channel to the wet well has a 12" parshall flume for flow measurement. However, the head measuring device and transmitter have been removed. It is recommended that a new level indicator/transmitter be installed.

B. The wet well has been provided with two (2) compartments with an interconnecting 20" square sluice gate. The influent channel has been provided with two (2) stop plates that allow for the flow to be directed to one or both wet well compartments. If the flow is directed to only one compartment, the level in the two compartments will be equalized if the interconnecting 20" sluice gate is open.

Directing the flow to one compartment and closing the 20" sluice gate would allow the plant personnel to clean the other compartment, replace or repair the level sensing element that controls the pump operation or repair or replace the suction valve or piping to the associated influent pump without the need for bypass piping.

There is no indication that the 20" sluice gate has ever been operated. It is recommended that the plant personnel attempt to close the gate and prove that each compartment can be isolated. If the gate is inoperable, then it is recommended to be replaced. Unfortunately, bypass pumping of the entire influent flow will be required to accomplish the replacement. As a result, this work should be scheduled concurrently when the 12" discharge valves for the three (3) raw sewage pumps are replaced. The replacement of the 12" valves is discussed in the next section.

C. The treatment plant personnel have indicated that periodically during manned and non-manned hours that slugs of waste with a low pH are discharged to the treatment plant. Since the influent pH is only sampled twice per day by means of grab samples, it is impossible to determine when and if a wastewater with a low pH is entering the treatment plant. It is recommended that a system to continuously measure and record the influent pH be installed.

3.5 Influent Pumps

A. The three (3) influent pumps are in reasonably good condition and can pump the maximum influent flow with one (1) pump in standby. A spare rotating assembly is available for immediate installation if a problem occurs with one of the pumps. Unfortunately, it is reported that both the suction and discharge OS & Y gate valve are difficult to operate and do not provide tight shutoff. It is recommended that all six (6) valves be replaced. In order to replace the discharge valves, bypass pumping of the influent flow to the Automatic Filter Screen located upstream of the Grit Chamber will be required.

B. Two (2) of the pumps have magnetic clutches coupled to the drive motor that permit the speed of the pump to be varied so that the discharge rate closely matches the influent rate. These drives are part of the original equipment installed in 1963 and have been very reliable. There is no record whether any service has ever been performed on the drives or speed controls. It is recommended at this time that a field service technician familiar with the equipment inspect the drives and controls, determine their condition, verify that replacement parts are available and make all necessary repairs.

3.6 Influent Pump Controller

The influent pump controller controls the starting, stopping and speed of the two (2) variable speed pumps and the one (1) constant speed pump. The manufacturer of the control panel is no longer in business and almost all of the parts are no longer manufactured. It is recommended that the control panel be completely replace.

3.7 Automatic Filter Screen

The screen has been in continuous use for approximately eighteen (18) years and has performed well. The plant personnel indicate that some of the screenings that would be captured by the screen are found being lodged in some of the downstream equipment. It is felt, as a minimum, that the brushes that clean the screen need to be replaced. However, considering the running time accumulated over the years and that there is no record that any significant maintenance has been performed, it is recommended that a factory authorized technician with the assistance of the plant personnel inspect the screen and replace parts as needed.

3.8 Grit Chamber

The inclined grit screw is the only moving part in the Grit Chamber. The screw operates at a low speed for a short time period each day. There is no apparent significant wear, noise or vibration from the drive system or the exposed portion of the screw.

It is recommended that the tank be drained and the lower and intermediate bearings and the submerged portion of the screw be inspected for wear.

3.9 Primary Clarifiers

A. The two (2) clarifiers are of the center feed, column supported type. The clarifier mechanisms are the original equipment and have been in continuous operation since being placed in service. There is no unusual noise, vibration or jerking motion in the drive system. It is understood that the torque sensing equipment for alarming and shutdown are not operable. Considering that the drive systems are approaching the end of their useful life and that the equipment manufacturer is no longer in business, it is recommended that the drives be replaced using a different drive manufacturer.

B. In order to replace the drives, the bridge from the outer wall to the center of the tank must be removed, an adapter plate installed to adapt to the new drive and then the bridge reinstalled. The bridge assembly consists of I beams with cross members, steel checkered plate walkway and iron handrail. From a visual inspection of that portion of the bridge that can be inspected with the tanks in service, the material appears to be in reasonable condition. However, since there is a substantial amount of cost to remove, adapt and reinstall the bridge assembly, it is felt that it would be prudent to budget for its replacement.

C. The weirs and baffles are in good condition.

D. Each clarifier has a scum collector arm at the liquid surface that is attached to and rotates with the collector mechanism. The scum arm directs the floating material to a scum box for removal from the tank. Unfortunately, there seems always to be a significant amount of floatables that have accumulated on the surface of both tanks. This accumulation is aesthetically unpleasant and can cause odors in warm weather.

It is felt that the scum removal system is not as effective as it could be because the crest of the scum troughs are too high. It is recommended that the crest be ¾" to 1" above the maximum water level. The crests for both scum trough appear to be approximately 2 to 2 ½" above the water level. It is recommended that the troughs be lowered. In the event the raising of the scum box does not completely resolve the problem, it is suggested that a baffle approximately 24 feet in length be installed from the center feed well to the scum box to guide the floatables to the scum box.

E. The submerged portion of the clarifier mechanism is usually fabricated from steel angles. At the bottom of the mechanism is a series of adjustable metal squeegees that are angled to direct the sludge on the bottom to the center sludge hopper as the mechanism turns. It is recommended that each tank be drained, the mechanism cleaned and any corroded structural member or defective squeegee replaced.

3.10 Trickling Filter Distribution Box

A. The effluent of both Primary Clarifiers is discharged to a distribution box. The distribution box serves the following functions:

- Receives the Primary Clarifier effluent and distributes the flow to the two Primary Trickling Filters that operate in parallel.
- Receive recirculated flow from the effluent of the Secondary Clarifiers and combines it with the Primary Clarifier effluent.
- Provides sluice gates for the isolation of each trickling filter.

B. The two (2) sluice gates for the trickling filters are provided with electric actuators. The actuators are original equipment and are no longer operable. It is recommended that as a minimum, both electric actuators be replaced. It is not known what type of shutoff will be provided when the gates are closed.

C. A third sluice gate is located in the distribution box. The electric actuator for this gate is also inoperable. This gate is always closed. However, if the gate were to be opened, the effluent from the Primary Clarifiers would be directed to the influent of the Chlorine Contact Tanks. No action is recommended for this actuator and the gate will remain closed.

3.11 Primary Trickling Filters

A. The synthetic media and rotary distributors are both in good condition and are operating well. It appears, however, that the orifices for the rotary distributors are not adjusted properly. It is recommended that the orifices be adjusted in accordance with the manufacturer's specifications to ensure that the distributors continue to rotate at low flows.

B. Sluice gates with inoperable electric actuators are located in the effluent box for each trickling filter. In the past, the sluice gates would be used TO periodically flood the rock media. However, since the rock media has been replaced with synthetic media with a high void ratio, periodic flooding is no longer required. As a result, no action on these gates is recommended.

3.12 Secondary Trickling Filter Pumps

A. The effluent of the Primary Trickling Filters flows by gravity to the wet well of the Secondary Trickling Filter pumps. The original screw pumps installed in 1988 to lift the sewage to the influent channel of the Secondary Trickling Filters have recently been replaced with self-priming type centrifugal pumps with variable speed drives. The pumps and controls are operating well.

B. A submerged transducer is used to measure the liquid depth in the wet well and send the speed signal to the pump controller. The type of transducer used is intended to be used for clean water. It is recommended that the transducer be replaced with one that is intended to be used in dirty water applications. In addition, it is recommended that a high level alarm be installed to indicate either a pump failure or pumping problem.

3.13 Secondary Trickling Filters

All items or equipment associated with the Secondary Trickling Filters appear to be in good condition and are operating well.

3.14 Secondary Clarifier Isolation Valves

Both clarifiers have a buried 24" gate valve on their influent pipes to allow for isolation of the clarifiers in order to perform the required maintenance. Each valve is difficult to operate and does not provide tight shutoff. As a result, each clarifier has not been drained for more than twenty (20) years. It is recommended that each 24" valve be replaced.

3.15 Secondary Clarifiers

A. The Secondary Clarifiers are of the same manufacturer as the Primary Clarifiers and are also original equipment. The same comments presented about the Primary Clarifiers also apply to the Secondary Clarifiers with the exception of the scum collector. No scum collection equipment has been provided. It is recommended that each clarifier drive be replaced after the influent isolation valves have been replaced. Also, it is recommended that the submerged portion of each clarifier mechanism be inspected and repaired as required.

B. Apparently several years after startup, a scum collection manhole was installed on the 24" influent line to each clarifier upstream of each shutoff valve. Scum is 'trapped' in each manhole and floatables are not usually present on the Clarifier water surface. However, no means of removing the accumulated scum from each manhole was provided and a thick scum mat is usually located in the manhole that is difficult for the operators to remove. Prior to replacing the 24" influent valves, it is recommended that a method for removing the scum be determined.

3.16 Chlorine Contact Tanks

A. The effluent from each Secondary Clarifier flows by gravity through the wet well of the Recirculation pump Station and then to the influent box of the Chlorine Contact Tanks via a submerged 24" pipe. Located in a Meter Pit between the wet well and the influent box is the effluent Doppler type flow meter. A 1 ½" PVC pipe chlorine solution diffuser with ten (10) 3/8" diameter holes has recently been installed and is located at the exit of the 24" pipe in the influent box to add and mix chlorine solution with the wastewater.

B. A chronic problem at the treatment plant has been non-compliance with either or both fecal coliform and chlorine residual limits. Better results have been obtained with the installation of the new diffuser, but non-compliance still exists. In order to obtain a fecal coliform count of less than 200/100 ml, a chlorine residual at the effluent of the Chlorine Contact Tanks of approximately 0.6 mg/l is required.

C. It has been observed that significantly different chlorine residuals are obtained when effluent samples are tested from each of the contact tanks. As a result, it is recommended that a mixer be installed in the influent box to obtain a better mix of the chlorine solution with the wastewater. Hopefully, the better mix will also result in a better coliform reduction.

D. The walls and floors of the Contact Tanks are black and some of the aggregate is exposed resulting in rough surfaces in portions of the tanks. It is recommended that the tanks be cleaned, patched where required and a protective coating be applied that will produce smooth and slippery surface that will be conducive to cleaning and not to bacterial growth or solids accumulation.

3.17 Recirculation Pump Station

A. A portion of the Final Clarifier effluent is pumped to the Primary Trickling Filter Distribution Box to ensure that there is sufficient forward flow to turn the rotary distributors and to dilute the Primary Clarifier effluent with oxygenated water. Two (2) vertical, pedestal-mounted, constant speed pumps each rated at 2.25 MGD are located in the pump station. With the exception of during high wet weather flows, one (1) pump runs continuously.

B. The pumps and valves are original equipment and are in reasonably good condition considering their age and use.

C. Since the equipment is approximately forty (40) years old, it is recommended that its replacement be planned for in the next few years. Either before or during the replacement of the pumps, it is suggested that the installation of Variable Frequency Drives with a controller be considered to allow for an automatic varying rate of recirculation and a relatively constant hydraulic loading to the Trickling Filters.