THOMAS, NIESEN & THOMAS, LLC
Attorneys and Counsellors at Law

THOMAS T. NIESEN
Direct Dial: 717.255.7641
tniesen@tntlawfirm.com

May 6, 2020

Via Electronic Filing

Rosemary Chiavetta, Secretary
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
Harrisburg, PA 17105-3265

In re: Docket No. A-2019-3015173
Application of Aqua Pennsylvania Wastewater, Inc. pursuant to Sections 1102, 1329 and 507 of the Public Utility Code for Approval of its Acquisition of the Wastewater System Assets of the Delaware County Regional Water Quality Control Authority

Dear Secretary Chiavetta:

We are counsel to Aqua Pennsylvania Wastewater, Inc. ("Aqua" or "Company") in connection with its above referenced Application, filed with the Public Utility Commission on March 3, 2020, pursuant to Sections 1102, 1329 and 507 of the Public Utility Code, for approval of the acquisition of the wastewater system assets of the Delaware County Regional Water Quality Control Authority. The Bureau of Technical Utility Services is reviewing the Application and has asked that we address certain requests for additional information. Several of the requests are addressed hereinafter. Requests not addressed in this letter will be addressed in a later submission.

INFORMATION REQUEST 1:
Checklist Item No. 7 – The Application's Exhibit S1 – GF Service Agreement and Invoices contains only a copy of a service agreement and does not include copies of any invoices quantifying the total fees paid to Gannet Fleming Valuation and Rate Consultants, LLC (GF) for services rendered. Please quantify the total amount paid to GF.

RESPONSE:
Please see Application Exhibit U3, p. 8, and Application Exhibit X, p. 7.

INFORMATION REQUEST 2:
Checklist Item No. 7 - The Application's Exhibit S1 – GF Service Agreement and Invoices contains only a copy of the service agreement and does not provide invoices supporting the total amount paid to GF. Please provide a copy of all invoices supporting the total amount paid to GF.

RESPONSE:
A copy of the Gannett Fleming invoices supporting the amount paid to Gannett Fleming are included with this letter.

INFORMATION REQUEST 6:
Checklist Item No. 17.a. – The Application's Exhibit U2, Appendix A, Page 2 of 11 does not state the number of Minimum Account customers under the Western Retail Class. Please state the number of Minimum Account customers under the Western Retail Class.

RESPONSE:
The number of minimum accounts included within the Western Retail Class are 3,869.

INFORMATION REQUEST 7:
Checklist Item No. 17.a – The Application does not quantify the future number of connections anticipated for the Springhill Farms wastewater system in the next five years. Please identify the number of connections anticipated within the next 5 years for the Springhill Farms wastewater system.

RESPONSE:
DELCORA does not have the number of customers connections anticipated for Springhill Farms for the next five years as Springhill Farms was not previously required to file Chapter 94 reports with the Pennsylvania Department of Environmental Protection ("DEP"). However, DELCORA has provided a best estimate of five additional customer connections in the next five years. More information will become available when DELCORA files the first Chapter 94 Report for the Springhill Farms system in 2021.

INFORMATION REQUEST 16:
Checklist Item No. 18.d. – The Application's Exhibit H indicates that the DELCORA Western Wholesale customer class is billed $2.87 per thousand gallons and the DELCORA EDU Wholesale customer class is billed $2.89 per thousand gallons. The Application's Exhibit U2, Appendix A, Page 2 appears to indicate APW is proposing a new APW Western Wholesale customer class to include both the DELCORA Western Wholesale and DELCORA EDU Wholesale customer classes. Please provide an amended version of the Application's Exhibit I11 to include a copy of the notification sent, or which will be sent, to the APW Western Wholesale customer class to describe the filing and the anticipated effect on rates for both the DELCORA EDU Wholesale and DELCORA Western Wholesale subclasses.

RESPONSE:
Application Exhibit U2, Appendix A, Page 2 is not proposing a new combined customer class or rate zone. Resolution 2019-21 is for the Western Wholesale Users. This is the only Resolution that was broken out into 2 Rate Zones because of "customer type". Currently the

Resolution covers Boeing Corporation, Harrah's Racino, Eddystone Borough, Lower Chichester Township and Southern Delaware County Authority. Boeing Corporation & Harrah's are in Rate Zone 12-C since they are Commercial/Industrial businesses. Eddystone Borough, Lower Chichester Township and Southern Delaware County Authority are in Rate Zone 12-H, Group H-2 since they are larger townships/authorities. Resolution 2019-22 is for EDU Wholesale Users which includes portions of Brookhaven Borough and portions of Nether Providence. This Resolution is covered under Rate Zone 12-H, Group H-3.

INFORMATION REQUEST 17:
Checklist Item No. 20.b. – The Application's Exhibits M1 through M5 and Exhibits N1 through N3 do not contain a copy of all National Pollution Discharge Elimination System (NPDES), Water Quality Management (WQM), and Water Quality Management General (WQG) Permits listed in the Application's Exhibit B-1, Schedule 4.14. Please provide a copy of the following NPDES, WQM, and WQG permits listed in the Application's Exhibit B-1, Schedule 4.14:

a. WQM Permit #2316401
b. WQG-02 Permit #WQG02231419
c. WQG-02 Permit #WQG02231810 T-1
d. WQG-02 Permit #WQG02231310
e. WQM Permit #2312401
f. NPDES Permit #PA0020575
g. WQM Permit #2318401
h. WQM Permit #2374402
i. WQG-02 Permit #WQG0223[illegible]510
j. WQG-02 Permit #WQG02230908
k. WQM Permit #2309410
l. WQM Permit #2374403
m. WQM Permit #2372406
n. WQM Permit #2304406
o. WQM Permit #2303403
p. WQM Permit #2372408
q. WQM Permit #2390404
r. WQM Permit #2392403
s. WQM Permit #2393401
t. WQM Permit #2399040
u. WQM Permit #2305406
v. WQM Permit #2307402
w. WQM Permit #2307402-A1
x. WQM Permit #2308402
y. WQM Permit #2309406
z. WQM Permit #WQM1505419
aa. WQM Permit #WQM2316401

bb. WQM Permit #2316406

RESPONSE:
The requested permits are included with this letter. Please note the following clarifications: (1) Item d. was a typo on Application Exhibit B1, Schedule 4.14, which should have read "WQM Permit #WQG02231301" and was included in the Application as Exhibit M1; (2) Items e. and f. relate to the Rose Valley Treatment Plant that was decommissioned and replaced with a pump station in September 2018 and are therefore no longer necessary; (3) Item t. is misstated as "WQM Permit #2399040" in the data request and should be "WQM Permit #2399404"; and (4) Item aa. is a duplicate of item a., and, therefore, will be removed.

INFORMATION REQUEST 21:
Checklist Item No. 22.a – The Application's Exhibits A4 and A6 indicate DELCORA serves customers in Upper Providence Township, Woodlyn Township, Brookhaven Borough, and Upper Chichester Township. Please demonstrate compliance with the Act 537 Plans for these municipalities.

RESPONSE:
Upper Providence Township, Brookhaven Borough, and Upper Chichester Township all adopt the DELCORA Western 537 Plan. Please see Application Exhibit P2, DELCORA Western Service Area Act 537 Plan - Chester Ridley Creek Update Appendix D for resolutions adopting the DELCORA 537 Plan. Woodlyn is not a Township, but a census designated area. The area of Woodlyn is part of Ridley Township. Ridley Township adopts the DELCORA Eastern Service Area Act 537 Plan. Please see Application Exhibit P1, DELCORA 2002 Eastern Plan of Study.

INFORMATION REQUEST 22:
Checklist Item No. 22.b – The Application's Exhibits A4 and A6 indicate DELCORA serves customers in Upper Providence Township, Woodlyn Township, Brookhaven Borough, and Upper Chichester Township. Please provide copies of the DEP-approved Act 537 Plans that include these municipalities.

RESPONSE:
Please see the response to Information Request 21, above.

INFORMATION REQUEST 23:
Checklist Item No. 22.b – Please provide a copy of the report titled, Act 537: Sewage Facilities Plan, Municipal & Authority Inflow and Infiltration Study, Summary Report (March 2000, revised July 2000), incorporated in the 2002 "Delaware County Act 537 Plan Update – Eastern

Plan of Study" by reference on Page 3-19 of the Application's Exhibit P1 – Eastern Service Area Act 537 Plan.

RESPONSE:
A copy of the Act 537: Sewage Facilities Plan, Municipal & Authority Inflow and Infiltration Study, Summary Report (March 2000, revised July 2000) is included with this letter.

INFORMATION REQUEST 24:
Checklist Item No. 22.b – Please provide a copy of the DELCORA Long -Term CSO Control Plan, City of Chester Combined Sewer System, April 1999, incorporated in the 2002 "Delaware County Act 537 Plan Update – Eastern Plan of Study" by reference on Page 5-11 of the Application's Exhibit P1 – Eastern Service Area Act 537 Plan.

RESPONSE:
A copy of the DELCORA Long -Term CSO Control Plan, City of Chester Combined Sewer System, April 1999, is included with this letter.

INFORMATION REQUEST 25:
Checklist Item No. 22.e – The Application provides web links to the Chester and Delaware County Comprehensive Plans but does not indicate whether it complies with the comprehensive plans of all affected municipalities and counties. Please provide a statement verifying the Application complies with the comprehensive plans of all the affected municipalities and counties.

RESPONSE:
The Company is not requesting service territory beyond the existing plant footprint. Please see Application Paragraph 51.

INFORMATION REQUEST 26:
Checklist Item No. 24.b. – The Asset Purchase Agreement (APA), provided as the Application's Exhibit B1, does not include copies of Exhibits B, C, and D identified on page one of the APA. Please provide copies of these missing exhibits.

RESPONSE:
Please see Exhibits B, C, and D of Application Exhibit B1 included with this letter.

INFORMATION REQUEST 29:
Checklist Item No. 25 – The Application's Exhibit F22 does not include a copy of the agreement between the Borough of Rutledge, Central Delaware County Authority and DELCORA dated May 1, 1973. Instead, a copy of two Standard Right-to-Know Law Form

requests to the Central Delaware County Authority and Rutledge Borough, both dated February 27, 2020, were provided Please provide a copy of the subject agreement.

RESPONSE:
A copy of the agreement between the Borough of Rutledge, Central Delaware County Authority and DELCORA dated May 1, 1973, is included with this letter.

INFORMATION REQUEST 30:
Checklist Item No. 25 – The Application does not include a copy of an agreement between DELCORA and Tinicum Township in the Application's Exhibit F series as averred to in the Application's Exhibit W3, Page 6. Please provide copies of all agreements between DELCORA and Tinicum Township to be assumed by the buyer as part of the acquisition.

RESPONSE:
A copy the agreement between DELCORA and Tinicum Township dated September 18, 2017 is included with this letter.

Please contact me with any questions about the foregoing.

Very truly yours,

THOMAS, NIESEN & THOMAS, LLC

By 

Thomas T. Niesen

cc: Certificate of Service (w/encl.)
Alexander R. Stahl, Esquire (via email, w/encl.)
Thomas S. Wyatt, Esquire (via email, w/encl.)

GANNETT FLEMING INVOICES

Gannett Fleming

Excellence Delivered As Promised

INVOICE

Gannett Fleming Valuation and Rate Consultants, LLC

ACH/EFT Payment Information:
ABA: 031312738
Account No.: 5003165655
Account Name: Gannett Fleming

Aqua Pennsylvania Wastewater, Inc.
Attn: William C. Packer, Vice President - Controller
762 W. Lancaster Avenue
Bryn Mawr, PA 19010-3489

Check Payment Information:
Gannett Fleming Valuation and Rate Consultants, LLC
PO Box 829160
Philadelphia, PA 19182-9160

Project: 066640
Invoice No: 066640*4986
Invoice Date: January 17, 2020

Federal EIN: 46-4413705
Send Remit Info: AccountsReceivable@gfnet.com

Note: TO PREVENT IMPOSTER FRAUD. If you receive any notification of a change in payment instructions, you should call our Accounts Receivable department at 717-763-7211 to verify the authenticity of the change. We cannot be held responsible for a misdirected payment as a result of your not confirming authenticity of requested changes to payment instructions or "imposter hacks" to your system.

Invoice Period: November 23, 2019 through December 27, 2019

Project Manager : Harold Walker III hwalker@gfnet.com 610 650-8101

Fair Market Value Appraisal - DELCORA

Summary of Current Charges

Phase 000	- FAIR MRKT VAL APPR - DELCORA	$ 1,180.00
	Total Charges	$ 1,180.00
	Total Due This Invoice	**$1,180.00**

Gannett Fleming

Excellence Delivered As Promised

Project: 066640
Invoice No: 066640*4986
Invoice Date: January 17, 2020

Gannett Fleming Valuation and Rate Consultants, LLC

Phase 000 -- Fair Mrkt Val Appr - DELCORA

Labor Costs

Labor Classification	*Hours*	*Rate*	*Amount*	
Harold Walker	4.00	$ 250.00	$ 1,000.00	
Support Staff	1.50	120.00	180.00	
		Total Labor Costs		**$ 1,180.00**
		Total Phase -- 000		**$ 1,180.00**

Gannett Fleming

Excellence Delivered As Promised

INVOICE

Gannett Fleming Valuation and Rate Consultants, LLC

ACH/EFT Payment Information:
ABA: 031312738
Account No.: 5003165655
Account Name: Gannett Fleming

Aqua Pennsylvania Wastewater, Inc.
Attn: William C. Packer, Vice President - Controller
762 W. Lancaster Avenue
Bryn Mawr, PA 19010-3489

Check Payment Information:
Gannett Fleming Valuation and Rate Consultants, LLC
PO Box 829160
Philadelphia, PA 19182-9160

Project: 066640
Invoice No: 066640*5053
Invoice Date: February 25, 2020

Federal EIN: 46-4413705
Send Remit Info: AccountsReceivable@gfnet.com

Note: TO PREVENT IMPOSTER FRAUD. If you receive any notification of a change in payment instructions, you should call our Accounts Receivable department at 717-763-7211 to verify the authenticity of the change. We cannot be held responsible for a misdirected payment as a result of your not confirming authenticity of requested changes to payment instructions or "imposter hacks" to your system.

Invoice Period: December 28, 2019 through February 14, 2020

Project Manager : Harold Walker III hwalker@gfnet.com 610 650-8101

Fair Market Value Appraisal - DELCORA

Summary of Current Charges

Phase 000	- FAIR MRKT VAL APPR - DELCORA	$ 30,070.00
	Total Charges	$ 30,070.00
	Total Due This Invoice	**$30,070.00**

Gannett Fleming Valuation and Rate Consultants, LLC

Phase 000 -- Fair Mrkt Val Appr - DELCORA

Labor Costs

Labor Classification	*Hours*	*Rate*	*Amount*
Analyst	1.00	$ 180.00	$ 180.00
Associate Analyst	9.00	170.00	1,530.00
Harold Walker	102.00	250.00	25,500.00
John J. Spanos	1.00	280.00	280.00
Support Staff	21.50	120.00	2,580.00

Total Labor Costs **$ 30,070.00**

Total Phase -- 000 **$ 30,070.00**

PERMITS

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

orig: EB FWP; BAB
DEC
JUL 22 2016
BY: 2016-0845

June 30, 2016

CERTIFIED MAIL NO. 7015 0640 0002 3147 7698

Mr. Edwin Bothwell
Director of Engineering
DELCORA
100 East Fifth Street
P.O. Box 999
Chester, PA 19013-4508

Re: WQM Permit - Sewage
DELCORA Sewer System & STP
Permit No. 2316401
Authorization ID No. 1140117
Chester City
Delaware County

Dear Mr. Bothwell:

Your Water Quality Management (WQM) permit is enclosed. You must comply with all Standard and Special Conditions attached to this Permit. Construction must be done in accordance with the permit application and all supporting documentation. Please review the permit conditions and the supporting documentation submitted with your application before starting construction.

Please note that you are responsible for securing all other required permits, approvals and/or registrations associated with the project, if applicable, under Chapters 102 (erosion and sedimentation control), 105 (stream obstructions and encroachments) and 106 (floodplains) of DEP's regulations. Construction may not proceed until all other required permits have been obtained.

Enclosed is the "Water Quality Management Post Construction Certification" form. A Pennsylvania-registered Professional Engineer must sign and complete this form prior to startup of the facilities. You or your authorized representative must also sign the form. This certification and other post-construction documentation must be submitted to DEP within 30 days of completion of the project and must be received by DEP prior to commencing operation of the facilities.

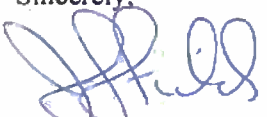
Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa.C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717.787.3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800.654.5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at 717.787.3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST REACH THE BOARD WITHIN 30 DAYS. YOU DO NOT NEED A LAWYER TO FILE AN APPEAL WITH THE BOARD.

IMPORTANT LEGAL RIGHTS ARE AT STAKE, HOWEVER, SO YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT AFFORD A LAWYER, YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY TO THE BOARD (717.787.3483) FOR MORE INFORMATION.

During construction or upon completing construction, please contact Mr. Keith Dudley at 484.250.5190 or kdudley@pa.gov so that an inspection of the facilities may be conducted, at DEP's discretion.

Sincerely,



Jenifer Fields, P.E.
Regional Manager
Clean Water

Enclosures

cc: Operations Section
Central Office, Operations Section (Pump Stations Only)
Mr. Charles Catania – Catania Engineering Association
Re 30 (GJE16CLW)182-9

3800-PM-WSFR0015 1/2011
Permit

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

PERMIT NO. 2316401

AMENDMENT NO. _____

APS ID. 916724

AUTH. ID. 1140117

WATER QUALITY MANAGEMENT PERMIT

A. PERMITTEE (Name and Address): CLIENT ID#: **42332** **DELCORA** **100 East Fifth Street P O Box 999** **Chester, PA 19016-0999**	B. PROJECT/FACILITY (Name): **DELCORA Sewer System & STP**
C. LOCATION (Municipality, County): **Chester City, Delaware County**	SITE ID#: **454804**

D. This permit approves the construction of sewage facilities consisting of:

A temporary pump station bypass to deal with combined sewer overflows during wet weather events.

Pump Stations: 1	Manure Storage:	Sewage Treatment Facility:
Design Capacity: 650 GPM	Volume: _____ MG	Annual Average Flow: _____ MGD
	Freeboard: _____ inches	Design Hydraulic Capacity: _____ MGD
		Design Organic Capacity: _____ lb/day

E. APPROVAL GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING:

1. **New Permits:** All construction, operations and procedures shall be in accordance with the Water Quality Management Permit application dated **05/10/2016**, its supporting documentation and addendums dated _____, which are hereby made a part of this permit.

   Amendments: All construction, operations and procedures shall be in accordance with the Water Quality Management Permit Amendment application dated _____ and its supporting documentation and addendums dated _____, which are hereby made a part of this amendment.

   Except for any herein approved modifications, all terms, conditions, supporting documentation and addendums approved under Water Quality Management Permit No. _____ dated _____ shall remain in effect.

   Transfers: Water Quality Management Permit No. _____ dated _____ and conditions, supporting documentation and addendums are also made part of this transfer.

2. Permit Conditions Relating to Sewerage are attached and made part of this permit.
3. Special Conditions _____ are attached and made part of this permit.

F. THE AUTHORITY GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING FURTHER QUALIFICATIONS:

1. If there is a conflict between the application or its supporting documents and amendments and the attached conditions, the attached conditions shall apply.
2. Failure to comply with the rules and regulations of DEP or with the terms or conditions of this permit shall void the authority given to the permittee by the issuance of this permit.
3. This permit is issued pursuant to the Clean Streams Law Act of June 22, 1937, P.L. 1987, as amended 35 P.S. §691.1 *et seq.* Issuance of this permit shall not relieve the permittee of any responsibility under any other law.
4. This permit shall expire on _____. The permittee shall submit an application to renew the permit no later than 180 days prior to the permit expiration date.

PERMIT ISSUED:

June 30, 2016

BY: _____

TITLE: Jenifer L. Fields, P.E.
Clean Water Program Manager
South East Regional Office

Permit No. 2316401

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

PERMIT CONDITIONS RELATING TO SEWERAGE

For use in Water Quality Management Permits

(Check boxes that apply)

General

☒ 1. The Department of Environmental Protection (DEP) considers the licensed Professional Engineer whose seal is affixed to the design documents to be fully responsible for the adequacy of all aspects of the facility design.

☒ 2. The permittee shall adopt and enforce an ordinance requiring the abandonment of privies, cesspools or similar receptacles for human waste and onlot sewage disposal systems on the premises of occupied structures accessible to public sewers. All such structures must be connected to the public sewers.

☐ 3. The outfall sewer or drain shall be extended to the low water mark of the receiving body of water. Where necessary to ensure proper mixing and waste assimilation, an outfall sewer or drain may be extended with appurtenances below the low water mark and into the bed of a navigable stream provided that the permittee has secured an easement, right-of-way, license or lease from DEP in accordance with Section 15 of the Dam Safety and Encroachments Act, the Act of November 26, 1978, P.L. 1375, as amended.

☒ 4. The approval is specifically made contingent on the permittee acquiring all necessary property rights, by easement or otherwise, providing for the satisfactory construction, operation, maintenance and replacement of all sewers or sewerage structures in, along or across private property with full rights of ingress, egress and regress.

☒ 5. When construction of the approved sewerage facilities is completed and before they are placed in operation, the permittee shall notify DEP in writing so that a DEP representative may inspect the facilities.

☒ 6. The approval of the plans, and the authority granted in this permit, if not specifically extended, shall cease and be null and void 2 years from the issuance date of this permit unless construction or modification of the facilities covered by this permit has begun on or before the second anniversary of the permit date.

☒ 7. If, at any time, the sewerage facilities covered by this permit create a public nuisance, including but not limited to, causing malodors or causing environmental harm to waters of the Commonwealth, DEP may require the permittee to adopt appropriate remedial measures to abate the nuisance or harm.

☒ 8. If, after the issuance of this permit, DEP approves a municipal sewage facilities official plan or an amendment to an official plan under Act 537 (Pennsylvania Sewage Facilities Act, the Act of January 24, 1966, P.L. 1535 as amended) in which sewage from the herein approved facilities will be treated and disposed of at other planned facilities, the permittee shall, upon notification from the municipality or DEP, provide for the conveyance of its sewage to the planned facilities, abandon use and decommission the herein approved facilities including the proper disposal of solids, and notify DEP accordingly. The permittee shall adhere to schedules in the approved official plan, amendments to the plan, or other agreements between the permittee and municipality. This permit shall then, upon notice from DEP, terminate and become null and void and shall be relinquished to DEP.

☒ 9. This permit does not relieve the permittee of its obligations to comply with all federal, interstate, state or local laws, ordinances and regulations applicable to the sewerage facilities.

☒ 10. This permit does not give any real or personal property rights or grant any exclusive privileges, nor shall it be construed to grant or confirm any right, easement or interest in, on, to or over any lands which belong to the Commonwealth.

☐ 11. The authority granted by this permit is subject to all effluent requirements, monitoring requirements and other conditions as set forth in NPDES Permit No. and all subsequent amendments and renewals. No discharge is authorized from these facilities unless approved by an NPDES Permit.

Construction

☒ 12. This permit is issued under the authorization of The Clean Streams Law and 25 Pa. Code Chapter 91. The permittee shall obtain all necessary permits, approvals and/or registrations under 25 Pa. Code Chapters 102, 105 and 106 prior to commencing construction of the facilities authorized by this permit, as applicable. The permittee should contact the DEP office that issued this permit if there are any questions concerning the applicability of additional permits.

☒ 13. The facilities shall be constructed under the supervision of a Pennsylvania licensed Professional Engineer in accordance with the approved reports, plans and specifications.

☒ 14. A Pennsylvania licensed Professional Engineer shall certify that construction of the permitted facilities was completed in accordance with the application and design plans submitted to DEP, using "Post Construction Certification" form (3800-PM-WSFR0179a). It is the permittee's responsibility to ensure that a Professional Engineer is on-site to provide the necessary oversight and/or inspections to certify the facilities. The certification must be submitted to DEP before the facility is placed in operation. As-built drawings, photographs (if available) and a description of all deviations from the application and design plans must be submitted to DEP within 30 days of certification.

☒ 15. Manhole inverts shall be formed to facilitate the flow of the sewage and to prevent the stranding of sewage solids. The manhole structure shall be built to prevent undue infiltration, entrance of street wash or grit and provide safe access to facilitate manhole maintenance activities.

☒ 16. The local Waterways Conservation Officer of the Pennsylvania Fish and Boat Commission (PFBC) shall be notified when the construction of any stream crossing and/or outfall is started and completed. A written permit must be secured from the PFBC if the use of explosives in any waterways is required and the permittee shall notify the local Waterways Conservation Officer when explosives are to be used.

Operation and Maintenance

☒ 17. The permittee shall maintain records of "as-built" plans showing all the treatment facilities as actually constructed together with facility operation and maintenance (O&M) manuals and any other relevant information that may be required. Upon request, the "as-built" plans and O&M manuals shall be filed with DEP.

☒ 18. The sewers shall have adequate foundation support as soil conditions require. Trenches shall be back-filled to ensure that sewers will have proper structural stability, with minimum settling and adequate protection against breakage. Concrete used in connection with these sewers shall be protected from damage by water, freezing, drying or other harmful conditions until cured.

☒ 19. Stormwater from roofs, foundation drains, basement drains or other sources shall not be admitted directly to the sanitary sewers.

☒ 20. The approved sewers shall be maintained in good condition, kept free of deposits by flushing or other cleaning methods and repaired when necessary.

☒ 21. The sewerage facilities shall be properly operated and maintained to perform as designed.

☒ 22. The attention of the permittee is called to the highly explosive nature of certain gases generated by the digestion of sewage solids when these gases are mixed in proper proportions with air and to the highly toxic character of certain gases arising from such digestion or from sewage in poorly ventilated compartments or sewers. Therefore, at all places throughout the sewerage facilities where hazard of fire, explosion or danger from toxic gases may occur, the permittee shall post conspicuous permanent and legible warnings. The permittee shall instruct all employees concerning the aforesaid hazards, first aid and emergency methods of meeting such hazards and shall make all necessary equipment and material accessible.

☐ 23. An operator certified in accordance with the Water and Wastewater Systems Operator Certification Act of February 21, 2002, 63 P.S. §§1001, *et seq.* shall operate the sewage treatment plant.

☒ 24. The permittee shall properly control any industrial waste discharged into its sewerage system by regulating the rate and quality of such discharge, requiring necessary pretreatment and excluding industrial waste, if necessary, to protect the integrity or operation of the permittee's sewerage system.

☒ 25. There shall be no physical connection between a public water supply system and a sewer or appurtenance to it which would permit the passage of any sewage or polluted water into the potable water supply. No water pipe shall pass through or come in contact with any part of a sewer manhole.

☒ 26. All connections to the approved sanitary sewers must be in accordance with the official Act 537 Plan and, if applicable, a corrective action plan as contained in the approved Title 25 Pa. Code Chapter 94 Municipal Wasteload Management Annual Report.

☒ 27. Collected screenings, slurries, sludge and other solids shall be handled and disposed of in compliance with Title 25 Pa. Code Chapters 271, 273, 275, 283 and 285 (related to permits and requirements for land filling, land application, incineration and storage of sewage sludge), Federal Regulations 40 CFR 257 and the Federal Clean Water Act and its amendments.

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

WATER QUALITY MANAGEMENT

POST CONSTRUCTION CERTIFICATION

PERMITTEE IDENTIFIER	
Permittee	DELCORA
Municipality	Chester City
County	Delaware
WQM Permit No.	2316401
Facility Type	Sewage

All of the above information should be taken directly from the Water Quality Management Permit.

CERTIFICATION

This certification must be completed and returned to the permits section of the DEP's regional office issuing the WQM permit within 30 days of completion of the project and received by DEP prior to operation, and if requested, as-built drawings, photographs (if available) and a discussion of any DEP-approved deviations from the design plans during construction.

I, being a Registered Professional Engineer in Pennsylvania, do hereby certify to the best of my knowledge and belief, based upon personal observation and interviews, that the above facility approved under the Water Quality Management Permit has been constructed in accordance with the plans, specifications and modifications approved by DEP.

Construction Completion Date (MM/DD/YYYY): _____

	Professional Engineer
	Name _____ (Please Print or Type)
	Signature
	Date
	License Expiration Date
	Firm or Agency
	Telephone
	Permittee or Authorized Representative
	Name _____ (Please Print or Type)
	Signature
Engineer's Seal	Title
	Telephone

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

#SW-1318-C

RECEIVED
JAN - 9 2015
BY: 2015-0025

cc: File Copy

January 6, 2015

CERTIFIED MAIL NO. 7007 3020 0002 8264 7136

Joseph Salvucci
DELCORA
100 East Fifth Street P O Box 999
Chester, PA 19016-0999

#SW-1318-C

Re: WQM Permit - Sewage
DELCORA Sewer System & STP
Permit No. WQG02231419
Authorization ID No. 1048354
Edgemont Township, Delaware County

Dear Mr. Salvucci:

Your Water Quality Management (WQM) permit is enclosed. You must comply with all Standard and Special Conditions attached to this Permit. Construction must be done in accordance with the permit application and all supporting documentation. Please review the permit conditions and the supporting documentation submitted with your application before starting construction.

Please note that you are responsible for securing all other required permits, approvals and/or registrations associated with the project, if applicable, under Chapters 102 (erosion and sedimentation control), 105 (stream obstructions and encroachments) and 106 (floodplains) of DEP's regulations. Construction may not proceed until all other required permits have been obtained.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa.C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717.787.3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800.654.5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at 717.787.3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST REACH THE BOARD WITHIN 30 DAYS. YOU DO NOT NEED A LAWYER TO FILE AN APPEAL WITH THE BOARD.

IMPORTANT LEGAL RIGHTS ARE AT STAKE, HOWEVER, SO YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT AFFORD A LAWYER, YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY TO THE BOARD (717.787.3483) FOR MORE INFORMATION.

During construction or upon completing construction, please contact Mr. Andrew Haneiko by e-mail at ahaneiko@pa.gov or by telephone at 484.250.5183 so that an inspection of the facilities may be conducted, at DEP's discretion.

Sincerely,

Jennifer Fields, P.E.
Regional Manager
Clean Water

Enclosures

cc: Operations Section
Mr. Fazler – Bradford Engineering Assoc.
Re 30 (GJE14CLW)322-10

Permit No. WQG02231419

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

WQG-02
WATER QUALITY MANAGEMENT
GENERAL PERMIT FOR SEWER EXTENSIONS AND PUMP STATIONS
PERMIT NUMBER WQG02231419

A. PERMITTEE (Name and Address): DELCORA 100 East Fifth Street P O Box 999 Chester, PA 19016-0999 **CLIENT ID#:** 42332	**B. PROJECT/FACILITY (Name):** Crum Creek Sewer Project **C. LOCATION (County, Municipality):** Edgmont Township, Delaware County

D. This General Permit approves the construction and operation of:

☒ **SEWER EXTENSION**

☐ **PUMP STATION**

E. APPROVAL GRANTED BY THIS GENERAL PERMIT IS SUBJECT TO THE FOLLOWING:

1. All construction, operations and procedures shall be in accordance with the *Domestic Wastewater Facilities Manual*.

   Transfers: In the event the permittee plans to transfer ownership of the facility to another entity, the permittee and the transferee shall submit an application for such transfer to DEP. If the transfer is approved by DEP, the transferee is subject to the terms and conditions of this General Permit.
2. The attached conditions apply to this General Permit and are hereby made part of same.

F. THE AUTHORITY GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING FURTHER QUALIFICATIONS:

1. If there is a conflict between the NOI or its supporting documents and amendments and the attached conditions, the attached conditions shall apply.
2. Failure to comply with the rules and regulations of DEP or with the terms or conditions of this General Permit shall void the authority given to the permittee by the issuance of this General Permit.
3. This General Permit is issued pursuant to the Clean Streams Law, Act of June 22, 1937, P.L. 1987, as amended 35 P.S. §691.1 *et seq.* Issuance of this General Permit shall not relieve the permittee of any responsibility under any other law.

PERMIT ISSUED: January 6, 2015

BY: _____

TITLE: Clean Water Program Manager

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

PERMIT CONDITIONS

General

1. Consistent with DEP's technical guidance document *Conducting Technical Reviews of Water Quality Management Permit Wastewater Treatment Facilities*, DEP ID: 362-2000-007, available on DEP's Web site, DEP considers the registered professional engineer whose seal is affixed to the design documents to be fully responsible for the adequacy of all aspects of the facility's design.
2. The approval is specifically made contingent on the permittee acquiring all necessary property rights, by easement or otherwise, providing for the satisfactory construction, operation, maintenance and replacement of all sewers or sewerage structures in, along or across private property with full rights of ingress, egress and regress.
3. If, at any time, the sewer extension and/or pump station covered by this General Permit creates a public nuisance, including but not limited to, causing malodors or causing environmental harm to waters of the Commonwealth, DEP may require the permittee to adopt appropriate remedial measures to abate the nuisance or harm.
4. This permit does not relieve the permittee of its obligations to comply with all federal, interstate, state or local laws, ordinances and regulations applicable to the facilities.
5. This General Permit does not give any real or personal property rights or grant any exclusive privileges, nor shall it be construed to grant or confirm any right, easement or interest in, on, to, or over any lands which belong to the Commonwealth.
6. No discharge is authorized from these facilities unless approved by an NPDES Permit.

Construction

7. An Erosion and Sedimentation (E&S) Control Plan must be developed prior to construction of the permitted facility, pursuant to Title 25 Pa. Code Chapter 102, and implemented during and after the earth disturbance activity.

   If the activity involves 5 or more acres of earth disturbance, or from 1 to 5 acres of earth disturbance with a point source discharge to surface waters of the Commonwealth, an NPDES Permit is required.

   In addition to the state NPDES permitting requirements, some municipalities, through local ordinances, require the E&S Control Plan to be reviewed and approved by the local county conservation district office prior to construction. For specific information regarding E&S control planning approval and NPDES permitting requirements please contact your local county conservation district office.
8. Prior to beginning any construction or excavation, the locations of all utility lines must be identified through notification to the PA One Call system (www.paonecall.org). The notification shall not be less than three nor more than 10 working days in advance of beginning the construction or excavation.
9. The local waterways conservation officer of the Pennsylvania Fish and Boat Commission (PFBC) shall be notified when the construction of any stream crossing and/or outfall is started and completed. A written permit must be secured from the PFBC if there is any use of explosives in any waterways and the permittee shall notify the local waterways conservation officer when explosives are to be used.
10. Manhole inverts shall be formed to facilitate the flow of the sewage and to prevent the stranding of sewage solids. The whole manhole structure shall be built to prevent undue infiltration, entrance of street wash or grit and provide safe access to facilitate manhole maintenance activities.
11. The facilities shall be constructed under the supervision of a Pennsylvania registered Professional Engineer in accordance with the approved reports, plans and specifications.

12. A Pennsylvania registered Professional Engineer shall certify that construction of the permitted facilities was completed in accordance with the application and design plans submitted to DEP, using "Post Construction Certification" (3800-PM-WSFR0179a). It is the permittee's responsibility to ensure that a Professional Engineer is on-site to provide the necessary oversight and/or inspections to certify the facilities. The certification must be submitted to DEP before the facility is placed in operation. If requested, "as-built" drawings, photographs (if available) and a description of any DEP-approved deviations from the application and design plans must be submitted to DEP within 30 days of certification. Construction must be completed within two years of permit issue date.

Operation and Maintenance

13. The permittee shall maintain sewer extension and/or pump station operation and maintenance (O&M) manuals at the facility and ensure proper O&M of the permitted facility. The permittee shall file the O&M manuals with DEP upon request.
14. Stormwater from roofs, foundation drains, basement drains or other sources shall not be admitted directly to the sewer extension or pump station.
15. The sewer extension shall have adequate foundation support as soil conditions require. Trenches shall be back-filled to ensure that sewers will have proper structural stability, with minimal settling and adequate protection against breakage. Concrete used in connection with these sewers shall be protected from damage by water, freezing, drying or other harmful conditions until cured.
16. The approved sewer extensions and/or pump stations shall be maintained in good condition, kept free of deposits by flushing or other cleaning methods and repaired when necessary.
17. The sewer extension and/or pump station shall be properly operated and maintained so that the facility will perform as designed.
18. The attention of the permittee is called to the highly explosive nature of certain gases generated by the digestion of sewage solids when these gases are mixed in proper proportions with air and to the highly toxic character of certain gases arising from such digestion or from sewage in poorly ventilated compartments or sewers. Therefore, at all places throughout the facilities where hazard of fire, explosion or danger from toxic gases may occur, the permittee shall post conspicuous permanent and legible warnings. The permittee shall instruct all employees concerning the aforesaid hazards, first aid and emergency methods of meeting such hazards and shall make all necessary equipment and material accessible.
19. There shall be no physical connection between a public water supply system and a sewer or appurtenance to it which would permit the passage of any sewage or polluted water into the potable water supply. No water pipe shall pass through or come in contact with any part of the sewer extension and/or pump station.
20. Collected screenings, slurries, sludge and other solids shall be handled and disposed of in compliance with Title 25 Pa. Code, Chapters 271, 273, 275, 283 and 285 (related to permits and requirements for land filling, land application, incineration and storage of sewage sludge), Federal Regulations 40 CFR Part 257 and the Federal Clean Water Act and its amendments.

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

WATER QUALITY MANAGEMENT
POST CONSTRUCTION CERTIFICATION

PERMITTEE IDENTIFIER	
Permittee	DELCORA – Crum Creek Sewer Project
Municipality	Chester City
County	Delaware
WQM Permit No.	WQG02231419
Facility Type	Sewage

All of the above information should be taken directly from the Water Quality Management Permit.

CERTIFICATION

This certification must be completed and returned to the permits section of the DEP's regional office issuing the WQM permit within 30 days of completion of the project and received by DEP prior to operation, and if requested, as-built drawings, photographs (if available) and a discussion of any DEP-approved deviations from the design plans during construction.

I, being a Registered Professional Engineer in Pennsylvania, do hereby certify to the best of my knowledge and belief, based upon personal observation and interviews, that the above facility approved under the Water Quality Management Permit has been constructed in accordance with the plans, specifications and modifications approved by DEP.

Construction Completion Date (MM/DD/YYYY): _____

Engineer's Seal

Professional Engineer
Name _____ (Please Print or Type)
Signature
Date
License Expiration Date
Firm or Agency
Telephone
Permittee or Authorized Representative
Name _____ (Please Print or Type)
Signature
Title
Telephone

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Scanned to Server
Crum Creek-Granville Rd FM
Dwg. Adm. Dept

RECEIVED
MAR 19 2019
By 2019-0296

March 13, 2019

CERTIFIED MAIL NO. 7017 1000 0000 5886 6722
9590 9402 2927 7094 0159 03

Robert Willert
DELCORA
100 E 5th Street PO Box 999
Chester, PA 19016

cc: RJW
MJD
CVH
JJP
A. Matlawski
M. Sweeney

Re: Permit Transfer- Sewage
DELCORA Edgmont Country Club
WQM Permit No. WQG02231810 T-1
Prior Permittee: Ag-Rw Edgmont Parent LLC
Edgmont Township, Delaware County

Dear Mr. Willert:

In accordance with your request received on January 18, 2019, the Department of Environmental Protection (DEP) has transferred the above referenced permit(s). Please study the permit(s) carefully and direct any questions to this office.

Any person aggrieved by this action may appeal the action to the Environmental Hearing Board (Board), pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. § 7514, and the Administrative Agency Law, 2 Pa.C.S. Chapter 5A. The Board's address is:

Environmental Hearing Board
Rachel Carson State Office Building, Second Floor
400 Market Street
P.O. Box 8457
Harrisburg, PA 17105-8457

TDD users may contact the Environmental Hearing Board through the Pennsylvania Relay Service, 800-654-5984.

Appeals must be filed with the Board within 30 days of receipt of notice of this action unless the appropriate statute provides a different time. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

A Notice of Appeal form and the Board's rules of practice and procedure may be obtained online at http://ehb.courtapps.com or by contacting the Secretary to the Board at 717-787-3483. The Notice of Appeal form and the Board's rules are also available in braille and on audiotape from the Secretary to the Board.

IMPORTANT LEGAL RIGHTS ARE AT STAKE. YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT AFFORD A LAWYER, YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY TO THE BOARD AT 717-787-3483 FOR MORE INFORMATION. YOU DO NOT NEED A LAWYER TO FILE A NOTICE OF APPEAL WITH THE BOARD.

IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST BE FILED WITH AND RECEIVED BY THE BOARD WITHIN 30 DAYS OF RECEIPT OF NOTICE OF THIS ACTION.

If you have any questions, please contact Vasantha Palakurti at 484-250-5198.

Sincerely,

Thomas L. Magge
Environmental Program Manager
Clean Water Program

Enclosures

cc: Ag-Rw Edgmont Parent LLC
Edgmont Township
Delaware County
Operations Section
Central Office Division of Operations, Monitoring and Data Systems
File

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF CLEAN WATER

WQG-02
WATER QUALITY MANAGEMENT
GENERAL PERMIT FOR SEWER EXTENSIONS AND PUMP STATIONS

PERMIT NUMBER WQG02231810 T-1

A. PERMITTEE (Name and Address):	B. PROJECT/FACILITY (Name):
DELCORA 100 E 5th Street PO Box 999 Chester, PA 19016 CLIENT ID# 42332	DELCORA Edgmont Country Club C. LOCATION (County, Municipality): Edgmont Township, Delaware County

D. This General Permit approves the construction and operation of:

☐ **SEWER EXTENSION**

☒ **PUMP STATION** **Annual Average Daily Flow** 44,800 gpd **Design Capacity** 0.175 MGD

E. APPROVAL GRANTED BY THIS GENERAL PERMIT IS SUBJECT TO THE FOLLOWING:

1. All construction, operations and procedures shall be in accordance with the *Domestic Wastewater Facilities Manual*.

   Transfers: In the event the permittee plans to transfer ownership of the facility to another entity, the permittee and the transferee shall submit an application for such transfer to DEP. If the transfer is approved by DEP, the transferee is subject to the terms and conditions of this General Permit.
2. The attached conditions apply to this General Permit and are hereby made part of same.

F. THE AUTHORITY GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING FURTHER QUALIFICATIONS:

1. If there is a conflict between the NOI or its supporting documents and amendments and the attached conditions, the attached conditions shall apply.
2. Failure to comply with the rules and regulations of DEP or with the terms or conditions of this General Permit shall void the authority given to the permittee by the issuance of this General Permit.
3. This General Permit is issued pursuant to the Clean Streams Law, Act of June 22, 1937, P.L. 1987, as amended 35 P.S. §691.1 *et seq.* Issuance of this General Permit shall not relieve the permittee of any responsibility under any other law.

PERMIT ISSUED: March 13, 2019

BY: Thomas Maggs

TITLE: Clean Water Program Manager

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF CLEAN WATER

WQG-02
WATER QUALITY MANAGEMENT
GENERAL PERMIT FOR SEWER EXTENSIONS AND PUMP STATIONS

PERMIT CONDITIONS

General

1. DEP considers the licensed professional engineer whose seal is affixed to the design documents to be fully responsible for the adequacy of all aspects of the facility's design.
2. The approval is specifically made contingent on the permittee acquiring all necessary property rights, by easement or otherwise, providing for the satisfactory construction, operation, maintenance and replacement of all sewers or sewerage structures in, along or across private property with full rights of ingress, egress and regress.
3. If, at any time, the sewer extension and/or pump station covered by this General Permit creates a public nuisance, including but not limited to, causing malodors or causing environmental harm to waters of the Commonwealth, DEP may require the permittee to adopt appropriate remedial measures to abate the nuisance or harm.
4. The approval of the plans, and the authority granted in this permit, if not specifically extended, shall cease and be null and void 2 years from the issuance date of this permit unless construction or modification of the facilities covered by this permit has begun on or before the second anniversary of the permit date.
5. This permit does not relieve the permittee of its obligations to comply with all federal, interstate, state or local laws, ordinances and regulations applicable to the facilities.
6. This General Permit does not give any real or personal property rights or grant any exclusive privileges, nor shall it be construed to grant or confirm any right, easement or interest in, on, to, or over any lands which belong to the Commonwealth.
7. No discharge is authorized from these facilities unless approved by an NPDES Permit.

Construction

8. A permit or approval is required under Chapter 102 for most earth disturbance activities. A permit or registration under Chapter 105 is required for stream obstructions, crossings, etc. The permittee must secure the necessary permits, approvals or registrations under Chapters 102 and 105 prior to beginning construction.
9. Prior to beginning any construction or excavation, the locations of all utility lines must be identified through notification to the PA One Call system (www.paonecall.org). The notification shall not be less than three nor more than 10 working days in advance of beginning the construction or excavation.
10. The local waterways conservation officer of the Pennsylvania Fish and Boat Commission (PFBC) shall be notified when the construction of any stream crossing and/or outfall is started and completed. A written permit must be secured from the PFBC if there is any use of explosives in any waterways and the permittee shall notify the local waterways conservation officer when explosives are to be used.
11. Manhole inverts shall be formed to facilitate the flow of the sewage and to prevent the stranding of sewage solids. The whole manhole structure shall be built to prevent undue infiltration, entrance of street wash or grit and provide safe access to facilitate manhole maintenance activities.
12. The facilities shall be constructed under the supervision of a Pennsylvania licensed Professional Engineer in accordance with the approved reports, plans and specifications.

13. A Pennsylvania licensed Professional Engineer shall certify that construction of the permitted facilities was completed in accordance with the application and design plans submitted to DEP, using "Post Construction Certification" (3800-PM-WSFR0179a). It is the permittee's responsibility to ensure that a Professional Engineer is on-site to provide the necessary oversight and/or inspections to certify the facilities. The certification must be submitted to DEP before the facility is placed in operation. If requested, "as-built" drawings, photographs (if available) and a description of any DEP-approved deviations from the application and design plans must be submitted to DEP within 30 days of certification. Construction must be completed within two years of permit issue date.

Operation and Maintenance

14. The permittee shall maintain sewer extension and/or pump station operation and maintenance (O&M) manuals at the facility and ensure proper O&M of the permitted facility. The permittee shall file the O&M manuals with DEP upon request.
15. Stormwater from roofs, foundation drains, basement drains or other sources shall not be admitted directly to the sewer extension or pump station.
16. The sewer extension shall have adequate foundation support as soil conditions require. Trenches shall be back-filled to ensure that sewers will have proper structural stability, with minimal settling and adequate protection against breakage. Concrete used in connection with these sewers shall be protected from damage by water, freezing, drying or other harmful conditions until cured.
17. The approved sewer extensions and/or pump stations shall be maintained in good condition, kept free of deposits by flushing or other cleaning methods and repaired when necessary.
18. The sewer extension and/or pump station shall be properly operated and maintained so that the facility will perform as designed.
19. The attention of the permittee is called to the highly explosive nature of certain gases generated by the digestion of sewage solids when these gases are mixed in proper proportions with air and to the highly toxic character of certain gases arising from such digestion or from sewage in poorly ventilated compartments or sewers. Therefore, at all places throughout the facilities where hazard of fire, explosion or danger from toxic gases may occur, the permittee shall post conspicuous permanent and legible warnings. The permittee shall instruct all employees concerning the aforesaid hazards, first aid and emergency methods of meeting such hazards and shall make all necessary equipment and material accessible.
20. There shall be no physical connection between a public water supply system and a sewer or appurtenance to it which would permit the passage of any sewage or polluted water into the potable water supply. No water pipe shall pass through or come in contact with any part of the sewer extension and/or pump station.
21. Collected screenings, slurries, sludge and other solids shall be handled and disposed of in compliance with Title 25 Pa. Code, Chapters 271, 273, 275, 283 and 285 (related to permits and requirements for land filling, land application, incineration and storage of sewage sludge), Federal Regulations 40 CFR Part 257 and the Federal Clean Water Act and its amendments.

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

WATER QUALITY MANAGEMENT
POST CONSTRUCTION CERTIFICATION

PERMITTEE IDENTIFIER	
Permittee	DELCORA
Municipality	Edgmont Township
County	Delaware
WQM Permit No.	WQG02231810 T-1
Facility Type	Sewage

All of the above information should be taken directly from the Water Quality Management Permit.

CERTIFICATION

This certification must be completed and returned to the permits section of the DEP's regional office issuing the WQM permit within 30 days of completion of the project and received by DEP prior to operation, and if requested, as-built drawings, photographs (if available) and a discussion of any DEP-approved deviations from the design plans during construction.

I, being a Registered Professional Engineer in Pennsylvania, do hereby certify to the best of my knowledge and belief, based upon personal observation and interviews, that the above facility approved under the Water Quality Management Permit has been constructed in accordance with the plans, specifications and modifications approved by DEP.

Construction Completion Date (MM/DD/YYYY): _____

Engineer's Seal

Professional Engineer
Name _____ (Please Print or Type)
Signature
Date
License Expiration Date
Firm or Agency
Telephone
Permittee or Authorized Representative
Name _____ (Please Print or Type)
Signature
Title
Telephone

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

SOUTHEAST REGIONAL OFFICE

Orig: File Copy

CC: CJH

March 22, 2013

CERTIFIED MAIL NO. 7007 3020 0002 8265 1591

Mr. Joseph Salvucci
DELCORA
100 East Fifth Street
P.O. Box 999
Chester, PA 19016-0999

Re: WQM Permit - Sewage
DELCORA Sewer System and STP
Permit No. WQG02231301
Authorization ID No. 964977
Chester City
Delaware County

Dear Mr. Salvucci:

Your Water Quality Management (WQM) permit is enclosed. You must comply with all Standard and Special Conditions attached to this Permit. Construction must be done in accordance with the permit application and all supporting documentation. Please review the permit conditions and the supporting documentation submitted with your application before starting construction.

Please note that you are responsible for securing all other required permits, approvals, and/or registrations associated with the project if applicable, under Chapters 102 (Erosion and Sedimentation Control), 105 (Stream Obstructions and Encroachments), and 106 (Floodplains) of the Department of Environmental Protection's (DEP) regulations. Construction may not proceed until all other required permits have been obtained.

Enclosed, is the "Water Quality Management Post Construction Certification" form. A Pennsylvania-registered Professional Engineer must sign and complete this form prior to startup of the facilities. You or your authorized representative must also sign the form. This certification and other post-construction documentation must be submitted to DEP within 30 days following startup of the facilities.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa.C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717.787.3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800.654.5984. Appeals

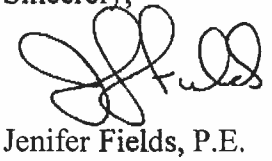
must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at 717.787.3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST REACH THE BOARD WITHIN 30 DAYS. YOU DO NOT NEED A LAWYER TO FILE AN APPEAL WITH THE BOARD.

IMPORTANT LEGAL RIGHTS ARE AT STAKE, HOWEVER, SO YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT AFFORD A LAWYER, YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY TO THE BOARD (717.787.3483) FOR MORE INFORMATION.

During construction or upon completing construction, please contact Mr. Andrew Haneiko at 484.250.5183 or by e-mail at ahaneiko@pa.gov so that an inspection of the facilities may be conducted, at DEP's discretion.

Sincerely,



Jenifer Fields, P.E.
Regional Manager
Clean Water

Enclosures

cc: Permits Chief
Operations Section
Mr. Rodriquez - Catania Engineering Assoc.
Re 30 (eh13clw)077-4

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

WQG-02
WATER QUALITY MANAGEMENT
GENERAL PERMIT FOR SEWER EXTENSIONS AND PUMP STATIONS
PERMIT NUMBER WQG02231301

A. **PERMITTEE (Name and Address):**	B. **PROJECT/FACILITY (Name):**
DELCORA 100 East Fifth Street P O Box 999 Chester, PA 19016-0999 **CLIENT ID#:** 42332	DELCORA Sewer System & STP **C. LOCATION (County, Municipality):** Chester City, Delaware County

D. This General Permit approves the construction and operation of:

☒ **SEWER EXTENSION**

☐ **PUMP STATION**

E. APPROVAL GRANTED BY THIS GENERAL PERMIT IS SUBJECT TO THE FOLLOWING:

1. All construction, operations and procedures shall be in accordance with the *Domestic Wastewater Facilities Manual.*

   Transfers: In the event the permittee plans to transfer ownership of the facility to another entity, the permittee and the transferee shall submit an application for such transfer to DEP. If the transfer is approved by DEP, the transferee is subject to the terms and conditions of this General Permit.
2. The attached conditions apply to this General Permit and are hereby made part of same.

F. THE AUTHORITY GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING FURTHER QUALIFICATIONS:

1. If there is a conflict between the NOI or its supporting documents and amendments and the attached conditions, the attached conditions shall apply.
2. Failure to comply with the rules and regulations of DEP or with the terms or conditions of this General Permit shall void the authority given to the permittee by the issuance of this General Permit.
3. This General Permit is issued pursuant to the Clean Streams Law, Act of June 22, 1937, P.L. 1987, as amended 35 P.S. §691.1 *et seq.* Issuance of this General Permit shall not relieve the permittee of any responsibility under any other law.

PERMIT ISSUED: March 22, 2013

BY: _____

TITLE: Clean Water Program Manager

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

PERMIT CONDITIONS

General

1. Consistent with DEP's technical guidance document *Conducting Technical Reviews of Water Quality Management Permit Wastewater Treatment Facilities*, DEP ID: 362-2000-007, available on DEP's Web site, DEP considers the registered professional engineer whose seal is affixed to the design documents to be fully responsible for the adequacy of all aspects of the facility's design.
2. The approval is specifically made contingent on the permittee acquiring all necessary property rights, by easement or otherwise, providing for the satisfactory construction, operation, maintenance and replacement of all sewers or sewerage structures in, along or across private property with full rights of ingress, egress and regress.
3. If, at any time, the sewer extension and/or pump station covered by this General Permit creates a public nuisance, including but not limited to, causing malodors or causing environmental harm to waters of the Commonwealth, DEP may require the permittee to adopt appropriate remedial measures to abate the nuisance or harm.
4. This permit does not relieve the permittee of its obligations to comply with all federal, interstate, state or local laws, ordinances and regulations applicable to the facilities.
5. This General Permit does not give any real or personal property rights or grant any exclusive privileges, nor shall it be construed to grant or confirm any right, easement or interest in, on, to, or over any lands which belong to the Commonwealth.
6. No discharge is authorized from these facilities unless approved by an NPDES Permit.

Construction

7. An Erosion and Sedimentation (E&S) Control Plan must be developed prior to construction of the permitted facility, pursuant to Title 25 Pa. Code Chapter 102, and implemented during and after the earth disturbance activity.

   If the activity involves 5 or more acres of earth disturbance, or from 1 to 5 acres of earth disturbance with a point source discharge to surface waters of the Commonwealth, an NPDES Permit is required.

   In addition to the state NPDES permitting requirements, some municipalities, through local ordinances, require the E&S Control Plan to be reviewed and approved by the local county conservation district office prior to construction. For specific information regarding E&S control planning approval and NPDES permitting requirements please contact your local county conservation district office.
8. Prior to beginning any construction or excavation, the locations of all utility lines must be identified through notification to the PA One Call system (www.paonecall.org). The notification shall not be less than three nor more than 10 working days in advance of beginning the construction or excavation.
9. The local waterways conservation officer of the Pennsylvania Fish and Boat Commission (PFBC) shall be notified when the construction of any stream crossing and/or outfall is started and completed. A written permit must be secured from the PFBC if there is any use of explosives in any waterways and the permittee shall notify the local waterways conservation officer when explosives are to be used.
10. Manhole inverts shall be formed to facilitate the flow of the sewage and to prevent the stranding of sewage solids. The whole manhole structure shall be built to prevent undue infiltration, entrance of street wash or grit and provide safe access to facilitate manhole maintenance activities.
11. The facilities shall be constructed under the supervision of a Pennsylvania registered Professional Engineer in accordance with the approved reports, plans and specifications.

12. A Pennsylvania registered Professional Engineer shall certify that construction of the permitted facilities was completed in accordance with the application and design plans submitted to DEP, using "Post Construction Certification" (3800-PM-WSFR0179a). It is the permittee's responsibility to ensure that a Professional Engineer is on-site to provide the necessary oversight and/or inspections to certify the facilities. The certification must be submitted to DEP before the facility is placed in operation. If requested, "as-built" drawings, photographs (if available) and a description of any DEP-approved deviations from the application and design plans must be submitted to DEP within 30 days of certification. Construction must be completed within two years of permit issue date.

Operation and Maintenance

13. The permittee shall maintain sewer extension and/or pump station operation and maintenance (O&M) manuals at the facility and ensure proper O&M of the permitted facility. The permittee shall file the O&M manuals with DEP upon request.
14. Stormwater from roofs, foundation drains, basement drains or other sources shall not be admitted directly to the sewer extension or pump station.
15. The sewer extension shall have adequate foundation support as soil conditions require. Trenches shall be back-filled to ensure that sewers will have proper structural stability, with minimal settling and adequate protection against breakage. Concrete used in connection with these sewers shall be protected from damage by water, freezing, drying or other harmful conditions until cured.
16. The approved sewer extensions and/or pump stations shall be maintained in good condition, kept free of deposits by flushing or other cleaning methods and repaired when necessary.
17. The sewer extension and/or pump station shall be properly operated and maintained so that the facility will perform as designed.
18. The attention of the permittee is called to the highly explosive nature of certain gases generated by the digestion of sewage solids when these gases are mixed in proper proportions with air and to the highly toxic character of certain gases arising from such digestion or from sewage in poorly ventilated compartments or sewers. Therefore, at all places throughout the facilities where hazard of fire, explosion or danger from toxic gases may occur, the permittee shall post conspicuous permanent and legible warnings. The permittee shall instruct all employees concerning the aforesaid hazards, first aid and emergency methods of meeting such hazards and shall make all necessary equipment and material accessible.
19. There shall be no physical connection between a public water supply system and a sewer or appurtenance to it which would permit the passage of any sewage or polluted water into the potable water supply. No water pipe shall pass through or come in contact with any part of the sewer extension and/or pump station.
20. Collected screenings, slurries, sludge and other solids shall be handled and disposed of in compliance with Title 25 Pa. Code, Chapters 271, 273, 275, 283 and 285 (related to permits and requirements for land filling, land application, incineration and storage of sewage sludge), Federal Regulations 40 CFR Part 257 and the Federal Clean Water Act and its amendments.

3800-PM-WSFR0179a 9/2005
Post Construction Certification

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

WATER QUALITY MANAGEMENT

POST CONSTRUCTION CERTIFICATION

PERMITTEE IDENTIFIER	
Permittee	DELCORA
Municipality	Chester City
County	Delaware
WQM Permit No.	WQG02231301
Facility Type	Sewage

All of the above information should be taken directly from the Water Quality Management Permit.

CERTIFICATION

This certification must be completed and returned to the permits section of the DEP's regional office issuing the WQM permit within 30 days of completion of the project and received by DEP prior to operation, and if requested, as-built drawings, photographs (if available) and a discussion of any DEP-approved deviations from the design plans during construction.

I, being a Registered Professional Engineer in Pennsylvania, do hereby certify to the best of my knowledge and belief, based upon personal observation and interviews, that the above facility approved under the Water Quality Management Permit has been constructed in accordance with the plans, specifications and modifications approved by DEP.

Construction Completion Date (MM/DD/YYYY): _____

Engineer's Seal

Professional Engineer
Name _____ (Please Print or Type)
Signature
Date
License Expiration Date
Firm or Agency
Telephone
Permittee or Authorized Representative
Name _____ (Please Print or Type)
Signature
Title
Telephone

3800-PM-WSWM0015 Rev. 6/2004
Permit

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER SUPPLY AND WASTEWATER MANAGEMENT

PERMIT NO. 2312401
AMENDMENT NO. _____
APS ID 772926
AUTH ID 914744

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

WATER QUALITY MANAGEMENT PERMIT

A. PERMITTEE (Name and Address): CLIENT ID#: 42332	B. PRIMARY FACILITY (Name):
DELCORA P.O. Box 999 Chester, PA 19016-0999	Rose Valley Borough STP
C. LOCATION (Municipality, County):	SITE ID#:
Rose Valley Borough Delaware County	465797

D. This permit approves the modification of sewerage facilities consisting of:
Conversion of gas chlorine to sodium hypochlorite solution for disinfection.

Pump Stations: ____	Manure Storage:	Industrial Wastewater/Sewage Treatment Facility:
Design Capacity: ____ GPM		Annual Average Flow: 0.13 MGD
Average Annual Flow: ____ GPD	Volume _____ MG	Design Hydraulic Capacity: 0.13 MGD
	Freeboard: _____ inches	Design Organic Capacity: 221 lb/day

E. APPROVAL GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING:

1. **New Permits:** All construction, operations, and procedures shall be in accordance with the Water Quality Management Permit application dated 02/08/2012, its supporting documentation, and addendums dated ____, which are hereby made a part of this permit.

   Amendments: All construction, operations, and procedures shall be in accordance with the Water Quality Management Permit Amendment application dated ____ and its supporting documentation, and addendums dated ____, which are hereby made a part of this amendment.

   Except for any herein approved modifications, all terms, conditions, supporting documentation and addendums approved under Water Quality Management Permit No. ____ dated ____ shall remain in effect.

   Transfers: Water Quality Management Permit No. ____ dated ____ and conditions, supporting documentation and addendums are also made part of this transfer.

2. **Permit Conditions Relating to sewerage** are attached and made part of this permit.
3. Special Conditions numbered ____ are attached and made part of this permit.

F. THE AUTHORITY GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING FURTHER QUALIFICATIONS:

1. If there is a conflict between the application or its supporting documents and amendments and the attached conditions, the attached conditions shall apply.
2. Failure to comply with the rules and regulations of DEP or with the terms or conditions of this permit shall void the authority given to the permittee by the issuance of this permit.
3. This permit is issued pursuant to the Clean Streams Law Act of June 22, 1937, P.L. 1987, as amended 35 P.S. §691.1 *et seq.* Issuance of this permit shall not relieve the permittee of any responsibility under any other law.

PERMIT ISSUED: March 14, 2012

BY: _____

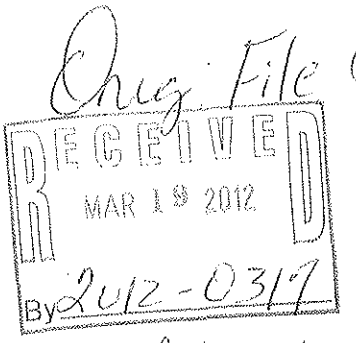
TITLE: Clean Water Program Manager

Re 30 (WP)

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

SOUTHEAST REGIONAL OFFICE

Orig. File Copy



cc. Cutt, Bothwell, DiSantis, DiMatteo
Pending File

March 14, 2012

Mr. Joseph Salvucci
Executive Director
DELCORA
P.O. Box 999
Chester, PA 19016-0999

Re: Rose Valley Borough STP
Application No. 2312401
File Type: Permit
Rose Valley Borough
Delaware County

Dear Mr. Salvucci:

Your permit is enclosed.

You must comply with all Standard and Special Conditions attached to this permit. Construction must be done in accordance with the permit application and all supporting documentation. Please review the permit conditions and the supporting documentation submitted with your application before starting construction.

Enclosed is the "Sewage and Industrial Wastewater Facilities Construction Certification" form. A Pennsylvania-registered Professional Engineer must sign and complete this form prior to startup of the facilities (see Special Conditions). You or your authorized representative must also sign the form. This certification and other post construction documentation must be submitted to the Department within 30 days following startup of the facilities.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa.C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717.787.3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800.654.5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at 717.787.3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST REACH THE BOARD WITHIN 30 DAYS. YOU DO NOT NEED A LAWYER TO FILE AN APPEAL WITH THE BOARD.

IMPORTANT LEGAL RIGHTS ARE AT STAKE, HOWEVER, SO YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT AFFORD A LAWYER, YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY TO THE BOARD (717.787.3483) FOR MORE INFORMATION.

If you have any questions, please call Mr. Andrew Haneiko at 484.250.5183.

Sincerely,

Jenifer Fields, P.E.
Regional Manager
Clean Water

Enclosures

cc: Permits Chief
Operations Section
Ms. Lashley
Re (dh12clw) 065-11

Permit No. 2312401

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER SUPPLY AND WASTEWATER MANAGEMENT

PERMIT CONDITIONS RELATING TO SEWERAGE

For use in Water Quality Management Permits

(Place a √ in the box that applies)

General

☒ 1. Consistent with the Department of Environmental Protection's (DEP) technical guidance document *Conducting Technical Reviews of Water Quality Management Permit Wastewater Treatment Facilities* (DEP ID: 362-2000-007) available on DEP's website at www.dep.state.pa.us . DEP considers the registered Professional Engineer whose seal is affixed to the design documents to be fully responsible for the adequacy of all aspects of the facility design.

☒ 2. The permittee shall adopt and enforce an ordinance requiring the abandonment of privies, cesspools or similar receptacles for human waste and onlot sewage disposal systems on the premises of occupied structures accessible to public sewers. All such structures must be connected to the public sewers.

☐ 3. The outfall sewer or drain shall be extended to the low water mark of the receiving body of water. Where necessary to ensure proper mixing and waste assimilation, an outfall sewer or drain may be extended with appurtenances below the low water mark and into the bed of a navigable stream provided that the permittee has secured an easement, right-of-way, license or lease from DEP in accordance with Section 15 of the Dam Safety and Encroachments Act, the Act of November 26, 1978, P.L. 1375, as amended.

☒ 4. The approval is specifically made contingent on the permittee acquiring all necessary property rights, by easement or otherwise, providing for the satisfactory construction, operation, maintenance and replacement of all sewers or sewerage structures in, along or across private property with full rights of ingress, egress and regress.

☒ 5. When construction of the approved sewerage facilities is completed and before they are placed in operation, the permittee shall notify DEP in writing so that a DEP representative may inspect the facilities.

☒ 6. If, at any time, the sewerage facilities covered by this permit create a public nuisance, including but not limited to, causing malodors or causing environmental harm to waters of the Commonwealth, DEP may require the permittee to adopt appropriate remedial measures to abate the nuisance or harm.

☐ 7. This permit authorizes the construction and operation of the proposed sewerage facilities until such time as facilities for conveyance and treatment at a more suitable location are installed and capable of receiving and treating the permittee's sewage. Such facilities must be in accordance with the applicable municipal official plan adopted pursuant to Section 5 of the Pennsylvania Sewage Facilities Act, the Act of January 24, 1966, P.L. 1535 as amended. When such municipal sewerage facilities become available, the permittee shall provide for the conveyance of the sewage to these sewerage facilities, abandon the use of these approved facilities and notify DEP accordingly. This permit shall then, upon notice from DEP, terminate and become null and void and shall be relinquished to DEP.

☒ 8. This permit does not relieve the permittee of its obligations to comply with all federal, interstate, state or local laws, ordinances and regulations applicable to the sewerage facilities.

☒ 9. This permit does not give any real or personal property rights or grant any exclusive privileges, nor shall it be construed to grant or confirm any right, easement or interest in, on, to or over any lands which belong to the Commonwealth.

☒ 10. The authority granted by this permit is subject to all effluent requirements, monitoring requirements and other conditions as set forth in NPDES Permit No. **PA0020575** and all subsequent amendments and renewals. No discharge is authorized from these facilities unless approved by an NPDES Permit.

Construction

☐ 11. An Erosion and Sedimentation (E&S) Plan must be developed prior to construction of the permitted facility, pursuant to Title 25 Pa. Code Chapter 102, and implemented during and after the earth disturbance activity.

If the activity involves 5 or more acres of earth disturbance, or from 1 to 5 acres of earth disturbance with a point source discharge to surface waters of the Commonwealth, an NPDES permit for the Discharge of Stormwater Associated with Construction Activity is required.

In addition to the state NPDES permitting requirements, some municipalities, through local ordinances, require the E&S Control Plan to be reviewed and approved by the local County Conservation District office prior to construction. For specific information regarding E&S control planning approval and NPDES permitting requirements, please contact your local County Conservation District office.

☒ 12. The facilities shall be constructed under the supervision of a Pennsylvania registered Professional Engineer in

accordance with the approved reports, plans and specifications.

☒ 13. A Pennsylvania registered Professional Engineer shall certify that construction of the permitted facilities was completed in accordance with the application and design plans submitted to DEP, using "Post Construction Certification" (3800-PM-WSWM0179a). It is the permittee's responsibility to ensure that a Professional Engineer is on-site to provide the necessary oversight and/or inspections to certify the facilities. The certification must be submitted to DEP before the facility is placed in operation. If requested, "as-built" drawings, photographs (if available) and a description of any DEP-approved deviations from the application and design plans must be submitted to DEP within 30 days of certification.

☐ 14. Manhole inverts shall be formed to facilitate the flow of the sewage and to prevent the stranding of sewage solids. The manhole structure shall be built to prevent undue infiltration, entrance of street wash or grit and provide safe access to facilitate manhole maintenance activities.

☐ 15. The local Waterways Conservation Officer of the Pennsylvania Fish and Boat Commission (PFBC) shall be notified when the construction of any stream crossing and/or outfall is started and completed. A written permit must be secured from the PFBC if the use of explosives in any waterways is required and the permittee shall notify the local Waterways Conservation Officer when explosives are to be used.

Operation and Maintenance

☒ 16. The permittee shall maintain records of "as-built" plans showing all the treatment facilities as actually constructed together with facility operation and maintenance (O&M) manuals and any other relevant information that may be required. Upon request, the "as-built" plans and O&M manuals shall be filed with DEP.

☐ 17. The sewers shall have adequate foundation support as soil conditions require. Trenches shall be back-filled to ensure that sewers will have proper structural stability, with minimum settling and adequate protection against breakage. Concrete used in connection with these sewers shall be protected from damage by water, freezing, drying or other harmful conditions until cured.

☐ 18. Stormwater from roofs, foundation drains, basement drains or other sources shall not be admitted directly to the sanitary sewers.

☐ 19. The approved sewers shall be maintained in good condition, kept free of deposits by flushing or other cleaning methods and repaired when necessary.

☒ 20. The sewerage facilities shall be properly operated and maintained to perform as designed.

☒ 21. The attention of the permittee is called to the highly explosive nature of certain gases generated by the digestion of sewage solids when these gases are mixed in proper proportions with air and to the highly toxic character of certain gases arising from such digestion or from sewage in poorly ventilated compartments or sewers. Therefore, at all places throughout the sewerage facilities where hazard of fire, explosion or danger from toxic gases may occur, the permittee shall post conspicuous permanent and legible warnings. The permittee shall instruct all employees concerning the aforesaid hazards, first aid and emergency methods of meeting such hazards and shall make all necessary equipment and material accessible.

☒ 22. An operator certified in accordance with the Water and Wastewater Systems Operator Certification Act of February 21, 2002, 63 P.S. §§1001, *et seq.* shall operate the sewage treatment plant.

☐ 23. The permittee shall properly control any industrial waste discharged into its sewerage system by regulating the rate and quality of such discharge, requiring necessary pretreatment and excluding industrial waste, if necessary, to protect the integrity or operation of the permittee's sewerage system.

☒ 24. There shall be no physical connection between a public water supply system and a sewer or appurtenance to it which would permit the passage of any sewage or polluted water into the potable water supply. No water pipe shall pass through or come in contact with any part of a sewer manhole.

☐ 25. All connections to the approved sanitary sewers must be in accordance with the corrective action plan as contained in the approved Title 25 Pa. Code Chapter 94 Municipal Wasteload Management Annual Report.

☐ 26. Collected screenings, slurries, sludge and other solids shall be handled and disposed of in compliance with Title 25 Pa. Code Chapters 271, 273, 275, 283 and 285 (related to permits and requirements for land filling, land application, incineration and storage of sewage sludge), Federal Regulations 40 CFR 257 and the Federal Clean Water Act and its amendments.

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Southeast Regional Office

Orig: Bob Willert
RECEIVED
JAN 15 2015
E. 2015-0042
Fwd: BAB

January 13, 2015

CERTIFIED MAIL NO. 7013 2250 0000 7504 1601

Mr. Robert J. Willert
Executive Director
DELCORA
100 East Fifth Street, P. O. Box 999
Chester, PA 19016

Re: Final NPDES Permit - Sewage
Rose Valley Borough STP
NPDES Permit No. PA0020575
Authorization ID No. 1024622
Rose Valley Borough, Delaware County

Dear Mr. Willert:

Your NPDES permit is enclosed. Please read the permit carefully. The permit expires on the date identified on page 1 of the permit. A renewal application must be submitted to this office 180 days prior to the permit expiration date, if a discharge is expected to continue past the expiration date of the permit.

Enclosed are Discharge Monitoring Report (DMR) templates and DMR instructions. It is recommended that you retain the DMR templates in the event you are unable to submit DMRs electronically through DEP's eDMR system. Routine use of the eDMR system is a requirement of the permit unless the conditions in Part A III.B of the permit are met to withdraw from the eDMR system.

Also enclosed is a Supplemental Form Inventory, which identifies the forms that are attached to the permit and must be submitted as attachments to eDMR reports, as applicable (see individual form instructions). The submission of other supplemental forms may be required in accordance with the permit. We encourage you to use the spreadsheet versions of supplemental forms that contain appropriate validation and DEP-approved calculations.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa.C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717.787.3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800.654.5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The

appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at 717.787.3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST REACH THE BOARD WITHIN 30 DAYS. YOU DO NOT NEED A LAWYER TO FILE AN APPEAL WITH THE BOARD.

IMPORTANT LEGAL RIGHTS ARE AT STAKE, HOWEVER, SO YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT AFFORD A LAWYER, YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY TO THE BOARD (717.787.3483) FOR MORE INFORMATION.

If you have any questions, please contact Sara Abraham at 484.250.5195.

Sincerely,

Jenifer L. Fields, P.E.
Environmental Program Manager
Clean Water Program

Enclosures

cc:

Rose Valley Borough (w/o enclosure)
Operations Section
Mr. Kovach-DRBC
Ms. Lashley (w/o enclosure)
Central Office, Division of Operations, Monitoring and Data Systems
Re

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM DISCHARGE REQUIREMENTS FOR PUBLICLY OWNED TREATMENT WORKS (POTWs)

NPDES PERMIT NO: PA0020575

In compliance with the provisions of the Clean Water Act, 33 U.S.C. Section 1251 *et seq.* ("the Act") and Pennsylvania's Clean Streams Law, as amended, 35 P.S. Section 691.1 *et seq.*,

Delaware County Regional Water Quality Control Authority (DELCORA)
100 East Fifth Street, P. O. Box 999
Chester, PA 19016

is authorized to discharge from a facility known as **Rose Valley Borough STP**, located at **18 S. Long Point Lane, Rose Valley Borough, Delaware County**, to **Ridley Creek** in Watershed(s) **3-G** in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts A, B and C hereof.

THIS PERMIT SHALL BECOME EFFECTIVE ON FEBRUARY 1, 2015

THIS PERMIT SHALL EXPIRE AT MIDNIGHT ON JANUARY 31, 2020

The authority granted by this permit is subject to the following further qualifications:

1. If there is a conflict between the application, its supporting documents and/or amendments and the terms and conditions of this permit, the terms and conditions shall apply.

2. Failure to comply with the terms, conditions or effluent limitations of this permit is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application. (40 CFR 122.41(a))

3. A complete application for renewal of this permit, or notice of intent to cease discharging by the expiration date, must be submitted to DEP at least 180 days prior to the above expiration date (unless permission has been granted by DEP for submission at a later date), using the appropriate NPDES permit application form. (40 CFR 122.41(b), 122.21(d))

   In the event that a timely and complete application for renewal has been submitted and DEP is unable, through no fault of the permittee, to reissue the permit before the above expiration date, the terms and conditions of this permit, including submission of the Discharge Monitoring Reports (DMRs), will be automatically continued and will remain fully effective and enforceable against the discharger until DEP takes final action on the pending permit application. (25 Pa. Code 92a.7(b), (c))

4. This NPDES permit does not constitute authorization to construct or make modifications to wastewater treatment facilities necessary to meet the terms and conditions of this permit.

DATE PERMIT ISSUED January 13, 2015 **ISSUED BY**

Jenifer L. Fields, P.E.
Clean Water Program Manager
Southeast Regional Office

Permit No. PA0020575

PART A - EFFLUENT LIMITATIONS, MONITORING, RECORDKEEPING AND REPORTING REQUIREMENTS

I. A. For Outfall 001 , **Latitude** 39° 53' 27.41" , **Longitude** 75° 23' 24.99" , **River Mile Index** 4.8 , **Stream Code** 00621

Receiving Waters: Ridley Creek

Type of Effluent: Treated Sewage

1. The permittee is authorized to discharge during the period from Permit Effective Date through January 31, 2018.

2. Based on the anticipated wastewater characteristics and flows described in the permit application and its supporting documents and/or amendments, the following effluent limitations and monitoring requirements apply (see also Additional Requirements and Footnotes).

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Weekly Average	Instant. Minimum	Average Monthly	Weekly Average	Instant. Maximum		
Flow (MGD)	Report	Report Daily Max	XXX	XXX	XXX	XXX	Continuous	Metered
pH (S.U.)	XXX	XXX	6.0	XXX	XXX	9.0	1/day	Grab
Dissolved Oxygen (Until 3/31/2015)	XXX	XXX	2.0	XXX	XXX	XXX	1/day	Grab
Dissolved Oxygen (4/1/2015 to 1/31/2018)	XXX	XXX	5.0	XXX	XXX	XXX	1/day	Grab
Total Residual Chlorine	XXX	XXX	XXX	0.5	XXX	1.6	1/day	Grab
CBOD5	27.1	43.4	XXX	25	40	50	1/week	24-Hr Composite
CBOD5 Raw Sewage Influent	Report	XXX	XXX	Report	XXX	XXX	1/week	24-Hr Composite
BOD5 Raw Sewage Influent	Report	XXX	XXX	Report	XXX	XXX	1/week	24-Hr Composite
Total Suspended Solids Raw Sewage Influent	Report	XXX	XXX	Report	XXX	XXX	1/week	24-Hr Composite
Total Suspended Solids	32.5	48.8	XXX	30	45	60	1/week	24-Hr Composite

Outfall 001, Continued (from Permit Effective Date through January 31, 2018)

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) [1]		Concentrations (mg/L)				Minimum [2] Measurement Frequency	Required Sample Type
	Average Monthly	Weekly Average	Instant. Minimum	Average Monthly	Weekly Average	Instant. Maximum		
Total Dissolved Solids	XXX	XXX	XXX	XXX	XXX	Report Daily Max.	1/quarter	24-Hr Composite
Fecal Coliform (CFU/100 ml) May 1 - Sep 30	XXX	XXX	XXX	200 Geo Mean	XXX	1,000	1/week	Grab
Fecal Coliform (CFU/100 ml) Oct 1 - Apr 30	XXX	XXX	XXX	200 Geo Mean	XXX	1,000*	1/week	Grab
Total Nitrogen	XXX	XXX	XXX	Report	XXX	Report	1/month	24-Hr Composite
Ammonia-Nitrogen	XXX	XXX	XXX	Report	XXX	Report	1/month	24-Hr Composite
Total Phosphorus	XXX	XXX	XXX	Report	XXX	Report	1/month	24-Hr Composite

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): at Outfall 001

*Shall not exceed in more than 10% of samples. See Part C.I. Other Requirement No G.

Permit No. PA0020575

PART A - EFFLUENT LIMITATIONS, MONITORING, RECORDKEEPING AND REPORTING REQUIREMENTS

I. B. For Outfall 001 , **Latitude** 39° 53' 27.41" , **Longitude** 75° 23' 24.99" , **River Mile Index** 4.8 , **Stream Code** 00621

Receiving Waters: Ridley Creek

Type of Effluent: Treated Sewage

1. The permittee is authorized to discharge during the period from February 1, 2018 through Permit Expiration Date.

2. Based on the anticipated wastewater characteristics and flows described in the permit application and its supporting documents and/or amendments, the following effluent limitations and monitoring requirements apply (see also Additional Requirements and Footnotes).

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) [1]		Concentrations (mg/L)				Minimum [2] Measurement Frequency	Required Sample Type
	Average Monthly	Weekly Average	Instant. Minimum	Average Monthly	Weekly Average	Instant. Maximum		
Flow (MGD)	Report	Report Daily Max	XXX	XXX	XXX	XXX	Continuous	Metered
pH (S.U.)	XXX	XXX	6.0	XXX	XXX	9.0	1/day	Grab
Dissolved Oxygen	XXX	XXX	5.0	XXX	XXX	XXX	1/day	Grab
Total Residual Chlorine	XXX	XXX	XXX	0.5	XXX	1.6	1/day	Grab
CBOD5	27.1	43.4	XXX	25	40	50	1/week	24-Hr Composite
CBOD5 Raw Sewage Influent	Report	XXX	XXX	Report	XXX	XXX	1/week	24-Hr Composite
BOD5 Raw Sewage Influent	Report	XXX	XXX	Report	XXX	XXX	1/week	24-Hr Composite
Total Suspended Solids Raw Sewage Influent	Report	XXX	XXX	Report	XXX	XXX	1/week	24-Hr Composite
Total Suspended Solids	32.5	48.8	XXX	30	45	60	1/week	24-Hr Composite

Outfall 001, Continued (from February 1, 2018 through Permit Expiration Date)

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) [1]		Concentrations (mg/L)				Minimum [2] Measurement Frequency	Required Sample Type
	Average Monthly	Weekly Average	Instant. Minimum	Average Monthly	Weekly Average	Instant. Maximum		
Total Dissolved Solids	XXX	XXX	XXX	XXX	XXX	Report Daily Max.	1/quarter	24-Hr Composite
Fecal Coliform (CFU/100 ml) May 1 - Sep 30	XXX	XXX	XXX	200 Geo Mean	XXX	1,000	1/week	Grab
Fecal Coliform (CFU/100 ml) Oct 1 - Apr 30	XXX	XXX	XXX	200 Geo Mean	XXX	1,000*	1/week	Grab
Total Nitrogen	XXX	XXX	XXX	Report	XXX	Report	1/month	24-Hr Composite
Ammonia-Nitrogen	XXX	XXX	XXX	Report	XXX	Report	1/month	24-Hr Composite
Total Phosphorus	2.2	XXX	XXX	2.0	XXX	4.0	1/week	24-Hr Composite

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): at Outfall 001

*Shall not exceed in more than 10% of samples. See Part C.I. Other Requirement No G.

PART A - EFFLUENT LIMITATIONS, MONITORING, RECORDKEEPING AND REPORTING REQUIREMENTS (Continued)

Additional Requirements

1. The permittee may not discharge:

   a. Floating solids, scum, sheen or substances that result in observed deposits in the receiving water. (25 Pa Code 92a.41(c))

   b. Oil and grease in amounts that cause a film or sheen upon or discoloration of the waters of this Commonwealth or adjoining shoreline, or that exceed 15 mg/l as a daily average or 30 mg/l at any time (or lesser amounts if specified in this permit). (25 Pa. Code 92a.47(a)(7) and 95.2(2))

   c. Substances in concentration or amounts sufficient to be inimical or harmful to the water uses to be protected or to human, animal, plant or aquatic life. (25 Pa Code 93.6(a))

   d. Foam or substances that produce an observed change in the color, taste, odor or turbidity of the receiving water, unless those conditions are otherwise controlled through effluent limitations or other requirements in this permit. (25 Pa Code 92a.41(c))

2. The monthly average percent removal of BOD_5 or $CBOD_5$ and TSS must be at least 85% for POTW facilities on a concentration basis except where 25 Pa. Code 92a.47(g) and (h) are applicable to facilities with combined sewer overflows (CSOs) or as otherwise specified in this permit. (25 Pa. Code 92a.47(a)(3))

3. If the permit requires the reporting of average weekly statistical results, the maximum weekly average concentration and maximum weekly average mass loading shall be reported, regardless of whether the results are obtained for the same or different weeks.

4. The permittee shall monitor the sewage effluent discharge(s) for the effluent parameters identified in the Part A limitations table(s) during all bypass events at the facility, using the sample types that are specified in the limitations table(s). Where the required sample type is "composite", the permittee must commence sample collection within one hour of the start of the bypass, wherever possible. The results shall be reported on the Daily Effluent Monitoring supplemental form (3800-FM-BPNPSM0435) and be incorporated into the calculations used to report self-monitoring data on Discharge Monitoring Reports (DMRs).

Footnotes

(1) When sampling to determine compliance with mass effluent limitations, the discharge flow at the time of sampling must be measured and recorded.

(2) This is the minimum number of sampling events required. Permittees are encouraged, and it may be advantageous in demonstrating compliance, to perform more than the minimum number of sampling events.

Supplemental Information

(1) The hydraulic design capacity of 0.13 million gallons per day for the treatment facility is used to prepare the annual Municipal Wasteload Management Report to help determine whether a "hydraulic overload" situation exists, as defined in Title 25 Pa. Code Chapter 94.

(2) The effluent limitations for Outfall 001 were determined using an effluent discharge rate of 0.13 MGD.

(3) The organic design capacity of 221 lbs BOD_5 per day for the treatment facility is used to prepare the annual Municipal Wasteload Management Report to determine whether an "organic overload" condition exists, as defined in 25 Pa. Code Chapter 94.

(4) Total Nitrogen is the sum of Total Kjeldahl-N (TKN) plus Nitrite-Nitrate as N (NO_2+NO_3-N), where TKN and NO_2+NO_3-N are measured in the same sample.

II. DEFINITIONS

At Outfall (XXX) means a sampling location in outfall line XXX below the last point at which wastes are added to outfall line (XXX), or where otherwise specified.

Average refers to the use of an arithmetic mean, unless otherwise specified in this permit. (40 CFR 122.41(l)(4)(iii))

Best Management Practices (BMPs) means schedules of activities, prohibitions of practices, maintenance procedures and other management practices to prevent or reduce the pollutant loading to surface waters of the Commonwealth. The term also includes treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. The term includes activities, facilities, measures, planning or procedures used to minimize accelerated erosion and sedimentation and manage stormwater to protect, maintain, reclaim, and restore the quality of waters and the existing and designated uses of waters within this Commonwealth before, during and after earth disturbance activities. (25 Pa. Code 92a.2)

Bypass means the intentional diversion of waste streams from any portion of a treatment facility. (40 CFR 122.41(m)(1)(i))

Calendar Week is defined as the seven consecutive days from Sunday through Saturday, unless the permittee has been given permission by DEP to provide weekly data as Monday through Friday based on showing excellent performance of the facility and a history of compliance. In cases when the week falls in two separate months, the month with the most days in that week shall be the month for reporting.

Clean Water Act means the Federal Water Pollution Control Act, as amended (33 U.S.C.A. §§1251 to 1387).

Composite Sample (for all except GC/MS volatile organic analysis) means a combination of individual samples (at least eight for a 24-hour period or four for an 8-hour period) of at least 100 milliliters (mL) each obtained at spaced time intervals during the compositing period. The composite must be flow-proportional; either the volume of each individual sample is proportional to discharge flow rates, or the sampling interval is proportional to the flow rates over the time period used to produce the composite. (EPA Form 2C)

Composite Sample (for GC/MS volatile organic analysis) consists of at least four aliquots or grab samples collected during the sampling event (not necessarily flow proportioned). The samples must be combined in the laboratory immediately before analysis and then one analysis is performed. (EPA Form 2C)

Daily Average Temperature means the average of all temperature measurements made, or the mean value plot of the record of a continuous automated temperature recording instrument, either during a calendar day or during the operating day if flows are of a shorter duration.

Daily Discharge means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the "daily discharge" is calculated as the average measurement of the pollutant over the day. (25 Pa. Code 92a.2, 40 CFR 122.2)

Daily Maximum Discharge Limitation means the highest allowable "daily discharge."

Discharge Monitoring Report (DMR) means the DEP or EPA supplied form(s) for the reporting of self-monitoring results by the permittee. (25 Pa. Code 92a.2 and 40 CFR 122.2)

Estimated Flow means any method of liquid volume measurement based on a technical evaluation of the sources contributing to the discharge including, but not limited to, pump capabilities, water meters and batch discharge volumes.

Geometric Mean means the average of a set of n sample results given by the n^{th} root of their product.

Grab Sample means an individual sample of at least 100 mL collected at a randomly selected time over a period not to exceed 15 minutes. (EPA Form 2C)
Hauled-In Wastes means any waste that is introduced into a treatment facility through any method other than a direct connection to the sewage collection system. The term includes wastes transported to and disposed of within the treatment facility or other entry points within the collection system.

Hazardous Substance means any substance designated under 40 CFR Part 116 pursuant to Section 311 of the Clean Water Act. (40 CFR 122.2)

Immersion Stabilization (i-s) means a calibrated device is immersed in the wastewater until the reading is stabilized.

Indirect Discharger means a non-domestic discharger introducing pollutants to a Publicly Owned Treatment Works (POTW) or other treatment works. (25 Pa. Code 92a.2 and 40 CFR 122.2)

Industrial User means a source of Indirect Discharge. (40 CFR 403.3)

Instantaneous Maximum Effluent Limitation means the highest allowable discharge of a concentration or mass of a substance at any one time as measured by a grab sample. (25 Pa. Code 92a.2)

Measured Flow means any method of liquid volume measurement, the accuracy of which has been previously demonstrated in engineering practice, or for which a relationship to absolute volume has been obtained.

Monthly Average Discharge Limitation means the highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month. (25 Pa. Code 92a.2)

Municipality means a city, town, borough, county, township, school district, institution, authority or other public body created by or pursuant to State law and having jurisdiction over disposal of sewage, industrial wastes, or other wastes. (25 Pa. Code 92a.2)

Municipal Waste Garbage, refuse, industrial lunchroom or office waste and other material, including solid, liquid, semisolid or contained gaseous material resulting from operation of residential, municipal, commercial or institutional establishments and from community activities; and sludge not meeting the definition of residual or hazardous waste under this section from a municipal, commercial or institutional water supply treatment plant, waste water treatment plant or air pollution control facility. (25 Pa. Code 271.1)

Publicly Owned Treatment Works (POTW) means a treatment works as defined by §212 of the Clean Water Act, owned by a state or municipality. The term includes any devices and systems used in the storage, treatment, recycling and reclamation of municipal sewage or industrial wastes of a liquid nature. The term also includes sewers, pipes or other conveyances if they convey wastewater to a POTW providing treatment. The term also means the municipality as defined in section 502(4) of the Clean Water Act, which has jurisdiction over the indirect discharges to and the discharges from such a treatment works. (25 Pa Code 92a.2 and 40 CFR 122.2)

Residual Waste Garbage, refuse, other discarded material or other waste, including solid, liquid, semisolid or contained gaseous materials resulting from industrial, mining and agricultural operations and sludge from an industrial, mining or agricultural water supply treatment facility, wastewater treatment facility or air pollution control facility, if it is not hazardous. The term does not include coal refuse as defined in the Coal Refuse Disposal Control Act. The term does not include treatment sludges from coal mine drainage treatment plants, disposal of which is being carried on under and in compliance with a valid permit issued under the Clean Streams Law. (25 Pa Code 287.1)

Severe Property Damage means substantial physical damage to property, damage to the treatment facilities that causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production. (40 CFR 122.41(m)(1)(ii))

Stormwater means the runoff from precipitation, snow melt runoff, and surface runoff and drainage. (25 Pa. Code 92a.2)

Stormwater Associated With Industrial Activity means the discharge from any conveyance that is used for collecting and conveying stormwater and that is directly related to manufacturing, processing or raw materials storage areas at an industrial plant, and as defined at 40 CFR §122.26(b)(14)(i) – (ix) and (xi) and 25 Pa. Code 92a.2.

Toxic Pollutant means those pollutants, or combinations of pollutants, including disease-causing agents, which after discharge and upon exposure, ingestion, inhalation or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains may, on the basis of information available to DEP cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions, including malfunctions in reproduction, or physical deformations in these organisms or their offspring. (25 Pa. Code 92a.2)

Weekly Average Discharge Limitation means the highest allowable average of "daily discharges" over a calendar week, calculated as the sum of all "daily discharges" measured during a calendar week divided by the number of "daily discharges" measured during that week.

III. SELF-MONITORING, REPORTING AND RECORDKEEPING

A. Representative Sampling

1. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity (40 CFR 122.41(j)(1)). Representative sampling includes the collection of samples, where possible, during periods of adverse weather, changes in treatment plant performance and changes in treatment plant loading. If possible, effluent samples must be collected where the effluent is well mixed near the center of the discharge conveyance and at the approximate mid-depth point, where the turbulence is at a maximum and the settlement of solids is minimized. (40 CFR 122.48 and 25 Pa. Code § 92a.61)

2. Records Retention (40 CFR 122.41(j)(2))

   Except for records of monitoring information required by this permit related to the permittee's sludge use and disposal activities which shall be retained for a period of at least 5 years, all records of monitoring activities and results (including all original strip chart recordings for continuous monitoring instrumentation and calibration and maintenance records), copies of all reports required by this permit, and records of all data used to complete the application for this permit shall be retained by the permittee for 3 years from the date of the sample measurement, report or application, unless a longer retention period is required by the permit. The 3-year period shall be extended as requested by DEP or the EPA Regional Administrator.

3. Recording of Results (40 CFR 122.41(j)(3))

   For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

   a. The exact place, date and time of sampling or measurements.
   b. The person(s) who performed the sampling or measurements.
   c. The date(s) the analyses were performed.
   d. The person(s) who performed the analyses.
   e. The analytical techniques or methods used; and the associated detection level.
   f. The results of such analyses.

4. Test Procedures (40 CFR 122.41(j)(4))

   Facilities that test or analyze environmental samples used to demonstrate compliance with this permit shall be in compliance with laboratory accreditation requirements of Act 90 of 2002 (27 Pa. C.S. §§4101-4113) and 25 Pa. Code Chapter 252, relating to environmental laboratory accreditation. Unless otherwise specified in this permit, the test procedures for the analysis of pollutants shall be those approved under 40 CFR Part 136 (or in the case of sludge use or disposal, approved under 40 CFR Part 136, unless otherwise specified in 40 CFR Part 503 or Subpart J of 25 Pa. Code Chapter 271), or alternate test procedures approved pursuant to those parts, unless other test procedures have been specified in this permit.

5. Quality/Assurance/Control

   In an effort to assure accurate self-monitoring analyses results:

   a. The permittee, or its designated laboratory, shall participate in the periodic scheduled quality assurance inspections conducted by DEP and EPA. (40 CFR 122.41(e), 122.41(i)(3))

   b. The permittee, or its designated laboratory, shall develop and implement a program to assure the quality and accurateness of the analyses performed to satisfy the requirements of this permit, in accordance with 40 CFR Part 136. (40 CFR 122.41(j)(4))

B. Reporting of Monitoring Results

1. The permittee shall effectively monitor the operation and efficiency of all wastewater treatment and control facilities, and the quantity and quality of the discharge(s) as specified in this permit. (40 CFR 122.41(e), 122.44(i)(1))

2. Discharge Monitoring Reports (DMRs) must be completed in accordance with DEP's published DMR Instructions (3800-FM-BPNPSM0463). DMRs are based on calendar reporting periods unless Part C of this permit requires otherwise. DMR(s) must be received by the agency(ies) specified in paragraph 3 below in accordance with the following schedule:

   - Monthly DMRs must be received within 28 days following the end of each calendar month.

   - Quarterly DMRs must be received within 28 days following the end of each calendar quarter, i.e., January 28, April 28, July 28, and October 28.

   - Semiannual DMRs must be received within 28 days following the end of each calendar semiannual period, i.e., January 28 and July 28.

   - Annual DMRs must be received by January 28, unless Part C of this permit requires otherwise.

3. The permittee shall complete all Supplemental Reporting forms (Supplemental DMRs) provided by DEP in this permit (or an approved equivalent), and submit the signed, completed forms as an attachment to the DMR(s). If the permittee elects to use DEP's electronic DMR (eDMR) system, one electronic submission may be made for DMRs and Supplemental DMRs. If paper forms are used, the completed forms shall be mailed to:

   Department of Environmental Protection
   Clean Water Program
   2 East Main Street
   Norristown, PA 19401

4. If the permittee elects to begin using DEP's eDMR system to submit DMRs required by the permit, the permittee shall, to assure continuity of business operations, continue using the eDMR system to submit all DMRs and Supplemental Reports required by the permit, unless the following steps are completed to discontinue use of eDMR:

   a. The permittee shall submit written notification to the regional office that issued the permit that it intends to discontinue use of eDMR. The notification shall be signed by a principal executive officer or authorized agent of the permittee.

   b. The permittee shall continue using eDMR until the permittee receives written notification from DEP's Central Office that the facility has been removed from the eDMR system, and electronic report submissions are no longer expected.

5. The completed DMR Form shall be signed and certified by either of the following applicable persons, as defined in 25 Pa. Code § 92a.22:

   - For a corporation - by a principal executive officer of at least the level of vice president, or an authorized representative, if the representative is responsible for the overall operation of the facility from which the discharge described in the NPDES form originates.
   - For a partnership or sole proprietorship - by a general partner or the proprietor, respectively.
   - For a municipality, state, federal or other public agency - by a principal executive officer or ranking elected official.

   If signed by a person other than the above, written notification of delegation of DMR signatory authority must be submitted to DEP in advance of or along with the relevant DMR form. (40 CFR 122.22(b))

6. If the permittee monitors any pollutant at monitoring points as designated by this permit, using analytical methods described in Part A III.A.4. herein, more frequently than the permit requires, the results of this monitoring shall be incorporated, as appropriate, into the calculations used to report self-monitoring data on the DMR. (40 CFR 122.41(l)(4)(ii))

C. Reporting and Notification Requirements

1. Planned Changes to Physical Facilities – The permittee shall give notice to DEP as soon as possible but no later than 30 days prior to planned physical alterations or additions to the permitted facility. A permit under 25 Pa. Code Chapter 91 may be required for these situations prior to implementing the planned changes. A permit application, or other written submission to DEP, can be used to satisfy the notification requirements of this section.

   Notice is required when:

   a. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR §122.29(b). (40 CFR 122.41(l)(1)(i))

   b. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are not subject to effluent limitations in this permit. (40 CFR 122.41(l)(1)(ii))

   c. The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan. (40 CFR 122.41(l)(1)(iii))

   d. The planned change may result in noncompliance with permit requirements. (40 CFR 122.41(l)(2))

2. Planned Changes to Waste Stream – Under the authority of 25 Pa. Code 92a.24(a) and 40 CFR 122.42(b), the permittee shall provide notice to DEP and EPA as soon as possible but no later than 45 days prior to any planned changes in the volume or pollutant concentration of its influent waste stream as a result of indirect discharges or hauled-in wastes, as specified in paragraphs 2.a. and 2.b., below. Notice shall be provided on the "Planned Changes to Waste Stream" Supplemental Report (3800-FM-BPNPSM0482), available on DEP's website. The permittee shall provide information on the quality and quantity of waste introduced into the POTW, and any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW (40 CFR 122.42(b)(3)). The Report shall be sent via Certified Mail or other means to confirm DEP's receipt of the notification. DEP will determine if the submission of a new application and receipt of a new or amended permit is required.

   a. Introduction of New Pollutants (25 Pa. Code 92a.24(a), 40 CFR 122.42(b)(1))

      New pollutants are defined as parameters that meet one or more of the following criteria:

      (i) Any pollutants that were not detected in the facilities' influent waste stream as reported in the permit application; and have not been approved to be included in the permittee's influent waste stream by DEP in writing.

      (ii) Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to Sections 301 or 306 of the Clean Water Act if it were directly discharging those pollutants (40 CFR 122.42(b)(1)).

      The permittee shall provide notification of the introduction of new pollutants in accordance with paragraph 2 above. The permittee may not authorize the introduction of new pollutants until the permittee receives DEP's written approval.

   b. Increased Loading of Approved Pollutants (25 Pa. Code 92a.24(a), 40 CFR 122.42(b)(2))

Approved pollutants are defined as parameters that meet one or more of the following criteria:

(i) Were detected in the facilities' influent waste stream as reported in the permittee's permit application; or have been previously approved to be included in the permittee's influent waste stream by DEP in writing.

(ii) Have an effluent limitation or monitoring requirement in this permit.

The permittee shall provide notification of the introduction of increased influent loading (lbs/day) of approved pollutants in accordance with paragraph 2 above when (1) the cumulative increase in influent loading (lbs/day) exceeds 20% of the maximum loading reported in the permit application, or a loading previously approved by DEP and/or EPA, or (2) may cause an exceedance in the effluent of Effluent Limitation Guidelines (ELGs) or limitations in Part A of this permit, or (3) may cause interference or pass through at the POTW, or (4) may cause exceedances of the applicable water quality standards in the receiving stream. Unless specified otherwise in this permit, if DEP does not respond to the notification within 30 days of its receipt, the permittee may proceed with the increase in loading. The acceptance of increased loading of approved pollutants may not result in an exceedance of ELGs or effluent limitations, may not result in a hydraulic or organic overload condition as defined in 25 Pa. Code 94.1, and may not cause exceedances of the applicable water quality standards in the receiving stream.

3. Reporting Requirements for Hauled-In Wastes

a. Receipt of Residual Waste

(i) The permittee shall document the receipt of all hauled-in residual wastes (including but not limited to wastewater from oil and gas wells, food processing waste, and landfill leachate), as defined at 25 Pa. Code § 287.1, that are received for processing at the treatment facility. The permittee shall report hauled-in residual wastes on a monthly basis to DEP on the "Hauled In Residual Wastes" Supplemental Report (3800-FM-BPNPSM0450) as an attachment to the DMR. If no residual wastes were received during a month, submission of the Supplemental Report is not required.

The following information is required by the Supplemental Report. The information used to develop the Report shall be retained by the permittee for five years from the date of receipt and must be made available to DEP or EPA upon request.

(1) The dates that residual wastes were received.

(2) The volume (gallons) of wastes received.

(3) The license plate number of the vehicle transporting the waste to the treatment facility.

(4) The permit number(s) of the well(s) where residual wastes were generated, if applicable.

(5) The name and address of the generator of the residual wastes.

(6) The type of wastewater.

The transporter of residual waste must maintain these and other records as part of the daily operational record (25 Pa. Code § 299.219). If the transporter is unable to provide this information or the permittee has not otherwise received the information from the generator, the residual wastes shall not be accepted by the permittee until such time as the permittee receives such information from the transporter or generator.

(ii) The following conditions apply to the characterization of residual wastes received by the permittee:

(1) If the generator is required to complete a chemical analysis of residual wastes in accordance with 25 Pa. Code § 287.51, the permittee must receive and maintain on file a chemical analysis of the residual wastes it receives. The chemical analysis must conform to the Bureau of Waste Management's Form 26R except as noted in paragraph (2), below. Each load of residual waste received must be covered by a chemical analysis if the generator is required to complete it.

(2) For wastewater generated from hydraulic fracturing operations ("frac wastewater") within the first 30 production days of a well site, the chemical analysis may be a general frac wastewater characterization approved by DEP. Thereafter, the chemical analysis must be waste-specific and be reported on the Form 26R.

b. Receipt of Municipal Waste

(i) The permittee shall document the receipt of all hauled-in municipal wastes (including but not limited to septage and liquid sewage sludge), as defined at 25 Pa. Code § 271.1, that are received for processing at the treatment facility. The permittee shall report hauled-in municipal wastes on a monthly basis to DEP on the "Hauled In Municipal Wastes" Supplemental Report (3800-FM-BPNPSM0437) as an attachment to the DMR. If no municipal wastes were received during a month, submission of the Supplemental Report is not required.

The following information is required by the Supplemental Report:

(1) The dates that municipal wastes were received.

(2) The volume (gallons) of wastes received.

(3) The BOD_5 concentration (mg/l) and load (lbs) for the wastes received.

(4) The location(s) where wastes were disposed of within the treatment facility.

(ii) Sampling and analysis of hauled-in municipal wastes must be completed to characterize the organic strength of the wastes, unless composite sampling of influent wastewater is performed at a location downstream of the point of entry for the wastes. The influent BOD_5 characterization for the treatment facility, as reported in the annual Municipal Wasteload Management Report per 25 Pa. Code Chapter 94, must be representative of the hauled-in municipal wastes received.

4. Unanticipated Noncompliance or Potential Pollution Reporting

   a. Immediate Reporting - The permittee shall immediately report any incident causing or threatening pollution in accordance with the requirements of 25 Pa. Code Sections 91.33 and 92a.41(b).

      (i) If, because of an accident, other activity or incident a toxic substance or another substance which would endanger users downstream from the discharge, or would otherwise result in pollution or create a danger of pollution or would damage property, the permittee shall immediately notify DEP by telephone of the location and nature of the danger. Oral notification to the Department is required as soon as possible, but no later than 4 hours after the permittee becomes aware of the incident causing or threatening pollution.

      (ii) If reasonably possible to do so, the permittee shall immediately notify downstream users of the waters of the Commonwealth to which the substance was discharged. Such notice shall include the location and nature of the danger.

      (iii) The permittee shall immediately take or cause to be taken steps necessary to prevent injury to property and downstream users of the waters from pollution or a danger of pollution and, in addition, within 15 days from the incident, shall remove the residual substances contained thereon or therein from the ground and from the affected waters of this Commonwealth to the extent required by applicable law.

   b. The permittee shall report any noncompliance which may endanger health or the environment in accordance with the requirements of 40 CFR 122.41(l)(6). These requirements include the following obligations:

      (i) 24 Hour Reporting - The permittee shall orally report any noncompliance with this permit which may endanger health or the environment within 24 hours from the time the permittee becomes aware of the circumstances. The following shall be included as information which must be reported within 24 hours under this paragraph (40 CFR 122.41(l)(6)(ii)):

         (1) Any unanticipated bypass which exceeds any effluent limitation in the permit;

         (2) Any upset which exceeds any effluent limitation in the permit; and

         (3) Violation of the maximum daily discharge limitation for any of the pollutants listed in the permit as being subject to the 24-hour reporting requirement.

      (ii) Written Report - A written submission shall also be provided within 5 days of the time the permittee becomes aware of any noncompliance which may endanger health or the environment. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

      (iii) Waiver of Written Report - DEP may waive the written report on a case-by-case basis if the associated oral report has been received within 24 hours from the time the permittee becomes aware of the circumstances which may endanger health or the environment. Unless such a waiver is expressly granted by DEP, the permittee shall submit a written report in accordance with this paragraph. (40 CFR 122.41(l)(6)(iii))

5. Other Noncompliance

   The permittee shall report all instances of noncompliance not reported under paragraph C.4 of this section or specific requirements of compliance schedules, at the time DMRs are submitted, on the Non-Compliance Reporting Form (3800-FM-BPNPSM0440). The reports shall contain the information listed in paragraph C.4.b.(ii) of this section. (40 CFR 122.41(l)(7))

PART B

I. MANAGEMENT REQUIREMENTS

A. Compliance Schedules (25 Pa. Code 92a.51, 40 CFR 122.47(a))

1. The permittee shall achieve compliance with the terms and conditions of this permit within the time frames specified in this permit.

2. The permittee shall submit reports of compliance or noncompliance, or progress reports as applicable, for any interim and final requirements contained in this permit. Such reports shall be submitted no later than 14 days following the applicable schedule date or compliance deadline. (40 CFR 122.47(a)(4))

B. Permit Modification, Termination, or Revocation and Reissuance

1. This permit may be modified, terminated, or revoked and reissued during its term in accordance with 25 Pa. Code 92a.72 and 40 CFR 122.41(f).

2. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition. (40 CFR 122.41(f))

3. In the absence of DEP action to modify or revoke and reissue this permit, the permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time specified in the regulations that establish those standards or prohibitions. (40 CFR 122.41(a)(1))

C. Duty to Provide Information

1. The permittee shall furnish to DEP, within a reasonable time, any information which DEP may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. (40 CFR 122.41(h))

2. The permittee shall furnish to DEP, upon request, copies of records required to be kept by this permit. (40 CFR 122.41(h))

3. Other Information - Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to DEP, it shall promptly submit the correct and complete facts or information. (40 CFR 122.41(l)(8))

4. The permittee shall provide the following information in the annual Municipal Wasteload Management Report, required under the provisions of Title 25 Pa. Code Chapter 94:

   a. The requirements identified in 25 Pa. Code 94.12.

   b. The identity of any indirect discharger(s) served by the POTW which are subject to pretreatment standards adopted under Section 307(b) of the Clean Water Act; the POTW shall also specify the total volume of discharge and estimated concentration of each pollutant discharged into the POTW by the indirect discharger.

   c. A "Solids Management Inventory" if specified in Part C of this permit.

   d. The total volume of hauled-in residual and municipal wastes received during the year, by source.

   e. The Annual Report requirements for permittees required to implement an industrial pretreatment program listed in Part C, as applicable.

D. General Pretreatment Requirements

1. Any POTW (or combination of POTWs operated by the same authority) with a total design flow greater than 5 million gallons per day (MGD) and receiving from industrial users pollutants which pass through or interfere with the operation of the POTW or are otherwise subject to Pretreatment Standards will be required to establish a POTW Pretreatment Program unless specifically exempted by the Approval Authority. A POTW with a design flow of 5 MGD or less may be required to develop a POTW Pretreatment Program if the Approval Authority finds that the nature or volume of the industrial influent, treatment process upsets, violations of effluent limitations, contamination of sludge, or other circumstances warrant in order to prevent interference or pass through. (40 CFR 403.8)

2. Each POTW with an approved Pretreatment Program pursuant to 40 CFR 403.8 shall develop and enforce specific limits to implement the prohibitions listed in 40 CFR 403.5(a)(1) and (b), and shall continue to develop these limits as necessary and effectively enforce such limits. This condition applies, for example, when there are planned changes to the waste stream as identified in Part A III.C.2. If the permittee is required to develop or continue implementation of a Pretreatment Program, detailed requirements will be contained in Part C of this permit.

3. For all POTWs, where pollutants contributed by indirect dischargers result in interference or pass through, and a violation is likely to recur, the permittee shall develop and enforce specific limits for indirect dischargers and other users, as appropriate, that together with appropriate facility or operational changes, are necessary to ensure renewed or continued compliance with this permit or sludge use or disposal practices. Where POTWs do not have an approved Pretreatment Program, the permittee shall submit a copy of such limits to DEP when developed. (25 Pa. Code 92a.47(d))

E. Proper Operation and Maintenance

1. The permittee shall employ operators certified in compliance with the Water and Wastewater Systems Operators Certification Act (63 P.S. §§1001-1015.1).

2. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance includes, but is not limited to, adequate laboratory controls including appropriate quality assurance procedures. This provision also includes the operation of backup or auxiliary facilities or similar systems that are installed by the permittee, only when necessary to achieve compliance with the terms and conditions of this permit. (40 CFR 122.41(e))

F. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge, sludge use or disposal in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment. (40 CFR 122.41(d))

G. Bypassing

1. Bypassing Not Exceeding Permit Limitations - The permittee may allow a bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions in paragraphs two, three and four of this section. (40 CFR 122.41(m)(2))

2. Other Bypassing - In all other situations, bypassing is prohibited and DEP may take enforcement action against the permittee for bypass unless:

   a. A bypass is unavoidable to prevent loss of life, personal injury or "severe property damage." (40 CFR 122.41(m)(4)(i)(A))

   b. There are no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This

condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance. (40 CFR 122.41(m)(4)(i)(B))

c. The permittee submitted the necessary notice required in paragraph G.4 below. (40 CFR 122.41(m)(4)(i)(C))

3. DEP may approve an anticipated bypass, after considering its adverse effects, if DEP determines that it will meet the conditions listed in paragraph G.2 above. (40 CFR 122.41(m)(4)(ii))

4. Notice

a. Anticipated Bypass – If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible, at least 10 days before the bypass. (40 CFR 122.41(m)(3)(i))

b. Unanticipated Bypass – The permittee shall submit oral notice of any other unanticipated bypass within 24 hours, regardless of whether the bypass may endanger health or the environment or whether the bypass exceeds effluent limitations. The notice shall be in accordance with Part A III.C.4.b.

H. Sanitary Sewer Overflows (SSOs)

An SSO is an overflow of wastewater, or other untreated discharge from a separate sanitary sewer system (which is not a combined sewer system), which results from a flow in excess of the carrying capacity of the system or from some other cause prior to reaching the headworks of the sewage treatment facility. SSOs are not authorized under this permit. The permittee shall immediately report any SSO to DEP in accordance with Part A III.C.4 of this permit.

II. PENALTIES AND LIABILITY

A. Violations of Permit Conditions

Any person violating Sections 301, 302, 306, 307, 308, 318 or 405 of the Clean Water Act or any permit condition or limitation implementing such sections in a permit issued under Section 402 of the Act is subject to civil, administrative and/or criminal penalties as set forth in 40 CFR §122.4l(a)(2).

Any person or municipality, who violates any provision of this permit; any rule, regulation or order of DEP; or any condition or limitation of any permit issued pursuant to the Clean Streams Law, is subject to criminal and/or civil penalties as set forth in Sections 602, 603 and 605 of the Clean Streams Law.

B. Falsifying Information

Any person who does any of the following:

- Falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit, or

- Knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit (including monitoring reports or reports of compliance or noncompliance)

Shall, upon conviction, be punished by a fine and/or imprisonment as set forth in *18 Pa.C.S.A § 4904* and 40 CFR §122.41(j)(5) and (k)(2).

C. Liability

Nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance pursuant to Section 309 of the Clean Water Act or Sections 602, 603 or 605 of the Clean Streams Law.

Nothing in this permit shall be construed to preclude the institution of any legal action or to relieve the permittee from any responsibilities, liabilities or penalties to which the permittee is or may be subject to under the Clean Water Act and the Clean Streams Law.

D. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for the permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. 40 CFR 122.41(c)

III. OTHER RESPONSIBILITIES

A. Right of Entry

Pursuant to Sections 5(b) and 305 of Pennsylvania's Clean Streams Law, and Title 25 Pa. Code Chapter 92a and 40 CFR §122.41(i), the permittee shall allow authorized representatives of DEP and EPA, upon the presentation of credentials and other documents as may be required by law:

1. To enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit; (40 CFR 122.41(i)(1))

2. To have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit; (40 CFR 122.41(i)(2))

3. To inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices or operations regulated or required under this permit; and (40 CFR 122.41(i)(3))

4. To sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act or the Clean Streams Law, any substances or parameters at any location. (40 CFR 122.41(i)(4))

B. Transfer of Permits

1. Transfers by modification. Except as provided in paragraph 2 of this section, a permit may be transferred by the permittee to a new owner or operator only if this permit has been modified or revoked and reissued, or a minor modification made to identify the new permittee and incorporate such other requirements as may be necessary under the Clean Water Act. (40 CFR 122.61(a))

2. Automatic transfers. As an alternative to transfers under paragraph 1 of this section, any NPDES permit may be automatically transferred to a new permittee if:

   a. The current permittee notifies DEP at least 30 days in advance of the proposed transfer date in paragraph 2.b. of this section; (40 CFR 122.61(b)(1))

   b. The notice includes the appropriate DEP transfer form signed by the existing and new permittees containing a specific date for transfer of permit responsibility, coverage and liability between them; and (40 CFR 122.61(b)(2))

   c. DEP does not notify the existing permittee and the proposed new permittee of its intent to modify or revoke and reissue this permit, the transfer is effective on the date specified in the agreement mentioned in paragraph 2.b. of this section. (40 CFR 122.61(b)(3))

   d. The new permittee is in compliance with existing DEP issued permits, regulations, orders and schedules of compliance, or has demonstrated that any noncompliance with the existing permits

has been resolved by an appropriate compliance action or by the terms and conditions of the permit (including compliance schedules set forth in the permit), consistent with 25 Pa. Code 92a.51 (relating to schedules of compliance) and other appropriate Department regulations. (25 Pa. Code 92a.71)

3. In the event DEP does not approve transfer of this permit, the new owner or operator must submit a new permit application.

C. Property Rights

The issuance of this permit does not convey any property rights of any sort, or any exclusive privilege. (40 CFR 122.41(g))

D. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for a new permit. (40 CFR 122.41(b))

E. Other Laws

The issuance of this permit does not authorize any injury to persons or property or invasion of other private rights, or any infringement of state or local law or regulations.

IV. ANNUAL FEE

Permittees shall pay an annual fee in accordance with 25 Pa. Code § 92a.62. Annual fee amounts are specified in the following schedule and are due on each anniversary of the effective date of the most recent new or reissued permit. All flows identified in the schedule are annual average design flows. (25 Pa. Code 92a.62)

Small Flow Treatment Facility (SRSTP and SFTF)	$0
Minor Sewage Facility < 0.05 MGD (million gallons per day)	$250
Minor Sewage Facility ≥ 0.05 and < 1 MGD	$500
Minor Sewage Facility with CSO (Combined Sewer Overflow)	$750
Major Sewage Facility ≥ 1 and < 5 MGD	$1,250
Major Sewage Facility ≥ 5 MGD	$2,500
Major Sewage Facility with CSO	$5,000

As of the effective date of this permit, the facility covered by the permit is classified in the following fee category: **Minor Sewage Facility >=0.05 and <1 MGD.**

Invoices for annual fees will be mailed to permittees approximately three months prior to the due date. In the event that an invoice is not received, the permittee is nonetheless responsible for payment. Throughout a five year permit term, permittees will pay four annual fees followed by a permit renewal application fee in the last year of permit coverage. Permittees may contact the DEP at 717-787-6744 with questions related to annual fees. The fees identified above are subject to change in accordance with 25 Pa. Code 92a.62(e).

Payment for annual fees shall be remitted to DEP at the address below by the anniversary date. Checks should be made payable to the Commonwealth of Pennsylvania.

PA Department of Environmental Protection
Bureau of Point and Non-Point Source Management
Re: Chapter 92a Annual Fee
P.O. Box 8466
Harrisburg, PA 17105-8466

PART C

I. OTHER REQUIREMENTS

A. No storm water from pavements, area ways, roofs, foundation drains or other sources shall be directly admitted to the sanitary sewers associated with the herein approved discharge.

B. The approval herein given is specifically made contingent upon the permittee acquiring all necessary property rights by easement or otherwise, providing for the satisfactory construction, operation, maintenance or replacement of all sewers or sewerage structures associated with the herein approved discharge in, along, or across private property, with full rights of ingress, egress and regress.

C. Collected screenings, slurries, sludges, and other solids shall be handled and disposed of in compliance with 25 Pa. Code, Chapters 271, 273, 275, 283, and 285 (related to permits and requirements for landfilling, land application, incineration, and storage of sewage sludge), Federal Regulation 40 CFR 257, Pennsylvania Clean Streams Law, Pennsylvania Solid Waste Management Act of 1980, and the Federal Clean Water Act and its amendments. The permittee is responsible to obtain or assure that contracted agents have all necessary permits and approvals for the handling, storage, transport, and disposal of solid waste materials generated as a result of wastewater treatment.

D. The permittee shall optimize chlorine dosages used for disinfection or other purposes to minimize the concentration of Total Residual Chlorine (TRC) in the effluent, meet applicable effluent limitations, and reduce the possibility of adversely affecting the receiving waters. Optimization efforts may include an evaluation of wastewater characteristics, mixing characteristics, and contact times, adjustments to process controls, and maintenance of the disinfection facilities. If DEP determines that effluent TRC is causing adverse water quality impacts, DEP may reopen this permit to apply new or more stringent effluent limitations and/or require implementation of control measures or operational practices to eliminate such impacts.

   Where the permittee does not use chlorine for primary or backup disinfection, but proposes the use of chlorine for cleaning or other purposes, the permittee shall notify DEP prior to initiating use of chlorine and monitor TRC concentrations in the effluent on each day in which chlorine is used. The results shall be submitted as an attachment to the DMR.

E. Notification of the designation of the responsible operator must be submitted to the permitting agency by the permittee within 60 days after the effective date of the permit and from time to time thereafter as the operator is replaced.

F. The DEP may identify and require certain discharge specific data to be submitted before the expiration date of this permit. Upon notification by the DEP, the permittee will have 12 months from the date of the notice to provide the required data. These data, along with any other data available to the DEP, will be used in completing the Watershed TMDL/WLA Analysis and in establishing discharge effluent limits. In the event that DEP requires the submission of data pursuant to this condition, the permittee shall have the right to appeal or otherwise contest the requirement.

G. The seasonal effluent limitations for fecal coliform are based on Chapter 92a (§ 92a.47(4) & (5)) of DEP's regulations and Delaware River Basin Commission's (DRBC's) Water Quality Regulations at § 4.30.4.A. DEP's regulations govern the summer limits for fecal coliform while the winter limits are based on DRBC's regulations. The DRBC regulations state that during winter season from October through April, the instantaneous maximum concentration of fecal coliform organisms shall not be greater than 1,000 per 100 milliliters in more than 10 percent of the samples tested. For reporting purposes, a copy of the guidelines on the 10 percent rule is enclosed with the permit.

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Orig: Charles Hurst

RECEIVED
MAY 1 2018
By 2018-0613

fwd: BAB

April 24, 2018

CERTIFIED MAIL NO. 7017 1000 0000 5886 5855

Charles Hurst
DELCORA
100 East Fifth Street P O Box 999
Chester, PA 19016-0999

Re: WQM Permit - Sewage
DELCORA Sewer System & STP
Permit No. 2318401
Authorization ID No. 1215341
Chester City, Delaware County

Dear Mr. Hurst:

Your Water Quality Management (WQM) permit is enclosed. You must comply with all Standard and Special Conditions attached to this Permit. Construction must be done in accordance with the permit application and all supporting documentation. Please review the permit conditions and the supporting documentation submitted with your application before starting construction.

Please note that you are responsible for securing all other required permits, approvals and/or registrations associated with the project, if applicable, under Chapters 102 (erosion and sedimentation control), 105 (stream obstructions and encroachments) and 106 (floodplains) of DEP's regulations. Construction may not proceed until all other required permits have been obtained.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa.C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717.787.3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800.654.5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at 717.787.3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST REACH THE BOARD WITHIN 30 DAYS. YOU DO NOT NEED A LAWYER TO FILE AN APPEAL WITH THE BOARD.

IMPORTANT LEGAL RIGHTS ARE AT STAKE, HOWEVER, SO YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT AFFORD A LAWYER, YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY TO THE BOARD (717.787.3483) FOR MORE INFORMATION.

During construction or upon completing construction, please contact Karen McDaniel at 484.250.5126 or kmcdaniel@pa.gov so that an inspection of the facilities may be conducted, at DEP's discretion.

Sincerely,

Environmental Program Manager
Clean Water Program

Enclosures

cc: City of Chester
Chester County Health Department
Chester County Commissioners
Mr. Elberti, P.E., Gannett Fleming, Inc.
Operations, SERO
Re

3800-PM-WSFR0015 1/2011
Permit

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

WATER QUALITY MANAGEMENT PERMIT

PERMIT NO. 2318401

AMENDMENT NO. _____

APS ID. 960174

AUTH. ID. 1215341

A. PERMITTEE (Name and Address): CLIENT ID#: 42332 **DELCORA** **100 East Fifth Street P O Box 999** **Chester, PA 19016-0999**	B. PROJECT/FACILITY (Name): **DELCORA Sewer System & STP**
C. LOCATION (Municipality, County): **Chester City, Delaware County**	SITE ID#: **454804**

D. This permit approves the modifications of sewage facilities consisting of: the wastewater treatment plant's pump station 3 upgrades for the replacement of the Return Activated Sludge(RAS) and the Waste Activated Sludge(WAS) pumps with 6 new return activated sludge pumps and 2 waste activated sludge pumps. Pump station 4 upgrades include the replacement of 2 pumps for utility water.

Pump Station: 3	Manure Storage:	Sewage Treatment Facility:
Design Capacity: 32.5 GPM	Volume: _____ MG	Annual Average Flow: _____ MGD
	Freeboard: _____ inches	Design Hydraulic Capacity: _____ MGD
		Design Organic Capacity: _____ lb/day

E. APPROVAL GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING:

1. **New Permits:** All construction, operations and procedures shall be in accordance with the Water Quality Management Permit application dated **01/26/2018**, its supporting documentation and addendums dated _____, which are hereby made a part of this permit.

   Amendments: All construction, operations and procedures shall be in accordance with the Water Quality Management Permit Amendment application dated _____ and its supporting documentation and addendums dated _____, which are hereby made a part of this amendment.

   Except for any herein approved modifications, all terms, conditions, supporting documentation and addendums approved under Water Quality Management Permit No. _____ dated _____ shall remain in effect.

   Transfers: Water Quality Management Permit No. _____ dated _____ and conditions, supporting documentation and addendums are also made part of this transfer.

2. Permit Conditions Relating to Sewerage are attached and made part of this permit.
3. Special Conditions _____ are attached and made part of this permit.

F. THE AUTHORITY GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING FURTHER QUALIFICATIONS:

1. If there is a conflict between the application or its supporting documents and amendments and the attached conditions, the attached conditions shall apply.
2. Failure to comply with the rules and regulations of DEP or with the terms or conditions of this permit shall void the authority given to the permittee by the issuance of this permit.
3. This permit is issued pursuant to the Clean Streams Law Act of June 22, 1937, P.L. 1987, as amended 35 P.S. §691.1 *et seq.* Issuance of this permit shall not relieve the permittee of any responsibility under any other law.
4. This permit shall expire on _____. The permittee shall submit an application to renew the permit no later than 180 days prior to the permit expiration date.

PERMIT ISSUED: 4/24/2018

BY: Sachin Shankar

TITLE: for **Clean Water Program Manager**
Southeast Regional Office

Permit No. 2318401

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

PERMIT CONDITIONS RELATING TO SEWERAGE

For use in Water Quality Management Permits

(Check boxes that apply)

General

☒ 1. The Department of Environmental Protection (DEP) considers the licensed Professional Engineer whose seal is affixed to the design documents to be fully responsible for the adequacy of all aspects of the facility design.

☒ 2. The permittee shall adopt and enforce an ordinance requiring the abandonment of privies, cesspools or similar receptacles for human waste and onlot sewage disposal systems on the premises of occupied structures accessible to public sewers. All such structures must be connected to the public sewers.

☐ 3. The outfall sewer or drain shall be extended to the low water mark of the receiving body of water. Where necessary to ensure proper mixing and waste assimilation, an outfall sewer or drain may be extended with appurtenances below the low water mark and into the bed of a navigable stream provided that the permittee has secured an easement, right-of-way, license or lease from DEP in accordance with Section 15 of the Dam Safety and Encroachments Act, the Act of November 26, 1978, P.L. 1375, as amended.

☒ 4. The approval is specifically made contingent on the permittee acquiring all necessary property rights, by easement or otherwise, providing for the satisfactory construction, operation, maintenance and replacement of all sewers or sewerage structures in, along or across private property with full rights of ingress, egress and regress.

☒ 5. When construction of the approved sewerage facilities is completed and before they are placed in operation, the permittee shall notify DEP in writing so that a DEP representative may inspect the facilities.

☒ 6. The approval of the plans, and the authority granted in this permit, if not specifically extended, shall cease and be null and void 2 years from the issuance date of this permit unless construction or modification of the facilities covered by this permit has begun on or before the second anniversary of the permit date.

☒ 7. If, at any time, the sewerage facilities covered by this permit create a public nuisance, including but not limited to, causing malodors or causing environmental harm to waters of the Commonwealth, DEP may require the permittee to adopt appropriate remedial measures to abate the nuisance or harm.

☒ 8. If, after the issuance of this permit, DEP approves a municipal sewage facilities official plan or an amendment to an official plan under Act 537 (Pennsylvania Sewage Facilities Act, the Act of January 24, 1966, P.L. 1535 as amended) in which sewage from the herein approved facilities will be treated and disposed of at other planned facilities, the permittee shall, upon notification from the municipality or DEP, provide for the conveyance of its sewage to the planned facilities, abandon use and decommission the herein approved facilities including the proper disposal of solids, and notify DEP accordingly. The permittee shall adhere to schedules in the approved official plan, amendments to the plan, or other agreements between the permittee and municipality. This permit shall then, upon notice from DEP, terminate and become null and void and shall be relinquished to DEP.

☒ 9. This permit does not relieve the permittee of its obligations to comply with all federal, interstate, state or local laws, ordinances and regulations applicable to the sewerage facilities.

☒ 10. This permit does not give any real or personal property rights or grant any exclusive privileges, nor shall it be construed to grant or confirm any right, easement or interest in, on, to or over any lands which belong to the Commonwealth.

☐ 11. The authority granted by this permit is subject to all effluent requirements, monitoring requirements and other conditions as set forth in NPDES Permit No. _____ and all subsequent amendments and renewals. No discharge is authorized from these facilities unless approved by an NPDES Permit.

Construction

☒ 12. This permit is issued under the authorization of The Clean Streams Law and 25 Pa. Code Chapter 91. The permittee shall obtain all necessary permits, approvals and/or registrations under 25 Pa. Code Chapters 102, 105 and 106 prior to commencing construction of the facilities authorized by this permit, as applicable. The permittee should contact the DEP office that issued this permit if there are any questions concerning the applicability of additional permits.

☒ 13. The facilities shall be constructed under the supervision of a Pennsylvania licensed Professional Engineer in accordance with the approved reports, plans and specifications.

☒ 14. A Pennsylvania licensed Professional Engineer shall certify that construction of the permitted facilities was completed in accordance with the application and design plans submitted to DEP, using "Post Construction Certification" form (3800-PM-WSFR0179a). It is the permittee's responsibility to ensure that a Professional Engineer is on-site to provide the necessary oversight and/or inspections to certify the facilities. The certification must be submitted to DEP before the facility is placed in operation. As-built drawings, photographs (if available) and a description of all deviations from the application and design plans must be submitted to DEP within 30 days of certification.

☒ 15. Manhole inverts shall be formed to facilitate the flow of the sewage and to prevent the stranding of sewage solids. The manhole structure shall be built to prevent undue infiltration, entrance of street wash or grit and provide safe access to facilitate manhole maintenance activities.

☒ 16. The local Waterways Conservation Officer of the Pennsylvania Fish and Boat Commission (PFBC) shall be notified when the construction of any stream crossing and/or outfall is started and completed. A written permit must be secured from the PFBC if the use of explosives in any waterways is required and the permittee shall notify the local Waterways Conservation Officer when explosives are to be used.

Operation and Maintenance

☒ 17. The permittee shall maintain records of "as-built" plans showing all the treatment facilities as actually constructed together with facility operation and maintenance (O&M) manuals and any other relevant information that may be required. Upon request, the "as-built" plans and O&M manuals shall be filed with DEP.

☒ 18. The sewers shall have adequate foundation support as soil conditions require. Trenches shall be back-filled to ensure that sewers will have proper structural stability, with minimum settling and adequate protection against breakage. Concrete used in connection with these sewers shall be protected from damage by water, freezing, drying or other harmful conditions until cured.

☐ 19. Stormwater from roofs, foundation drains, basement drains or other sources shall not be admitted directly to the sanitary sewers.

☒ 20. The approved sewers shall be maintained in good condition, kept free of deposits by flushing or other cleaning methods and repaired when necessary.

☒ 21. The sewerage facilities shall be properly operated and maintained to perform as designed.

☒ 22. The attention of the permittee is called to the highly explosive nature of certain gases generated by the digestion of sewage solids when these gases are mixed in proper proportions with air and to the highly toxic character of certain gases arising from such digestion or from sewage in poorly ventilated compartments or sewers. Therefore, at all places throughout the sewerage facilities where hazard of fire, explosion or danger from toxic gases may occur, the permittee shall post conspicuous permanent and legible warnings. The permittee shall instruct all employees concerning the aforesaid hazards, first aid and emergency methods of meeting such hazards and shall make all necessary equipment and material accessible.

☒ 23. An operator certified in accordance with the Water and Wastewater Systems Operator Certification Act of February 21, 2002, 63 P.S. §§1001, *et seq.* shall operate the sewage treatment plant.

☒ 24. The permittee shall properly control any industrial waste discharged into its sewerage system by regulating the rate and quality of such discharge, requiring necessary pretreatment and excluding industrial waste, if necessary, to protect the integrity or operation of the permittee's sewerage system.

☒ 25. There shall be no physical connection between a public water supply system and a sewer or appurtenance to it which would permit the passage of any sewage or polluted water into the potable water supply. No water pipe shall pass through or come in contact with any part of a sewer manhole.

☐ 26. All connections to the approved sanitary sewers must be in accordance with the official Act 537 Plan and, if applicable, a corrective action plan as contained in the approved Title 25 Pa. Code Chapter 94 Municipal Wasteload Management Annual Report.

☒ 27. Collected screenings, slurries, sludge and other solids shall be handled and disposed of in compliance with Title 25 Pa. Code Chapters 271, 273, 275, 283 and 285 (related to permits and requirements for land filling, land application, incineration and storage of sewage sludge), Federal Regulations 40 CFR 257 and the Federal Clean Water Act and its amendments.

3800-PM-WSFR0179a 9/2005
Post Construction Certification

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF CLEAN WATER

WATER QUALITY MANAGEMENT
POST CONSTRUCTION CERTIFICATION

PERMITTEE IDENTIFIER	
Permittee	DELCORA
Municipality	Chester City
County	Delaware
WQM Permit No.	2318401
Facility Type	Sewage

All of the above information should be taken directly from the Water Quality Management Permit.

CERTIFICATION

This certification must be completed and returned to the permits section of the DEP's regional office issuing the WQM permit within 30 days of completion of the project and received by DEP prior to operation, and if requested, as-built drawings, photographs (if available) and a discussion of any DEP-approved deviations from the design plans during construction.

I, being a Registered Professional Engineer in Pennsylvania, do hereby certify to the best of my knowledge and belief, based upon personal observation and interviews, that the above facility approved under the Water Quality Management Permit has been constructed in accordance with the plans, specifications and modifications approved by DEP.

Construction Completion Date (MM/DD/YYYY): _____

	Professional Engineer
	Name _____ (Please Print or Type)
	Signature
	Date
	License Expiration Date
	Firm or Agency
	Telephone
	Permittee or Authorized Representative
	Name _____ (Please Print or Type)
Engineer's Seal	Signature
	Title
	Telephone

ER-BWQ-15 Rev. 9/73

COMMONWEALTH OF PENNSYLVANIA
PARTMENT OF ENVIRONMENTAL RESOUR(
JUREAU OF WATER QUALITY MANAGEMEN.

WATER QUALITY MANAGEMENT PERMIT

NO. 2374402

A. PERMITTEE (Name and Address)

elaware County Regional Water Quality
Control Authority
100 East Fifth Street
Chester, Pennsylvania 19013

B. PROJECT LOCATION

Municipality City of Chester

County Delaware

C. TYPE OF FACILITY OR ESTABLISHMENT

Pumping Station and force main 2nd and Dock Streets

D. NAME OF MINE, OPERATION OR AREA SERVED

Chester Creek Drainage Area & Eddystone Borough
Ridley Creek and Crum Creek Service Area

E. THIS PERMIT APPROVES

1. Plans For Construction of

a. [X] PUMP STATIONS; SEWERS AND APPURTENANCES

b. [ ] SEWAGE TREATMENT FACILITIES

c. [ ] MINE DRAINAGE TREATMENT FACILITIES

d. [ ] INDUSTRIAL WASTE TREATMENT FACILITIES

e. [ ] OUTFALL & HEADWALL

f. [ ] STREAM CROSSING

2. The Discharge of:

a. [ ] TREATED

[ ] UNTREATED

b. [ ] INDUSTRIAL WASTE

[ ] MINE DRAINAGE

[ ] SEWAGE

3. The Operation of:

[ ] MINE
MAXIMUM AREA TO BE DEEP MINED _____

[ ] DAM

4. An Erosion and Sedimentation Control Plan [X]
PROJECT AREA IS _____ ACRES.

5. Nature of Discharge or Impoundment:

[ ] DISCHARGE TO SURFACE WATER [ ] DISCHARGE TO GROUND WATER

[ ] IMPOUNDMENT _____

(Name of Stream to which discharged or drainage area on which ground water discharge takes place or impoundment is located).

F. You are hereby authorized to construct, operate or discharge, as indicated above, provided that you comply with the following :

1. All representations regarding operations, construction, maintenance and closing procedures as well as all other matters set forth in your application and its supporting documents (Application No. 2374402 dated February 19, 1974), and amendments dated August 5 and Sept. 3, 1974
Such application, it's supporting documents and amendments are hereby made a part of this permit.
2. Conditions numbered 1, 2, 3, 4, 6, 7, 8, 9, 11, 12, 13, 14, 21, 22, & 30, 31 of the Sewerage Standard Conditions dated 1972
which conditions are attached hereto and are made a part of this permit.
3. Special condition(s) designated This permit is also subject to the Standard
which are attached hereto and are made a part of this permit. Conditions Relating to Erosion Control (1973.

G. The Authority granted by this permit is subject to the following further qualifications:

1. If there is a conflict between the application or its supporting documents and amendments and the standard or special conditions, the standard or special conditions shall apply.
2. Failure to comply with the Rules and Regulations of the Department or the terms or conditions of this permit shall void the authority given to the permittee by the issuance of the permit.
3. This permit is issued pursuant to the Clean Streams Law, The Act of June 22, 1937, P.L. 1987 as amended and/or the Water Obstruction Act of June 25, 1913, P.L. 555 as amended.
Issuance of this permit shall not relieve the permittee of any responsibility under any other law.
This permit must be recorded in the Recorder of Deeds Office in Delaware County.

PERMIT ISSUED
DEPARTMENT OF ENVIRONMENTAL RESOURCES

DATE 5-15-75

BY C.T. Beechwood
C.T. Beechwood

TITLE Regional Sanitary Engineer
Norristown Office

Rev. 5-73

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES

STANDARD CONDITIONS RELATING TO SEWERAGE - 1972

ONE: All relevant and non-superseded conditions of prior sewerage or water quality management permits or orders issued to the herein named permittee or his predecessor shall continue in full force and effect and together with the provisions of this permit shall apply to his successors, lessees, heirs, and assigns.

TWO: During construction no radical changes shall be made from the plans, designs, and other data herein approved unless the permittee shall first receive written approval thereof from the Department. The sewerage facilities shall be constructed under expert engineering supervision and competent inspection.

THREE: Sewers herein approved shall have tight, well-fitting joints, shall be laid with straight alignment and grade and shall have smooth interior surfaces. The sewers shall have adequate foundation support as soil conditions requires. Special care shall be taken in construction of sewers under deep or shallow cover and under other conditions which impose extra hazards to sewer stability. Trenches shall be back-filled such that the sewers will have proper structural stability, with minimum setting and adequate protection against breakage. Concrete used in connection with these sewers shall be protected until cured from injury by water, freezing, drying or other harmful conditions.

FOUR: Manholes shall be placed and constructed as shown upon the herein approved plans except, that if not already so provided, they shall be placed on all sewers at junctions, at each change in grade or alignment, at summit ends, and upon straight lines at intervals not exceeding four hundred feet, or wherever necessary to permit satisfactory entrance to and maintenance of the sewers; manhole inverts shall be so formed as to facilitate the flow of the sewage and to prevent the stranding of sewage solids, and the whole manhole structure shall have proper structural strength and be so constructed as to prevent undue infiltration, entrance of street wash or grit, and to provide convenient and safe means of access and maintenance.

FIVE: No storm water from pavements, area ways, roofs, foundation drains or other sources shall be admitted to the sanitary sewers herein approved.

SIX: Attention is directed to the necessity of having a qualified person make a proper study of all industrial wastes discharging or proposed for discharge to the public sewer systems, to determine what degree of preliminary treatment is necessary before these waste may be discharged to the sewer system so that the wastes will not prejudicially affect the sewerage structure or their functioning or the process of sewage treatment.

SEVEN: The permittee shall adopt and enforce an ordinance or otherwise require all occupied buildings on premises accessible to a public sewer used in conformity with the requirements of State Law, to be connected thereto; also require the abandonment of privies, cesspools or similar receptacle for human excrement on said premises.

EIGHT: The herein approved and previously constructed sewers shall be maintained in good condition, by repair when necessary and kept free from deposits by flushing or other proper means of cleaning.

NINE: The permittee shall file with the Department of Environmental Resources a satisfactory record or detail plans showing the correct plan of all sewers and sewerage structures as actually constructed together with any other information in connection therewith that may be required.

TEN: The out fall sewer or drain shall be extended to low water mark of the receiving body of water in such a manner as to insure the satisfactory dispersion of its effluent thereinto; insofar as practicable it shall have its outlet submerged; and shall be contructed of cast iron, concrete, or other material approved by the Department; and shall be so protected against the effects of flood water, ice, or other hazards as to reasonable insure its structural stability and freedom from stoppage.

ELEVEN: The permittee shall secure any necessary permission from the proper federal authority for any outfall or sewage treatment structure which discharges into or enters navigable waters and shall obtain approval of any stream crossing, encroachment or change of natural stream conditions coming within the jurisdiction of the Department.

TWELVE: If at any time the sewerage facilities of the permittee, or any part thereof, or the discharge of the effluent therefrom, shall have created a public nuisance, or such discharge is causing or contributing to pollution of the waters of the Commonwealth, the permittee shall forthwith adopt such remedial measures as are acceptable to the Department.

THIRTEEN: Nothing herein contained shall be construed to be an intent on the part of the Department to approve any act made or to be made by the permittee inconsistent with the permittee's lawful powers or with existing laws of the Commonwealth regulating stream pollution and the practice of professional engineering, nor shall this permit be construed to sanction any act otherwise forbidden by any of the laws of the Commonwealth of Pennsylvania or of the United States.

FOURTEEN: The approval herein given is specifically made contingent upon the permittee acquiring all necessary rights, by easement or otherwise as required, providing for the satisfactory construction, operation, maintenance and replacement of all sewers or sewerage structures in, along, or across private property, with full rights of ingress, egress and regress.

FIFTEEN: When the herein a approved sewage treatment works is completed and before it is placed in operation, the permittee shall notify the Department in writing so that an inspection of the works may be made by a representative of the Department.

SIXTEEN: The various structures and apparatus of the sewage treatment works herein approved shall be maintained in proper condition so that the facilities will individually and collectively preform the functions for which they were designed.

SEVENTEEN: The screenings and sludge shall be so handled that nuisance is not created and shall be disposed of in a sanitary manner satisfactory to the Department.

EIGHTEEN: The permittee shall keep records of operation and efficiency of the waste treatment works and shall submit to the Department, promptly at the end of each month, such report thereon as may be required by the Department.

NINETEEN: The sewage treatment works shall be operated by a competent person or persons. In this connection attention is directed to the necessity for expert advice and supervision over the operation of the sewage treatment works in order to secure efficiency of operation and protection to the waters of the Commonwealth. To this end the permittee shall place the operation of the sewage treatment works under the control of the dsigner of the works or some other person expert in the operation of sewage treatment works, for at least one year after completion thereof and report submitted. The sewage treatment works shall be operated by a operator certified in accordance with the Sewage Treatment Plant and Water Works Operators Certification Act, Act No. 322 approved November 18, 1968 as amended.

TWENTY: The right to discharge the effluent from the herein approved sewage treatment works into the waters of the Commonwealth is contingent upon such operation of these works as will at all times produce an effluent of a quality satisfactory to the Department. If, in the opinion of the Department, these works are not so operated or if by reason of change in the character of wastes or increased load upon the works, or changed use or condition of the receiving body of water, or otherwise, the said effluent ceases to be satisfactory for such discharge, then upon notice by the Department the right herein granted to discharge such effluent shall cease and become null and void unless within the time specified by the Department, the permittee shall adopt such remedial measures as will produce an effluent which, in the opinion of the Department, will be satisfactory for discharge into the said receiving body of water.

TWENTY-ONE: The attention of the permittee is called to the highly explosive nature of certain gases generated by the digestion of sewage solids when these gases are mixed in proper proportions with air, and to the highly toxic character of certain gases arising from such digestion or from sewage in insufficiently ventilated compartments or sewers. Therefore, at all places throughout the sewerage facilities where hazard of fire, explosion, or danger from toxic gases may occur, the permittee shall post conspicuously proper warnings of a permanent and easily legible character and shall provide for the thorough instruction of all employes concerning the aforesaid hazards and in first aid and emergency methods of meeting such hazards and shall further provide, in a conveniently accessible place, all necessary equipment and material therefor.

TWENTY-TWO: Cross connections between a potable water supply and a sewerage system constitute a potential danger to the public health. Therefore, all direct and indirect connections whereby under normal or abnormal conditions the potable water supply may become contaminated from an inferior water supply, from any unit of the sewage treatment works, or by any appurtenance thereof or from any part of a sewerage system, are hereby specifically prohibited. The permittee is further warned against permitting to be made permanent any temporary connection with a potable supply designed to be held in place while being used for flushing or other purposes, and is also cautioned against the danger of back siphonage through portable hose lines and similar avenues of possible contamination.

TWENTY-THREE: Effective disinfection to control disease producing organisms shall be the production of an effluent which will contain a concentration not greater than 200/100 ml of Fecal Coliform organisms as a geometric average value nor greater than 1,000/100 ml of these organisms in more than 10% of the samples tested.

TWENTY-FOUR: The approval herein granted for sewers is limited to the right to construct the sewers, but approval of connection there to is specifically withheld until such time approval for use thereof is granted by the Department.

TWENTY-FIVE: The attention of the permittee is directed to the fact that the effluent from the herein approved sewage treatment works is discharged to a dry stream normally without the benefit of dilution. If the effluent creates a health hazard or nuisance, the permittee shall upon notice from the Department of Environmental Resources, provide such additional treatment as may be required by the Department.

TWENTY-SIX: If facilities become available for conveying the sewage to and treating it at a more suitable location, upon order from the Department of Environmental Resources, the permittee shall provide for the discharge of the sewage to such facilities and shall abandon the use of the herein approved sewage treatment works.

TWENTY-SEVEN: The plant hereby approved is required to effect secondary treatment of the sewage which it receives. Secondary treatment is that treatment that will reduce the organic waste load as measured by the biochemical oxygen demand test by at least 85% during the period May 1 to October 31 and by at least 75% during the remainder of the year based on a five consecutive day average of values; will remove practically all of the suspended solids; will provide effective disinfection to control disease producing organisms; will provide satisfactory disposal of sludge; and will reduce the quantities of oil, greases, acids, alkalis, toxic, taste and odor producing substances, color, and other substances inimical to the public interest to levels that will not pollute the receiving stream.

TWENTY-EIGHT: Records of the operation of the single residence sewage treatment works as the State Department of Environmental Resources may deem necessary for the proper control of the operation of the treatment works shall be kept on forms satisfactory to the Department and shall be filed in the Regional Office of the Department at intervals as specified.

TWENTY-NINE: The permittee shall submit to the Department by March 31 of each year a report showing the hydraulic and organic load compared to the design load and the expected load for a period of five years hence.

THIRTY: The permittee shall prohibit additional connections to a sewer system or load from being placed upon a sewage treatment plant when the plant capacity will be exceeded within five years unless steps have been taken to enlarge the plant within that time.

THIRTY-ONE: The permittee shall take the necessary measures for the construction of sewerage facilities in a manner compatible with good conservation methods to minimize the effect on the environment, the regimen of the stream bed or channel, and to prevent sediment and pollutants from entering the waters of the Commonwealth.

THIRTY-TWO: The local waterways patrolmen of the Pennsylvania Fish Commission shall be notified when the construction of the stream crossing and outfall is started and completed. A permit must be secured from the Pennsylvania Fish Commission if the use of explosives is required. The permittee shall notify the local waterways patrolmen when explosives are to be used.

THIRTY-THREE: If future operations by the Commonwealth of Pennsylvania require modification of the stream crossing, and/or outfall or there shall be unreasonable obstruction to the free passage of floods or navigation, the permittee shall remove or alter the structural work or obstruction without expense to the Commonwealth of Pennsylvania. If upon the revocation of the permit, the work shall not be completed, the permittee, at his own expense and in such time and manner as the Department may require, shall remove any or all portions of the incompleted work and restore the watercourse to its former condition. No claim shall be made against the Commonwealth of Pennsylvania on account of any such removal or alteration.

ER-BWQ-68 Rev. 4-73

Delaware Co[illegible]ty Regional Water Quality
Contro[illegible]uthority
100 East Fifth Street
Chester, Pennsylvania 19103

Permit No. 2374402

City of Chester
Delaware County

Commonwealth of Pennsylvania
Department of Environmental Resources

RECORDER OF DEEDS CERTIFICATE

I hereby certify that on . . . . . .
(Date)

there was recorded in Book . . . . . .

page . . . . . the sewerage permit issued

to . . . . . .

bearing date of . . . . . .

. . . . . .
Recorder of Deeds for

. . . . . .County

COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF ENVIRONMENTAL RESOURCES

STANDARD CONDITIONS RELATING TO EROSION CONTROL

For use in Water Quality Management Permits

1973

General

1. By approval of the plans for which this permit is issued, neither the Department nor the Commonwealth of Pennsylvania assumes any responsibility for the feasibility of the plans or the operation of the measures and facilities to be constructed thereunder.

2. All relevant conditions of any prior water quality management permits, decrees, or orders issued to the herein permittee or his predecessor shall be continued in full force and effect unless explicitly superseded by this permit. The provisions of this permit shall apply to the permittee's successors, lessees, heirs and assigns.

3. The responsibility for the carrying out of the conditions of this permit shall rest upon the owner, lessee, assignee, or other party in responsible managerial charge of the earthmoving affecting the runoff and of the erosion control facilities herein approved, such responsibility passing with each succession in said control. Approval of measures and facilities under a permit shall not be effective as to a new owner until a transfer has been executed and filed on forms provided by the Department and the transfer is approved by the Department.

4. The permittee shall secure any necessary permission from the proper federal authority for any outfall or structure which discharges into or enters navigable waters.

5. In order to avoid obsolescence of the plans of erosion control measures and facilities, the approval of the plans herein granted, and the authority granted in the permit, if not specifically extended, shall cease and be null and void two years from the date of this permit unless the erosion control measures and facilities covered by said plans shall have been completed and placed in operation on or before that date. Also, cancellation of permits by the Regional Sanitary Engineer or Water Quality Manager may be possible six months after construction has ended.

6. Approval of plans refers to functional design and not constructional stability, which is assumed to be sound and in accordance with good structural design. Failure of the measures and facilities herein approved because of faulty structural design or poor construction will render the permit void.

7. If at any time the activities undertaken pursuant to this permit or the discharge of the effluent therefrom is causing or contributing to pullution of the waters of the Commonwealth, the permittee shall forthwith adopt such remedial measures as are acceptable to the Department.

8. The Clean Streams Law and the Regulations promulgated thereunder are incorporated into and made part of this permit.

9. The permittee shall have his erosion control plan available at the site of the activity at all times.

Construction

10. At least seven days before earthmoving will begin, the permittee, by certified mail, shall notify the Regional Sanitary Engineer or Water Quality Manager of the date for beginning of construction.

11. All earthmoving activities shall be undertaken in such a manner as to minimize the areal extent of disturbed land.

12. All surface water upslope of the project area shall be kept away by diverting the water around the project area.

13. The erosion control measures and facilities shall be constructed under expert professional supervision and competent inspection, and in accordance with plans, designs, and other data as herein approved or amended, and with the conditions of this permit.

14. No radical changes shall be made in the measures and facilities herein approved without approval of the Deaprtment. Revisions which do not change the control measures and facilities or the points of discharge may be approved by the Regional Sanitary Engineer or Water Quality Manager upon submission of plans. Other revisions must be approved by a permit.

15. When the herein approved erosion control measures and facilities are completed, the permittee shall notify the Department so that an inspection of the measures and facilities may be made by a representative of the Department.

Operation and Maintenance

16. No storm water, sewage or industrial wastes not specifically approved herein, shall be admitted to the measures and facilities for which this permit is issued, unless with the approval of the Department

17. The erosion control measures and facilities herein approved shall be maintained in proper condition so that they will individually and collectively perform the functions for which they were designed. In order to insure the efficacy and proper maintenance of the measures and facilities, the permittee shall make periodic inspections at sufficiently frequent intervals to detect any impairment of the structural stability, adequate capacity, or other requisites of the herein approved measures and facilities which might impair their effectiveness, and shall take immediate steps to correct any such impairment found to exist.

18. Sediment shall at no time be permitted to accumulate in sedimentation basins to a depth sufficient to limit storage capacity or interfere with the settling efficiency thereof. Any such material removed shall be handled and disposed of so that a problem is not created and so that every reasonable and practical precaution is taken to prevent the said material from reaching the waters of the Commonwealth.

19. All slopes, channels, ditches or any disturbed area shall be stabilized as soon as possible after the final grade or final earthmoving has been completed. Where it is not possible to permanently stabilize a disturbed area immediately after the final earthmoving has been completed or where the activity ceases for more than 20 days, interim stabilization measures shall be implemented promptly.

20. Upon completion of the project, all areas which were disturbed by the project shall be stabilized so that accelerated erosion will be prevented. Any erosion and sedimentation control facility required or necessary to protect areas from erosion during the stabilization period shall be maintained until stabilization is completed. Upon completion of stabilization, all unnecessary or unusable control measures and facilities shall be removed, the areas shall be graded and the soils shall be stabilized.

ER-BWQ-69 Rev. 4-73

STATE OF PENNSYLVANIA }
COUNTY OF MONTGOMERY } SS

On the 15th day of May in the year one thousand nine hundred and seventy-five before me, the Subscriber, a Notary Public, came the above named

C.T. Beechwood

and duly acknowledged the foregoing permit to be his act and deed and desired that the same might be recorded as such.

Witness my hand and notarial seal the day and year aforesaid.

John F. Daly Jr.
NOTARY PUBLIC
Notary Public Boro of Norristown, Montg. Co.
My Commission Expires August 16, 1976

ER-BWQ-5 Rev. 3-73

Date Prepared

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
WATER QUALITY MANAGEMENT

For Department Use Only

Application For
Water Quality Management Permit

Applicant Name	Project Location
Delaware County Regional Water Control Authority (DELCORA)	(A) Municipality: Chester City
Telephone No.	
Mailing Address: Delaware County Regional Water Quality Control Auth., Chester, PA 19063	(B) County: Delaware County

Hereby Applies For: (Check appropriate blocks in columns A, B, C and D)

A. Approval of Plans for Construction of:

- [X] Pump Stations; Sewers and Appurtenances
- [ ] Sewage Treatment Plant
- [ ] Mine Drainage Treatment Plant
- [ ] Industrial Waste Treatment Plant
- [ ] Outfall and Headwall
- [ ] Stream Crossing

B. Approval to Discharge:

(1)
- [ ] Treated
- [X] Untreated

(2)
- [ ] Industrial Waste
- [ ] Mine Drainage
- [X] Sewage

C. Approval to Operate:

- [ ] Underground Mine

D. Approval of an

- [X] Erosion and Sedimentation Plan

(All Discharges Of Wastes Are Pursuant To "The Clean Streams Law")

I hereby certify that the accompanying report and all plans, modules, and documents designated therein are attached to this application, and made a part hereof.

William H. Turner
Signature of Applicant or Responsible Official

Name of Applicant or Responsible Official:	Title	Date of Application
William H. Turner	Executive Director	February 19, 1974

Address: 100 E. Fifth Street, Chester, Pennsylvania 19013

Affidavit

Commonwealth of Pennsylvania, County of Delaware

I, William H. Turner, being duly sworn, according to law, depose and say that I (~~am the applicant~~) (~~am an officer or official of the applicant~~) (have the authority to make this application) and that the plans, reports and documents submitted as part of the application are true and correct to the best of my knowledge and belief.

Sworn and subscribed to before me this

19th day of February 1974

Frances M. Bader
Notary Public, Norwood Boro, Delaware Co.
My Commission Expires August 26, 1975

William H. Turner
Signature of Applicant or Responsible Official

The section below is to be completed by the person authorized by the applicant to prepare this application. NOTE: Sewerage, Industrial Waste , and Mine Drainage applications require a registered professional engineer, except that a registered surveyor is acceptable where public health and safety are not involved.

Name of Design Individual and Firm		
D. N. Bibbo, P.E. Gilbert & Friel a division of Betz Environmental Eng.		
Mailing Address: Plymouth Meeting Mall PA 19462	Plymouth Meeting,	Telephone Number: 215-825-3800
Agreement Date: Jan. 11, 1972	Signature of Design Engineer (or other): D. N. Bibbo	

COMMONWEALTH OF PENNSYLVANIA
PROFESSIONAL
Design Engineer's Seal
D. N. Bibbo
ENGINEER
PENNSYLVANIA

ER710.046.1

DATE PREPARED 2-28-74

DATE REVISED

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
WATER QUALITY MANAGEMENT

WATER POLLUTION CONTROL

MODULE 1 – GENERAL INFORMATION SEWERAGE

For Department Use Only

APPLICANT Delaware County Regional Water Quality Control Authority

LOCATION OF PROJECT: MUNICIPALITY Chester City COUNTY Delaware

DESIGN ENGINEER AND FIRM Albright & Friel Div. of Betz Environmental Engineers, Inc. Plymouth Meeting, Pa.

DESIGN ENGINEERS ADDRESS 1 Plymouth Meeting Mall ZIP CODE 19462 TELEPHONE 215-825-3800

DESCRIPTION OF PROJECT Modification of Sewage Pumping Station on 2nd & Dock St. in Chester City with approximately 2.5 miles of force main to the Chester Wastewater Treatment Plant. (See Attachment No. 1 appended to these modules).

A. DOCUMENTATION REQUIRED

1. HAS A CHECK FOR $25.00, PAYABLE TO THE PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES, BEEN INCLUDED? (NOT REQUIRED OF STATE OR FEDERAL AGENCIES) — [X] Yes [ ] No [ ] N/A

2. HAVE 2 COPIES OF THE APPLICATION, FORM H710.046, BEEN SUBMITTED? (3 COPIES REQUIRED FOR PROJECTS IN ALLEGHENY COUNTY AND DELAWARE RIVER BASIN). — [X] Yes [ ] No

   A. HAS THE AFFIDAVIT BEEN PROPERLY COMPLETED AND EXECUTED? — [X] Yes [ ] No

3. DOES THE APPLICATION INCLUDE THE FOLLOWING APPLICABLE MODULES:

MODULE NUMBER	TITLE	NUMBER OF PAGES	
1	GENERAL INFORMATION – SEWERAGE	9	[X] Yes
4	WASTE LOAD AND CHARACTERISTICS	3	[ ] Yes
5	GEOLOGY AND GROUND WATER INFORMATION	2	[ ] Yes
6	SEWERS AND APPURTENANCES	5	[ ] Yes
7	SEWAGE PUMPING STATIONS	4	[X] Yes
8	PUMPING FACILITIES	1	[ ] Yes
9	FLOW EQUALIZATION AND STORAGE BASINS	2	[ ] Yes
10	GRIT CHAMBERS	1	[X] Yes
11	SCREENING AND COMMINUTING DEVICES	2	[X] Yes
12	IMHOFF AND SEPTIC TANKS	2	[ ] Yes
13	SETTLING TANKS	2	[ ] Yes
14	EARTHEN SETTLING BASINS	2	[ ] Yes

ER710.046.1

DATE PREPARED
2-28-74
DATE REVISED

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
WATER QUALITY MANAGEMENT

NSYL
TAI

WATER POLLUTION CONTROL
MODULE 1 – GENERAL INFORMATION
SEWERAGE

For Department Use Only

NOT APPLICABLE

A. DOCUMENTATION REQUIRED – CONTINUED

MODULE NUMBER	TITLE	NUMBER OF PAGES	
15	TRICKLING FILTERS	2	☐ Yes
16	AERATION TANKS OR BASINS	3	☐ Yes
17	WASTE STABILIZATION PONDS	3	☐ Yes
18	CHEMICAL TREATMENT (INCLUDING FEEDERS)	3	☐ Yes
19	MIXING AND FLOCCULATION FACILITIES	1	☐ Yes
20	SAND FILTERS	2	☐ Yes
21	DISINFECTION	2	☐ Yes
22	SPRAY IRRIGATION	1	☐ Yes
23	PHYSICAL ABSORPTION, ION EXCHANGE, AND CONTACT UNITS	2	☐ Yes
25	DEEP WELL DISPOSAL	4	☐ Yes
26	SLUDGE TREATMENT AND DISPOSAL		
	A. SEPARATE DIGESTION TANKS AND SLUDGE THICKENING TANKS	2	☐ Yes
	B. ELUTRIATION	1	☐ Yes
	C. WET OXIDATION	1	☐ Yes
	D. SLUDGE DRYING BEDS	1	☐ Yes
	E. LAND DISPOSAL OF SLUDGE	1	☐ Yes
	F. SLUDGE BASINS	1	☐ Yes
	G. FILTERS AND CENTRIFUGES	1	☐ Yes
	H. INCINERATION	1	☐ Yes

B. REQUIRED DATA

1. THE FRONT COVER OR FLYLEAF OF EACH SET OF DRAWINGS AND SPECIFICATIONS MUST BEAR THE SIGNATURE AND SEAL OF THE REGISTERED PROFESSIONAL ENGINEER, SURVEYOR BY OR UNDER WHOM PREPARED. EACH DRAWING MUST BEAR AN IMPRINT OR REASONABLE FACSIMILE OF SUCH SEAL.

NOT APPLICABLE

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
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WATER POLLUTION CONTROL
MODULE 1 – GENERAL INFORMATION SEWERAGE

For Department Use Only

B. REQUIRED DATA – CONTINUED

2. INFORMATION RELATIVE TO SPECIFIC PROGRAMS:

A. 2 COPIES OF DESIGNER'S PLANS, MODULES, AND SPECIFICATIONS (3 COPIES REQUIRED FOR PROJECTS IN ALLEGHENY COUNTY AND DELAWARE RIVER BASIN)

B. HYDRAULIC PROFILE OR SCHEMATIC FLOW DIAGRAM FOR PROPOSED TREATMENT PLANT. ☐ N/A

C. UNITED STATES GEOLOGICAL SURVEY TOPOGRAPHICAL MAP SHOWING EXACT POINT OF DISCHARGE AND TREATMENT PLANT OR PUMP STATION LOCATION AND/OR AREA TO SEWERS. Appended as Module 1-10 ☐ N/A

D. HAVE YOU APPLIED FOR A PUBLIC UTILITY COMMISSION CERTIFICATE OF PUBLIC CONVENIENCE? ☐ Yes ☐ No ☒ N/A

(1) SPECIFY PUBLIC UTILITY COMMISSION APPLICATION NUMBER _____

(2) IS CERTIFICATE OF PUBLIC CONVENIENCE ENCLOSED? ☐ Yes ☐ No NA

E. HAVE YOU APPLIED FOR APPROVAL OF STREAM ENCROACHMENT(S)? ☐ Yes ☐ No ☒ N/A

F. HAVE YOU APPLIED FOR DEPARTMENT OF LABOR AND INDUSTRY APPROVAL FOR FEATURES AFFECTING EMPLOYEE SAFETY? Application will be made ☐ Yes ☐ No ☐ N/A

G. DO YOU HAVE AN AGREEMENT INDICATING APPROVAL TO DISCHARGE TO SEWER SYSTEM AND TREATMENT PLANT OF ANOTHER PERMITTEE? ☐ Yes ☐ No ☒ N/A

H. HAVE YOU APPLIED FOR APPROVAL OF AIR POLUTION CONTROL FACILITIES? ☐ Yes ☐ No ☒ N/A

I. HAVE YOU SUBMITTED A LIST WITH NAMES, ADDRESSES, AND TITLES OF ALL PARTNERS IN THE CASE OF A PARTNERSHIP OR ALL OFFICERS IN THE CASE OF A CORPORATION, UNINCORPORATED ASSOCIATION, INCORPORATED ASSOCIATION, PARTNERSHIP, OR OTHER ENTITY (NOT MUNICIPAL)? ☐ Yes ☐ No ☒ N/A

3. SPECIFY THE FOLLOWING:

2nd and Dock St. Sewage Pumping Station

A. PLANS: Contract No. 10 (TITLE/DESCRIPTION) NO. OF SHEETS 8 DATE Feb. 28, 1972

Structural and Mechanical Work

PLANS: Contract No. 11 (TITLE/DESCRIPTION) NO. OF SHEETS 2 DATE Feb. 28, 1972

Electrical Work

PLANS: Contract No. 12 (TITLE/DESCRIPTION) NO. OF SHEETS 14 DATE Feb. 28, 1972

Chester Sewage Force Main

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B. REQUIRED DATA -- CONTINUED

B. SPECIFICATIONS (IF APPLICABLE): 2nd and Dock Street Sewage Pumping Station
Contract No. 10 - Structural and Mechanical Work
Contract No. 11 - Electrical Work
TITLE

NUMBER OF VOLUMES 1 DATE 2-28-74

C. OTHER (SPECIFY TYPE AND NUMBER):

Chester Sewage Force Main
Contract No. 12
No. of Volumes 1 Date Feb. 28, 1974

4. ARE THE PLANS:

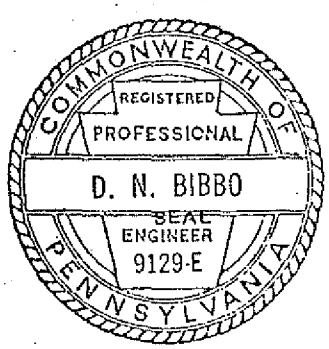
A. CLEAR, LEGIBLE, AND DRAWN TO SCALE WITH NORTH ARROW INDICATED? [x] Yes [ ] No

B. WITHIN MAXIMUM SIZE OF 36 INCHES BY 50 INCHES? [x] Yes [ ] No

C. SEAL AND SIGNATURE OF PROFESSIONAL ENGINEER OR SURVEYOR RESPONSIBLE FOR THIS APPLICATION

1. SIGNATURE OF PROFESSIONAL ENGINEER (OR SURVEYOR WHERE PERMITTED BY LAW) D. N. Bibbo

2. SEAL OF PROFESSIONAL ENGINEER (OR SURVEYOR WHERE PERMITTED BY LAW)



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CLASS OF CONSTRUCTION (Check all applicable blocks)

☐ NEW
☐ REPLACEMENT OF EXISTING UNIT(S)
☐ ADDITIONS AND/OR
☐ MODIFICATIONS TO EXISTING UNIT(S)

TABLE I – DESIGN LOADING DATA			Existing Facilities Design	Present Operating Load	Proposed Total Facilities Design
1. EQUIVALENT POPULATION TO BE SERVED (NO. OF PERSONS – SUBMIT CALCULATIONS)					
	A. DOMESTIC			74,500	77,500
	B. INDUSTRIAL			-0-	195,000
	C. TOTAL			74,500	272,500
2. DESIGN YEAR OR PERIOD FOR OPERATING DATA					1990
3. RUNOFF PERIOD		(HRS)		24	24
4. DOMESTIC WASTE FLOW DATA	A. PER CAPITA FLOW	(GPCD)		85	85
	B. AVERAGE DAILY FLOW	(MGD)		6.3	6.6
	C. INFILTRATION (1)	(MGD)		1.4	1.4
	D. RUNOFF FLOW RATE	(MGD)			
	E. MAXIMUM FLOW RATE (1)	(MGD)		25.0	25.0
5. INDUSTRIAL WASTE FLOW DATA	A. AVERAGE DAILY FLOW	(MGD)		-0-	16.5
	B. MAXIMUM DAILY FLOW	(MGD)		-0-	30.0
6. TOTAL DESIGN AVERAGE FLOW		(MGD)			24.5

TABLE II – FACILITIES DESIGN DATA (Specify number of units)

Units	Existing	To Be Abandoned	Total Proposed	Units	Existing	To Be Abandoned	Total Proposed
1. SCREENING DEVICES	2*	2	2	13. CHLORINE CONTACT TANK(S)			
2. GRIT CHAMBER(S)	2**	-	2	14. DISINFECTION FACILITIES			
3. COMMINUTOR(S)				15. SEPARATE SLUDGE DIGESTORS			
4. PRE-AERATION TANKS				16. SLUDGE DRYING BEDS			
5. PRIMARY SETTLING TANKS				17. MECHANICAL SLUDGE DEWATERING			
6. IMHOFF TANK(S)				18. SLUDGE ELUTRIATION TANKS			
7. TRICKLING FILTERS				19. SLUDGE STABILIZATION TANKS			
8. INTERMEDIATE SETTLING TANKS				20. INCINERATOR(S)			
9. AERATION TANKS				21. MIXING AND FLOCCULATION TANKS			
10. FINAL SETTLING TANKS				22. OTHER (Specify) Pumping Station	1***	1	1
11. INTERMITTENT SAND FILTERS				23. OTHER (Specify)			
12. WASTE STABILIZATION POND(S)				24. OTHER (Specify)			

* Replace Existing Devices
** Provide Mechanical Cleaning Device
*** Replace Existing Pumps
(1) Combined sewers, includes inflow

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D. GENERAL INFORMATION

1. EXISTING COMBINED SEWERS MAKE UP 60 % OF THE TOTAL AREA SERVED BY THE SYSTEM.

2. ARE THE EXISTING SANITARY SEWERS SUBJECT TO EXCESSIVE INFILTRATION? [X] Yes [ ] No [ ] N/A

A. IF YES, SPECIFY MAJOR SOURCES OF INFILTRATION: Not established.

B. HAS A REGULATION PROHIBITING THE ADMITTANCE OF STORM WATER FROM PAVEMENTS, ROOFS, AND OTHER SOURCES BEEN ADOPTED? (IF YES, ENCLOSE COPY.) [ ] Yes [X] No

C. SPECIFY STEPS TAKEN OR BEING TAKEN TO CORRECT THE INFILTRATION PROBLEM, INCLUDING DATES: [ ] N/A

An infiltration/inflow analysis according to EPA guidelines is presently being conducted. Report will be available by April 15, 1974

3. TYPES OF INDUSTRIAL WASTES OF SPECIAL CONSIDERATION: None

4. WILL THE APPLICANT BE RESPONSIBLE FOR REPAIR AND MAINTENANCE OF SEWAGE FACILITIES FOR WHICH APPLICATION IS SUBMITTED? [X] Yes [ ] No

A. IF NO, EXPLAIN:

Pumping Station

5. THE DISTANCE OF THIS ~~PLANT~~/TO THE NEAREST OCCUPIED DWELLING:

A. PRESENT 200 FEET

B. PROPOSED 200 FEET

6. IF THE APPLICANT IS OTHER THAN A MUNICIPALITY OR MUNICIPAL AUTHORITY, HAS THE GOVERNING MUNICIPALITY OBJECTED TO THE PROPOSED SEWAGE TREATMENT PLANT? [ ] Yes [ ] No [X] N/A

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D. GENERAL INFORMATION – CONTINUED

A. IS THE LETTER FROM MUNICIPAL OFFICER, SIGNIFYING THE OPINION, APPENDED TO THIS APPLICATION? ☐ Yes ☐ No NA

7. ARE DUPLICATE TREATMENT UNITS PROVIDED WHERE REQUIRED? ☐ Yes ☐ No ☒ N/A

A. IF NO, EXPLAIN: _____

B. DO ANY BY-PASS STRUCTURES DISCHARGE TO WATERS OF THE COMMONWEALTH? (SPECIFY PLAN SHEET NUMBER(S) SHOWING BY-PASS STRUCTURES) ☒ Yes ☐ No Sheet #401 Emergency By-pass Pumps

8. HAS AN AUXILIARY STANDBY POWER SOURCE BEEN PROVIDED? ☒ Yes ☐ No ☐ N/A

9. DOES ANY PIPING OR CONNECTION EXIST IN ANY PART OF THE TREATMENT WORKS WHICH MAY CAUSE CONTAMINATION OF THE POTABLE WATER SUPPLY? ☐ Yes ☒ No

10. IF A NON-POTABLE WATER SUPPLY IS PROVIDED, ARE ALL OUTLETS PERMANENTLY POSTED TO INDICATE WATER IS NOT SAFE FOR DRINKING? ☐ Yes ☐ No ☒ N/A

11. ARE FACILITIES PROVIDED FOR MEASURING THE SEWAGE FLOW? ☒ Yes ☐ No

12. SAFETY:

A. ARE FACILITIES PROVIDED TO EFFECTIVELY PROTECT THE OPERATOR AND VISITORS? ☒ Yes ☐ No

13. OUTFALL SEWER: Not applicable to this project.

A. IS THE OUTFALL SEWER ADEQUATELY PROTECTED TO ENSURE ITS STRUCTURAL STABILITY AND FREEDOM FROM STOPPAGE? ☐ Yes ☐ No NA

B. IS AN OUTFALL HEAD WALL PROVIDED? ☐ Yes ☐ No ☒ N/A

C. DOES THE OUTFALL EXTEND TO THE LOW WATER MARK OF THE RECEIVING STREAM? ☐ Yes ☐ No ☒ N/A

14. HAVE PROVISIONS BEEN MADE TO PROTECT ALL STRUCTURES AGAINST FLOTATION? ☒ Yes ☐ No

15. IF THE PROJECT INVOLVES ADDITIONS TO AN EXISTING TREATMENT PLANT, DO THE SPECIFICATIONS INCLUDE A PROGRAM TO PREVENT BY-PASSING OF ANY UNIT TO WATERS OF THE COMMONWEALTH DURING CONSTRUCTION? ☐ Yes ☐ No ☒ N/A

A. SPECIFY VOLUME AND PAGE NUMBER OF SPECIFICATIONS: NA

16. SPECIFY NAMES OF MUNICIPALITIES AND POPULATION SERVED OR TO BE SERVED BY THIS ~~PLANT~~ Pumping Station: See Attachment No. 1

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E. RECEIVING STREAM*

1. WHAT IS THE NAME OF THE RECEIVING STREAM? Delaware River

A. TRIBUTARY OF Delaware Bay

B. TRIBUTARY OF Atlantic Ocean

C. MAJOR DRAINAGE BASIN:

- [x] DELAWARE
- [ ] SUSQUEHANNA
- [ ] POTOMAC
- [ ] LAKE ERIE
- [ ] GENESEE
- [ ] ALLEGHENY
- [ ] MONONGAHELA
- [ ] OHIO

2. DESCRIBE THE EXACT POINT OF DISCHARGE:

39 DEG, 49 MIN, 34" SEC LATITUDE

75 DEG, 23 MIN, 39" SEC LONGITUDE

A. WATERSHED AREA ABOVE POINT OF DISCHARGE IS

NA* SQUARE MILES.

*This data does not appear applicable because the applicant is proposing discharging to the Chester Wastewater treatment plant.

3. WHAT IS THE:

A. MINIMUM 7-CONSECUTIVE-DAYS FLOW OCCURRING ONCE IN 10 YEARS?

NA* CUBIC FEET PER SECOND.

B. MINIMUM STREAM FLOW: NA*

C. ABOVE FLOWS ARE BASED ON:

- [ ] MEASUREMENTS
- [ ] ESTIMATES

NA* YEARS OF RECORD

4. IS THE TREATMENT PLANT SUBJECT TO FLOODING? [ ] Yes [x] No
pumping station

5. THE PROBABILITY OF THE ~~TREATMENT PLANT~~ BEING OUT OF SERVICE

DUE TO FLOODING IS ONCE IN fifty YEARS.

A. LIST BRIEFLY THE METHODS USED FOR FLOOD PROTECTION:

* *Attach U.S. Geological Survey 7.5' or 15' Quadrangle Map showing exact points of discharge.*

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E. RECEIVING STREAM – CONTINUED

NOT APPLICABLE

6. TO THE BEST OF YOUR KNOWLEDGE, WILL THE TREATED WASTE DISCHARGE ADVERSELY AFFECT:

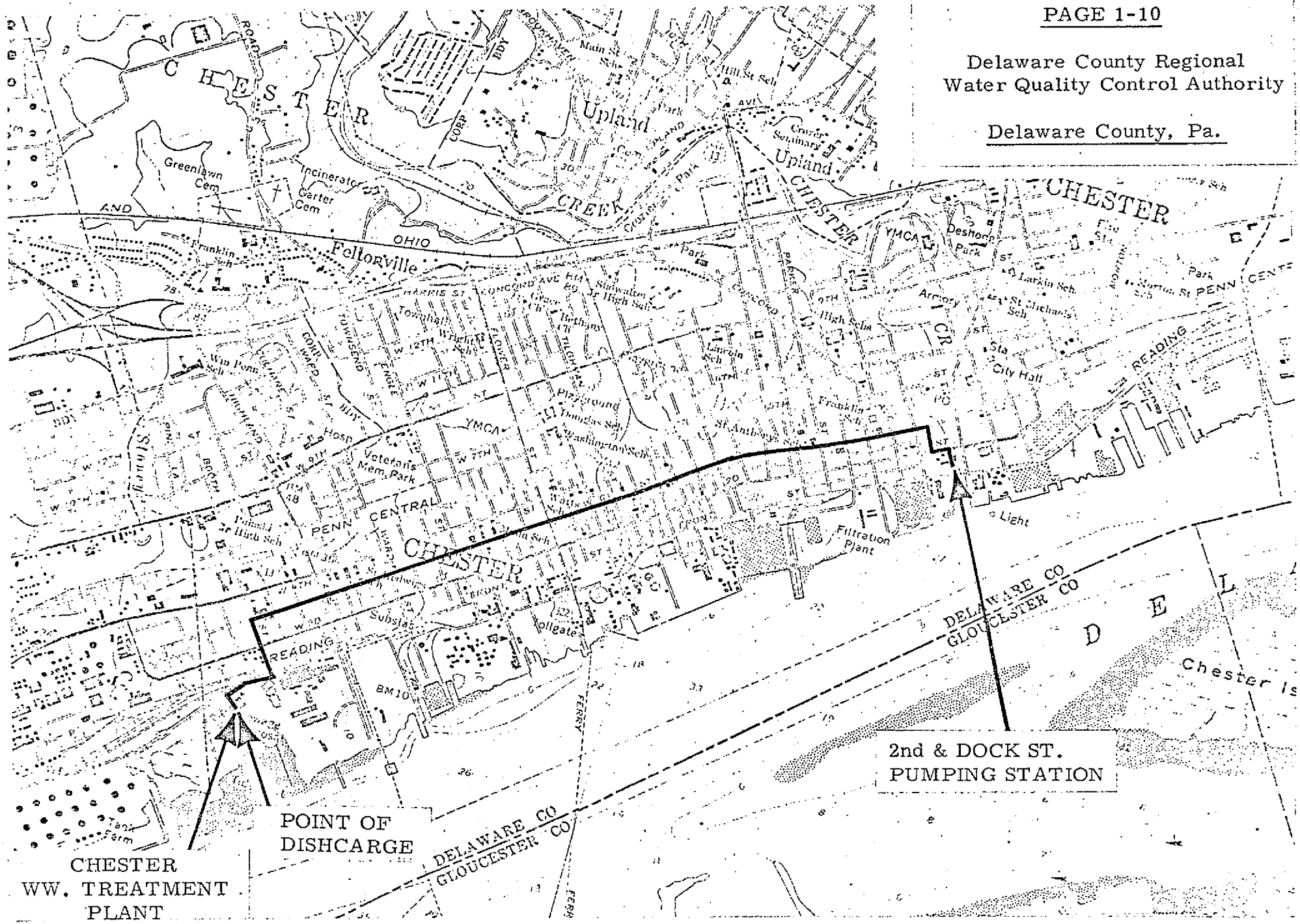
A. DOMESTIC WATER SUPPLY?	☐ Yes	☐ No
B. BATHING?	☐ Yes	☐ No
C. STOCK WATERING?	☐ Yes	☐ No
D. FISH AND AQUATIC LIFE?	☐ Yes	☐ No
E. INDUSTRIAL WATER SUPPLY?	☐ Yes	☐ No
F. IRRIGATION?	☐ Yes	☐ No
G. BOATING AND AESTHETICS?	☐ Yes	☐ No

7. IF ANY ITEMS IN 6 ABOVE ARE ANSWERED YES, INDICATE DISTANCE TO, LOCATION OF, AND EXTENT OF ADVERSE EFFECT:

This module is not applicable since the project force main will terminate at the Chester Wastewater Treatment Plant.

Delaware County Regional
Water Quality Control Authority

Delaware County, Pa.



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MODULE 7 -- SEWAGE PUMPING STATIONS

STREET LOCATION _____ PLAN SHEET NUMBER _____

CLASS OF CONSTRUCTION (Check All Applicable Blocks)
- [ ] NEW
- [ ] REPLACEMENT OF EXISTING UNIT(S)
- [x] ADDITIONS AND/OR MODIFICATIONS TO EXISTING UNIT(S)

NOTE: SUBMIT SEPARATE MODULE FOR EACH PUMPING STATION

TABLE I – DESIGN LOADING INFORMATION

1. POPULATION TO BE SERVED	INITIAL	DESIGN	DESIGN YEAR
	269,500	272,500	1990

2. DESIGN FLOW DATA	RATE (GPCD)	RATE (MGD)
A. MAXIMUM FLOW RATE (BASED ONLY ON DESIGN POPULATION TO BE SERVED)		10.0
B. MAXIMUM INDUSTRIAL WASTE FLOW RATE		30.0
C. MAXIMUM INFILTRATION RATE combined sewer inflow		25.0
D. MAXIMUM DESIGN FLOW RATE		65.00

TABLE II – FACILITIES DESIGN INFORMATION

1. PROBABILITY OF FLOODING IS ONCE IN 50 YEARS.

2. PROBABILITY OF POWER FAILURE IS ONCE IN _____ YEARS. No power failure reported by the power company in the past 10 years.

3 Elevation Information	A. MAXIMUM WATER ELEVATION IN COLLECTION SYSTEM AT A POWER FAILURE	8.5
	B. OVERFLOW LEVEL IN WET WELL	Level in wet well is constant when flow increases over 55 mgd the overflow pump starts.
	C. LOWEST BASEMENT FLOOR IN SYSTEM CONNECTED TO PUMP STATION	Unknown
4. CAPACITY AND OPERATION	A. EFFECTIVE WET WELL CAPACITY (Gal.)	48,500
	B. DETENTION TIME (Min.)	1.25 min at max. flow
	C. FORCE MAIN (1) TYPE OF MATERIAL	Prestressed reinf. conc. cylinder pipe
	C. FORCE MAIN (2) LENGTH (Ft.)	13,253
	C. FORCE MAIN (3) DIAMETER (In.)	48
	C. FORCE MAIN (4) DESIGN AVERAGE VELOCITY (Fps.)	3.00
	D. COMPUTED TOTAL DYNAMIC HEAD (Pump Station + Force Main)	110 FT.

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MODULE 7 – SEWAGE PUMPING STATIONS

TABLE III – PUMPING FACILITIES

UNIT NUMBER	CHECK TWO ITEMS (IF PUMP, SPECIFY TYPE)	CHECK ONE ITEM	RATED CAPACITY (GPM)	RATED HEAD (FT.)	PIPE SIZE (IN.)	
					SUCTION	DISCHARGE
#1	[ ] EJECTOR [X] PUMP Centrifugal [ ] EXISTING [X] PROPOSED [ ] STANDBY	[X] BUBBLER [ ] SEALED ELECTRODE [ ] FLOAT [ ] OTHER (SPECIFY) variable speed	19,000	110	30	24
#2	[ ] EJECTOR [X] PUMP Centrifugal [ ] EXISTING [X] PROPOSED [ ] STANDBY	[X] BUBBLER [ ] SEALED ELECTRODE [ ] FLOAT [ ] OTHER (SPECIFY) variable speed	19,000	110	30	24
#3	[ ] EJECTOR [X] PUMP Centrifugal [ ] EXISTING [X] PROPOSED [X] STANDBY	[X] BUBBLER [ ] SEALED ELECTRODE [ ] FLOAT [ ] OTHER (SPECIFY) variable speed	19,000	110	30	24
#4	[ ] EJECTOR [X] PUMP Centrifugal [ ] EXISTING [X] PROPOSED [ ] STANDBY	[X] BUBBLER [ ] SEALED ELECTRODE [ ] FLOAT [ ] OTHER (SPECIFY) variable speed	7,000	30	16	16
#5	[ ] EJECTOR [X] PUMP Centrifugal [ ] EXISTING [X] PROPOSED [X] STANDBY	[X] BUBBLER [ ] SEALED ELECTRODE [ ] FLOAT [ ] OTHER (SPECIFY) variable speed	7,000	30	16	16
	[ ] EJECTOR [ ] PUMP [ ] EXISTING [ ] PROPOSED [ ] STANDBY	[ ] BUBBLER [ ] SEALED ELECTRODE [ ] FLOAT [ ] OTHER (SPECIFY)				

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MODULE 7 – SEWAGE PUMPING STATIONS

A. GENERAL INFORMATION

1. THE WET WELL VENTILATION IS ☐ CONTINUOUS AT 30 AIR CHANGES PER HOUR. ☒ INTERMITTENT

2. THE DRY WELL VENTILATION IS ☐ CONTINUOUS AT 30 AIR CHANGES PER HOUR. ☒ INTERMITTENT

3. IF NO GRIT REMOVAL FACILITIES PRECEDE PUMP STATIONS, IS WET WELL AND PUMP PIPING DESIGNED TO PREVENT GRIT SETTLING IN DISCHARGE LINES OF PUMPS THAT ARE NOT OPERATING? ☐ Yes ☐ No ☒ N/A

4. ARE WET AND DRY WELLS, INCLUDING THEIR SUPERSTRUCTURES, COMPLETELY SEPARATED? ☐ Yes ☒ No

5. SPECIFY THE TYPE OF ACCESS TO DRY AND WET WELLS: stairways

6. ARE PUMPS, EXCEPT EJECTORS, HANDLING RAW SEWAGE PROTECTED BY BAR SCREENS (2 INCHES MAXIMUM CLEAR OPENING) OR COMMINUTORS? ☒ Yes ☐ No ☐ N/A

7. MAXIMUM SIZE OF SPHERE PASSED BY PUMPING FACILITIES: 5.6 INCHES.

8. DOES ELECTRICAL EQUIPMENT IN ENCLOSED PLACES WHERE GAS MAY ACCUMULATE COMPLY WITH NATIONAL BOARD OF FIRE UNDERWRITERS' SPECIFICATIONS FOR HAZARDOUS CONDITIONS? ☒ Yes ☐ No

9. DOES EACH PUMP HAVE A SEPARATE INTAKE? ☒ Yes ☐ No

10. IS A SEPARATE DRY WELL PUMP PROVIDED WITH DISCHARGE TO WET WELL ABOVE OVERFLOW ELEVATION? ☒ Yes ☐ No

11. UNDER NORMAL CONDITIONS, WILL PUMPING FACILITIES OPERATE UNDER A POSITIVE SUCTION HEAD? ☒ Yes ☐ No

12. ARE SHUTOFF VALVES PROVIDED FOR EACH PUMP SUCTION AND DISCHARGE LINE WITH A CHECK VALVE BETWEEN THE SHUTOFF VALVE AND PUMP ON THE DISCHARGE LINE? ☒ Yes ☐ No

13. ARE WET WELL HOPPER SIDE SLOPES AT A MINIMUM OF 1 TO 1 AND THE HOPPER BOTTOM HORIZONTAL AREA NO LARGER THAN NECESSARY? ☒ Yes ☐ No

14. DO WET WELLS CONTAINING EQUIPMENT REQUIRING INSPECTION AND MAINTENANCE HAVE A VENTILATION SYSTEM INDEPENDENT OF DRY WELL SYSTEM? ☒ Yes ☐ No

15. IS THERE ANY PHYSICAL CONNECTION BETWEEN THE POTABLE WATER SUPPLY AND SEWAGE PUMP STATION FACILITIES? ☐ Yes ☒ No ☐ N/A

16. ARE AUTOMATIC AIR RELIEF VALVES PROVIDED AT HIGH POINTS IN FORCE MAIN? ☒ Yes ☐ No

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MODULE 7 – SEWAGE PUMPING STATIONS

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A. GENERAL INFORMATION – CONTINUED

17. IF NO OVERFLOW IS PROVIDED, ARE TWO INDEPENDENT GENERATING SOURCES PROVIDED? (The overflow is pumped out) [X] Yes [ ] No [ ] N/A

18. IF NO OVERFLOW IS PROVIDED, IS EMERGENCY POWER EQUIPMENT PROVIDED? [ ] Yes [X] No [ ] N/A

19. SPECIFY TYPE OF EMERGENCY EQUIPMENT: _____

A. IF OVERFLOW IS PROVIDED, WHAT PROVISIONS HAVE BEEN MADE TO MINIMIZE OBJECTIONABLE CONDITIONS AND STREAM POLLUTION DURING EMERGENCY USE OF OVERFLOW?

20. DO THE EXISTING SEWERS TO WHICH THE PROPOSED PUMP STATION AND FORCE MAIN WILL CONNECT HAVE ADEQUATE CAPACITY TO CONVEY THE ADDITIONAL FLOW? * [X] Yes [ ] No

21. DO THE PLANS INDICATE THE PERMIT NUMBER OF THE EXISTING SEWER(S) AT THE PROPOSED POINT OF CONNECTION AND THE NAME OF THE PERMITEE? ** [X] Yes [ ] No

*Force main to terminate at Chester Wastewater Treatment Plant
**Permit issued to DELCORA for Chester W. W. T. P.

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MODULE 10 – GRIT CHAMBERS

For Department Use Only

TABLE I		UNIT 1 [x] EXISTING* [ ] PROPOSED	UNIT 2** [x] EXISTING* [ ] PROPOSED	UNIT ____ [ ] EXISTING [ ] PROPOSED
1. TYPE OF UNIT	A. CHANNEL	-	-	
	B. DETRITOR	-	-	
	C. AERATED	-	-	
	D. MANUALLY CLEANED	-	-	
	E. MECHANICALLY CLEANED	Yes	Yes	
	F. OTHER (Specify)	-	-	
2. DIMENSIONS	A. LENGTH (Ft.)	60	60	
	B. WIDTH (Ft.)	11	11	
	C. DIAMETER (Ft.)	-	-	
	D. SWD (Ft.)	-	-	
3. OPERATION	A. HORIZONTAL VELOCITY (Fps.)	1	1	
	B. METHOD OF VELOCITY CONTROL (Specify)	Proportional Flow weir	Proportional Flow weir	
	C. DETENTION PERIOD (Min.) AT	1 min	1 min	
	(1) AVERAGE DAILY FLOW	8.0 MGD	8.0 MGD	
	(2) MINIMUM DAILY FLOW			
	(3) MAXIMUM DAILY FLOW	25.0 MGD	25.0 MGD	
4.	SIZE OF PARTICLES TO BE REMOVED (Mm.)	0.2 Mm and larger	0.2 Mm and larger	
5.	GRIT DISPOSAL A. DESCRIBE DISPOSAL METHOD AND LOCATION (If to land, complete appropriate portions of Module 5.)	To an approved landfill	To an approved landfill	

(ONLY SEWERAGE APPLICANTS COMPLETE ITEM A)

A. GENERAL INFORMATION

1. DOES THE UNIT PROVIDE FACILITIES FOR WASHING GRIT? [ ] Yes [ ] No

2. IF A MECHANICALLY CLEANED OR A SINGLE HAND-CLEANED CHAMBER IS PROVIDED, IS A BYPASS PROVIDED? [ ] Yes [ ] No [ ] N/A

3. ARE UNITS LOCATED IN DEEP PITS PROVIDED WITH STAIRWAY ACCESS, ADEQUATE LIGHTING AND VENTILATION, AND ADEQUATE MEANS FOR REMOVING GRIT? [ ] Yes [ ] No [ ] N/A

4. IS THE CHANNEL PRECEDING AND FOLLOWING THE UNIT SHAPED TO ELIMINATE STRANDING AND SETTLING OF SOLIDS? [ ] Yes [ ] No

* The existing grit chambers are manually cleaned. The project provides

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WATER QUALITY MANAGEMENT

WATER POLLUTION CONTROL

MODULE 11 – SCREENING AND COMMINUTING DEVICES

For Department Use Only

TABLE I SCREENING DEVICES	UNIT 1	UNIT 2	UNIT
	[ ] EXISTING [X] PROPOSED	[ ] EXISTING [X] PROPOSED	[ ] EXISTING [ ] PROPOSED
IDENTIFY BY FUNCTION AT RIGHT AND ANSWER ALL APPLICABLE INFORMATION LISTED BELOW.	[ ] MANUALLY CLEANED [X] MECHANICALLY CLEANED [ ] BYPASS BAR SCREEN [ ] VIBRATING SCREEN [ ] ROTATING SCREEN [ ] OTHER* (Specify)	[ ] MANUALLY CLEANED [X] MECHANICALLY CLEANED [ ] BYPASS BAR SCREEN [ ] VIBRATING SCREEN [ ] ROTATING SCREEN [ ] OTHER* (Specify)	[ ] MANUALLY CLEANED [ ] MECHANICALLY CLEANED [ ] BYPASS BAR SCREEN [ ] VIBRATING SCREEN [ ] ROTATING SCREEN [ ] OTHER* (Specify)
1. SPECIFY SOURCE OF WASTE**			
PROPRIETARY DEVICES 2. A. TYPE **			
B. MANUFACTURER ** MODEL **			
DESIGN DATA 3. A. RATED CAPACITY (Mgd)	25.0	25.0	
B. TOTAL	COMPUTE THE TOTAL FOR ALL UNITS AND ENTER HERE		25.0
C. CAPACITY RANGE (Mgd)			
D. CLEAR OPENING BETWEEN BARS (IN.) OR SIZE OF MESH OR SCREEN (NO.)	2 1/2"	2 1/2"	
E. VELOCITY THROUGH BARS (Fps)	2.5	2.5	
F. SLOPE OF BARS FROM HORIZONTAL (Deg)	83° 46'	83° 46'	

** If other device than listed, describe.*

*** Only Industrial Waste Applicants*

A. GENERAL INFORMATION – SCREENING

1. SCREENINGS DISPOSAL

A. DESCRIBE DISPOSAL METHOD AND LOCATION: incineration at Delaware County Incinerator

2. IS AN AUXILIARY SCREEN PROVIDED WITH AUTOMATIC DIVERSION OF FLOW WHEN MECHANICALLY OPERATED SCREEN FAILS? [X] Yes [ ] No [ ] N/A

ER710.046.11

DATE PREPARED 2-28-74

DATE REVISED

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
WATER QUALITY MANAGEMENT

WATER POLLUTION CONTROL

MODULE 11 – SCREENING AND COMMINUTING DEVICES

For Department Use Only

A. GENERAL INFORMATION – SCREENING (CONTINUED)

3. ARE PROVISIONS MADE TO DE-WATER EACH UNIT? [X] Yes [ ] No

4. IS INLET CHANNEL DESIGNED TO PREVENT DEPOSITION OF SOLIDS? [X] Yes [ ] No

***5. ARE UNITS LOCATED IN DEEP PITS PROVIDED WITH STAIRWAY ACCESS, ADEQUATE LIGHTING AND VENTILATION, AND ADEQUATE MEANS FOR REMOVAL OF SCREENINGS? [X] Yes [ ] No [ ] N/A

*** *Only Sewerage Applicants*

TABLE II COMMINUTING DEVICES Not Applicable	UNIT_____ [ ] EXISTING [ ] PROPOSED	UNIT_____ [ ] EXISTING [ ] PROPOSED	UNIT_____ [ ] EXISTING [ ] PROPOSED	UNIT_____ [ ] EXISTING [ ] PROPOSED
1. A. RATED CAPACITY (Mgd)				
B. CAPACITY RANGE (Mgd)				
2. DIFFERENCE IN ELEVATION BETWEEN THE INVERT OF THE INCOMING SEWER AND THE INVERT OF THE SCREEN AND COMMINUTING CHANNEL (In)				

B. GENERAL INFORMATION – COMMINUTING DEVICES

1. ARE CHANNELS PROVIDED WITH NECESSARY GATES TO DIVERT FLOW FROM EACH COMMINUTING UNIT? [ ] Yes [ ] No [ ] N/A

2. ARE PROVISIONS MADE TO DE-WATER EACH UNIT? [ ] Yes [ ] No

3. IS AN AUXILIARY BAR SCREEN PROVIDED WITH AUTOMATIC DIVERSION OF FLOW WHEN COMMINUTING DEVICE FAILS? [ ] Yes [ ] No

4. IS INLET CHANNEL DESIGNED TO PREVENT DEPOSITION OF SOLIDS? [ ] Yes [ ] No

***5. ARE UNITS LOCATED IN DEEP PITS PROVIDED WITH STAIRWAY ACCESS, ADEQUATE LIGHTING, AND VENTILATION? [ ] Yes [ ] No [ ] N/A

*** *Only Sewerage Applicants*

DELAWARE COUNTY REGIONAL WATER QUALITY CONTROL AUTHORITY
DELAWARE COUNTY, PENNSYLVANIA
ATTACHMENT NO. 1
PURPOSE AND DESCRIPTION OF PROJECT

1. The subject project is another step in a regional program to control pollution of streams from wastewaters originating in practically all 49 municipalities in Delaware County and several neighboring municipalities in Chester County. It is one of many projects recommended in a comprehensive report prepared by Albright & Friel, a Division of Betz Environmental Engineers, Inc., for the Delaware County Planning Commission entitled: "DELAWARE COUNTY REGIONAL SEWERAGE PROJECT", dated October 28, 1971. The following agencies coordinated their efforts in arriving at a solution to this regional project:

   Delaware County Planning Commission
   City of Philadelphia
   Delaware River Basin Commission
   Delaware Valley Regional Planning Commission
   Pennsylvania Department of Environmental Resources

   The subject involves the expansion and rehabilitation of the existing pump station located at 2nd and Dock Streets in the City of Chester. In addition to rehabilitating the pump station, all existing pumps will be removed and replaced. Two (2) sewage pumps plus one (1) spare, each of 27.5 MGD capacity @ 110 ft. TDH will be installed to pump sewage through a proposed 48" force main approximately 13,000 ft. to the proposed expanded and upgraded wastewater treatment plant in the City of Chester which will be constructed with Federal aid and for which bids were received February 19, 1974. One (1) additional pump plus one spare, each of 10 MGD capacity will also be installed to automatically pump all flows exceeding 55 MGD directly to Chester Creek. This pumping station will have capacity to pump sewage from portions of the City of Chester and all or part of the following municipalities: Borough of Brookhaven, Ridley Twp, Borough of Rose Valley, Borough of Parkside, Nether Providence Twp, and Upland Borough. In addition, it will have capacity to receive industrial wastewaters from the Scott Paper Company in the City of Chester and sewage from the Borough of Eddystone, thereby enabling the future "phasing out" of the existing primary wastewater treatment plant of the Borough of Eddystone.

   The project will be a major factor in promoting the improvement of water quality in the Delaware River, which is an interstate and tidal stream used as a major source of industrial water; for propagation of fish, aquatic life and wildlife; and for recreational, agricultural and other legitimate uses.

Available or existing facilities of the existing pumping station and its grit chamber which were constructed in 1929 and modified in 1939 will be used to the fullest extent possible. Modifications will include new pumping units, mechanically cleaned grit chamber, and new grit cleaning facilities and various structural rehabilitations. The existing 36" force main which now operates under a relatively low pressure has been subject to numerous failures. The now proposed 47" main will be considerably longer and operating at a much higher pressure pumping directly to the expanded and upgraded treatment plant which will be elevated to a higher elevation than the existing primary treatment plant.

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

March 7, 2016

CERTIFIED MAIL NO. 7015 0640 0002 9146 7095

RECEIVED
MAR 11 2016
BY: 2016-0337
MJD
EB
file

Mr. Bill Messic
Project Manager
Rose Hill Developers, LP
1 Raymond Drive
Havertown, PA 19083

Re: WQM Permit - Sewage
Rose Hill Pump Station
Permit No. WQG02231601
Authorization ID No. 1106700
Chester Heights Borough
Delaware County

Dear Mr. Messic:

Your Water Quality Management (WQM) permit is enclosed. You must comply with all Standard and Special Conditions attached to this Permit. Construction must be done in accordance with the permit application and all supporting documentation. Please review the permit conditions and the supporting documentation submitted with your application before starting construction.

Please note that you are responsible for securing all other required permits, approvals and/or registrations associated with the project, if applicable, under Chapters 102 (erosion and sedimentation control), 105 (stream obstructions and encroachments) and 106 (floodplains) of DEP's regulations. Construction may not proceed until all other required permits have been obtained.

Enclosed is the "Water Quality Management Post Construction Certification" form. A Pennsylvania-registered Professional Engineer must sign and complete this form prior to startup of the facilities. You or your authorized representative must also sign the form. This certification and other post-construction documentation must be submitted to DEP within 30 days of completion of the project and must be received by DEP prior to commencing operation of the facilities.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa.C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717.787.3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800.654.5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at 717.787.3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST REACH THE BOARD WITHIN 30 DAYS. YOU DO NOT NEED A LAWYER TO FILE AN APPEAL WITH THE BOARD.

IMPORTANT LEGAL RIGHTS ARE AT STAKE, HOWEVER, SO YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT AFFORD A LAWYER, YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY TO THE BOARD (717.787.3483) FOR MORE INFORMATION.

If you have any questions, please contact Mr. James Roth at 484.250.5169.

Sincerely,

Jenifer Fields, P.E.
Regional Manager
Clean Water

Enclosures

cc: Chester Heights Borough
SWDCMA
DELCORA
Mr. Ciocco, P.E. – Catania Engineering Associates, Inc.
Operations
Re 30 (GJE16CLW)054-3

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

WQG-02
WATER QUALITY MANAGEMENT
GENERAL PERMIT FOR SEWER EXTENSIONS AND PUMP STATIONS
PERMIT NUMBER WQG02231510

A. PERMITTEE (Name and Address):	B. PROJECT/FACILITY (Name):
Rose Hill Developers, LP 1 Raymond Drive Havertown, PA 19083 CLIENT ID# 325865	PF: Southwest Delaware County Municipal Authority WWTP SF: Rose Hill Development Pump Station **C. LOCATION (County, Municipality):** Chester Heights Borough, Delaware County

D. This General Permit approves the construction and operation of:

☐ **SEWER EXTENSION**

☒ **PUMP STATION**

E. APPROVAL GRANTED BY THIS GENERAL PERMIT IS SUBJECT TO THE FOLLOWING:

1. All construction, operations and procedures shall be in accordance with the *Domestic Wastewater Facilities Manual.*

   Transfers: In the event the permittee plans to transfer ownership of the facility to another entity, the permittee and the transferee shall submit an application for such transfer to DEP. If the transfer is approved by DEP, the transferee is subject to the terms and conditions of this General Permit.

2. The attached conditions apply to this General Permit and are hereby made part of same.

F. THE AUTHORITY GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING FURTHER QUALIFICATIONS:

1. If there is a conflict between the NOI or its supporting documents and amendments and the attached conditions, the attached conditions shall apply.
2. Failure to comply with the rules and regulations of DEP or with the terms or conditions of this General Permit shall void the authority given to the permittee by the issuance of this General Permit.
3. This General Permit is issued pursuant to the Clean Streams Law, Act of June 22, 1937, P.L. 1987, as amended 35 P.S. §691.1 *et seq.* Issuance of this General Permit shall not relieve the permittee of any responsibility under any other law.

PERMIT ISSUED: March 7, 2016

BY: _____

TITLE: Clean Water Program Manager

Pennsylvania Department of Environmental Protection

2 East Main Street
Norristown, PA 19401
December 4, 2009

Southeast Regional Office

Phone: 484-250-5970
Fax: 484-250-5971

Mr. David Debusschere
FC Pennsylvania Stadium, LLC
322 A Street, Suite 300
Wilmington, DE 19801

Re: Chester Soccer Stadium Pump Station
Sewerage WQG02230908
File Type: Permit
City of Chester
Delaware County

Dear Mr. Debusschere:

Your permit is enclosed.

You must comply with all Standard and Special Conditions attached to this permit. Construction must be done in accordance with the permit application and all supporting documentation. Please review the permit conditions and the supporting documentation submitted with your application before starting construction.

An Operation and Maintenance Agreement between FC Pennsylvania LLC and the Delaware County Regional Authority for the Chester Soccer Stadium Pump Station must be finalized and signed to satisfy the Act 537 Planning requirements for this portion of the project. A copy of the signed O&M Agreement shall be submitted to the PA DEP, Water Management Planning Section prior to start-up of the pump station.

Enclosed is the "Sewage and Industrial Wastewater Facilities Construction Certification" form. A Pennsylvania-registered Professional Engineer must sign and complete this form prior to startup of the facilities (see Special Conditions). You or your authorized representative must also sign the form. This certification and other post-construction documentation must be submitted to the Department within 30 days following startup of the facilities.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa.C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717-787-3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800-654-5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at 717-787-3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST REACH THE BOARD WITHIN 30 DAYS. YOU DO NOT NEED A LAWYER TO FILE AN APPEAL WITH THE BOARD.

IMPORTANT LEGAL RIGHTS ARE AT STAKE, HOWEVER, SO YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT AFFORD A LAWYER, YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY TO THE BOARD (717-787-3483) FOR MORE INFORMATION.

If you have any questions, please call Mr. David Talley at 484-250-5181.

Sincerely,

Jenifer Fields, P.E.
Regional Manager
Water Management

Enclosures

cc: Mr. Andrews – Pennoni Associates
Operations Section
Re (GJE09WQ)275-11

3800-PM-WSFR0045f 6/2005
Permit

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

WQG-02
WATER QUALITY MANAGEMENT
GENERAL PERMIT FOR SEWER EXTENSIONS AND PUMP STATIONS
PERMIT NO. WQG02230908

A. **PERMITTEE (Name and Address):**	B. **PROJECT/FACILITY (Name):**
FC Pennsylvania Stadium, LLC 322 A Street, Suite 300 Wilmington, DE 19801 **CLIENT ID#** 268226	Chester Soccer Stadium Pump Station
	C. **LOCATION (County, Municipality):** City of Chester Delaware County

D. This General Permit approves the construction and operation of:

☐ **SEWER EXTENSION**

☒ **PUMP STATION**

E. APPROVAL GRANTED BY THIS GENERAL PERMIT IS SUBJECT TO THE FOLLOWING:

1. All construction, operations and procedures shall be in accordance with the *Domestic Wastewater Facilities Manual.*

   Transfers: In the event the permittee plans to transfer ownership of the facility to another entity, the permittee and the transferee shall submit an application for such transfer to DEP. If the transfer is approved by DEP, the transferee is subject to the terms and conditions of this General Permit.

2. The attached conditions apply to this General Permit and are hereby made part of same.

F. THE AUTHORITY GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING FURTHER QUALIFICATIONS:

1. If there is a conflict between the NOI or its supporting documents and amendments and the attached conditions, the attached conditions shall apply.
2. Failure to comply with the rules and regulations of DEP or with the terms or conditions of this General Permit shall void the authority given to the permittee by the issuance of this General Permit.
3. This General Permit is issued pursuant to the Clean Streams Law, Act of June 22, 1937, P.L. 1987, *as amended* 35 P.S. §691.1 *et seq.* Issuance of this General Permit shall not relieve the permittee of any responsibility under any other law.

PERMIT ISSUED: December 4, 2009

BY: _____

TITLE: Water Management Program Manager

PERMIT CONDITIONS

1. Consistent with DEP's technical guidance document *Conducting Technical Reviews of Water Quality Management Permit Wastewater Treatment Facilities*, DEP ID: 362-2000-007, available on DEP's website, DEP considers the registered professional engineer whose seal is affixed to the design documents to be fully responsible for the adequacy of all aspects of the facility's design.
2. The approval is specifically made contingent on the permittee acquiring all necessary property rights, by easement or otherwise, providing for the satisfactory construction, operation, maintenance and replacement of all sewers or sewerage structures in, along or across private property with full rights of ingress, egress and regress.
3. If, at any time, the sewer extension and/or pump station covered by this General Permit creates a public nuisance, including but not limited to, causing malodors or causing environmental harm to waters of the Commonwealth, DEP may require the permittee to adopt appropriate remedial measures to abate the nuisance or harm.
4. This permit does not relieve the permittee of its obligations to comply with all federal, interstate, state or local laws, ordinances and regulations applicable to the facilities.
5. This General Permit does not give any real or personal property rights or grant any exclusive privileges, nor shall it be construed to grant or confirm any right, easement or interest in, on, to, or over any lands which belong to the Commonwealth.
6. No discharge is authorized from these facilities unless approved by an NPDES Permit.

7. An Erosion and Sedimentation (E&S) Control Plan must be developed prior to construction of the permitted facility, pursuant to Title 25 Pa. Code Chapter 102, and implemented during and after the earth disturbance activity.

   If the activity involves 5 or more acres of earth disturbance, or from 1 to 5 acres of earth disturbance with a point source discharge to surface waters of the Commonwealth, an NPDES Permit is required.

   In addition to the state NPDES permitting requirements, some municipalities, through local ordinances, require the E&S Control Plan to be reviewed and approved by the local county conservation district office prior to construction. For specific information regarding E&S control planning approval and NPDES permitting requirements please contact your local county conservation district office.
8. Prior to beginning any construction or excavation, the locations of all utility lines must be identified through notification to the PA One Call system (www.paonecall.org). The notification shall not be less than three nor more than 10 working days in advance of beginning the construction or excavation.
9. The local waterways conservation officer of the Pennsylvania Fish and Boat Commission (PFBC) shall be notified when the construction of any stream crossing and/or outfall is started and completed. A written permit must be secured from the PFBC if there is any use of explosives in any waterways and the permittee shall notify the local waterways conservation officer when explosives are to be used.
10. Manhole inverts shall be formed to facilitate the flow of the sewage and to prevent the stranding of sewage solids. The whole manhole structure shall be built to prevent undue infiltration, entrance of street wash or grit and provide safe access to facilitate manhole maintenance activities.
11. The facilities shall be constructed under the supervision of a Pennsylvania registered Professional Engineer in accordance with the approved reports, plans and specifications.
12. A Pennsylvania registered Professional Engineer shall certify that construction of the permitted facilities was completed in accordance with the application and design plans submitted to DEP, using "Post Construction Certification" (3800-PM-WSWM0179a). It is the permittee's responsibility to ensure that a Professional Engineer is on-site to provide the necessary oversight and/or inspections to certify the facilities. The certification must be submitted to DEP before the facility is placed in operation. If requested, "as-built" drawings, photographs (if available) and a description of any DEP-approved deviations from the application and design plans must be submitted to DEP within 30 days of certification. Construction must be completed within two years of permit issue date.

13. The permittee shall maintain sewer extension and/or pump station operation and maintenance (O&M) manuals at the facility and ensure proper O&M of the permitted facility. The permittee shall file the O&M manuals with DEP upon request

14. Stormwater from roofs, foundation drains, basement drains or other sources shall not be admitted directly to the sewer extension or pump station.

15. The sewer extension shall have adequate foundation support as soil conditions require. Trenches shall be back-filled to ensure that sewers will have proper structural stability, with minimal settling and adequate protection against breakage. Concrete used in connection with these sewers shall be protected from damage by water, freezing, drying or other harmful conditions until cured.

16. The approved sewer extensions and/or pump stations shall be maintained in good condition, kept free of deposits by flushing or other cleaning methods and repaired when necessary.

17. The sewer extension and/or pump station shall be properly operated and maintained so that the facility will perform as designed.

18. The attention of the permittee is called to the highly explosive nature of certain gases generated by the digestion of sewage solids when these gases are mixed in proper proportions with air and to the highly toxic character of certain gases arising from such digestion or from sewage in poorly ventilated compartments or sewers. Therefore, at all places throughout the facilities where hazard of fire, explosion or danger from toxic gases may occur, the permittee shall post conspicuous permanent and legible warnings. The permittee shall instruct all employees concerning the aforesaid hazards, first aid and emergency methods of meeting such hazards and shall make all necessary equipment and material accessible.

19. There shall be no physical connection between a public water supply system and a sewer or appurtenance to it which would permit the passage of any sewage or polluted water into the potable water supply. No water pipe shall pass through or come in contact with any part of the sewer extension and/or pump station.

20. Collected screenings, slurries, sludge and other solids shall be handled and disposed of in compliance with Title 25 Pa. Code, Chapters 271, 273, 275, 283 and 285 (related to permits and requirements for land filling, land application, incineration and storage of sewage sludge), Federal Regulations 40 CFR Part 257 and the Federal Clean Water Act and its amendments.

Re 30 (GJE09WQ)275-11A

Pennsylvania Department of Environmental Protection

2 East Main Street
Norristown, PA 19401
December 7, 2009

Southeast Regional Office

Phone: 484-250-5970
Fax: 484-250-5971

Mr. Michael Hare
FC Pennsylvania Stadium, LLC
322 A Street, Suite 300
Wilmington, DE 19801

Re: Chester Soccer Stadium Pump Station
Sewerage 2309410
File Type: Permit
City of Chester
Delaware County

Dear Mr. Hare:

Your permit is enclosed.

You must comply with all Standard and Special Conditions attached to this permit. Construction must be done in accordance with the permit application and all supporting documentation. Please review the permit conditions and the supporting documentation submitted with your application before starting construction.

Enclosed is the "Sewage and Industrial Wastewater Facilities Construction Certification" form. A Pennsylvania-registered Professional Engineer must sign and complete this form prior to startup of the facilities (see Special Conditions). You or your authorized representative must also sign the form. This certification and other post-construction documentation must be submitted to the Department within 30 days following startup of the facilities.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa.C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717-787-3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800-654-5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at 717-787-3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST REACH THE BOARD WITHIN 30 DAYS. YOU DO NOT NEED A LAWYER TO FILE AN APPEAL WITH THE BOARD.

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If you have any questions, please call David Talley at 484-250-5181.

Sincerely,

Jenifer Fields, P.E.
Regional Manager
Water Management

Enclosures

cc: Mr. Becker – RK&K
Operations Section
Re (GJE09WQ)329-6

3800-PM-WSWM0015 Rev. 6/2004
Permit

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER SUPPLY AND WASTEWATER MANAGEMENT

PERMIT NO. 2309410
AMENDMENT NO.
APS ID 707616
AUTH ID 814445

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

WATER QUALITY MANAGEMENT PERMIT

A. PERMITTEE (Name and Address): CLIENT ID#: 268226 **FC Pennsylvania Stadium, LLC** **322 A. Street, Suite 300** **Wilmington, DE 19428**	B. PRIMARY FACILITY (Name): **Chester Soccer Stadium Pump Station**
C. LOCATION (Municipality, County): **City of Chester** **Delaware County**	SITE ID#: **454804**

D. **This permit approves the construction and operation of sewerage facilities consisting of:**

-A sanitary pump station and associated force main
-A 15" PVC gravity line to deliver flow to the pump station

Pump Stations: 1	Manure Storage:	Industrial Wastewater/Sewage Treatment Facility:
Design Capacity: 925 GPM		Annual Average Flow: _____ MGD
Average Annual Flow: 226,000 GPD	Volume _____ MG	Design Hydraulic Capacity: _____ MGD
	Freeboard: _____ inches	Design Organic Capacity: _____ lb/day

E. APPROVAL GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING:

1. **New Permits:** All construction, operations, and procedures shall be in accordance with the Water Quality Management Permit application dated **October 2, 2009**, its supporting documentation, and addendums dated ____, which are hereby made a part of this permit.

   Amendments: All construction, operations, and procedures shall be in accordance with the Water Quality Management Permit Amendment application dated ____ and its supporting documentation, and addendums dated ____, which are hereby made a part of this amendment.

   Except for any herein approved modifications, all terms, conditions, supporting documentation and addendums approved under Water Quality Management Permit No. ____ dated ____ shall remain in effect.

   Transfers: Water Quality Management Permit No. ____ dated ____ and conditions, supporting documentation and addendums are also made part of this transfer.

2. **Permit Conditions Relating to sewerage** are attached and made part of this permit.

3. Special Conditions numbered ____ are attached and made part of this permit.

F. THE AUTHORITY GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING FURTHER QUALIFICATIONS:

1. If there is a conflict between the application or its supporting documents and amendments and the attached conditions, the attached conditions shall apply.

2. Failure to comply with the rules and regulations of DEP or with the terms or conditions of this permit shall void the authority given to the permittee by the issuance of this permit.

3. This permit is issued pursuant to the Clean Streams Law Act of June 22, 1937, P.L. 1987, as amended 35 P.S. §691.1 *et seq.* Issuance of this permit shall not relieve the permittee of any responsibility under any other law.

PERMIT ISSUED: December 7, 2009

BY: _____

TITLE: Water Management Program Manager

3800-FM-WSWM0405 10/2004

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER SUPPLY AND WASTEWATER MANAGEMENT

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

ENGINEERING INTERNAL REVIEW AND RECOMMENDATIONS

Name of Applicant:	eFACTS APS ID Number:	Application Number:
FC Pennsylvania Stadium LLC	707616	2309410

Project Location:
City of Chester
Delaware County

Brief Description of Project and Discussion (use additional sheets if necessary):

The applicant proposes the construction and operation of a sanitary pump station. The pump station will serve the proposed Chester Soccer Stadium, as well as additional commercial and residential development.

Permitted annual average flow will be 226,000gpd. The expected peak instantaneous peak flow is 1.12MGD (~778gpm). The proposed pump station will have three pumps. With two pumps running, the capacity of the pump station is 925-975gpm, depending on the wet well level. The peaking factor for a pump station of this size should be 3.5. 1,120,000/243,502 = 4.6 OK.

The proposal also includes a 15" PVC gravity line to deliver flow from the soccer stadium to the proposed pump station.

The force main will be constructed of 10" DIP and will discharge to DELCORA's collection system for disposal.

Emergency power is being provided by a back-up generator.

Act 14 Notifications were provided to the City of Chester and Delaware County on Oct. 1, 2009.

RECOMMENDATION AND ACTION

Approve	Return	Deny	Signature	Date
☒	☐	☐	Reviewer	11/25/09
☒	☐	☐	Chief, Technical Services	12/4/09
☒	☐	☐	Program Manager	12-7-09

Hydrogeology IR&R Attached? ☐ Yes ☐ No
Soils IR&R Attached? ☐ Yes ☐ No

Re 30 WP

construction. For specific information regarding E&S control planning approval and NPDES permitting requirements, please contact your local County Conservation District office.

☒ 12. The facilities shall be constructed under the supervision of a Pennsylvania registered Professional Engineer in accordance with the approved reports, plans and specifications.

☒ 13. A Pennsylvania registered Professional Engineer shall certify that construction of the permitted facilities was completed in accordance with the application and design plans submitted to DEP, using "Post Construction Certification" (3800-PM-WSWM0179a). It is the permittee's responsibility to ensure that a Professional Engineer is on-site to provide the necessary oversight and/or inspections to certify the facilities. The certification must be submitted to DEP before the facility is placed in operation. If requested, "as-built" drawings, photographs (if available) and a description of any DEP-approved deviations from the application and design plans must be submitted to DEP within 30 days of certification.

☒ 14. Manhole inverts shall be formed to facilitate the flow of the sewage and to prevent the stranding of sewage solids. The manhole structure shall be built to prevent undue infiltration, entrance of street wash or grit and provide safe access to facilitate manhole maintenance activities.

☒ 15. The local Waterways Conservation Officer of the Pennsylvania Fish and Boat Commission (PFBC) shall be notified when the construction of any stream crossing and/or outfall is started and completed. A written permit must be secured from the PFBC if the use of explosives in any waterways is required and the permittee shall notify the local Waterways Conservation Officer when explosives are to be used.

☒ 16. The permittee shall maintain records of "as-built" plans showing all the treatment facilities as actually constructed together with facility operation and maintenance (O&M) manuals and any other relevant information that may be required. Upon request, the "as-built" plans and O&M manuals shall be filed with DEP.

☒ 17. The sewers shall have adequate foundation support as soil conditions require. Trenches shall be back-filled to ensure that sewers will have proper structural stability, with minimum settling and adequate protection against breakage. Concrete used in connection with these sewers shall be protected from damage by water, freezing, drying or other harmful conditions until cured.

☒ 18. Stormwater from roofs, foundation drains, basement drains or other sources shall not be admitted directly to the sanitary sewers.

☒ 19. The approved sewers shall be maintained in good condition, kept free of deposits by flushing or other cleaning methods and repaired when necessary.

☒ 20. The sewerage facilities shall be properly operated and maintained to perform as designed.

☒ 21. The attention of the permittee is called to the highly explosive nature of certain gases generated by the digestion of sewage solids when these gases are mixed in proper proportions with air and to the highly toxic character of certain gases arising from such digestion or from sewage in poorly ventilated compartments or sewers. Therefore, at all places throughout the sewerage facilities where hazard of fire, explosion or danger from toxic gases may occur, the permittee shall post conspicuous permanent and legible warnings. The permittee shall instruct all employees concerning the aforesaid hazards, first aid and emergency methods of meeting such hazards and shall make all necessary equipment and material accessible.

☒ 22. An operator certified in accordance with the Water and Wastewater Systems Operator Certification Act of February 21, 2002, 63 P.S. §§1001, *et seq.* shall operate the sewage treatment plant.

☒ 23. The permittee shall properly control any industrial waste discharged into its sewerage system by regulating the rate and quality of such discharge, requiring necessary pretreatment and excluding industrial waste, if necessary, to protect the integrity or operation of the permittee's sewerage system.

☒ 24. There shall be no physical connection between a public water supply system and a sewer or appurtenance to it which would permit the passage of any sewage or polluted water into the potable water supply. No water pipe shall pass through or come in contact with any part of a sewer manhole.

☐ 25. All connections to the approved sanitary sewers must be in accordance with the corrective action plan as contained in the approved Title 25 Pa. Code Chapter 94 Municipal Wasteload Management Annual Report.

☐ 26. Collected screenings, slurries, sludge and other solids shall be handled and disposed of in compliance with Title 25 Pa. Code Chapters 271, 273, 275, 283 and 285 (related to permits and requirements for land filling, land application, incineration and storage of sewage sludge), Federal Regulations 40 CFR 257 and the Federal Clean Water Act and its amendments.

3800-PM-WSWM0015a Rev. 6/2004
Conditions Sewerage

Permit No. 2309410

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER SUPPLY AND WASTEWATER MANAGEMENT

PERMIT CONDITIONS RELATING TO SEWERAGE

For use in Water Quality Management Permits

(Place a √ in the box that applies)

☒ 1. Consistent with the Department of Environmental Protection's (DEP) technical guidance document *Conducting Technical Reviews of Water Quality Management Permit Wastewater Treatment Facilities* (DEP ID: 362-2000-007) available on DEP's website at www.dep.state.pa.us. DEP considers the registered Professional Engineer whose seal is affixed to the design documents to be fully responsible for the adequacy of all aspects of the facility design.

☒ 2. The permittee shall adopt and enforce an ordinance requiring the abandonment of privies, cesspools or similar receptacles for human waste and onlot sewage disposal systems on the premises of occupied structures accessible to public sewers. All such structures must be connected to the public sewers.

☐ 3. The outfall sewer or drain shall be extended to the low water mark of the receiving body of water. Where necessary to ensure proper mixing and waste assimilation, an outfall sewer or drain may be extended with appurtenances below the low water mark and into the bed of a navigable stream provided that the permittee has secured an easement, right-of-way, license or lease from DEP in accordance with Section 15 of the Dam Safety and Encroachments Act, the Act of November 26, 1978, P.L. 1375, as amended.

☒ 4. The approval is specifically made contingent on the permittee acquiring all necessary property rights, by easement or otherwise, providing for the satisfactory construction, operation, maintenance and replacement of all sewers or sewerage structures in, along or across private property with full rights of ingress, egress and regress.

☒ 5. When construction of the approved sewerage facilities is completed and before they are placed in operation, the permittee shall notify DEP in writing so that a DEP representative may inspect the facilities.

☒ 6. If, at any time, the sewerage facilities covered by this permit create a public nuisance, including but not limited to, causing malodors or causing environmental harm to waters of the Commonwealth, DEP may require the permittee to adopt appropriate remedial measures to abate the nuisance or harm.

☐ 7. This permit authorizes the construction and operation of the proposed sewerage facilities until such time as facilities for conveyance and treatment at a more suitable location are installed and capable of receiving and treating the permittee's sewage. Such facilities must be in accordance with the applicable municipal official plan adopted pursuant to Section 5 of the Pennsylvania Sewage Facilities Act, the Act of January 24, 1966, P.L. 1535 as amended. When such municipal sewerage facilities become available, the permittee shall provide for the conveyance of the sewage to these sewerage facilities, abandon the use of these approved facilities and notify DEP accordingly. This permit shall then, upon notice from DEP, terminate and become null and void and shall be relinquished to DEP.

☒ 8. This permit does not relieve the permittee of its obligations to comply with all federal, interstate, state or local laws, ordinances and regulations applicable to the sewerage facilities.

☒ 9. This permit does not give any real or personal property rights or grant any exclusive privileges, nor shall it be construed to grant or confirm any right, easement or interest in, on, to or over any lands which belong to the Commonwealth.

☐ 10. The authority granted by this permit is subject to all effluent requirements, monitoring requirements and other conditions as set forth in NPDES Permit No. PA_____ and all subsequent amendments and renewals. No discharge is authorized from these facilities unless approved by an NPDES Permit.

☒ 11. An Erosion and Sedimentation (E&S) Plan must be developed prior to construction of the permitted facility, pursuant to Title 25 Pa. Code Chapter 102, and implemented during and after the earth disturbance activity.

If the activity involves 5 or more acres of earth disturbance, or from 1 to 5 acres of earth disturbance with a point source discharge to surface waters of the Commonwealth, an NPDES permit for the Discharge of Stormwater Associated with Construction Activity is required.

In addition to the state NPDES permitting requirements, some municipalities, through local ordinances, require the E&S Control Plan to be reviewed and approved by the local County Conservation District office prior to

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BWQ-15 Rev. 9/73

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF WATER QUALITY MANAGEMENT

WATER QUALITY MANAGEMENT PERMIT

NO. 2374403

A. PERMITTEE (Name and Address)

Delaware County Regional Water Quality Control Authority
Chester, Pennsylvania 19063

B. PROJECT LOCATION

Municipality: Marcus Hook Borough

County: Delaware County

C. TYPE OF FACILITY OR ESTABLISHMENT

Sewage Pumping Station and Forcemain

D. NAME OF MINE, OPERATION OR AREA SERVED

Marcus Hook Borough, Lower Chichester Township
Sun Oil Company and FMC Corporation

E. THIS PERMIT APPROVES

1. Plans For Construction of

- a. [X] PUMP STATIONS; ~~SEWAGE~~ AND APPURTENANCES
- b. [ ] SEWAGE TREATMENT FACILITIES
- c. [ ] MINE DRAINAGE TREATMENT FACILITIES
- d. [ ] INDUSTRIAL WASTE TREATMENT FACILITIES
- e. [ ] OUTFALL & HEADWALL
- f. [ ] STREAM CROSSING

2. The Discharge of: N/A

- a. [ ] TREATED
- [ ] UNTREATED
- b. [ ] INDUSTRIAL WASTE
- [ ] MINE DRAINAGE
- [ ] SEWAGE

3. The Operation of: N/A

- [ ] MINE
  MAXIMUM AREA TO BE DEEP MINED _____
- [ ] DAM

4. An Erosion and Sedimentation Control Plan [X]
PROJECT AREA IS _____ ACRES.

5. Nature of Discharge or Impoundment: N/A

- [ ] DISCHARGE TO SURFACE WATER
- [ ] DISCHARGE TO GROUND WATER
- [ ] IMPOUNDMENT

(Name of Stream to which discharged or drainage area on which ground water discharge takes place or impoundment is located).

F. You are hereby authorized to construct, operate or discharge, as indicated above, provided that you comply with the following :

1. All representations regarding operations, construction, maintenance and closing procedures as well as all other matters set forth in your application and its supporting documents (Application No. 2374403 dated February 19, 1974), and amendments dated July 18, 1974
Such application, it's supporting documents and amendments are hereby made a part of this permit.
2. Conditions numbered 1,2,6,8,9,11,12,13,14,21,22,30 of the Sewerage Standard Conditions dated 1972 which conditions are attached hereto and are made a part of this permit.
3. Special condition(s) designated ---------- which are attached hereto and are made a part of this permit.

This permit is also subject to the Standard Conditions Relating to Erosion Control (1973)

G. The Authority granted by this permit is subject to the following further qualifications:

1. If there is a conflict between the application or its supporting documents and amendments and the standard or special conditions, the standard or special conditions shall apply.
2. Failure to comply with the Rules and Regulations of the Department or the terms or conditions of this permit shall void the authority given to the permittee by the issuance of the permit.
3. This permit is issued pursuant to the Clean Streams Law, The Act of June 22, 1937, P.L. 1987 as amended and/or the Water Obstruction Act of June 25, 1913, P.L. 555 as amended.
Issuance of this permit shall not relieve the permittee of any responsibility under any other law.

This permit must be recorded in the Recorder of Deeds Office in Delaware County.

PERMIT ISSUED
DEPARTMENT OF ENVIRONMENTAL RESOURCES

DATE 10-23-74

BY C.T. Beechwood

TITLE C.T. Beechwood
Regional Sanitary Engineer
Norristown Office

ER-BWQ-69 , Rev. 4-73

STATE OF PENNSYLVANIA }
COUNTY OF MONTGOMERY } SS

On the 23rd day of October in the year one thousand nine hundred and seventy-four before me, the Subscriber, a Notary Public, came the above named

C.T. Beechwood

and duly acknowledged the foregoing permit to be his act and deed and desired that the same might be recorded as such.

Witness my hand and notarial seal the day and year aforesaid.

John F. Daly, Jr.
NOTARY PUBLIC

Notary Public Boro of Norristown, Montg. Co.
My Commission Expires August 16, 1976

JOHN F. DALY, JR. NOTARY PUBLIC

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES

STANDARD CONDITIONS RELATING TO SEWERAGE - 1972

ONE: All relevant and non-superseded conditions of prior sewerage or water quality management permits or orders issued to the herein named permittee or his predecessor shall continue in full force and effect and together with the provisions of this permit shall apply to his successors, lessees, heirs, and assigns.

TWO: During construction no radical changes shall be made from the plans, designs, and other data herein approved unless the permittee shall first receive written approval thereof from the Department. The sewerage facilities shall be constructed under expert engineering supervision and competent inspection.

THREE: Sewers herein approved shall have tight, well-fitting joints, shall be laid with straight alignment and grade and shall have smooth interior surfaces. The sewers shall have adequate foundation support as soil conditions requires. Special care shall be taken in construction of sewers under deep or shallow cover and under other conditions which impose extra hazards to sewer stability. Trenches shall be back-filled such that the sewers will have proper structural stability, with minimum setting and adequate protection against breakage. Concrete used in connection with these sewers shall be protected until cured from injury by water, freezing, drying or other harmful conditions.

FOUR: Manholes shall be placed and constructed as shown upon the herein approved plans except, that if not already so provided, they shall be placed on all sewers at junctions, at each change in grade or alignment, at summit ends, and upon straight lines at intervals not exceeding four hundred feet, or wherever necessary to permit satisfactory entrance to and maintenance of the sewers; manhole inverts shall be so formed as to facilitate the flow of the sewage and to prevent the stranding of sewage solids, and the whole manhole structure shall have proper structural strength and be so constructed as to prevent undue infiltration, entrance of street wash or grit, and to provide convenient and safe means of access and maintenance.

FIVE: No storm water from pavements, area ways, roofs, foundation drains or other sources shall be admitted to the sanitary sewers herein approved.

SIX: Attention is directed to the necessity of having a qualified person make a proper study of all industrial wastes discharging or proposed for discharge to the public sewer systems, to determine what degree of preliminary treatment is necessary before these waste may be discharged to the sewer system so that the wastes will not prejudicially affect the sewerage structure or their functioning or the process of sewage treatment.

SEVEN: The permittee shall adopt and enforce an ordinance or otherwise require all occupied buildings on premises accessible to a public sewer used in conformity with the requirements of State Law, to be connected thereto; also require the abandonment of privies, cesspools or similar receptacle for human excrement on said premises.

EIGHT: The herein approved and previously constructed sewers shall be maintained in good condition, by repair when necessary and kept free from deposits by flushing or other proper means of cleaning.

NINE: The permittee shall file with the Department of Environmental Resources a satisfactory record or detail plans showing the correct plan of all sewers and sewerage structures as actually constructed together with any other information in connection therewith that may be required.

TEN: The out fall sewer or drain shall be extended to low water mark of the receiving body of water in such a manner as to insure the satisfactory dispersion of its effluent thereinto; insofar as practicable it shall have its outlet submerged; and shall be contructed of cast iron, concrete, or other material approved by the Department; and shall be so protected against the effects of flood water, ice, or other hazards as to reasonable insure its structural stability and freedom from stoppage.

ELEVEN: The permittee shall secure any necessary permission from the proper federal authority for any outfall or sewage treatment structure which discharges into or enters navigable waters and shall obtain approval of any stream crossing, encroachment or change of natural stream conditions coming within the jurisdiction of the Department.

TWELVE: If at any time the sewerage facilities of the permittee, or any part thereof, or the discharge of the effluent therefrom, shall have created a public nuisance, or such discharge is causing or contributing to pollution of the waters of the Commonwealth, the permittee shall forthwith adopt such remedial measures as are acceptable to the Department.

THIRTEEN: Nothing herein contained shall be construed to be an intent on the part of the Department to approve any act made or to be made by the permittee inconsistent with the permittee's lawful powers or with existing laws of the Commonwealth regulating stream pollution and the practice of professional engineering, nor shall this permit be construed to sanction any act otherwise forbidden by any of the laws of the Commonwealth of Pennsylvania or of the United States.

FOURTEEN: The approval herein given is specifically made contingent upon the permittee acquiring all necessary rights, by easement or otherwise as required, providing for the satisfactory construction, operation, maintenance and replacement of all sewers or sewerage structures in, along, or across private property, with full rights of ingress, egress and regress.

FIFTEEN: When the herein a approved sewage treatment works is completed and before it is placed in operation, the permittee shall notify the Department in writing so that an inspection of the works may be made by a representative of the Department.

SIXTEEN: The various structures and apparatus of the sewage treatment works herein approved shall be maintained in proper condition so that the facilities will individually and collectively preform the functions for which they were designed.

SEVENTEEN: The screenings and sludge shall be so handled that nuisance is not created and shall be disposed of in a sanitary manner satisfactory to the Department.

EIGHTEEN: The permittee shall keep records of operation and efficiency of the waste treatment works and shall submit to the Department, promptly at the end of each month, such report thereon as may be required by the Department.

NINETEEN: The sewage treatment works shall be operated by a competent person or persons. In this connection attention is directed to the necessity for expert advice and supervision over the operation of the sewage treatment works in order to secure efficiency of operation and protection to the waters of the Commonwealth. To this end the permittee shall place the operation of the sewage treatment works under the control of the dsigner of the works or some other person expert in the operation of sewage treatment works, for at least one year after completion thereof and report submitted. The sewage treatment works shall be operated by a operator certified in accordance with the Sewage Treatment Plant and Water Works Operators Certification Act, Act No. 322 approved November 18, 1968 as amended.

TWENTY: The right to discharge the effluent from the herein approved sewage treatment works into the waters of the Commonwealth is contingent upon such operation of these works as will at all times produce an effluent of a quality satisfactory to the Department. If, in the opinion of the Department, these works are not so operated or if by reason of change in the character of wastes or increased load upon the works, or changed use or condition of the receiving body of water, or otherwise, the said effluent ceases to be satisfactory for such discharge, then upon notice by the Department the right herein granted to discharge such effluent shall cease and become null and void unless within the time specified by the Department, the permittee shall adopt such remedial measures as will produce an effluent which, in the opinion of the Department, will be satisfactory for discharge into the said receiving body of water.

TWENTY-ONE: The attention of the permittee is called to the highly explosive nature of certain gases generated by the digestion of sewage solids when these gases are mixed in proper proportions with air, and to the highly toxic character of certain gases arising from such digestion or from sewage in insufficiently ventilated compartments or sewers. Therefore, at all places throughout the sewerage facilities where hazard of fire, explosion, or danger from toxic gases may occur, the permittee shall post conspicuously proper warnings of a permanent and easily legible character and shall provide for the thorough instruction of all employes concerning the aforesaid hazards and in first aid and emergency methods of meeting such hazards and shall further provide, in a conveniently accessible place, all necessary equipment and material therefor.

TWENTY-TWO: Cross connections between a potable water supply and a sewerage system constitute a potential danger to the public health. Therefore, all direct and indirect connections whereby under normal or abnormal conditions the potable water supply may become contaminated from an inferior water supply, from any unit of the sewage treatment works, or by any appurtenance thereof or from any part of a sewerage system, are hereby specifically prohibited. The permittee is further warned against permitting to be made permanent any temporary connection with a potable supply designed to be held in place while being used for flushing or other purposes, and is also cautioned against the danger of back siphonage through portable hose lines and similar avenues of possible contamination.

TWENTY-THREE: Effective disinfection to control disease producing organisms shall be the production of an effluent which will contain a concentration not greater than 200/100 ml of Fecal Coliform organisms as a geometric average value nor greater than 1,000/100 ml of these organisms in more than 10% of the samples tested.

TWENTY-FOUR: The approval herein granted for sewers is limited to the right to construct the sewers, but approval of connection there to is specifically withheld until such time approval for use thereof is granted by the Department.

TWENTY-FIVE: The attention of the permittee is directed to the fact that the effluent from the herein approved sewage treatment works is discharged to a dry stream normally without the benefit of dilution. If the effluent creates a health hazard or nuisance, the permittee shall upon notice from the Department of Environmental Resources, provide such additional treatment as may be required by the Department.

TWENTY-SIX: If facilities become available for conveying the sewage to and treating it at a more suitable location, upon order from the Department of Environmental Resources, the permittee shall provide for the discharge of the sewage to such facilities and shall abandon the use of the herein approved sewage treatment works.

TWENTY-SEVEN: The plant hereby approved is required to effect secondary treatment of the sewage which it receives. Secondary treatment is that treatment that will reduce the organic waste load as measured by the biochemical oxygen demand test by at least 85% during the period May 1 to October 31 and by at least 75% during the remainder of the year based on a five consecutive day average of values; will remove practically all of the suspended solids; will provide effective disinfection to control disease producing organisms; will provide satisfactory disposal of sludge; and will reduce the quantities of oil, greases, acids, alkalis, toxic, taste and odor producing substances, color, and other substances inimical to the public interest to levels that will not pollute the receiving stream.

TWENTY-EIGHT: Records of the operation of the single residence sewage treatment works as the State Department of Environmental Resources may deem necessary for the proper control of the operation of the treatment works shall be kept on forms satisfactory to the Department and shall be filed in the Regional Office of the Department at intervals as specified.

TWENTY-NINE: The permittee shall submit to the Department by March 31 of each year a report showing the hydraulic and organic load compared to the design load and the expected load for a period of five years hence.

THIRTY: The permittee shall prohibit additional connections to a sewer system or load from being placed upon a sewage treatment plant when the plant capacity will be exceeded within five years unless steps have been taken to enlarge the plant within that time.

THIRTY-ONE: The permittee shall take the necessary measures for the construction of sewerage facilities in a manner compatible with good conservation methods to minimize the effect on the environment, the regimen of the stream bed or channel, and to prevent sediment and pollutants from entering the waters of the Commonwealth.

THIRTY-TWO: The local waterways patrolmen of the Pennsylvania Fish Commission shall be notified when the construction of the stream crossing and outfall is started and completed. A permit must be secured from the Pennsylvania Fish Commission if the use of explosives is required. The permittee shall notify the local waterways patrolmen when explosives are to be used.

THIRTY-THREE: If future operations by the Commonwealth of Pennsylvania require modification of the stream crossing, and/or outfall or there shall be unreasonable obstruction to the free passage of floods or navigation, the permittee shall remove or alter the structural work or obstruction without expense to the Commonwealth of Pennsylvania. If upon the revocation of the permit, the work shall not be completed, the permittee, at his own expense and in such time and manner as the Department may require, shall remove any or all portions of the incompleted work and restore the watercourse to its former condition. No claim shall be made against the Commonwealth of Pennsylvania on account of any such removal or alteration.

COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF ENVIRONMENTAL RESOURCES

STANDARD CONDITIONS RELATING TO EROSION CONTROL

For use in Water Quality Management Permits

1973

General

1. By approval of the plans for which this permit is issued, neither the Department nor the Commonwealth of Pennsylvania assumes any responsibility for the feasibility of the plans or the operation of the measures and facilities to be constructed thereunder.

2. All relevant conditions of any prior water quality management permits, decrees, or orders issued to the herein permittee or his predecessor shall be continued in full force and effect unless explicitly superseded by this permit. The provisions of this permit shall apply to the permittee's successors, lessees, heirs and assigns.

3. The responsibility for the carrying out of the conditions of this permit shall rest upon the owner, lessee, assignee, or other party in responsible managerial charge of the earthmoving affecting the runoff and of the erosion control facilities herein approved, such responsibility passing with each succession in said control. Approval of measures and facilities under a permit shall not be effective as to a new owner until a transfer has been executed and filed on forms provided by the Department and the transfer is approved by the Department.

4. The permittee shall secure any necessary permission from the proper federal authority for any outfall or structure which discharges into or enters navigable waters.

5. In order to avoid obsolescence of the plans of erosion control measures and facilities, the approval of the plans herein granted, and the authority granted in the permit, if not specifically extended, shall cease and be null and void two years from the date of this permit unless the erosion control measures and facilities covered by said plans shall have been completed and placed in operation on or before that date. Also, cancellation of permits by the Regional Sanitary Engineer or Water Quality Manager may be possible six months after construction has ended.

6. Approval of plans refers to functional design and not constructional stability, which is assumed to be sound and in accordance with good structural design. Failure of the measures and facilities herein approved because of faulty structural design or poor construction will render the permit void.

7. If at any time the activities undertaken pursuant to this permit or the discharge of the effluent therefrom is causing or contributing to pullution of the waters of the Commonwealth, the permittee shall forthwith adopt such remedial measures as are acceptable to the Department.

8. The Clean Streams Law and the Regulations promulgated thereunder are incorporated into and made part of this permit.

9. The permittee shall have his erosion control plan available at the site of the activity at all times.

Construction

10. At least seven days before earthmoving will begin, the permittee, by certified mail, shall notify the Regional Sanitary Engineer or Water Quality Manager of the date for beginning of construction.

11. All earthmoving activities shall be undertaken in such a manner as to minimize the areal extent of disturbed land.

12. All surface water upslope of the project area shall be kept away by diverting the water around the project area.

13. The erosion control measures and facilities shall be constructed under expert professional supervision and competent inspection, and in accordance with plans, designs, and other data as herein approved or amended, and with the conditions of this permit.

14. No radical changes shall be made in the measures and facilities herein approved without approval of the Deaprtment. Revisions which do not change the control measures and facilities or the points of discharge may be approved by the Regional Sanitary Engineer or Water Quality Manager upon submission of plans. Other revisions must be approved by a permit.

15. When the herein approved erosion control measures and facilities are completed, the permittee shall notify the Department so that an inspection of the measures and facilities may be made by a representative of the Department.

Operation and Maintenance

16. No storm water, sewage or industrial wastes not specifically approved herein, shall be admitted to the measures and facilities for which this permit is issued, unless with the approval of the Department

17. The erosion control measures and facilities herein approved shall be maintained in proper condition so that they will individually and collectively perform the functions for which they were designed. In order to insure the efficacy and proper maintenance of the measures and facilities, the permittee shall make periodic inspections at sufficiently frequent intervals to detect any impairment of the structural stability, adequate capacity, or other requisites of the herein approved measures and facilities which might impair their effectiveness, and shall take immediate steps to correct any such impairment found to exist.

18. Sediment shall at no time be permitted to accumulate in sedimentation basins to a depth sufficient to limit storage capacity or interfere with the settling efficiency thereof. Any such material removed shall be handled and disposed of so that a problem is not created and so that every reasonable and practical precaution is taken to prevent the said material from reaching the waters of the Commonwealth.

19. All slopes, channels, ditches or any disturbed area shall be stabilized as soon as possible after the final grade or final earthmoving has been completed. Where it is not possible to permanently stabilize a disturbed area immediately after the final earthmoving has been completed or where the activity ceases for more than 20 days, interim stabilization measures shall be implemented promptly.

20. Upon completion of the project, all areas which were disturbed by the project shall be stabilized so that accelerated erosion will be prevented. Any erosion and sedimentation control facility required or necessary to protect areas from erosion during the stabilization period shall be maintained until stabilization is completed. Upon completion of stabilization, all unnecessary or unusable control measures and facilities shall be removed, the areas shall be graded and the soils shall be stabilized.

RECORDED in the Office for Recording of Deeds in and for
Del. Co., Pa., in DEED
Book No. 2519 Page 1168
Witness my hand and seal of office this SIXTH
day of NOVEMBER Anno Domini 1974

Henry E. W. Teti
Recorder of Deeds

Joseph O'Connor
DEPUTY

A710.120 REV. 3-71

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES

1.11(b) Bypass

WATER QUALITY MANAGEMENT PERMIT

NO. 2372406

A. PERMITTEE: (Name and Address)	B. PROJECT LOCATION
Delaware County Regional Water Control Auth. Delaware County Court House Media, Pa. 19063	Municipality: Darby Township and the City of Philadelphia County: Delaware and Philadelphia
C. TYPE OF FACILITY	D. NAME OF MINE OR AREA SERVED
Sewage pump station and force main	By-pass from Darby Creek Joint Authority sewage treatment plant to Phila. S.W.plant treatment

E. THIS PERMIT APPROVES:

1. Plans For Construction Of:
   - a. [X] Pump Stations; Sewers and Appurtenances
   - b. [ ] Sewage Treatment Facilities
   - c. [ ] Industrial Wastes Treatment Facilities

2. The Discharge Of:
   - a. [ ] Treated — N.A.
   - [ ] Untreated
   - b. [ ] Industrial Wastes
   - [ ] Sewage

   TO: _____ (Receiving Waters)

3. The Operation Of:
   - a. [ ] Mine — N.A.

   Maximum surface area to be affected shall not exceed _____ acres. (Surface Mines)

   Maximum area to be deep mined _____ acres.

F. YOU ARE HEREBY AUTHORIZED TO CONSTRUCT, OPERATE OR DISCHARGE, AS INDICATED ABOVE, PROVIDED THAT YOU COMPLY WITH THE FOLLOWING:

1. ALL REPRESENTATIONS REGARDING OPERATION, CONSTRUCTION, MAINTENANCE AND CLOSING PROCEDURES AS WELL AS ALL OTHER MATTERS SET FORTH IN YOUR APPLICATION AND ITS SUPPORTING DOCUMENTS (APPLICATION NO. 2372406 DATED February 29, 1972, AND AMENDMENTS DATED June 1, 1972.) SUCH APPLICATION, ITS SUPPORTING DOCUMENTS AND AMENDMENTS ARE HEREBY MADE A PART OF THIS PERMIT.

2. CONDITIONS NUMBERED 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 13, 14, 15, 17, 18, 25, 26 & 27 OF THE sewerage STANDARD CONDITIONS DATED November 1, 1942 WHICH CONDITIONS ARE ATTACHED HERETO AND ARE MADE A PART OF THIS PERMIT.

3. SPECIAL CONDITION(S) NUMBERED None WHICH ARE ATTACHED HERETO AND ARE MADE A PART OF THIS PERMIT. to become operative this permit must be recorded in the office of the Recorder of Deeds in Delaware County

G. THE AUTHORITY GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING FURTHER QUALIFICATIONS:

1. IF THERE IS A CONFLICT BETWEEN THE APPLICATION OR ITS SUPPORTING DOCUMENTS AND AMENDMENTS AND THE STANDARD OR SPECIAL CONDITIONS, THE STANDARD OR SPECIAL CONDITIONS SHALL APPLY.

2. FAILURE TO COMPLY WITH THE RULES AND REGULATIONS OF THE DEPARTMENT OR THE TERMS OR CONDITIONS OF THIS PERMIT SHALL VOID THE AUTHORITY GIVEN TO THE PERMITTEE BY THE ISSUANCE OF THE PERMIT.

3. THIS PERMIT IS ISSUED PURSUANT TO THE CLEAN STREAMS LAW, THE ACT OF JUNE 22, 1937, P.L. 1957, AS AMENDED. ISSUANCE OF THIS PERMIT SHALL NOT RELIEVE THE PERMITTEE OF ANY RESPONSIBILITY UNDER ANY OTHER LAW.

PERMIT ISSUED

DATE 8-7-72

DEPARTMENT OF ENVIRONMENTAL RESOURCES

BY C. T. Leonard

TITLE Regional Sanitary Engineer

BOOK 2442 PAGE 182

ER 711.308

STATE OF PENNSYLVANIA
COUNTY OF PHILADELPHIA } SS

On the seventh day of August in the year one thousand nine hundred and seventy-two before me, the Subscriber, a Notary Public, came the above named

C.T. Beechwood

and duly acknowledged the foregoing permit to be his act and deed and desired that the same might be recorded as such.

Witness my hand and notarial seal the day and year aforesaid.

Thomas E Wilson
NOTARY PUBLIC

THOMAS E. WILSON
Notary Public, Philadelphia, Philadelphia Co.
My Commission Expires May 13, 1974

HSE-6310-P

PENNSYLVANIA DEPARTMENT OF HEALTH
SANITARY WATER BOARD

STANDARD CONDITIONS RELATING TO SEWERAGE

Effective November 1, 1942.

ONE: All relevant and non-superseded conditions of prior sewerage permits, decrees, or orders issued to the herein named permittee or his predecessor shall be continued in full force and effect.

TWO: During construction no radical changes shall be made from the plans, designs, and other data herein approved unless the permittee shall first submit each such revision to the Sanitary Water Board and receive written approval thereof.

THREE: The works shall be constructed under expert engineering supervision and competent inspection, and in accordance with the plans, designs, and other data as herein approved or amended, and with the conditions of this permit.

FOUR: During construction the herein approved sewers shall be so laid and such care and skill shall be used in their construction as will insure that they conform to the following requirements:

(a) They shall have well-fitted joints made tight to reduce infiltration to a minimum; shall be laid with straight alignment and to true grade; and shall have smooth interior surfaces.

(b) They shall have adequate foundation support by means of the natural soil; or by an approved, especially prepared foundation of piling, concrete cradle, or encasement, or otherwise as conditions require; and their trenches shall be so back-filled that the sewers will have proper structural stability, minimum settlement, and adequate protection against breakage.

(c) To these ends special care shall be taken in the placing of sewers under deep or shallow cover, under heavy loading, in stream crossings, in rock or wet excavations, or under other conditions which impose extra hazards upon their construction.

(d) All concrete used in connection with these sewers and their appurtenances shall be so placed and protected until cured that it will not be injured by water, freezing, drying, or otherwise.

(e) The type and material of both sewer pipe and joint shall be so selected in accordance with actual field and construction conditions, and shall be so incorporated into the work as to conform to the aforesaid requirements.

FIVE: Manholes shall be placed and constructed as shown upon the herein approved plans except, that if not already so provided, they shall be placed on all sewers at junctions, at each change in grade or alignment, at summit ends, and upon straight lines at intervals not exceeding four hundred feet, or wherever necessary to permit satisfactory entrance to and maintenance of the sewers; manhole inverts shall be so formed as to facilitate the flow of the sewage and to prevent the stranding of sewage solids, and the whole manhole structure shall have proper structural strength and be so constructed as to prevent undue infiltration, entrance of street wash or grit, and to provide convenient and safe means of access and maintenance.

SIX: No storm water from pavements, areaways, roofs, or other sources shall be admitted to the sanitary sewers herein approved, which shall be used exclusively as carriers of domestic sewage and suitable industrial wastes.

Storm water shall be admitted only to such sewers as are specifically approved for use as combined sewers.

SEVEN: Attention is directed to the necessity of having a qualified person make proper study of all industrial wastes proposed for discharge to the public sewer system, to determine the degree of preliminary treatment, if any, which is necessary before these wastes may be discharged to the said system.

No industrial wastes shall be discharged to the sewer system which will prejudicially affect the sewerage structures or their functioning, or the processes of sewage treatment, and any permission granted by the permittee for industrial wastes discharge into the sewer system should reserve to the permittee the right to regulate the rate of such discharge or to require such further preliminary treatment as may be necessary, or the exclusion of the said industrial wastes from the sewers, if this be deemed necessary to protect the permittee's interests.

EIGHT: The permittee shall forthwith adopt and enforce an ordinance requiring all occupied buildings on premises accessible to a public sewer used in conformity with the requirements of State laws, to be connected thereto; also requiring the abandonment of privies, cesspools or similar receptables for human excrement on said premises; and also prohibiting any connection from any privy vault or cesspool being made to the public sewer system.

NINE: In accordance with the provisions of State laws regarding connection to sewers and the rules and regulations of the Pennsylvania Department of Health pertaining thereto, the permittee shall forthwith require all occupied buildings on premises accessible to a public sewer used in conformity with the requirements of State laws, to be connected thereto; and shall also require the abandonment of privies, cesspools or similar receptacles for human excrement on said premises; and shall also prohibit any connection from any privy vault or cesspool being made to any approved sewers.

TEN: The herein approved and previously constructed sewers shall be maintained in good condition, by repair when necessary, and kept free from deposits by flushing or other proper means of cleansing, in order that they may at all times afford a proper means for the prompt conveyance of sewage.

ELEVEN: No sewers or sewerage work shall be constructed except such as are herein approved or have been approved by a prior permit still valid; and on or before December thirty-first of each year the permittee shall file in the office of the State Department of Health satisfactory record, or detail plans, showing the correct plan of all sewers and sewerage structures as actually constructed during that year, together with any other information in connection therewith that may be required, in order that the Sanitary Water Board may at all times have full information as to the extent and use of the system.

TWELVE: The outfall sewer shall be extended to low water mark of the receiving body of water in such a manner as to insure the satisfactory dispersion of its effluent thereinto; insofar as practicable it shall have its outlet submerged; and shall be constructed of cast iron, concrete, or other material approved by the Bureau of Sanitary Engineering; and shall be so protected against the effects of flood water, ice, or other hazards as to reasonably insure its structural stability and freedom from stoppage.

THIRTEEN: The permittee shall secure any necessary permission

from the proper federal authority for any outfall or sewerage structure which discharges into or enters navigable waters and shall obtain from the State Water & Power Resources Board approval of any stream crossing, encroachment, or change of natural stream conditions coming within the jurisdiction of the said Board.

FOURTEEN: If at any time the sewerage system of the permittee, or any part thereof, or the discharge of sewage therefrom, shall have created a public nuisance, or such discharge is or may become inimical and injurious to the public health or to animal or aquatic life or to the use of the receiving water for domestic or industrial consumption, or for recreation, the permittee shall forthwith adopt such remedial measures as the Sanitary Water Board may advise or approve.

FIFTEEN: Nothing herein contained shall be construed to be an intent on the part of the Sanitary Water Board to approve any act made or to be made by the permittee inconsistent with the permittee's lawful powers or with existing laws of the Commonwealth regulating sewerage and the practice of professional engineering, or shall be construed as approval of the structural adequacy of the approved structures; nor shall this permit be construed to permit any act otherwise forbidden by any of the laws of the Commonwealth of Pennsylvania or of the United States.

SIXTEEN: The improvements being effected in the waters of the State through the progressive, sanitary clean-up of streams by the Sanitary Water Board render the effects of untreated municipal sewage and industrial wastes upon these waters increasingly harmful or inimical to the public interest, in consequence of which the time should be anticipated when such sewage and/or industrial wastes must be suitably modified prior to its discharge thereto.

Therefore, the permittee is hereby notified that when the Sanitary Water Board shall have determined that the public interests require the treatment or further treatment of the sewage and/or industrial wastes of the permittee, then the permittee shall, upon notice by the Board, within the time specified, submit to the Board for its approval, plans and a report providing for the degree of treatment of the permittee's sewage and/or industrial wastes specified by the Board and after approval thereof shall construct such works in accordance with the directions of the Board.

SEVENTEEN: The approval herein given is specifically made

contingent upon the permittee acquiring all necessary rights, by easement or otherwise as required, providing for the satisfactory construction, operation, maintenance and replacement of all sewers or sewerage structures in, along, or across private property, with full rights of ingress, egress and regress.

EIGHTEEN: Promptly upon completion of the herein approved sewerage, duplicate detail record plans showing these works as actually constructed, shall be filed with the Sanitary Water Board for its information.

NINETEEN: When the herein approved sewage treatment works is constructed and before it is placed in operation, the permittee shall notify the State Department of Health so that an inspection of the works may be made by a representative of the Department.

TWENTY: The various structures and apparatus of the sewage treatment works herein approved shall be maintained in proper condition so that they will individually and collectively perform the functions for which they were designed.

TWENTY-ONE: The screenings and sludge shall be so handled that a nuisance is not created and shall be disposed of in a sanitary manner to the satisfaction of the Sanitary Water Board.

TWENTY-TWO: Daily records of the operation of the sewage treatment works shall be kept on forms satisfactory to the State Department of Health and copies of such records shall be filed at weekly intervals in the office of the said Department. These reports shall include the quantity of sewage treated and the results of such tests and analyses as the State Department of Health may deem necessary for proper control of the operation of the sewage treatment works.

TWENTY-THREE: The sewage treatment works shall be operated by a competent person or persons. In this connection attention is directed to the necessity for expert advice and supervision over the operation of the sewage treatment works in order to secure efficiency of operation and protection to the waters of the State. To this end the permittee shall place the operation of the sewage treatment works under the control of the designer of these works, or some other person expert in the operation of sewage treatment works, for at least one year after completion thereof. Effective January 1, 1971, the sewage treatment plant shall be operated by a certified operator, in accordance with the Sewage Treatment Plant and Waterworks Operators' Certification Act, Act #322, approved November 18, 1968.

(Amended June 13, 1969)

TWENTY-FOUR: The right to discharge the effluent from the permittee's sewage treatment works into the waters of the State is specifically made contingent upon such operation of these works as will produce an effluent of a quality satisfactory for discharge into the receiving body of water. If, in the opinion of the Sanitary Water Board, these works are not so operated or if by reason of increased load upon the works, changed use or condition of the receiving body of water, or otherwise, the said effluent ceases to be satisfactory for such discharge, then upon notice by the Board the right herein granted to discharge such effluent shall cease and become null and void and, within the time specified by the Board, the permittee shall take such remedial measures as will produce an effluent which in the opinion of the Board, will be satisfactory for discharge into the said receiving body of water.

TWENTY-FIVE: The attention of the permittee is called to the highly explosive nature of certain gases generated by the digestion of sewage solids when these gases are mixed in proper proportions with air, and to the highly toxic character of certain gases arising from such digestion or from sewage in insufficiently ventilated compartments or sewers. Therefore, at all places throughout the works where hazard of fire, explosion, or danger from toxic gases may occur, the permittee shall post conspicuously proper warnings of a permanent and easily legible character and shall provide for the thorough instruction of all employes concerning the aforesaid hazards and in first aid and emergency methods of meeting such hazards and shall further provide, in a conveniently accessible place, all necessary equipment and material therefor.

TWENTY-SIX: Adequate and assured ventilation shall be provided for all enclosed screen chambers, sewage wells, pump rooms, sludge wells, general control rooms, chlorine control, and digestor control rooms, and also for all other compartments in which explosive or dangerous gases or dusts can accumulate and which must be entered periodically for inspection or operation.

TWENTY-SEVEN: Cross connections between a potable water supply and a sewerage system constitute a potential danger to the public health. Therefore, all direct and indirect connections whereby under normal or abnormal conditions the potable water supply may become contaminated from an inferior water supply, from any unit of the sewage treatment works, or by any appurtenance thereof or from any part of a sewerage system, are hereby specifically prohibited. The permittee is further warned against permitting to be made permanent any temporary connection with a potable supply designed to be held in place while being

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used for flushing or other purposes, and is also cautioned against the danger of back siphonage through portable hose lines and similar avenues of possible contamination.

COMMONWEALTH OF PENNSYLVANIA

RECEIVED 8-16-72
REFER TO
ANSWD

DEPARTMENT OF ENVIRONMENTAL RESOURCES

August 7, 1972

Certified Mail

Delaware County Regional Water Control Authority
Delaware County Court House
Media, Pa. 19063
Attn: William H. Turner, Chairman

SUBJECT: Sewerage Permit No. 2372406
Delaware County Regional Water Control Authority

Gentlemen:

Subject permit is enclosed.

Please study the permit carefully and direct any questions to this office.

To become operative this permit must be recorded in the Office of the Recorder of Deeds in the county in which the discharge is located. Enclosed is a certificate and pre-addressed envelope for this purpose. Please have the Recorder of Deeds accomplish the certificate and return it within ten (10) days.

Very truly yours,

C. T. Beechwood
Regional Sanitary Engineer

Enclosures - Permit
Standard Conditions
Certificate
Return Envelope

cc: Division of Management Services
Albright and Friel

Orig: CVH

Pennsylvania Department of Environmental Protection

RECEIVED
MAR 7 2005
By 2005-0503

cc: JLS & File Copy

2 East Main Street
Norristown, PA 19401

March 3, 2005

Southeast Regional Office

Phone: 484-250-5970
Fax: 484-250-5971

Orig: Permit Book

Mr. Joseph Salvucci
Executive Director
Delaware County Regional Water Quality Authority
100 East Fifth Street
P.O. Box 999
Chester, PA 19016

Re: DELCORA
Project Name: PRF Pump Station
Sewerage 2304406
File Type: Permit
Chester City
Delaware County

Dear Mr. Salvucci:

Your permit is enclosed.

You must comply with all Standard and Special Conditions attached to this Permit. Construction must be done in accordance with the permit application and all supporting documentation. Please review the permit conditions and the supporting documentation submitted with your application before starting construction.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa.C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717-787-3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800-654-5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at 717-787-3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST REACH THE BOARD WITHIN 30 DAYS. YOU DO NOT NEED A LAWYER TO FILE AN APPEAL WITH THE BOARD.

IMPORTANT LEGAL RIGHTS ARE AT STAKE, HOWEVER, SO YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT AFFORD A LAWYER, YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY TO THE BOARD (717-787-3483) FOR MORE INFORMATION.

If you have any questions, please call Mr. David Talley at 484-250-5181.

Sincerely,

James Newbold, P.E.
Regional Manager
Water Management

Enclosures

cc: Mr. Weinzapfel, BCM Engineers
Operations Section
Water Management
Permits Chief
File
Re (AR05WQM)054-5

3800-PM-WSWM0015 Rev. 6/2004
Permit

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER SUPPLY AND WASTEWATER MANAGEMENT

WATER QUALITY MANAGEMENT PERMIT

PERMIT NO. 2304406
AMENDMENT NO. _____
APS ID 541986
AUTH ID 577753

A. PERMITTEE (Name and Address): CLIENT ID#: 42332	B. PRIMARY FACILITY (Name):
Delaware County Regional Water Quality Authority (DELCORA) **100 E. Fifth St.** **P.O. Box 999** **Chester, PA 19016**	**DELCORA Western Treatment Plant** **Plant Return Feed (PRF) Pump Station**
C. LOCATION (Municipality, County): **Chester City** **Delaware County**	SITE ID#: **454804**

D. **This permit approves the modification of sewerage facilities consisting of:**
Upgrading the capacity of the PRF pump station from approximately 2.0mgd to approximately 4.5mgd.

Pump Stations: 1	Manure Storage:	Industrial Wastewater/Sewage Treatment Facility:
Design Capacity: 3150 GPM	Volume _____ MG	Annual Average Flow: _____ MGD
Average Annual Flow: 4,500,000 GPD	Freeboard: _____ inches	Design Hydraulic Capacity: _____ MGD
		Design Organic Capacity: _____ lb/day

E. APPROVAL GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING:

1. **New Permits:** All construction, operations, and procedures shall be in accordance with the Water Quality Management Permit application dated 12/8/04, its supporting documentation, and addendums dated ____, which are hereby made a part of this permit.

   Amendments: All construction, operations, and procedures shall be in accordance with the Water Quality Management Permit Amendment application dated ____ and its supporting documentation, and addendums dated ____, which are hereby made a part of this amendment.

   Except for any herein approved modifications, all terms, conditions, supporting documentation and addendums approved under Water Quality Management Permit No. ____ dated ____ shall remain in effect.

   Transfers: Water Quality Management Permit No. ____ dated ____ and conditions, supporting documentation and addendums are also made part of this transfer.

2. **Permit Conditions Relating to sewerage** are attached and made part of this permit.
3. Special Conditions numbered ____ are attached and made part of this permit.

F. THE AUTHORITY GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING FURTHER QUALIFICATIONS:

1. If there is a conflict between the application or its supporting documents and amendments and the attached conditions, the attached conditions shall apply.
2. Failure to comply with the rules and regulations of DEP or with the terms or conditions of this permit shall void the authority given to the permittee by the issuance of this permit.
3. This permit is issued pursuant to the Clean Streams Law Act of June 22, 1937, P.L. 1987, as amended 35 P.S. §691.1 *et seq.* Issuance of this permit shall not relieve the permittee of any responsibility under any other law.

PERMIT ISSUED: March 3, 2005

BY: James J. Newbold

TITLE: Water Management Program Manager

Re 30

Permit No. 2304406

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER SUPPLY AND WASTEWATER MANAGEMENT

PERMIT CONDITIONS RELATING TO SEWERAGE

For use in Water Quality Management Permits

(Place a √ in the box that applies)

General

☒ 1. Consistent with the Department of Environmental Protection's (DEP) technical guidance document *Conducting Technical Reviews of Water Quality Management Permit Wastewater Treatment Facilities* (DEP ID: 362-2000-007) available on DEP's website at www.dep.state.pa.us. DEP considers the registered Professional Engineer whose seal is affixed to the design documents to be fully responsible for the adequacy of all aspects of the facility design.

☐ 2. The permittee shall adopt and enforce an ordinance requiring the abandonment of privies, cesspools or similar receptacles for human waste and onlot sewage disposal systems on the premises of occupied structures accessible to public sewers. All such structures must be connected to the public sewers.

☐ 3. The outfall sewer or drain shall be extended to the low water mark of the receiving body of water. Where necessary to ensure proper mixing and waste assimilation, an outfall sewer or drain may be extended with appurtenances below the low water mark and into the bed of a navigable stream provided that the permittee has secured an easement, right-of-way, license or lease from DEP in accordance with Section 15 of the Dam Safety and Encroachments Act, the Act of November 26, 1978, P.L. 1375, as amended.

☒ 4. The approval is specifically made contingent on the permittee acquiring all necessary property rights, by easement or otherwise, providing for the satisfactory construction, operation, maintenance and replacement of all sewers or sewerage structures in, along or across private property with full rights of ingress, egress and regress.

☒ 5. When construction of the approved sewerage facilities is completed and before they are placed in operation, the permittee shall notify DEP in writing so that a DEP representative may inspect the facilities.

☒ 6. If, at any time, the sewerage facilities covered by this permit create a public nuisance, including but not limited to, causing malodors or causing environmental harm to waters of the Commonwealth, DEP may require the permittee to adopt appropriate remedial measures to abate the nuisance or harm.

☐ 7. This permit authorizes the construction and operation of the proposed sewerage facilities until such time as facilities for conveyance and treatment at a more suitable location are installed and capable of receiving and treating the permittee's sewage. Such facilities must be in accordance with the applicable municipal official plan adopted pursuant to Section 5 of the Pennsylvania Sewage Facilities Act, the Act of January 24, 1966, P.L. 1535 as amended. When such municipal sewerage facilities become available, the permittee shall provide for the conveyance of the sewage to these sewerage facilities, abandon the use of these approved facilities and notify DEP accordingly. This permit shall then, upon notice from DEP, terminate and become null and void and shall be relinquished to DEP.

☒ 8. This permit does not relieve the permittee of its obligations to comply with all federal, interstate, state or local laws, ordinances and regulations applicable to the sewerage facilities.

☒ 9. This permit does not give any real or personal property rights or grant any exclusive privileges, nor shall it be construed to grant or confirm any right, easement or interest in, on, to or over any lands which belong to the Commonwealth.

☒ 10. The authority granted by this permit is subject to all effluent requirements, monitoring requirements and other conditions as set forth in NPDES Permit No. **PA0027103** and all subsequent amendments and renewals. No discharge is authorized from these facilities unless approved by an NPDES Permit.

Construction

☐ 11. An Erosion and Sedimentation (E&S) Plan must be developed prior to construction of the permitted facility, pursuant to Title 25 Pa. Code Chapter 102, and implemented during and after the earth disturbance activity.

If the activity involves 5 or more acres of earth disturbance, or from 1 to 5 acres of earth disturbance with a point source discharge to surface waters of the Commonwealth, an NPDES permit for the Discharge of Stormwater Associated with Construction Activity is required.

In addition to the state NPDES permitting requirements, some municipalities, through local ordinances, require the E&S Control Plan to be reviewed and approved by the local County Conservation District office prior to

construction. For specific information regarding E&S control planning approval and NPDES permitting requirements, please contact your local County Conservation District office.

☒ 12. The facilities shall be constructed under the supervision of a Pennsylvania registered Professional Engineer in accordance with the approved reports, plans and specifications.

☐ 13. A Pennsylvania registered Professional Engineer shall certify that construction of the permitted facilities was completed in accordance with the application and design plans submitted to DEP, using "Post Construction Certification" (3800-PM-WSWM0179a). It is the permittee's responsibility to ensure that a Professional Engineer is on-site to provide the necessary oversight and/or inspections to certify the facilities. The certification must be submitted to DEP before the facility is placed in operation. If requested, "as-built" drawings, photographs (if available) and a description of any DEP-approved deviations from the application and design plans must be submitted to DEP within 30 days of certification.

☐ 14. Manhole inverts shall be formed to facilitate the flow of the sewage and to prevent the stranding of sewage solids. The manhole structure shall be built to prevent undue infiltration, entrance of street wash or grit and provide safe access to facilitate manhole maintenance activities.

☐ 15. The local Waterways Conservation Officer of the Pennsylvania Fish and Boat Commission (PFBC) shall be notified when the construction of any stream crossing and/or outfall is started and completed. A written permit must be secured from the PFBC if the use of explosives in any waterways is required and the permittee shall notify the local Waterways Conservation Officer when explosives are to be used.

Operation and Maintenance

☒ 16. The permittee shall maintain records of "as-built" plans showing all the treatment facilities as actually constructed together with facility operation and maintenance (O&M) manuals and any other relevant information that may be required. Upon request, the "as-built" plans and O&M manuals shall be filed with DEP.

☐ 17. The sewers shall have adequate foundation support as soil conditions require. Trenches shall be back-filled to ensure that sewers will have proper structural stability, with minimum settling and adequate protection against breakage. Concrete used in connection with these sewers shall be protected from damage by water, freezing, drying or other harmful conditions until cured.

☐ 18. Stormwater from roofs, foundation drains, basement drains or other sources shall not be admitted directly to the sanitary sewers.

☐ 19. The approved sewers shall be maintained in good condition, kept free of deposits by flushing or other cleaning methods and repaired when necessary.

☒ 20. The sewerage facilities shall be properly operated and maintained to perform as designed.

☒ 21. The attention of the permittee is called to the highly explosive nature of certain gases generated by the digestion of sewage solids when these gases are mixed in proper proportions with air and to the highly toxic character of certain gases arising from such digestion or from sewage in poorly ventilated compartments or sewers. Therefore, at all places throughout the sewerage facilities where hazard of fire, explosion or danger from toxic gases may occur, the permittee shall post conspicuous permanent and legible warnings. The permittee shall instruct all employees concerning the aforesaid hazards, first aid and emergency methods of meeting such hazards and shall make all necessary equipment and material accessible.

☐ 22. An operator certified in accordance with the Water and Wastewater Systems Operator Certification Act of February 21, 2002, 63 P.S. §§1001, *et seq.* shall operate the sewage treatment plant.

☐ 23. The permittee shall properly control any industrial waste discharged into its sewerage system by regulating the rate and quality of such discharge, requiring necessary pretreatment and excluding industrial waste, if necessary, to protect the integrity or operation of the permittee's sewerage system.

☐ 24. There shall be no physical connection between a public water supply system and a sewer or appurtenance to it which would permit the passage of any sewage or polluted water into the potable water supply. No water pipe shall pass through or come in contact with any part of a sewer manhole.

☐ 25. All connections to the approved sanitary sewers must be in accordance with the corrective action plan as contained in the approved Title 25 Pa. Code Chapter 94 Municipal Wasteload Management Annual Report.

☐ 26. Collected screenings, slurries, sludge and other solids shall be handled and disposed of in compliance with Title 25 Pa. Code Chapters 271, 273, 275, 283 and 285 (related to permits and requirements for land filling, land application, incineration and storage of sewage sludge), Federal Regulations 40 CFR 257 and the Federal Clean Water Act and its amendments.

Scanned 11/1/19 bab

Pennsylvania Department of Environmental Protection

Lee Park, Suite 6010
555 North Lane
Conshohocken, PA 19428

July 10, 2003

Southeast Regional Office

Phone: 610-832-6130
Fax: 610-832-6133

RECEIVED
JUL 14 2003
By 2003-185

Ms. Christine Volkay-Hiditch
Director of Engineering
Delaware County Regional Water Quality
Control Authority
100 East Fifth Street
Chester, PA 19016-0999

Re: Western Regional Treatment Plant
SEW 2303403
File Type: Permit
City of Chester
Delaware County

Dear Ms. Volkay-Hiditch:

Your permit is enclosed.

You must comply with all Standard and Special Conditions attached to this Permit. Construction must be done in accordance with the permit application and all supporting documentation. Please review the permit conditions and the supporting documentation submitted with your application before starting construction.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa. C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717-787-3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800-654-5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at 717-787-3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

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If you have any questions, please call Mr. Paul R. Grella at 610-832-6195.

Sincerely,

James Newbold, P.E.
Regional Manager
Water Management

Enclosure

cc: Mr. Weinzapfel - BCM Engineers
Operations Section
Water Management
Permits Chief
File
Re 30 (RN03WQM)112-17

3600-PM-WQ0015 Rev. 8/94

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
WATER MANAGEMENT PROGRAM

PERMIT NO. 2303403

AMENDMENT NO. _____

WATER QUALITY MANAGEMENT PERMIT

A. PERMITTEE (Name & Address):

Delaware County Regional Water Quality Control Authority - Client ID No. 42332
100 East Fifth Street
Chester, PA 19016-0999

B. PROJECT (Name, County, Municipality)

Sludge Mixing and Pump Upgrade - Site ID No. 454804
City of Chester
Delaware County

C. THIS: X **Permit** ____ **Permit Amendment** ____ **Permit Transfer**

APPROVES:

	The construction/operation of:		Modification(s) to the construction/operation of:
X	Sewage Treatment Facilities	____	Industrial Waste Treatment Facilities
____	Land Application Facilities	____	Other: ____
____	Average Design Flow of ____	____	MGD consisting of: ____
____	Sewers and Appurtenances	____	Pump Station(s)
____	Impoundment(s)	____	Injection Well(s)
____	Soil Erosion & Sedimentation Control Plan	____	Forcemain with or without Individual Pumps
____	Stream Crossing(s)	____	Outfall & Headwall(s)

D. APPROVAL GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING CONDITIONS:

1. a. All construction, operations, and procedures shall be in accordance with the Water Quality Management Permit/Permit Amendment Application dated **January 31, 2003**, its supporting documentation, and addendums dated ____. Such application, its supporting documentation and addendums are hereby made a part of this permit.

   b. Water Quality Management Permit No. ____ dated ____ and conditions, supporting documentation and addendums are (except for any modifications to the original permit herein permitted) also made a part of this permit amendment.

2. Conditions numbered **1-6, 11-13, and 17-19** of the **Sewerage** standard conditions dated **09/98** and conditions numbered **1-13** of the erosion control standard conditions dated **09/98** are attached and made part of this permit.

3. Special conditions numbered **I** are attached and made part of this permit.

E. THE AUTHORITY GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING FURTHER QUALIFICATIONS:

1. If there is a conflict between the application or its supporting documents and amendments and the standard or special conditions, the standard or special conditions shall apply.
2. Failure to comply with the rules and regulations of the Department or with the terms or conditions of this permit shall void the authority given to the permittee by the issuance of the permit.
3. This permit is issued pursuant to the Clean Stream law Act of June 22, 1937, P.L. 1987, as amended 35 P.S. § 691.1 et seq., and/or the Dam Safety and Encroachments Act of November 26, 1978, P.L. 1375, as amended, 32 P.S. § 693.1 et seq. Issuance of this permit shall not relieve the permittee of any responsibility under any other law.
4. Industrial Facilities - If the herein permitted facilities or modifications are not completed with two (2) years of the issue date below, this permit will become null and void and reapplication shall be required.

PERMIT ISSUED:
DATE July 10, 2003

AMENDMENT ISSUED:
DATE ____

DEPARTMENT OF ENVIRONMENTAL PROTECTION
BY: James J. Seebold
TITLE: Regional Manager, Water Management

Re 30 (GJE03WQ)111-30

Sewerage Permit No. 2303403
Delaware County Regional Water Quality Control Authority
City of Chester, Delaware County

This permit is subject to the following Special Condition(s):

I. Consistent with Department of Environmental Protection Policy, the Department did not conduct a detailed technical review of the application for this permit. The Department considers the registered professional engineer whose seal is affixed to the design documents, to be fully responsible for the adequacy of all aspects of the facility design.

Re 30 (RN03WQM)111-23

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD CONDITIONS RELATING TO SEWERAGE
for Use in Water Quality Management Permits

1. During construction, no changes affecting any engineering design parameter relied on in issuing this permit shall be made from the plans, designs, and other data herein approved unless the permittee shall first receive written approval thereof from the Department. The sewerage facilities shall be constructed under expert engineering supervision and competent inspection.

The permittee shall maintain "as-built" plans showing the correct plan of all sewers and sewerage structures as actually constructed together with any other information that may be required. The permittee shall also maintain facility operation and maintenance (O&M) manuals at the facility to assure proper O&M of the permitted facility. The permittee shall file the "as-builts" and O&M manuals with the Department upon request.

2. The sewers shall have adequate foundation support, as soil conditions require. Trenches shall be back-filled such that the sewers will have proper structural stability, with minimum settling and adequate protection against breakage. Concrete used in connection with these sewers shall be protected from damage by water, freezing, drying, or other harmful conditions until cured.

3. Manhole inverts shall be so formed as to facilitate the flow of the sewage and to prevent the standing of sewage solids, and the whole manhole structure shall have proper structural strength and be so constructed as to prevent undue infiltration, entrance of the street wash or grit, and to provide convenient and safe means of access and maintenance.

4. No stormwater from pavements, area ways, roofs, foundation drains, basement drains, or other sources shall be admitted to the sanitary sewers herein approved. The stormwater from stormwater collection and retention facilities serving the facility may be discharged to the plant headworks at a hydraulic and organic rate, which will not violate the Permit.

5. The permittee shall adopt and enforce an ordinance requiring the abandonment of privies, cesspools, or similar receptacles for human waste and on-lot sewage disposal systems on the premises of occupied structures, which are accessible to public sewers and require the connection of such structures to the public sewers.

6. The herein approved sewers shall be maintained in good condition, kept free from deposits by flushing or other proper means of cleaning, and repaired when necessary.

7. The outfall sewer or drain shall be extended to the low water mark of the receiving body of water. Where necessary to assure the proper mixing and waste assimilation, an outfall sewer or drain may be extended with appurtenances below the low water mark and into the bed of a navigable stream, provided that the permittee has secured an easement, right-of-way, license, or lease from the Department in accordance with Section 15 of the Dam Safety and Encroachments Act, the Act of November 26, 1978, P.L. 1375, as amended.

8. The approval is specifically made contingent upon the permittee acquiring all necessary property rights, by easement or otherwise, providing for the satisfactory construction, operation, maintenance, and replacement of all sewers or sewerage structures in, along, or across private property, with full rights of ingress, egress, and regress.

9. The various structures and apparatus of the sewage treatment works herein approved shall be maintained in proper condition so that the facility will individually and collectively perform the functions for which they were designed.

10. When the herein approved sewage treatment works is completed and before it is placed in operation, the permittee shall notify the Department in writing so that an inspection of the works may be made by a representative of the Department.

11. If, at any time, the sewage and/or conveyance facilities covered by this permit create a public nuisance, including but not limited to, causing malodors, or cause environmental harm to waters of the Commonwealth, the Department may require the permittee to adopt appropriate remedial measures to abate the nuisance or harm.

12. The attention of the permittee is called to the highly explosive nature of certain gases generated by the digestion of sewage solids when these gases are mixed in proper portions with air, and to the highly toxic character of certain gases arising from such digestion or from sewage in insufficiently ventilated compartments or sewers. Therefore, at all places throughout the sewerage facilities where hazard of fire, explosion, or danger from toxic gases may occur, the permittee shall post conspicuously proper warnings of a permanent and legible character and shall provide for the thorough instruction of all employees concerning the aforesaid hazards and in first aid and emergency methods of meeting such hazards and shall further provide, in a conveniently accessible place, all necessary equipment and material therefore.

13. Cross connections between the potable water supply and the sewerage system constitute a potential danger to the public health. Therefore, all direct and indirect connections whereby under normal or abnormal conditions, the potable water supply may become contaminated from an inferior water supply from any unit of the sewage treatment works, or by any appurtenance thereof or from any part of a sewerage system are hereby specifically prohibited. The permittee is further warned against performing to be made permanent any temporary connection with a potable supply designed to be held in place while being used for flushing or other purposes, and is also cautioned against the danger of back siphonage through portable hose lines and similar avenues of possible contamination.

14. This permit authorizes the construction and operation of the proposed sewerage facilities until such time as facilities for conveyance and treatment at a more suitable location are installed and are capable of receiving and treating the permittee's sewage. Such facilities must be in accordance with the applicable municipal official plan adopted pursuant to Section 5 of the Pennsylvania Sewage Facilities Act, the Act of January 24, 1956, P.L. 1535, as amended. When such municipal sewerage facilities become available, the permittee shall provide for the conveyance of the sewage to these sewerage facilities, abandon the use of the herein-approved facilities, and notify the Department accordingly. This permit shall then, upon notice from the Department, terminate and become null and void, and shall be relinquished to the Department.

15. The local waterways patrolman of the Pennsylvania Fish and Boat Commission shall be notified when the construction of a stream crossing and outfall is started and completed. A permit must be secured from the Pennsylvania Fish and Boat Commission if the use of explosives is required. The permittee shall notify the local waterways patrolman when explosives are to be used.

16. The sewage treatment plant shall be operated by an operator certified in accordance with the Sewage Treatment Plant and Waterworks Operators' Certification Act, the Act of November 18, 1968, P.L. 1217, as amended.

17. The permittee shall properly control any industrial waste discharged into its sewerage system by regulating the rate and quality of such discharge, requiring necessary pretreatment, and excluding industrial waste, if necessary, to protect the integrity or operation of the permittee's sewerage system.

18. The permit does not relieve the permittee of its obligations to comply with all federal, interstate, state or local laws, ordinances, and regulations applicable to the sewerage facilities authorized herein.

19. This permit does not give any real or personal property rights or grant any exclusive privileges, nor shall it be construed to grant or confirm any right, title, easement, or interest in, on, to, or over any lands belonging to the Commonwealth.

20. No untreated or ineffectively treated wastewaters from any facility shall be discharged into the waters of the Commonwealth, and special care shall be used in developing and implementing the PPC plan to prevent accidental "spills" or similar unusual discharges of all raw, finished, and waste materials.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD CONDITIONS RELATING TO EROSION AND SEDIMENT CONTROL
for Use in Water Quality Management Permits

1. By approval of the plans for which this permit is issued, neither the Department nor the Commonwealth of Pennsylvania assumes any responsibility for the feasibility of the plans or the measures and facilities to be constructed thereunder.

2. If at any time the erosion and sediment control activities undertaken pursuant to this permit or other activities carried out at the location is causing or contributing to pollution of the waters of the Commonwealth, the permitee shall forthwith adopt such remedial measures as are acceptable to the Department.

3. This permit does not authorize any earth disturbance controlled or regulated by an ordinance enacted by a local municipality. Additional permits must be secured from local municipalities where earthmoving activities are covered by such local ordinances.

4. At least seven days before earthmoving will begin, the permittee, by telephone or certified mail, shall notify the Department or its designee of the date for beginning of construction and invite the County Conservation District representative to attend a pre-construction conference. The permittee shall have his erosion control plan available at the activity at all times.

5. All earthmoving activities shall be undertaken in the manner set forth in the erosion and sediment control plan identified with this permit. Revisions to the plan shall be pre-approved by the Department or the conservation district.

The erosion control measures and facilities shall be constructed under the supervision and competent inspection of an individual trained and experienced in erosion control, and in accordance with the plans, designs and other data as herein approved or amended, and with the conditions of this permit. Control facilities shall be frequently inspected and maintained to insure effective control.

7. When the herein approved erosion and sediment control measures and facilities are completed, the permittee shall notify the County Conservation District so that a final inspection of the measures and facilities may be made.

8. No storm water, sewage or other wastes not specifically approved herein, shall be admitted to the erosion and sediment control facilities for which this permit is issued.

9. Sediment shall at not time be permitted to accumulate in sedimentation basins to a depth that may limit storage capacity or interfere with the facility's settling efficiency. The sediment removed shall be handled and disposed of in a manner that will not create pollution problems and so that every reasonable and practical precaution is taken to prevent the said material from reaching the waters of the Commonwealth.

10. All slopes, channels, ditches or any disturbed area shall be stabilized as soon as possible after the final grade or final earthmoving has been completed. Where it is not possible to permanently stabilize a disturbed area immediately after the final earthmoving has been completed or where the activity ceases for more than 20 days, interim stabilization measures shall be implemented promptly.

11. Upon completion of the project, all areas which were disturbed by the project shall be stabilized so that accelerated erosion will be prevented. Any erosion and sediment control facility required or necessary to protect areas from erosion during the stabilization period shall be maintained until stabilization is completed. Upon completion of stabilization, all unnecessary or unusable control measures and facilities shall be removed, the areas shall be graded and the soils shall h abilized.

12. The responsibility of carrying out the permit conditions or to assure that they are carried out shall rest with the permittee.

13. If the proposed earth disturbance is five acres or greater, the permittee shall comply with the NPDES General

WQ-15 Rev. 11/72

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES

'11(a Plan

WATER QUALITY MANAGEMENT PERMIT

NO. 2372408

A. PERMITTEE: (Name and Address)	B. PROJECT LOCATION
'Delaware Co. Reg. Water Control Auth. Delaware County Courthouse Media, Pa. 19063	Municipality: City of Chester County: Delaware
C. TYPE OF FACILITY	D. NAME OF MINE OR AREA SERVED
Sewage Treatment Plant Expansion	City of Chester and adjacent Service Area

E. THIS PERMIT APPROVES:

1. Plans For Construction Of:
   - a. [ ] Pump Stations: Sewers and Appurtenances
   - b. [x] Sewage Treatment Facilities
   - c. [ ] Industrial Wastes Treatment Facilities

2. The Discharge Of:
   - a. [x] Treated
   - [ ] Untreated
   - b. [ ] Industrial Wastes
   - [x] Sewage

   TO: Delaware River (Receiving Waters)

3. The Operation Of N.A.
   - a. [ ] Mine

   Maximum surface area to be affected shall not exceed _____ acres. (Surface Mines)

   Maximum area to be deep mined _____ acres.

F. YOU ARE HEREBY AUTHORIZED TO CONSTRUCT, OPERATE OR DISCHARGE, AS INDICATED ABOVE, PROVIDED THAT YOU COMPLY WITH THE FOLLOWING:

1. ALL REPRESENTATIONS REGARDING OPERATION, CONSTRUCTION, MAINTENANCE AND CLOSING PROCEDURES AS WELL AS ALL OTHER MATTERS SET FORTH IN YOUR APPLICATION AND ITS SUPPORTING DOCUMENTS (APPLICATION NO. 2372408 DATED February 22, 1972, AND AMENDMENTS DATED 9/15/72 and 2/1/73.) SUCH APPLICATION, ITS SUPPORTING DOCUMENTS AND AMENDMENTS ARE HEREBY MADE A PART OF THIS PERMIT.

2. CONDITIONS NUMBERED 1, 2, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 29 and 30. OF THE Sewerage STANDARD CONDITIONS DATED 1972 WHICH CONDITIONS ARE ATTACHED HERETO AND ARE MADE A PART OF THIS PERMIT.

3. SPECIAL CONDITION(S) NUMBERED I WHICH ARE ATTACHED HERETO AND ARE MADE A PART OF THIS PERMIT.

This permit must be recorded in the Recorder of Deeds Office in Delaware Co.

G. THE AUTHORITY GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING FURTHER QUALIFICATIONS:

1. IF THERE IS A CONFLICT BETWEEN THE APPLICATION OR ITS SUPPORTING DOCUMENTS AND AMENDMENTS AND THE STANDARD OR SPECIAL CONDITIONS, THE STANDARD OR SPECIAL CONDITIONS SHALL APPLY.

2. FAILURE TO COMPLY WITH THE RULES AND REGULATIONS OF THE DEPARTMENT OR THE TERMS OR CONDITIONS OF THIS PERMIT SHALL VOID THE AUTHORITY GIVEN TO THE PERMITTEE BY THE ISSUANCE OF THE PERMIT.

3. THIS PERMIT IS ISSUED PURSUANT TO THE CLEAN STREAMS LAW, THE ACT OF JUNE 22, 1937, P.L. 1987, AS AMENDED. ISSUANCE OF THIS PERMIT SHALL NOT RELIEVE THE PERMITTEE OF ANY RESPONSIBILITY UNDER ANY OTHER LAW.

PERMIT ISSUED

DATE 2-15-73

DEPARTMENT OF ENVIRONMENTAL RESOURCES

BY C. T. Bechtel

TITLE Regional Sanitary Engineer
Norristown Office

BOOK 2461 PAGE 55

Sewerage Permit No. 2372408
'DELCORA'
City of Chester, Delaware County

This permit is subject to the following special condition:

I. The plant hereby approved is required to effect secondary treatment of the sewage which it receives. For the purpose of this permit, secondary treatment is that treatment that will:

During the period May 1 through October 31 reduce the organic waste load as measured by the biochemical oxygen demand test by at least 89.25% and limit the amount of carbonaceous oxygen demand that may be discharged in the effluent from DELCORA's Chester Regional Water Pollution Control Plant to 9,350 lbs. per day (30 consecutive day average value).

During the period November 1 through April 30 reduce the organic waste load as measured by the biochemical oxygen demand test by at least 82% and limit the amount of carbonaceous oxygen demand that may be discharged in the effluent from DELCORA's Chester Regional Water Pollution Control Plant to 15,600 lbs. per day (10 consecutive day average value).

The suspended solids in the effluent shall not exceed 20 mg/l (based on a five (5) consecutive day average value).

In addition, secondary treatment is that treatment that will provide effective disinfection to control disease producing organisms; will provide satisfactory disposal of sludge; and will reduce the quantities of oil, grease, acid, alkalis, toxic, taste and odor producing substances inimical to the public interest to levels that will not pollute the receiving stream.

H711-308

STATE OF PENNSYLVANIA }
COUNTY OF MONTGOMERY } SS

On the 15th day of February in the year one thousand nine hundred and seventy-three before me, the Subscriber, a Notary Public, came the above named

C.T. Beechwood

and duly acknowledged the foregoing permit to be his act and deed and desired that the same might be recorded as such.

Witness my hand and notarial seal the day and year aforesaid.

John F. Daly, Jr.
NOTARY PUBLIC

Notary Public Boro of Norristown, Montg. Co.
My Commission Expires August 16, 1976

ER-711.310
Rev. 9/72

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES

STANDARD CONDITIONS RELATING TO SEWERAGE - 1972

ONE: All relevant and non-superseded conditions of prior sewerage or water quality management permits or orders issued to the herein named permittee or his predecessor shall continue in full force and effect and together with the provisions of this permit shall apply to his successors, lessees, heirs, and assigns.

TWO: During construction no radical changes shall be made from the plans, designs, and other data herein approved unless the permittee shall first receive written approval thereof from the Department. The sewerage facilities shall be constructed under expert engineering supervision and competent inspection.

THREE: Sewers herein approved shall have tight, well-fitting joints, shall be laid with straight alignment and grade and shall have smooth interior surfaces. The sewers shall have adequate foundation support as soil conditions requires. Special care shall be taken in construction of sewers under deep or shallow cover and under other conditions which impose extra hazards to sewer stability. Trenches shall be back-filled such that the sewers will have proper structural stability, with minimum setting and adequate protection against breakage. Concrete used in connection with these sewers shall be protected until cured from injury by water, freezing, drying or other harmful conditions.

FOUR: Manholes shall be placed and constructed as shown upon the herein approved plans except, that if not already so provided, they shall be placed on all sewers at junctions, at each change in grade or alignment, at summit ends, and upon straight lines at intervals not exceeding four hundred feet, or wherever necessary to permit satisfactory entrance to and maintenance of the sewers; manhole inverts shall be so formed as to facilitate the flow of the sewage and to prevent the stranding of sewage solids, and the whole manhole structure shall have proper structural strength and be so constructed as to prevent undue infiltration, entrance of street wash or grit, and to provide convenient and safe means of access and maintenance.

FIVE: No storm water from pavements, area ways, roofs, foundation drains or other sources shall be admitted to the sanitary sewers herein approved.

SIX: Attention is directed to the necessity of having a qualified person make a proper study of all industrial wastes discharging or proposed for discharge to the public sewer systems, to determine what degree of preliminary treatment is necessary before these waste may be discharged to the sewer system so that the wastes will not prejudicially affect the sewerage structure or their functioning or the process of sewage treatment.

SEVEN: The permittee shall adopt and enforce an ordinance or otherwise require all occupied buildings on premises accessible to a public sewer used in conformity with the requirements of State Law, to be connected thereto; also require the abandonment of privies, cesspools or similar receptacle for human excrement on said premises.

EIGHT: The herein approved and previously constructed sewers shall be maintained in good condition, by repair when necessary and kept free from deposits by flushing or other proper means of cleaning.

NINE: The permittee shall file with the Department of Environmental Resources a satisfactory record or detail plans showing the correct plan of all sewers and sewerage structures as actually constructed together with any other information in connection therewith that may be required.

TEN: The out fall sewer or drain shall be extended to low water mark of the receiving body of water in such a manner as to insure the satisfactory dispersion of its effluent thereinto; insofar as practicable it shall have its outlet submerged; and shall be contructed of cast iron, concrete, or other material approved by the Department; and shall be so protected against the effects of flood water, ice, or other hazards as to reasonable insure its structural stability and freedom from stoppage.

ELEVEN: The permittee shall secure any necessary permission from the proper federal authority for any outfall or sewage treatment structure which discharges into or enters navigable waters and shall obtain approval of any stream crossing, encroachment or change of natural stream conditions coming within the jurisdiction of the Department.

TWELVE: If at any time the sewerage facilities of the permittee, or any part thereof, or the discharge of the effluent therefrom, shall have created a public nuisance, or such discharge is causing or contributing to pollution of the waters of the Commonwealth, the permittee shall forthwith adopt such remedial measures as are acceptable to the Department.

THIRTEEN: Nothing herein contained shall be construed to be an intent on the part of the Department to approve any act made or to be made by the permittee inconsistent with the permittee's lawful powers or with existing laws of the Commonwealth regulating stream pollution and the practice of professional engineering, nor shall this permit be construed to sanction any act otherwise forbidden by any of the laws of the Commonwealth of Pennsylvania or of the United States.

FOURTEEN: The approval herein given is specifically made contingent upon the permittee acquiring all necessary rights, by easement or otherwise as required, providing for the satisfactory construction, operation, maintenance and replacement of all sewers or sewerage structures in, along, or across private property, with full rights of ingress, egress and regress.

FIFTEEN: When the herein a approved sewage treatment works is completed and before it is placed in operation, the permittee shall notify the Department in writing so that an inspection of the works may be made by a representative of the Department.

SIXTEEN: The various structures and apparatus of the sewage treatment works herein approved shall be maintained in proper condition so that the facilities will individually and collectively preform the functions for which they were designed.

SEVENTEEN: The screenings and sludge shall be so handled that nuisance is not created and shall be disposed of in a sanitary manner satisfactory to the Department.

EIGHTEEN: The permittee shall keep records of operation and efficiency of the waste treatment works and shall submit to the Department, promptly at the end of each month, such report thereon as may be required by the Department.

NINETEEN: The sewage treatment works shall be operated by a competent person or persons. In this connection attention is directed to the necessity for expert advice and supervision over the operation of the sewage treatment works in order to secure efficiency of operation and protection to the waters of the Commonwealth. To this end the permittee shall place the operation of the sewage treatment works under the control of the dsigner of the works or some other person expert in the operation of sewage treatment works, for at least one year after completion thereof and report submitted. The sewage treatment works shall be operated by a operator certified in accordance with the Sewage Treatment Plant and Water Works Operators Certification Act, Act No. 322 approved November 18, 1968 as amended.

TWENTY: The right to discharge the effluent from the herein approved sewage treatment works into the waters of the Commonwealth is contingent upon such operation of these works as will at all times produce an effluent of a quality satisfactory to the Department. If, in the opinion of the Department, these works are not so operated or if by reason of change in the character of wastes or increased load upon the works, or changed use or condition of the receiving body of water, or otherwise, the said effluent ceases to be satisfactory for such discharge, then upon notice by the Department the right herein granted to discharge such effluent shall cease and become null and void unless within the time specified by the Department, the permittee shall adopt such remedial measures as will produce an effluent which, in the opinion of the Department, will be satisfactory for discharge into the said receiving body of water.

TWENTY-ONE: The attention of the permittee is called to the highly explosive nature of certain gases generated by the digestion of sewage solids when these gases are mixed in proper proportions with air, and to the highly toxic character of certain gases arising from such digestion or from sewage in insufficiently ventilated compartments or sewers. Therefore, at all places throughout the sewerage facilities where hazard of fire, explosion, or danger from toxic gases may occur, the permittee shall post conspicuously proper warnings of a permanent and easily legible character and shall provide for the thorough instruction of all employes concerning the aforesaid hazards and in first aid and emergency methods of meeting such hazards and shall further provide, in a conveniently accessible place, all necessary equipment and material therefor.

TWENTY-TWO: Cross connections between a potable water supply and a sewerage system constitute a potential danger to the public health. Therefore, all direct and indirect connections whereby under normal or abnormal conditions the potable water supply may become contaminated from an inferior water supply, from any unit of the sewage treatment works, or by any appurtenance thereof or from any part of a sewerage system, are hereby specifically prohibited. The permittee is further warned against permitting to be made permanent any temporary connection with a potable supply designed to be held in place while being used for flushing or other purposes, and is also cautioned against the danger of back siphonage through portable hose lines and similar avenues of possible contamination.

TWENTY-THREE: Effective disinfection to control disease producing organisms shall be the production of an effluent which will contain a concentration not greater than 200/100 ml of Fecal Coliform organisms as a geometric average value nor greater than 1,000/100 ml of these organisms in more than 10% of the samples tested.

TWENTY-FOUR: The approval herein granted for sewers is limited to the right to construct the sewers, but approval of connection there to is specifically withheld until such time approval for use thereof is granted by the Department.

TWENTY-FIVE: The attention of the permittee is directed to the fact that the effluent from the herein approved sewage treatment works is discharged to a dry stream normally without the benefit of dilution. If the effluent creates a health hazard or nuisance, the permittee shall upon notice from the Department of Environmental Resources, provide such additional treatment as may be required by the Department.

TWENTY-SIX: If facilities become available for conveying the sewage to and treating it at a more suitable location, upon order from the Department of Environmental Resources, the permittee shall provide for the discharge of the sewage to such facilities and shall abandon the use of the herein approved sewage treatment works.

TWENTY-SEVEN: The plant hereby approved is required to effect secondary treatment of the sewage which it receives. Secondary treatment is that treatment that will reduce the organic waste load as measured by the biochemical oxygen demand test by at least 85% during the period May 1 to October 31 and by at least 75% during the remainder of the year based on a five consecutive day average of values; will remove practically all of the suspended solids; will provide effective disinfection to control disease producing organisms; will provide satisfactory disposal of sludge; and will reduce the quantities of oil, greases, acids, alkalis, toxic, taste and odor producing substances, color, and other substances inimical to the public interest to levels that will not pollute the receiving stream.

TWENTY-EIGHT: Records of the operation of the single residence sewage treatment works as the State Department of Environmental Resources may deem necessary for the proper control of the operation of the treatment works shall be kept on forms satisfactory to the Department and shall be filed in the Regional Office of the Department at intervals as specified.

TWENTY-NINE: The permittee shall submit to the Department by March 31 of each year a report showing the hydraulic and organic load compared to the design load and the expected load for a period of five years hence.

THIRTY: The permittee shall prohibit additional connections to a sewer system or load from being placed upon a sewage treatment plant when the plant capacity will be exceeded within five years unless steps have been taken to enlarge the plant within that time.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES

Special Conditions Relative To Sewerage - 1972

I The plant hereby approved is required to effect (specify secondary or tertiary) treatment of the sewage which it receives. (Specify secondary or tertiary) treatment is treatment that will, for the purpose of this permit, reduce the organic waste load at least (Specify % BOD removal, suspended solids, P04 etc. or concentration permitted in effluent) during the remainder of the year based on a five consecutive day average of values; will remove practically all of the suspended solids; will provide effective disinfection to control disease producing orginisms; will provide satisfactory disposal of sludge; and will reduce the quantities of oil, grease, acids, alkalis, toxic, taste and odor producing substances, color, and other substances inimical to the public interest to levels that will not pollute the receiving stream.

II The plant hereby approved is required to effect the specified degree of reduction of BOD and suspended solids and under no circumstances may more than (specify) pounds of BOD or (specify) pound of suspended solids (or any other parameter) be discharge on any one day.

ER-BWQ-15-Rev. 11/85

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF WATER QUALITY MANAGEMENT

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WATER QUALITY MANAGEMENT PERMIT

NO. 2390404

A. PERMITTEE: (Name and Address)

Delaware County Regional
Water Quality Control Authority
100 East Fifth Street
Chester, PA 19013

B. PROJECT LOCATION

Municipality: City of Chester

County: Delaware

C. TYPE OF FACILITY (For industrial wastes, type of establishment)

Sludge Dewatering Facilities

D. NAME OF PLANT, AREA SERVED, OUTFALL NO., ETC.

Western Regional Treatment Plant

E. THIS PERMIT APPROVES:

1. Plans For Construction Of:
   a. [ ] Pump Stations Sewers and Appurtenances
   b. [X] Sewage Treatment Facilities
   c. [ ] Industrial Wastes Treatment Facilities
   d. [ ] Injection Well
   e. [ ] Outfall & Headwall
   f. [ ] Stream Crossing
   g. [ ] Impoundment

2. The Discharge Of: a. [ ] Treated N/A b. [ ] Untreated c. [ ] Sewage d. [ ] Industrial Wastes

3. Discharge To:
   a. [ ] Surface Water
   b. [ ] Ground Water
   N/A Name of Stream to which discharged or drainage area in which groundwater discharge takes place or impoundment is located.

4. Preparedness, Prevention, Contingency (PPC) Plan [ ] N/A

5. An Erosion and Sedimentation Control Plan [ ]
   Project Area is N/A Acres

F. THIS APPROVAL IS SUBJECT TO THE FOLLOWING CONDITIONS:

1. ALL CONSTRUCTION, OPERATIONS, PROCEDURES AND DISCHARGE SHALL BE IN ACCORDANCE WITH APPLICATION NO. 2390404 DATED 7/31/90 ITS SUPPORTING DOCUMENTATION, AND AMENDMENTS DATED 8/30/90, 1/3/91, 1/14/91 SUCH APPLICATION, ITS SUPPORTING DOCUMENTATION AND AMENDMENTS ARE HEREBY MADE A PART OF THIS PERMIT.

2. CONDITIONS NUMBERED 1, 7, 9-14, 16, 19-22 OF THE Sewerage STANDARD CONDITIONS DATED 09/02/83 AND CONDITIONS NUMBERED 1 through 12 OF THE EROSION CONTROL STANDARD CONDITIONS DATED 1985 WHICH CONDITIONS ARE ATTACHED AND MADE PART OF THIS PERMIT.

3. SPECIAL CONDITIONS DESIGNATED I WHICH ARE ATTACHED ~~AND~~ ARE MADE A PART OF THIS PERMIT.

G. THE AUTHORITY GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING FURTHER QUALIFICATIONS:

1. IF THERE IS A CONFLICT BETWEEN THE APPLICATION ON ITS SUPPORTING DOCUMENTS AND AMENDMENTS AND THE STANDARD OR SPECIAL CONDITIONS, THE STANDARD OR SPECIAL CONDITIONS SHALL APPLY.

2. FAILURE TO COMPLY WITH THE RULES AND REGULATIONS OF THE DEPARTMENT OR WITH THE TERMS OR CONDITIONS OF THIS PERMIT SHALL VOID THE AUTHORITY GIVEN TO THE PERMITTEE BY THE ISSUANCE OF THE PERMIT.

3. THIS PERMIT IS ISSUED PURSUANT TO THE CLEAN STREAMS LAW, ACT OF JUNE 22, 1937, P.L. 1987 AS AMENDED 35 P.S. §691.1 ET SEQ. AND/OR THE DAM SAFETY AND ENCROACHMENTS ACT OF NOVEMBER 26, 1978, P.L. 1375, AS AMENDED, 32 P.S. §693.1 ET SEQ. ISSUANCE OF THIS PERMIT SHALL NOT RELIEVE THE PERMITTEE OF ANY RESPONSIBILITY UNDER ANY OTHER LAW.

PERMIT ISSUED

DATE 2/7/91

DEPARTMENT OF ENVIRONMENTAL RESOURCES

BY Joseph A. Feola

Joseph A. Feola

TITLE Regional Water Quality Manager

(WQM).1

Sewerage Permit No. 2390404
Delaware County Regional Water Quality Control Authority
City of Chester, Delaware County

This permit is subject to the following Special Condition(s):

I. The Authority granted by this permit is subject to all effluent requirements, and other conditions as set forth in Parts A, B and C of the Part I Discharge Permit No. PA0027103 Amendment No. 1 as issued on August 7, 1987. No discharge is authorized for these facilities unless approved by a Part I permit.

(WQM).2

September 2, 1983

STANDARD CONDITIONS RELATING TO SEWERAGE - PART II PERMITS

ONE: During construction, no changes affecting any engineering design parameter shall be made from the plans, designs, and other data herein approved unless the permittee shall first receive written approval thereof from the Department. The sewerage facilities shall be constructed under expert engineering supervision and competent inspection.

TWO: The sewers shall have adequate foundation support as soil conditions require. Trenches shall be back-filled such that the sewers will have proper structural stability, with minimum settling and adequate protection against breakage. Concrete used in connection with these sewers shall be protected from injury by water, freezing, drying or other harmful conditions until cured.

THREE: Manhole inverts shall be so formed as to facilitate the flow of the sewage and to prevent the stranding of sewage solids, and the whole manhole structure shall have proper structural strength and be so constructed as to prevent undue infiltration, entrance of the street wash or grit, and to provide convenient and safe means of access and maintenance.

FOUR: No stormwater from pavements, area ways, roofs, foundation drains or other sources shall be admitted to the sanitary sewers herein approved.

FIVE: The permittee shall adopt and enforce an ordinance requiring the abandonment of privies, cesspools or similar receptacles for human waste and on-lot sewage disposal systems on the premises of occupied structures which are accessible to public sewers and require the connection of such structures to the public sewers.

SIX: The herein approved sewers shall be maintained in good condition, kept free from deposits by flushing or other proper means of cleaning, and repaired when necessary.

SEVEN: The permittee shall file with the Department of Environmental Resources "as-built" plans showing the correct plan of all sewers and sewerage structures as actually constructed together with any other information in connection therewith that may be required.

EIGHT: The outfall sewer or drain shall be extended to the low water mark of the receiving body of water. Where necessary to assure the proper mixing and waste assimilation an outfall sewer or drain may be extended with appurtenances below the low water mark and into the bed of navigable stream, provided that the permittee has secured an easement, right-of-way, license, or lease from the Department in accordance with Section 15 of the Dam Safety and Encroachment Act, the Act of November 26, 1978, P.L. 1375, as amended.

NINE: The approval herein given is specifically made contingent upon the permittee acquiring all necessary property rights, by easement or otherwise, providing for the satisfactory construction, operation, maintenance and replacement of all sewers or sewerage structures in, along, or across private property, with full rights of ingress, egress and regress.

TEN: When the herein approved sewage treatment works is completed and before it is placed in operation, the permittee shall notify the Department in writing so that an inspection of the works may be made by a representative of the Department.

ELEVEN: The various structures and apparatus of the sewage treatment works herein approved shall be maintained in proper condition so that the facility will individually and collectively perform the functions for which they were designed.

TWELVE: If, in the opinion of the Department, these works are not so operated or if by reason of change in the character of wastes or increased load upon the works, or changed use or condition of the receiving body of water, or otherwise the effluent from the said works ceases to be satisfactory or the sewerage facilities shall have created a public nuisance, then upon notice by the Department, the right herein granted shall cease and become null and void unless within the time specified by the Department, the permittee shall adopt such remedial measures as will produce an effluent which, in the opinion of the Department, will be satisfactory.

THIRTEEN: The attention of the permittee is called to the highly explosive nature of certain gases generated by the digestion of sewage solids when these gases are mixed in proper portions with air, and to the highly toxic character of certain gases arising from such digestion or from sewage in insufficiently ventilated compartments or sewers. Therefore, at all places throughout the sewerage facilities where hazard of fire, explosion, or danger from toxic gases may occur, the permittee shall post conspicuously proper warnings of a permanent and legible character and shall provide for the thorough instruction of all employees concerning the aforesaid hazards and in first aid and emergency methods of meeting such hazards and shall further provide, in a conveniently accessible place, all necessary equipment and material therefor.

FOURTEEN: Cross connections between the potable water supply and the sewerage system constitute a potential danger to the public health. Therefore, all direct and indirect connections whereby under normal or abnormal conditions the potable water supply may become contaminated from an inferior water supply from any unit of the sewage treatment works, or by any appurtenance thereof or from any part of a sewerage system are hereby specifically prohibited. The permittee is further warned against permitting to be made permanent any temporary connection with a potable supply designed to be held in place while being used for flushing or other purposes, and is also cautioned against the danger of back siphonage through portable hose lines and similar avenues of possible contamination.

FIFTEEN: This permit authorizes the construction and operation of the proposed sewerage facilities until such time as facilities for conveyance and treatment at a more suitable location are installed and are capable of receiving and treating the permittee's sewage. Such facilities must be in accordance with either the applicable municipal official plan adopted pursuant to Section 5 of the Pennsylvania Sewage Facilities Act, the Act of January 24, 1956, P.L. 1535, as amended, or a comprehensive Water Quality Management Plan as set forth in Section 91.31 of the Rules and Regulations of the Department. When such municipal sewerage facilities become available, the permittee shall provide for the conveyance of the sewage to these sewerage facilities, abandon the use of the herein-approved facilities and notify the Department accordingly. This permit shall then, upon notice from the Department, terminate and become null and void, and shall be relinquished to the Department.

SIXTEEN: The permittee shall construct the sewerage facilities in a manner compatible with good conservation methods in order to minimize the adverse effect on the environment.

SEVENTEEN: The local waterways patrolman of the Pennsylvania Fish Commission shall be notified when the construction of a stream crossing and outfall is started and completed. A permit must be secured from the Pennsylvania Fish Commission if the use of explosives is required. The permittee shall notify the local waterways patrolman when explosives are to be used.

EIGHTEEN: If future operations by the Commonwealth of Pennsylvania require modifications of the stream crossing and/or outfall, or there shall be unreasonable obstruction to the free passage of floods or navigation from the stream crossing and/or outfall, permittee shall remove or alter the structural work or obstruction without expense to the Commonwealth of Pennsylvania. If upon the revocation of the permit, the work shall not be completed, the permittee, at his own expense and in such time and manner as the Department may require, shall remove any or all portions of the incompleted work and restore the water-course to its former condition. No claims shall be made against the Commonwealth of Pennsylvania on account of any such removal or alteration.

NINETEEN: The sewage treatment plant shall be operated by an operator certified in accordance with the Sewage Treatment Plant and Waterworks Operators' Certification Act, the Act of November 18, 1968, P.L. 1217, as amended.

TWENTY: All industrial waste discharged or proposed for discharge into the sewer system shall be studied to determine the degree of pretreatment necessary in order that the industrial waste will not adversely affect the sewerage facilities or the sewage treatment process. The permittee shall properly control any industrial waste discharge into its sewerage system by regulating the rate of such discharge, requiring necessary pretreatment, and excluding industrial waste, if necessary, to protect the integrity of the permittee's sewerage system.

TWENTY-ONE: Receipt of this permit does not relieve the permittee of its obligations to comply with all federal, interstate, state, or local laws, ordinances, and regulations applicable to the sewerage facilities authorized herein.

TWENTY-TWO: This permit does not give any real or personal property rights or grant any exclusive privileges, nor shall it be construed to grant or confirm any right, title, easement, or interest in, on, to, or over any lands belonging to the Commonwealth.

DEPARTMENT OF ENVIRONMENTAL RESOURCES
STANDARD CONDITIONS RELATING TO EROSION CONTROL 1985
For Use in Water Quality Management Permits

1. By approval of the plans for which this permit is issued, neither the Department nor the Commonwealth of Pennsylvania assumes any responsibility for the feasibility of the plans or the operation of the measures and facilities to be constructed thereunder.

2. If at any time the erosion and sedimentation activities undertaken pursuant to this permit or the discharge of the effluent therefrom is causing or contributing to pollution of the waters of the Commonwealth, the permittee shall forthwith adopt such remedial measures as are acceptable to the Department.

3. This permit does not authorize any earth disturbance controlled by an ordinance enacted by a local municipality. Additional permits must be secured from local municipalities where earthmoving activities are covered by local ordinances.

4. At least seven days before earthmoving will begin, the permittee, by telephone or certified mail, shall notify the Department or its designee of the date for beginning of construction and invite the County Conservation District Representative to attend a pre-construction conference with the contractor. The permittee shall have his erosion control plan available at the site of the activity at all times.

5. All earthmoving activities shall be undertaken in the manner set forth in the erosion and sedimentation control plan identified with this permit. Revisions to the plan shall be approved by the Department.

6. The erosion control measures and facilities shall be constructed under the supervision and competent inspection of an individual trained and experienced in erosion control, and in accordance with plans, designs and other data as herein approved or amended, and with the conditions of this permit. Control facilities shall be frequently inspected to insure effective control.

7. When the herein approved erosion control measures and facilities are completed, the permittee shall notify the Department so that an inspection of the measures and facilities may be made by a representative of the County Conservation District.

8. No storm water, sewage or industrial wastes not specifically approved herein, shall be admitted to the erosion and sedimentation measures and facilities for which this permit is issued, unless with the approval of the Department.

9. Sediment shall at no time be permitted to accumulate in sedimentation basins to a depth sufficient to limit storage capacity or interfere with the settling efficiency thereof. The sediment removed shall be handled and disposed of in a manner that will not create pollution problems and so that every reasonable and practical precaution is taken to prevent the said material from reaching the waters of the Commonwealth.

10. All slopes, channels, ditches or any disturbed area shall be stabilized as soon as possible after the final grade or final earthmoving has been completed. Where it is not possible to permanently stabilize a disturbed area immediately after the final earthmoving has been completed or where the activity ceases for more than 20 days, interim stabilization measures shall be implemented promptly.

11. Upon completion of the project, all areas which were disturbed by the project shall be stabilized so that accelerated erosion will be prevented. Any erosion and sedimentation control facility required or necessary to protect areas from erosion during the stabilization period shall be maintained until stabilization is completed. Upon completion of stabilization, all unnecessary or unusable control measures and facilities shall be removed, the areas shall be graded and the soils shall be stabilized.

12. The responsibility of carrying out the permit conditions shall rest with the owner, lessee, assign or other responsible manager of earthmoving that affects the approved erosion controls. Such responsibility passes with each control succession.

ER-BWQ-15-Rev. 11/85

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF WATER QUALITY MANAGEMENT

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#TC-9105-C

WATER QUALITY MANAGEMENT PERMIT

NO. 2392403

A. PERMITTEE: (Name and Address)

Delaware County Regional Water
Quality Control Authority
100 East Fifth Street
Chester, PA 19013

B. PROJECT LOCATION

Municipality: ~~City of Chester~~

County: Delaware

C. TYPE OF FACILITY (For industrial wastes: type of establishment)

Dry Ash Handling System

D. NAME OF PLANT, AREA SERVED, OUTFALL NO., ETC.

Delcora Western Regional Treatment Plant

E. THIS PERMIT APPROVES:

1. Plans For Construction Of:
   a. [ ] Pump Stations: Sewers and Appurtenances
   b. [X] Sewage Treatment Facilities
   c. [ ] Industrial Wastes Treatment Facilities
   d. [ ] Injection Well
   e. [ ] Outfall & Headwall
   f. [ ] Stream Crossing
   g. [ ] Impoundment

2. The Discharge Of: a. [ ] Treated N/A b. [ ] Untreated c. [ ] Sewage d. [ ] Industrial Wastes

3. Discharge To:
   a. [ ] Surface Water
   b. [ ] Ground Water
   N/A Name of Stream to which discharged or drainage area in which groundwater discharge takes place or impoundment is located.

4. Preparedness, Prevention, Contingency (PPC) Plan [ ] N/A

5. An Erosion and Sedimentation Control Plan [X]
   Project Area is <1 Acres

THIS APPROVAL IS SUBJECT TO THE FOLLOWING CONDITIONS:

1. ALL CONSTRUCTION, OPERATIONS, PROCEDURES AND DISCHARGE SHALL BE IN ACCORDANCE WITH APPLICATION NO. 2392403 DATED 02/19/92 ITS SUPPORTING DOCUMENTATION, AND AMENDMENTS DATED _____. SUCH APPLICATION, ITS SUPPORTING DOCUMENTATION AND AMENDMENTS ARE HEREBY MADE A PART OF THIS PERMIT.

2. CONDITIONS NUMBERED 1, 7, 9-14, 16, 17, 19, 20, 21, 22 OF THE Sewerage STANDARD CONDITIONS DATED 09/02/83 AND CONDITIONS NUMBERED 1 through 12 OF THE EROSION CONTROL STANDARD CONDITIONS DATED 1985 WHICH CONDITIONS ARE ATTACHED AND MADE PART OF THIS PERMIT.

3. SPECIAL CONDITIONS DESIGNATED I WHICH ARE ATTACHED AND ARE MADE A PART OF THIS PERMIT.

G. THE AUTHORITY GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING FURTHER QUALIFICATIONS:

1. IF THERE IS A CONFLICT BETWEEN THE APPLICATION ON ITS SUPPORTING DOCUMENTS AND AMENDMENTS AND THE STANDARD OR SPECIAL CONDITIONS, THE STANDARD OR SPECIAL CONDITIONS SHALL APPLY.

2. FAILURE TO COMPLY WITH THE RULES AND REGULATIONS OF THE DEPARTMENT OR WITH THE TERMS OR CONDITIONS OF THIS PERMIT SHALL VOID THE AUTHORITY GIVEN TO THE PERMITTEE BY THE ISSUANCE OF THE PERMIT.

3. THIS PERMIT IS ISSUED PURSUANT TO THE CLEAN STREAMS LAW, ACT OF JUNE 22, 1937, P.L. 1987 AS AMENDED 35 P.S. §691.1 ET SEQ. AND/OR THE DAM SAFETY AND ENCROACHMENTS ACT OF NOVEMBER 26, 1978, P.L. 1375, AS AMENDED, 32 P.S. §693.1 ET SEQ. ISSUANCE OF THIS PERMIT SHALL NOT RELIEVE THE PERMITTEE OF ANY RESPONSIBILITY UNDER ANY OTHER LAW.

DEPARTMENT OF ENVIRONMENTAL RESOURCES

PERMIT ISSUED

DATE 4/8/92

BY Joseph A. Feola

Joseph A. Feola

TITLE Regional Water Quality Manager

(WQM) 2

Sewerage Permit No. 2392403
Delaware County Regional Water Quality
Control Authority
City of Chester
Delaware County

This permit is subject to the following Special Condition(s):

I. The Authority granted by this permit is subject to all effluent requirements, and other conditions as set forth in Parts A, B and C of the Part I Discharge Permit No. PA0027103 Amendment No. 1 as issued on July 8, 1987. No discharge is authorized for these facilities unless approved by a Part I permit.

(WQM).4

DEPARTMENT OF ENVIRONMENTAL RESOURCES
STANDARD CONDITIONS RELATING TO EROSION CONTROL
For Use in Water Quality Management Permits

August 1991

1. By approval of the plans for which this permit is issued, neither the Department nor the Commonwealth of Pennsylvania assumes any responsibility for the feasibility of the plans or the operation of the measures and facilities to be constructed thereunder.

2. If at any time the erosion and sedimentation activities undertaken pursuant to this permit or the discharge of the effluent therefrom is causing or contributing to pollution of the waters of the Commonwealth, the permittee shall forthwith adopt such remedial measures as are acceptable to the Department.

3. This permit does not authorize any earth disturbance controlled by an ordinance enacted by a local municipality. Additional permits must be secured from local municipalities where earthmoving activities are covered by local ordinances.

4. At least seven days before earthmoving will begin, the permittee, by telephone or certified mail, shall notify the Department or its designee of the date for beginning of construction and invite the County Conservation District Representative to attend a pre-construction conference with the contractor. The permittee shall have his erosion control plan available at the site of the activity at all times.

5. All earthmoving activities shall be undertaken in the manner set forth in the erosion and sedimentation control plan identified with this permit. Revisions to the plan shall be pre-approved by the Department.

6. The erosion control measures and facilities shall be constructed under the supervision and competent inspection of an individual trained and experienced in erosion control, and in accordance with plans, designs and other data as herein approved or amended, and with the conditions of this permit. Control facilities shall be frequently inspected and maintained to insure effective control.

7. When the herein approved erosion control measures and facilities are completed, the permittee shall notify the County Conservation District so that an inspection of the measures and facilities may be made.

8. No storm water, sewage or industrial wastes not specifically approved herein, shall be admitted to the erosion and sedimentation measures and facilities for which this permit is issued, unless with the approval of the Department.

9. Sediment shall at no time be permitted to accumulate in sedimentation basins to a depth sufficient to limit storage capacity or interfere with the settling efficiency thereof. The sediment removed shall be handled and disposed of in a manner that will not create pollution problems and so that every reasonable and practical precaution is taken to prevent the said material from reaching the waters of the Commonwealth.

10. All slopes, channels, ditches or any disturbed area shall be stabilized as soon as possible after the final grade or final earthmoving has been completed. Where it is not possible to permanently stabilize a disturbed area immediately after the final earthmoving has been completed or where the activity ceases for more than 20 days, interim stabilization measures shall be implemented promptly.

11. Upon completion of the project, all areas which were disturbed by the project shall be stabilized so that accelerated erosion will be prevented. Any erosion and sedimentation control facility required or necessary to protect areas from erosion during the stabilization period shall be maintained until stabilization is completed. Upon completion of stabilization, all unnecessary or unusable control measures and facilities shall be removed, the areas shall be graded and the soils shall be stabilized.

12. The responsibility of carrying out the permit conditions shall rest with the owner, lessee, assignee or other responsible manager of earthmoving that affects the approved erosion controls. Such responsibility passes with each control succession.

September 2, 1983

STANDARD CONDITIONS RELATING TO SEWERAGE - PART II PERMITS

ONE: During construction, no changes affecting any engineering design parameter shall be made from the plans, designs, and other data herein approved unless the permittee shall first receive written approval thereof from the Department. The sewerage facilities shall be constructed under expert engineering supervision and competent inspection.

TWO: The sewers shall have adequate foundation support as soil conditions require. Trenches shall be back-filled such that the sewers will have proper structural stability, with minimum settling and adequate protection against breakage. Concrete used in connection with these sewers shall be protected from injury by water, freezing, drying or other harmful conditions until cured.

THREE: Manhole inverts shall be so formed as to facilitate the flow of the sewage and to prevent the stranding of sewage solids, and the whole manhole structure shall have proper structural strength and be so constructed as to prevent undue infiltration, entrance of the street wash or grit, and to provide convenient and safe means of access and maintenance.

FOUR: No stormwater from pavements, area ways, roofs, foundation drains or other sources shall be admitted to the sanitary sewers herein approved.

FIVE: The permittee shall adopt and enforce an ordinance requiring the abandonment of privies, cesspools or similar receptacles for human waste and on-lot sewage disposal systems on the premises of occupied structures which are accessible to public sewers and require the connection of such structures to the public sewers.

SIX: The herein approved sewers shall be maintained in good condition, kept free from deposits by flushing or other proper means of cleaning, and repaired when necessary.

SEVEN: The permittee shall file with the Department of Environmental Resources "as-built" plans showing the correct plan of all sewers and sewerage structures as actually constructed together with any other information in connection therewith that may be required.

EIGHT: The outfall sewer or drain shall be extended to the low water mark of the receiving body of water. Where necessary to assure the proper mixing and waste assimilation an outfall sewer or drain may be extended with appurtenances below the low water mark and into the bed of navigable stream, provided that the permittee has secured an easement, right-of-way, license, or lease from the Department in accordance with Section 15 of the Dam Safety and Encroachment Act, the Act of November 26, 1978, P.L. 1375, as amended.

NINE: The approval herein given is specifically made contingent upon the permittee acquiring all necessary property rights, by easement or otherwise, providing for the satisfactory construction, operation, maintenance and replacement of all sewers or sewerage structures in, along, or across private property, with full rights of ingress, egress and regress.

TEN: When the herein approved sewage treatment works is completed and before it is placed in operation, the permittee shall notify the Department in writing so that an inspection of the works may be made by a representative of the Department.

ELEVEN: The various structures and apparatus of the sewage treatment works herein approved shall be maintained in proper condition so that the facility will individually and collectively perform the functions for which they were designed.

TWELVE: If, in the opinion of the Department, these works are not so operated or if by reason of change in the character of wastes or increased load upon the works, or changed use or condition of the receiving body of water, or otherwise the effluent from the said works ceases to be satisfactory or the sewerage facilities shall have created a public nuisance, then upon notice by the Department, the right herein granted shall cease and become null and void unless within the time specified by the Department, the permittee shall adopt such remedial measures as will produce an effluent which, in the opinion of the Department, will be satisfactory.

THIRTEEN: The attention of the permittee is called to the highly explosive nature of certain gases generated by the digestion of sewage solids when these gases are mixed in proper portions with air, and to the highly toxic character of certain gases arising from such digestion or from sewage in insufficiently ventilated compartments or sewers. Therefore, at all places throughout the sewerage facilities where hazard of fire, explosion, or danger from toxic gases may occur, the permittee shall post conspicuously proper warnings of a permanent and legible character and shall provide for the thorough instruction of all employees concerning the aforesaid hazards and in first aid and emergency methods of meeting such hazards and shall further provide, in a conveniently accessible place, all necessary equipment and material therefor.

FOURTEEN: Cross connections between the potable water supply and the sewerage system constitute a potential danger to the public health. Therefore, all direct and indirect connections whereby under normal or abnormal conditions the potable water supply may become contaminated from an inferior water supply from any unit of the sewage treatment works, or by any appurtenance thereof or from any part of a sewerage system are hereby specifically prohibited. The permittee is further warned against permitting to be made permanent any temporary connection with a potable supply designed to be held in place while being used for flushing or other purposes, and is also cautioned against the danger of back siphonage through portable hose lines and similar avenues of possible contamination.

FIFTEEN: This permit authorizes the construction and operation of the proposed sewerage facilities until such time as facilities for conveyance and treatment at a more suitable location are installed and are capable of receiving and treating the permittee's sewage. Such facilities must be in accordance with either the applicable municipal official plan adopted pursuant to Section 5 of the Pennsylvania Sewage Facilities Act, the Act of January 24, 1956, P.L. 1535, as amended, or a comprehensive Water Quality Management Plan as set forth in Section 91.31 of the Rules and Regulations of the Department. When such municipal sewerage facilities become available, the permittee shall provide for the conveyance of the sewage to these sewerage facilities, abandon the use of the herein-approved facilities and notify the Department accordingly. This permit shall then, upon notice from the Department, terminate and become null and void, and shall be relinquished to the Department.

SIXTEEN: The permittee shall construct the sewerage facilities in a manner compatible with good conservation methods in order to minimize the adverse effect on the environment.

SEVENTEEN: The local waterways patrolman of the Pennsylvania Fish Commission shall be notified when the construction of a stream crossing and outfall is started and completed. A permit must be secured from the Pennsylvania Fish Commission if the use of explosives is required. The permittee shall notify the local waterways patrolman when explosives are to be used.

EIGHTEEN: If future operations by the Commonwealth of Pennsylvania require modifications of the stream crossing and/or outfall, or there shall be unreasonable obstruction to the free passage of floods or navigation from the stream crossing and/or outfall, permittee shall remove or alter the structural work or obstruction without expense to the Commonwealth of Pennsylvania. If upon the revocation of the permit, the work shall not be completed, the permittee, at his own expense and in such time and manner as the Department may require, shall remove any or all portions of the incompleted work and restore the water-course to its former condition. No claims shall be made against the Commonwealth of Pennsylvania on account of any such removal or alteration.

NINETEEN: The sewage treatment plant shall be operated by an operator certified in accordance with the Sewage Treatment Plant and Waterworks Operators' Certification Act, the Act of November 18, 1968, P.L. 1217, as amended.

TWENTY: All industrial waste discharged or proposed for discharge into the sewer system shall be studied to determine the degree of pretreatment necessary in order that the industrial waste will not adversely affect the sewerage facilities or the sewage treatment process. The permittee shall properly control any industrial waste discharge into its sewerage system by regulating the rate of such discharge, requiring necessary pretreatment, and excluding industrial waste, if necessary, to protect the integrity of the permittee's sewerage system.

TWENTY-ONE: Receipt of this permit does not relieve the permittee of its obligations to comply with all federal, interstate, state, or local laws, ordinances, and regulations applicable to the sewerage facilities authorized herein.

TWENTY-TWO: This permit does not give any real or personal property rights or grant any exclusive privileges, nor shall it be construed to grant or confirm any right, title, easement, or interest in, on, to, or over any lands belonging to the Commonwealth.

DEPARTMENT OF ENVIRONMENTAL RESOURCES
STANDARD CONDITIONS RELATING TO EROSION CONTROL 1985
For Use in Water Quality Management Permits

1. By approval of the plans for which this permit is issued, neither the Department nor the Commonwealth of Pennsylvania assumes any responsibility for the feasibility of the plans or the operation of the measures and facilities to be constructed thereunder.

2. If at any time the erosion and sedimentation activities undertaken pursuant to this permit or the discharge of the effluent therefrom is causing or contributing to pollution of the waters of the Commonwealth, the permittee shall forthwith adopt such remedial measures as are acceptable to the Department.

3. This permit does not authorize any earth disturbance controlled by an ordinance enacted by a local municipality. Additional permits must be secured from local municipalities where earthmoving activities are covered by local ordinances.

4. At least seven days before earthmoving will begin, the permittee, by telephone or certified mail, shall notify the Department or its designee of the date for beginning of construction and invite the County Conservation District Representative to attend a pre-construction conference with the contractor. The permittee shall have his erosion control plan available at the site of the activity at all times.

5. All earthmoving activities shall be undertaken in the manner set forth in the erosion and sedimentation control plan identified with this permit. Revisions to the plan shall be approved by the Department.

6. The erosion control measures and facilities shall be constructed under the supervision and competent inspection of an individual trained and experienced in erosion control, and in accordance with plans, designs and other data as herein approved or amended, and with the conditions of this permit. Control facilities shall be frequently inspected to insure effective control.

7. When the herein approved erosion control measures and facilities are completed, the permittee shall notify the Department so that an inspection of the measures and facilities may be made by a representative of the County Conservation District.

8. No storm water, sewage or industrial wastes not specifically approved herein, shall be admitted to the erosion and sedimentation measures and facilities for which this permit is issued, unless with the approval of the Department.

9. Sediment shall at no time be permitted to accumulate in sedimentation basins to a depth sufficient to limit storage capacity or interfere with the settling efficiency thereof. The sediment removed shall be handled and disposed of in a manner that will not create pollution problems and so that every reasonable and practical precaution is taken to prevent the said material from reaching the waters of the Commonwealth.

10. All slopes, channels, ditches or any disturbed area shall be stabilized as soon as possible after the final grade or final earthmoving has been completed. Where it is not possible to permanently stabilize a disturbed area immediately after the final earthmoving has been completed or where the activity ceases for more than 20 days, interim stabilization measures shall be implemented promptly.

11. Upon completion of the project, all areas which were disturbed by the project shall be stabilized so that accelerated erosion will be prevented. Any erosion and sedimentation control facility required or necessary to protect areas from erosion during the stabilization period shall be maintained until stabilization is completed. Upon completion of stabilization, all unnecessary or unusable control measures and facilities shall be removed, the areas shall be graded and the soils shall be stabilized.

12. The responsibility of carrying out the permit conditions shall rest with the owner, lessee, assignee or other responsible manager of earthmoving that affects the approved erosion controls. Such responsibility passes with each control succession.

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF WATER QUALITY MANAGEMENT

WATER QUALITY MANAGEMENT PERMIT

NO. 2393401

A. PERMITTEE: (Name and Address)

Delaware County Regional Water
Quality Control Authority
100 East Fifth Street
Chester, PA 19013

B. PROJECT LOCATION

Municipality: City of Chester

County: Delaware

C. TYPE OF FACILITY (For industrial wastes: type of establishment

Final Clarifier Upgrade

D. NAME OF PLANT, AREA SERVED, OUTFALL NO., ETC.

Western Regional Treatment Plant

E. THIS PERMIT APPROVES:

1. Plans For Construction Of:
   a. [X] Pump Stations, Sewers and Appurtenances
   b. [X] Sewage Treatment Facilities
   c. [ ] Industrial Wastes Treatment Facilities
   d. [ ] Injection Well
   e. [ ] Outfall & Headwall
   f. [ ] Stream Crossing
   g. [ ] Impoundment

2. The Discharge Of: a. [ ] Treated N/A b. [ ] Untreated c. [ ] Sewage d. [ ] Industrial Wastes

3. Discharge To:
   a. [ ] Surface Water
   b. [ ] Ground Water
   N/A — Name of Stream to which discharged or drainage area in which groundwater discharge takes place or impoundment is located.

4. Preparedness, Prevention, Contingency (PPC) Plan [ ] N/A

5. An Erosion and Sedimentation Control Plan [X]
   Project Area is <1 Acres

F. THIS APPROVAL IS SUBJECT TO THE FOLLOWING CONDITIONS:

1. ALL CONSTRUCTION, OPERATIONS, PROCEDURES AND DISCHARGE SHALL BE IN ACCORDANCE WITH APPLICATION NO. 2393401 DATED 12/29/92 ITS SUPPORTING DOCUMENTATION, AND AMENDMENTS DATED _____. SUCH APPLICATION, ITS SUPPORTING DOCUMENTATION AND AMENDMENTS ARE HEREBY MADE A PART OF THIS PERMIT.

2. CONDITIONS NUMBERED 1, 7, 9-14, 16, 17, 19, 20, 21, 22 OF THE Sewerage STANDARD CONDITIONS DATED 09/02/83 AND CONDITIONS NUMBERED 1 through 12 OF THE EROSION CONTROL STANDARD CONDITIONS DATED August, 1991 WHICH CONDITIONS ARE ATTACHED AND MADE PART OF THIS PERMIT.

3. SPECIAL CONDITIONS DESIGNATED I, II WHICH ARE ATTACHED AND ARE MADE A PART OF THIS PERMIT.

G. THE AUTHORITY GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING FURTHER QUALIFICATIONS:

1. IF THERE IS A CONFLICT BETWEEN THE APPLICATION ON ITS SUPPORTING DOCUMENTS AND AMENDMENTS AND THE STANDARD OR SPECIAL CONDITIONS, THE STANDARD OR SPECIAL CONDITIONS SHALL APPLY.

2. FAILURE TO COMPLY WITH THE RULES AND REGULATIONS OF THE DEPARTMENT OR WITH THE TERMS OR CONDITIONS OF THIS PERMIT SHALL VOID THE AUTHORITY GIVEN TO THE PERMITTEE BY THE ISSUANCE OF THE PERMIT.

3. THIS PERMIT IS ISSUED PURSUANT TO THE CLEAN STREAMS LAW, ACT OF JUNE 22, 1937, P.L. 1987 AS AMENDED 35 P.S. §691.1 ET SEQ. AND/OR THE DAM SAFETY AND ENCROACHMENTS ACT OF NOVEMBER 26, 1978, P.L. 1375, AS AMENDED, 32 P.S. §693.1 ET SEQ. ISSUANCE OF THIS PERMIT SHALL NOT RELIEVE THE PERMITTEE OF ANY RESPONSIBILITY UNDER ANY OTHER LAW.

DEPARTMENT OF ENVIRONMENTAL RESOURCES

PERMIT ISSUED

DATE 6-8-93

BY Joseph A. Feola

Joseph A. Feola

TITLE Regional Water Quality Manager

(WQM)

Sewerage Permit No. 2393401
Delaware County Regional Water Quality Control Authority
City of Chester, Delaware County

This permit is subject to the following Special Condition(s):

I. The water level within the impoundment(s) shall be controlled so that a freeboard of at least 24 inches is maintained at all times.

II. The Authority granted by this permit is subject to all effluent requirements, and other conditions as set forth in Parts A, B and C of the Part I Discharge Permit No. PA0027103, Amendment No. 1 as issued on July 8, 1987. No discharge is authorized for these facilities unless approved by a Part I permit.

(WQM2).1

DEPARTMENT OF ENVIRONMENTAL RESOURCES
STANDARD CONDITIONS RELATING TO EROSION CONTROL
For Use in Water Quality Management Permits

August 1991

1. By approval of the plans for which this permit is issued, neither the Department nor the Commonwealth of Pennsylvania assumes any responsibility for the feasibility of the plans or the operation of the measures and facilities to be constructed thereunder.

2. If at any time the erosion and sedimentation activities undertaken pursuant to this permit or the discharge of the effluent therefrom is causing or contributing to pollution of the waters of the Commonwealth, the permittee shall forthwith adopt such remedial measures as are acceptable to the Department.

3. This permit does not authorize any earth disturbance controlled by an ordinance enacted by a local municipality. Additional permits must be secured from local municipalities where earthmoving activities are covered by local ordinances.

4. At least seven days before earthmoving will begin, the permittee, by telephone or certified mail, shall notify the Department or its designee of the date for beginning of construction and invite the County Conservation District Representative to attend a pre-construction conference with the contractor. The permittee shall have his erosion control plan available at the site of the activity at all times.

5. All earthmoving activities shall be undertaken in the manner set forth in the erosion and sedimentation control plan identified with this permit. Revisions to the plan shall be pre-approved by the Department.

6. The erosion control measures and facilities shall be constructed under the supervision and competent inspection of an individual trained and experienced in erosion control, and in accordance with plans, designs and other data as herein approved or amended, and with the conditions of this permit. Control facilities shall be frequently inspected and maintained to insure effective control.

7. When the herein approved erosion control measures and facilities are completed, the permittee shall notify the County Conservation District so that an inspection of the measures and facilities may be made.

8. No storm water, sewage or industrial wastes not specifically approved herein, shall be admitted to the erosion and sedimentation measures and facilities for which this permit is issued, unless with the approval of the Department.

9. Sediment shall at no time be permitted to accumulate in sedimentation basins to a depth sufficient to limit storage capacity or interfere with the settling efficiency thereof. The sediment removed shall be handled and disposed of in a manner that will not create pollution problems and so that every reasonable and practical precaution is taken to prevent the said material from reaching the waters of the Commonwealth.

10. All slopes, channels, ditches or any disturbed area shall be stabilized as soon as possible after the final grade or final earthmoving has been completed. Where it is not possible to permanently stabilize a disturbed area immediately after the final earthmoving has been completed or where the activity ceases for more than 20 days, interim stabilization measures shall be implemented promptly.

11. Upon completion of the project, all areas which were disturbed by the project shall be stabilized so that accelerated erosion will be prevented. Any erosion and sedimentation control facility required or necessary to protect areas from erosion during the stabilization period shall be maintained until stabilization is completed. Upon completion of stabilization, all unnecessary or unusable control measures and facilities shall be removed, the areas shall be graded and the soils shall be stabilized.

12. The responsibility of carrying out the permit conditions shall rest with the owner, lessee, assignee or other responsible manager of earthmoving that affects the approved erosion controls. Such responsibility passes with each control succession.

September 2, 1983

STANDARD CONDITIONS RELATING TO SEWERAGE - PART II PERMITS

ONE: During construction, no changes affecting any engineering design parameter shall be made from the plans, designs, and other data herein approved unless the permittee shall first receive written approval thereof from the Department. The sewerage facilities shall be constructed under expert engineering supervision and competent inspection.

TWO: The sewers shall have adequate foundation support as soil conditions require. Trenches shall be back-filled such that the sewers will have proper structural stability, with minimum settling and adequate protection against breakage. Concrete used in connection with these sewers shall be protected from injury by water, freezing, drying or other harmful conditions until cured.

THREE: Manhole inverts shall be so formed as to facilitate the flow of the sewage and to prevent the stranding of sewage solids, and the whole manhole structure shall have proper structural strength and be so constructed as to prevent undue infiltration, entrance of the street wash or grit, and to provide convenient and safe means of access and maintenance.

FOUR: No stormwater from pavements, area ways, roofs, foundation drains or other sources shall be admitted to the sanitary sewers herein approved.

FIVE: The permittee shall adopt and enforce an ordinance requiring the abandonment of privies, cesspools or similar receptacles for human waste and on-lot sewage disposal systems on the premises of occupied structures which are accessible to public sewers and require the connection of such structures to the public sewers.

SIX: The herein approved sewers shall be maintained in good condition, kept free from deposits by flushing or other proper means of cleaning, and repaired when necessary.

SEVEN: The permittee shall file with the Department of Environmental Resources "as-built" plans showing the correct plan of all sewers and sewerage structures as actually constructed together with any other information in connection therewith that may be required.

EIGHT: The outfall sewer or drain shall be extended to the low water mark of the receiving body of water. Where necessary to assure the proper mixing and waste assimilation an outfall sewer or drain may be extended with appurtenances below the low water mark and into the bed of navigable stream, provided that the permittee has secured an easement, right-of-way, license, or lease from the Department in accordance with Section 15 of the Dam Safety and Encroachment Act, the Act of November 26, 1978, P.L. 1375, as amended.

NINE: The approval herein given is specifically made contingent upon the permittee acquiring all necessary property rights, by easement or otherwise, providing for the satisfactory construction, operation, maintenance and replacement of all sewers or sewerage structures in, along, or across private property, with full rights of ingress, egress and regress.

TEN: When the herein approved sewage treatment works is completed and before it is placed in operation, the permittee shall notify the Department in writing so that an inspection of the works may be made by a representative of the Department.

ELEVEN: The various structures and apparatus of the sewage treatment works herein approved shall be maintained in proper condition so that the facility will individually and collectively perform the functions for which they were designed.

TWELVE: If, in the opinion of the Department, these works are not so operated or if by reason of change in the character of wastes or increased load upon the works, or changed use or condition of the receiving body of water, or otherwise the effluent from the said works ceases to be satisfactory or the sewerage facilities shall have created a public nuisance, then upon notice by the Department, the right herein granted shall cease and become null and void unless within the time specified by the Department, the permittee shall adopt such remedial measures as will produce an effluent which, in the opinion of the Department, will be satisfactory.

THIRTEEN: The attention of the permittee is called to the highly explosive nature of certain gases generated by the digestion of sewage solids when these gases are mixed in proper portions with air, and to the highly toxic character of certain gases arising from such digestion or from sewage in insufficiently ventilated compartments or sewers. Therefore, at all places throughout the sewerage facilities where hazard of fire, explosion, or danger from toxic gases may occur, the permittee shall post conspicuously proper warnings of a permanent and legible character and shall provide for the thorough instruction of all employees concerning the aforesaid hazards and in first aid and emergency methods of meeting such hazards and shall further provide, in a conveniently accessible place, all necessary equipment and material therefor.

FOURTEEN: Cross connections between the potable water supply and the sewerage system constitute a potential danger to the public health. Therefore, all direct and indirect connections whereby under normal or abnormal conditions the potable water supply may become contaminated from an inferior water supply from any unit of the sewage treatment works, or by any appurtenance thereof or from any part of a sewerage system are hereby specifically prohibited. The permittee is further warned against permitting to be made permanent any temporary connection with a potable supply designed to be held in place while being used for flushing or other purposes, and is also cautioned against the danger of back siphonage through portable hose lines and similar avenues of possible contamination.

FIFTEEN: This permit authorizes the construction and operation of the proposed sewerage facilities until such time as facilities for conveyance and treatment at a more suitable location are installed and are capable of receiving and treating the permittee's sewage. Such facilities must be in accordance with either the applicable municipal official plan adopted pursuant to Section 5 of the Pennsylvania Sewage Facilities Act, the Act of January 24, 1956, P.L. 1535, as amended, or a comprehensive Water Quality Management Plan as set forth in Section 91.31 of the Rules and Regulations of the Department. When such municipal sewerage facilities become available, the permittee shall provide for the conveyance of the sewage to these sewerage facilities, abandon the use of the herein-approved facilities and notify the Department accordingly. This permit shall then, upon notice from the Department, terminate and become null and void, and shall be relinquished to the Department.

SIXTEEN: The permittee shall construct the sewerage facilities in a manner compatible with good conservation methods in order to minimize the adverse effect on the environment.

SEVENTEEN: The local waterways patrolman of the Pennsylvania Fish Commission shall be notified when the construction of a stream crossing and outfall is started and completed. A permit must be secured from the Pennsylvania Fish Commission if the use of explosives is required. The permittee shall notify the local waterways patrolman when explosives are to be used.

EIGHTEEN: If future operations by the Commonwealth of Pennsylvania require modifications of the stream crossing and/or outfall, or there shall be unreasonable obstruction to the free passage of floods or navigation from the stream crossing and/or outfall, permittee shall remove or alter the structural work or obstruction without expense to the Commonwealth of Pennsylvania. If upon the revocation of the permit, the work shall not be completed, the permittee, at his own expense and in such time and manner as the Department may require, shall remove any or all portions of the incompleted work and restore the water-course to its former condition. No claims shall be made against the Commonwealth of Pennsylvania on account of any such removal or alteration.

NINETEEN: The sewage treatment plant shall be operated by an operator certified in accordance with the Sewage Treatment Plant and Waterworks Operators' Certification Act, the Act of November 18, 1968, P.L. 1217, as amended.

TWENTY: All industrial waste discharged or proposed for discharge into the sewer system shall be studied to determine the degree of pretreatment necessary in order that the industrial waste will not adversely affect the sewerage facilities or the sewage treatment process. The permittee shall properly control any industrial waste discharge into its sewerage system by regulating the rate of such discharge, requiring necessary pretreatment, and excluding industrial waste, if necessary, to protect the integrity of the permittee's sewerage system.

TWENTY-ONE: Receipt of this permit does not relieve the permittee of its obligations to comply with all federal, interstate, state, or local laws, ordinances, and regulations applicable to the sewerage facilities authorized herein.

TWENTY-TWO: This permit does not give any real or personal property rights or grant any exclusive privileges, nor shall it be construed to grant or confirm any right, title, easement, or interest in, on, to, or over any lands belonging to the Commonwealth.

ER-BWQ-188:REV.3/83

DATE PREPARED
12-14-92

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF WATER QUALITY MANAGEMENT

FOR DEPARTMENT USE ONLY

APPLICATION FOR PART II
WATER QUALITY MANAGEMENT PERMIT
SEWERAGE

APPLICANT NAME
Delaware County Regional Water Quality Control Authority (DELCORA)

TELEPHONE NO. (215)876-5523

MAILING ADDRESS: 100 East Fifth Street
Chester, PA 19013

PROJECT DESCRIPTION

NAME OF PROJECT, OR MUNICIPALITY SERVED:
Secondary Clarifier No. 5 and Activated Sludge Pumping Station

PROJECT LOCATION: Western Regional Treatment Plant
COUNTY: Delaware

MUNICIPALITY: City of Chester

HEREBY APPLIES FOR: (CHECK APPROPRIATE BLOCKS IN SPACES A,B,AND C)

A. APPROVAL OF PLANS FOR CONSTRUCTION OF:
- ☐ SEWERS AND APPURTENANCES
- ☐ PUMP STATIONS
- ☒ SEWAGE TREATMENT PLANT
- ☐ OUTFALL AND HEADWALL
- ☐ STREAM CROSSING
- ☐ IMPOUNDMENT

B. ☐ APPROVAL TO OPERATE SEWERAGE FACILITIES

C. ☒ APPROVAL OF AN EROSION AND SEDIMENTATION CONTROL PLAN

DATE OF APPLICATION
12-14-92

(ALL DISCHARGES OF WASTES ARE PURSUANT TO "THE CLEAN STREAMS LAW" AND NPDES PART I PERMIT)

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA, COUNTY OF Delaware

I, Nicholas F. Catania, Executive Director BEING DULY SWORN, ACCORDING TO LAW, DEPOSE AND SAY THAT I (AM THE APPLICANT) (AM AN OFFICER OR OFFICIAL OF THE APPLICANT) (HAVE THE AUTHORITY TO MAKE THIS APPLICATION) AND THAT THE PLANS, REPORTS AND DOCUMENTS DESIGNATED AND ATTACHED HERE WITH AS PART OF THE APPLICATION ARE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

Signature Nicholas F Catania Date December 29, 1992

Title Executive Director

Notarial Seal
Frances M. Bender, Notary Public
Upper Chichester Twp., Delaware County
My Commission Expires Nov. 6, 1994
Member, Pennsylvania Association of Notaries

SWORN AND SUBSCRIBED TO BEFORE ME THIS
29th DAY OF December 19 92

Frances M. Bender
Notary Public

NOTARY SEAL

THIS SECTION TO BE COMPLETED BY THE REGISTERED PROFESSIONAL ENGINEER WHO PREPARES THIS APPLICATION, ACCOMPANYING REPORT AND SUPPORTING DOCUMENTATION:

This is to certify that I have personally reviewed all engineering information contained in the accompanying modules, drawings, specifications, and other documents which are part of this application and that I have found it to be good engineering quality, true and correct, and is in conformance with the requirements of the Department of Environmental Resources, and it does not, to the best of my knowledge, withhold information that is pertinent to a determination of compliance with the requirements of the Department.

NOTICE: **It is an offense under Pennsylvania Crimes Code to affirm a false statement in documents submitted to the Department.**

Name of Design Engineer: Donald T. Edwards, P.E.

Design Firm: PSC Engineers & Consultants, Inc.

Mailing Address: 649 North Lewis Road
Limerick, PA 19468

Telephone: (215) AC 495-0303

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL SEAL DONALD T. EDWARDS ENGINEER

Signature of Professional Engineer

(See Reverse Side For Application Checklist for Submittal)

ER 6470-1861.1:REV.3/83

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
WATER QUALITY MANAGEMENT

DATE PREPARED: 12-14-92
DATE REVISED:

WATER POLLUTION CONTROL

MODULE 1 – GENERAL INFORMATION SEWERAGE

FOR DEPARTMENT USE ONLY

CLASS OF CONSTRUCTION (Check all applicable blocks)

- [ ] NEW
- [ ] REPLACEMENT OF EXISTING UNIT(S)
- [X] ADDITIONS AND/OR
- [X] MODIFICATIONS TO EXISTING UNIT(S)

TABLE I – DESIGN LOADING DATA			Existing Facilities Design	Present Operating Data	Proposed Total Facilities Design
1. EQUIVALENT POPULATION TO BE SERVED (NO. OF PERSONS–SUBMIT CALCULATIONS)					
	A. DOMESTIC				
	B. INDUSTRIAL				
	C. TOTAL				
2. DESIGN YEAR OR PERIOD FOR OPERATING DATA			NO CHANGES IN		
3. RUNOFF PERIOD		(HRS)	TREATMENT PROCESS		
4. DOMESTIC WASTE FLOW DATA	A. PER CAPITA FLOW	(GPCD)	NOR SEWAGE FLOWS		
	B. AVERAGE DAILY FLOW	(MGD)	PROPOSED		
	C. INFILTRATION	(MGD)			
	D. RUNOFF FLOW RATE	(MGD)			
	E. MAXIMUM FLOW RATE	(MGD)			
5. INDUSTRIAL WASTE FLOW DATA	A. AVERAGE DAILY FLOW	(MGD)			
	B. MAXIMUM DAILY FLOW	(MGD)			
6. TOTAL DESIGN AVERAGE FLOW		(MGD)	44.0 MGD		

TABLE II – FACILITIES DESIGN DATA (Specify number of units)

Units	Existing	To Be Abandoned	Total Proposed	Units	Existing	To Be Abandoned	Total Proposed
1. SCREENING DEVICES	-	-	-	14. RAPID SAND FILTER(S)	-	-	-
2. GRIT CHAMBER(S)	2	-	-	15. MICROSCREEN UNIT(S)	-	-	-
3. COMMINUTOR(S)	-	-	-	16. WASTE STABILIZATION POND(S)	-	-	-
4. EQUALIZATION TANK(S)	3	-	-	17. CHLORINE CONTACT TANK(S)	2	-	-
5. PRE-AERATION TANKS	2	-	-	18. DISINFECTION FACILITIES	-	-	-
6. PRIMARY SETTLING TANKS	8	-	-	19. SLUDGE THICKENING TANK(S)	4	-	-
7. TRICKLING FILTERS	-	-	-	20. AEROBIC DIGESTION TANKS	-	-	-
8. INTERMEDIATE SETTLING TANKS	-	-	-	21. ANAEROBIC DIGESTORS	-	-	-
9. AERATION TANKS	4	-	-	22. MECHANICAL SLUDGE DEWATERING	3	-	-
10. FINAL SETTLING TANKS	4	-	1	23. SLUDGE DRYING BEDS	-	-	-
11. MIXING AND FLOCCULATION TANKS	-	-	-	24. INCINERATOR(S)	2	-	-
12. CHEMICAL TREATMENT	-	-	-	25. OTHER (SPECIFY) Activated Sludge			
13. INTERMITTENT SAND FILTERS				Pumping Station	1	-	1

Form [illegible] REV 3/83

DATE PREPARED 12-14-92

DATE REVISED

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF WATER QUALITY MANAGEMENT

SEWERAGE APPLICATION
CHECKLIST FOR SUBMITTAL

FOR DEPARTMENT USE ONLY

Accompanying materials and documentation (See General Instructions)	ATTACHED YES	ATTACHED N/A	DER USE COMPLETE YES	DER USE COMPLETE NO
1 Appropriate application fee	[X]	[ ]	[ ]	[ ]
2. Two(2) copies of application, design engineer's report, and accompanying drawings and plans.	[X]		[ ]	[ ]
a. Affidavit and proper signatures			[ ]	[ ]
b. Engineers's professional seal			[ ]	[ ]
c. Properly notarized			[ ]	[ ]
d. Plans Secondary Clarifier No. 5 and Activated Sludge P.S. (TITLE/DESCRIPTION)				
No. of sheets 24 Date 12/15/92	[X]		[ ]	[ ]
Plans _____ (TITLE/DESCRIPTION)				
No. of sheets _____ Date _____	[ ]		[ ]	[ ]
Specifications Same as plans (TITLE)	[ ]	[ ]	[ ]	
3. 2 additional copies of application, design engineer's report, and accompanying plans and specifications for review by DRBC, Allegheny County or Erie County.	[X]	[ ]	[ ]	[ ]
4. Soil Erosion and Sedimentation Control Plan	[X]	[ ]	[ ]	[ ]
a. County Conservation District comments (optional)	[X]	[ ]	[ ]	[ ]
5. Has appropriate ACT 537 planning approval been obtained?	[ ]	N/A	[ ]	[ ]
6. Other:	[ ]		[ ]	[ ]

DATE PREPARED
12-14-92

DATE REVISED

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF WATER QUALITY MANAGEMENT

WATER POLLUTION CONTROL
MODULE 2

FOR DEPARTMENT USE ONLY

6. General Information

(a) Describe 100 yr. flood elevation, ventilation, emergency power provision and alarm system.

Refer to Engineer's Report.

TABLE 3 - PUMPING FACILITIES

LIST ALL THE PUMPS IN THE ENTIRE TREATMENT FACILITY

NUMBER OF IDENTICAL PUMPS	Describe Pump Use	Type of Pump	Check Columns That Apply To Each Pump								Pump Capacity	
			EXISTING	PROPOSED	VARIABLE SPEED	CONSTANT SPEED	AUTOMATIC CONTROL	MANUAL CONTROL	PNEUMATIC EJECTOR	STAND BY OPERATION	(GPM)	TDH (FT.)
	NEW PUMPING STATION:											
2	Return Activated Sludge	Vertical, non-clog centrifugal		x	x		x				8,280	40
1	Waste Activated Sludge	Vertical, non-clog		x	x		x				730	60
	EXISTING PUMPING STATION:											
2**	Return Activated Sludge	Horizontal, non-clog, centrif.		x	x		x				8,630	28
2*	Return Activated Sludge	Vertical, non-clog		x		x	x				5,340	37
2**	Waste Activated Sludge	Vertical, non-clog centrifugal		x	x		x				730	60

* Modifications to existing pumps
** Replacement of existing pumps

ER-BWQ-188.4: REV. 3/83

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
WATER QUALITY MANAGEMENT

WATER POLLUTION CONTROL

MODULE 4

DATE PREPARED
12-14-92

FOR DEPARTMENT USE ONLY

TABLE 1 – SCREENING AND COMMINUTING DEVICES

FOR EACH DEVICE BEING USED, PROVIDE A BRIEF DESCRIPTION FOR FUNCTION – INCLUDE DESIGN DATA SUCH AS CAPACITY, VELOCITY THROUGH BARS AND SLOPE OF BARS

TYPE	LOCATION	FUNCTION

TABLE 2 SETTLING TANKS

IDENTIFY FUNCTION AND SEQUENCE IN THE PROCESS USED.

			UNIT 1 [XX] Existing [ ] Proposed; [ ] Primary [ ] Intermediate [X] Final	UNIT 2 [X] Existing [ ] Proposed; [ ] Primary [ ] Intermediate [X] Final	UNIT 3 [X] Existing [ ] Proposed; [ ] Primary [ ] Intermediate [X] Final	UNIT 4 [XX] Existing [ ] Proposed; [ ] Primary [ ] Intermediate [X] Final
1. HYDRAULIC LOADING DURING RUN-OFF PERIOD	A. FORWARD FLOW (Mgd)		7.58	7.58	7.58	7.58
	B. RECIRCULATION FLOW (If applicable) (Mgd)		2.27	2.27	2.27	2.27
	C. TOTAL FLOW (A + B) (Mgd)		9.85	9.85	9.85	9.85
2. LOADING RATES (BASED ON FORWARD FLOW)	A. CAPACITY (gallons)		1,490,000	1,490,000	1,490,000	1,490,000
	B. DETENTION TIME (Hrs)	(1) Average	4.72	4.72	4.72	4.72
		(2) Minimum	2.43	2.43	2.43	2.43
	C. SURFACE SETTLING RATE (Gal/Div/Sq. Ft.)	(1) Average	570	570	570	570
		(2) Maximum	1,107	1,107	1,107	1,107
	D. WEIR OVERFLOW RATE (Gal/Ft/Day)	(1) Average	10,437	10,437	10,437	10,437
		(2) Maximum	20,255	20,255	20,255	20,255

1. FOR FINAL SETTLING TANKS IN THE ACTIVATED SLUDGE PROCESS, DESCRIBE THE AVERAGE AND PEAK SOLIDS LOADING RATES BASED ON MIXED LIQUOR FLOW (FORWARD FLOW + RECIRCULATION)

E.	Solids Loading Rate (lbs/day/sq. ft.) MLSS = 3,000 mg/L	Avg.	18.6	18.6	18.6	18.6
		Max.	36.0	36.0	36.0	36.0

ER-BWQ-188.4: REV. 3/83

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
WATER QUALITY MANAGEMENT

WATER POLLUTION CONTROL

MODULE 4

DATE PREPARED
12-14-92

FOR DEPARTMENT USE ONLY

TABLE 1 – SCREENING AND COMMINUTING DEVICES

FOR EACH DEVICE BEING USED, PROVIDE A BRIEF DESCRIPTION FOR FUNCTION – INCLUDE DESIGN DATA SUCH AS CAPACITY, VELOCITY THROUGH BARS AND SLOPE OF BARS

TYPE	LOCATION	FUNCTION

TABLE 2 SETTLING TANKS

IDENTIFY FUNCTION AND SEQUENCE IN THE PROCESS USED.

			UNIT 5	UNIT	UNIT	UNIT
			[ ] Existing [X] Proposed	[ ] Existing [ ] Proposed	[ ] Existing [ ] Proposed	[ ] Existing [ ] Proposed
			[ ] Primary [ ] Intermediate [X] Final	[ ] Primary [ ] Intermediate [ ] Final	[ ] Primary [ ] Intermediate [ ] Final	[ ] Primary [ ] Intermediate [ ] Final
1. HYDRAULIC LOADING DURING RUN-OFF PERIOD	A. FORWARD FLOW (Mgd)		13.7			
	B. RECIRCULATION FLOW (If applicable) (Mgd)		4.11			
	C. TOTAL FLOW (A + B) (Mgd)		17.81			
2. LOADING RATES (BASED ON FORWARD FLOW)	A. CAPACITY (gallons)		3,238,000			
	B. DETENTION TIME (Hrs)	(1) Average	5.67			
		(2) Minimum	2.92			
	C. SURFACE SETTLING RATE (Gal/Div/Sq. Ft.)	(1) Average	570			
		(2) Maximum	1,107			
	D. WEIR OVERFLOW RATE (Gal/Ft/Day)	(1) Average	9,494			
		(2) Maximum	18,434			

1. FOR FINAL SETTLING TANKS IN THE ACTIVATED SLUDGE PROCESS, DESCRIBE THE AVERAGE AND PEAK SOLIDS LOADING RATES BASED ON MIXED LIQUOR FLOW (FORWARD FLOW + RECIRCULATION)

E. Solids Loading Rate
(lbs/day/sq. ft.) Avg. 18.6
MLSS = 3,000 mg/L Max. 36.0

PSC Engineers & Consultants, Inc.

December 13, 1991

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mayor's Office
City of Chester
Welsh Street
City of Chester, PA 19013

RE: Delaware County Regional
Water Quality Control
Authority (DELCORA)
P.N. 1267.01

Gentlemen:

In accordance with Act 14 of the Commonwealth of Pennsylvania's Administrative Code, Section 1905-A, "Cooperation with Municipalities", DELCORA is hereby notifying you that the Authority will be applying to the Pennsylvania Department of Environmental Resources for a Water Quality Management Permit Amendment for constructing a new final clarifier and associated appurtenances at the Auhtority's wastewater treatment plant. No response from your office is required. However, if you wish to comment on this project, you have a 30 day period in which to do so.

Sincerely yours,

Russell M. Smith

Russell M. Smith, P.E.
Project Manager

cc: Mr. Nick Catania, DELCORA
J.E. Spitko, Jr., PSC E&C
D.S. Friedman, PSC E&C
D.T. Edwards, PSC E&C

Merging Huth Engineers & PSC Environmental Services

649 North Lewis Road, Limerick, PA 19468 215-495-0303 / FAX 215-495-5855

SENDER:
- Complete items 1 and/or 2 for additional services.
- Complete items 3, and 4a & b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece next to the article number.

I also wish to receive the following services (for an extra fee):

1. ☐ Addressee's Address
2. ☐ Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:

Mayor's Office
City of Chester
Welsh St.
City of Chester, PA 19013

4a. Article Number
P 837 215 890

4b. Service Type
☐ Registered ☐ Insured
☑ Certified ☐ COD
☐ Express Mail ☐ Return Receipt for Merchandise

7. Date of Delivery
DEC 17 1991

5. Signature (Addressee)

8. Addressee's Address (Only if requested and fee is paid)

6. Signature (Agent)
Kevin Auclair

PS Form 3811, October 1990 ★U.S. GPO: 1990—273-861 **DOMESTIC RETURN RECEIPT**

PSC Engineers & Consultants, Inc.

December 13, 1991

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. John E. Pickett, Director
Delaware County Planning Department
Second and Orange Streets
Media, PA 19063

RE: Delaware County Regional
Water Quality Control
Authority (DELCORA)
P.N. 1267.01

Dear Mr. Pickett:

In accordance with Act 14 of the Commonwealth of Pennsylvania's Administrative Code, Section 1905-A, "Cooperation with Municipalities", DELCORA is hereby notifying you that the Authority will be applying to the Pennsylvania Department of Environmental Resources for a Water Quality Management Permit Amendment for constructing a new final clarifier and associated appurtenances at the Auhtority's wastewater treatment plant. No response from your office is required. However, if you wish to comment on this project, you have a 30 day period in which to do so.

Sincerely yours,

Russell M. Smith

Russell M. Smith, P.E.
Project Manager

cc: Mr. Nick Catania, DELCORA
J.E. Spitko, Jr., PSC E&C
D.S. Friedman, PSC E&C
D.T. Edwards, PSC E&C

Merging Huth Engineers & PSC Environmental Services

649 North Lewis Road, Limerick, PA 19468 215-495-0303 / FAX 215-495-5855

SENDER:
- Complete items 1 and/or 2 for additional services.
- Complete items 3, and 4a & b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece next to the article number.

I also wish to receive the following services (for an extra fee):

1. ☐ Addressee's Address
2. ☐ Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:

John Pickett
Delaware Co. Planning Dept
Second + Orange St.
Media, PA 19063

4a. Article Number
P 837 215 891

4b. Service Type
☐ Registered ☐ Insured
☑ Certified ☐ COD
☐ Express Mail ☐ Return Receipt for Merchandise

7. Date of Delivery
DEC 17 199-

5. Signature (Addressee)

6. Signature (Agent)

8. Addressee's Address (Only if requested and fee is paid)

PS Form 3811, October 1990 ☆U.S. GPO: 1990—273-861 **DOMESTIC RETURN RECEIPT**

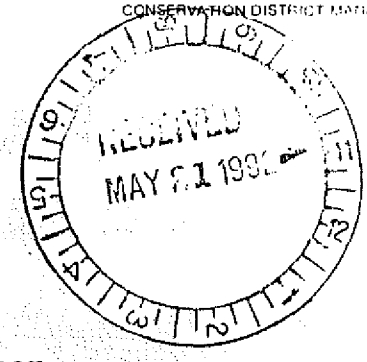
FILE 166.0
DELCORA

DELAWARE COUNTY CONSERVATION DISTRICT
FAIR ACRES CENTER, BUILDING 19
MIDDLETOWN ROAD
LIMA, PENNSYLVANIA 19037

AREA CODE (215) 891-5962
FAX # (215) 891-2706

EDWARD M. MAGARG...
CONSERVATION DISTRICT MANAGER

May 19, 1992



Brian P. MacEwen
P.S.C. Engineers & Consultants
649 North Lewis Road
Limerick, Pa. 19468

Re: Delcora Expansion - Classifier - City of Chester

Dear Mr. MacEwen:

The Erosion and Sediment Control Plan for the clarifier additions to Delcora's Plant in the City of Chester has been reviewed by the Delaware County Conservation District. The plan will be considered adequate as submitted. Please note the following conditions or minor corrections:

1. Inlet Protection - While the control device illustrated is an acceptable alternative, the design engineer must evaluate whether or not these controls will cause significant problems if they become plugged. Especially on the two inlets contained within the silt fence. I would suggest a sump around these two inlets, and a donut hole in the center of the stone berm covering the inlet as one consideration.

A copy of this plan is required by law to be available on site at all times during construction.

The Conservation District reviews plans solely to determine, whether they are adequate to satisfy the requirements of 25 Pa. Code 102.1 et. seq., the erosion control regulations of the Department of Environmental Resources. By a determination that the plan is adequate to meet these requirements, neither the Conservation District nor the County assumes responsibility for the implementation of the plan or the proper construction and operation of the facilities contained in the plan. This review is void after two years if construction has not started.

This review does not take the place of any reviews which may be required by the Department of Environmental Resources.

- continued -

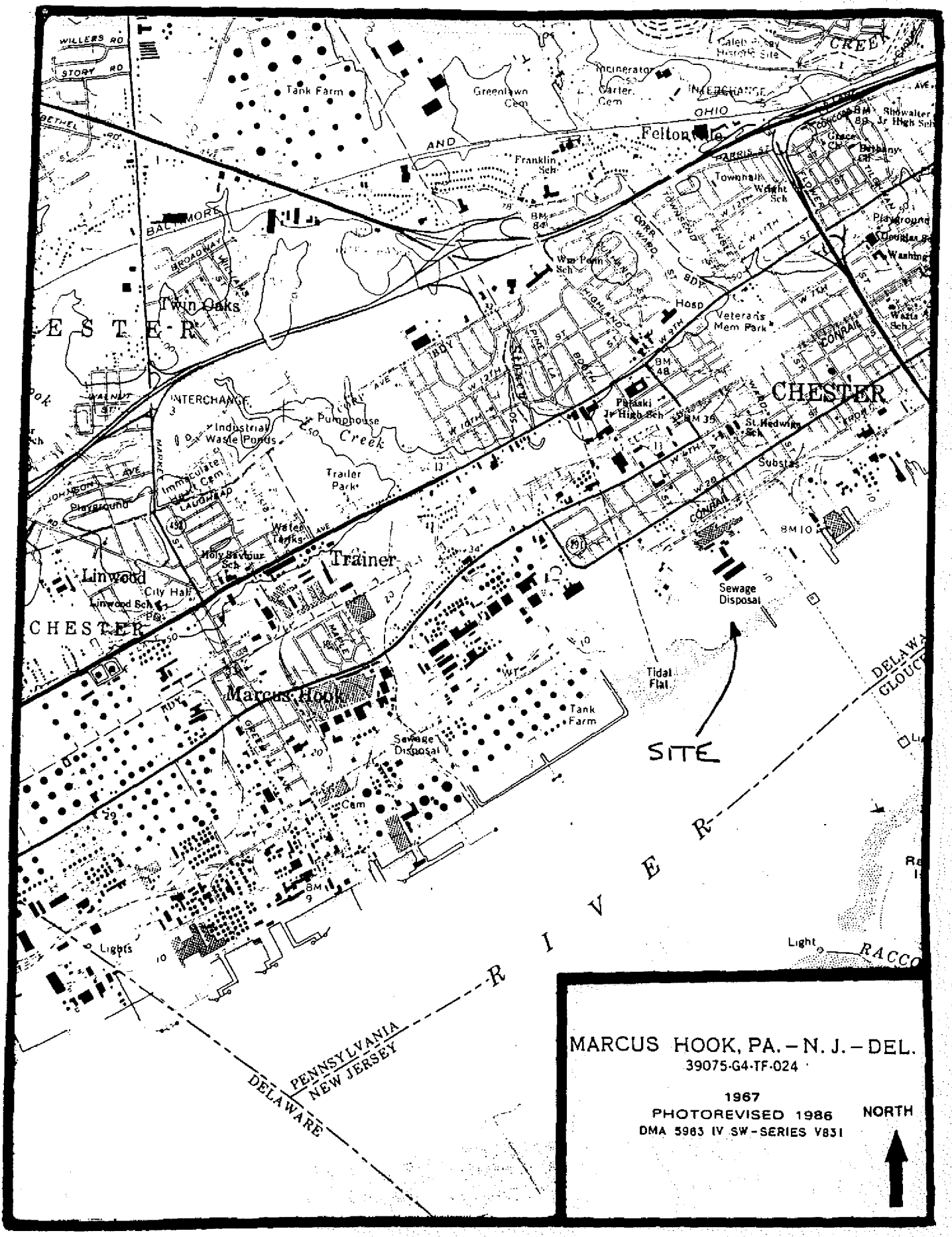
It is the duty of the contractor to comply with the provisions of Act 172 (Public Utilities Law) before performing any excavation work.

If you would like further assistance, please feel free to contact the Conservation District Office at 891-5962.

Edward M. Magargee
Edward M. Magargee,
Conservation District Manager

EMM:jf

p.c. - City of Chester


Tank Farm
Greenlawn Cem
Incinerator
Carter Cem
INTERCHANGE
OHIO
AND
Felton ville
Franklin Sch
Townsend Wright Sch
Wm Penn Sch
Hosp
Veterans Mem Park
Playground
Twin Oaks
CHESTER
INTERCHANGE
Industrial Waste Ponds
Pumphouse Creek
Trailer Park
Immaculate Conception Cem
Playground
Water Tanks
Holy Saviour Sch
Trainer
Linwood
City Hall
Linwood Sch
CHESTER
Pulaski Jr High Sch
St Hedwigs Sch
Substa
CONRAIL
Sewage Disposal
Tidal Flat
Marcus Hook
Tank Farm
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PENNSYLVANIA
NEW JERSEY
DELAWARE
MARCUS HOOK, PA. – N. J. – DEL.
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1967
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NORTH

CDPS Upgrade

Pennsylvania Department of Environmental Protection

Lee Park, Suite 6010
555 North Lane
Conshohocken, PA 19428

RECEIVED
APR 13 2000
2000-0919

April 12, 2000

COPY

Southeast Regional Office

610-832-6130
Fax 610-832-6133

cc: MBFW questionnaire

Mr. Joseph L. Salvacci
Executive Director
Delaware County Regional Water
Quality Control Authority
100 East Fifth Street, P.O. Box 999
Chester, PA 19016

Re: Sewerage Permit No. 2399404
Delaware County Regional Water
Quality Control Authority
APS No. 43379, AUTH No. 45485
Ridley Township
Delaware County

Dear Mr. Salvacci:

Referenced permit is enclosed.

Please study the permit carefully and direct any questions to the Permits Section of this office.

Please take the time to complete the enclosed questionnaire and return it in the pre-addressed and stamped envelope. Your response will be taken into account, as we consider ways of improving our service to the public and regulated community. Thank you for your cooperation.

Sincerely,

James Newbold, P.E.
Regional Manager
Water Management

Enclosures: Permit
Standard Conditions Relating to Sewerage
Standard Conditions Relating to Erosion Control

cc: Ridley Township
City of Chester
Permits and Compliance
Mr. Newbold
Ms. W. Warren (Transmittal Letter Only)
Re 30 (RN99)202-21C

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
WATER MANAGEMENT PROGRAM

PERMIT NO. 2399404

AMENDMENT NO. _____

WATER QUALITY MANAGEMENT PERMIT

A. PERMITTEE (Name & Address):

Delaware County Regional Water Quality Control Authority - Client ID No. 42332
100 East Fifth Street, P.O. Box 999
Chester, PA 19016

B. PROJECT (Name, County, Municipality)

Central Delaware County Pumping Station
Delaware County Regional Water Quality Control Authority - Site ID No. 4548804
Ridley Township
Delaware County

C. THIS: X **Permit** ____ **Permit Amendment**

APPROVES:

X	**The construction/operation of:**	____	**Modification(s) to the construction/operation of:**
____	Sewage Treatment Facilities	____	Industrial Waste Treatment Facilities
____	Land Application Facilities	____	Other: ____
____	Average Design Flow of ____	MGD consisting of: ____	
X	Sewers and Appurtenances	X	Pump Station(s)
____	Impoundment(s)	____	Injection Well(s)
X	Soil Erosion & Sedimentation Control Plan		
X	Stream Crossing(s)	____	Outfall & Headwall(s)

D. APPROVAL GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING CONDITIONS:

1. a. All construction, operations, and procedures shall be in accordance with the Water Quality Management Permit/Permit Amendment Application dated **05/28/99**, its supporting documentation, and addendums dated **07/14/99**. Such application, it's supporting documentation and addendums are hereby made a part of this permit.

   b. Water Quality Management Permit No. ____ dated ____ and conditions, supporting documentation and addendums are (except for any modifications to the original permit herein permitted) also made a part of this permit amendment.

2. Conditions numbered **1-6, 8, 11 through 15, 17, 18, 19** of the **Sewerage** standard conditions dated **09/98** and conditions numbered **1-13** of the erosion control standard conditions dated **09/98** are attached and made part of this permit.

3. Special conditions numbered **I** are attached and made part of this permit.

E. THE AUTHORITY GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING FURTHER QUALIFICATIONS:

1. If there is a conflict between the application or its supporting documents and amendments and the standard or special conditions, the standard or special conditions shall apply.
2. Failure to comply with the rules and regulations of the Department or with the terms or conditions of this permit shall void the authority given to the permittee by the issuance of the permit.
3. This permit is issued pursuant to the Clean Stream law Act of June 22, 1937, P.L. 1987, as amended 35 P.S. § 691.1 et seq., and/or the Dam Safety and Encroachments Act of November 26, 1978, P.L. 1375, as amended, 32 P.S. § 693.1 et seq. Issuance of this permit shall not relieve the permittee of any responsibility under any other law.
4. Industrial Facilities - If the herein permitted facilities or modifications are not completed with two (2) years of the issue date below, this permit will become null and void and reapplication shall be required.

PERMIT ISSUED:

DATE April 12, 2000

AMENDMENT ISSUED:

DATE ____

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: James Harold

TITLE: Regional Manager, Water Management

Sewerage Permit No. 2399404
Delaware County Regional Water Quality Control Authority
Ridley Township, Delaware County

This permit is subject to the following Special Condition(s):

I. Consistent with Department of Environmental Protection Policy, the Department did not conduct a detailed technical review of the application for this permit. The Department considers the registered professional engineer whose seal is affixed to the design documents, to be fully responsible for the adequacy of all aspects of the facility design.

Re 30 (RN99)202-21D

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD CONDITIONS RELATING TO SEWERAGE
for Use in Water Quality Management Permits

1. During construction, no changes affecting any engineering design parameter relied on in issuing this permit shall be made from the plans, designs, and other data herein approved unless the permittee shall first receive written approval thereof from the Department. The sewerage facilities shall be constructed under expert engineering supervision and competent inspection.

The permittee shall maintain "as-built" plans showing the correct plan of all sewers and sewerage structures as actually constructed together with any other information that may be required. The Permittee shall also maintain facility operation and maintenance (O&M) manuals at the facility to assure proper O&M of the permitted facility. The Permittee shall file the "as-builts" and O&M manuals with the Department upon request.

2. The sewers shall have adequate foundation support as soil conditions require. Trenches shall be back-filled such that the sewers will have proper structural stability, with minimum settling and adequate protection against breakage. Concrete used in connection with these sewers shall be protected from damage by water, freezing, drying or other harmful conditions until cured.

3. Manhole inverts shall be so formed as to facilitate the flow of the sewage and to prevent the standing of sewage solids, and the whole manhole structure shall have proper structural strength and be so constructed as to prevent undue infiltration, entrance of the street wash or grit, and to provide convenient and safe means of access and maintenance.

4. No stormwater from pavements, area ways, roofs, foundation drains, basement drains, or other sources shall be mitted to the sanitary sewers herein approved. The stormwater from stormwater collection and retention facilities serving the facility may be discharged to the plant headworks at a hydraulic and organic rate which will not violate the Permit.

5. The permittee shall adopt and enforce an ordinance requiring the abandonment of privies, cesspools or similar receptacles for human waste and on-lot sewage disposal systems on the premises of occupied structures which are accessible to public sewers and require the connection of such structures to the public sewers.

6. The herein approved sewers shall be maintained in good condition, kept free from deposits by flushing or other proper means of cleaning, and repaired when necessary.

7. The outfall sewer or drain shall be extended to the low water mark of the receiving body of water. Where necessary to assure the proper mixing and waste assimilation, an outfall sewer or drain may be extended with appurtenances below the low water mark and into the bed of a navigable stream, provided that the permittee has secured an easement, right-of-way, license, or lease from the Department in accordance with Section 15 of the Dam Safety and Encroachments Act, the Act of November 26, 1978, P.L. 1375, as amended.

8. The approval is specifically made contingent upon the permittee acquiring all necessary property rights, by easement or otherwise, providing for the satisfactory construction, operation, maintenance and replacement of all sewers or sewerage structures in, along, or across private property, with full rights of ingress, egress and regress.

9. The various structures and apparatus of the sewage treatment works herein approved shall be maintained in proper condition so that the facility will individually and collectively perform the functions for which they were designed.

10. When the herein approved sewage treatment works is completed and before it is placed in operation, the permittee all notify the Department in writing so that an inspection of the works may be made by a representative of the Department.

11. If, at any time, the sewage and/or conveyance facilities covered by this permit create a public nuisance, including but not limited to, causing malodors, or cause environmental harm to waters of the Commonwealth, the Department may require the Permittee to adopt appropriate remedial measures to abate the nuisance or harm.

12. The attention of the permittee is called to the highly explosive nature of certain gases generated by the digestion sewage solids when these gases are mixed in proper portions with air, and to the highly toxic character of certain gas arising from such digestion or from sewage in insufficiently ventilated compartments or sewers. Therefore, at all places throughout the sewerage facilities where hazard of fire, explosion, or danger from toxic gases may occur, the permittee shall post conspicuously proper warnings of a permanent and legible character and shall provide for the thorough instruction of all employees concerning the aforesaid hazards and in first aid and emergency methods of meeting such hazards and shall further provide, in a conveniently accessible place, all necessary equipment and material therefor.

13. Cross connections between the potable water supply and the sewerage system constitute a potential danger to the public health. Therefore, all direct and indirect connections whereby under normal or abnormal conditions the potable water supply may become contaminated from an inferior water supply from any unit of the sewage treatment works, or by any appurtenance thereof or from any part of a sewerage system are hereby specifically prohibited. The permittee is further warned against permitting to be made permanent any temporary connection with a potable supply designed to be held in place while being used for flushing or other purposes, and is also cautioned against the danger of back siphonage through portable hose lines and similar avenues of possible contamination.

14. This permit authorizes the construction and operation of the proposed sewerage facilities until such time as facilities for conveyance and treatment at a more suitable location are installed and are capable of receiving and treating the permittee's sewage. Such facilities must be in accordance with either the applicable municipal official plan adopted pursuant to Section 5 of the Pennsylvania Sewage Facilities Act, the Act of January 24, 1956, P.L. 1535, as amended, or a comprehensive Water Quality Management Plan as set forth in Section 91.31 of the Rules and Regulations of the Department. When such municipal sewerage facilities become available, the permittee shall provide for the conveyance of the sewage to these sewerage facilities, abandon the use of the herein-approved facilities and notify the Department accordingly. This permit shall then, upon notice from the Department, terminate and become null and void, and shall be relinquished to the Department.

15. The local waterways patrolman of the Pennsylvania Fish and Boat Commission shall be notified when construction of a stream crossing and outfall is started and completed. A permit must be secured from the Pennsylvania Fish and Boat Commission if the use of explosives is required. The permittee shall notify the local waterways patrolman when explosives are to be used.

16. The sewage treatment plant shall be operated by an operator certified in accordance with the Sewage Treatment Plant and Waterworks Operators' Certification Act, the Act of November 18, 1968, P.L. 1217, as amended.

17. The permittee shall properly control any industrial waste discharged into its sewerage system by regulating the rate and quality of such discharge, requiring necessary pretreatment, and excluding industrial waste, if necessary, to protect the integrity or operation of the permittee's sewerage system.

18. The permit does not relieve the permittee of its obligations to comply with all federal, interstate, state, or local laws, ordinances, and regulations applicable to the sewerage facilities authorized herein.

19. This permit does not give any real or personal property rights or grant any exclusive privileges, nor shall it be construed to grant or confirm any right, title, easement, or interest in, on, to, or over any lands belonging to the Commonwealth.

20. No untreated or ineffectively treated wastewaters from any facility shall be discharged into the waters of the Commonwealth, and special care shall be used in developing and implementing the PPC plan to prevent accidental "spills" or similar unusal discharges of all raw, finished and waste materials.

21. No stormwater from pavements, area ways, roofs, foundation drains, basement drains, or other sources shall be admitted to the sanitary sewers herein approved. The stormwater from stormwater collection and retention facilities serving the facility may be discharged to the plant has wastes as a hydraulic and organic rate which will not violate Permit.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD CONDITIONS RELATING TO EROSION AND SEDIMENT CONTROL
for Use in Water Quality Management Permits

1. By approval of the plans for which this permit is issued, neither the Department nor the Commonwealth of Pennsylvania assumes any responsibility for the feasibility of the plans or the measures and facilities to be constructed thereunder.

2. If at any time the erosion and sediment control activities undertaken pursuant to this permit or other activities carried out at the location is causing or contributing to pollution of the waters of the Commonwealth, the permitee shall forthwith adopt such remedial measures as are acceptable to the Department.

3. This permit does not authorize any earth disturbance controlled or regulated by an ordinance enacted by a local municipality. Additional permits must be secured from local municipalities where earthmoving activities are covered by such local ordinances.

4. At least seven days before earthmoving will begin, the permittee, by telephone or certified mail, shall notify the Department or its designee of the date for beginning of construction and invite the County Conservation District representative to attend a pre-construction conference. The permittee shall have his erosion control plan available at the activity at all times.

5. All earthmoving activities shall be undertaken in the manner set forth in the erosion and sediment control plan identified with this permit. Revisions to the plan shall be pre-approved by the Department or the conservation district.

6. The erosion control measures and facilities shall be constructed under the supervision and competent inspection of an individual trained and experienced in erosion control, and in accordance with the plans, designs and other data as herein approved or amended, and with the conditions of this permit. Control facilities shall be frequently inspected and maintained to insure effective control.

7. When the herein approved erosion and sediment control measures and facilities are completed, the permittee shall notify the County Conservation District so that a final inspection of the measures and facilities may be made.

8. No storm water, sewage or other wastes not specifically approved herein, shall be admitted to the erosion and sediment control facilities for which this permit is issued.

9. Sediment shall at not time be permitted to accumulate in sedimentation basins to a depth that may limit storage capacity or interfere with the facility's settling efficiency. The sediment removed shall be handled and disposed of in a manner that will not create pollution problems and so that every reasonable and practical precaution is taken to prevent the said material from reaching the waters of the Commonwealth.

10. All slopes, channels, ditches or any disturbed area shall be stabilized as soon as possible after the final grade or final earthmoving has been completed. Where it is not possible to permanently stabilize a disturbed area immediately after the final earthmoving has been completed or where the activity ceases for more than 20 days, interim stabilization measures shall be implemented promptly.

11. Upon completion of the project, all areas which were disturbed by the project shall be stabilized so that accelerated erosion will be prevented. Any erosion and sediment control facility required or necessary to protect areas from erosion during the stabilization period shall be maintained until stabilization is completed. Upon completion of stabilization, all unnecessary or unusable control measures and facilities shall be removed, the areas shall be graded and the soils shall be stabilized.

12. The responsibility of carrying out the permit conditions or to assure that they are carried out shall rest with the permittee.

13. If the proposed earth disturbance is five acres or greater, the permittee shall comply with the NPDES General Permit for Stormwater Discharges from Construction Activities. An individual NPDES Storm Water Discharge Permit issued by the Department is required for any earth disturbance activities in waters designated as Special Protection at 25 PA Code Chapter 93.

Scanned 11/1/2019 bab

Pennsylvania Department of Environmental Protection

2 East Main Street
Norristown, PA 19401

Southeast Regional Office

Phone: 484-250-5970
Fax: 484-250-5971

April 21, 2006

Orig: Project Design File

RECEIVED
MAY 2 2006
By 2006-0743

cc: JLS, CVA, DiSantis, B. Kanch, BCM Design File

Mr. Joseph L. Salvucci
Executive Director
Delaware County Regional Water Quality
Control Authority (DELCORA)
100 East Fifth Street
P.O. Box 999
Chester, PA 19016-0999

Re: Darby Creek Pump Station
WQM Application No. 2305406
File Type: Sewage Permit
Sharon Hill Borough
Delaware County

Dear Mr. Salvucci:

Your permit is enclosed.

You must comply with all Standard and Special Conditions attached to this permit. Construction must be done in accordance with the permit application and all supporting documentation. Please review the permit conditions and the supporting documentation submitted with your application before starting construction.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa.C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717-787-3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800-654-5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at 717-787-3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST REACH THE BOARD WITHIN 30 DAYS. YOU DO NOT NEED A LAWYER TO FILE AN APPEAL WITH THE BOARD.

IMPORTANT LEGAL RIGHTS ARE AT STAKE, HOWEVER, SO YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT AFFORD A LAWYER, YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY TO THE BOARD (717-787-3483) FOR MORE INFORMATION.

If you have any questions, please call Ms. Karen McDaniel at 484-250-5126.

Sincerely,

Jenifer Fields, P.E.
Regional Manager
Water Management

Enclosures

cc: Mr. Weinzapfel – BCM Engineers
Operations Section
Data Systems and Analysis
File
Re (GJE06)074-2

3800-PM-WSWM0015 Rev. 6/2004
Permit

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER SUPPLY AND WASTEWATER MANAGEMENT

PERMIT NO. 2305406
AMENDMENT NO.
APS ID 564280
AUTH ID 607269

WATER QUALITY MANAGEMENT PERMIT

A. PERMITTEE (Name and Address): CLIENT ID#: 42332 **Delaware County Regional Water Quality Control Authority (DELCORA)** **100 East Fifth Street** **P.O. Box 999** **Chester, PA 19016-0999**	B. PRIMARY FACILITY (Name): **DELCORA Sew Sys to S.W. PWD STP (Darby Creek pump station)**
C. LOCATION (Municipality, County): **Sharon Hill Borough** **Delaware County**	SITE ID#: **573137**

D. **This permit approves the construction of sewerage facilities consisting of:**

Upgrades to the Darby Creek pump station along with the rebuilding of two existing 25,000 gpm pumps and the addition of a third 25,000 gpm pump.

Pump Stations: 1 Design Capacity: 25,000 GPM Average Annual Flow: 36,000,000 GPD	Manure Storage: Volume MG Freeboard: inches	Industrial Wastewater/Sewage Treatment Facility: Annual Average Flow: MGD Design Hydraulic Capacity: MGD Design Organic Capacity: lb/day

E. APPROVAL GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING:

1. **New Permits:** All construction, operations, and procedures shall be in accordance with the Water Quality Management Permit application dated 09/21/06, its supporting documentation, and addendums dated 10/13/06, which are hereby made a part of this permit.

   Amendments: All construction, operations, and procedures shall be in accordance with the Water Quality Management Permit Amendment application dated ____ and its supporting documentation, and addendums dated ____, which are hereby made a part of this amendment.

   Except for any herein approved modifications, all terms, conditions, supporting documentation and addendums approved under Water Quality Management Permit No. ____ dated ____ shall remain in effect.

   Transfers: Water Quality Management Permit No. ____ dated ____ and conditions, supporting documentation and addendums are also made part of this transfer.

2. **Permit Conditions Relating to sewerage** are attached and made part of this permit.

3. Special Conditions numbered ____ are attached and made part of this permit.

F. THE AUTHORITY GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING FURTHER QUALIFICATIONS:

1. If there is a conflict between the application or its supporting documents and amendments and the attached conditions, the attached conditions shall apply.

2. Failure to comply with the rules and regulations of DEP or with the terms or conditions of this permit shall void the authority given to the permittee by the issuance of this permit.

3. This permit is issued pursuant to the Clean Streams Law Act of June 22, 1937, P.L. 1987, as amended 35 P.S. §691.1 *et seq.* Issuance of this permit shall not relieve the permittee of any responsibility under any other law.

PERMIT ISSUED: April 21, 2006

BY: _____

TITLE: Water Management Program Manager

Permit No. 2305406_____

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER SUPPLY AND WASTEWATER MANAGEMENT

PERMIT CONDITIONS RELATING TO SEWERAGE

For use in Water Quality Management Permits

(Place a √ in the box that applies)

General

☒ 1. Consistent with the Department of Environmental Protection's (DEP) technical guidance document *Conducting Technical Reviews of Water Quality Management Permit Wastewater Treatment Facilities* (DEP ID: 362-2000-007) available on DEP's website at www.dep.state.pa.us. DEP considers the registered Professional Engineer whose seal is affixed to the design documents to be fully responsible for the adequacy of all aspects of the facility design.

☐ 2. The permittee shall adopt and enforce an ordinance requiring the abandonment of privies, cesspools or similar receptacles for human waste and onlot sewage disposal systems on the premises of occupied structures accessible to public sewers. All such structures must be connected to the public sewers.

☐ 3. The outfall sewer or drain shall be extended to the low water mark of the receiving body of water. Where necessary to ensure proper mixing and waste assimilation, an outfall sewer or drain may be extended with appurtenances below the low water mark and into the bed of a navigable stream provided that the permittee has secured an easement, right-of-way, license or lease from DEP in accordance with Section 15 of the Dam Safety and Encroachments Act, the Act of November 26, 1978, P.L. 1375, as amended.

☒ 4. The approval is specifically made contingent on the permittee acquiring all necessary property rights, by easement or otherwise, providing for the satisfactory construction, operation, maintenance and replacement of all sewers or sewerage structures in, along or across private property with full rights of ingress, egress and regress.

☒ 5. When construction of the approved sewerage facilities is completed and before they are placed in operation, the permittee shall notify DEP in writing so that a DEP representative may inspect the facilities.

☒ 6. If, at any time, the sewerage facilities covered by this permit create a public nuisance, including but not limited to, causing malodors or causing environmental harm to waters of the Commonwealth, DEP may require the permittee to adopt appropriate remedial measures to abate the nuisance or harm.

☒ 7. This permit authorizes the construction and operation of the proposed sewerage facilities until such time as facilities for conveyance and treatment at a more suitable location are installed and capable of receiving and treating the permittee's sewage. Such facilities must be in accordance with the applicable municipal official plan adopted pursuant to Section 5 of the Pennsylvania Sewage Facilities Act, the Act of January 24, 1966, P.L. 1535 as amended. When such municipal sewerage facilities become available, the permittee shall provide for the conveyance of the sewage to these sewerage facilities, abandon the use of these approved facilities and notify DEP accordingly. This permit shall then, upon notice from DEP, terminate and become null and void and shall be relinquished to DEP.

☒ 8. This permit does not relieve the permittee of its obligations to comply with all federal, interstate, state or local laws, ordinances and regulations applicable to the sewerage facilities.

☒ 9. This permit does not give any real or personal property rights or grant any exclusive privileges, nor shall it be construed to grant or confirm any right, easement or interest in, on, to or over any lands which belong to the Commonwealth.

☐ 10. The authority granted by this permit is subject to all effluent requirements, monitoring requirements and other conditions as set forth in NPDES Permit No. **PA**_____ and all subsequent amendments and renewals. No discharge is authorized from these facilities unless approved by an NPDES Permit.

Construction

☒ 11. An Erosion and Sedimentation (E&S) Plan must be developed prior to construction of the permitted facility, pursuant to Title 25 Pa. Code Chapter 102, and implemented during and after the earth disturbance activity.

If the activity involves 5 or more acres of earth disturbance, or from 1 to 5 acres of earth disturbance with a point source discharge to surface waters of the Commonwealth, an NPDES permit for the Discharge of Stormwater Associated with Construction Activity is required.

In addition to the state NPDES permitting requirements, some municipalities, through local ordinances, require the E&S Control Plan to be reviewed and approved by the local County Conservation District office prior to

construction. For specific information regarding E&S control planning approval and NPDES permitting requirements, please contact your local County Conservation District office.

☒ 12. The facilities shall be constructed under the supervision of a Pennsylvania registered Professional Engineer in accordance with the approved reports, plans and specifications.

☒ 13. A Pennsylvania registered Professional Engineer shall certify that construction of the permitted facilities was completed in accordance with the application and design plans submitted to DEP, using "Post Construction Certification" (3800-PM-WSWM0179a). It is the permittee's responsibility to ensure that a Professional Engineer is on-site to provide the necessary oversight and/or inspections to certify the facilities. The certification must be submitted to DEP before the facility is placed in operation. If requested, "as-built" drawings, photographs (if available) and a description of any DEP-approved deviations from the application and design plans must be submitted to DEP within 30 days of certification.

☒ 14. Manhole inverts shall be formed to facilitate the flow of the sewage and to prevent the stranding of sewage solids. The manhole structure shall be built to prevent undue infiltration, entrance of street wash or grit and provide safe access to facilitate manhole maintenance activities.

☐ 15. The local Waterways Conservation Officer of the Pennsylvania Fish and Boat Commission (PFBC) shall be notified when the construction of any stream crossing and/or outfall is started and completed. A written permit must be secured from the PFBC if the use of explosives in any waterways is required and the permittee shall notify the local Waterways Conservation Officer when explosives are to be used.

Operation and Maintenance

☒ 16. The permittee shall maintain records of "as-built" plans showing all the treatment facilities as actually constructed together with facility operation and maintenance (O&M) manuals and any other relevant information that may be required. Upon request, the "as-built" plans and O&M manuals shall be filed with DEP.

☒ 17. The sewers shall have adequate foundation support as soil conditions require. Trenches shall be back-filled to ensure that sewers will have proper structural stability, with minimum settling and adequate protection against breakage. Concrete used in connection with these sewers shall be protected from damage by water, freezing, drying or other harmful conditions until cured.

☐ 18. Stormwater from roofs, foundation drains, basement drains or other sources shall not be admitted directly to the sanitary sewers.

☒ 19. The approved sewers shall be maintained in good condition, kept free of deposits by flushing or other cleaning methods and repaired when necessary.

☒ 20. The sewerage facilities shall be properly operated and maintained to perform as designed.

☐ 21. The attention of the permittee is called to the highly explosive nature of certain gases generated by the digestion of sewage solids when these gases are mixed in proper proportions with air and to the highly toxic character of certain gases arising from such digestion or from sewage in poorly ventilated compartments or sewers. Therefore, at all places throughout the sewerage facilities where hazard of fire, explosion or danger from toxic gases may occur, the permittee shall post conspicuous permanent and legible warnings. The permittee shall instruct all employees concerning the aforesaid hazards, first aid and emergency methods of meeting such hazards and shall make all necessary equipment and material accessible.

☒ 22. An operator certified in accordance with the Water and Wastewater Systems Operator Certification Act of February 21, 2002, 63 P.S. §§1001, *et seq.* shall operate the sewage treatment plant.

☐ 23. The permittee shall properly control any industrial waste discharged into its sewerage system by regulating the rate and quality of such discharge, requiring necessary pretreatment and excluding industrial waste, if necessary, to protect the integrity or operation of the permittee's sewerage system.

☒ 24. There shall be no physical connection between a public water supply system and a sewer or appurtenance to it which would permit the passage of any sewage or polluted water into the potable water supply. No water pipe shall pass through or come in contact with any part of a sewer manhole.

☒ 25. All connections to the approved sanitary sewers must be in accordance with the corrective action plan as contained in the approved Title 25 Pa. Code Chapter 94 Municipal Wasteload Management Annual Report.

☐ 26. Collected screenings, slurries, sludge and other solids shall be handled and disposed of in compliance with Title 25 Pa. Code Chapters 271, 273, 275, 283 and 285 (related to permits and requirements for land filling, land application, incineration and storage of sewage sludge), Federal Regulations 40 CFR 257 and the Federal Clean Water Act and its amendments.

Pennsylvania Department of Environmental Protection

Southeast Regional Office

2 East Main Street
Norristown, PA 19401

Phone: 484-250-5970
Fax: 484-250-5971

COPY

cc: # FW0707C
Scanned 7/5/07

May 3, 2007

Orig: Pending File

RECEIVED
MAY 7 2007
By 2007-0640

cc: JLS, CVH, mgd, D. Matteo, Ed Bothwell, Drew Cressman & Weston, Permit Book

Mr. Joseph Salvucci
Executive Director
DELCORA
100 East Fifth Street
Chester, PA 19016-0999

Re: DELCORA – Trainer Borough Sewer System
Application No. 2307402
File Type: Permit
Trainer Borough
DelawareCounty

Dear Mr. Salvucci:

Your permit is enclosed.

You must comply with all Standard and Special Conditions attached to this permit. Construction must be done in accordance with the permit application and all supporting documentation. Please review the permit conditions and the supporting documentation submitted with your application before starting construction.

Enclosed is the "Sewage and Industrial Wastewater Facilities Construction Certification" form. A Pennsylvania-registered Professional Engineer must sign and complete this form prior to startup of the facilities (see Special Conditions). You or your authorized representative must also sign the form. This certification and other post-construction documentation must be submitted to the Department within 30 days following startup of the facilities.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa.C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717-787-3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800-654-5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at 717-787-3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST REACH THE BOARD WITHIN 30 DAYS. YOU DO NOT NEED A LAWYER TO FILE AN APPEAL WITH THE BOARD.

IMPORTANT LEGAL RIGHTS ARE AT STAKE, HOWEVER, SO YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT AFFORD A LAWYER, YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY TO THE BOARD (717-787-3483) FOR MORE INFORMATION.

If you have any questions, please call Mr. Andrew Haneiko at 484-250-5183.

Sincerely,

Jenifer Fields, P.E.
Regional Manager
Water Management

Enclosures

cc: Mr. Burt – Weston Solutions
Operations Section
Mr. Sheckler
Re 30 (joh07wqm)120-15

3800-PM-WSWM0015 Rev. 6/2004
Permit

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER SUPPLY AND WASTEWATER MANAGEMENT

PERMIT NO. 2307402
AMENDMENT NO. _____
APS ID 609094
AUTH ID 673255

WATER QUALITY MANAGEMENT PERMIT

A. PERMITTEE (Name and Address): CLIENT ID#: 42332
DELCORA
100 East Fifth Street
Chester, PA 19016

B. PRIMARY FACILITY (Name):
DELCORA STP – Trainer Boro Sewer System

C. LOCATION (Municipality, County):
Trainer Borough
Delaware County

SITE ID#:
454804

D. **This permit approves the construction of sewerage facilities consisting of:**
8" and 10" forcemain collection system.

Pump Stations: ____	Manure Storage:	Industrial Wastewater/Sewage Treatment Facility:
Design Capacity: ____ GPM	Volume _____ MG	Annual Average Flow: _____ MGD
Average Annual Flow: ____ GPD	Freeboard: _____ inches	Design Hydraulic Capacity: _____ MGD
		Design Organic Capacity: _____ lb/day

E. APPROVAL GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING:

1. **New Permits:** All construction, operations, and procedures shall be in accordance with the Water Quality Management Permit application dated 03/08/2007, its supporting documentation, and addendums dated ____, which are hereby made a part of this permit.

   Amendments: All construction, operations, and procedures shall be in accordance with the Water Quality Management Permit Amendment application dated ____ and its supporting documentation, and addendums dated ____, which are hereby made a part of this amendment.

   Except for any herein approved modifications, all terms, conditions, supporting documentation and addendums approved under Water Quality Management Permit No. ____ dated ____ shall remain in effect.

   Transfers: Water Quality Management Permit No. ____ dated ____ and conditions, supporting documentation and addendums are also made part of this transfer.

2. **Permit Conditions Relating to sewerage** are attached and made part of this permit.

3. Special Conditions numbered ____ are attached and made part of this permit.

F. THE AUTHORITY GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING FURTHER QUALIFICATIONS:

1. If there is a conflict between the application or its supporting documents and amendments and the attached conditions, the attached conditions shall apply.

2. Failure to comply with the rules and regulations of DEP or with the terms or conditions of this permit shall void the authority given to the permittee by the issuance of this permit.

3. This permit is issued pursuant to the Clean Streams Law Act of June 22, 1937, P.L. 1987, as amended 35 P.S. §691.1 *et seq.* Issuance of this permit shall not relieve the permittee of any responsibility under any other law.

PERMIT ISSUED:
May 3, 2007

BY: _____

TITLE: Water Management Program Manager

Re 30

Permit No. 2307402

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER SUPPLY AND WASTEWATER MANAGEMENT

PERMIT CONDITIONS RELATING TO SEWERAGE

For use in Water Quality Management Permits

(Place a √ in the box that applies)

General

☒ 1. Consistent with the Department of Environmental Protection's (DEP) technical guidance document *Conducting Technical Reviews of Water Quality Management Permit Wastewater Treatment Facilities* (DEP ID: 362-2000-007) available on DEP's website at www.dep.state.pa.us. DEP considers the registered Professional Engineer whose seal is affixed to the design documents to be fully responsible for the adequacy of all aspects of the facility design.

☒ 2. The permittee shall adopt and enforce an ordinance requiring the abandonment of privies, cesspools or similar receptacles for human waste and onlot sewage disposal systems on the premises of occupied structures accessible to public sewers. All such structures must be connected to the public sewers.

☐ 3. The outfall sewer or drain shall be extended to the low water mark of the receiving body of water. Where necessary to ensure proper mixing and waste assimilation, an outfall sewer or drain may be extended with appurtenances below the low water mark and into the bed of a navigable stream provided that the permittee has secured an easement, right-of-way, license or lease from DEP in accordance with Section 15 of the Dam Safety and Encroachments Act, the Act of November 26, 1978, P.L. 1375, as amended.

☒ 4. The approval is specifically made contingent on the permittee acquiring all necessary property rights, by easement or otherwise, providing for the satisfactory construction, operation, maintenance and replacement of all sewers or sewerage structures in, along or across private property with full rights of ingress, egress and regress.

☒ 5. When construction of the approved sewerage facilities is completed and before they are placed in operation, the permittee shall notify DEP in writing so that a DEP representative may inspect the facilities.

☒ 6. If, at any time, the sewerage facilities covered by this permit create a public nuisance, including but not limited to, causing malodors or causing environmental harm to waters of the Commonwealth, DEP may require the permittee to adopt appropriate remedial measures to abate the nuisance or harm.

☐ 7. This permit authorizes the construction and operation of the proposed sewerage facilities until such time as facilities for conveyance and treatment at a more suitable location are installed and capable of receiving and treating the permittee's sewage. Such facilities must be in accordance with the applicable municipal official plan adopted pursuant to Section 5 of the Pennsylvania Sewage Facilities Act, the Act of January 24, 1966, P.L. 1535 as amended. When such municipal sewerage facilities become available, the permittee shall provide for the conveyance of the sewage to these sewerage facilities, abandon the use of these approved facilities and notify DEP accordingly. This permit shall then, upon notice from DEP, terminate and become null and void and shall be relinquished to DEP.

☒ 8. This permit does not relieve the permittee of its obligations to comply with all federal, interstate, state or local laws, ordinances and regulations applicable to the sewerage facilities.

☒ 9. This permit does not give any real or personal property rights or grant any exclusive privileges, nor shall it be construed to grant or confirm any right, easement or interest in, on, to or over any lands which belong to the Commonwealth.

☐ 10. The authority granted by this permit is subject to all effluent requirements, monitoring requirements and other conditions as set forth in NPDES Permit No. **PA**_____ and all subsequent amendments and renewals. No discharge is authorized from these facilities unless approved by an NPDES Permit.

Construction

☒ 11. An Erosion and Sedimentation (E&S) Plan must be developed prior to construction of the permitted facility, pursuant to Title 25 Pa. Code Chapter 102, and implemented during and after the earth disturbance activity.

If the activity involves 5 or more acres of earth disturbance, or from 1 to 5 acres of earth disturbance with a point source discharge to surface waters of the Commonwealth, an NPDES permit for the Discharge of Stormwater Associated with Construction Activity is required.

In addition to the state NPDES permitting requirements, some municipalities, through local ordinances, require the E&S Control Plan to be reviewed and approved by the local County Conservation District office prior to

construction. For specific information regarding E&S control planning approval and NPDES permitting requirements, please contact your local County Conservation District office.

☒ 12. The facilities shall be constructed under the supervision of a Pennsylvania registered Professional Engineer in accordance with the approved reports, plans and specifications.

☒ 13. A Pennsylvania registered Professional Engineer shall certify that construction of the permitted facilities was completed in accordance with the application and design plans submitted to DEP, using "Post Construction Certification" (3800-PM-WSWM0179a). It is the permittee's responsibility to ensure that a Professional Engineer is on-site to provide the necessary oversight and/or inspections to certify the facilities. The certification must be submitted to DEP before the facility is placed in operation. If requested, "as-built" drawings, photographs (if available) and a description of any DEP-approved deviations from the application and design plans must be submitted to DEP within 30 days of certification.

☒ 14. Manhole inverts shall be formed to facilitate the flow of the sewage and to prevent the stranding of sewage solids. The manhole structure shall be built to prevent undue infiltration, entrance of street wash or grit and provide safe access to facilitate manhole maintenance activities.

☐ 15. The local Waterways Conservation Officer of the Pennsylvania Fish and Boat Commission (PFBC) shall be notified when the construction of any stream crossing and/or outfall is started and completed. A written permit must be secured from the PFBC if the use of explosives in any waterways is required and the permittee shall notify the local Waterways Conservation Officer when explosives are to be used.

Operation and Maintenance

☒ 16. The permittee shall maintain records of "as-built" plans showing all the treatment facilities as actually constructed together with facility operation and maintenance (O&M) manuals and any other relevant information that may be required. Upon request, the "as-built" plans and O&M manuals shall be filed with DEP.

☒ 17. The sewers shall have adequate foundation support as soil conditions require. Trenches shall be back-filled to ensure that sewers will have proper structural stability, with minimum settling and adequate protection against breakage. Concrete used in connection with these sewers shall be protected from damage by water, freezing, drying or other harmful conditions until cured.

☒ 18. Stormwater from roofs, foundation drains, basement drains or other sources shall not be admitted directly to the sanitary sewers.

☒ 19. The approved sewers shall be maintained in good condition, kept free of deposits by flushing or other cleaning methods and repaired when necessary.

☐ 20. The sewerage facilities shall be properly operated and maintained to perform as designed.

☒ 21. The attention of the permittee is called to the highly explosive nature of certain gases generated by the digestion of sewage solids when these gases are mixed in proper proportions with air and to the highly toxic character of certain gases arising from such digestion or from sewage in poorly ventilated compartments or sewers. Therefore, at all places throughout the sewerage facilities where hazard of fire, explosion or danger from toxic gases may occur, the permittee shall post conspicuous permanent and legible warnings. The permittee shall instruct all employees concerning the aforesaid hazards, first aid and emergency methods of meeting such hazards and shall make all necessary equipment and material accessible.

☐ 22. An operator certified in accordance with the Water and Wastewater Systems Operator Certification Act of February 21, 2002, 63 P.S. §§1001, *et seq.* shall operate the sewage treatment plant.

☒ 23. The permittee shall properly control any industrial waste discharged into its sewerage system by regulating the rate and quality of such discharge, requiring necessary pretreatment and excluding industrial waste, if necessary, to protect the integrity or operation of the permittee's sewerage system.

☒ 24. There shall be no physical connection between a public water supply system and a sewer or appurtenance to it which would permit the passage of any sewage or polluted water into the potable water supply. No water pipe shall pass through or come in contact with any part of a sewer manhole.

☐ 25. All connections to the approved sanitary sewers must be in accordance with the corrective action plan as contained in the approved Title 25 Pa. Code Chapter 94 Municipal Wasteload Management Annual Report.

☐ 26. Collected screenings, slurries, sludge and other solids shall be handled and disposed of in compliance with Title 25 Pa. Code Chapters 271, 273, 275, 283 and 285 (related to permits and requirements for land filling, land application, incineration and storage of sewage sludge), Federal Regulations 40 CFR 257 and the Federal Clean Water Act and its amendments.

3800-PM-WSWM0179a 5/2004
Post Construction Certification

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER SUPPLY AND WASTEWATER MANAGEMENT

WATER QUALITY MANAGEMENT
POST CONSTRUCTION CERTIFICATION

PERMITTEE IDENTIFIER	
Permittee	DELCORA
Municipality	Trainer Borough
County	Delaware
WQM Permit No.	2307402
Facility Type	Collection system

All of the above information should be taken directly from the Water Quality Management Permit.

CERTIFICATION

This certification must be completed and returned to the permits section of the DEP's regional office issuing the WQM permit within 30 days of completion of the project and received by DEP prior to operation, and if requested, as-built drawings, photographs (if available) and a discussion of any DEP-approved deviations from the design plans during construction.

being a Registered Professional Engineer in Pennsylvania, do hereby certify to the best of my knowledge and belief, based upon personal observation and interviews, that the above facility approved under the Water Quality Management Permit has been constructed in accordance with the plans, specifications and modifications approved by DEP.

Construction Completion Date (MM/DD/YYYY): _____

Engineer's Seal

Professional Engineer

Name _____
(Please Print or Type)

SIGN HERE

Signature

Date

License Expiration Date

Firm or Agency

Telephone

Permittee or Authorized Representative

Name _____
(Please Print or Type)

SIGN HERE

Signature

Title

Telephone

10/21/08
• Copy the permit book and add to table of contents
• Copy the file where we have the permit application (I think we have one for construction permits) thanks

nnsylvania Department of Environmental Protection

2 East Main Street
Norristown, PA 19401

October 9, 2008

RECEIVED
OCT 20 2008
2008-1328

Phone: 484-250-5970
Fax: 484-250-5971

cc: Permit Binder
Constr. Permit File
Western Dist.
Orig - Central File

ality Control Authority
100 East Fifth Street
Chester, PA 19016-0999

Re: Trainer Borough Sewer System - Price Street Pump Station
Application No. 2307402 - A1
File Type: Permit
Trainer Borough
Delaware County

Dear Mr. Salvucci:

Your permit is enclosed.

You must comply with all Standard and Special Conditions attached to this permit. Construction must be done in accordance with the permit application and all supporting documentation. Please review the permit conditions and the supporting documentation submitted with your application before starting construction.

Enclosed is the "Sewage and Industrial Wastewater Facilities Construction Certification" form. A Pennsylvania-registered Professional Engineer must sign and complete this form prior to startup of the facilities (see Special Conditions). You or your authorized representative must also sign the form. This certification and other post-construction documentation must be submitted to the Department within 30 days following startup of the facilities.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa.C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717-787-3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800-654-5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at 717-787-3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST REACH THE BOARD WITHIN 30 DAYS. YOU DO NOT NEED A LAWYER TO FILE AN APPEAL WITH THE BOARD.

IMPORTANT LEGAL RIGHTS ARE AT STAKE, HOWEVER, SO YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT AFFORD A LAWYER, YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY TO THE BOARD (717-787-3483) FOR MORE INFORMATION.

If you have any questions, please call Mr. Andrew Haneiko at 484-250-5183.

Sincerely,

Jenifer Fields, P.E.
Regional Manager
Water Management

Enclosures

cc: Permits Chief
Mr. Volkay-Hilditch – DELCORA
Mr. Burt – Weston Solutions
Mr. Goldberg, DEP
Operations Section
Mr. Sheckler
Re 30 (joh08wqm)280-6

3800-PM-WSWM0015 Rev. 6/2004
Permit

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER SUPPLY AND WASTEWATER MANAGEMENT

PERMIT NO. 2307402
AMENDMENT NO. 1
APS ID 651764
AUTH ID 734480

WATER QUALITY MANAGEMENT PERMIT

A. PERMITTEE (Name and Address): CLIENT ID#: 42332 **DELCORA** **100 East Fifth Street** **Chester, PA 19016-0999**	B. PRIMARY FACILITY (Name): **DELCORA STP -Trainer Borough Sewer System – Price Street P.S.**
C. LOCATION (Municipality, County): **Trainer Borough** **Delaware County**	SITE ID#: **454804**

D. **This amendment approves the construction of sewerage facilities consisting of:**
Replacement and upgrade of the existing pump station.

Pump Stations: 1 Design Capacity: 600 GPM Average Annual Flow: 0.08 GPD	Manure Storage: Volume _____ MG Freeboard: _____ inches	Industrial Wastewater/Sewage Treatment Facility: Annual Average Flow: _____ MGD Design Hydraulic Capacity: _____ MGD Design Organic Capacity: _____ lb/day

E. APPROVAL GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING:

1. **New Permits:** All construction, operations, and procedures shall be in accordance with the Water Quality Management Permit application dated __, its supporting documentation, and addendums dated ____, which are hereby made a part of this permit.

   Amendments: All construction, operations, and procedures shall be in accordance with the Water Quality Management Permit Amendment application dated 07/08/2008 and its supporting documentation, and addendums dated ____, which are hereby made a part of this amendment.

   Except for any herein approved modifications, all terms, conditions, supporting documentation and addendums approved under Water Quality Management Permit No. 2307402 dated 05/03/2007 shall remain in effect.

   Transfers: Water Quality Management Permit No. ____ dated ____ and conditions, supporting documentation and addendums are also made part of this transfer.

2. **Permit Conditions Relating to sewerage** are attached and made part of this permit.

3. Special Conditions numbered ____ are attached and made part of this permit.

F. THE AUTHORITY GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING FURTHER QUALIFICATIONS:

1. If there is a conflict between the application or its supporting documents and amendments and the attached conditions, the attached conditions shall apply.
2. Failure to comply with the rules and regulations of DEP or with the terms or conditions of this permit shall void the authority given to the permittee by the issuance of this permit.
3. This permit is issued pursuant to the Clean Streams Law Act of June 22, 1937, P.L. 1987, as amended 35 P.S. §691.1 *et seq.* Issuance of this permit shall not relieve the permittee of any responsibility under any other law.

PERMIT ISSUED: October 9, 2008

BY: _____

TITLE: Water Management Program Manager

Re 30 (WP)

Pennsylvania Department of Environmental Protection

2 East Main Street
Norristown, PA 19401

August 5, 2008

Southeast Regional Office

Phone: 484-250-5970
Fax: 484-250-5971

Orig: File Copy
RECEIVED
AUG 7 2008
By 2008-1031

CC: CUH, Karch Dutton

cc: John Kochanska
Application file
Weston Project file
Permit Book-CUH
TC-0808-C-scanned to

Mr. Joseph Salvucci
Executive Director
Delaware County Regional Water Quality Authority
100 East Fifth Street
Chester, PA 19016-0999

Re: DELCORA STP
Application No. 2308402
File Type: Permit
Chester City
Delaware County

Dear Mr. Salvucci:

Your permit is enclosed.

You must comply with all Standard and Special Conditions attached to this permit. Construction must be done in accordance with the permit application and all supporting documentation. Please review the permit conditions and the supporting documentation submitted with your application before starting construction.

Enclosed is the "Sewage and Industrial Wastewater Facilities Construction Certification" form. A Pennsylvania-registered Professional Engineer must sign and complete this form prior to startup of the facilities (see Special Conditions). You or your authorized representative must also sign the form. This certification and other post-construction documentation must be submitted to the Department within 30 days following startup of the facilities.

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IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST REACH THE BOARD WITHIN 30 DAYS. YOU DO NOT NEED A LAWYER TO FILE AN APPEAL WITH THE BOARD.

IMPORTANT LEGAL RIGHTS ARE AT STAKE, HOWEVER, SO YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT AFFORD A LAWYER, YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY TO THE BOARD (717-787-3483) FOR MORE INFORMATION.

If you have any questions, please call Mr. Andrew Haneiko at 484-250-5183.

Sincerely,

Jenifer Fields, P.E.
Regional Manager
Water Management

Enclosures

cc: Permits Chief
Mr. Booz – Weston Solutions
Operations Section
Mr. Sheckler
Re (joh08wqm)203-5

3800-PM-WSWM0015 Rev. 6/2004
Permit

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER SUPPLY AND WASTEWATER MANAGEMENT

PERMIT NO. 2308402
AMENDMENT NO. _____
APS ID 648346
AUTH ID 728667

WATER QUALITY MANAGEMENT PERMIT

A. PERMITTEE (Name and Address): CLIENT ID#: 42332
Delaware County Regional Water Quality Authority
100 East Fifth Street
Chester, PA 19016-0999

B. PRIMARY FACILITY (Name):
DELCORA STP

C. LOCATION (Municipality, County):
Chester City
Delaware County

SITE ID#:
454804

D. **This permit approves the construction of sewerage facilities consisting of:**
Sludge screen, grease screen, and pump modifications to existing facility.

Pump Stations: ____	Manure Storage:	Industrial Wastewater/Sewage Treatment Facility:
Design Capacity: ____ GPM	Volume _____ MG	Annual Average Flow: 50 MGD
Average Annual Flow: ____ GPD	Freeboard: _____ inches	Design Hydraulic Capacity: _____ MGD
		Design Organic Capacity: _____ lb/day

APPROVAL GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING:

1. **New Permits:** All construction, operations, and procedures shall be in accordance with the Water Quality Management Permit application dated 6/02/2008, its supporting documentation, and addendums dated ____, which are hereby made a part of this permit.

   Amendments: All construction, operations, and procedures shall be in accordance with the Water Quality Management Permit Amendment application dated ____ and its supporting documentation, and addendums dated ____, which are hereby made a part of this amendment.

   Except for any herein approved modifications, all terms, conditions, supporting documentation and addendums approved under Water Quality Management Permit No. ____ dated ____ shall remain in effect.

   Transfers: Water Quality Management Permit No. ____ dated ____ and conditions, supporting documentation and addendums are also made part of this transfer.

2. **Permit Conditions Relating to sewerage** are attached and made part of this permit.
3. Special Conditions numbered ____ are attached and made part of this permit.

F. THE AUTHORITY GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING FURTHER QUALIFICATIONS:

1. If there is a conflict between the application or its supporting documents and amendments and the attached conditions, the attached conditions shall apply.
2. Failure to comply with the rules and regulations of DEP or with the terms or conditions of this permit shall void the authority given to the permittee by the issuance of this permit.
3. This permit is issued pursuant to the Clean Streams Law Act of June 22, 1937, P.L. 1987, as amended 35 P.S. §691.1 *et seq.* Issuance of this permit shall not relieve the permittee of any responsibility under any other law.

PERMIT ISSUED:
August 5, 2008

BY: _____

TITLE: Water Management Program Manager

ne 30 (WP)

Permit No. 2308402

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER SUPPLY AND WASTEWATER MANAGEMENT

PERMIT CONDITIONS RELATING TO SEWERAGE

For use in Water Quality Management Permits

(Place a √ in the box that applies)

General

☒ 1. Consistent with the Department of Environmental Protection's (DEP) technical guidance document *Conducting Technical Reviews of Water Quality Management Permit Wastewater Treatment Facilities* (DEP ID: 362-2000-007) available on DEP's website at www.dep.state.pa.us. DEP considers the registered Professional Engineer whose seal is affixed to the design documents to be fully responsible for the adequacy of all aspects of the facility design.

☐ 2. The permittee shall adopt and enforce an ordinance requiring the abandonment of privies, cesspools or similar receptacles for human waste and onlot sewage disposal systems on the premises of occupied structures accessible to public sewers. All such structures must be connected to the public sewers.

☐ 3. The outfall sewer or drain shall be extended to the low water mark of the receiving body of water. Where necessary to ensure proper mixing and waste assimilation, an outfall sewer or drain may be extended with appurtenances below the low water mark and into the bed of a navigable stream provided that the permittee has secured an easement, right-of-way, license or lease from DEP in accordance with Section 15 of the Dam Safety and Encroachments Act, the Act of November 26, 1978, P.L. 1375, as amended.

☒ 4. The approval is specifically made contingent on the permittee acquiring all necessary property rights, by easement or otherwise, providing for the satisfactory construction, operation, maintenance and replacement of all sewers or sewerage structures in, along or across private property with full rights of ingress, egress and regress.

☒ 5. When construction of the approved sewerage facilities is completed and before they are placed in operation, the permittee shall notify DEP in writing so that a DEP representative may inspect the facilities.

☒ 6. If, at any time, the sewerage facilities covered by this permit create a public nuisance, including but not limited to, causing malodors or causing environmental harm to waters of the Commonwealth, DEP may require the permittee to adopt appropriate remedial measures to abate the nuisance or harm.

☐ 7. This permit authorizes the construction and operation of the proposed sewerage facilities until such time as facilities for conveyance and treatment at a more suitable location are installed and capable of receiving and treating the permittee's sewage. Such facilities must be in accordance with the applicable municipal official plan adopted pursuant to Section 5 of the Pennsylvania Sewage Facilities Act, the Act of January 24, 1966, P.L. 1535 as amended. When such municipal sewerage facilities become available, the permittee shall provide for the conveyance of the sewage to these sewerage facilities, abandon the use of these approved facilities and notify DEP accordingly. This permit shall then, upon notice from DEP, terminate and become null and void and shall be relinquished to DEP.

☒ 8. This permit does not relieve the permittee of its obligations to comply with all federal, interstate, state or local laws, ordinances and regulations applicable to the sewerage facilities.

☒ 9. This permit does not give any real or personal property rights or grant any exclusive privileges, nor shall it be construed to grant or confirm any right, easement or interest in, on, to or over any lands which belong to the Commonwealth.

☒ 10. The authority granted by this permit is subject to all effluent requirements, monitoring requirements and other conditions as set forth in NPDES Permit No. **PA0027103** and all subsequent amendments and renewals. No discharge is authorized from these facilities unless approved by an NPDES Permit.

Construction

☐ 11. An Erosion and Sedimentation (E&S) Plan must be developed prior to construction of the permitted facility, pursuant to Title 25 Pa. Code Chapter 102, and implemented during and after the earth disturbance activity.

If the activity involves 5 or more acres of earth disturbance, or from 1 to 5 acres of earth disturbance with a point source discharge to surface waters of the Commonwealth, an NPDES permit for the Discharge of Stormwater Associated with Construction Activity is required.

In addition to the state NPDES permitting requirements, some municipalities, through local ordinances, require the E&S Control Plan to be reviewed and approved by the local County Conservation District office prior to

construction. For specific information regarding E&S control planning approval and NPDES permitting requirements, please contact your local County Conservation District office.

☒ 12. The facilities shall be constructed under the supervision of a Pennsylvania registered Professional Engineer in accordance with the approved reports, plans and specifications.

☒ 13. A Pennsylvania registered Professional Engineer shall certify that construction of the permitted facilities was completed in accordance with the application and design plans submitted to DEP, using "Post Construction Certification" (3800-PM-WSWM0179a). It is the permittee's responsibility to ensure that a Professional Engineer is on-site to provide the necessary oversight and/or inspections to certify the facilities. The certification must be submitted to DEP before the facility is placed in operation. If requested, "as-built" drawings, photographs (if available) and a description of any DEP-approved deviations from the application and design plans must be submitted to DEP within 30 days of certification.

☐ 14. Manhole inverts shall be formed to facilitate the flow of the sewage and to prevent the stranding of sewage solids. The manhole structure shall be built to prevent undue infiltration, entrance of street wash or grit and provide safe access to facilitate manhole maintenance activities.

☐ 15. The local Waterways Conservation Officer of the Pennsylvania Fish and Boat Commission (PFBC) shall be notified when the construction of any stream crossing and/or outfall is started and completed. A written permit must be secured from the PFBC if the use of explosives in any waterways is required and the permittee shall notify the local Waterways Conservation Officer when explosives are to be used.

Operation and Maintenance

☒ 16. The permittee shall maintain records of "as-built" plans showing all the treatment facilities as actually constructed together with facility operation and maintenance (O&M) manuals and any other relevant information that may be required. Upon request, the "as-built" plans and O&M manuals shall be filed with DEP.

☐ 17. The sewers shall have adequate foundation support as soil conditions require. Trenches shall be back-filled to ensure that sewers will have proper structural stability, with minimum settling and adequate protection against breakage. Concrete used in connection with these sewers shall be protected from damage by water, freezing, drying or other harmful conditions until cured.

☒ 18. Stormwater from roofs, foundation drains, basement drains or other sources shall not be admitted directly to the sanitary sewers.

☐ 19. The approved sewers shall be maintained in good condition, kept free of deposits by flushing or other cleaning methods and repaired when necessary.

☒ 20. The sewerage facilities shall be properly operated and maintained to perform as designed.

☒ 21. The attention of the permittee is called to the highly explosive nature of certain gases generated by the digestion of sewage solids when these gases are mixed in proper proportions with air and to the highly toxic character of certain gases arising from such digestion or from sewage in poorly ventilated compartments or sewers. Therefore, at all places throughout the sewerage facilities where hazard of fire, explosion or danger from toxic gases may occur, the permittee shall post conspicuous permanent and legible warnings. The permittee shall instruct all employees concerning the aforesaid hazards, first aid and emergency methods of meeting such hazards and shall make all necessary equipment and material accessible.

☒ 22. An operator certified in accordance with the Water and Wastewater Systems Operator Certification Act of February 21, 2002, 63 P.S. §§1001, *et seq.* shall operate the sewage treatment plant.

☐ 23. The permittee shall properly control any industrial waste discharged into its sewerage system by regulating the rate and quality of such discharge, requiring necessary pretreatment and excluding industrial waste, if necessary, to protect the integrity or operation of the permittee's sewerage system.

☒ 24. There shall be no physical connection between a public water supply system and a sewer or appurtenance to it which would permit the passage of any sewage or polluted water into the potable water supply. No water pipe shall pass through or come in contact with any part of a sewer manhole.

☐ 25. All connections to the approved sanitary sewers must be in accordance with the corrective action plan as contained in the approved Title 25 Pa. Code Chapter 94 Municipal Wasteload Management Annual Report.

☒ 26. Collected screenings, slurries, sludge and other solids shall be handled and disposed of in compliance with Title 25 Pa. Code Chapters 271, 273, 275, 283 and 285 (related to permits and requirements for land filling, land application, incineration and storage of sewage sludge), Federal Regulations 40 CFR 257 and the Federal Clean Water Act and its amendments.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

WATER QUALITY MANAGEMENT
POST CONSTRUCTION CERTIFICATION

PERMITTEE IDENTIFIER	
Permittee	DELCORA
Municipality	Chester City
County	Delaware
WQM Permit No.	2308402
Facility Type	WWTP

All of the above information should be taken directly from the Water Quality Management Permit.

CERTIFICATION

This certification must be completed and returned to the permits section of the DEP's regional office issuing the WQM permit within 30 days of completion of the project and received by DEP prior to operation, and if requested, as-built drawings, photographs (if available) and a discussion of any DEP-approved deviations from the design plans during construction.

I, being a Registered Professional Engineer in Pennsylvania, do hereby certify to the best of my knowledge and belief, based upon personal observation and interviews, that the above facility approved under the Water Quality Management Permit has been constructed in accordance with the plans, specifications and modifications approved by DEP.

Construction Completion Date (MM/DD/YYYY): _____

Engineer's Seal

Professional Engineer
Name _____ (Please Print or Type)
Signature
Date
License Expiration Date
Firm or Agency
Telephone
Permittee or Authorized Representative
Name _____ (Please Print or Type)
Signature
Title
Telephone

Pennsylvania Department of Environmental Protection

2 East Main Street
Norristown, PA 19401

May 6, 2009

Orig: File Copy

cc: JLS, CVH, DiSantis, Hindt, Kochubka

Southeast Regional Office

Phone: 484-250-5970
Fax: 484-250-5971

cc: Ed Bothwell
Chester Sewer Sta file

Mr. Joseph Salvucci
Executive Director
DELCORA
P.O. Box 999
Chester, PA 19016-0999

Re: DELCORA STP – Chester Riverfront
Redevelopment MSL Stadium CSO Relocation
Application No. 2309406
File Type: Permit
City Chester
Delaware County

Dear Mr. Salvucci:

Your permit is enclosed.

You must comply with all Standard and Special Conditions attached to this permit. Construction must be done in accordance with the permit application and all supporting documentation. Please review the permit conditions and the supporting documentation submitted with your application before starting construction.

Enclosed is the "Sewage and Industrial Wastewater Facilities Construction Certification" form. A Pennsylvania-registered Professional Engineer must sign and complete this form prior to startup of the facilities (see Special Conditions). You or your authorized representative must also sign the form. This certification and other post-construction documentation must be submitted to the Department within 30 days following startup of the facilities.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa.C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717-787-3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800-654-5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at 717-787-3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST REACH THE BOARD WITHIN 30 DAYS. YOU DO NOT NEED A LAWYER TO FILE AN APPEAL WITH THE BOARD.

IMPORTANT LEGAL RIGHTS ARE AT STAKE, HOWEVER, SO YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT AFFORD A LAWYER, YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY TO THE BOARD (717-787-3483) FOR MORE INFORMATION.

If you have any questions, please call Mr. Andrew Haneiko at 484-250-5183.

Sincerely,

Jenifer Fields, P.E.
Regional Manager
Water Management

Enclosures

cc: Permits Chief
Operations Section
Delwayne Becker – RK&K Engineers
Mr. Sheckler
Re 30 (AR09WQM)106-5

3800-PM-WSWM0015 Rev. 6/2004
Permit

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER SUPPLY AND WASTEWATER MANAGEMENT

PERMIT NO. 2309406
AMENDMENT NO. _____
APS ID 690245
AUTH ID 787912

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

WATER QUALITY MANAGEMENT PERMIT

A. PERMITTEE (Name and Address): CLIENT ID#: 42332 **DELCORA** **P.O. Box 999** **Chester, PA 19016-0999**	B. PRIMARY FACILITY (Name): **DELCORA STP – Chester Riverfront Redevelopment MSL Stadium CSO Relocation**
C. LOCATION (Municipality, County): **City of Chester** **Delaware County**	SITE ID#: **454804**

D. **This permit approves the construction of sewerage facilities consisting of:**
The relocation of an existing combined sewer overflow.

Pump Stations: ____ Design Capacity: ____ GPM Average Annual Flow: ____ GPD	Manure Storage: Volume _____ MG Freeboard: _____ inches	Industrial Wastewater/Sewage Treatment Facility: Annual Average Flow: _____ MGD Design Hydraulic Capacity: _____ MGD Design Organic Capacity: _____ lb/day

E. APPROVAL GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING:

1. **New Permits:** All construction, operations, and procedures shall be in accordance with the Water Quality Management Permit application dated 03/20/2009, its supporting documentation, and addendums dated ____, which are hereby made a part of this permit.

   Amendments: All construction, operations, and procedures shall be in accordance with the Water Quality Management Permit Amendment application dated ____ and its supporting documentation, and addendums dated ____, which are hereby made a part of this amendment.

   Except for any herein approved modifications, all terms, conditions, supporting documentation and addendums approved under Water Quality Management Permit No. ____ dated ____ shall remain in effect.

   Transfers: Water Quality Management Permit No. ____ dated ____ and conditions, supporting documentation and addendums are also made part of this transfer.

2. **Permit Conditions Relating to sewerage** are attached and made part of this permit.
3. Special Conditions numbered ____ are attached and made part of this permit.

F. THE AUTHORITY GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING FURTHER QUALIFICATIONS:

1. If there is a conflict between the application or its supporting documents and amendments and the attached conditions, the attached conditions shall apply.
2. Failure to comply with the rules and regulations of DEP or with the terms or conditions of this permit shall void the authority given to the permittee by the issuance of this permit.
3. This permit is issued pursuant to the Clean Streams Law Act of June 22, 1937, P.L. 1987, as amended 35 P.S. §691.1 *et seq.* Issuance of this permit shall not relieve the permittee of any responsibility under any other law.

PERMIT ISSUED: May 6, 2009

BY: _____

TITLE: Water Management Program Manager

Re 30 (WP)

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER SUPPLY AND WASTEWATER MANAGEMENT

PERMIT CONDITIONS RELATING TO SEWERAGE

For use in Water Quality Management Permits

(Place a √ in the box that applies)

General

☒ 1. Consistent with the Department of Environmental Protection's (DEP) technical guidance document *Conducting Technical Reviews of Water Quality Management Permit Wastewater Treatment Facilities* (DEP ID: 362-2000-007) available on DEP's website at www.dep.state.pa.us . DEP considers the registered Professional Engineer whose seal is affixed to the design documents to be fully responsible for the adequacy of all aspects of the facility design.

☐ 2. The permittee shall adopt and enforce an ordinance requiring the abandonment of privies, cesspools or similar receptacles for human waste and onlot sewage disposal systems on the premises of occupied structures accessible to public sewers. All such structures must be connected to the public sewers.

☒ 3. The outfall sewer or drain shall be extended to the low water mark of the receiving body of water. Where necessary to ensure proper mixing and waste assimilation, an outfall sewer or drain may be extended with appurtenances below the low water mark and into the bed of a navigable stream provided that the permittee has secured an easement, right-of-way, license or lease from DEP in accordance with Section 15 of the Dam Safety and Encroachments Act, the Act of November 26, 1978, P.L. 1375, as amended.

☒ 4. The approval is specifically made contingent on the permittee acquiring all necessary property rights, by easement or otherwise, providing for the satisfactory construction, operation, maintenance and replacement of all sewers or sewerage structures in, along or across private property with full rights of ingress, egress and regress.

☒ 5. When construction of the approved sewerage facilities is completed and before they are placed in operation, the permittee shall notify DEP in writing so that a DEP representative may inspect the facilities.

☒ 6. If, at any time, the sewerage facilities covered by this permit create a public nuisance, including but not limited to, causing malodors or causing environmental harm to waters of the Commonwealth, DEP may require the permittee to adopt appropriate remedial measures to abate the nuisance or harm.

☐ 7. This permit authorizes the construction and operation of the proposed sewerage facilities until such time as facilities for conveyance and treatment at a more suitable location are installed and capable of receiving and treating the permittee's sewage. Such facilities must be in accordance with the applicable municipal official plan adopted pursuant to Section 5 of the Pennsylvania Sewage Facilities Act, the Act of January 24, 1966, P.L. 1535 as amended. When such municipal sewerage facilities become available, the permittee shall provide for the conveyance of the sewage to these sewerage facilities, abandon the use of these approved facilities and notify DEP accordingly. This permit shall then, upon notice from DEP, terminate and become null and void and shall be relinquished to DEP.

☒ 8. This permit does not relieve the permittee of its obligations to comply with all federal, interstate, state or local laws, ordinances and regulations applicable to the sewerage facilities.

☒ 9. This permit does not give any real or personal property rights or grant any exclusive privileges, nor shall it be construed to grant or confirm any right, easement or interest in, on, to or over any lands which belong to the Commonwealth.

☐ 10. The authority granted by this permit is subject to all effluent requirements, monitoring requirements and other conditions as set forth in NPDES Permit No. **PA (A)** and all subsequent amendments and renewals. No discharge is authorized from these facilities unless approved by an NPDES Permit.

Construction

☒ 11. An Erosion and Sedimentation (E&S) Plan must be developed prior to construction of the permitted facility, pursuant to Title 25 Pa. Code Chapter 102, and implemented during and after the earth disturbance activity.

If the activity involves 5 or more acres of earth disturbance, or from 1 to 5 acres of earth disturbance with a point source discharge to surface waters of the Commonwealth, an NPDES permit for the Discharge of Stormwater Associated with Construction Activity is required.

In addition to the state NPDES permitting requirements, some municipalities, through local ordinances, require the E&S Control Plan to be reviewed and approved by the local County Conservation District office prior to construction. For specific information regarding E&S control planning approval and NPDES permitting requirements, please contact your local County Conservation District office.

☒ 12. The facilities shall be constructed under the supervision of a Pennsylvania registered Professional Engineer in

accordance with the approved reports, plans and specifications.

☒ 13. A Pennsylvania registered Professional Engineer shall certify that construction of the permitted facilities was completed in accordance with the application and design plans submitted to DEP, using "Post Construction Certification" (3800-PM-WSWM0179a). It is the permittee's responsibility to ensure that a Professional Engineer is on-site to provide the necessary oversight and/or inspections to certify the facilities. The certification must be submitted to DEP before the facility is placed in operation. If requested, "as-built" drawings, photographs (if available) and a description of any DEP-approved deviations from the application and design plans must be submitted to DEP within 30 days of certification.

☒ 14. Manhole inverts shall be formed to facilitate the flow of the sewage and to prevent the stranding of sewage solids. The manhole structure shall be built to prevent undue infiltration, entrance of street wash or grit and provide safe access to facilitate manhole maintenance activities.

☐ 15. The local Waterways Conservation Officer of the Pennsylvania Fish and Boat Commission (PFBC) shall be notified when the construction of any stream crossing and/or outfall is started and completed. A written permit must be secured from the PFBC if the use of explosives in any waterways is required and the permittee shall notify the local Waterways Conservation Officer when explosives are to be used.

Operation and Maintenance

☒ 16. The permittee shall maintain records of "as-built" plans showing all the treatment facilities as actually constructed together with facility operation and maintenance (O&M) manuals and any other relevant information that may be required. Upon request, the "as-built" plans and O&M manuals shall be filed with DEP.

☒ 17. The sewers shall have adequate foundation support as soil conditions require. Trenches shall be back-filled to ensure that sewers will have proper structural stability, with minimum settling and adequate protection against breakage. Concrete used in connection with these sewers shall be protected from damage by water, freezing, drying or other harmful conditions until cured.

☒ 18. Stormwater from roofs, foundation drains, basement drains or other sources shall not be admitted directly to the sanitary sewers.

☒ 19. The approved sewers shall be maintained in good condition, kept free of deposits by flushing or other cleaning methods and repaired when necessary.

☒ 20. The sewerage facilities shall be properly operated and maintained to perform as designed.

☒ 21. The attention of the permittee is called to the highly explosive nature of certain gases generated by the digestion of sewage solids when these gases are mixed in proper proportions with air and to the highly toxic character of certain gases arising from such digestion or from sewage in poorly ventilated compartments or sewers. Therefore, at all places throughout the sewerage facilities where hazard of fire, explosion or danger from toxic gases may occur, the permittee shall post conspicuous permanent and legible warnings. The permittee shall instruct all employees concerning the aforesaid hazards, first aid and emergency methods of meeting such hazards and shall make all necessary equipment and material accessible.

☐ 22. An operator certified in accordance with the Water and Wastewater Systems Operator Certification Act of February 21, 2002, 63 P.S. §§1001, *et seq.* shall operate the sewage treatment plant.

☒ 23. The permittee shall properly control any industrial waste discharged into its sewerage system by regulating the rate and quality of such discharge, requiring necessary pretreatment and excluding industrial waste, if necessary, to protect the integrity or operation of the permittee's sewerage system.

☒ 24. There shall be no physical connection between a public water supply system and a sewer or appurtenance to it which would permit the passage of any sewage or polluted water into the potable water supply. No water pipe shall pass through or come in contact with any part of a sewer manhole.

☐ 25. All connections to the approved sanitary sewers must be in accordance with the corrective action plan as contained in the approved Title 25 Pa. Code Chapter 94 Municipal Wasteload Management Annual Report.

26. Collected screenings, slurries, sludge and other solids shall be handled and disposed of in compliance with Title 25 Pa. Code Chapters 271, 273, 275, 283 and 285 (related to permits and requirements for land filling, land application, incineration and storage of sewage sludge), Federal Regulations 40 CFR 257 and the Federal Clean Water Act and its amendments.

Re 30 (WP)

3800-PM-WSFR0020e 9/2005
Post Construction Certification

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

WATER QUALITY MANAGEMENT
POST CONSTRUCTION CERTIFICATION

PERMITTEE IDENTIFIER	
Permittee	DELCORA
Address	P.O. Box 999, Chester, PA 19016-0999
Municipality	City of Chester
County	Delaware

CERTIFICATION

The following information must be completed and returned to the permits section of the DEP regional office issuing the WQM permit within 30 days of completion of the project and received by DEP prior to operation, and if requested as-built drawings, photographs (if available), and a discussion of any DEP approved deviations from the design plans during construction.

I, _____, being a Registered Professional Engineer in Pennsylvania do hereby certify that the _____ approved under Water Quality Management Permit No. 2309406 has been inspected and constructed in accordance with the plans and specifications approved by DEP.

Construction Completion Date (MM/DD/YYYY): _____

Engineer's Seal

Professional Engineer
Name _____ (Please Print or Type)
Signature
Date
Title
Firm or Agency
Telephone
Permittee or Authorized Representative
Name _____ (Please Print or Type)
Signature
Title
Telephone

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Scanned to Server

Orig: B. Willert

RECEIVED
APR 23 2015
BY: 2015-0411

cc: RJW
MJD
Joe DiMatteo

April 20, 2015

CERTIFIED MAIL NO. 7013 2250 0000 7504 1694

Robert J. Willert
Executive Director
DELCORA
PO Box 999
Chester, PA 19016

Re: WQM Permit - Sewage
Sheeder Tract Subdivision
Permit No. 1505419
Authorization ID No. 1050423
Pocopson Township, Chester County

Dear Mr. Willert:

Your Water Quality Management (WQM) permit is enclosed. You must comply with all Standard and Special Conditions attached to this Permit. Please review the permit conditions and the supporting documentation.

Note: Please pay special attention to significant changes to the irrigation conditions that are outlined in the special conditions of the permit.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa. C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717.787.3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800.654.5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at 717.787.3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST REACH THE BOARD WITHIN 30 DAYS. YOU DO NOT NEED A LAWYER TO FILE AN APPEAL WITH THE BOARD.

IMPORTANT LEGAL RIGHTS ARE AT STAKE, HOWEVER, SO YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT AFFORD A LAWYER,

YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY TO THE BOARD (717.787.3483) FOR MORE INFORMATION.

If you have any questions, please contact Karen McDaniel at 484.250.5126 or kmcdaniel@pa.gov.

Sincerely,

Jenifer L. Fields, P.E.
Environmental Program Manager
Clean Water Program

Enclosures

cc: Pocopson Township
Chester County Health Department
Chester County Board of Commissioners
Ms. Hessler, Castle Valley Consultants
Operations-SERO
Ms. Sansoni- SERO
Ms. Lashley- SERO
Re

3800-PM-WSFR0015 1/2011
Permit

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

WATER QUALITY MANAGEMENT PERMIT

PERMIT NO. 1505419
AMENDMENT NO. Renewal
APS ID. 857488
AUTH. ID. 1050423

A. PERMITTEE (Name and Address): CLIENT ID#: **110302** **DELCORA** **PO Box 999** **Chester, PA 19016**	B. PROJECT/FACILITY (Name): **Sheeder Tract Wastewater Treatment Plant**
C. LOCATION (Municipality, County): **Pocopson Township, Chester County**	SITE ID#: **656747**

D. This permit approves the renewal of sewage facilities consisting of: the existing : An influent pump station with a grinder, an aerated treatment lagoon, a storage lagoon, chlorination, and a spray irrigation system discharging effluent to 3- zones on 9.02 acres.

Pump Stations: **Influent** , **Spray Irrigation**	Lagoon Storage:	Sewage Treatment Facility:		
Design Capacity: **125** GPM , **516** GPM	Volume: **6.4** MG	Annual Average Flow:	**.045150**	MGD
	Freeboard: **24** inches	Design Hydraulic Capacity:	**.125**	MGD
		Design Organic Capacity:	**96**	lb/day

E. APPROVAL GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING:

1. **New Permits:** All construction, operations and procedures shall be in accordance with the Water Quality Management Permit application dated _____, its supporting documentation and addendums dated _____, which are hereby made a part of this permit.

   Renewal : All construction, operations and procedures shall be in accordance with the Water Quality Management Permit Amendment application dated **11/10/2014** and its supporting documentation and addendums dated _____, which are hereby made a part of this amendment.

   Except for any herein approved modifications, all terms, conditions, supporting documentation and addendums approved under Water Quality Management Permit No. _____ dated _____ shall remain in effect.

   Transfers: Water Quality Management Permit No. _____ dated _____ and conditions, supporting documentation and addendums are also made part of this transfer.

2. Permit Conditions Relating to Sewerage are attached and made part of this permit.
3. Special Conditions **I - XVI** are attached and made part of this permit.

F. THE AUTHORITY GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING FURTHER QUALIFICATIONS:

1. If there is a conflict between the application or its supporting documents and amendments and the attached conditions, the attached conditions shall apply.
2. Failure to comply with the rules and regulations of DEP or with the terms or conditions of this permit shall void the authority given to the permittee by the issuance of this permit.
3. This permit is issued pursuant to the Clean Streams Law Act of June 22, 1937, P.L. 1987, as amended 35 P.S. §691.1 *et seq.* Issuance of this permit shall not relieve the permittee of any responsibility under any other law.
4. This permit shall expire on _____. The permittee shall submit an application to renew the permit no later than 180 days prior to the permit expiration date.

PERMIT ISSUED:

April 20, 2015

BY: _____

TITLE: **Jenifer L. Fields, P.E.**
Clean Water Program Manager
Southeast Regional Office

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

SPECIAL CONDITIONS

Water Quality Management Permit No. 1505419

Pocopson Township, Chester County

This permit is subject to the following Special Condition(s):

I. Effective disinfection to control disease producing organisms shall be the production of an effluent which will contain a concentration not greater than 200/100 ml of Fecal Coliform organisms, as a geometric average value not greater than 1,000/100 ml of these organisms in more than 10 percent of the samples tested.

II. Copies of monthly Discharge Monitoring Reports must be submitted within 28 days of the end of the monitoring period to:

Department of Environmental Protection
Southeast Regional Office
Water Management
2 East Main Street
Norristown, PA 19401

III. **Discharge Limitations and Monitoring Requirements**

Effluent from the sewage treatment plant shall be sampled from a designated sampling point and shall be limited at all times as follows:

	Discharge Limitations (mg/l)			**Monitoring Requirements**	
Parameter	**Average Monthly**	**Average Weekly**	**Instantaneous Maximum**	**Measurement Frequency**	**Sample Type**
Flow (mgd)	**.045150**			Continuous	Recorded
$CBOD_5$	25		50	1/Month	8 Hour Composite
Total Nitrogen*	Monitor/ Report		Monitor/ Report	1/Month	8 Hour Composite
Suspended Solids	30		60	1/Month	8 Hour Composite
Fecal Coliform	200/100 ml as geometric average			1/Month	Grab
pH	Within limits of 6.0 to 9.0 standard units at all times			1/Month	Grab

* Total Nitrogen = Total Kjeldahl Nitrogen + Nitrite (NO_2) + Nitrate (NO_3)

Additional treatment requirements include the satisfactory disposal of sludge and the reduction of quantities of oils, greases, acids, alkalis, toxic, taste and odor producing substances, inimical to the public interest to levels which will not pollute the receiving waters

IV. Groundwater Monitoring Requirements

The permittee shall effectively monitor the quality of the groundwater. The parameters to be tested, and frequency of analysis and other monitoring requirements shall be as follows:

- Quarterly analysis of groundwater sampled at groundwater monitoring wells MW-1, MW-2, MW-3, MW-4, MW-5R, MW-6, and MW-7 shall consist of: static water level, sampling depth, turbidity, pH, chloride, total phosphorus, ammonia nitrogen, nitrate nitrogen, nitrite nitrogen, total dissolved solids, fecal coliform, and alkalinity.

- Annual analysis of groundwater sampled at all groundwater monitoring wells shall consist of: total solids, settleable solids, total iron, total manganese, sulfate, and sodium.

- Groundwater elevations must be measured prior to purging the groundwater monitoring well.

- Before collection of the groundwater sample, a groundwater monitoring well shall be properly purged and allowed to recover to at least 90 percent of the well volume that was present prior to purging.

- All groundwater samples shall be collected from within the top five feet of the water elevation within the well column.

V. Groundwater Monitoring Data Reporting Requirements

All groundwater data shall be submitted to DEP **annually** and be in **report form.** The report shall be due to DEP within 28 days of the end of your annual permit cycle. For example, if your permit was issued on March 4, 2008, then your annual report is due by April 28, 2009. The annual report shall be mailed under separate cover and addressed to:

Department of Environmental Protection
Southeast Regional Office
Clean Water Program
2 East Main Street
Norristown, PA 19401

Attention: Hydrogeologist
Planning Section

The annual groundwater monitoring report shall include the following information:

1. General Information

   A. Facility name
   B. Facility permit number
   C. Facility location (including municipality and county)
   D. Facility contact information:

   - permittee name, address, and telephone number
   - contact name and title
   - facility operator name, address, and telephone number
   - facility consultant name, address, and telephone number

2. Site Information

   A. Brief narrative, including site limitations.

   B. Soil type and bedrock lithology beneath the absorption areas.

   C. Site drawings showing general location of absorption fields and monitoring wells. Drawings must show site topography.

3. Construction details of each groundwater monitoring well shall include:

   A. Well depth.
   B. Casing depth.
   C. Static water levels.
   D. Surface elevation.
   E. Well log.
   F. Water bearing zones.
   G. Top of casing elevation.
   H. Ground surface elevation.

4. Site History

   A. Date site 537 approval issued.

   B. Date site permit issued.

   C. Date groundwater monitoring began.

   D. Date treatment plant started operation.

   E. Date land application of treated wastewater started.

F. Date of any additional permit actions and description of actions (e.g., waiver of special conditions or anything else which may impact the groundwater monitoring program contained within this permit). Include copy of any correspondence in correspondence section.

G. Date and description of any enforcement action.

H. Date and description of any facility event which impacted any part of the groundwater monitoring program whether or not it resulted in an enforcement action (e.g., collapse of groundwater monitoring well, etc.).

5. Site Data

A. Average effluent flow for the year covered by the report.

B. In tabular form, the following information needs to be provided for at least the last 5 years of system operation:

i. Date of sampling.
ii. Groundwater elevation.
iii. Sampling depth.
iv. Identification of upgradient and downgradient wells.
v. The results of the analysis of the samples.

C. Background groundwater data generated prior to system start-up.

6. Comprehensive Groundwater Evaluation (CGE)

As part of the facility's 5-year permit renewal application, the permittee shall submit a report that is a result of a comprehensive evaluation of the systems impact on groundwater. A Registered P.G. must identify any trends which may pose a threat to human health or certify that none are present. Should adverse impacts to groundwater be identified, the permittee needs to recommend actions to address the potential threat.

VI. Sprayfield Weekly Maximum Hydraulic Loadings

A. Effluent flows to each sprayfield must be consistent with the maximum hydraulic loading requirements of the following table, which provides the weekly maximum irrigation gallons for each zone.

B. The permittee shall include with the monthly Discharge Monitoring Report a Supplemental Land Application System Form 3800-FM-BPNPSM0449 that indicates the gallons per day discharged to each of the zones.

C. At no time shall the application rate exceed 0.25 inch per hour.

MAXIMUM WEEKLY HYDRAULIC LOADINGS IN GALLONS PER ZONE

Month	Zone 1 3.78 ac Grass Field (gal/wk)	Zone 2 3.29 ac Wooded (gal/wk)	Zone 3 1.98 ac Grass Field (gal/wk)
Jan	51,318	44,666	26,881
Feb	51,318	44,666	26,881
Mar	153,954	133,997	80,643
Apr	153,954	133,997	80,643
May	205,272	178,663	107,524
Jun	256,590	223,328	134,404
Jul	256,590	223,328	134,404
Aug	256,590	133,997	134,404
Sep	256,590	111,664	134,404
Oct	112,900	98,265	59,138
Nov	102,636	58,065	53,762
Dec	51,318	44,666	26,881

VII. Sprayfield Operation

A. Application of the effluent shall be managed to prevent runoff from the permitted spray fields and ponding of effluent.

B. No irrigation is to occur on frozen soils.

C. No irrigation is to occur if more than 0.5 inches of rainfall has fallen during the previous 24 hours.

D. The operator is to assess soil moisture content and soil/vegetation conditions frequently. It is the operator's responsibility to inspect the fields on a routine basis to prevent and/or address damage to the irrigation fields.

E. The spray fields shall be maintained to ensure that vegetation does not interfere with or impair proper operation of the spray heads.

F. All spray fields must be managed to maintain a perennial grass or forested cover. Several times each growing season, grass fields must be harvested by cutting, with clippings removed off the spray fields. Forested fields should be maintained to remove dead and fallen wood during periods that would minimize soil compaction by equipment.

G. Sprayfield vegetation and soils must be managed in accordance with an approved annual Crop Management Plan (CMP). Upon notification by the Department, the permittee shall prepare and submit an updated CMP for review and approval.

XIII. Storage Lagoon Management

At all times, the wastewater levels in the lagoon shall be managed within the low and high water level parameters as designed. The water level shall be controlled so that a freeboard of at least 24 inches is maintained at all times. The Department must be notified if the water level is anticipated to enter freeboard.

IX. If there is a change in ownership of this facility or in permittee name, an application for transfer of permit must be submitted to the Department.

X. The authorization to discharge contained in this permit shall expire in five years from the date of issuance, or reissuance. Application for renewal of this permit, or notification of intent to cease discharging by the expiration date, must be submitted to the Department at least 180 days prior to the above expiration date (unless permission has been granted by the Department for submission at a later date). In the event that a timely and complete application for renewal has been submitted and the Department is unable, through no fault of the permittee, to reissue the permit before the above expiration date, the terms and conditions of this permit will be automatically continued and will remain fully effective and enforceable pending the grant or denial of the application for permit renewal. The application for renewal shall be submitted on the appropriate Water Quality Management Part II Application forms and shall include a tabulated summary of all groundwater monitoring data for the previous five years, including a discussion of groundwater quality trends resulting from this discharge.

XI. Unless, otherwise, specified in this permit, the test procedures for analysis of pollutants shall be those contained in 40 C.F.R. Part 136, or alternative test procedures approved pursuant to that Part. For the analysis of CBOD5, consult Section 507 of Standard Methods.

XII. If the permittee monitors any pollutant more frequently than the permit requires, the results of this monitoring shall be incorporated, as appropriate, into the calculations used to report self-monitoring data on the DMR.

XIII. Recording of Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

1. The exact place, date, and time of sampling or measurement.
2. The person(s) who performed the sampling or measurement.
3. The dates the analyses were performed.
4. The person(s) who performed the analyses.
5. The analytical techniques or methods used.
6. The results of such analyses.

XIV. Recordkeeping and Retention

The permittee shall keep records of operation and efficiency of the wastewater treatment facilities. All records of monitoring activities and results (including all original strip chart recordings for continuous monitoring instrumentation and calibration and maintenance records), copies of all reports required by this permit, and records of all data used to complete the application for this permit shall be retained by the permittee for three (3) years. The three-year period shall be extended as requested by the Department.

XV. Laboratory Certification

The Environmental Laboratory Accreditation Act of 2002 requires that all environmental laboratories register with the Department of Environmental Protection. An environmental laboratory is any facility engaged in the testing or analysis of environmental samples required by a statute administered by the Department relating to the protection of the environment or of public health, safety, and welfare.

VXI. The facility shall be operated under the charge of a responsible operator(s) certified under the Pennsylvania Water and Wastewater Systems Operations Certification Act (Act 11). The operator(s) shall comply with the continuing education requirements required under the regulations and guidelines related to Act 11.

3800-PM-BPNPSM0462 3/2012

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

PRIMARY FACILITY NAME/ADDRESS

NAME Sheeder Tract Subdivision STP

CLIENT Pocopson Township Chester County

ADDRESS PO Box 999
Chester, PA 19016

LOCATION Pocopson Township
Chester County

WATERSHED 3-H

1505419	Sprayfield Zones 1,2 and 3
PERMIT NUMBER	OUTFALL NUMBER

MONITORING PERIOD						
YEAR	MO	DAY	TO	YEAR	MO	DAY

Reporting Frequency:
DMR Effective From:
DMR Effective To:
Permit Expires: April 30 2020
Permit Application Due: November 1, 2019
___ Check Here if No Discharge
NOTE: Read Instructions before completing this form

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		Average	Maximum	UNITS	Average Monthly	Average Weekly	Inst. Maximum	UNITS			
FLOW	SAMPLE MEASUREMENT				XXXX	XXXX	XXXX				
	PERMIT REQUIREMENT	.045150	MONITOR/ REPORT	MGD	XXXX	XXXX	XXXX	XXXX		CONTINOUS	METER
CBOD5	SAMPLE MEASUREMENT	XXXX	XXXX			XXXX					
	PERMIT REQUIREMENT	XXXX	XXXX	XXXX	25	XXXX	50	MG/L		1/MONTH	8HR COMPOSITE
TSS	SAMPLE MEASUREMENT	XXXX	XXXX			XXXX					
	PERMIT REQUIREMENT	XXXX	XXXX	XXXX	30	XXXX	60	MG/L		1/MONTH	8HR COMPOSITE
TOTAL NITROGEN	SAMPLE MEASUREMENT	XXXX	XXXX			XXXX					
	PERMIT REQUIREMENT	XXXX	XXXX	XXXX	MONITOR/ REPORT	XXXX	MONITOR/ REPORT	MG/L		1/MONTH	8HR Composite
FECAL COLIFORM	SAMPLE MEASUREMENT	XXXX	XXXX			XXXX	XXXX				
	PERMIT REQUIREMENT	XXXX	XXXX	XXXX	200/100ML GEOMETRIC MEAN	XXXX	XXXX	#/100ml		1/MONTH	GRAB
pH	SAMPLE MEASUREMENT	XXXX	XXXX			XXXX					
	PERMIT REQUIREMENT	XXXX	XXXX	XXXX	6.0 MINIMUM	XXXX	9.0 MINIMUM	SU		1/MONTH	GRAB

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. See 18 Pa. C.S. § 4904 (relating to unsworn falsification).		TELEPHONE		DATE		
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	MO	DAY

COMMENTS *(Report all violations on the "Non-Compliance Reporting Form")*

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

INSTRUCTIONS FOR COMPLETING DISCHARGE MONITORING REPORTS (DMRs)

General

One or more Discharge Monitoring Reports (DMRs) are attached to your permit for reporting the results of self-monitoring activities as required by your permit. You should make copies of the DMRs for your ongoing use, unless you elect to participate in the Department of Environmental Protection's (DEP's) electronic DMR (eDMR) program (see www.dep.state.pa.us/edmr).

- Reporting frequencies will vary depending on the monitoring frequencies listed in your permit, and are generally monthly, quarterly semi-annually and annually.
- Your reports must be received by DEP on the 28th day of the month following the end of the reporting period, unless otherwise specified in Part C of your permit.
- Your permit may require submission of DMRs to other agencies, including the U.S. Environmental Protection Agency (EPA).
- If you receive DMRs in the mail from EPA, please discontinue use of DMR Form No. 3800-FM-BPNPSM0462 and begin using EPA's DMRs.
- DMRs will generally include pre-populated information for permittee name and address, facility location, permit number, outfall number, permit expiration date, parameter names, and permit requirements. If you identify any errors on a DMR issued by DEP, please contact the DEP regional office that issued your permit. If you identify any errors on a DMR issued by EPA, please contact DEP's Central Office at 717-787-6744. **DO NOT make changes to DMRs issued to you.**
- You may use computer-generated replicas of Form No. 3800-FM-BPNPSM0462 or of EPA's DMR if you receive prior approval from DEP and EPA. **DEP reserves the right to instruct you to discontinue the submission of computer-generated DMRs if the permit requirements you entered on the form are inaccurate.**

Instructions

1. Enter statistical results into each blank field below the "VALUE" column headers. Results must be reported in the same units shown on the DMR.
2. Sum the total number of excursions or exceedances of permit limits across the row for each parameter and enter the value into the "NO. EX" field. For example, if the permit contains limits of 6.0 S.U. (Minimum) and 9.0 S.U. (Maximum) for pH, and the Minimum and Maximum results are 5.9 S.U. and 9.1 S.U., respectively, enter "2" into the "NO. EX" field.
3. Report the actual sampling frequency and sample type utilized during the reporting period in the fields corresponding to "Frequency of Analysis" and "Sample Type", respectively.
4. Type the name of the principal executive officer (or an authorized agent designated by a principal executive officer) who is taking responsibility for the report, sign the report (should be in ink), enter the telephone number of the responsible individual, and record the date that the report was signed. Mail only original, signed copies of DMRs.
5. In the Comments section at the bottom of the DMR, you may write a brief summary of violations in this section; however, DEP requests that all violations during the monitoring period be reported in more detail on DEP's **Non-Compliance Reporting Form** (3800-FM-BPNPSM0440) and be submitted as an attachment to the DMR. Other uses of the Comments Section include explanations of attachments to the DMR, explanations for the unavailability of data, and brief summaries of issues that have affected operations or effluent quality during the monitoring period. Always consider attaching a letter or separate document to explain your situation in more detail.

No Discharge or No Data Available

If there was no discharge at all from an outfall during the monitoring period, check the "No Discharge" box on the top of the DMR. Complete the information above and below the table and mail the DMR to the appropriate agencies. Be sure to sign and date the DMR.

If there was no discharge of a specific parameter (e.g., if a chlorine limit is in the permit but chlorine was not used for disinfection during the entire reporting period), or if data are not available for a specific parameter for the entire reporting period, do not leave the DMR blank. Instead, report one of the following No Data Indicator (NODI) codes that apply to your situation in the appropriate value field, and **provide an explanation as an attachment to the DMR**:

A Use if you are exempted from monitoring the parameter because of a General Permit condition.

E Use if all samples or results are not available for the reporting period due to equipment failure or because sample collection was overlooked or samples could not be collected for the parameter.

GG Use if your permit requires sample collection and analysis only under certain conditions and those conditions were not met during the reporting period (e.g., report chlorine results only when chlorination system is used).

FF Other: use if there is any reason for the absence of data that is not covered by those above.

If you have at least one result for a parameter, the value should be reported and not a NODI code.

Calculations

The following explains how to calculate statistical values that are commonly required by permits:

Monthly Average – For Loading (lbs/day), sum the total of daily loadings and divide by the number of samples during the month. To calculate the daily loading, multiply the daily concentration (mg/l) by the flow (MGD) on the date of sampling and a conversion factor of 8.34. For Concentration, sum the total of daily concentrations and divide by the number of samples.

Weekly Average – For Loading (lbs/day), sum the total of average daily loadings during each week of the reporting period (beginning on a Sunday and ending on a Saturday) and divide by the number of samples during the week. For Concentration, sum the total of daily concentrations each week and divide by the number of samples. Report the maximum weekly average on the DMR.

Maximum Daily ("Daily Max") – Report the maximum concentration or load measured during a 24-hour period during the reporting period; if multiple measurements are taken daily, include all data in the analysis.

Instantaneous Maximum ("IMAX") – Report the maximum result obtained by a grab sample for a specific pollutant over the entire reporting period covered by a DMR.

Instantaneous Minimum ("Minimum") – Report the minimum result obtained by a grab sample for a specific pollutant over the entire reporting period covered by a DMR.

Total Monthly Load (lbs) – Sum the total of average daily loadings, divide by the number of samples during the month, and multiply by the number of days in the month.

Geometric Mean – Report the average of a set of *n* sample results given by the *n*th root of their product. If any result is zero (0), substitute 1 for the calculation. For example, five samples were analyzed with the following results: 20, 300, 400, 500, and 0. The calculation of geometric mean is as follows (note that you will need to use the power function on a calculator):

$$\sqrt[5]{20 \cdot 300 \cdot 400 \cdot 500 \cdot 1} = \sqrt[5]{1{,}200{,}000{,}000} = (1{,}200{,}000{,}000)^{1/5} = \mathbf{65}$$

Non-Detect Data

Conventional and Toxic Parameters

For calculating average values of data sets in which there are some "detections" (results at or above the laboratory reporting limit) and some "non-detect" data (results reported below the laboratory reporting limit), use the reporting limit for non-detect data. In other words, ignore the less than (<) symbol for statistical calculations and include the < symbol with the statistical result if there is at least one non-detect result in the data set. For example, four samples were analyzed with the following results: < 1.0, 2.0, < 1.0, and 1.0. The average statistical result is < 1.3.

Where the permit includes an effluent limitation for a parameter that is less than the most sensitive detection limit available, and the laboratory reports a value at or below the lowest level specified by the permit, you may use zero (0) in the calculation in lieu of the reporting limit, if the parameter is identified in 25 Pa. Code Chapter 16, Appendix A, Tables 2A and 2B. In general, parameters with limitations that are less than the most sensitive detection limit will be identified in Part C of the permit, if applicable.

Bacteria Parameters

Report all "non-detect" (e.g., < 2) and "too numerous to count" (TNTC) (e.g., > 2,000) results on DMR supplemental forms as reported by the laboratory. Do not report "TNTC" on supplemental forms, but instead report a value qualified with the">" symbol. Where a data set includes one or more "non-detect" and/or TNTC results, calculate the geometric mean by ignoring qualifying symbols, but report the value with the symbol. If a data set includes both ">" and "<" qualifiers, the ">" qualifier takes precedence for reporting. For all "non-detect" values, specify in the Comments section of the DMR the maximum volume filtered at the laboratory.

Example 1 – For results are determined, < 2, 10, 20, and 30. The geometric mean should be reported as $< (2 \bullet 10 \bullet 20 \bullet 30)^{0.25} = < 10$. Specify the maximum volume filtered for the < 2 result in the DMR Comments.

Example 2 – Three results are determined, < 2, 1,000, and > 2,000. The geometric mean should be reported as $> (2 \bullet 1{,}000 \bullet 2{,}000^{0.333} = > 158$.

Rounding and Precision

Statistical values reported on the DMR should be rounded to the same number of decimal places as the limit for the parameter as set forth in the permit. If the permit does not contain a limit but requests monitoring only, statistical values for concentration results should be rounded to the maximum number of decimal places in the data set as reported by the laboratory or the instrument used for analysis. If mass loads must be reported and there is no limit, round statistical values to the nearest whole number, unless the calculated number is less than one, in which case the value should be rounded to one significant figure (e.g., 0.1, 0.05, etc.). If the number you are rounding is followed by 5, 6, 7, 8, or 9, round the number up, otherwise round down.

The documents "Discharge Monitoring Reports Overview and Summary" (3800-BK-DEP3047) and "Management of Non-Detect Results for Discharge Monitoring Reports" (3800-FS-DEP4262) contain more information and are incorporated by reference. These documents are available on DEP's website.

Permit No. 1505419

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

PERMIT CONDITIONS RELATING TO SEWERAGE

For use in Water Quality Management Permits

(Check boxes that apply)

General

☐ 1. The Department of Environmental Protection (DEP) considers the licensed Professional Engineer whose seal is affixed to the design documents to be fully responsible for the adequacy of all aspects of the facility design.

☒ 2. The permittee shall adopt and enforce an ordinance requiring the abandonment of privies, cesspools or similar receptacles for human waste and onlot sewage disposal systems on the premises of occupied structures accessible to public sewers. All such structures must be connected to the public sewers.

☐ 3. The outfall sewer or drain shall be extended to the low water mark of the receiving body of water. Where necessary to ensure proper mixing and waste assimilation, an outfall sewer or drain may be extended with appurtenances below the low water mark and into the bed of a navigable stream provided that the permittee has secured an easement, right-of-way, license or lease from DEP in accordance with Section 15 of the Dam Safety and Encroachments Act, the Act of November 26, 1978, P.L. 1375, as amended.

☒ 4. The approval is specifically made contingent on the permittee acquiring all necessary property rights, by easement or otherwise, providing for the satisfactory construction, operation, maintenance and replacement of all sewers or sewerage structures in, along or across private property with full rights of ingress, egress and regress.

☐ 5. When construction of the approved sewerage facilities is completed and before they are placed in operation, the permittee shall notify DEP in writing so that a DEP representative may inspect the facilities.

☐ 6. The approval of the plans, and the authority granted in this permit, if not specifically extended, shall cease and be null and void 2 years from the issuance date of this permit unless construction or modification of the facilities covered by this permit has begun on or before the second anniversary of the permit date.

☒ 7. If, at any time, the sewerage facilities covered by this permit create a public nuisance, including but not limited to, causing malodors or causing environmental harm to waters of the Commonwealth, DEP may require the permittee to adopt appropriate remedial measures to abate the nuisance or harm.

☒ 8. If, after the issuance of this permit, DEP approves a municipal sewage facilities official plan or an amendment to an official plan under Act 537 (Pennsylvania Sewage Facilities Act, the Act of January 24, 1966, P.L. 1535 as amended) in which sewage from the herein approved facilities will be treated and disposed of at other planned facilities, the permittee shall, upon notification from the municipality or DEP, provide for the conveyance of its sewage to the planned facilities, abandon use and decommission the herein approved facilities including the proper disposal of solids, and notify DEP accordingly. The permittee shall adhere to schedules in the approved official plan, amendments to the plan, or other agreements between the permittee and municipality. This permit shall then, upon notice from DEP, terminate and become null and void and shall be relinquished to DEP.

☒ 9. This permit does not relieve the permittee of its obligations to comply with all federal, interstate, state or local laws, ordinances and regulations applicable to the sewerage facilities.

☒ 10. This permit does not give any real or personal property rights or grant any exclusive privileges, nor shall it be construed to grant or confirm any right, easement or interest in, on, to or over any lands which belong to the Commonwealth.

☐ 11. The authority granted by this permit is subject to all effluent requirements, monitoring requirements and other conditions as set forth in NPDES Permit No. and all subsequent amendments and renewals. No discharge is authorized from these facilities unless approved by an NPDES Permit.

Construction

☒ 12. This permit is issued under the authorization of The Clean Streams Law and 25 Pa. Code Chapter 91. The permittee shall obtain all necessary permits, approvals and/or registrations under 25 Pa. Code Chapters 102, 105 and 106 prior to commencing construction of the facilities authorized by this permit, as applicable. The permittee should contact the DEP office that issued this permit if there are any questions concerning the applicability of additional permits.

☐ 13. The facilities shall be constructed under the supervision of a Pennsylvania licensed Professional Engineer in accordance with the approved reports, plans and specifications.

☐ 14. A Pennsylvania licensed Professional Engineer shall certify that construction of the permitted facilities was completed in accordance with the application and design plans submitted to DEP, using "Post Construction Certification" form (3800-PM-WSFR0179a). It is the permittee's responsibility to ensure that a Professional Engineer is on-site to provide the necessary oversight and/or inspections to certify the facilities. The certification must be submitted to DEP before the facility is placed in operation. As-built drawings, photographs (if available) and a description of all deviations from the application and design plans must be submitted to DEP within 30 days of certification.

☒ 15. Manhole inverts shall be formed to facilitate the flow of the sewage and to prevent the stranding of sewage solids. The manhole structure shall be built to prevent undue infiltration, entrance of street wash or grit and provide safe access to facilitate manhole maintenance activities.

☒ 16. The local Waterways Conservation Officer of the Pennsylvania Fish and Boat Commission (PFBC) shall be notified when the construction of any stream crossing and/or outfall is started and completed. A written permit must be secured from the PFBC if the use of explosives in any waterways is required and the permittee shall notify the local Waterways Conservation Officer when explosives are to be used.

Operation and Maintenance

☒ 17. The permittee shall maintain records of "as-built" plans showing all the treatment facilities as actually constructed together with facility operation and maintenance (O&M) manuals and any other relevant information that may be required. Upon request, the "as-built" plans and O&M manuals shall be filed with DEP.

☒ 18. The sewers shall have adequate foundation support as soil conditions require. Trenches shall be back-filled to ensure that sewers will have proper structural stability, with minimum settling and adequate protection against breakage. Concrete used in connection with these sewers shall be protected from damage by water, freezing, drying or other harmful conditions until cured.

☒ 19. Stormwater from roofs, foundation drains, basement drains or other sources shall not be admitted directly to the sanitary sewers.

☒ 20. The approved sewers shall be maintained in good condition, kept free of deposits by flushing or other cleaning methods and repaired when necessary.

☒ 21. The sewerage facilities shall be properly operated and maintained to perform as designed.

☒ 22. The attention of the permittee is called to the highly explosive nature of certain gases generated by the digestion of sewage solids when these gases are mixed in proper proportions with air and to the highly toxic character of certain gases arising from such digestion or from sewage in poorly ventilated compartments or sewers. Therefore, at all places throughout the sewerage facilities where hazard of fire, explosion or danger from toxic gases may occur, the permittee shall post conspicuous permanent and legible warnings. The permittee shall instruct all employees concerning the aforesaid hazards, first aid and emergency methods of meeting such hazards and shall make all necessary equipment and material accessible.

☒ 23. An operator certified in accordance with the Water and Wastewater Systems Operator Certification Act of February 21, 2002, 63 P.S. §§1001, *et seq.* shall operate the sewage treatment plant.

☒ 24. The permittee shall properly control any industrial waste discharged into its sewerage system by regulating the rate and quality of such discharge, requiring necessary pretreatment and excluding industrial waste, if necessary, to protect the integrity or operation of the permittee's sewerage system.

☒ 25. There shall be no physical connection between a public water supply system and a sewer or appurtenance to it which would permit the passage of any sewage or polluted water into the potable water supply. No water pipe shall pass through or come in contact with any part of a sewer manhole.

☒ 26. All connections to the approved sanitary sewers must be in accordance with the official Act 537 Plan and, if applicable, a corrective action plan as contained in the approved Title 25 Pa. Code Chapter 94 Municipal Wasteload Management Annual Report.

☒ 27. Collected screenings, slurries, sludge and other solids shall be handled and disposed of in compliance with Title 25 Pa. Code Chapters 271, 273, 275, 283 and 285 (related to permits and requirements for land filling, land application, incineration and storage of sewage sludge), Federal Regulations 40 CFR 257 and the Federal Clean Water Act and its amendments.

3800-FM-BPNPSM0189 3/2012

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

SUPPLEMENTAL LABORATORY ACCREDITATION FORM[1]

Permittee Name: DELCORA

Address: PO Box 999
Chester, PA 19016

PERMIT NUMBER	MONITORING PERIOD Year/Month/Day						
1505419				TO			

PARAMETER	ANALYSIS METHOD	LAB NAME	LAB ID NUMBER[2]

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibly of fine and imprisonment for knowing violations.

Name/Title Principal Executive Officer **Phone:** _____ **Signature of Principal Executive Officer or Authorized Agent**

_____ **Date:** _____ _____

[1] Submit this form with the first Discharge Monitoring Report (DMR) or Annual Report, where sample results are submitted to the Department for compliance purposes. You do not need to send this form to the Department again UNLESS there has been a change to the lab(s), parameter(s) or method(s) of analysis.

[2] For parameter(s) covered under accreditation-by-rule, submit the lab's registration number in lieu of an accreditation number.

3800-FM-BPNPSM0449 3/2012

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DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

SUPPLEMENTAL REPORT
LAND APPLICATION SYSTEMS

Facility Name: Sheeder Tract Subdivision
Municipality: Pocopson Township County: Chester
Watershed: 3-H

Month: _____ Year: _____
Permit No.: 1505419 Outfall No.: _____
This permit will expire on

	Zone: 1 Acres: 3.78	Zone: 2 Acres: 3.29	Zone: 3 Acres: 1.98	Zone: Acres:	Zone: Acres:	Precipitation		Average Temp	Ground Conditions
Day	Gallons	Gallons	Gallons	Gallons	Gallons	Inches	Type	°F	(Wet, Dry, Frozen)
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
Totals:									

I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. See 18 Pa. C.S. § 4904 (relating to unsworn falsification).

Prepared By: _____ Signature: _____

Title: _____ Date: _____

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

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INSTRUCTIONS FOR COMPLETING LAND APPLICATION SYSTEMS SUPPLEMENTAL REPORT

Use this form to document wastewater management activities for facilities with land application programs (e.g., surface or subsurface irrigation, drip irrigation, etc.) approved under a Water Quality Management (WQM) permit.

1. Enter Facility Name, Municipality, County, Watershed No., Month, Year, Permit No., Outfall No. (if applicable) and Permit Expiration Date (if applicable).

2. Next to each "Zone" heading (this may also be considered "land application site"), enter a unique identifier. For example, "1," "2," etc. or "Site 1," Site 2," etc. If the name of the zone or site is too long for the space provided, please use an abbreviation. Up to five zones can be accommodated on one report. If you have more than five zones, please use more sheets. Next to each "Acres" heading, enter the number of acres that receive effluent (e.g., "wettable acres").

3. Enter the daily volume (gallons) applied onto each zone.

4. Enter the average daily temperature at the land application site. An on-site temperature monitoring system is recommended, but other approaches may be acceptable, such as use of local airport data.

5. Enter the daily ground surface conditions (site-wide). Recommended entries include "dry," "wet," and "frozen," but others may be used.

6. Type the name of the person who prepared the form, the person's job title, and sign and date the form after reading the certification statement.

3800-FM-BPNPSM0439 Rev. 3/2014

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

SUPPLEMENTAL REPORT – CHEMICAL ADDITIVES USAGE

Facility Name: Sheeder Tract Subdivision
Municipality: Pocopson Township County: Chester
Watershed: 3-H

Month: _____ Year: _____
NPDES Permit No.: 1505419 Outfall No.: _____
Renewal application due **180 days** prior to expiration
This permit will expire on _____

Day	Chemical Names															
	gallons	lbs	gallons	lbs	gallons	lbs	gallons	lbs	gallons	lbs	gallons	lbs	gallons	lbs	gallons	lbs
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
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21																
22																
23																
24																
25																
26																
27																
28																
29																
30																
31																
Average																
Maximum																

I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. See 18 Pa. C.S. § 4904 (relating to unsworn falsification).

Prepared By: _____ Signature: _____

Title: _____ Date: _____

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

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INSTRUCTIONS FOR COMPLETING CHEMICAL ADDITIVES USAGE SUPPLEMENTAL REPORT

1. Enter Facility Name, Municipality, County, Watershed No., Month, Year, NPDES Permit No., Outfall No. and Permit Expiration Date. A separate sheet is required for each outfall that receives chemical additives.

2. In the spaces below the Chemical Names header in the table, enter the chemical additives used at the facility. If more than eight additives are used per Outfall, add more sheets.

3. Enter the daily usage rates for each chemical. Enter additives introduced in liquid form in the "gallons" column and additives in solid form (or if you have calculated the mass equivalent of liquid additives) under the "lbs" column.

4. Calculate and report the average and maximum usage rates for each chemical at the bottom of the table.

5. Type the name of the person who prepared the form, the person's job title, and sign and date the form after reading the certification statement.

3800-FM-BPNPSM0440 3/2012

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DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

NON-COMPLIANCE REPORTING FORM

Use this supplemental form to report all permit violations and any other non-compliance that may endanger health or the environment, in accordance with your permit. Complete all sections that apply. If you are reporting violations of permit limits, monitoring requirements or schedules that do not pose an immediate threat to health or the environment, you may attach this form to the Discharge Monitoring Report (DMR). **Title 25, Pa. Code §§ 91.33 and 91.34 (regarding incidents causing or threatening pollution and activities utilizing pollutants, respectively), in part requires immediate notification by telephone to the Department of pollution incidents, remediation, and may require an additional report on the incident or plan of pollution prevention measures.** If you are reporting other non-compliance events, and the reporting deadline does not coincide with your submission of the DMR, it should be submitted separately to the Department by the reporting deadline set forth in the permit. See instructions for more information.

Facility Name: Sheeder Tract Subdivision Month: _____ Year: _____

Municipality: Pocopson Township County: Chester Permit No.: 1505419

☐ **Violations of Permit Effluent Limitations***

Date	Parameter	Permit Limit	Units	Statistical Code	Result	Units	Cause of Violation	Corrective Action Taken

☐ **Sanitary Sewer Overflows and Other Unauthorized Discharges***

Event Date	Substance Discharged	Location	Volume (gals)	Duration (hrs)	Receiving Waters	Impact on Waters	Cause of Discharge	Date DEP Notified

☐ **Other Permit Violations***

☐ Sample collection less frequent than required Explain _____

☐ Sample type not in compliance with permit Explain _____

☐ Violation of permit schedule Explain _____

☐ Other Explain _____

☐ Other Explain _____

*** If the space provided is not sufficient to record all information, please attach additional sheets.**

I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. See 18 Pa. C.S. § 4904 (relating to unsworn falsification).

Prepared By: _____ Signature: _____

Title: _____ Date: _____

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

INSTRUCTIONS FOR COMPLETING NON-COMPLIANCE REPORTING FORM

Use this supplemental form to report all permit violations and any other non-compliance that may endanger health or the environment, in accordance with your permit. Complete all sections that apply. If you are reporting violations of permit limits, monitoring requirements or schedules that do not pose an immediate threat to health or the environment, you may attach this form to the Discharge Monitoring Report (DMR). If you are reporting other non-compliance events, and the deadline for a written report (e.g., 5 days) does not coincide with your submission of the DMR, this form should be submitted separately to the Department by the reporting deadline set forth in the permit.

If you are unsure of whether an incident constitutes non-compliance that may endanger health or the environment, it is recommended that you notify the Department verbally as soon as possible after you become aware of the incident. Title 25, Pa. Code §§ 91.33 and 91.34 (regarding incidents causing or threatening pollution and activities utilizing pollutants, respectively), in part requires immediate notification by telephone to the Department of pollution incidents, remediation, and may require an additional report on the incident or plan of pollution prevention measures.

Instructions:

1. Enter the name of the facility, the municipality and county where it is located, the month and year when violations occurred, and the NPDES or WQM permit number for the facility.

2. If there were violations of permit effluent limitations during the month, check the box next to "Violations of Permit Effluent Limitations." (Note – if using the electronic version of this form, check the boxes first, and then select Tools – Unprotect Document to enter additional information). Enter the date of the violation (if a violation of a minimum or maximum limit, the date of sample collection, or if a violation of an average limit, the end of the monitoring period), the parameter name, the permit limit and units, the statistical code (e.g., "MIN", "MAX", "MO AVG", etc.), the measured result and units, the cause of the violation and the corrective action taken. **If there are more than two violations during the monitoring period and/or if the space provided is insufficient to explain the cause or corrective action, please attach additional pages.**

3. If there are Sanitary Sewer Overflow (SSO) discharges or other unauthorized discharges from the facility (e.g., spills, leaks, etc.) that enter or have the potential to enter waters of the Commonwealth, including groundwater, notify DEP by phone as soon as possible, and document the discharge on this form by checking the box next to "Sanitary Sewer Overflows and Other Unauthorized Discharges." Record the event (discharge) date, the substance discharged (e.g., sewage, on-site chemicals, etc.), the location where the discharge occurred (e.g., manhole number, pump station name, equipment description, etc.), the volume discharged (gallons), the approximate duration of the discharge (hours), the receiving waters (name of stream or groundwater), the impact on the receiving waters, if observed (e.g., solids deposition, foam, fish kill, etc.), the cause of the discharge, and the date on which the Department was verbally notified. **If there are more than two discharge events during the monitoring period and/or if the space provided is insufficient to explain the discharge, please attach additional pages.**

4. If there are other violations of the permit, check the box next to "Other Permit Violations," and check the appropriate box that describes the violation type. If not identified on the form, check the box next to "Other" and provide a written explanation. **If the space provided is insufficient to explain the violation, please attach additional pages.**

5. Type your name and title and sign and date the form after reading the certification statement.

If you have questions about completing this form, contact the Clean Water Program Operations Section of the Department in your region:

Southeast Region – (484) 250-5970
Northeast Region – (570) 826-2553
Southcentral Region – (717) 705-4707
Northcentral Region – (570) 327-0532
Southwest Region – (412) 442-4060
Northwest Region – (814) 332-6942

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

PFR-1705-C
Orig: B. Willert
REC
JUN - 8 2017
BY: 2017-0610

June 6, 2017

CERTIFIED MAIL NO. 7015 0640 0002 3147 6479

Robert J. Willert
DELCORA
100 East Fifth Street P O Box 999
Chester, PA 19016-0999

cc: Bothwell, Hurst, Kochubka-Weston, Lehman-Weston, Contract File

Re: WQM Permit - Sewage
DELCORA Sewer System & STP
Rose Valley PS
Permit No. 2316406
Authorization ID No. 1161679
Chester City, Delaware County

Dear Mr. Willert:

Your Water Quality Management (WQM) permit is enclosed. You must comply with all Standard and Special Conditions attached to this Permit. Construction must be done in accordance with the permit application and all supporting documentation. Please review the permit conditions and the supporting documentation submitted with your application before starting construction.

Please note that you are responsible for securing all other required permits, approvals and/or registrations associated with the project, if applicable, under Chapters 102 (erosion and sedimentation control), 105 (stream obstructions and encroachments) and 106 (floodplains) of DEP's regulations. Construction may not proceed until all other required permits have been obtained.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa.C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717.787.3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800.654.5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at 717.787.3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST REACH THE BOARD WITHIN 30 DAYS. YOU DO NOT NEED A LAWYER TO FILE AN APPEAL WITH THE BOARD.

IMPORTANT LEGAL RIGHTS ARE AT STAKE, HOWEVER, SO YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT AFFORD A LAWYER, YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY TO THE BOARD (717.787.3483) FOR MORE INFORMATION.

During construction or upon completing construction, please contact Karen McDaniel at 484.250.5126 or kmcdaniel@pa.gov so that an inspection of the facilities may be conducted, at DEP's discretion.

Sincerely,

Jenifer L. Fields, P.E.
Environmental Program Manager
Clean Water Program

Enclosures

cc:

Ms. Healy, Rose Valley Borough
Delaware County Planning Department
Middletown Township
Ms. Bolt, P.E., Weston Solutions, Inc
Mr. Kochubka, Weston Solutions, Inc
SERO Operations
Re

3800-PM-WSFR0015 1/2011
Permit

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

PERMIT NO. 2316406

AMENDMENT NO. _____

APS ID. 928907

AUTH. ID. 1161679

WATER QUALITY MANAGEMENT PERMIT

A. PERMITTEE (Name and Address): CLIENT ID#: **42332** **DELCORA** **100 East Fifth Street P O Box 999** **Chester, PA 19016-0999**	B. PROJECT/FACILITY (Name): **Rose Valley Pump Station /DELCORA Sewer System & STP**
C. LOCATION (Municipality, County): **Chester City, Delaware County**	SITE ID#: **454804**

D. This permit approves the construction of sewage facilities consisting of: the new Rose Valley Pump Station that will replace the Rose Valley STP along with the installation of a 6 in diameter force main that will tie into the Middletown Township Sewer Authority force main along Knowltown Rd. Rose Valley PS will consists of a wet well, influent screen, valve vault and 2- submersible 35 Hp pumps. The new force main from the new pump station will a 6 in HDPE main that will connect to the existing Middletown Township 's 8 in force main. The existing and exposed force main crossing under Ridley Creek from Old Mill PS to the Rose Valley STP will be replaced with a new 6 in diameter force main.

Pump Stations: Rose Valley PS	Manure Storage:	Sewage Treatment Facility:
Design Capacity: 275 GPM	Volume: _____ MG	Annual Average Flow: _____ MGD
Annual Aver Flow: 130,000 GPD	Freeboard: _____ inches	Design Hydraulic Capacity: _____ MGD
		Design Organic Capacity: _____ lb/day

E. APPROVAL GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING:

1. **New Permits:** All construction, operations and procedures shall be in accordance with the Water Quality Management Permit application dated **11/16/2016**, its supporting documentation and addendums dated _____, which are hereby made a part of this permit.

   Amendments: All construction, operations and procedures shall be in accordance with the Water Quality Management Permit Amendment application dated _____ and its supporting documentation and addendums dated _____, which are hereby made a part of this amendment.

   Except for any herein approved modifications, all terms, conditions, supporting documentation and addendums approved under Water Quality Management Permit No. _____ dated _____ shall remain in effect.

   Transfers: Water Quality Management Permit No. _____ dated _____ and conditions, supporting documentation and addendums are also made part of this transfer.

2. Permit Conditions Relating to Sewerage are attached and made part of this permit.
3. Special Conditions _____ are attached and made part of this permit.

F. THE AUTHORITY GRANTED BY THIS PERMIT IS SUBJECT TO THE FOLLOWING FURTHER QUALIFICATIONS:

1. If there is a conflict between the application or its supporting documents and amendments and the attached conditions, the attached conditions shall apply.
2. Failure to comply with the rules and regulations of DEP or with the terms or conditions of this permit shall void the authority given to the permittee by the issuance of this permit.
3. This permit is issued pursuant to the Clean Streams Law Act of June 22, 1937, P.L. 1987, as amended 35 P.S. §691.1 *et seq.* Issuance of this permit shall not relieve the permittee of any responsibility under any other law.
4. This permit shall expire on _____. The permittee shall submit an application to renew the permit no later than 180 days prior to the permit expiration date.

PERMIT ISSUED: June 6, 2017

BY: _____

TITLE: Jenifer L. Fields, P.E.
Clean Water Program Manager
Southeast Regional Office

Permit No. 2316406

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

PERMIT CONDITIONS RELATING TO SEWERAGE

For use in Water Quality Management Permits

(Check boxes that apply)

General

☒ 1. The Department of Environmental Protection (DEP) considers the licensed Professional Engineer whose seal is affixed to the design documents to be fully responsible for the adequacy of all aspects of the facility design.

☒ 2. The permittee shall adopt and enforce an ordinance requiring the abandonment of privies, cesspools or similar receptacles for human waste and onlot sewage disposal systems on the premises of occupied structures accessible to public sewers. All such structures must be connected to the public sewers.

☐ 3. The outfall sewer or drain shall be extended to the low water mark of the receiving body of water. Where necessary to ensure proper mixing and waste assimilation, an outfall sewer or drain may be extended with appurtenances below the low water mark and into the bed of a navigable stream provided that the permittee has secured an easement, right-of-way, license or lease from DEP in accordance with Section 15 of the Dam Safety and Encroachments Act, the Act of November 26, 1978, P.L. 1375, as amended.

☒ 4. The approval is specifically made contingent on the permittee acquiring all necessary property rights, by easement or otherwise, providing for the satisfactory construction, operation, maintenance and replacement of all sewers or sewerage structures in, along or across private property with full rights of ingress, egress and regress.

☒ 5. When construction of the approved sewerage facilities is completed and before they are placed in operation, the permittee shall notify DEP in writing so that a DEP representative may inspect the facilities.

☒ 6. The approval of the plans, and the authority granted in this permit, if not specifically extended, shall cease and be null and void 2 years from the issuance date of this permit unless construction or modification of the facilities covered by this permit has begun on or before the second anniversary of the permit date.

☒ 7. If, at any time, the sewerage facilities covered by this permit create a public nuisance, including but not limited to, causing malodors or causing environmental harm to waters of the Commonwealth, DEP may require the permittee to adopt appropriate remedial measures to abate the nuisance or harm.

☒ 8. If, after the issuance of this permit, DEP approves a municipal sewage facilities official plan or an amendment to an official plan under Act 537 (Pennsylvania Sewage Facilities Act, the Act of January 24, 1966, P.L. 1535 as amended) in which sewage from the herein approved facilities will be treated and disposed of at other planned facilities, the permittee shall, upon notification from the municipality or DEP, provide for the conveyance of its sewage to the planned facilities, abandon use and decommission the herein approved facilities including the proper disposal of solids, and notify DEP accordingly. The permittee shall adhere to schedules in the approved official plan, amendments to the plan, or other agreements between the permittee and municipality. This permit shall then, upon notice from DEP, terminate and become null and void and shall be relinquished to DEP.

☒ 9. This permit does not relieve the permittee of its obligations to comply with all federal, interstate, state or local laws, ordinances and regulations applicable to the sewerage facilities.

☒ 10. This permit does not give any real or personal property rights or grant any exclusive privileges, nor shall it be construed to grant or confirm any right, easement or interest in, on, to or over any lands which belong to the Commonwealth.

☐ 11. The authority granted by this permit is subject to all effluent requirements, monitoring requirements and other conditions as set forth in NPDES Permit No. and all subsequent amendments and renewals. No discharge is authorized from these facilities unless approved by an NPDES Permit.

Construction

☒ 12. This permit is issued under the authorization of The Clean Streams Law and 25 Pa. Code Chapter 91. The permittee shall obtain all necessary permits, approvals and/or registrations under 25 Pa. Code Chapters 102, 105 and 106 prior to commencing construction of the facilities authorized by this permit, as applicable. The permittee should contact the DEP office that issued this permit if there are any questions concerning the applicability of additional permits.

☒ 13. The facilities shall be constructed under the supervision of a Pennsylvania licensed Professional Engineer in accordance with the approved reports, plans and specifications.

☒ 14. A Pennsylvania licensed Professional Engineer shall certify that construction of the permitted facilities was completed in accordance with the application and design plans submitted to DEP, using "Post Construction Certification" form (3800-PM-WSFR0179a). It is the permittee's responsibility to ensure that a Professional Engineer is on-site to provide the necessary oversight and/or inspections to certify the facilities. The certification must be submitted to DEP before the facility is placed in operation. As-built drawings, photographs (if available) and a description of all deviations from the application and design plans must be submitted to DEP within 30 days of certification.

☒ 15. Manhole inverts shall be formed to facilitate the flow of the sewage and to prevent the stranding of sewage solids. The manhole structure shall be built to prevent undue infiltration, entrance of street wash or grit and provide safe access to facilitate manhole maintenance activities.

☒ 16. The local Waterways Conservation Officer of the Pennsylvania Fish and Boat Commission (PFBC) shall be notified when the construction of any stream crossing and/or outfall is started and completed. A written permit must be secured from the PFBC if the use of explosives in any waterways is required and the permittee shall notify the local Waterways Conservation Officer when explosives are to be used.

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☒ 17. The permittee shall maintain records of "as-built" plans showing all the treatment facilities as actually constructed together with facility operation and maintenance (O&M) manuals and any other relevant information that may be required. Upon request, the "as-built" plans and O&M manuals shall be filed with DEP.

☒ 18. The sewers shall have adequate foundation support as soil conditions require. Trenches shall be back-filled to ensure that sewers will have proper structural stability, with minimum settling and adequate protection against breakage. Concrete used in connection with these sewers shall be protected from damage by water, freezing, drying or other harmful conditions until cured.

☒ 19. Stormwater from roofs, foundation drains, basement drains or other sources shall not be admitted directly to the sanitary sewers.

☒ 20. The approved sewers shall be maintained in good condition, kept free of deposits by flushing or other cleaning methods and repaired when necessary.

☒ 21. The sewerage facilities shall be properly operated and maintained to perform as designed.

☒ 22. The attention of the permittee is called to the highly explosive nature of certain gases generated by the digestion of sewage solids when these gases are mixed in proper proportions with air and to the highly toxic character of certain gases arising from such digestion or from sewage in poorly ventilated compartments or sewers. Therefore, at all places throughout the sewerage facilities where hazard of fire, explosion or danger from toxic gases may occur, the permittee shall post conspicuous permanent and legible warnings. The permittee shall instruct all employees concerning the aforesaid hazards, first aid and emergency methods of meeting such hazards and shall make all necessary equipment and material accessible.

☒ 23. An operator certified in accordance with the Water and Wastewater Systems Operator Certification Act of February 21, 2002, 63 P.S. §§1001, *et seq.* shall operate the sewage treatment plant.

☒ 24. The permittee shall properly control any industrial waste discharged into its sewerage system by regulating the rate and quality of such discharge, requiring necessary pretreatment and excluding industrial waste, if necessary, to protect the integrity or operation of the permittee's sewerage system.

☒ 25. There shall be no physical connection between a public water supply system and a sewer or appurtenance to it which would permit the passage of any sewage or polluted water into the potable water supply. No water pipe shall pass through or come in contact with any part of a sewer manhole.

☒ 26. All connections to the approved sanitary sewers must be in accordance with the official Act 537 Plan and, if applicable, a corrective action plan as contained in the approved Title 25 Pa. Code Chapter 94 Municipal Wasteload Management Annual Report.

☒ 27. Collected screenings, slurries, sludge and other solids shall be handled and disposed of in compliance with Title 25 Pa. Code Chapters 271, 273, 275, 283 and 285 (related to permits and requirements for land filling, land application, incineration and storage of sewage sludge), Federal Regulations 40 CFR 257 and the Federal Clean Water Act and its amendments.

3800-PM-WSFR0179a 9/2005
Post Construction Certification

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

WATER QUALITY MANAGEMENT
POST CONSTRUCTION CERTIFICATION

PERMITTEE IDENTIFIER	
Permittee	DELCORA
Municipality	Chester City
County	Delaware
WQM Permit No.	2316406
Facility Type	Sewage
All of the above information should be taken directly from the Water Quality Management Permit.	

CERTIFICATION

This certification must be completed and returned to the permits section of the DEP's regional office issuing the WQM permit within 30 days of completion of the project and received by DEP prior to operation, and if requested, as-built drawings, photographs (if available) and a discussion of any DEP-approved deviations from the design plans during construction.

I, being a Registered Professional Engineer in Pennsylvania, do hereby certify to the best of my knowledge and belief, based upon personal observation and interviews, that the above facility approved under the Water Quality Management Permit has been constructed in accordance with the plans, specifications and modifications approved by DEP.

Construction Completion Date (MM/DD/YYYY): _____

	Professional Engineer
	Name _____ (Please Print or Type)
	Signature
	Date
	License Expiration Date
	Firm or Agency
	Telephone
	Permittee or Authorized Representative
	Name _____ (Please Print or Type)
	Signature
	Title
	Telephone

ACT 537 PLAN: SEWAGE FACILITIES PLAN, MUNICPAL & AUTHORITY INFLOW AND INFILTRATIONS STUDY, SUMMARY REPORT (MARCH 2000, REVISED JULY 2000)

Delaware County
Planning Department

Delaware County Regional
Water Quality Control Authority

ACT 537: SEWAGE FACILITIES PLAN

MUNICIPAL & AUTHORITY INFLOW AND INFILTRATION STUDY

Summary Report

March 2000
Revised July 2000

ROY F. WESTON, INC.
1400 Weston Way
West Chester, PA 19380

ACT 537: SEWAGE FACILITIES PLAN

MUNICIPAL & AUTHORITY INFLOW AND INFILTRATION STUDY

SUMMARY REPORT

Prepared for

DELAWARE COUNTY PLANNING DEPARTMENT
Media, Pennsylvania

and

DELAWARE COUNTY REGIONAL WATER QUALITY CONTROL AUTHORITY
Chester, Pennsylvania

Prepared by

ROY F. WESTON, INC.
West Chester, Pennsylvania 19380

March 2000
Revised July 2000

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LIST OF ACRONYMS

CDCA	Central Delaware County Authority
CEO	Code Enforcement Officer
DELCORA	Delaware County Regional Water Quality Control Authority
DCJA	Darby Creek Joint Authority
EDU	Equivalent dwelling unit
I&I	Infiltration / Inflow
MA	Muckinipates Authority
O&M	Operation and maintenance
PSW	Philadelphia Suburban Water Company
PSWPCP	Philadelphia Southwest Water Pollution Control Plant
RHM	Radnor-Haverford-Marple Sewer Authority
WRTP	Western Region Treatment Plant

1. INTRODUCTION

Many of the nation's sewer systems are slowly beginning to fail. Because sewer lines are placed underground, signs of accelerated deterioration and capacity limitations are not readily apparent until there is a major failure. Sewer systems inevitably begin to fail over time as pipes and manhole walls age and crack, laterals deflect, and joints offset, causing leaks to occur in the system and at manhole covers. Even with an effective maintenance plan, these failures cannot be completely avoided as tree roots, roadway repairs, and general wear and tear ultimately take their toll.

As a sewer system begins to fail, it allows the "infiltration" and/or "inflow" of large volumes of uncontaminated water to enter during periods of rain and high groundwater elevations. This additional water can cause sewer backups, surcharging at pump stations, and the bypassing of raw sewage at conveyance and treatment facilities. This puts a strain on the community's ecosystem, creates a health hazard, and raises sewage treatment costs because all flows going into a wastewater treatment facility must be treated. The long-term treatment of excessive amounts of uncontaminated waters, such as storm water and groundwater, is economically undesirable. Reduction of infiltration and inflow (I&I) by way of a well-planned program can result in a significant reduction in hydraulic loading at collection, conveyance, and treatment facilities during periods of wet weather. This, in turn, lowers capital and operating and maintenance (O&M) costs while prolonging the lifetime-capacity of the treatment facility. Reduction of wet-weather flows in a system and the installation of meters for customer billing translates into lower sewer bills. Therefore, by locating and subsequently correcting excessive I&I into a sewer system, a municipality can economically reduce collection, conveyance, and treatment costs; increase or extend plant capacity for new users; and prevent an environmentally hazardous situation in the community.

Eastern Delaware County contains in excess of 750 miles of sanitary sewers. In many areas, these sanitary sewers are more than 50 years old, with some sections built prior to 1910, and I&I constitutes a significant portion of the flow.

1.1 INFILTRATION/INFLOW DEFINITIONS

Excessive Infiltration/Inflow is defined as the quantities of I&I that can be economically eliminated from a sewer system by rehabilitation, as determined by a cost-effectiveness analysis that compares the costs for correcting the I&I conditions with the total cost for transportation and treatment of the I&I.

Extraneous Water includes all additional water flows, not generated by the system's users.

Exfiltration is defined as the wastewater that leaks out of sewer system and service connections into the ground or surface waters through such means as deteriorated pipes and separated joints.

Infiltration/Inflow (I&I) is defined as the total volume or flow of all extraneous waters that enter a sanitary sewer through either infiltration or inflow or both.

Infiltration is defined as the water entering a sewer system and service connections from the ground through defects such as deteriorated pipes, separated pipe joints, or deteriorated manhole walls. Infiltration requires that the groundwater level be above the sewer as is often the case for lines running in close proximity to streams, ponds, or other bodies of surface water. The established engineering standard for infiltration is 1,500 gallons/day/inch-mile, where the inch refers to the diameter of the sewer and the mile refers to the length.

Inflow is defined as the water discharged into a sewer system including illegal service connections from such sources as roof leaders, sump pumps, cellar and yard drains, foundation drains, drains from springs and swampy areas, faulty manhole covers, storm waters, surface runoff, or streams. The ideal standard for inflow is zero gallons per day (gpd). Theoretically, these sources are controllable and should not be discharging to the sewer system.

Peaking Factor is defined as the ratio between the peak observed flow and the average flow (either observed for computed theoretically). During wet weather events (storm), the peaking factor is a measure of the inflow into the system. Under ideal conditions, the wet weather peaking factor would be 1 but often this is not the case. The acceptable range of inflow is based on the available capacity of the collection system and treatment plant. During dry weather, the peaking factor is a measure of the demand or user discharge characteristics. Normal dry weather (sewage flow) peaking factors can range from 2 to 5 depending on the size of the service area. The smaller the service area the greater the sewage flow peaking factor, and conversely, the larger the service area the smaller the sewage flow peaking factor.

1.2 PURPOSE OF THE STUDY

During 1996 and 1997, I&I studies were conducted (or recent studies submitted in lieu of conducting a new study) by each of 24 individual municipalities and the four municipal authorities in eastern Delaware County. These studies were conducted in order to gather information required to update the County-wide Act 537 Sewage Facilities Plan. The purpose of the studies as set forth in the scope of services was as follows:

> "To identify and resolve existing sewage disposal problems, to avoid potential sewage problems resulting from new land development and to provide for the future disposal needs of the County, by developing planning strategies to:
>
> 1. Ensure that a lack of sewage facilities does not impair economic growth,
> 2. Eliminate restrictions on sewer connections and prevent future connection bans,
> 3. Eliminate any existing health hazards and property damage from overloaded municipal systems and malfunctioning on-site systems as well as prevent health hazards and property damage in the future,
> 4. Provide cost-effective solutions to sewage facility needs, and
> 5. Reduce the cost of conveying and treating extraneous water (infiltration and inflow) in the eastern service area."

These studies were performed to determine the extent of I&I in each municipality and to locate those segments with excessive I&I. These studies also quantified the I&I volume and estimated costs for potential corrective actions. The scope of work for each of the I&I studies included the following:

- Description of the study area.
- Review of plans and calculation of theoretical sewage flows.
- Flow monitoring to establish the magnitude of the problem as well as aid in determining those areas of the collection system that are subject to severe I&I. The flow meters used for the project typically measured the depth of flow in a sewer (with a pressure transducer) and velocity. The flow was computed by coupling this information with the pipe diameter.
- Field investigation and data gathering including:
  - Visual inspection of manholes for defects in the walls of the manholes that allow infiltration as well as inspection of the manhole cover for evidence of inflow either around the ring or through the cover.
  - Smoke testing, which involves isolation of a segment of the sewer system (typically with a sand bag or inflatable plug) and blowing a nonhazardous smoke into the sewer. Smoke testing is especially effective at finding inflow sources such as roof leaders, area drains, and storm water inlets.
  - Televising sewer lines by dragging or crawling a video camera through the sewer to inspect for broken or cracked pipe, offset or separated pipe joints, or any other defect that would allow infiltration.
- Data analysis.
- Corrective action plan.

Often with I&I studies, the length of sewers and the number of manholes are so large that a complete inspection of the sewer system is not feasible. Therefore, it is necessary to either conduct a "screening" of the sewer system to determine problem areas upon which further inspection will be performed or to inspect a representative section of the system with the assumption that the remaining sections will have the same problems on a proportional basis. The method selected is often dictated by knowledge of the system by the sewer maintenance employees and examination of flow metering records during storm events. If the flow monitoring shows severe problems with I&I in isolated areas but not system-wide, a focused study is appropriate, whereas if the monitoring shows widespread problems, a representative inspection is appropriate to establish the scope and magnitude of the problem.

1.3 STUDY AREA

The municipalities listed in Table 1-1 and shown on Figure 1-1 comprise the study area in eastern Delaware County that is serviced by the Delaware County Regional Water Quality Control Authority (DELCORA). The municipalities in the study area are organized into four

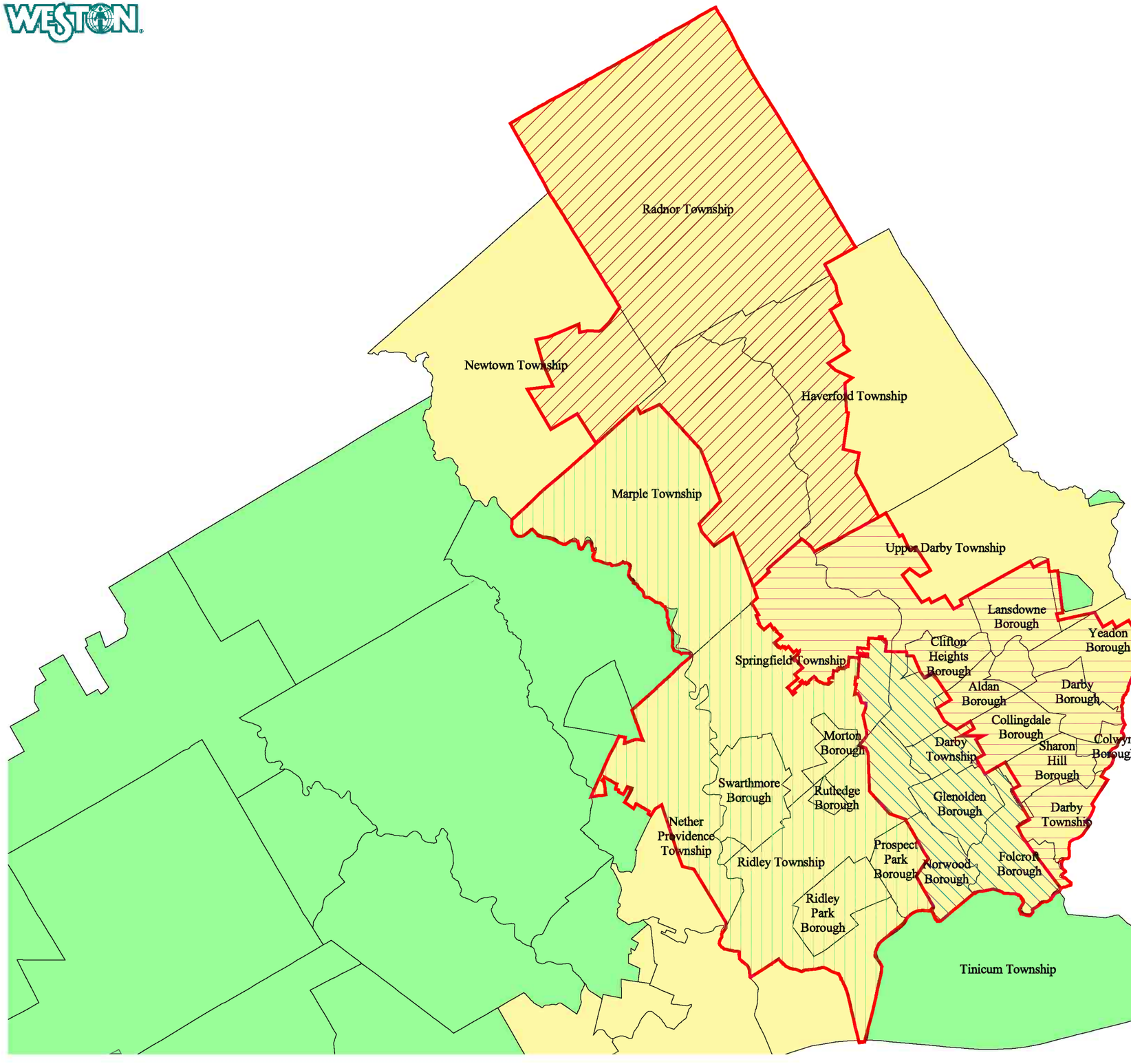
authorities: Darby Creek Joint Authority (DCJA), Muckinipates Authority (MA), Central Delaware County Authority (CDCA), and Radnor-Haverford-Marple Sewer Authority (RHM) with some municipalities belonging to more than one authority. These authorities have agreements with DELCORA for the conveyance and treatment of wastewater that is generated in the Eastern Service Area. DELCORA, in turn, has an agreement with the City of Philadelphia for treatment of wastewater at the Philadelphia Southwest Water Pollution Control Plant (PSWPCP). In the case of sewage flows from CDCA, it will soon pump its wastewater to the Western Region Treatment Plant (WRTP).

Table 1-1
Eastern Delaware County Municipalities Served by DELCORA

Municipality	Authority	Municipality	Authority
Aldan Borough	DCJA	Newtown Township	RHM
Clifton Heights Borough	DCJA, MA	Norwood Borough	MA
Collingdale Borough	DCJA	Prospect Park Borough	CDCA
Colwyn Borough	DCJA	Radnor Township	RHM
Darby Borough	DCJA	Ridley Park Borough	CDCA
Darby Township	DCJA, MA	Ridley Township	MA, CDCA
Folcroft Borough	DCJA, MA	Rutledge Borough	CDCA
Glenolden Borough	MA	Sharon Hill Borough	DCJA
Haverford Township	RHM	Springfield Township	DCJA, MA, CDCA
Lansdowne Borough	DCJA	Swarthmore Borough	CDCA
Marple Township	RHM, CDCA	Upper Darby Township	DCJA, MA
Morton Borough	CDCA	Yeadon Borough	DCJA
Nether Providence Township	CDCA		

The peaking factor discussed in the following summaries is defined as the metered flow divided by the theoretical flow based on the service area. It is also important to recognize that a high peak hourly flow coincident with a precipitation event is an indication of inflow. On the other hand, continuous low flows monitored in early morning are an indication of a persistent amount of infiltration that is leaking into the pipes and that is actually occurring continuously over a 24-hr period.

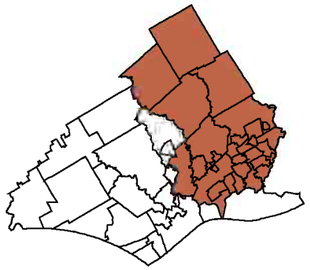
In many cases, a consultant selected by the municipality conducted the I&I study and thus, the level of detail and the unit costs vary between municipalities.



LEGEND

- Central Delaware County Authority
- RHM Authority
- Muckinipates Authority
- Darby Creek Joint Authority
- DELCORA Served Community
- Other

N



Location Map

1 0 1 2 Miles

ACT 537: SEWAGE FACILITIES PLAN
Municipal Inflow and Infiltration Study
Summary Report

FIGURE 1-1

STUDY AREA MUNICIPALITIES

2. SUMMARIES OF INDIVIDUAL MUNICIPAL STUDIES

The following subsections summarize the individual municipal studies conducted by others; thus, there is some variability in the information presented. The observed problems and corrective actions presented below are those presented in the individual studies.

2.1 ALDAN BOROUGH

Aldan Borough, a member of the DCJA, owns and operates approximately 13 miles of sanitary sewers with 254 manholes. The system was found to be in generally good condition from a maintenance standpoint, and structurally the manholes were found to be in good condition. However, based on field inspections and flow metering, there was probable significant I&I at various locations. There was evidence in most manholes of ground water seepage through the brick wall construction and the point where the manhole frame sits on top of the manhole. These two defects were significant sources of I&I into the system. Another significant source of suspected inflow was noted through illegal connections such as sump pumps and roof drains.

The Borough has an annual contract with a contractor to clean and flush the sewer system. This was evident during visual inspection of the manholes and sewer lines because neither blockages nor signs of surcharging were evident.

2.1.1 Observed Problems

- Some manholes are flooded during wet weather events and thus, inflow occurs into the system through the top of the manhole.
- Inflow during wet weather events was evidenced by the increase in flow of 142,841 gpd detected near the storm sewer crossing on Laurel Avenue just east of Linden Avenue and through the easements between Aldan Avenue and Linden Avenue (Linden Ave MH-168 to MH-167; Laurel Ave MH-167 to MH-123; Easements MH-167 to MH-157).
- The Lobbs Run Creek easement and crossing area was sited with I&I of approximately 280,963 gpd (easement from the manhole at Springfield Rd to MH-223 to West Maryland Ave at the stream crossing).
- I&I problems, totaling approximately 74,984 gpd, occurred between MH-45 and either MH-43 on Woodlawn Ave or MH-101 on Magnolia Avenue.
- The total I&I for the Borough was estimated to be 848,200 gpd.

2.1.2 Corrective Action Plan

It was estimated that I&I could be reduced in the Borough by 636,150 gpd. By installing manhole inserts and chimney seals alone, the estimated reduction in I&I would be 508,920 gpd.

Aldan Borough currently has a procedure for evaluating properties to determine whether an illegal connection of sump pumps/roof drains to the sanitary sewer connection exists. By acquiring the issuance of an Occupancy Certificate, Borough officials inspect both rental and owner-occupied units at time of rental or sale. If an illegal connection is identified, the

certificate is withheld until the connection has been removed and such has been verified by a Borough official (Borough Code, Ordinance No. 396, and Section 5.05 and 7.08).

In addition to the individual corrective actions mentioned above, a detailed listing of the common corrective actions for Aldan Borough is available in Table 4-1 of Section 4.

2.2 CLIFTON HEIGHTS BOROUGH

Clifton Heights Borough, a member of the DCJA and MA, owns and operates approximately 12.1 miles of sanitary sewers with 253 manholes. The system is reported to be in excess of 60 years old.

Based on metered results, the Borough's average daily flow was calculated to be 1,649,805 gpd with an average daily flow peak factor of 2.96. Districts II-B, III, and IV contribute 224,405 gpd, or 40% of the Borough's theoretical flow, and are responsible for 1,004,100 gpd, or 61% of the Borough's I&I.

2.2.1 Observed Problems

2.2.1.1 District II

Analysis of the flow metering results determined that this district was within the acceptable 1.5 peaking factor. During field inspections, a direct source of inflow was found within the district. It appears that a 6-inch PVC pipe entering the wall of MH-18 originates at a Philadelphia Suburban Water Company (PSW) water tower and could be an overflow pipe. It was estimated that the overflow is contributing 3,000 gpd and is flowing constantly. The Borough was notified that PSW should be directed to disconnect the lateral if it is not currently permitted.

2.2.1.2 District IIB

Analysis of the flow metering data determined that this district had a peaking factor greater than 1.5. Three sewer lines were found to have severe deflections.

Interviews with maintenance personnel and field inspections revealed that an underground stream flows through this district and soils of this district are slow draining. Field observations and the flooding history of the district indicate that this area is a significant contributor to the Borough's overall I&I problem.

2.2.1.3 District III

Analysis of the flow metering data determined that this district had a peaking factor greater than 1.5. Ten specific sewer lines were noted as having deficiencies and visible evidence was found of infiltration through the walls of some of the district's manholes.

The region bordered by Sycamore Avenue, Mill Road, Rockbourne Road, and Darby Creek appears to contribute the greatest amount of I&I. This region is fed by a natural spring that is channeled into an underground stream that runs alongside the sanitary sewer, possibly sharing the same trench. Along the creek, sewage is carried in a 21-inch terracotta pipe. The inspection revealed cracks, broken sections, deflections, roots, and bows in the line. It appears that the entire line from MH-238 to MH-165 is in need of repair. The Darby Creek crossing between MH-166 and I-121 of the Darby Creek Interceptor also has the potential for large quantities of I&I.

A service lateral to a warehouse at the intersection of Rockbourne Road and Bridge Avenue was observed to be broken and exposed to the creek. During the inspection, it appeared that raw sewage was being discharged into the creek. During wet weather events it appears that this break would be submerged and thus, would be a source of direct inflow.

2.2.1.4 District IV

Analysis of the flow metering data determined that this district had a peaking factor greater than 1.5. Several sewer lines at the following locations were found to have deficiencies including bowed and defected lines. The sewers along Broadway Avenue are very deep and are almost assured to be below the water table. During the inspection of MH-211 it was found that the northern line had a cracked pipe.

2.2.1.4 District V

Analysis of the flow metering data determined that this district was within the acceptable 1.5 peaking factor. At the time of inspection, it was noted that the line from MH-243 to I-116 crosses Darby Creek and should be regularly monitored as a potential future source of I&I.

Once the districts were defined and the metering completed, the results suggested that infiltration was the more substantial portion of the I&I problem. However, the potential exists for greater amounts of inflow under certain conditions.

2.2.2 Corrective Action Plan

A four-phased corrective plan is recommended to reduce the I&I flow to an overall peaking factor of 1.5.

Manhole rehabilitation work conducted in Phase 1 will be expected to reduce the inflow portion of the average daily flow during rain events by 75%. Considering the total metered inflow of 219,440 gpd, this amounts to a reduction of 164,580 gpd.

Phases 2, 3, and 4 involve an in-depth study and rehabilitation plan that prioritizes districts in order of I&I importance. An analysis of each will involve re-metering to confirm the amount of I&I, followed by an in-depth study to locate the sources. After each study portion is performed, a detailed alternatives analysis and cost estimate will be prepared. The plan would provide long term, cost-effective solutions, using the best available technology. The plan will also involve the

implementation of rehabilitation measures. This work will mainly reduce the infiltration portion of the I&I. However, any inflow sources located during the study will be identified and targeted for rehabilitation.

After implementation of the corrective action plan, monitoring will be conducted to quantify the actual I&I reduction and evaluate the effectiveness of the plan.

The Borough's maintenance department is responsible for sewer system O&M that should include:

1. An improved sewer cleaning schedule.
2. The implementation of an I&I monitoring program.
3. Improved documentation.
4. Creation of a sanitary sewer file.

The implementation of these four items could prove to be the most cost-effective approach to maintaining the integrity of the Borough's sanitary system.

In addition to the individual corrective actions mentioned above, a detailed listing of the common corrective actions for Clifton Heights Borough is available in Table 4-1 of Section 4.

2.3 COLLINGDALE BOROUGH

Collingdale Borough, a member of the DCJA, owns and operates approximately 14.2 miles of sanitary sewers with 245 manholes and serves approximately 9,900 residents who generate 3,091 equivalent dwelling units (EDUs, assigned a daily flow of 180 gpd) of sewage flow to the DELCORA system. Conditions during field inspections were generally better than expected in that few manholes along the streams exhibited visible signs of inflow. A majority of manholes in or near streets were in fair to good condition, with the exception that many manholes exhibited corroded and/or missing access rungs.

Manhole inspections indicated that approximately 20% (50 manholes) required some kind of repair. Rehabilitation would involve testing and grouting, which would extend the life of the structures approximately 3 to 4 additional years, or slip lining the manhole, which would serve as a permanent repair.

I&I was estimated to be approximately 320,000 gpd with a peaking factor of 1.5.

2.3.1 Observed Problems

Problem areas were determined to be the collector along Andrews Run and the sewer extending from the intersection of Clifton and Pitman Avenues. In addition to the potential for bad joints and leaking manholes resulting in I&I, results demonstrate the possibility of exfiltration. There have been reports of sewer overflows in heavy rain events from MH-66 at the intersection of Clifton and Pitman Avenues.

Flow metering revealed a significant I&I problem that occurred above MH-8. This manhole is located directly adjacent to the Hermesprota Creek along which a high volume of I&I appears to be occurring (252,157 gpd). However, no television inspections have been performed along this reach to determine if the pipes have defects.

Two additional areas of concern are above MH-243 and MH-173. The metered average flow exceeded the theoretical flow by approximately 75,000 gpd and 100,000 gpd, respectively. This represents a peaking factor of approximately twice the theoretical flow associated with the system. The metered location at MH-197 exhibited about 65,000 gpd of I&I that results in a peaking factor of 1.1. Because MH-243 and MH-173 are tributary to MH-197, the large drop in I&I indicates that exfiltration may be occurring.

The metering alone was not comprehensive enough to specifically identify localized portions of the system contributing to excessive flows. It was, however, apparent through observation during metering, that the portion of the system along Andrew's Run and its tributaries along with the line extending from Clifton and Pitman, would be the most appropriate sections at which to begin a program of televised inspection and repair/replacement.

Total projected flow was 516,780 gpd, whereas the total average metered flow was approximately 1.6 times the projected flow for the Borough limits. It is also apparent from the data that rainfall has a significant impact on the flows within the system. One storm event recorded the actual flow to be 87% above the average daily flow. The increases associated with rainfall events indicated that inflow was a significant problem.

Only a moderate amount of flow, approximately 317,290 gpd on average, is being added to the collection system through infiltration and would be expected to be less for lower groundwater periods. One of the most significant results of the study was the discovery that exfiltration appears to be occurring during rainfall events.

2.3.2 Corrective Action Plan

The corrective action plan for Collingdale Borough includes the further inspection by camera of the collector along Andrews Run and the sewer extending from the intersection of Clifton and Pitman Avenues. Anticipated repairs include replacement of certain sections of sewers while other areas will need slip lining or grouting of joints. An anticipated reduction of approximately 60,000 gpd will be realized with the full implementation of the recommendations, including accounting for the additional flow added by the elimination of exfiltration.

In addition to the individual corrective actions mentioned above, a detailed listing of the common corrective actions for Collingdale Borough is available in Table 4-1 of Section 4.

2.4 COLWYN BOROUGH

Colwyn Borough, a member of the DCJA, owns and operates approximately 3.3 miles of sanitary sewers with 85 manholes. Results from the study revealed that the Borough's sanitary

sewer system appears to be in adequate condition. It is estimated that Colwyn's sanitary sewer system produces between 57,600 and 324,000 gpd of inflow during a wet weather event and 61,200 gpd of infiltration. The threshold for determining excess infiltration is 20,160 gpd (based on the established engineering standard of 1,500 gallons/day/inch-mile). Based on these data, the Borough does not appear to be a major contributor to the I&I problem currently being experienced by DELCORA.

2.4.1 Observed Problems

Of the six regions that were flow metered, three meter locations were judged to have infiltration rates in excess of acceptable standards. Although sanitary sewers were not televised, it is believed that there is approximately 72,000 gpd of infiltration. The study recommended undertaking an extensive televising and grouting project of the Borough's entire sanitary system to establish a master plan for total system rehabilitation.

Inspections during wet weather events revealed that there are seven slotted/grated sanitary sewer manhole covers that allow rainwater (inflow) to enter directly into the sewer system and seven other manholes in which the rainwater was entering into the sewer system through the manhole frame and cover. By replacing the manhole covers and using plastic dome inserts, it is estimated that the inflow rate could be reduced by at least 50%.

Based on the results of field surveys in which 43% of the manholes were inspected, the existing manholes appeared to be in good structural condition. Of the 30 manholes inspected, only four (13.3%) were noted to need serious rehabilitation (resealing the manhole and/or the connecting pipe with mortar).

Manholes located in open space areas of Beach and Peach Streets should be constructed with a locking frame to dissuade potential illegal discharge into the sewer system, and a "Flow-Seal" type manhole cover installed to inhibit stormwater flow from entering into the sewer system.

The region defined by meter locations 1 and 2 had an average flow rate of 119,664 gpd. A review of the raw data indicated that during the course of the study a large amount of flow, usually in excess of 720,000 gpd, is introduced to this drainage area several times over the course of the day.

Sump pump connection did not appear to be a problem.

2.4.2 Corrective Action Plan

The corrective action plan for Colwyn Borough includes televising and grouting terra cotta pipe joints, replacement of 7 slotted manhole lids, repair of 12 manholes, and the placement of manhole inserts. It was estimated that up to 243,000 gpd of I&I could be removed with the completion of the corrective action plan.

In addition to the individual corrective actions mentioned above, a detailed listing of the common corrective actions for Colwyn Borough is available in Table 4-1 of Section 4.

2.5 DARBY BOROUGH

Darby Borough, a member of the DCJA, owns and operates approximately 16.7 miles of sanitary sewers with 370 manholes. It is reported that 75% of the collection system was built prior to 1920. Since 1975 the Borough has undertaken several projects to reconstruct parts of the sanitary sewer system. Counting all projects, 65 manholes have been rebuilt, and 5,443 ft of sewer have been replaced, representing improvement of 17.5% of the manholes and 6% of the sewer main.

Between 1975 and 1994 the replacement rate averaged 220 ft of pipe each year. Starting in 1995, the Borough began major sewer reconstruction on Ninth and Tenth Streets in conjunction with improvement of the SEPTA trolley track. This work has been completed, and 19 manholes and 1,100 ft of sanitary sewer have been built.

As part of the planning for the project, sewers were cleaned and televised. It was discovered that seven storm inlets on Ninth Street and six inlets on Tenth Street connected into the sanitary sewer lines. At the time of the flow metering, all of the inlets on Ninth Street had been eliminated with the construction of a new storm system. At present, all inlets on Ninth and Tenth Streets between Main Street and Cedar Avenue have been disconnected from the sanitary sewer.

2.5.1 Observed Problems

2.5.1.1 Creek Crossings

Along Darby Creek there are six locations where the Borough's sewer lines are below the water level; three of these are located behind Park Lane School. At the time of the TV inspection, there were difficulties in accessing these six locations and any problems related to these crossings were unidentifiable. However, it was noted that from Bradford Rd to Thirteenth Street a sanitary sewer runs parallel to a small stream behind Park Lane School. The sewer is below the groundwater level for much of its length.

2.5.1.2 Roof Leaders

Curbside investigations identified blocks where homes and roof drains are connected to underground pipes. In eight of the 30 blocks surveyed, points of surface discharge for roof drains were located, with as many as 108 homes that may have roof drains connected to the sanitary sewers.

It was recommended that the Borough contact the residents on these blocks individually about disconnecting the roof drains.

2.5.1.3 Inlets

A map of the Borough identifying locations of inlets was developed from a curbside survey. As a result, 13 inlets on Ninth and Tenth Streets were disconnected from the sanitary sewer in 1996. There are 13 inlets that remain connected to the sanitary sewer.

2.5.1.4 Manhole Inspection

In 1978, the Borough initiated a program to rehabilitate existing manholes (replace frames and lids, replace steps, repair mortar joints, construct new channels, and parge over brick walls). Approximately 1/3 of all the manholes had work done under this program. Current inspections found that manholes were generally in very good condition, especially those repaired in 1978. Results of the investigations found only six manholes having any kind of seepage or minor leaks.

2.5.1.5 Sewer Video Inspection

The following problem areas were identified:

- The trunk sewer behind the Park Lane School, between Golf Road and Main Street, merits complete reconstruction of several large sections.
- Several spot repairs are needed on the trunk sewer along 13th Street.
- Two sections of the sewer along Cedar Avenue are high priorities for repair.
- On Fern Street, one manhole must be raised to grade.
- On 3rd Street, Greenway Avenue, and 4th Street, there are sections of the sewer that must be reconstructed.

2.5.1.6 Flow Metering

Analysis of the flow metering results revealed that Basin D-1 is contributing 46 million gallons annually from infiltration, primarily in the trunk sewer behind the Park Lane School, between Golf Road and Main Street. Basin D-2 contributes 5.8 million gallons annually, primarily due to inflow from inlets along MacDade Boulevard. Basin D-5 contributes 42 million gallons annually, primarily from infiltration through leaking joints of the trunk sewer.

Exhibit 4 of the Darby Borough I&I study report shows sewers that were observed to be carrying significant volumes of sewage during night monitoring. The trunk sewers in Subbasins D-1 and D-5 were carrying considerable volumes of flow.

Exhibit 18 of the Darby Borough I&I study report identifies specific I&I problem locations. In summary, the study reached the following conclusions:

- There are no pipes with average daily flows at capacity and the major trunk sewers are able to accommodate the peak flows.
- Less than 1% of the manholes have infiltration problems through the walls or pipe joints.

- An estimated 17.5 million gallons of inflow enters the Darby sewer system each year; the primary source being storm inserts and roof drains. The study identified pickholes in manhole lids as a secondary source of inflow.
- Inlets are connected to the sanitary sewer in the 900 block of Main Street, the 1100 block of Chestnut Street, MacDade Boulevard, and Pine Street.
- Inflow to the sanitary system can be reduced by 50%, or 8.8 million gallons, each year by proposed corrective action.
- An estimated 145 million gallons of infiltration enters the Darby sewer system each year.

2.5.2 Corrective Action Plan

The following actions were recommended in a 10-year plan:

- Eliminate the storm inlets in the 900 block of Main Street and the 1100 block of Chestnut Street.
- Install manhole inserts at low points.
- Perform spot repairs in Basins D-1 and D-6.
- Construct a separate storm sewer on Pine Street.
- Disconnect all roof drains from sewers.
- Grout joints in the Basin D-5 trunk sewer.
- Reconstruct 2,000 ft of Basin D-1 trunk sewer.
- Slip line 3,000 ft of Basin D-1 trunk sewer.
- Construct a separate storm sewer for MacDade Boulevard.

In addition to the individual corrective actions mentioned above, a detailed listing of the common corrective actions for Darby Borough is available in Table 4-1 of Section 4.

2.6 DARBY TOWNSHIP

Darby Township, a member of the DCJA and MA, owns and operates approximately 19 miles of sanitary sewers with 270 manholes and has performed I&I studies previously. Little sewer-related corrective action has been initiated to relieve conditions noted in these earlier I&I studies. A manhole insert procurement and installation program has been implemented as well as a program of inspections to identify illegal discharges. At present, only 45% of the manhole covers with through-style pick holes have no insert in place.

Darby Township is forecasting no expansion of its sanitary sewer infrastructure for the purpose of serving additional units.

2.6.1 Observed Problems

Investigations of sewers and appurtenances suggest that inflow was responsible for metered values that were slightly higher than those theoretically determined. Televised inspections conducted in sewers that were suspected I&I sources revealed no problems.

Raw sewerage data for the entire township correlate well with theoretical flows. However, visual observations made during manhole inspections revealed that widespread cover holes present a greater potential for I&I during precipitation events. Inflow, as opposed to infiltration was stressed because wet-weather peaks only marginally exceeded dry flows. According to the weighting scheme established for adjustment of visual inspection data by weather, metered flow, and I&I potential, only a portion of Darby Township merits significant corrective action. These conclusions were determined more on the basis of manhole inspection reports than metering data trends.

The Township's sewers exhibited a wet-weather peaking only 1.5 times greater than theoretical flow. Previous attempts to meter or televise Township sewers, near the Muckinipates interceptor outfall, were frequently abandoned or postponed due to excess surcharging.

2.6.2 Corrective Action Plan

Every manhole cover in the Township has two through-style pick holes, admitting potential inflow. The study recommended procurement of approximately 111 inserts to correct the balance of manhole conditions. Further, manhole insert installation, replacement, and/or rehabilitation will also serve to enhance hydraulic capacity by reducing inflow. At a minimum, 44.6% of Darby Township's manholes will receive corrective action. The best-case I&I reduction of 288,000 gpd could be justified at the resultant cost/benefit estimate of $0.017/gpd eliminated.

None of the existing collection system was proposed for pipe rehabilitation.

In addition to the individual corrective actions mentioned above, a detailed listing of the common corrective actions for Darby Township is available in Table 4-1 of Section 4.

2.7 FOLCROFT BOROUGH

Folcroft Borough, a member of the DCJA and MA, owns and operates approximately 11.1 miles of sanitary sewers with 195 manholes. Prior I&I studies in the Borough pinpointed specific problems and corrective actions were initiated. No widespread programs for manhole insert procurement and installation or removal of illegal connections have been initiated.

Folcroft Borough is forecasting no expansion of its sanitary sewer infrastructure for the purpose of serving additional units.

2.7.1 Observed Problems

In general, raw sewage meter data for much of the Borough correlated well with theoretical flows developed from actual building counts. Manhole inspections revealed that widespread cover holes present a greater potential for I&I during wet weather events. I&I was stressed because wet weather peaking factors were approximately 3.0. This pattern also was exhibited at meter site #10, even when average daily flow mirrored theoretical flow.

Analysis of the flow metering data reveals that inflow accounts for much more of the flow increases than infiltration during peak flow periods. This conclusion is clearly demonstrated in the Taylor and Heather subbasin (meter site #101).

Much of the Borough's collection system is located in proximity to either the main branch or a tributary of the Muckinipates Creek and Hermesprota Run. This location may account for the infiltration patterns in the flow metering data.

2.7.2 Corrective Action Plan

The corrective action plan recommends procurement of approximately 42 inserts (21.6% of system manholes). Actual meter results correspond closely to theoretical values and therefore, do not justify correcting the balance of the manhole deficiencies.

Only two portions of the existing collection system (creek crossings) are proposed for pipe rehabilitation totaling 373 linear feet of sewer. One aerial crossing near Valleyview Drive will require structural modification, but is not considered to exhibit I&I potential. Sewer repair/rehabilitation represents 6.3% of the system, and 21.6% of the Borough's manholes will receive corrective action.

In addition to the individual corrective actions mentioned above, a detailed listing of the common corrective actions for Folcroft Borough is available in Table 4-1 of Section 4.

2.8 GLENOLDEN BOROUGH

Glenolden Borough, a member of the MA, owns and operates approximately 16.7 miles of sanitary sewers with 224 manholes. Based on historic mapping, the majority of the Borough's system was constructed prior to the 1930s. Prior I&I studies in the Borough pinpointed specific problems and corrective actions were initiated. No widespread programs for manhole insert procurement/installation or removal of illegal connections have been initiated.

Glenolden Borough is forecasting no expansion of its sanitary sewer infrastructure for the purpose of serving additional units.

2.8.1 Observed Problems

Investigations of the sewers suggest that infiltration is responsible for peaking factors averaging 2.5 (maximum observed of 3.8). Low short-term increases in metered values were noted, suggesting that inflow does not greatly exacerbate infiltration-based peaking factors. Moreover, the Karen Circle meter site (#81) demonstrated virtually no effects from I&I.

The age and structural integrity of the manholes necessitate replacement, rather than inserts. Much of the Borough's collection system is located in proximity to the Muckinipates Creek. This may account for more infiltration-associated data patterns.
On average, the Borough's sewers exhibited a wet-weather peaking factor for both I&I of 3.32 times the theoretical flow. For this reason, should limited pipe rehabilitation or similar measures prove to reduce inflow, other sewers should be targeted for more intensive investigation. Only I&I sources with the greatest potential (sewers near/crossing creeks, i.e., Glen Avenue, Elmwood Avenue, MacDade Boulevard, Llanwellyn Avenue, Grays Avenue, Lynwood Circle, and Harrison Avenue) were televised.

2.8.2 Corrective Action Plan

Only certain portions of Glenolden Borough merit significant corrective action. Planned corrective action calls for procurement of 150 manhole inserts, 35 manhole rehabilitations, 12 manhole frames and covers (totaling 88% of the Borough's manholes); plus a total of 2,102 ft of sewer rehabilitation (2.38% of the collection system) in 3 locations (creek crossings).

In addition to the individual corrective actions mentioned above, a detailed listing of the common corrective actions for Glenolden Borough is available in Table 4-1 of Section 4.

2.9 LANSDOWNE BOROUGH

Lansdowne Borough, a member of the DCJA, owns and operates approximately 25.9 miles of sanitary sewers with 664 manholes. Since 1975, the Borough has undertaken 17 projects to reconstruct parts of its sanitary sewer system. A total of 7,050 ft of pipe have been replaced and 58 manholes rebuilt, representing 5% of the mains and 8.7% of the existing manholes. From 1977 to 1996, the replacement rate has averaged 353 ft per year. In 1995, the Borough purchased 100 polyethylene manhole inserts to restrict inflow during rainfall events. These were installed along Union Avenue, Wycombe Avenue, and in other low-lying intersections. This represents 15% of the total number of manholes in the Borough.

The Borough has a second ongoing I&I reduction program that requires the inspection of homes when sold to check for illegal connection of sump pumps and floor drains. Owners are required to physically disconnect the illegal plumbing.

In several locations the sanitary sewer follows the route of an old swale or stream where the drainageway has been enclosed in a culvert. Culverts built of set stone, mortared stone, or brick were generally built without solid floors. Culverts are prone to ground water seepage and are subject to exfiltration to a lesser extent. Locations where creeks run inside culverts are Pennock

Terrace from Baltimore Avenue, east of Ardmore Avenue, and behind the Ardmore Avenue Elementary School. As mentioned in the definitions, areas near bodies of surface water and with high ground water level are prone to infiltration.

North Wycombe Avenue and Bartram Avenue are two locations where groundwater is very close to the surface and above the elevation of the sewers.

A check was made throughout the Borough for roof drains that discharged underground, with possible connections to the sanitary sewer. No locations were identified as sources of inflow to the sewer.
The portion of the Borough that is tributary to the Cobbs Creek Basin (flowing to the City of Philadelphia) was studied in 1979. At that time, I&I was determined to be non-excessive; therefore, this area was not included in the current study.

2.9.1 Observed Problems

2.9.1.1 Creek Crossings

In various locations where sanitary sewers cross streams, the cast iron pipe encased in mortared stone, acts as a small dam or weir across the stream. There is no encasement around the 24-inch collector that crosses Falls Run at two locations. At the creek crossing west of the Knoll, and the crossing of Falls Run west of Bryn Mawr Avenue, two segments of sewer were repaired and encased in concrete in November 1996 to eliminate possible infiltration. Where Martin Drive crosses Falls Run, the stream bank has eroded, exposing the terra cotta pipe. Dye testing found no evidence of leaking, but the terra cotta pipe is damaged and the amount of inflow could be substantial.

2.9.1.2 Cross Connections

Two cross connections were identified during the study, both of which resulted in exfiltration from the sanitary sewer. Both locations have subsequently been sealed or the sewer abandoned.

2.9.1.3 Surcharging

Sewer system backups during wet weather periods have been reported near the intersection of Bryn Mawr and Runnemede Avenues.

2.9.1.4 Manhole Inspection

The overall condition of the Borough's manholes is good. Less than 4% were found to have infiltration of any significance. Where no channel exists, the flow velocity slows as the sewage goes through the manhole and sediment and debris settle out of the flow stream. Accumulations of sediment and debris in manholes are frequent causes of blockages in the system. MH-253 behind Wildman Arms has a 4-inch pipe discharging a steady stream of what appears to be non-sewage water from the apartments.

2.9.1.5 Video Inspection

The poor condition of the following sewers prevented the passage of the video equipment and the data collected from these sections are incomplete. Because most of the pipes that are in poor condition have alignment problems and bad sags, there are relatively few locations where a trenchless repair technique can be successfully applied. Most repairs will require complete reconstruction.

- Trunk sewer along south Lansdowne Avenue between Linden and Pennock Terrace needs joint rehabilitation to reduce high infiltration.
- Sewers in the 100 block of Stratford Avenue need to be replaced due to storm sewer deterioration.
- Trunk sewer between Baltimore Avenue and Dudley Avenue is in poor condition structurally with a number of offset joints.

2.9.1.6 Flow Metering

Based on night inspections, infiltration in the 10-inch and 12-inch diameter trunk sewer between Ardmore and Green Avenues is as much as 12,000 gpd/inch-mile. The volume of inflow to the sewers is significant because of the large number of manholes located near low points in the roadway and along gutterlines.

One outstanding observation from the investigations at the meter on Basin L-3 is that there are hydraulic conditions that are causing the pipe to surcharge. The volume of water during a wet weather peak exceeds the capacity of a 12-inch pipe at minimum grade. For the average daily flow of 330,000 gpd, there is no capacity problem, but wet weather peaks can triple the flow rate. Results from metering also demonstrated that during high flow periods the velocity slows dramatically (dropping below 1.0 ft/second.). This reduced velocity may result in the settling of sand and grit in the morning. The recommended course of action for basin L-3 is as follows:

- Fit manholes with inserts.
- Evaluate the maximum capacity of the trunk sewer between Stratford Avenue MH-650 and Bryn Mawr Avenue MH-142.
- Significantly reduce inflow, otherwise a section of the trunk sewer will have to be replaced with a larger pipe to increase the capacity.
- Improve several sections of sewer main between Ardmore and Green Avenues, which could reduce infiltration by 82 million gallons per year.

Infiltration into Basin L-4 is the second greatest volume of water being introduced to the sewer system, i.e., 46.5 million gallons annually. The rate of infiltration is 4,000 gpd/inch-mile. Although there were a number of manhole inserts installed on Union Avenue, inflow levels remain high, and the peak of the wet day flow graph has a strong correlation to the beginning and ending of a rainfall.

Within Basin L-5, the trunk sewer between Baltimore Avenue and Dudley Avenue is not structurally sound and the alignment is poor with a number of offset joints. Infiltration is the major problem in this basin, which allows 28.8 million gallons of water into the sewer system annually.

2.9.2 Corrective Action Plan

Exhibit 17 in the Borough's I&I study report identifies specific problem areas and corrective actions including:

- Regrout joints of the 24-inch diameter trunk sewer crossing Falls Run.
- Eliminate inflow from Wildman Arms at MH-253.
- Install manhole inserts in all manholes that are sited in a sump condition.
- Initiate an annual cleaning program.
- Grout the joints on the 18-inch diameter trunk sewer on Lansdowne Avenue between MH-599 and MH-605.
- Extend the concrete encasement of the sanitary sewer flowing from Martin Drive.
- Reconstruct the sewer from MH-510 on Baltimore Avenue to MH-657 south of the railroad.
- Implement system-wide manhole rehabilitation program.
- Reconstruct the sewer on Stratford Avenue between MH-273 and MH-650.
- Reconstruct portions of the trunk sewer between MH-650 and MH-142 that have insufficient capacity.
- Slip line portions of the trunk sewer between MH-650 and MH-333 to reduce infiltration.

In addition to the individual corrective actions mentioned above, a detailed listing of the common corrective actions for Lansdowne Borough is available in Table 4-1 of Section 4.

2.10 MARPLE TOWNSHIP

Marple Township, a member of the RHM and CDCA, owns and operates more than 65 miles of sanitary sewers with over 2,000 manholes. The sanitary sewer system in Marple Township is divided into five subsystems. Subsystems 1 through 4 discharge to RHM, and Subsystem 5 discharges to CDCA. This study focused on Subsystem 5, which is comprised of approximately 32.5 miles of sanitary sewers with over 900 manholes. It was estimated that during storm events, Subsystem 5 contributed between 720,000 and 1,440,000 gpd of inflow and approximately 365,760 gpd of infiltration.

2.10.1 Observed Problems

2.10.1.1 Infiltration

Of the 12 areas that were flow metered, only 4 were found to have excessive infiltration rates that could be removed in a cost-effective manner. Although the sanitary sewer mains in those four areas (meter locations 2 and 4, 5, 7, and 13) were not televised, it is believed that joint grouting could eliminate approximately 224,470 gpd of infiltration. The 30 sewer segments were identified as having significant infiltration and should be candidates for grouting.

An excessive amount of infiltration is entering the system between Beechtree Road and Cedar Grove Road (MH-356 to MH-375). This portion of the system should be considered for rehabilitation to abate the high infiltration rate.

2.10.1.2 Inflow

It is believed that the probable sources of the high inflow rate are residential sump pumps and/or the seepage of rainwater through leaky sanitary sewer main joints. An inflow evaluation conducted throughout Subsystem 5 identified only a few potential sources that would contribute to the high inflow rate, including two sanitary sewer mains (located near meter locations 3, 9, and 10) that were exposed to a flowing stream.

The study identified a pipe from MH 119 that is located over a stream with an open joint. Therefore, an increase in stream level could be a significant source of inflow that is attributed to the high inflow levels.

2.10.1.3 Manholes

The manholes were constructed both of brick and mortar and of precast concrete and as a whole were found to be in good structural condition; however, 27 manholes were observed to allow I&I. The Richard Drive sewer main is in such poor condition that it should be sealed off or reconfigured.

2.10.2 Corrective Action Plan

The recommended corrective action plan to remediate I&I in the Township consists of the following elements:

- Televising and grouting of joints, as needed, of approximately 9 miles of sanitary sewer.
- Implementing a program to remove illegal sump pump connections with the inspection occurring at the closing of real estate transactions. This program would also include a public education program about the illegality of sump pump and other area drain connections.
- Reconstructing sewers that are exposed to creeks.
- Raising manholes and installing watertight lids in wooded/natural areas.
- Installing manhole inserts in all manholes that do not currently have them.

- Repairing/rehabilitating an estimated 273 manholes.

In addition to the individual corrective actions mentioned above, a detailed listing of the common corrective actions for Marple Township is available in Table 4-1 of Section 4.

2.11 MORTON BOROUGH

Morton Borough, a member of the CDCA, owns and operates approximately 7.6 miles of sanitary sewers with 132 manholes. Prior I&I studies in the Borough pinpointed specific problems and corrective actions were initiated. No widespread programs have been initiated for manhole insert procurement/installation or removal of illegal connections. Approximately 11.2% of the Borough's collection system is located in proximity to Stony Creek, including 12 stream crossings.

Morton Borough is forecasting no expansion of its sanitary sewer infrastructure for the purpose of serving additional units.

2.11.1 Observed Problems

The results of the metered data reveal virtually no lag in meter value increases after a storm event and are indicative of inflow. Investigation of these sewers and appurtenances suggests that inflow is responsible for escalating metered flows to values 43% higher during wet weather events.

The Borough's sewers did corporately exhibit a wet-weather peaking factor roughly five times greater than theoretical flows and the suspected main source of I&I is through illegal connections.

2.11.2 Corrective Action Plan

The corrective action plan for the Borough calls for the procurement of 132 manhole inserts (all the manholes owned by the Borough), the replacement of 7 frames and covers, and the rehabilitation of 744 linear feet of sewer between Providence Road and Harding Street (which represents less than 2% of the entire system).

In addition to the individual corrective actions mentioned above, a detailed listing of the common corrective actions for Morton Borough is available in Table 4-1 of Section 4.

2.12 NETHER PROVIDENCE TOWNSHIP

Nether Providence Township, a member of the CDCA, owns and operates approximately 27.6 miles of sanitary sewers with 650 manholes serving 2,763 units. There is no history of a formal I&I program in the Township; thus, problems have been corrected as they arose.

Nether Providence Township has large areas that are currently unsewered and is planning expansion of its sanitary sewer infrastructure into these areas for the purpose of serving additional units.

2.12.1 Observed Problems

Based on the results of the manhole inspection, sediment was apparent in some of the manholes (about 2%), indicating that there could be breaks in upstream lines or separated joints.

The results of the smoke tests revealed that over 60% of the surface-water intrusion occurred through laterals and house plumbing.

The results from the metered data indicated the possibility of infiltration in the NP-12 study area. This is probably the result of several factors:

- Cracked/broken sanitary sewer pipe and/or offset/leaky joints exposed to high water table.
- Lateral connections in poor condition exposed to groundwater.

Inflow does not appear to be as significant a problem as does infiltration. Infiltration from the water table through breaks in the line such as the one confirmed on Surry Road, is suspected to be a major source of infiltration.

2.12.2 Corrective Action Plan

Key maintenance items were selected based on the presumed overall benefit to the I&I situation including the following specific items:

- Repair of 378 manholes.
- Installation of 600 manhole inserts.
- Replacement of 8 manhole covers.
- Cleaning of 137 manholes.
- Parging of 54 manholes.
- Chemical root treatment of all sewers.
- Grouting of all joints.
- Annual cleaning and televising of the system.

In addition to the individual corrective actions mentioned above, a detailed listing of the common corrective actions for Nether Providence Township is available in Table 4-1 of Section 4.

2.13 NORWOOD BOROUGH

Norwood Borough, a member of the MA, owns and operates approximately 14.1 miles of sanitary sewers with 206 manholes. Prior I&I studies in the Borough pinpointed specific problems and corrective actions were initiated. No program for the removal of illegal connections has been initiated.

It is apparent that the age of the system, root damage, manhole seepage, and tie-ins of basement sump pumps are the significant contributors to the I&I problem facing the Borough. Approximately 50% of the manholes investigated have inserts.

Norwood Borough is forecasting no expansion of its sanitary sewer infrastructure for the purpose of serving additional units.

2.13.1 Observed Problems

The results of the manhole inspection indicate that there is only one manhole that is in immediate need of replacement. Sediment was apparent in some of the manholes (about 5%), indicating that there could be breaks in lines or separated joints upstream from the manhole.

Grease is predominant in several locations:

- Seneca line from Summit Avenue.
- Chester Pike Line from Huron Avenue to Winona Avenue, principally due to Dunkin Donuts.
- The line running in the alley parallel to Winona Avenue and Amosland Road, between Welcome Avenue to Chester Pike (this line is behind Erin's Pub).

Smoke testing revealed that over 60% of surface-water inflow occurs through lateral and house plumbing.

2.13.2 Corrective Action Plan

Retrofitting the remainder of the manholes with inserts is an immediate remedial action that will reduce inflow.

Key maintenance items were selected, based on the presumed overall benefit to the I&I situation. These include: chemical root treatment to destroy roots and prohibit regrowth; grouting, on average, every fourth joint in the system; and annual cleaning of all sewers. In addition, manhole repairs should be scheduled as priority items.

In addition to the individual corrective actions mentioned above, a detailed listing of the common corrective actions for Norwood Borough is available in Table 4-1 of Section 4.

2.14 PROSPECT PARK BOROUGH

Prospect Park Borough, a member of the CDCA, owns and operates approximately 13.9 miles of sanitary sewers with 179 manholes. Prior I&I studies in the Borough pinpointed specific problems and corrective actions were initiated. No program for the removal of illegal connections has been initiated.

In general, the sanitary sewer system is in adequate condition; however, the five drainage areas defined by meter locations 9, 11, 12, 13, and 14 are responsible for approximately 85% of the infiltration generated and should be considered for abatement.

Prospect Park Borough is forecasting no expansion of its sanitary sewer infrastructure for the purpose of serving additional units.

2.14.1 Observed Problems

Inflow evaluation did not discover any deficiencies in the sanitary sewer system, therefore, it is believed that the probable sources of the high inflow rate are sump pumps or leaky sewer joints. Measured infiltration rates after a rainstorm event were between 1,000 and 10,000% higher than during a period without precipitation in certain areas of the Borough.

Physical inspection of manholes found a moderately high incidence rate of groundwater infiltration due to their poor structural condition. An estimated 27.4% of the 60.7% of sewer system manholes inspected need rehabilitation measures.

2.14.2 Corrective Action Plan

The recommended corrective action plan to remediate I&I in the Borough consists of the following elements:

- Televising and grouting of joints, as needed, of approximately 3 miles of sanitary sewer.
- Implementing a program to remove illegal sump pump connections with the inspection occurring at the closing of real estate transactions. This program would also include a public education program about the illegality of sump pump and other area drain connections.
- Replacing two slotted manhole covers.
- Installing manhole inserts in selected manholes that do not currently have them.
- Repairing/rehabilitating of an estimated 81 manholes.

In addition to the individual corrective actions mentioned above, a detailed listing of the common corrective actions for Prospect Park Borough is available in Table 4-1 of Section 4.

2.15 RIDLEY PARK BOROUGH

Ridley Park Borough, a member of the CDCA, owns and operates approximately 18.8 miles of sanitary sewers with 339 manholes. Prior I&I studies in the Borough pinpointed specific problems and corrective actions were initiated. To this date, efforts to reduce I&I were typically completed on a "case-by-case" basis. Although manhole repair, rehabilitation, and widespread insert procurement/installation were undertaken, very little sewer-related corrective action has been initiated to relieve conditions noted in earlier I&I studies. A program of inspections is in place to identify illegal discharges to Ridley Park collector sewers.

The study concluded that short-term increases in sewage flow, with a peaking factor of 3, are directly attributable to inflow solely introduced from pick-holes in the manhole covers.

Ridley Park Borough is forecasting no expansion of its sanitary sewer infrastructure for the purpose of serving additional units.

2.15.1 Observed Problems

In general, raw sewerage metering data collected during the study period for the entire Borough correlate well with theoretical flows developed from actual building counts. However, visual observations made during manhole inspections revealed that widespread cover holes (especially when in sump condition) present a greater potential for I&I during precipitation events.

A high "base ratio" of average daily flows with respect to theoretical flow at sites 42 and 85 during dry weather suggest that infiltration is the dominant source of additional water in these areas. Meter site 85 demonstrated the highest base ratio (9.79) but only increased 14% during storm events. However, on average, the Borough's sewers did frequently exhibit a wet-weather peaking factor 2 to 3 times greater than average daily flows, indicating that inflow is present.

2.15.2 Corrective Action Plan

Manhole insert installation, replacement, and/or rehabilitation will also serve to enhance hydraulic capacity by reducing inflow. In addition, rehabilitation/replacement of existing terra cotta pipe with plastic sewer sections or lining sewers will enhance capacity.

In summary, certain conditions have been viewed as strongly problematic, with respect to the potential for large volume I&I. These problem areas were determined primarily on the basis of inspections and metering, rather than on TV inspection trends. Every manhole cover in the Borough has two, through-style pick holes, admitting present/potential inflow. Therefore, the corrective action plan recommended that approximately 35 manholes be rehabilitated, and 292 inserts and 12 new frames and covers be procured to correct observed problems. Little of the existing collection system is proposed for pipe rehabilitation.

In addition to the individual corrective actions mentioned above, a detailed listing of the common corrective actions for Ridley Park Borough is available in Table 4-1 of Section 4.

2.16 RIDLEY TOWNSHIP

Ridley Township, a member of the MA and CDCA, owns and operates approximately 69.5 miles of sanitary sewers with approximately 1,400 manholes. Prior I&I studies in the Township pinpointed specific problems, and corrective actions were initiated. Other than manhole and isolated pipe repairs made concurrent with the earlier studies, little infrastructure rehabilitation has been undertaken. No other efforts have been made to significantly reduce I&I. Areas in the Crum Creek collection system have been upgraded via insert placement. No system-wide program for the installation of manhole inserts has been initiated. A program of inspections is in place to identify illegal discharges to Township collector sewers.

Ridley Township is forecasting no expansion of its sanitary sewer infrastructure for the purpose of serving additional units.

Inspection of sanitary sewers and appurtenances suggests that inflow is responsible for peaking factors, which, in some areas are over 8. Corrective actions focus on basin-specific, sewer/manhole rehabilitation and widespread identification and elimination of illegal connections. Additionally, much of the Township collection system is located in proximity to or crosses Stony, Muckinipates, Little Crum, and Crum Creeks.

Only 7.6% of the total system received TV inspection of which none revealed significant problems. High recurrent incidence of poor manhole conditions, and the fact that all manholes have two through-style pick holes, may explain that short-term (hours after rain events) increases in metered values were attributable to inflow introduced solely from street manhole cover pick-holes.

2.16.1 Observed Problems

Because of the prolonged history of downstream surcharging near the confluences of Ridley Township with other municipal collection systems and interceptors, efforts were concentrated in these areas. However, reproducible metering results were generally limited to dry weather events, inferring that wet weather events would exacerbate the already problematic peak flow conveyance.

Overall, the Township's sewer system exhibited mean dry and wet weather peaking factors of 2.73 or 4.52 times greater than theoretical flows, respectively. More specifically, the Crum Creek subbasins exhibited mean dry and wet-weather peaking factors of 2.25 or 3.07, while Stony Creek values escalated to 3.21 or 5.97, respectively. In Subbasin 49 (Eisenhower, Catherine, Kossuth, Vauclain, and Kelly Avenues), metered flows during precipitation events peaked as high as 9.56 times theoretical flows and were attributed to manhole conditions combined with illegal connection of roof and area drains.

2.16.2 Corrective Action Plan

Every manhole cover in the Township presently has two through-style pick holes. The results of the study recommended 73 manhole in situ rehabilitations, and procurement of 161 inserts and

28 new watertight frames/covers to correct manhole conditions. Widespread manhole insert installation, replacement, and/or rehabilitation will serve to enhance hydraulic capacity and mend structural problems.

The corrective active plan also calls for slip lining 43,300 ft of sewer. As a result, 11.8% of the total sewer footage and 262 manholes will receive corrective action.

In addition to the individual corrective actions mentioned above, a detailed listing of the common corrective actions for Ridley Township is available in Table 4-1 of Section 4.

2.17 RUTLEDGE BOROUGH

Rutledge Borough, a member of the CDCA, owns and operates approximately 2.5 miles of sanitary sewers with 33 manholes serving 124 units. Prior I&I studies in the Borough pinpointed specific problems and corrective actions were initiated. To this date, efforts to reduce I&I were typically completed on a "case-by-case" basis. No widespread programs for manhole insert procurement or the removal of illegal discharges to Borough sewers have been implemented.

Rutledge Borough is forecasting no expansion of its sanitary sewer infrastructure for the purpose of serving additional units.

2.17.1 Observed Problems

A severe sag in the sewer was observed in the line running along Waverly Terrace and from Waverly Terrace to the first manhole between Swarthmore Avenue and Rutledge Avenue.

A total of 1,668 ft of sewer were televised, and the following problems were noted:

- Three cracked crowns.
- One hole in the pipe.
- Two leaking joints.
- One instance of root intrusion.

2.17.2 Corrective Action Plan

The planned corrective action plan includes the following items:

- Installation of 33 manhole inserts.
- Slip lining of 1,190 ft of sewer.
- Replacement of 435 ft of sewer.

In addition to the individual corrective actions mentioned above, a detailed listing of the common corrective actions for Rutledge Borough is available in Table 4-1 of Section 4.

2.18 SHARON HILL BOROUGH

Sharon Hill Borough, a member of the DCJA, owns and operates approximately 12.2 miles of sanitary sewers with 230 manholes serving approximately 5,600 residents. Efforts to reduce I&I in the Borough date back over 30 years. Within the last 3 years, several projects have been undertaken to remove storm sewer inlet connections to the sanitary sewer. These inlets were all connected to the Darby Creek Interceptor watershed, and were estimated to allow an average of 12,000 gpd inflow into the system.

Sharon Hill Borough is forecasting no expansion of its sanitary sewer infrastructure for the purpose of serving additional units.

Based on flow metering, it can be concluded that infiltration is introducing far more extraneous water into the sewer system than inflow. The adjusted annual inflow values were found to be 10 to 100 times less than the base infiltration amounts in each of the subbasins.

The Borough inspects dwellings and businesses for occupancy permits and requires removal of illegal downspout and sump pump connections. Also, the Borough has recently removed what was believed to be the last storm drainage connection.

2.18.1 Observed Problems

The three metered areas comprised 75% of the total dwelling units, over half the land area and most of the 90-year-old sewers. The flow metering during night hours found that Subbasins D-3a and D-3b had the greatest percentage increase in observed flows during wet weather events.

Investigations revealed that isolated house roof drains may be connected to the sanitary laterals in some of the older dwellings in Subbasin D-2a.

The channel in MH-61 is deteriorated.

The study noted an increase in flows in Subbasin D-3a during wet weather events, but could not trace them to storm sewer connections. However, various properties were identified as having possible roof drain connections to sanitary laterals. Secondly, high flow rates may be a consequence of infiltration given the age of the system. It was noted that about 51% of the sewer system in Subbasin D-3a is over 90 years old and the remainder of the system is 60 to 70 years old.

A section of a combined sewer was discovered still in use, extending from the terminus of Ridley Avenue to Barker Avenue. The old 24-inch diameter sewer carried the sanitary flows from Ridley Avenue.

The infiltration rate measured in Subbasin D-3b was over 5,166 gpd/inch-mile. This high value can be attributed to the vicinity of the coastal plain. Subbasin D-3b is probably subjected to higher groundwater levels than Subbasins D-3a and D-2a. Infiltration measured in Subbasin D-2a was less than 1,400 gpd/inch-mile and is not considered excessive, whereas the rate of

infiltration measured in Subbasin D-3b was over 1,733 gpd/inch-mile. This figure is higher than desirable and may be reflective of the large number of lateral connections in this subbasin. Analysis of the base infiltration for the three subbasins shows that Subbasin D-3b has the greatest rate of infiltration. Subbasin D-2a has the least infiltration.

2.18.2 Corrective Action Plan

The corrective action plan for Sharon Hill Borough includes the following items:

- Clean and televise sections not inspected to date.
- Slip line 4,780 ft of sewers.

In addition to the individual corrective actions mentioned above, a detailed listing of the common corrective actions for Sharon Hill Borough is available in Table 4-1 of Section 4.

2.19 SPRINGFIELD TOWNSHIP

Springfield Township, a member of the DCJA, MA, and CDCA, owns and maintains approximately 83.4 miles of sanitary sewer with 2,060 manholes. Since 1972, the Borough has been very aggressive in controlling I&I with a program of televised inspections, flow metering, smoke testing, grouting, and inflow elimination.

Springfield Township has an active I&I program with ongoing repairs. Over the last few years the following rehabilitation has been performed: Insituform rehabilitation of 1,000 ft of sewer line, manhole inserts for 1,000 manholes, sump pump inspections, and metering of 75% of the Township's sanitary sewers.

2.19.1 Observed Problems

Because the Township has an active I&I elimination program, a study was not performed. No estimates of I&I reduction were provided by the Township.

2.19.2 Corrective Action Plan

It is anticipated that the I&I elimination program conducted by the Township will continue at its present level for the near future with an additional 1,000 linear feet of sewer being slip lined and an additional 1,000 manhole inserts being procured over the next 5 years.

In addition to the individual corrective actions mentioned above, a detailed listing of the common corrective actions for Springfield Township is available in Table 4-1 of Section 4.

2.20 SWARTHMORE BOROUGH

Swarthmore Borough, a member of the CDCA, owns and maintains approximately 18 miles of sanitary sewer with 398 manholes. The Borough has been very aggressive since 1972 in controlling I&I with a program of televised inspections, flow metering, smoke testing, grouting, and inflow elimination.

Borough personnel have indicated that surcharging of the interceptor in the North Drainage Area occurs during periods of heavy rainfall. The surcharging begins in the vicinity of MH-B13 on Benjamin West Avenue between Garrett Avenue and Princeton Avenue. The surcharging conditions occur along the remainder of the interceptor that extends from MH-B13 under the SEPTA railroad tracks, under the Borough garage, and then along Oberlin Avenue, Lafayette Avenue, and Harvard Avenue to MH-B1 located South of Cresson Lane. MH-B1 is the tie-in point of the Borough's sanitary sewer with the CDCA interceptor.

Surcharging of the interceptor below MH-A14 also occurs during periods of heavy rain. This interceptor extends from MH-A10 easterly through private property to the intersection of Haverford Place with Drexel Avenue and then easterly along Drexel Avenue to another tie-in point with the CDCA interceptor located east of the cul-de-sac end of Dickinson Avenue.

2.20.1 Observed Problems

The results of the flow monitoring indicate that infiltration of approximately 250,000 gpd is occurring upstream of MH-B7 in the North Drainage Area. Above MH-A7 in the South Drainage Area, infiltration in the amount of approximately 20,000 gpd is present. The conclusions drawn from the flow measurements are that the surcharging in the South Drainage Areas is mainly attributable to inflow because the base flow from infiltration is relatively small. However, in the North Drainage Area, it appears that both I&I contribute to the surcharging problems.

Results from the smoke tests indicated possible sources of inflow at nine locations in the North Drainage Area and eight locations in the South Drainage Area.

The TV inspection reports identified six areas where the mains were broken or obstructed, root intrusion was present at joints and lateral connections, and offset joints and wet joints also indicate possible sources of infiltration.

2.20.2 Corrective Action Plan

The corrective action plan for Swarthmore Borough includes the following items:

- Slip lining from MH-C2 to MH-C1 and lateral serving 410 Thayer Road.
- Slip lining from MH-A31 to MH-A25 and the laterals serving 210 and 214 Cornell Avenue.

- Slip lining from MH-A16 to MH-A14, MH-B3 to MH-B6, MH-B6 to MH-B22, MH-B37 to MH-B61, MH-C12 to MH-C10, MH-B6 to MH B37, and from the new Odgen Avenue manhole (see below) to MH-C32.
- Installing a frame and cover on a manhole in the yard of 124 Guernsey Road in the vicinity of MH-C23
- Reconstructing MH-A64 and MH-A65 in the 300 block of Cornell Avenue.
- Reconstructing the sewer from MH-A66 and MH-A25 in the 300 block of Cornell Avenue.
- Reconstructing the sewer from MH-A15 to MH-A14 on Union Avenue.
- Reconstructing the sewer from MH-B10 to MH-B60 on Oberlin Avenue.
- Reconstructing the sewer from MH-C20 to MH-C22 including a new manhole on the north side of Odgen Avenue.
- Performing chemical/mechanical root removal.
- Installing manhole inserts in MH-C38, MH-B22, MH-A31, and MH-A66.

In addition to the individual corrective actions mentioned above, a detailed listing of the common corrective actions for Swarthmore Borough is available in Table 4-1 of Section 4.

2.21 UPPER DARBY TOWNSHIP

Upper Darby Township, a member of the DJCA and MA, owns and maintains sanitary sewers that discharge to the City of Philadelphia as well as to the Authorities. This study focused on the areas serviced by DELCORA through DJCA and MA. This area comprises 2.9 square miles and contains approximately 51.7 miles of sewers and over 1,213 manholes serving over 27,000 residents.

2.21.1 Observed Problems

The study indicated that sanitary sewers in the Darby Creek system have an infiltration rate of 1,310,000 gpd and an inflow rate of 1,520,000 gpd. The Muckinipates system on the other hand has an infiltration rate of 730,000 gpd and an inflow rate of 190,000 gpd.

Results from flow monitoring indicated several problem areas. Subbasins A5, D1, and D5 from the Darby Creek sewershed had surcharged readings. During TV inspections of the lines notable findings were identified in the I&I report and identified on the map. The following subbasins were identified as having predominantly high I&I rates:

Subbasin	Infiltration (gpd)	Inflow (gpd)	Subbasin	Infiltration (gpd)	Inflow (gpd)
A-2	358,000	608,000	D-2	248,000	145,000
A-5	447,000	384,000	P-2*	736,000	38,000
A-7*	287,000	73,000	P-5	726,000	186,000
A-8*	99,000	142,000			

* indicates subbasin that flows into other subbasin.

Physical inspection found evidence of inflow entering different areas of the system. The manholes subjected to ponding and those located in a drainage path are particularly vulnerable to any extraneous flows entering through cracked, broken, or loose covers and/or frames. The inspection indicated no evidence of problems related to cross-connections with storm sewers.

2.21.2 Corrective Action Plan

The corrective action plan for Upper Darby Township includes the following items:

- Joint grouting 5,790 ft of sewers.
- Slip lining of 1,924 ft of sewers.
- Replacing of 1,162 ft of sewers.
- Replacing of one manhole.
- Cleaning of 317 manholes.
- Repairing manhole frames and covers on 948 manholes.
- Installing 20 manhole inserts.
- Sealing the walls of 409 manholes.

In addition to the individual corrective actions mentioned above, a detailed listing of the common corrective actions for Upper Darby Township is available in Table 4-1 of Section 4.

2.22 YEADON BOROUGH

Yeadon Borough, a member of the DCJA, owns and operates approximately 21.7 miles of sanitary sewers with 400 manholes serving 4,900 units. There is no history of a formal I&I program and problems have only been addressed as they arose.

Yeadon Borough is forecasting no expansion of its sanitary sewer infrastructure for the purpose of serving additional units.

It is apparent that the age of the system is a major issue. Root damage, manhole seepage, and degraded joints are the primary causes of the problems. Approximately 30% of the manholes did have an insert. Sump pumps connections do not appear to be prevalent in the Yeadon system.

2.22.1 Observed Problems

Grease is predominant in several locations:

- Parmley Avenue from West Cobbs Creek Parkway to Pleasant Road.
- Baily Road and Cypress Street.

Sediment was apparent in some of the manholes (about 4.5%), indicating that there could be a break in upstream lines or joints.

2.22.2 Corrective Action Plan

Key maintenance items were selected based on the presumed overall benefit to the I&I situation as follows:

- Repair of 164 defects observed in the manholes.
- Installation of 287 manhole inserts.
- Chemical root treatment.
- Grouting of every joint in the system.
- Annual cleaning and televised inspections.

In addition to the individual corrective actions mentioned above, a detailed listing of the common corrective actions for Yeadon Borough is available in Table 4-1 of Section 4.

3. SUMMARIES OF INDIVIDUAL AUTHORITY STUDIES

3.1 CENTRAL DELAWARE COUNTY AUTHORITY

CDCA has four primary interceptor lines: Crum Creek Interceptor, Little Crum Creek Interceptor, Stony Creek Interceptor, and the Prospect Park Interceptor, totaling approximately 16.4 miles of sewers with 540 manholes. In 1994, a study was completed to determine the need for improvement of these facilities. The facilities were also monitored for the influence of I&I on the system. The Trout Run extension of the Crum Creek Interceptor in Marple Township was found to be in good condition in a 1986 study and was not re-investigated in 1994.

3.1.1 Observed Problems

Signs of severe surcharging caused by numerous partial blockages were observed in the Prospect Park Interceptor.

Inspection of the Little Crum Creek Interceptor revealed an area of visible infiltration along the south side of Ridley Park Lake. The inspection also revealed five areas where the old interceptor, thought to have been abandoned, was still in service. These areas are listed below:

1. Ridley Township, south of MacDade Boulevard, behind the properties along Morton Avenue.
2. Ridley Township, Georgetown Road, south of Rosemont Lane.
3. Ridley Township, north of Michigan Avenue.
4. Swarthmore Borough, east of Dickenson Avenue.
5. Swarthmore Borough, north and south of Yale Avenue. The site south of Yale Avenue required emergency repair to prevent the discharge of sewage into the creek.

Inspection of the Crum Creek Interceptor creek crossings revealed visible infiltration at the crossing in Smedley Park.

3.1.2 Corrective Action Plan

The two sites with the potential for exfiltration were repaired as an emergency repair.

Based on the other problems, the corrective action plan includes:

- Installing manhole inserts in all manholes.
- Slip lining the Smedley Park creek crossing.
- Televising the remaining creek crossings and slip lining if necessary.
- Cleaning the interceptors on a regular basis. (According to the report, the Prospect Park Interceptor was cleaned in September 1994.)
- Repairing the remaining areas in the old interceptor as described above.

In addition to the individual corrective actions mentioned above, a detailed listing of the common corrective actions for CDCA is available in Table 4-1 of Section 4.

3.2 DARBY CREEK JOINT AUTHORITY

DCJA has three primary interceptor lines: the Darby Creek Interceptor, the Cobbs Creek Interceptor, and the Hermesprota Creek Interceptor, totaling approximately 10.7 miles with 250 manholes. In 1994, DCJA commissioned an I&I study of their system.

3.2.1 Observed Problems

Flow metering confirmed the presence of severe I&I. Specifically, the following problems were observed:

- Suspected grit deposits downstream from MH-49 are partially obstructing flow.
- A blockage is suspected between MH-98 and MH-99 adjacent to the Hoffman Park tennis courts in Lansdowne Borough.
- In Darby Borough, an abandoned 24-inch creek crossing allows creek water to enter the interceptor.
- A second creek crossing between Springfield and Upper Darby is allowing creek water to enter the interceptor.

3.2.2 Corrective Action Plan

On May 19, 1999, the DCJA Board approved a routine maintenance and inspection program for their interceptor system. The plan covers a 6-year cycle in which the rights-of-way are cleared, pipes are cleaned, video inspection is conducted, and root control treatment is performed.

In addition to the routine maintenance program, the following corrective actions are appropriate:

- Cleaning to remove blockages.
- Investigation of the creek crossings and slip lining as necessary.
- Installation of manhole inserts in all manholes.

In addition to the individual corrective actions mentioned above, a detailed listing of the common corrective actions for DCJA is available in Table 4-1 of Section 4.

3.3 MUCKINIPATES AUTHORITY

MA has only one primary interceptor, Muckinipates Creek Interceptor, which was constructed during 1949 and 1950 and runs approximately 4.9 miles with 118 manholes. There are 55 municipal sewer connections to the interceptor and 17 direct user connections, including 5 apartment complexes, shopping center, church, and 10 residences. In the 1980s, an I&I study of

the interceptor concluded that the majority of the I&I problem was attributable to the tributary municipal systems.

3.3.1 Observed Problems

Historically, two sections of the interceptor have been subject to surcharging. The first section is in the rear of #1, #3, and #5 Amosland Road. These houses have laterals that tie into the interceptor and the backyards were graded to within 6 to 12 inches of the top of the interceptor. The other area is between MH-64 and MH-70 where one of the apartment complexes discharges. Root removal was conducted between MH-62 and MH-64 to correct the problem.

The lack of properly recorded easements has created a number of difficulties in accessing and maintaining the interceptor. The interceptor from MH-3 to MH-16 has never been televised due to access difficulties.

A total of 77 manhole covers were found to be subject to inflow, and 26 either could not be found or could not be opened.

A total of 12 stream crossings were inspected and no problems were observed.

3.3.2 Corrective Action Plan

The recommended corrective action plan for MA includes:

- Procuring and installing manhole inserts.
- Televising all lines to document I&I.
- Cleaning sewers and manholes.

3.4 RADNOR HAVERFORD MARPLE SEWER AUTHORITY

RHM maintains an active I&I reduction program for its 8.25 miles of interceptors. RHM began conducting extensive I&I studies in 1994. An I&I program annual report dated 7 April 1998 was submitted that summarized I&I activities in 1997. RHM provides I&I corrective services to its member municipalities.

3.4.1 Observed Problems

The ongoing study has found leaking pipe joints, cracked pipes, etc.

3.4.2 Corrective Action Plan

RHM remedies problems, such as leaking pipe joints, as part of normal maintenance and repair activities. Extraordinary problems, such as storm sewer interconnections, are reported to the individual municipalities.

In 1997, RHM estimated that 43,875 gpd of I&I was removed by repair and rehabilitation activities, 15,900 gpd of I&I was removed by the RHM installation of manhole inserts, and 90,000 gpd of I&I was removed by municipal activities, for a total annual removal of 149,775 gpd.

In addition to the individual corrective actions mentioned above, a detailed listing of the common corrective actions for RHM is available in Table 4-1 of Section 4.

3.5 FIVE-YEAR PLAN FOR AUTHORITIES

The I&I studies for the Authorities were reviewed to identify the types of I&I problems present in the systems and potential remedies for the problems. An optional Five-Year Plan was then developed for the Authorities that should reduce the I&I present in their systems.

The I&I problems observed in the Authority systems include leaking joints along the interceptors, line breaks in the interceptors at creek crossings, open connections to the creeks, and leaking manholes and manhole covers. The studies also noted areas of accumulated grit and debris that would, or could, surcharge the interceptor system.

The generic Five-Year Plan that the Authorities could adopt to address these problems is outlined below:

Year 1

- Review the I&I studies and determine where maintenance and sewer cleaning need to be conducted. Execute maintenance and cleaning activities and identify any I&I problems observed.
- Review the I&I studies and I&I problems observed during maintenance and cleaning (above). Identify potential corrective actions required to reduce I&I and conduct a cost-benefit analysis to determine the corrective actions to be taken.
- Authorize the execution of the corrective actions. These actions would be scheduled to meet seasonal (construction) and financial constraints over the duration of the Five-Year Plan.
- Identify routine maintenance practices that would lead to improved performance of the interceptor system. Prepare a Preventative Maintenance Plan that would include a sewer cleaning schedule, monitoring of "trouble" locations in the system, and other activities that would benefit the Authority. Include a procedure that would immediately identify I&I problems for subsequent corrective action.
- Implement the Preventative Maintenance Plan.
- Install manhole inserts in all manholes.

Years 2 Through 5

- Execute corrective actions. As the corrective actions are completed, monitor their performance.
- Execute the Preventative Maintenance Plan. Remedy observed I&I problems.

4. SUMMARY OF INDIVIDUAL CORRECTIVE ACTION PLANS

Table 4-1 presents a summary of the corrective action plans and the costs estimated in each individual study. However, because the widely varying unit costs make comparison between municipalities difficult, an attempt was made to normalize these unit costs. The normalized unit cost row on Table 4-1 was calculated by averaging the unit costs reported in each study and adding 25% for costs associated with engineering, legal, and procurement services. Unit costs from the individual studies that were significantly outside the norm of the other studies were discounted and not used to compute the average. Springfield Township did not perform a study because they currently have an active I&I removal program. The estimates for future work were based on the effort expended in recent years and the assumption that this level of effort will continue. RHM also has an active I&I program and its future efforts were estimated in the same manner.

Table 4-2 presents the items in the individual, municipal corrective action plans using the normalized unit costs from Table 4-1. The summary of all recommended improvements results in an average cost of $0.85/gpd removed for the municipalities and an average cost of $2.02/gpd removed for the Authorities.

Sumps and downspouts are an especially difficult problem for any municipality. Ordinances may prohibit sumps and roof drains from being connected to sanitary sewers. However, many are suspected of being tied into the sewers. Some communities have implemented programs that call for the Code Enforcement Officer (CEO) to inspect a property when it is sold and to order illegally connected sumps and roof drains disconnected and the discharge transferred to the lawn. However, it is suspected that many of these sumps are reconnected as the homeowners do not want the discharge onto their lawns. With few storm sewers, discharging to the lawn is the most logical option. When the lawn is saturated, the homeowner would probably want to reconnect the sump to the sanitary sewer. This becomes an almost impossible inspection problem for the CEO.

Table 4-1
Effort and Cost Summary of Recommended I&I Reduction Program

Municipality	TV (lf)	TV/Clean (lf)	Chemical Grouting (lf)	Chemical Root Removal (lf)	Sewer Slip Lining (lf)	Sewer Replacement (lf)	Inserts (ea)	Manhole Cleaning (lf)	Reset Frame (ea)	Seal Frame (ea)	Frame & Cover Replacement (ea)	Manhole Repair/Seal (ea)	MH Chimney Seal (ea)	Manhole Liner (ea)	Manhole Replacement (ea)	Disconnect Inlets (ea)
Aldan Borough		$ 8.33	$ 30.00 [1]		$ 50		$ 50					$ 300	$ 250			
Clifton Heights Borough							$ 40			$ 300	$ 250	$ 500	$ 250			
Collingdale Borough						$ 80						$ 1,150		$ 2,500	$ 2,500	
Colwyn Borough							$ 50				$ 1,000	$ 720				
Darby Borough					$ 37	$ 140	$ 30									$ 2,000
Darby Township							$ 47									
Folcroft Borough																
Glenolden Borough					$ 48		$ 34									
Lansdowne Borough						$ 300 [1]										
Marple Township	$ 1.63						$ 50				$ 1,250	$ 720				
Morton Borough					$ 47		$ 34									
Nether Providence Township	$ 0.65		$ 5.00	$ 1.75			$ 36		$ 140	$ 50	$ 480	$ 410	$ 300			
Norwood Borough	$ 0.65		$ 5.00	$ 1.75	$ 44	$ 100	$ 36	$ 150	$ 140	$ 50	$ 480	$ 600	$ 300		$ 2,500	
Prospect Park Borough	$ 1.50		$ 4.50		$ 135 [1]		$ 50				$ 1,000	$ 720				
Ridley Park Borough					$ 55		$ 34									
Ridley Township					$ 42		$ 34									
Rutledge Borough					$ 52		$ 34									
Sharon Hill Borough		$ 5.00			$ 100 [1]											
Springfield Township																
Swarthmore Borough																
Upper Darby Township			$ 7.50		$ 200 [1]	$ 100		$ 150	$ 250			$ 650	$ 500		$ 4,000	
Yeadon Borough	$ 0.65		$ 5.00	$ 1.75	$ 52	$ 100										
Normalized unit cost [2]	$ 1.27	$ 8.33	$ 6.75	$ 2.20	59.00	$ 130	$ 50	$ 188	$ 221	62.50	$ 929	$ 801	$ 400	$ 3,125	$ 3,750	$ 2,500
Aldan Borough		5,360	2,000		3,000		200					200	200			
Clifton Heights Borough							162			21	4	7	17			
Collingdale Borough	6,300		4,752		5,586	1,000						14		14	4	
Colwyn Borough							85				8	12				
Darby Borough					3,000	2,000	100									5
Darby Township			3,000				111									
Folcroft Borough					373		42									
Glenolden Borough					2,102		150				12	35				
Lansdowne Borough			950		3,300	980	120					200				
Marple Township	171,600						380				40	273				
Morton Borough					744		132				7					
Nether Providence Township	145,582		54,375	145,582			600		162	141	8	45	54			
Norwood Borough	74,300		44,580	74,300	3,715	743	83	46	41	43	6	27	12		1	
Prospect Park Borough	71,280		15,555		2,400		100				2	81				
Ridley Park Borough					1,114		292				12	35				
Ridley Township					43,300		161				28	73				
Rutledge Borough					1,190	435	33									
Sharon Hill Borough		21,161			4,780											
Springfield Township [3]					1,000		1,000									
Swarthmore Borough					4,130	1,749	4				3		4			
Upper Darby Township			5,790		1,924	1,162	20	317	948			409			1	
Yeadon Borough	114,500		68,700	114,500	5,725	5,725	300						400			
Central Delaware County Authority		86,563		43,300	850		540					108				
Darby Creek Joint Authority		47,800		24,000	107		139					28				
Muckinipates Authority		28,581					77									
Radnor-Haverford-Marple Sewer Authority [4]	900,995		23,010	104,665			265					1,825				

Notes:
[1] Unit cost outside the norm. Not used to compute normalized cost.
[2] Includes 25% for engineering, legal, procurement costs, etc.
[3] Projected based on work reported to have been performed in recent years.
[4] Actual repairs from 1997 and includes all member municipalities.

Table 4-2
Normalized Summary of Recomended I&I Reduction Program

Municipality	Sewer Length in Service Area (lf)	Inserts (ea)	Disconnect Inlets (ea)	MH Frame Repairs (ea)	MH Repairs (ea)	MH Liner / Replacement (ea)	Sewer Replacement (lf)	Chemical Grouting (lf)	Chemical Root Removal (lf)	Sewer Slip Lining (lf)	Estimated Inflow Cost	Estimated Infiltration Cost	Estimated I&I Cost	Estimated I&I Reduction[3] (gpd)	Cost per I&I Gallon Removed
Normalized unit cost [1]		$ 50	$ 2,500	$ 197	$ 685	$ 3,313	$ 130	$ 6.75	$ 2.20	$ 59					
Aldan Borough	68,750	200	-	-	400	-	-	2,000	-	3,000	$ 10,000	$ 464,500	$ 474,500	636,150	$ 0.75
Clifton Heights Borough	64,000	162	-	21	28	-	-	-	-	-	$ 12,237	$ 19,180	$ 31,417	814,000	$ 0.04
Collingdale Borough	75,000	-	-	-	14	18	1,000	4,752	-	5,586	$ -	$ 560,874	$ 560,874	300,000	$ 1.87
Colwyn Borough	17,670	85	-	-	20	-	-	-	-	-	$ 4,250	$ 13,700	$ 17,950	130,000	$ 0.14
Darby Borough	87,950	100	5	-	-	-	2,000	-	-	3,000	$ 17,500	$ 437,000	$ 454,500	447,000	$ 1.02
Darby Township	100,415	111	-	-	-	-	-	3,000	-	-	$ 5,550	$ 20,250	$ 25,800	290,000	$ 0.09
Folcroft Borough	58,785	42	-	-	-	-	-	-	-	373	$ 2,100	$ 22,007	$ 24,107	288,000	$ 0.08
Glenolden Borough	87,955	150	-	-	47	-	-	-	-	2,102	$ 7,500	$ 156,213	$ 163,713	1,380,000	$ 0.12
Lansdowne Borough	136,900	120	-	-	200	-	980	950	-	3,300	$ 6,000	$ 465,513	$ 471,513	529,000	$ 0.89
Marple Township	171,215	380	-	-	313	-	-	-	-	-	$ 19,000	$ 214,405	$ 233,405	585,000	$ 0.40
Morton Borough	40,090	132	-	-	7	-	-	-	-	744	$ 6,600	$ 48,691	$ 55,291	414,000	$ 0.13
Nether Providence Township	145,582	600	-	303	107	-	-	54,375	145,582	-	$ 89,691	$ 760,607	$ 850,298	149,000	$ 5.71
Norwood Borough	74,300	83	-	84	45	1	743	44,580	74,300	3,715	$ 20,698	$ 814,288	$ 834,986	112,300	$ 7.44
Prospect Park Borough	73,300	100	-	-	83	-	-	15,555	-	2,400	$ 5,000	$ 303,451	$ 308,451	963,000	$ 0.32
Ridley Park Borough	99,000	292	-	-	47	-	-	-	-	1,114	$ 14,600	$ 97,921	$ 112,521	1,250,000	$ 0.09
Ridley Township	367,000	161	-	-	101	-	-	-	-	43,300	$ 8,050	$ 2,623,885	$ 2,631,935	2,950,000	$ 0.89
Rutledge Borough	13,450	33	-	-	-	-	435	-	-	1,190	$ 1,650	$ 126,760	$ 128,410	463,000	$ 0.28
Sharon Hill Borough	64,634	-	-	-	-	-	-	-	-	4,780	$ -	$ 282,020	$ 282,020	380,000	$ 0.74
Springfield Township	440,145	1,000	-	-	-	-	-	-	-	1,000	$ 50,000	$ 59,000	$ 109,000	350,000	$ 0.31
Swarthmore Borough	95,000	4	-	-	7	-	1,749	-	-	4,130	$ 200	$ 475,835	$ 476,035	270,000	$ 1.76
Upper Darby Township	272,761	20	-	948	409	1	1,162	5,790	-	1,924	$ 187,756	$ 587,137	$ 774,893	620,000	$ 1.25
Yeadon Borough	114,500	300	-	-	400	-	5,725	68,700	114,500	5,725	$ 15,000	$ 2,071,650	$ 2,086,650	131,000	$ 15.93
Municipal Totals	2,668,402	4,075	5	1,356	2,228	20	13,794	199,702	334,382	87,383	$ 483,382	$10,624,886	$11,108,268	13,451,450	$ 0.83
Central Delaware County Authority	121,064	540	-	-	108	-	-	-	43,300	850	$ 27,000	$ 219,390	$ 246,390	253,480	$ 0.97
Darby Creek Joint Authority	48,921	250	-	-	28	-	-	-	24,000	107	$ 12,500	$ 78,293	$ 90,793	87,380	$ 1.04
Muckinipates Authority	26,581	77	-	-	-	-	-	-	-	-	$ 3,850	$ -	$ 3,850	23,100	$ 0.17
Radnor-Haverford-Marple Sewer Authority[2]	1,072,000	265	-	-	1,825	-	-	23,010	104,665	-	$ 13,250	$ 1,635,706	$ 1,648,956	748,775	$ 2.20
Authority Totals	1,268,566	1,132	-	-	1,961	-	-	23,010	171,965	957	$ 56,600	$ 1,933,389	$ 1,989,989	$ 1,112,735	$ 1.79

Notes:
[1] Includes 25% for engineering, legal, procurement costs, etc.
[2] Actual repairs from 1997 and includes all member municipalities.
[3] Estimated I&I reduction for Springfield Twp., CDCA, DJCA, and MA based on 300 gpd per insert, 60 gpd per manhole repair, and 50 gpd per linear foot of pipe grout/slip line/replacement.

5. CONCLUSIONS AND RECOMMENDATIONS

The respective individual municipal and authority studies show that a significant I&I problem exists in DELCORA's Eastern Service Area. Reduction of this I&I will produce a number of benefits to DELCORA, the Authorities, and the individual municipalities, which include:

- Increase sewer infrastructure capacity for other users.
- Reduced treatment and O&M costs associated with disposal.
- Reduction or elimination of potential public health hazards resulting from sewage overflows in various problem areas with overtaxed facilities.

5.1 RECOMMENDED PROGRAMMATIC CORRECTIVE ACTIONS

Programmatic corrective actions are actions that each municipality and authority should implement as part of a comprehensive, sewage facility management program of which I&I reductions is a key component. A program that will ensure the continued long-term operation of the sewage facilities should consist of at least the following four items:

- Regular sewer cleaning.
- Implementation of an I&I monitoring program.
- Sewage facilities documentation.
- Implementation of a sewage facility management system.

5.1.1 Regular Sewer Cleaning

Regular cleaning of manholes and sewers is an important step to minimize the impact of I&I flow on a system. The accumulation of material in the sewers reduces the capacity of the sewers making it more difficult to manage the additional flows from I&I. Typically, all sewers and manholes should be cleaned once per year, however, there are exceptions in sewer segments that accumulate material at a rapid rate. Another aspect of this part of the programmatic recommendations is the need to maintain easements to allow access to the sewers.

5.1.2 I&I Monitoring Program Implementation

The concept of a formal program to reduce I&I is not new, but it is one that if properly implemented can prove to be a cost-effective tool in ensuring continued elimination of I&I. There are three key aspects of an I&I monitoring program:

- Increasing public awareness.
- Implementation of a program to remove illegal connections.
- Regular manhole and sewer inspections.

The first aspect involves distributing information (handouts or possibly a column in the municipal newsletter) to the educate the residents about I&I by explaining why illegal connections such as foundation drains, roof drains, and sump pumps should not be connected to

the sanitary sewer system. A key point to stress to the residents is that every gallon of storm water that is discharged to the sanitary sewer system costs them money directly through increased pumping and treatment costs. Residents also pay indirectly for I&I through limitations on adding new customers who can share the fixed operating costs because of capacity limitations.

5.1.3 Sewage Facilities Documentation

Documentation of the facilities and all activities is integral to maintaining a management program. Keeping records of cleaning activities will ensure the entire system gets cleaned and will indicate those segments that need more frequent attention. The most important document is an accurate map that shows all lines, manholes, pipe sizes, etc.

5.1.4 Sewage Facility Management System Implementation

A sewage facility management system will provide a means by which to maintain the information collected by the program. This is a tool to aid the municipality in determining and tracking:

- An annual O&M plan.
- Sewer cleaning schedules.
- Sewer segments needing to be cleaned more frequently.
- A prioritization of corrective actions.
- Effectiveness of I&I monitoring program.
- Documentation on repairs.

5.2 AFFORDABILITY OF RECOMMENDED CORRECTIVE ACTION PLANS

In general, the priority of the corrective actions should be such that the most I&I is removed for each dollar spent. With this in mind, the following corrective actions in Table 5-1 are ranked in the order of cost effectiveness. Some items mentioned are not specifically listed in the individual corrective actions, such as public information and roof leader/sump pump disconnects, but are important components of an overall I&I removal strategy.

Table 5-1
Prioritization of Corrective Actions

Priority	Corrective Action	Priority	Corrective Action
1	Manhole Inserts	6	Chemical Grouting
2	Public Education/Information	7	Manhole Repairs
3	Roof Leader/Sump Pump Disconnects	8	Slip Lining of Other Segments
4	Manhole Frame Repairs	9	Disconnect Inlets
5	Slip Lining of Stream Crossings	10	Sewer Replacement

Table 5-2 has been developed as a means of comparing the relative costs from the individual studies associated with I&I reduction by the municipalities of the Eastern Service Area. This table presents the relative "unit cost" for I&I reduction, in cost per gallons per day of I&I removed, ranked by municipality from least expensive to most expensive. The table also shows the proportion of overall I&I in the service area that could potentially be removed by the respective corrective actions of each municipality. Based on the populations of each municipality, projected to the year 2000, the table was further expanded to roughly estimate the number of equivalent dwelling units (EDUs) in the Eastern Service Area within each municipality.

The determination of EDUs is based on an assumed uniform household size of 2.8 persons per dwelling unit and was utilized to develop a theoretical unit rehabilitative cost for I&I reduction per EDU (or customer) within each municipality. While this method to compute EDUs is not exact, this unit cost shows the relative affordability of the corrective actions in terms of potential financial impacts to users within each community. For a program period of 5 years over which the respective corrective actions would be implemented, it was assumed that an affordable user cost increase associated with the sewer rehabilitation should be approximately $40 per year (or a total of about $200 over the 5-year program period).

Using this cost range as a guideline, Table 5-2 shows those municipalities that could easily implement their respective planned corrective actions, as well as those that would need either outside financial assistance, an extension of the number of years to implement the recommended correction (more than 5), or a scaled-back proposal of rehabilitative measures. In the latter case, these municipalities would need to reassess and prioritize only those measures that would provide the greatest potential reduction in I&I at a more reasonable total cost.

Table 5-3 presents the same information except that the municipalities are ranked by the annual estimated rehabilitation cost per EDU. The table also shows a summary of the costs, I&I reduction, and unit costs for the 10 most affordable programs to be implemented (top 50%) and the 16 most affordable programs (top 75%).

From Tables 5-2 and 5-3, the following observations and conclusions are made:

- The Corrective Action Plans for Folcroft Borough and Darby Borough appear to have the lowest unit cost for I&I reduction and the lowest sewer rehabilitation cost per user in comparison to other municipalities in the Eastern Service Area.
- With the exception of Rutledge, Aldan, Norwood, Swarthmore, and Yeadon Boroughs, as well as Ridley Township, the corrective actions prescribed by the respective municipal studies appear to be affordable to the users in those communities assuming these actions are taken over a 5-year planning period.
- Three of the municipalities (Ridley Park, Glenolden, and Clifton Heights Boroughs), which have some of the lowest unit costs for I&I reduction and the low rehabilitation cost per user, represent a combined potential I&I reduction of over 25% of the total projected I&I reduction for all of the municipal studies.

Table 5-2
Relative I/I Reduction Program Cost-Effectiveness

No.	Municipality	I&I Reduction[1] ($)	Est. I&I Reduction (gpd)	Cost per I&I gpd Removed	Potential I&I Reduction	Population (Yr. 2000 Projection)[2]	Estimated EDUs[3]	Total Est. Rehab Cost per EDU	Annual Est. Rehab Cost per EDU[4]	Comments
1	Clifton Heights Borough	$ 31,417	814,000	$ 0.04	6%	6,930	2,475	$ 12.69	$ 2.54	Low cost per EDU; relatively high potential I&I reduction
2	Folcroft Borough	$ 24,107	288,000	$ 0.08	2%	7,340	2,621	$ 9.20	$ 1.84	Very low cost per EDU
3	Darby Township	$ 25,800	290,000	$ 0.09	2%	10,580	3,779	$ 6.83	$ 1.37	Very low cost per EDU
4	Ridley Park Borough	$ 112,521	1,250,000	$ 0.09	9%	7,430	2,654	$ 42.40	$ 8.48	Low cost per EDU; high potential I&I reduction
5	Glenolden Borough	$ 163,713	1,380,000	$ 0.12	10%	7,140	2,550	$ 64.20	$ 12.84	Low cost per EDU; high potential I&I reduction
6	Morton Borough	$ 55,291	414,000	$ 0.13	3%	2,810	1,004	$ 55.07	$ 11.01	
7	Colwyn Borough	$ 17,950	130,000	$ 0.14	1%	2,500	893	$ 20.10	$ 4.02	
8	Rutledge Borough	$ 128,410	463,000	$ 0.28	3%	840	300	$ 428.03	$ 85.61	High cost per EDU; very small number of EDUs
9	Springfield Township	$ 109,000	350,000	$ 0.31	3%	23,500	8,393	$ 12.99	$ 2.60	Low cost per EDU
10	Prospect Park Borough	$ 308,451	963,000	$ 0.32	7%	6,650	2,375	$ 129.87	$ 25.97	Moderately low cost per EDU; high potential I&I reduction
11	Marple Township	$ 233,405	585,000	$ 0.40	4%	23,350	8,339	$ 27.99	$ 5.60	
12	Sharon Hill Borough	$ 282,020	380,000	$ 0.74	3%	5,570	1,989	$ 141.79	$ 28.36	
13	Aldan Borough	$ 474,500	636,150	$ 0.75	5%	4,570	1,632	$ 290.75	$ 58.15	High cost per EDU; relatively small number of EDUs; relatively high potential I&I reduction
14	Lansdowne Borough	$ 471,513	529,000	$ 0.89	4%	11,290	4,032	$ 116.94	$ 23.39	
15	Ridley Township	$ 2,631,935	2,950,000	$ 0.89	22%	30,490	10,889	$ 241.71	$ 48.34	Moderately high cost per EDU; very high potential I&I reduction
16	Darby Borough	$ 454,500	447,000	$ 1.02	3%	10,740	3,836	$ 118.48	$ 23.70	
17	Upper Darby Township	$ 774,893	620,000	$ 1.25	5%	27,000	9,643	$ 80.36	$ 16.07	
18	Swarthmore Borough	$ 476,035	270,000	$ 1.76	2%	6,060	2,164	$ 219.98	$ 44.00	
19	Collingdale Borough	$ 560,874	300,000	$ 1.87	2%	8,820	3,150	$ 178.06	$ 35.61	
20	Nether Providence Township	$ 850,298	149,000	$ 5.71	1%	13,160	4,700	$ 180.91	$ 36.18	Small potential I&I reduction
21	Norwood Borough	$ 834,986	112,300	$ 7.44	1%	6,160	2,200	$ 379.54	$ 75.91	Very high cost per EDU; small potential I&I reduction
22	Yeadon Borough	$ 2,086,650	131,000	$ 15.93	1%	11,600	4,143	$ 503.66	$ 100.73	Very high cost per EDU; small potential I&I reduction
	Municipal Totals	$ 11,108,268	13,451,450	$ 0.83		234,530	83,761	$ 132.62	$ 26.52	
	Top 10 Totals (50%)	$ 976,660	6,342,000	$ 0.15	47%	75,720	27,043	$ 36.12	$ 7.22	
	Top 16 Totals (75%)	$ 5,524,533	11,869,150	$ 0.47	88%	161,730	57,761	$ 95.64	$ 19.13	
1	Muckinipates Authority	$ 3,850	23,100	$ 0.17	2%	38,492	13,747	$ 0.28	$ 0.06	
2	Central Delaware County Authority	$ 246,390	253,480	$ 0.97	23%	84,811	34,768	$ 7.09	$ 1.42	
3	Darby Creek Joint Authority	$ 90,793	87,380	$ 1.04	8%	100,944	36,052	$ 2.52	$ 0.50	
4	Radnor-Haverford-Marple Sewer Authority	$ 1,648,956	748,775	$ 2.20	69%	73,828	26,367	$ 62.54	$ 12.51	
	Authority Totals	$ 30,707,717	1,089,635	$ 1.79		259,584	97,187	$ 315.97	$ 63.19	

Notes:
[1] Costs presented are based on normalized costs presented in Tables 4-1 and 4-2.
[2] Population figures based on Delco Planning Commission figures.
[3] EDUs (equivalent dwelling units) based on uniform assumed household size of 2.8 persons per dwelling unit. CDCA based on 2.53 persons per EDU and includes 1,250 EDUs for industrial.
[4] Annual estimated rehabilitation cost per EDU is based on 5-year program period.

Table 5-3
Reduction Program Cost-Effectiveness per EDU

No.	Municipality	I&I Reduction[1] ($)	Est. I&I Reduction (gpd)	Cost per I&I gpd Removed	Potential I&I Reduction	Population (Yr. 2000 Projection)[2]	Estimated EDUs[3]	Total Est. Rehab Cost per EDU	Annual Est. Rehab Cost per EDU[4]	Comments
1	Darby Township	$ 25,800	290,000	$ 0.09	2%	10,580	3,779	$ 6.83	$ 1.37	Very low cost per user
2	Folcroft Borough	$ 24,107	288,000	$ 0.08	2%	7,340	2,621	$ 9.20	$ 1.84	Very low cost per EDU
3	Clifton Heights Borough	$ 31,417	814,000	$ 0.04	6%	6,930	2,475	$ 12.69	$ 2.54	Low cost per EDU; relatively high potential I&I reduction
4	Springfield Township	$ 109,000	350,000	$ 0.31	3%	23,500	8,393	$ 12.99	$ 2.60	
5	Colwyn Borough	$ 17,950	130,000	$ 0.14	1%	2,500	893	$ 20.10	$ 4.02	
6	Marple Township	$ 233,405	585,000	$ 0.40	4%	23,350	8,339	$ 27.99	$ 5.60	
7	Ridley Park Borough	$ 112,521	1,250,000	$ 0.09	9%	7,430	2,654	$ 42.40	$ 8.48	Low cost per EDU; high potential I&I reduction
8	Morton Borough	$ 55,291	414,000	$ 0.13	3%	2,810	1,004	$ 55.07	$ 11.01	
9	Glenolden Borough	$ 163,713	1,380,000	$ 0.12	10%	7,140	2,550	$ 64.20	$ 12.84	Low cost per EDU; high potential I&I reduction
10	Upper Darby Township	$ 774,893	620,000	$ 1.25	5%	27,000	9,643	$ 80.36	$ 16.07	
11	Lansdowne Borough	$ 471,513	529,000	$ 0.89	4%	11,290	4,032	$ 116.94	$ 23.39	
12	Darby Borough	$ 454,500	447,000	$ 1.02	3%	10,740	3,836	$ 118.48	$ 23.70	
13	Prospect Park Borough	$ 308,451	963,000	$ 0.32	7%	6,650	2,375	$ 129.87	$ 25.97	Moderately low cost per EDU; high potential I&I reduction
14	Sharon Hill Borough	$ 282,020	380,000	$ 0.74	3%	5,570	1,989	$ 141.79	$ 28.36	
15	Collingdale Borough	$ 560,874	300,000	$ 1.87	2%	8,820	3,150	$ 178.06	$ 35.61	
16	Nether Providence Township	$ 850,298	149,000	$ 5.71	1%	13,160	4,700	$ 180.91	$ 36.18	Small potential I&I reduction
17	Swarthmore Borough	$ 476,035	270,000	$ 1.76	2%	6,060	2,164	$ 219.98	$ 44.00	
18	Ridley Township	$ 2,631,935	2,950,000	$ 0.89	22%	30,490	10,889	$ 241.71	$ 48.34	Moderately high cost per EDU; very high potential I&I reduction
19	Aldan Borough	$ 474,500	636,150	$ 0.75	5%	4,570	1,632	$ 290.75	$ 58.15	High cost per EDU; relatively small number of EDUs; relatively high potential I&I reduction
20	Norwood Borough	$ 834,986	112,300	$ 7.44	1%	6,160	2,200	$ 379.54	$ 75.91	Very high cost per EDU; small potential I&I reduction
21	Rutledge Borough	$ 128,410	463,000	$ 0.28	3%	840	300	$ 428.03	$ 85.61	High cost per EDU; very small number of EDUs
22	Yeadon Borough	$ 2,086,650	131,000	$ 15.93	1%	11,600	4,143	$ 503.66	$ 100.73	Very high cost per EDU; small potential I&I reduction
	Municipal Totals	$ 11,108,268	13,451,450	$ 0.83		234,530	83,761	$ 132.62	$ 26.52	
	Top 10 Totals (50%)	$ 1,548,097	6,121,000	$ 0.25	46%	118,580	42,350	$ 36.55	$ 7.31	
	Top 16 Totals (75%)	$ 4,475,752	8,889,000	$ 0.50	66%	174,810	62,432	$ 71.69	$ 14.34	
1	Muckinipates Authority	$ 3,850	23,100	$ 0.17	2%	38,492	13,747	$ 0.28	$ 0.06	
2	Darby Creek Joint Authority	$ 90,793	87,380	$ 1.04	8%	100,944	36,052	$ 2.52	$ 0.50	
3	Central Delaware County Authority	$ 246,390	253,480	$ 0.97	23%	84,811	34,768	$ 7.09	$ 1.42	
4	Radnor Haverford Marple Sewer Authority	$ 1,648,956	748,775	$ 2.20	67%	73,828	26,367	$ 62.54	$ 12.51	
	Authority Totals	$ 1,989,989	1,112,735	$ 1.79	100	298,076	110,934	$ 17.94	$ 3.59	

Notes:
[1] Costs presented are based on normalized costs presented in Tables 4-1 and 4-2.
[2] Population figures based on Delaware County Planning Department figures.
[3] EDUs (equivalent dwelling units) based on uniform assumed household size of 2.8 persons per dwelling unit.
[4] Annual estimated rehabilitation cost per EDU is based on 5-year program period.

- Two municipalities, Prospect Park Borough and Ridley Township, combined represent almost 30% of the total potential I&I reduction for all of the municipality studies. These two municipalities, together with Ridley Park, Glenolden, and Clifton Heights Boroughs, represent over 55% of the total projected I&I reduction for all of the municipality studies.
- Norwood and Yeadon Boroughs exhibit rehabilitation costs per user that are deemed to be prohibitively high, while the anticipated I&I reductions represent a small proportional percentage (less than 2%) of the total for all municipalities studied. Part of the reason for this high cost is the recommendation that chemical root removal and other rehabilitative measures be performed over the entire length or a large percentage of sewers within each of these municipalities.
- Rutledge Borough, which could realize a significant proportional reduction in I&I in relation to all municipalities studied based on its size, has a high unit rehabilitation cost per user, primarily due to the relatively small number of users in the community.

Based on the above observations, it appears that, with the exception of Aldan, Norwood, Rutledge, Swarthmore and Yeadon Boroughs, and Ridley Township, the planned corrective actions of the communities in the Eastern Service Area are deemed to be affordable over the course of a 5-year program period.

It is recommended that each of these municipalities be encouraged to proceed with the implementation of their respective corrective action plans as highlighted in Section 2 for I&I reduction if they have not already been initiated.

5.3 CORRECTIVE ACTION PLANS REQUIRING MODIFICATION

For those municipalities having corrective action plans that appear to be too expensive to be borne by users in the community, an extension of the program period or a reassessment of the rehabilitative measures proposed and the objectives for I&I reduction is warranted. Such a re-assessment should focus on discerning the most cost-effective rehabilitative measures that would result in the greatest proportional reduction in I&I. It is acknowledged that both the individual municipalities and their respective consultants, with their knowledge of local problem areas and the projected impacts of planned rehabilitative measures, can best make judgments regarding which corrective measures to implement.

Based on a review of the results presented in the individual I&I studies, the following recommendations are offered as a means of reducing the financial burden for corrective action in the previously noted municipalities while still providing a significant reduction in I&I. Note that this analysis looks solely at the capital cost of the corrective actions and does not factor in the cost savings benefit due to reduced collection, pumping, and treatment costs. The impact of the cost savings benefit is examined in Subsection 5.4.

5.3.1 Aldan Borough

Because of its relatively small population, which results in higher unit rehabilitative costs per user, it appears that Aldan Borough will need to reduce the scope of its planned corrective action for I&I reduction unless funding or grants are obtained from outside entities such as PADEP.

If no financial assistance can be obtained, then Aldan Borough probably will need to reduce its projected total sewer rehabilitation cost for I&I reduction to a more affordable cost for its users. Using the normalized costs of Tables 5-2 and 5-3, it is estimated that the total cost of the corrective action would need to be reduced from the current rehabilitative cost total of $468,000 to approximately $300,000 to be considered "affordable." Under this scenario, all of the planned manhole insert installations (200) could be implemented, as well as approximately 65% of the combined projected cost for manhole repairs, slip lining, and chemical grouting of sewers.

Candidate sewer lengths for either slip lining or chemical grouting would be prioritized based on the amount of I&I reduction anticipated by these methods of rehabilitation.

Installation of manhole chimney seals would be delayed beyond the 5-year program period.

5.3.2 Norwood Borough

Norwood Borough is similar to Nether Providence Township in that a very large proportion of the projected cost for the sewer rehabilitation is associated with chemical grouting of sewers (44,580 linear feet), and chemical root removal (all 74,300 linear feet of sewers in the Borough). Consideration should be given to delaying the implementation of some or all of these measures beyond the 5-year program period, which would bring the total cost of the corrective action back to a more affordable range for the users of the Borough. Most other recommended rehabilitative measures, including manhole insert installation (83), manhole repairs (326), sewer replacement (743 linear feet), and slip lining (3,715 linear feet), could be implemented in the initial 5-year program period.

5.3.3 Ridley Township

Ridley Township's planned corrective action for I&I reduction is only slightly above the cost level in the analysis deemed to be "affordable." Therefore, only a relatively small portion (less than 20%) of the planned total footage of sewers to be slip lined (43,300 linear feet), as recommended in that community's I&I study, would need to be considered for a delay in implementation beyond the 5-year program period.

5.3.4 Rutledge Borough

Rutledge Borough has a very small user base resulting in higher sewer rehabilitation costs per user. In this case, if outside financial assistance is unavailable, it is recommended that the portion of the I&I study corrective action consisting of manhole insert installation (33) and sewer replacement (435 linear feet) be undertaken during the 5-year program period. Slip lining of the projected sewer footage of 1,190 linear feet should be delayed for later implementation.

5.3.5 Swarthmore Borough

Like Ridley Township, Swarthmore Borough's projected costs for corrective action to reduce I&I appear to be only slightly above the affordable level for the community. Therefore, the majority of the planned rehabilitative measures could be implemented within the 5-year program period. Consideration could be given to reducing the total corrective action cost associated with sewer replacement and slip lining by an estimated 10% to 15% to bring the rehabilitative costs to a more affordable range.

5.3.6 Yeadon Borough

Yeadon Borough is similar to Norwood Borough in that a very large portion of the I&I study's recommended corrective action costs are associated with chemical root removal (the entire sewer system of 114,500 linear feet), chemical grouting of sewers (68,700 linear feet), and sewer replacement (5,725 linear feet). Consideration should be given to delaying the implementation of some or all of these measures beyond the 5-year program period in order to bring the total cost of rehabilitation to a more affordable range for users.

5.4 IMPACT OF THE COST-SAVING BENEFIT ON THE CORRECTIVE ACTION PLANS

As detailed previously, there is a definite capital cost associated with implementing the corrective action plans for each municipality and authority. Every gallon of groundwater and surface water that is allowed into the collection system must be transported, pumped, and treated. Based on recent figures developed by DELCORA, it costs approximately $1,109 per million gallons to convey and treat wastewater at PSWPCP. This cost does not include fixed annual costs. Using this pump/treat cost and the I&I reduction estimated for each of the individual municipal and authority corrective action plans, it is possible to estimate the annual savings and, therefore also estimate the years required to pay back the initial capital investment and compute the capital investment rate of return (IRR).

Table 5-4 presents the time required for payback and the IRR for a 20-year life span. The calculations are based on the following assumptions:

- The entire program cost is incurred in the first year.
- The return on investment does not begin until the fourth year.
- A 60% reinvestment is required in the tenth year.

Figure 5-1 graphically depicts the IRR and clearly shows that only three corrective action plans have a negative IRR and only one more (RHM, which already has an active I&I program in-place) has a return of less that 10%.

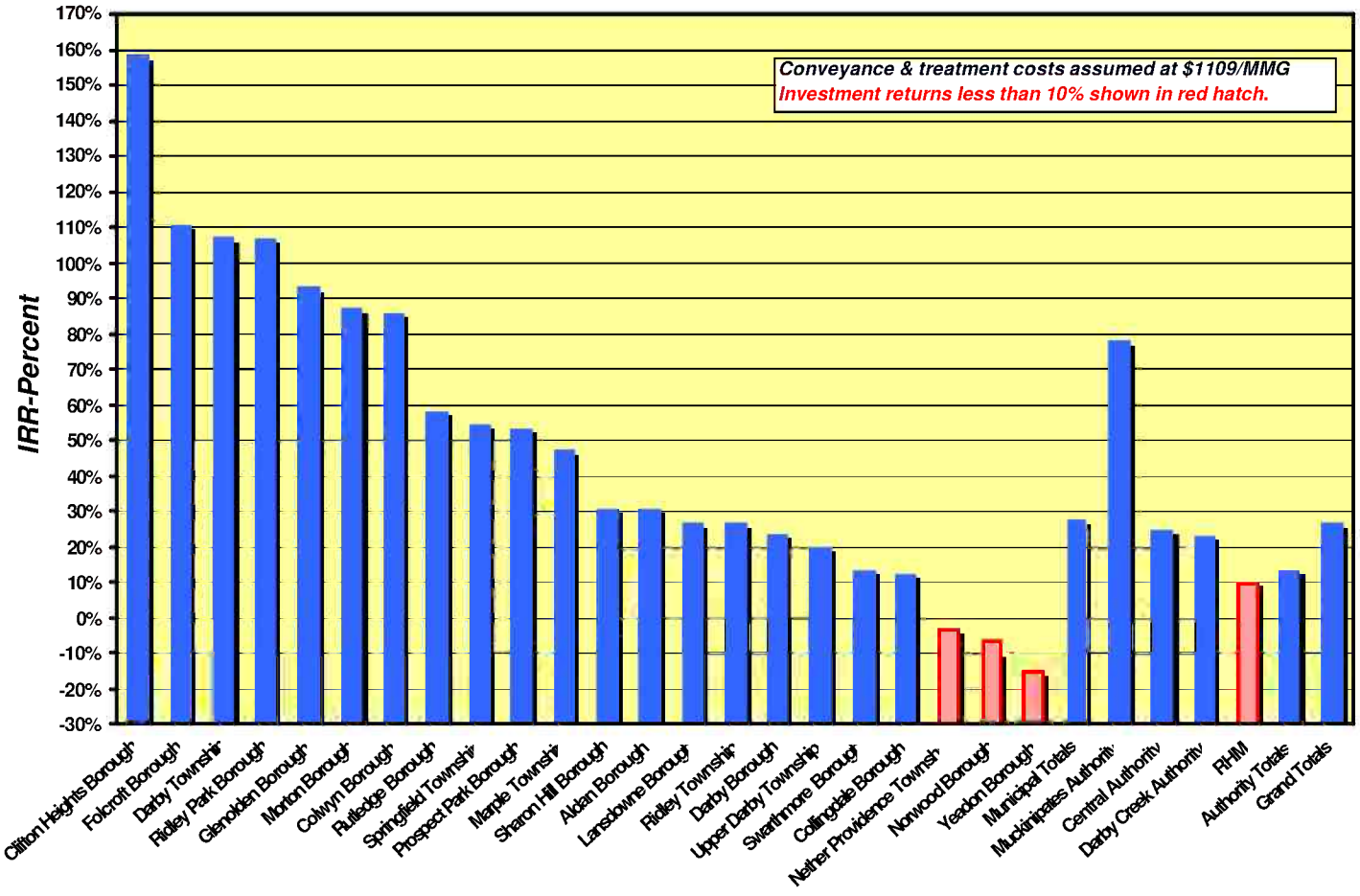
Table 5-4
Investment Return Eastern Municipalities I&I Correction Program

Municipality	Estimated Inflow Cost	Estimated Infiltration Cost	Estimated I&I Cost	Estimated I&I Reduction (gpd)	Cost per I&I Gallon Removed	Annual Savings[1]	Payback Years	IRR[2] w/ 20-Year Life
Clifton Heights Borough	12,237	19,180	31,417	814,000	0.04	329,495	0.10	157.8%
Folcroft Borough	2,100	22,007	24,107	288,000	0.08	116,578	0.21	109.8%
Darby Township	5,550	20,250	25,800	290,000	0.09	117,388	0.22	106.6%
Ridley Park Borough	14,600	97,921	112,521	1,250,000	0.09	505,981	0.22	105.9%
Glenolden Borough	7,500	156,213	163,713	1,380,000	0.12	558,603	0.29	92.2%
Morton Borough	6,600	48,691	55,291	414,000	0.13	167,581	0.33	86.7%
Colwyn Borough	4,250	13,700	17,950	130,000	0.14	52,622	0.34	85.2%
Rutledge Borough	1,650	126,760	128,410	463,000	0.28	187,415	0.69	57.9%
Springfield Township	50,000	59,000	109,000	350,000	0.31	141,675	0.77	54.1%
Prospect Park Borough	5,000	303,451	308,451	963,000	0.32	389,808	0.79	53.2%
Marple Township	19,000	214,405	233,405	585,000	0.40	236,799	0.99	46.4%
Sharon Hill Borough	-	282,020	282,020	380,000	0.74	153,818	1.83	30.1%
Aldan Borough	10,000	464,500	474,500	636,150	0.75	257,504	1.84	30.0%
Lansdowne Borough	6,000	465,513	471,513	529,000	0.89	214,131	2.20	26.1%
Ridley Township	8,050	2,623,885	2,631,935	2,950,000	0.89	1,194,116	2.20	26.1%
Darby Borough	17,500	437,000	454,500	447,000	1.02	180,939	2.51	23.3%
Upper Darby Township	187,756	587,137	774,893	620,000	1.25	250,967	3.09	19.3%
Swarthmore Borough	200	475,835	476,035	270,000	1.76	109,292	4.36	13.1%
Collingdale Borough	-	560,874	560,874	300,000	1.87	121,436	4.62	12.2%
Nether Providence Township	89,691	760,607	850,298	149,000	5.71	60,313	14.10	-3.6%
Norwood Borough	20,698	814,288	834,986	112,300	7.44	45,457	18.37	-6.8%
Yeadon Borough	15,000	2,071,650	2,086,650	131,000	15.93	53,027	39.35	-15.3%
Municipal Totals	483,382	10,624,886	11,108,268	13,451,450	0.83	5,444,945	2.04	27.7%
Muckinipates Authority	3,850	-	3,850	23,100	0.17	9,351	0.41	77.1%
Central Delaware County Authority	27,000	219,390	246,390	253,480	0.97	102,605	2.40	24.2%
Darby Creek Joint Authority	12,500	78,293	90,793	87,380	1.04	35,370	2.57	22.9%
Radnor Haverford Marple Sewer Authority	13,250	1,635,706	1,648,956	748,775	2.20	303,093	5.44	9.5%
Authority Totals	56,600	1,933,389	1,989,989	1,112,735	1.79	450,418	4.42	12.9%
Grand Totals	539,982	12,558,275	13,098,257	14,564,185	0.90	5,895,364	2.22	25.9%

Notes:

[1] Based on treatment and conveyance costs of $ 1,109.00 per million gallons.

[2] Assumes no savings in first 3 years and a 60% reinvestment in the 10th year.



ACT 537: SEWAGE FACILITIES PLAN
MUNICIPAL & AUTHORITY INFLOW AND INFILTRATION STUDY
SUMMARY REPORT

FIGURE 5-1

CORRECTIVE ACTION PLANS INVESTMENT RATES OF RETURN

DELCORA LONG-TERM CSO CONTROL PLAN, CITY OF CHESTER COMBINED SEWER SYSTEM, APRIL 1999

DELAWARE COUNTY REGIONAL WATER QUALITY CONTROL AUTHORITY (DELCORA)

LONG-TERM CSO CONTROL PLAN

CITY OF CHESTER COMBINED SEWER SYSTEM
APRIL 1999

Prepared by:

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West Chester, Pennsylvania 19380

W.O. No. 05623-009-001

DELCORA Long-Term CSO Control Plan

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SECTION 1
BACKGROUND

1.1 PURPOSE OF LONG-TERM CONTROL PLAN

The fundamental purpose of DELCORA's combined sewer overflow (CSO) program is to minimize the impacts of CSO's upon the quality of the receiving waters by developing a long-term strategy that is both technically viable and financially feasible. This Long-Term Control Plan (LTCP) summarizes DELCORA's strategy to achieve this purpose and consists of three primary elements:

1. System Characterization - including modeling and system monitoring.
2. Development and Evaluation of Alternatives.
3. Selection and Implementation of Controls.

This document presents the requirements as defined in the existing NPDES Permit and the Department letter of 23 July 1996. Consideration is also given to EPA's CSO Policy, the Delaware River Basin Commission's (DRBC) CSO related studies, coordination with DELCORA's proposed CDPS Diversion Project, and the EPA CSO Policy provisions for "small system considerations" and "community's financial capability."

1.2 NPDES PERMIT AND LTCP REQUIREMENTS

In a letter issued by the Pennsylvania Department of Environmental Protection (DEP) to DELCORA on 23 July 1996, the Department discusses both its comments regarding the DELCORA Nine Minimum Control (NMC) Plan, as well as the three major elements that the Department considers to be essential to the LTCP as presented above.

These elements are consistent with the LTCP requirements in the existing NPDES Permit No. PA0027103.(Part C, Section 12.5), which include:

- Implementation of the nine minimum controls (NMC).
- Characterization and modeling of the system.
- Consideration of sensitive areas.
- Financial capability as related to implementation of the plan.
- Implementation schedule.

The Department has granted DELCORA an extension from 21 July 1996 until 25 July 1997 to submit the LTCP. The Department also requested a response from DELCORA regarding the Department's comments on the NMC Plan, as well as a copy of the SWMM model analysis. The NMC response was submitted 19 November 1996, and the SWMM model application, developed by Roy F. Weston, Inc. (WESTON®) for the DELCORA system, was submitted 16 May 1997.

1.3 IMPLEMENTATION OF THE NINE MINIMUM CONTROLS

DELCORA submitted its Nine Minimum Controls (NMC) Report for Correction of Combined Sewer Overflows (CSO) in July of 1995. DELCORA received PADEP comments on the NMC Report in a letter dated 23 July 1996 and on 19 November 1996 submitted revisions to the report. No subsequent comments have been received since this submission. Progress to date includes:

- Placement of warning signs is complete.
- Posting of CSO outfalls is complete.
- Conversion of the sewer system model to the EPA SWMM model is complete.
- Replacement of regulators is discussed in detail in this plan.
- Review of potential segregation of sanitary and stormwater flows is discussed in detail in this plan.
- Inlet modification/replacement is discussed in detail in this plan.

1.4 EPA CSO POLICY AND SMALL SYSTEM CONSIDERATIONS

In addition to the Pennsylvania DEP requirements for the LTCP as discussed in the correspondence of 23 July 1996 and the specific LTCP requirements defined in the NPDES permit, the EPA CSO Control Policy identifies nine elements required for the LTCP. Three of these elements are currently specified in the existing DELCORA NPDES permit. The EPA CSO Policy also provides

some relief for small combined sewer systems that serve populations less than 75,000. At the discretion of the NPDES Authority, small systems may not need to complete all of the nine elements required for the LTCP. The nine elements of the LTCP as defined by EPA are indicated in Table 1.1-1. Also indicated in Table 1.1-1 are the elements that are currently required in the existing NPDES permit, and those requirements that must be addressed, at a minimum, for systems with populations under 75,000.

The EPA CSO Policy provides two options for combined sewer systems to demonstrate compliance with the Clean Water Act Requirements. The first approach, or "demonstration approach," requires that a planned control program be developed to meet existing water quality standards. This approach requires system characterization (modeling and monitoring). The characterization effort may indicate that water quality standards can be met even if overflows occur. The second approach, or "presumptive approach," limits overflow events to four per year and requires treatment of no less than 85% of the combined sewage volume. Given the limited capacity of the DELCORA CSS conveyance system, compliance with the presumptive approach would likely be very capital intensive and costly for DELCORA.

With regard to small system requirements, the EPA CSO Policy requirements for small systems do not include a requirement for system characterization using modeling and monitoring. However, it is not possible to meet the requirements of the demonstration approach without system characterization and Part C of DELCORA's existing NPDES permit requires a System Hydraulic Characterization using SWMM to characterize overflow events. EPA has indicated that the initial cost of system characterization is generally offset by the reduced costs of the control measures associated with the demonstration approach (i.e., the demonstration approach often indicates that overflows are allowable and do not compromise water quality standards). This is particularly applicable when the CSOs are to a large receiving stream, such as the Delaware River, with significant assimilative capacity.

1.5 OVERVIEW OF COMBINED SEWER SYSTEM

The Delaware County Regional Water Quality Authority (DELCORA) owns and operates the Western Regional Treatment Plant (WRTP) located in Chester, Delaware County. WRTP receives both sanitary wastewater flows and combined sanitary wastewater/storm water flows from the City of Chester, which has both separate and combined sewers. Several neighboring municipalities (Trainer Borough, Chester Township, Upland Borough, Brookhaven Borough, Parkside Borough, Nether Providence Township, Eddystone Borough, Lower Chichester, and Marcus Hook) discharge sanitary wastewater flows directly to the interceptors leading to the WRTP. There are twenty-five regulators within the City of Chester combined sewer system, which, during storm periods, control the rate of flow from the combined sewers to the WRTP. As the flow rates increase, the regulators close, preventing additional flow to the WRTP and allowing for overflow to the receiving waters. The overflows discharge at 24 outfalls (Outfalls 002-009 and 011-026) to the Delaware River, Chester Creek, and Ridley Creek. Regulator 10 discharges to the collector sewer system flowing to Regulator 9. In addition, the Chester Pump Station is permitted to bypass combined flows when the discharge received exceeds the 30 MGD pumping capacity during storm periods. This outfall is now being added to NPDES permit as Outfall 027. The WRTP (permit Outfall 001) and CSO outfalls (permit Outfalls 002-026) discharge under National Pollutant Discharge Elimination System (NPDES) Permit No. PA0027103, issued to DELCORA by the Pennsylvania Department of Environmental Protection (DEP) on 21 July 1993. A map showing the location of the regulators, outfalls, and associated drainage areas used for the baseline conditions is included as Figure 1.5-1.

1.6 OVERVIEW OF MONITORING AND MODELING EFFORT

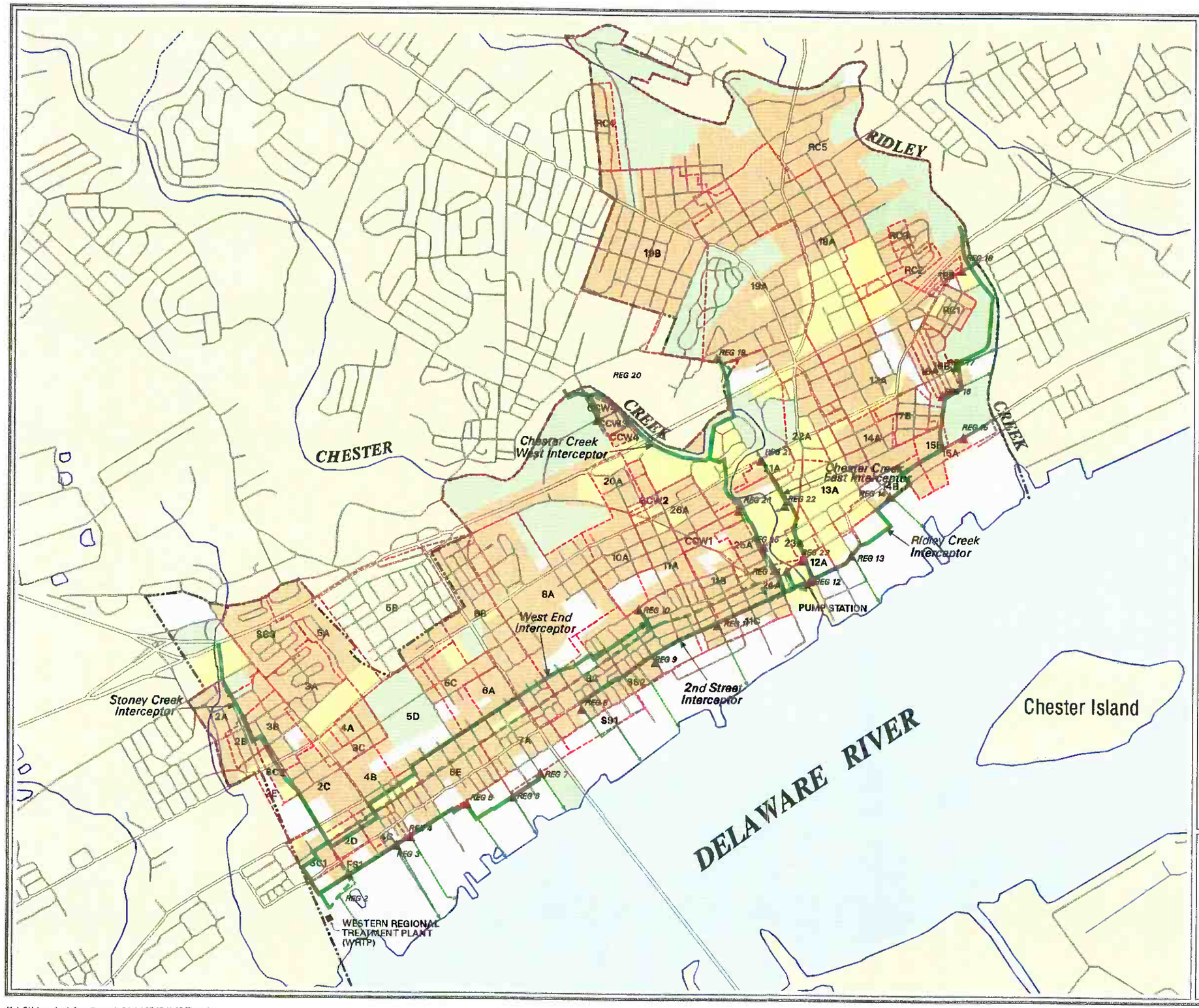
Evaluation of the combined sewer system response to storm events, through both monitoring and modeling, is central to compliance with the permit requirements. A hydraulic evaluation of the City of Chester combined sewer system was conducted by WESTON using the US EPA Storm Water Management Model (SWMM). SWMM is a mathematical computer model that simulates the complex time-varying process of rainfall onto land of varying characteristics, the conversion of rainfall to runoff, and the collection and transport of mixed stormwater runoff and sanitary sewage through the collection system. SWMM was developed to evaluate both quantity and quality

problems associated with urban stormwater runoff and combined sewer overflow phenomena. The model is public domain and has undergone many modifications and improvements due to its wide use and application. SWMM Version 4.30 (beta) was used in the analysis of the City of Chester combined sewer system.

Based on the flow monitoring data and model representation, it has been determined that the urban watershed area responds rapidly to storm events, quickly reaching peak runoff rates in response to rainfall. Correspondingly, the hydraulic system and regulators controlling discharges to the combined sewer outfalls respond rapidly to storm events, essentially routing flows to the outfalls early in the storm events.

Flow monitoring was conducted by DELCORA during three periods in 1994. The flow loggers showed the influence of the operation of the regulators on both the interceptors and the collector trunks.

Water quality monitoring was conducted during March and April 1997. The overflow from three different regulators as well as the flow through the Chester Pump Station (CPS) at 2nd and Dock Streets and the influent pumping station (EPS-1) at the WRTP were sampled and analyzed for five storm events.



LEGEND

- Industrial
- Commercial
- Residential
- Open
- Drainage Area Boundary
- Interceptor
- Combined Sewer Outfall
- Force Main
- Regulator

N

Scale in Feet

1000 0 1000 2000 3000 4000

Delaware County Regional Water
Quality Control Authority (DELCORA)

Long Term CSO Control Plan
City of Chester Combined Sewer System

FIGURE 1.5-1
LOCATION OF REGULATORS, OUTFALLS, AND DRAINAGE AREAS FOR BASELINE CONDITIONS

/data2/delcora/amle/baseline.eml ..24 Jul 97 13:11:48 Thursday

Table 1.1-1

Long Term Control Plan Requirements

LTCP Requirement	NPDES Permit Requirement	CSO Policy/ EPA Small System Requirement	PA DEP Letter 23 July 1996
Implementation of NMC (including response to DEP letter)	X	X	X
EPA LTCP Requirements			
1. Characterization, monitoring, and modeling of system.	X	X[1]	X
2. A public participation process.		X	
3. Consideration of sensitive areas.	X	X	
4. Evaluation of alternatives to meet CWA requirements.	X	X	X
5. Cost/performance considerations.			
6. Operation plan revisions for CSO controls.			
7. Maximization of treatment at POTW.[2]	X		
8. Implementation schedule for CSO controls.	X		X
9. Post-construction monitoring program.		X	

[1] Required for Demonstration Approach.
[2] Requirement of NMC.

SECTION 2
SYSTEM CHARACTERIZATION

2.1 OBJECTIVE OF SYSTEM CHARACTERIZATION

The EPA CSO Control Policy states that, "The purpose of the system characterization, monitoring, and modeling program initially is to assist the permittee in developing appropriate measures to implement the nine minimum controls and, if necessary to support the development of the long-term control plan." This is consistent with the Department's letter of 23 July 1996, which stated that, "The purpose of the modeling is not only to evaluate the quality and quantity of flows being discharged during storm events, but it is also to be utilized in conjunction with the NMC to implement non-capital intensive improvements within your system to help abate the discharges." Specifically, the system characterization defines the frequency and duration of overflows, on an average annual basis, and the effect of those CSOs on the receiving water quality. This further defines what CSO controls are necessary to protect water quality standards.

2.2 ANALYSIS OF EXISTING DATA

This effort includes compilation and review of all existing relevant data. Much of the existing data, especially related to the combined sewer system (CSS), was compiled during the development of the SWMM application. Required data for system characterization includes the following:

- **Existing precipitation data.**

  The event-specific precipitation data collected by DELCORA during the flow monitoring effort was used in the initial SWMM application development. Two-minute precipitation data was gathered by rain gages at the WRTP and the CPS. Further discussion of the precipitation data for the system flow monitoring as well as a summary of the precipitation data can be found in the SWMM model application report. The long-term one-hour precipitation data available for the NOAA meteorological station at the Philadelphia International Airport was used to determine the precipitation events for an average year. The period of record used for this analysis was from 1901 to 1995.

- **Drainage Areas.**

  The drainage areas to the regulators, as well as the drainage areas to interceptors flowing to the WRTP, have been delineated and a map developed. Further discussion of this data can be found in the SWMM model application report.

- **Physical Combined Sewer System Data.**

  Information on the location and inverts of the combined sewers, manholes, regulators, location of pumping stations, and other structural data was obtained from the DELCORA Location Plans - Wastewater Facilities (Sheets 0805-0808, 0905-0908, 1005-1008, and 110-1108). In a number of locations where plan information was lacking, field verification was performed by DELCORA. The locations of surface inlets were obtained from the City of Chester Storm Sewers map (Revised September 1974). Further discussion of this data can be found in the SWMM model application report.

- **Estimates of dry weather flows.**

  Estimates were made of the dry weather flows to each regulator and to the interceptors based on reported data. Further discussion of this data can be found in the SWMM model application report.

- **Existing receiving stream water quality and flow data.**

  A review of the existing flow and water quality data for the receiving streams is necessary to evaluate the impacts of the CSOs on the receiving stream water quality, and the ability of DELCORA's LTCP to meet the requirements of the Clean Water Act. All available water quality data was obtained from the EPA's STORET database for sampling since 1980.

- **Review of industrial dischargers.**

  A review of the connection locations of permitted significant industrial users (SIUs) revealed that no SIUs discharge above the regulators. All SIUs connect directly to the WRTP, EPS-1, CPS, the CPS force main, or the interceptor system.

- **Location and nature of sensitive areas.**

  Consideration of the impact on sensitive areas is a requirement of the LTCP. Any sensitive areas will be defined in the review of existing data. A further discussion of sensitive areas is contained in Section 3 of this plan.

2.3 MONITORING

CSS monitoring is a key element of system characterization since few systems have existing data sufficient to establish wet weather baseline conditions. Dry weather baseline conditions (sanitary sewage characterization) were obtained from the continuous monitoring of the WRTP influent conducted in 1995 and 1996. Literature values (i.e., EPA (1983)) were used to characterize the quality of the storm runoff portion of the overflow. The limited sampling data at the CSOs was used to fill gaps and to verify and calibrate the literature quality estimates. Data from the EPA's STORET database for sampling since 1980 was used to characterize the baseline conditions of the receiving waters.

2.3.1 Flow Monitoring

Flow monitoring in the CSS was conducted by DELCORA during three periods in 1994. Further discussion of flow monitoring can be found in the SWMM model application report.

2.3.2 Water Quality Monitoring

Water quality monitoring of the CSS consisted of sampling flows during storms at the WRTP, the CPS, and the following three regulators:

- Regulator 05 is located at Front and Townsend Streets with a drainage area of 281 acres, discharging directly to the WRTP when the regulator is open. SWMM indicates that Regulator 05 closes fairly rapidly in response to rainfall. Regulator 05 is an 8" McNulty which discharges to the Delaware River, has a double tide gate, and is not submerged during low tide. It is the closest regulator to the WRTP with a tide gate.

- Regulator 19 is located at 14th Street and Crozer Hospital and has a large drainage area (296 acres) discharging to the WRTP when the regulator is open. Regulator 19 is also fairly responsive to rainfall. It does not have a tide gate, but is only partially submerged during high tide, with discharge to Ship Creek/Ridley Creek. The regulator is a Brown and Brown with a 7 1/2" x 15 3/8" orifice.

- Regulator 25 is located at 5th and Penn Streets and has a relatively small drainage area (12 acres) discharging to the CPS when open. Regulator 25 discharges to Chester Creek and has a double tide gate. The regulator is an 8" McNulty and does not open as early in an event as Regulators 05 and 19.

The automatic samplers at the regulators were set with a sensor in the outfall pipe. When the sensor detected flow, the sampler began its program. Samplers at the WRTP and the CPS were started manually. All samplers collected an aliquot every 15 minutes into one of six discrete bottles.

At the WRTP and the CPS, grab samples were collected as the sampler was activated and again after one hour. The time-weighted samples collected in the first hour were composited to represent the first flush. The samples collected after the first hour until the end of the storm (or six hours, whichever came first) were also composited. Appendix A contains a summary of the sampled parameters and the results for each event monitored at the WRTP and the CPS.

Since grab samples could not be obtained at the regulators, Bottle 1 was used at the grab sample for the first flush. Bottles 2 through 5 were combined as the first hour composite. Bottle 6 was used as the grab for the remainder of the storm and all other collected bottles were composited. Appendix A contains a summary of the sampled parameters and the results for each of the events monitored at the regulator outfalls.

2.4 PRECIPITATION DATA

Since the mechanical nature of the regulators prevent using SWMM in continuous mode, a typical year of precipitation events was created from the 95 years of data from the Philadelphia International Airport meteorological station. Using the RAIN block in SWMM, an analysis of the precipitation data from 1901 through 1995 was performed. The RAIN block requires that the length of the dry period between storm events be specified. A value of 12 hours was selected as the

length of dry period between events. Table 2.4-1 presents a summary of the statistics for the 95 years of data.

2.4.1 Flow Monitoring Events

Precipitation data during the flow monitoring was collected by DELCORA at the WRTP, and limited data was available from the rain gage at the CPS. Further discussion of the precipitation data for the flow monitoring can be found in the SWMM model application report.

2.4.2 Typical Year Precipitation

The typical year was created by selecting months of data that represented rainfall volumes and number of precipitation events very close to the 95-year averages. Table 2.4-2 presents a comparison of the typical year to the 95-year average, and Figures 2.4-1 and 2.4-2 provide a graphical comparison between the typical year and the 95-year average.

This analysis assumes that all precipitation occurs as rainfall in the typical year. While this is not actually the case, the number of overflows modeled as rain events will be greater than the actual number of overflows observed since some precipitation events (i.e., snow storms) will not cause an overflow. This is because of the slow melting of a snowfall event. Appendix B contains a listing of the events contained in the typical year.

2.4.3 Frequency Analysis

A frequency analysis was performed on the 95 years of precipitation data from the Philadelphia International Airport meteorological station. Table 2.4-3 presents a summary of statistics from the frequency analysis of the precipitation data. In terms of overall storm precipitation volume, the analysis produced values very close to those presented in the frontal design storms from NJDEP (1994) as well as close to literature values from *Rainfall Frequency Atlas of the United States for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years* (USWB, 1961).

2.5 MODELING OF COMBINED SEWER SYSTEM

2.5.1 SWMM Application and Calibration

The SWMM application, using SWMM Version 4.30 (beta), to the City of Chester combined sewer system has been developed to estimate the volume of runoff originating from the combined sewer drainage areas for a given storm event, the volume of combined flows routed to the WRTP, and the volume of CSO associated with a given storm event. The model can also indicate hydraulic bottlenecks, and can be used to evaluate the effects of modifications to the existing system. The model was applied for purposes of calibration to six storm events observed in 1994 for which precipitation and limited flow data was available. Further discussion of the SWMM model calibration can be found in the *Application of the US EPA Stormwater Management Model (SWMM)* report (DELCORA, 1997).

2.5.2 Hydraulic Characterization

2.5.2.1 System Characterization

Constraints/Bottlenecks

The analysis of the 87 events in a typical year clearly show constraints/bottlenecks in the interceptor system. Table 2.5-1 shows the junctions and the corresponding interceptors that are subject to frequent surcharging. Figure 2.5-1 shows the interceptor reaches that frequently surcharge. The frequency and widespread nature of the surcharging clearly demonstrates that little or no additional capacity is available in most of the system to store combined flows. This is especially true in the sections of the Front Street interceptor approaching the WRTP (conduits C, D, E, and F), the sections of the 2nd Street Interceptor (conduits I, H1, H2, and H3) and the Ridley Creek Interceptor (all conduits) that approach the CPS. There does, however, appear to be the potential for some storage and additional capacity in the West End Interceptor that can be evaluated. Extreme care must be given in changing the operating character of the interceptors since lateral connections to residences and businesses tie directly into the interceptor. Any change that would create more surcharging may create backup in the laterals.

The WRTP is currently permitted for an average flow of 44 MGD. Peak flow capacity is estimated at 85 MGD. The peak hydraulic capacity of the force mains from CPS and industrial users (given current pump configurations and the planned diversion from the Central Delaware Pumping Station) is 58.5 MGD (CPS - 30 MGD, Kimberly Clark – 16.5 MGD, CDPS – 12 MGD). The peak capacity of the gravity flow interceptor to the WRTP is 2.0 MGD.

2.5.2.2 Annual Discharge Volume

Overflows

Table 2.5-2 shows a monthly and annual summary by outfall of the overflows experienced in a typical year. Table 2.5-3 summarizes the monthly and annual overflows by receiving water.

Chester Pump Station and EPS-1 at WRTP

Table 2.5-4 summarizes the monthly and annual flows from the interceptor system to CPS and to EPS-1 at the WRTP.

2.5.2.3 Frequency Analysis

In addition to analyzing the eighty-seven events of the typical year, an analysis was conducted of storm events with a specified return frequency. The purpose of this analysis is to identify those outfalls that discharge for the specified storm events. The analysis was performed on both recurrence interval storms selected from the historic record, as shown on Table 2.4-3 and the frontal design storms presented in *Projected Storm Water Generated Pollutant Loadings to the Delaware Estuary - A Modeling Study* (NJDEP, 1994). Table 2.5-5 summarizes the analysis and reveals that all outfalls discharge for all events with a return frequency greater than 2 months. It is important to observe that the analysis predicts that Regulators 12 and 23 do not close even for a 5-year event.

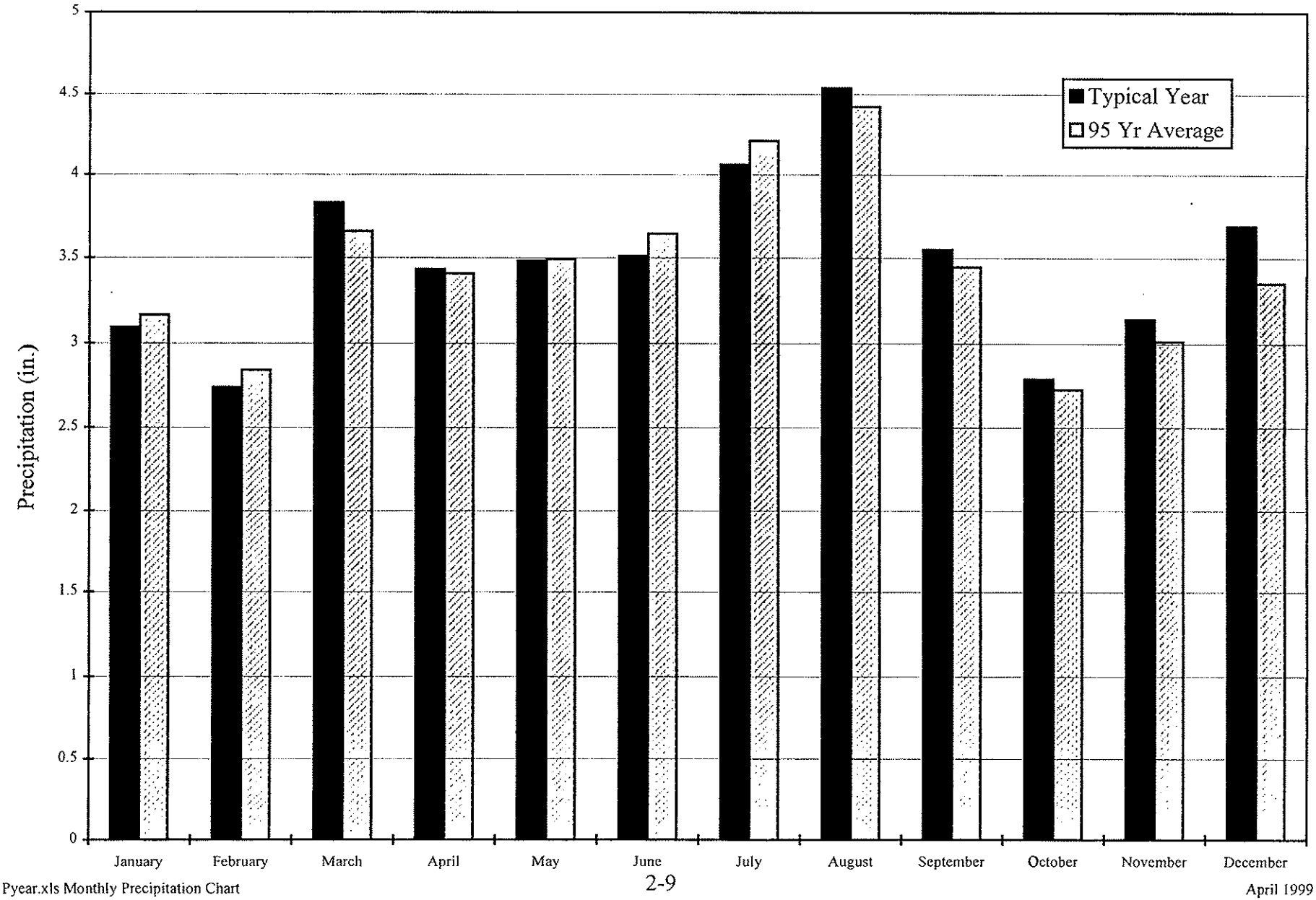
2.5.3 Combined Sewer Overflow Quality Characterization

The total load of a specified pollutant to the receiving water is computed by dividing the total CSO volume into a sanitary wastewater base flow component and a storm water runoff component. The apportioned volumes are then multiplied by the concentration of the specified pollutant in the

wastewater and storm water. Literature values were used to characterize the quality of the storm runoff portion of the overflow and the sampling data at the CSOs was used to supplement and verify and calibrate the characterization. The use of literature values to characterize the storm runoff portion of the overflow is consistent with the approach outlined in a 2 May 1995 letter from the City of Philadelphia to the Delaware River Basin Commission (DRBC). The DRBC is supportive of this approach and agrees that limited sampling data available does not improve the overall results. The sanitary sewage component of the CSO was characterized by using WRTP influent data from 1995 and 1996. Table 2.5-6 presents a summary of the literature values, the characterization sampling results, and the concentrations selected for the CSO quality characterization. Samples that reported values less than the analysis method reporting limit were treated as discussed in *Statistical Analysis of Ground-Water Monitoring Data for RCRA Facilities - Addendum to Interim Final Guidance (Draft)* (EPA, 1992).

Using the selected concentrations for wastewater and storm water from Table 2.5-6 and the CSO discharge volumes from Table 2.5-2, the annual load was computed by outfall and by receiving water for the specified pollutants as presented in Tables 2.5-7 through 2.5-21.

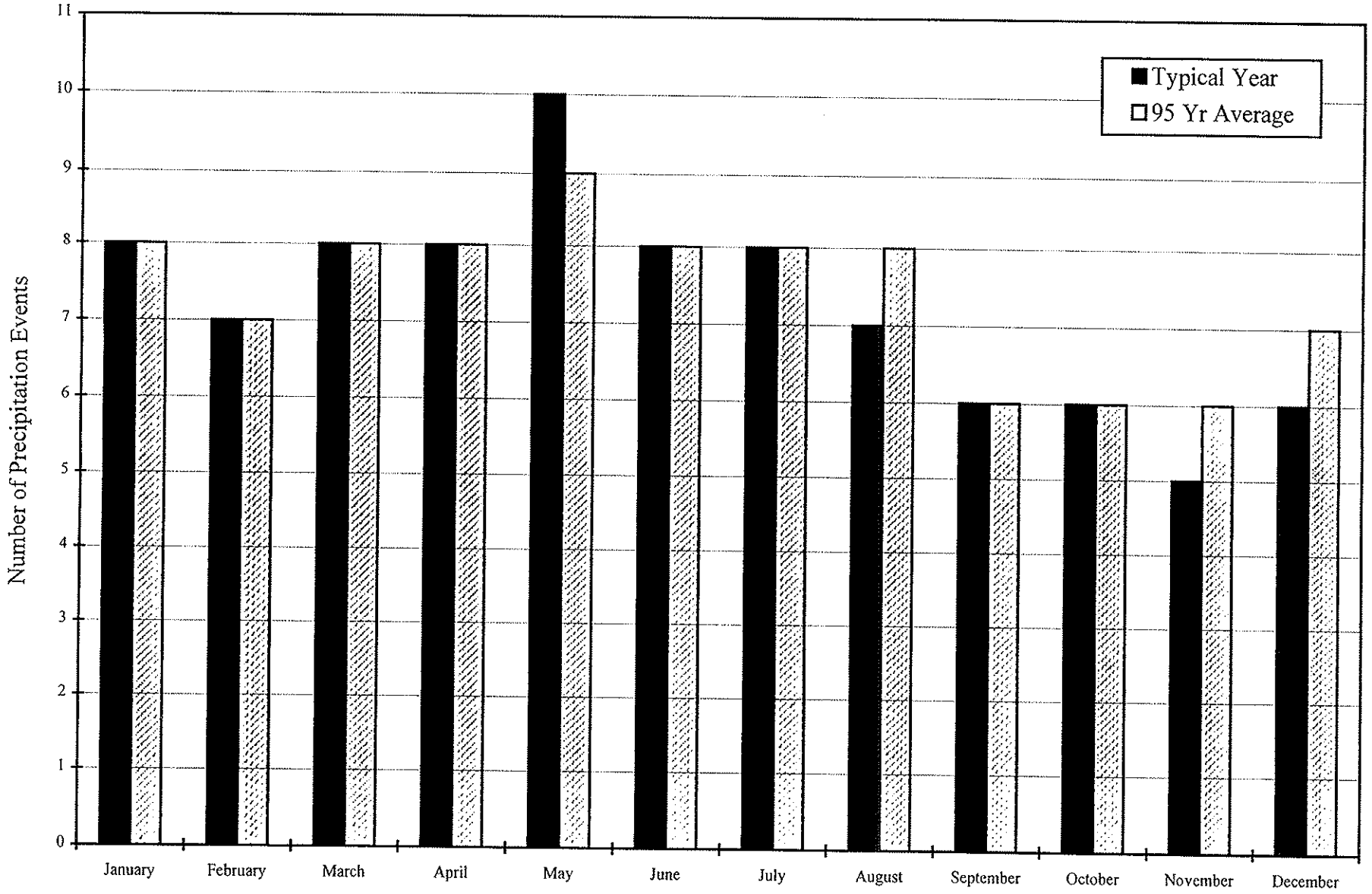
Figure 2.4-1 Comparison of Monthly Precipitation Totals

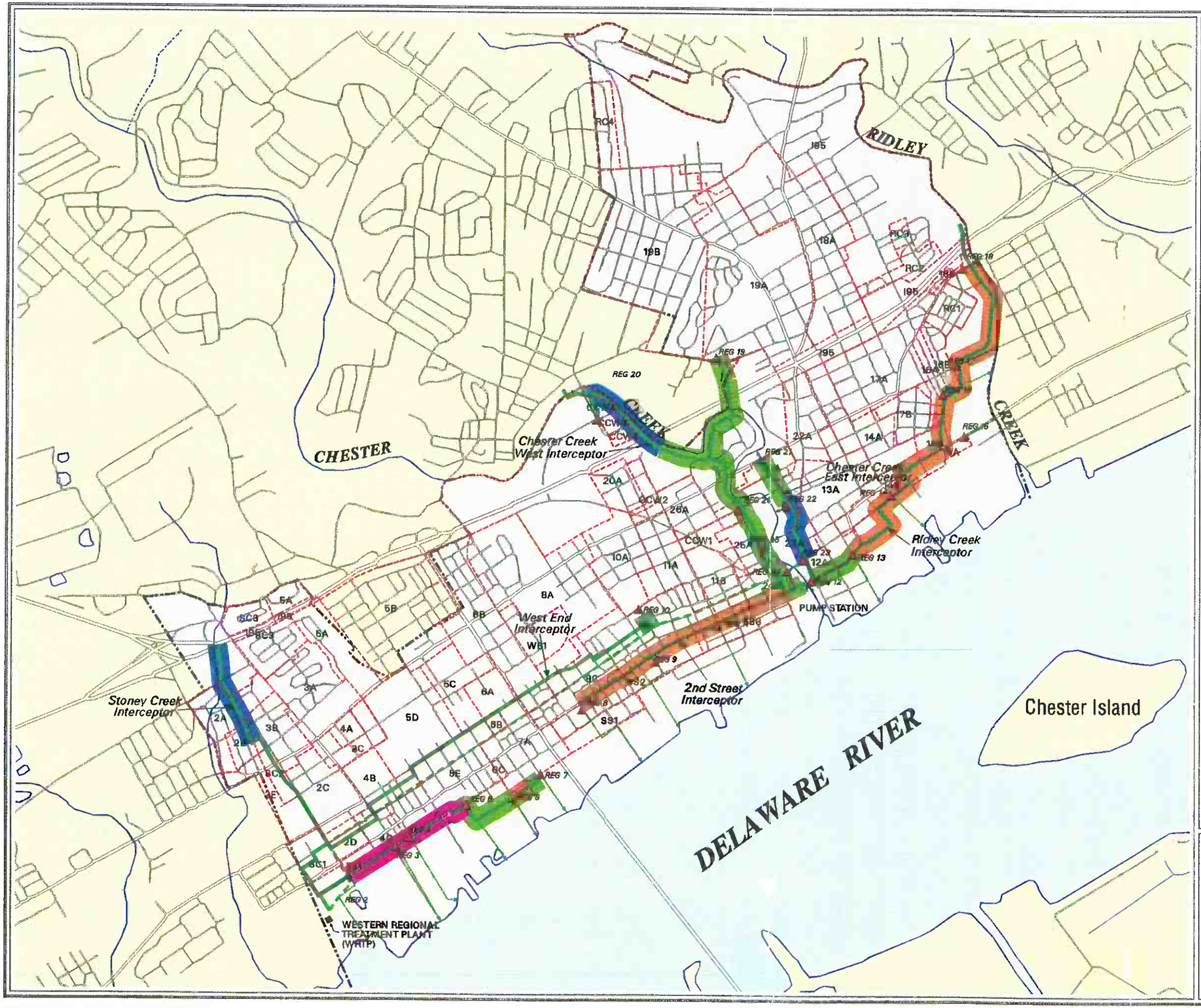


Pyear.xls Monthly Precipitation Chart

April 1999

Figure 2.4-2 Comparison of Number of Events per Month





LEGEND

- City of Chester
- Drainage Area Boundary
- Interceptor
- Combined Sewer Outfall
- Force Main
- Regulator

Percent of Time Surcharging

- 75-100
- 50-75
- 25-50
- 1-25

N

Scale in Feet

1000 0 1000 2000 3000 4000

Delaware County Regional Water
Quality Control Authority (DELCORA)

Long Term CSO Control Plan
City of Chester Combined Sewer System

FIGURE 2.5-1
INTERCEPTORS EXPERIENCING FREQUENT SURCHARGING DURING THE BASELINE TYPICAL YEAR

/data2/delcora/amis/eurohpre.aml ..24 Jul 97 13:11:13 Thursday

Table 2.4-1

95 Year Precipitation Statistics

Month	12 Hour Dry Period			
	Total Number of Events	Average Number of Events	Average Event Volume (in.)	Average Volume (in.)
January	738	7.8	0.407	3.16
February	660	6.9	0.409	2.84
March	764	8.0	0.455	3.66
April	742	7.8	0.436	3.41
May	823	8.7	0.403	3.49
June	805	8.5	0.43	3.64
July	799	8.4	0.5	4.21
August	737	7.8	0.57	4.42
September	592	6.2	0.553	3.45
October	529	5.6	0.49	2.73
November	604	6.4	0.474	3.01
December	673	7.1	0.473	3.35
Total	**8466**	**89.12**	**0.467**	**41.37**

Table 2.4-2

Typical Year Comparison to 95 Year Average

Month	Precipitation (inches)			Number of Events	
	Typical Year		95 Yr Average	Typical Year	95 Yr Average
January	3.09	(1995)	3.16	8	8
February	2.74	(1964)	2.84	7	7
March	3.83	(1970)	3.66	8	8
April	3.43	(1962)	3.41	8	8
May	3.48	(1967)	3.49	10	9
June	3.51	(1937)	3.64	8	8
July	4.06	(1986)	4.21	8	8
August	4.54	(1994)	4.42	7	8
September	3.55	(1995)	3.45	6	6
October	2.79	(1960)	2.73	6	6
November	3.14	(1975)	3.01	5	6
December	3.69	(1993)	3.35	6	7
Total	**41.85**		**41.37**	**87**	**89**

Table 2.4-3

95 Year Frequency Analysis Statistics

Return Period	12 Hour Dry Period			Philadelphia Frontal Design Storms [1]			TP-40 [2]	Typical Storms	
	Duration (hrs)	Intensity (in/hr)	Volume (in)	Duration (hrs)	Maximum Intensity (in/hr)	Volume (in)	24-Hr Volume (in)	Date	Duration (hrs)
5-Year	68	0.64	4.35	21	1.53	3.68	4.25	6/1/46	22
2-Year	57	0.495	3.47	17	1.31	2.71	3.25	1/12/15	32
1-Year	47	0.374	2.8	13	1.12	2.21	2.7	4/14/70	29
2-Month	27	0.153	1.47	7	0.75	1.36	N/A	9/25/92	18

[1] NJDEP (1994)

[2] USWB (1961)

Table 2.5-1

Interceptor Surcharging During Baseline Typical Year Storm Events

Junction			Storm Number																																																																																			Frequency	
Name	Interceptor Name	Conduit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	#	%
C15	Front St.	A																																																																																								0	0%
C10	Front St.;West End	B;10F																																																																																							0	0%
C12	Front St.	C	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	84	97%
D16	Front St.	D	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X		X	X	X	X	X	X		X	X	X		X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	80	92%
D17	Front St.	E	X		X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	X		X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X		X	X	X		X	X	X		X	X	X	X		X	X			X	X		X	X	X		X	X	X	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X	X	X		X	71	82%
A9	Front St.	F	X		X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	X		X	X	X	X	X	X	X		X	X	X	X	X	X	X	X			X	X	X		X	X	X		X	X	X	X		X	X						X	X	X		X	X	X	X	X	X	X	X		X		X	X	X	X		X	X	X	X	X	X		X	67	77%
A16	Front St.	G1			X						X						X			X	X								X									X					X	X							X		X																									X		X	X				X	X		X			17	20%
B18	Front St.	G2			X						X		X				X	X		X	X	X							X									X					X	X				X			X		X																X		X		X				X		X	X				X	X		X			24	28%
B19	Front St.	G2			X																																																																																				1	1%
O28	West End	10E																																																																																									0	0%
O12	West End;Stoney Cr.	10D;SC1																																																																																									0	0%
P13	West End	10C																																																																																								0	0%
N08	West End	10B																																																																																									0	0%
P12	West End	10B																																																																																									0	0%
10-P01	West End	10A						|X|																																														|X|																																				2	2%
G17	Stoney Cr.	SC2																																																																																										0	0%
O05	Stoney Cr.	SC3			X				X		X		X			X	X	X	X		X		X	X		X	X	X		X						X		X		X	X				X	X	X	X	X	X		X		X	X	X		X	X		X		X	X	X		X			X	X	X			X		X			X	X	X		X			X			46	53%
K03	Stoney Cr.	SC3			X				X		X		X			X		X	X		X		X	X		X	X	X		X						X		X		X	X				X	X	X	X	X	X		X		X	X	X		X	X		X		X	X	X					X	X	X			X		X			X	X	X		X			X			44	51%
B17	2nd St.	P																																																																																								0	0%
B13	2nd St.	O;N							X																			X												X						X	X		X	X			X		X		X		X			X		X	X	X											X		X			X	X				X						20	23%
N41	2nd St.	O						|X|																																														|X|																																				2	2%
B11	Chester Cr.-W;2nd St.	M1;J							X																			X												X						X	X			X			X		X		X					X		X	X	X											X						X									15	17%
N18	Chester Cr.-W	M2							X																			X																		X	X			X			X		X		X					X		X	X	X											X						X									14	16%
N15	Chester Cr.-W	L							X																			X																					X			X		X		X							X		X											X															9	10%
J07	Chester Cr.-W	K2							X																																								X							X							X												X															5	6%
F04	Chester Cr.-W	K3;K1A							X																																								X							X							X												X															5	6%
O18	Chester Cr.-W	K3																																																					|X|																																				1	1%
B02	Chester Cr.-W	K1B							X																			X																		X	X			X			X		X	X	X					X		X		X										X						X									14	16%
N05	Chester Cr.-W	K1C			X				X		X		X			X	X	X	X		X	X	X	X		X	X	X	X	X						X		X		X	X				X	X	X		X	X		X		X	X	X		X	X		X		X	X	X		X			X	X	X			X		X			X	X	X		X			X			47	54%
I18	Chester Cr.-W	K			X				X		X		X			X	X	X	X		X		X	X		X	X	X	X	X						X		X		X	X				X	X	X		X	X		X		X		X		X	X		X		X	X	X		X			X	X	X			X		X			X	X	X		X			X			45	52%
M02	Chester Cr.-W	K			X				X				X			X			X					X	X		X		X								X				X	X				X	X			X			X		X		X		X	X		X		X	X	X					X	X	X			X		X			X	X			X			X			33	38%
A07	2nd St.	I			X				X																	X		X								X				X						X	X		X	X			X		X		X		X			X		X	X	X					X		X			X		X			X	X				X						25	29%
P56	2nd St.	H1			X				X															X		X		X								X				X						X	X		X	X			X		X		X		X			X		X	X	X					X		X			X		X			X	X				X						26	30%
P50	2nd St.	H2			X				X				X			X			X					X	X		X		X								X		X		X	X				X	X		X	X			X		X		X		X	X		X		X	X	X					X	X	X			X		X			X	X				X			X			35	40%
O38	2nd St.	H2			X				X							X								X	X		X		X								X				X	X				X	X		X	X			X		X		X		X			X		X	X	X					X	X	X			X		X			X	X				X			X			31	36%
B22	2nd St.																																																																																											0	0%
B27	2nd St.	Z																																																																																								0	0%
B18E	Chester Cr.-E;Ridley Cr.	Y;V																																																																																									0	0%
N31	Chester Cr.-E	X																																																																																								0	0%
K33	Chester Cr.-E	W			X						X		X			X	X	X	X	X	X	X	X	X		X	X	X	X	X				X	X	X	X	X		X	X		X		X	X	X	X	X	X	X	X		X	X			X	X		X		X	X	X	X	X			X	X	X			X		X			X	X	X		X	X		X			54	62%
G05	Chester Cr.-E	W																										X												X						X	X			X			X		X				X			X		X		X										X					X	X				X						15	17%
C14	Ridley Cr.	U			X								X			X			X					X	X		X										X		X			X							X											X						X						X	X	X			X		X							X			X			20	23%
P38	Ridley Cr.	T			X				X		X		X			X		X	X		X		X	X		X	X	X								X		X		X	X				X	X		X	X			X		X		X		X	X		X		X	X	X					X	X	X			X		X			X	X				X			X			39	45%
M10	Ridley Cr	S1			X				X		X		X			X		X	X		X		X	X		X	X	X		X						X		X		X	X				X	X		X	X			X		X		X		X	X		X		X	X	X					X	X	X			X		X			X	X	X		X			X			41	47%
I32	Ridley Cr.	S2			X				X		X		X			X			X		X		X	X		X		X								X		X		X	X				X	X		X	X			X		X		X		X	X		X		X	X	X					X	X	X			X		X			X	X				X			X			37	43%
I25	Ridley Cr.	RT1			X				X		X		X			X			X		X		X	X		X		X								X		X		X	X				X	X		X	X			X		X		X		X	X		X		X	X	X					X	X	X			X		X			X	X				X			X			37	43%
I27	Ridley Cr.	16C;RT2			X								X			X			X					X	X		X										X					X						X		X				X							X						X						X	X	X			X		X							X			X			21	24%
J12	Ridley Cr.	Q1			X				X				X			X			X		X		X	X		X		X								X		X		X	X				X	X		X	X			X		X		X		X	X		X		X	X	X					X	X	X			X		X			X	X				X			X			36	41%
G02	Ridley Cr.	Q2			X				X				X			X			X					X	X		X		X								X		X		X	X				X	X		X	X			X		X		X		X	X		X		X	X	X					X	X	X			X		X			X	X				X			X			35	40%
C04	Ridley Cr.	Q3			X				X				X			X			X					X	X		X		X								X		X		X	X				X	X		X	X			X		X		X		X	X		X		X	X	X					X	X	X			X		X			X	X				X			X			35	40%
C02	Ridley Cr.	Q3			X				X				X			X			X					X	X		X		X								X		X		X	X				X	X		X	X			X		X		X		X	X		X		X	X	X					X	X	X			X		X			X	X				X			X			35	40%

Table 2.5-2

Monthly and Annual Summary of Overflows by Outfall for Baseline Typical Year

Outfall	January		February		March		April		May		June		July		August		September		October		November		December		Annual	
	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)
002	2,528.2	545,240	2,916.6	524,017	4,354.9	723,368	3,324.2	673,892	4,454.1	627,555	3,489.1	639,235	3,286.1	789,214	3,786.1	916,749	3,310.3	644,210	2,673.3	500,887	2,670.3	592,296	3,562.2	694,988	40,355.5	7,871,651
003	818.6	674,480	1,514.4	487,608	2,486.1	712,720	2,023.5	686,728	1,943.8	594,385	1,197.3	736,288	1,058.5	879,766	1,919.2	1,072,897	1,907.9	750,219	1,069.8	599,119	1,557.6	698,237	2,035.7	722,468	19,532.4	8,614,915
004	829.1	339,130	1,566.4	206,019	2,629.7	312,250	2,115.6	312,641	1,790.4	247,022	1,297.3	334,232	1,117.9	444,923	2,003.1	486,686	1,980.7	340,304	1,132.7	271,099	1,691.7	321,495	2,078.8	320,688	20,233.4	3,936,490
005	4,787.4	1,337,021	5,303.2	1,084,110	10,171.3	1,613,041	7,462.7	1,383,638	11,890.4	1,387,060	9,083.0	1,404,878	7,555.5	1,675,111	7,047.7	1,859,073	7,427.1	1,488,922	5,748.0	1,143,392	5,585.7	1,364,600	6,223.6	1,488,794	88,285.5	17,229,640
006	808.8	115,324	1,460.1	77,012	1,908.9	97,766	1,633.1	95,354	1,361.8	82,486	1,014.3	109,058	977.6	148,959	1,568.6	155,153	1,506.2	106,692	837.9	86,906	1,004.9	99,946	1,764.9	105,968	15,847.1	1,280,624
007	1,206.2	369,654	2,020.0	279,371	3,681.9	389,577	2,540.9	358,548	2,925.3	330,425	1,753.6	371,993	1,555.9	481,200	2,233.4	520,599	2,397.3	379,776	1,506.7	299,636	1,980.5	363,287	2,539.3	391,814	26,341.1	4,535,880
008	4,057.8	1,591,780	5,354.3	1,433,828	10,190.8	2,083,199	7,512.7	1,859,780	11,226.6	1,800,553	9,117.4	1,958,008	6,811.1	2,135,698	6,337.0	2,602,676	7,470.3	1,965,756	5,778.3	1,527,708	5,612.3	1,912,563	5,514.2	1,979,540	84,982.7	22,851,089
009	863.7	707,630	1,951.4	411,830	3,071.5	558,396	2,327.4	546,650	2,514.7	535,780	1,553.2	684,767	1,377.7	928,622	2,164.6	992,766	2,175.8	646,206	1,310.8	564,901	1,870.5	666,904	2,383.5	601,219	23,564.7	7,845,670
011	681.8	379,120	910.8	167,705	1,225.1	204,563	1,163.9	209,041	975.4	237,668	761.8	335,784	785.8	489,464	1,516.9	486,696	1,316.7	294,696	818.1	290,020	933.7	327,258	1,339.8	299,070	12,429.9	3,721,086
012	62.6	10,465	-	-	-	-	56.4	1,830	49.6	371	290.5	8,398	283.1	16,540	228.0	6,942	-	-	82.9	3,704	281.1	2,398	15.2	61	1,349.6	50,710
013	1,186.8	717,355	2,078.0	573,787	3,801.9	799,926	2,652.5	732,849	3,051.7	654,574	1,957.6	744,370	1,670.5	947,454	2,315.7	1,056,138	2,498.3	765,422	1,492.3	595,177	2,077.2	721,009	2,632.4	789,491	27,414.9	9,097,551
014	700.5	340,310	346.8	40,594	415.7	55,604	577.1	118,952	715.0	126,204	647.4	292,561	696.1	441,160	1,301.8	391,154	812.9	137,431	750.9	203,421	611.3	301,101	679.1	101,537	8,254.5	2,550,028
015	1,321.2	154,252	1,877.3	62,003	3,058.9	97,574	2,591.4	101,157	2,981.5	97,883	1,795.4	141,237	1,665.5	198,445	2,453.7	208,377	2,528.4	121,233	1,583.1	119,301	2,007.0	145,787	2,673.7	103,288	26,537.1	1,550,536
016	886.8	480,260	1,880.4	217,152	2,424.8	303,887	2,172.8	318,902	1,792.0	265,771	1,217.2	415,445	1,337.7	629,561	1,941.9	599,032	1,866.7	354,965	1,002.6	337,310	1,321.1	389,371	2,009.5	343,661	19,853.6	4,655,316
017	3,885.3	414,208	5,686.9	387,874	9,598.3	550,990	6,854.3	483,903	10,609.5	459,489	8,334.4	466,400	6,810.5	534,427	6,442.1	647,113	6,877.4	513,511	4,164.6	374,197	5,418.0	454,169	5,918.4	520,617	80,599.8	5,806,898
018	3,956.3	1,132,256	5,706.4	881,672	9,575.1	1,283,246	6,887.9	1,154,437	10,624.5	1,126,156	8,351.0	1,214,806	6,061.3	1,483,802	6,446.7	1,621,841	6,929.9	1,210,918	4,326.3	934,745	5,419.3	1,136,066	5,223.6	1,207,109	79,508.3	14,387,055
019	956.2	1,442,300	2,151.1	1,402,030	3,372.3	1,891,195	2,633.8	1,731,923	2,795.0	1,482,172	1,799.6	807,829	1,699.7	1,244,958	2,450.1	2,014,762	2,398.7	1,820,550	1,175.7	1,051,146	2,057.1	1,056,460	2,502.5	1,928,542	25,991.8	17,873,866
020	780.4	116,461	1,143.3	38,756	1,523.3	51,976	1,149.3	62,697	1,080.5	61,855	844.3	108,009	762.5	158,485	1,253.4	133,796	1,245.4	71,364	737.9	73,117	661.4	92,880	1,368.1	63,913	12,549.9	1,033,310
021	564.5	62,294	651.4	19,272	784.6	26,157	790.5	32,964	583.9	30,869	606.4	60,722	519.1	87,401	962.9	77,117	955.0	37,787	562.3	41,799	527.5	53,967	992.0	34,884	8,500.1	565,233
022	786.1	230,431	1,320.9	92,167	1,695.3	123,999	1,287.0	138,097	1,142.8	133,157	927.5	215,580	813.6	308,897	1,404.8	274,297	1,334.8	158,772	774.2	152,222	739.9	189,724	1,520.1	143,490	13,747.1	2,160,832
023	360.3	30,553	236.9	1,217	284.0	2,679	240.1	11,393	395.9	8,583	363.0	35,730	407.9	52,411	542.5	36,410	303.6	6,167	296.3	16,211	363.2	23,512	243.3	5,869	4,037.1	230,735
024	730.7	185,310	1,023.4	92,987	1,679.5	122,782	1,367.9	127,872	1,278.7	126,989	825.5	171,431	813.5	243,038	1,612.5	258,104	1,588.9	164,275	922.9	147,241	1,132.9	172,493	1,627.1	161,394	14,603.6	1,973,915
025	667.2	78,412	517.3	8,344	792.6	12,343	1,109.7	29,801	688.0	23,714	670.6	71,961	621.2	101,822	1,441.0	100,111	968.8	20,421	728.2	49,264	892.8	71,167	925.9	29,439	10,023.3	596,799
026	734.9	197,801	897.9	53,156	1,189.3	71,131	1,314.9	113,696	1,129.9	110,660	829.7	186,012	736.1	257,016	1,618.6	274,920	1,395.3	138,431	935.1	152,137	1,084.2	184,132	1,324.0	113,117	13,189.9	1,852,210
Total	**34,161.5**	**11,652,046**	**48,515.2**	**8,542,511**	**79,915.5**	**12,088,368**	**61,789.2**	**11,286,746**	**78,001.2**	**10,551,381**	**58,727.3**	**11,514,731**	**49,424.3**	**14,678,373**	**60,992.1**	**16,793,410**	**61,196.8**	**12,138,029**	**40,411.3**	**9,534,661**	**47,501.2**	**11,340,821**	**57,097.0**	**12,150,961**	**677,732.6**	**142,272,037**

Table 2.5-3

Monthly and Annual Summary of Overflows by Receiving Water for Baseline Typical Year

Receiving Water	January		February		March		April		May		June		July		August		September		October		November		December		Annual	
	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)
Ridley Creek	10,049.7	2,180,976	15,151.0	1,548,701	24,657.1	2,235,696	18,506.4	2,058,399	26,007.6	1,949,298	19,698.0	2,237,887	15,875.0	2,846,235	17,284.3	3,076,363	18,202.4	2,200,628	11,076.7	1,765,553	14,165.4	2,125,393	15,825.3	2,174,675	206,498.7	26,399,804
Chester Creek	5,643.0	2,354,027	7,942.1	1,707,929	11,320.9	2,302,261	9,949.5	2,250,274	9,144.4	1,978,370	7,157.2	1,665,671	6,656.8	2,470,568	11,513.8	3,176,459	10,190.6	2,417,766	6,215.7	1,686,842	7,740.1	1,846,732	10,518.2	2,480,710	103,992.3	26,337,608
Delaware River	18,468.9	7,117,043	25,422.1	5,285,880	43,937.5	7,550,411	33,333.3	6,978,074	42,849.2	6,623,712	31,872.0	7,611,172	26,892.6	9,361,570	32,194.1	10,540,588	32,803.7	7,519,635	23,118.9	6,082,267	25,595.8	7,368,696	30,753.6	7,495,576	367,241.6	89,534,625
Total	**34,161.5**	**11,652,046**	**48,515.2**	**8,542,511**	**79,915.5**	**12,088,368**	**61,789.2**	**11,286,746**	**78,001.2**	**10,551,381**	**58,727.3**	**11,514,731**	**49,424.3**	**14,678,373**	**60,992.1**	**16,793,410**	**61,196.8**	**12,138,029**	**40,411.3**	**9,534,661**	**47,501.2**	**11,340,821**	**57,097.0**	**12,150,961**	**677,732.6**	**142,272,037**

Table 2.5-4

Monthly and Annual Summary of Wet Weather Flows to 2nd and Dock Pump Station and EPS-1 at WRTP

Outfall	January	February	March	April	May	June	July	August	September	October	November	December	Annual
	Total Flow (cu ft)	Total Flow (cu ft)	Total Flow (cu ft)	Total Flow (cu ft)	Total Flow (cu ft)	Total Flow (cu ft)	Total Flow (cu ft)	Total Flow (cu ft)	Total Flow (cu ft)	Total Flow (cu ft)	Total Flow (cu ft)	Total Flow (cu ft)	Total Flow (cu ft)
WRTP	2,481,270	2,517,580	3,077,710	2,754,640	3,590,110	2,621,170	2,334,040	2,357,090	2,491,120	2,206,560	1,872,480	2,542,590	30,846,360
2nd & Dock	7,653,490	7,807,080	10,084,980	8,862,580	11,442,590	8,370,700	7,520,690	7,749,810	8,255,050	7,029,120	6,061,770	8,163,010	99,000,870
Total	**10,134,760**	**10,324,660**	**13,162,690**	**11,617,220**	**15,032,700**	**10,991,870**	**9,854,730**	**10,106,900**	**10,746,170**	**9,235,680**	**7,934,250**	**10,705,600**	**129,847,230**

Table 2.5-5

Summary of Storm Frequency Analysis for Each Regulator

Regulator	Frontal Design Storm per NJDEP (1994)				Typical Storm From Historic Record			
	2-Month Event	1-Year Event	2-Year Event	5-Year Event	2-Month Event	1-Year Event	2-Year Event	5-Year Event
	Discharge	Discharge	Discharge	Discharge	Discharge	Discharge	Discharge	Discharge
2	X	X	X	X	X	X	X	X
3	X	X	X	X	X	X	X	X
4	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X
7	X	X	X	X	X	X	X	X
8	X	X	X	X	X	X	X	X
9	X	X	X	X	X	X	X	X
10	X	X	X	X	X	X	X	X
12	X	X	X	X	X	X	X	X
13	X	X	X	X	X	X	X	X
14	X	X	X	X	X	X	X	X
15	X	X	X	X	X	X	X	X
16	X	X	X	X	X	X	X	X
17	X	X	X	X	X	X	X	X
18	X	X	X	X	X	X	X	X
19	X	X	X	X	X	X	X	X
20	X	X	X	X	X	X	X	X
21	X	X	X	X	X	X	X	X
22	X	X	X	X	X	X	X	X
23	X	X	X	X	X	X	X	X
24	X	X	X	X	X	X	X	X
25	X	X	X	X	X	X	X	X
26	X	X	X	X	X	X	X	X

Table 2.5-6

Summary of Event Mean Concentration (EMC) Values, Sampling Results, and Selected Concentrations

Pollutant	NURP EMC Mean Concentration[1] (mg/l)	EMC For Older Urban Areas (Baltimore)[2] (mg/l)	Average DELCORA WRTP Influent Sewage Concentrations[3] (mg/l)	Average DELCORA Sewage Concentrations at 2nd and Dock and EPS-1 First Flush (mg/l)	Average DELCORA Sewage Concentrations at 2nd and Dock and EPS-1 Composite (mg/l)	Average DELCORA CSO Concentrations First Flush (mg/l)	Average DELCORA CSO Concentrations Composite (mg/l)	Selected Concentrations for Sewage Characterization (mg/l)	Selected Concentrations for Storm Water Characterization (mg/l)
Total Suspended Solids	180	NR	171.22	282.46	200.29	193.46	115.36	171.22 [6]	180 [9]
BOD_5	12	NR	119.23	102.77	81.79	55.67 [4]	35.80 [4]	119.23 [6]	12 [9]
COD	92	163	358.17	369.62	286.71	205.31	104.00	358.17 [6]	163 [10]
Fecal Coliform (#/100 ml)	NR	NR	1,000,000	NS	NS	75,795	79,091	1,000,000 [6]	0
Dissolved Oxygen	NR	NR	NS	6.21	NS	7.87	9.15	6.21 [7]	8.51 [11]
Oil & Grease	NR	NR	22.30	23.61	25.71	27.70	7.42	22.30 [6]	17.56 [11]
Total Kjeldahl Nitrogen	1.9	7.2	11.99	11.94	9.64	7.75	4.71	11.99 [6]	7.2 [10]
Total Phosphorus	0.42	1.08	1.68	2.55	2.24	1.51	1.09	1.68 [6]	1.08 [10]
Total Zinc	0.202	0.397	0.1737	0.1620	0.1779	0.3305	0.1369	0.1737 [6]	0.3970 [10]
Total Copper	0.043	0.105	0.0417	0.0528	0.0844	0.1407	0.0430	0.0417 [6]	0.1050 [10]
Total Aluminum	NR	NR	1.4114	1.9069	2.5593	3.7465	1.9087	1.4114 [6]	2.8276 [11]
Total Lead	0.182	0.389	0.0173	0.0228 [4]	0.0392 [5]	0.1000 [4]	0.0440 [4]	0.0173 [6]	0.1820 [12]
Mercury	NR	NR	0.0003	0.0003 [5]	0.0005 [5]	0.0002 [5]	0.0003 [5]	0.0003 [6]	0.0003 [11]
Silver	NR	NR	0.0080	0.0100 [5]	0.0107 [5]	0.0100 [5]	0.0100 [5]	0.0080 [6]	0.0100 [11]
Total Phenols	NR	NR	3.78	0.1538 [4]	0.0648 [4]	0.0660 [4]	0.0778 [4]	0.1538 [8]	0.0719 [11]

[1] EPA (1983)
[2] Metropolitan Washington Council of Governments (MWCOG, 1987)
[3] Includes Sun Oil and Kimberly Clark industrial discharges.
[4] Corrected using Aitchison's Adjustment for less than 50% non-detect samples as per EPA (1992)
[5] Corrected using detection limit at value for samples reporting non-detect as per EPA (1992)
[6] From average DELCORA WRTP influent sewage concentrations.
[7] From average DELCORA sewage concentrations at 2nd and Dock and EPS-1 for first flush.
[8] From average DELCORA sewage concentrations at 2nd and Dock and EPS-1 for first flush since WRTP influent contains Sun Oil Co. and Kimberly-Clark industrial discharges.
[9] From Nationwide Urban Runoff Program (NURP) concentrations for storm water (EPA, 1983).
[10] From Baltimore study for older urban areas (MWCOG, 1987).
[11] Average of DELCORA CSO first flush and composite samples.
[12] Based on observed sample results and removal of lead from gasoline, NURP concentration for storm water was selected.
NR - No value reported.
NS - No samples collected.

Table 2.5-7

Total Suspended Solids Annual Load for Baseline Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (mg/l)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (mg/l)	Discharge Load (lbs)
002	0.20	4.84E+05	6.2%	171.2	7.39E+06	93.8%	180.00	88,197
003	0.24	2.81E+05	3.3%	171.2	8.33E+06	96.7%	180.00	96,661
004	0.11	1.34E+05	3.4%	171.2	3.80E+06	96.6%	180.00	44,165
005	0.41	2.17E+06	12.6%	171.2	1.51E+07	87.4%	180.00	192,438
006	0.04	3.80E+04	3.0%	171.2	1.24E+06	97.0%	180.00	14,371
007	0.11	1.74E+05	3.8%	171.2	4.36E+06	96.2%	180.00	50,879
008	0.57	2.91E+06	12.7%	171.2	1.99E+07	87.3%	180.00	255,209
009	0.25	3.53E+05	4.5%	171.2	7.49E+06	95.5%	180.00	87,977
011	0.13	9.70E+04	2.6%	171.2	3.62E+06	97.4%	180.00	41,765
012	0.01	8.10E+02	1.6%	171.2	4.99E+04	98.4%	180.00	569
013	0.21	3.45E+05	3.8%	171.2	8.75E+06	96.2%	180.00	102,050
014	0.14	6.93E+04	2.7%	171.2	2.48E+06	97.3%	180.00	28,619
015	0.05	7.96E+04	5.1%	171.2	1.47E+06	94.9%	180.00	17,381
016	0.07	8.34E+04	1.8%	171.2	4.57E+06	98.2%	180.00	52,271
017	0.27	1.31E+06	22.5%	171.2	4.50E+06	77.5%	180.00	64,543
018	0.33	1.57E+06	10.9%	171.2	1.28E+07	89.1%	180.00	160,820
019	0.67	1.04E+06	5.8%	171.2	1.68E+07	94.2%	180.00	200,295
020	0.05	3.76E+04	3.6%	171.2	9.96E+05	96.4%	180.00	11,592
021	0.03	1.53E+04	2.7%	171.2	5.50E+05	97.3%	180.00	6,344
022	0.08	6.60E+04	3.1%	171.2	2.09E+06	96.9%	180.00	24,247
023	0.02	4.84E+03	2.1%	171.2	2.26E+05	97.9%	180.00	2,590
024	0.06	5.26E+04	2.7%	171.2	1.92E+06	97.3%	180.00	22,154
025	0.03	1.80E+04	3.0%	171.2	5.79E+05	97.0%	180.00	6,697
026	0.07	5.54E+04	3.0%	171.2	1.80E+06	97.0%	180.00	20,785
Ridley Creek	0.72	3.04E+06	11.5%	171.2	2.34E+07	88.5%	180.00	295,015
Chester Creek	0.95	1.24E+06	4.7%	171.2	2.51E+07	95.3%	180.00	295,305
Delaware River	2.41	7.05E+06	7.9%	171.2	8.25E+07	92.1%	180.00	1,002,331
Total	4.08	1.13E+07	8.0%	171.2	1.31E+08	92.0%	180.00	1,592,651

Table 2.5-8

Total Biochemical Oxygen Demand Annual Load for Baseline Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (mg/l)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (mg/l)	Discharge Load (lbs)
002	0.20	4.84E+05	6.2%	119.2	7.39E+06	93.8%	12	9,139
003	0.24	2.81E+05	3.3%	119.2	8.33E+06	96.7%	12	8,337
004	0.11	1.34E+05	3.4%	119.2	3.80E+06	96.6%	12	3,843
005	0.41	2.17E+06	12.6%	119.2	1.51E+07	87.4%	12	27,448
006	0.04	3.80E+04	3.0%	119.2	1.24E+06	97.0%	12	1,214
007	0.11	1.74E+05	3.8%	119.2	4.36E+06	96.2%	12	4,562
008	0.57	2.91E+06	12.7%	119.2	1.99E+07	87.3%	12	36,577
009	0.25	3.53E+05	4.5%	119.2	7.49E+06	95.5%	12	8,244
011	0.13	9.70E+04	2.6%	119.2	3.62E+06	97.4%	12	3,437
012	0.01	8.10E+02	1.6%	119.2	4.99E+04	98.4%	12	43
013	0.21	3.45E+05	3.8%	119.2	8.75E+06	96.2%	12	9,128
014	0.14	6.93E+04	2.7%	119.2	2.48E+06	97.3%	12	2,375
015	0.05	7.96E+04	5.1%	119.2	1.47E+06	94.9%	12	1,695
016	0.07	8.34E+04	1.8%	119.2	4.57E+06	98.2%	12	4,046
017	0.27	1.31E+06	22.5%	119.2	4.50E+06	77.5%	12	13,092
018	0.33	1.57E+06	10.9%	119.2	1.28E+07	89.1%	12	21,318
019	0.67	1.04E+06	5.8%	119.2	1.68E+07	94.2%	12	20,386
020	0.05	3.76E+04	3.6%	119.2	9.96E+05	96.4%	12	1,026
021	0.03	1.53E+04	2.7%	119.2	5.50E+05	97.3%	12	526
022	0.08	6.60E+04	3.1%	119.2	2.09E+06	96.9%	12	2,061
023	0.02	4.84E+03	2.1%	119.2	2.26E+05	97.9%	12	205
024	0.06	5.26E+04	2.7%	119.2	1.92E+06	97.3%	12	1,831
025	0.03	1.80E+04	3.0%	119.2	5.79E+05	97.0%	12	568
026	0.07	5.54E+04	3.0%	119.2	1.80E+06	97.0%	12	1,759
Ridley Creek	0.72	3.04E+06	11.5%	119.2	2.34E+07	88.5%	12	40,150
Chester Creek	0.95	1.24E+06	4.7%	119.2	2.51E+07	95.3%	12	28,034
Delaware River	2.41	7.05E+06	7.9%	119.2	8.25E+07	92.1%	12	114,306
Total	4.08	1.13E+07	8.0%	119.2	1.31E+08	92.0%	12	182,490

Table 2.5-9

Total Chemical Oxygen Demand Annual Load for Baseline Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (mg/l)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (mg/l)	Discharge Load (lbs)
002	0.20	4.84E+05	6.2%	358.2	7.39E+06	93.8%	163	86,008
003	0.24	2.81E+05	3.3%	358.2	8.33E+06	96.7%	163	91,099
004	0.11	1.34E+05	3.4%	358.2	3.80E+06	96.6%	163	41,688
005	0.41	2.17E+06	12.6%	358.2	1.51E+07	87.4%	163	201,805
006	0.04	3.80E+04	3.0%	358.2	1.24E+06	97.0%	163	13,496
007	0.11	1.74E+05	3.8%	358.2	4.36E+06	96.2%	163	48,279
008	0.57	2.91E+06	12.7%	358.2	1.99E+07	87.3%	163	267,964
009	0.25	3.53E+05	4.5%	358.2	7.49E+06	95.5%	163	84,150
011	0.13	9.70E+04	2.6%	358.2	3.62E+06	97.4%	163	39,050
012	0.01	8.10E+02	1.6%	358.2	4.99E+04	98.4%	163	526
013	0.21	3.45E+05	3.8%	358.2	8.75E+06	96.2%	163	96,792
014	0.14	6.93E+04	2.7%	358.2	2.48E+06	97.3%	163	26,796
015	0.05	7.96E+04	5.1%	358.2	1.47E+06	94.9%	163	16,749
016	0.07	8.34E+04	1.8%	358.2	4.57E+06	98.2%	163	48,392
017	0.27	1.31E+06	22.5%	358.2	4.50E+06	77.5%	163	75,006
018	0.33	1.57E+06	10.9%	358.2	1.28E+07	89.1%	163	165,596
019	0.67	1.04E+06	5.8%	358.2	1.68E+07	94.2%	163	194,629
020	0.05	3.76E+04	3.6%	358.2	9.96E+05	96.4%	163	10,974
021	0.03	1.53E+04	2.7%	358.2	5.50E+05	97.3%	163	5,939
022	0.08	6.60E+04	3.1%	358.2	2.09E+06	96.9%	163	22,794
023	0.02	4.84E+03	2.1%	358.2	2.26E+05	97.9%	163	2,407
024	0.06	5.26E+04	2.7%	358.2	1.92E+06	97.3%	163	20,729
025	0.03	1.80E+04	3.0%	358.2	5.79E+05	97.0%	163	6,293
026	0.07	5.54E+04	3.0%	358.2	1.80E+06	97.0%	163	19,524
Ridley Creek	0.72	3.04E+06	11.5%	358.2	2.34E+07	88.5%	163	305,743
Chester Creek	0.95	1.24E+06	4.7%	358.2	2.51E+07	95.3%	163	283,141
Delaware River	2.41	7.05E+06	7.9%	358.2	8.25E+07	92.1%	163	997,128
Total	**4.08**	**1.13E+07**	**8.0%**	**358.2**	**1.31E+08**	**92.0%**	**163**	**1,586,012**

Table 2.5-10

Fecal Coliform Bacteria Annual Load for Baseline Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (#/100 ml)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (#/100 ml)	Discharge Load (colonies)
002	0.20	4.84E+05	6.2%	1,000,000	7.39E+06	93.8%	0.00	3.02E+08
003	0.24	2.81E+05	3.3%	1,000,000	8.33E+06	96.7%	0.00	1.76E+08
004	0.11	1.34E+05	3.4%	1,000,000	3.80E+06	96.6%	0.00	8.34E+07
005	0.41	2.17E+06	12.6%	1,000,000	1.51E+07	87.4%	0.00	1.36E+09
006	0.04	3.80E+04	3.0%	1,000,000	1.24E+06	97.0%	0.00	2.37E+07
007	0.11	1.74E+05	3.8%	1,000,000	4.36E+06	96.2%	0.00	1.09E+08
008	0.57	2.91E+06	12.7%	1,000,000	1.99E+07	87.3%	0.00	1.81E+09
009	0.25	3.53E+05	4.5%	1,000,000	7.49E+06	95.5%	0.00	2.21E+08
011	0.13	9.70E+04	2.6%	1,000,000	3.62E+06	97.4%	0.00	6.05E+07
012	0.01	8.10E+02	1.6%	1,000,000	4.99E+04	98.4%	0.00	5.06E+05
013	0.21	3.45E+05	3.8%	1,000,000	8.75E+06	96.2%	0.00	2.16E+08
014	0.14	6.93E+04	2.7%	1,000,000	2.48E+06	97.3%	0.00	4.33E+07
015	0.05	7.96E+04	5.1%	1,000,000	1.47E+06	94.9%	0.00	4.97E+07
016	0.07	8.34E+04	1.8%	1,000,000	4.57E+06	98.2%	0.00	5.21E+07
017	0.27	1.31E+06	22.5%	1,000,000	4.50E+06	77.5%	0.00	8.15E+08
018	0.33	1.57E+06	10.9%	1,000,000	1.28E+07	89.1%	0.00	9.83E+08
019	0.67	1.04E+06	5.8%	1,000,000	1.68E+07	94.2%	0.00	6.52E+08
020	0.05	3.76E+04	3.6%	1,000,000	9.96E+05	96.4%	0.00	2.35E+07
021	0.03	1.53E+04	2.7%	1,000,000	5.50E+05	97.3%	0.00	9.55E+06
022	0.08	6.60E+04	3.1%	1,000,000	2.09E+06	96.9%	0.00	4.12E+07
023	0.02	4.84E+03	2.1%	1,000,000	2.26E+05	97.9%	0.00	3.02E+06
024	0.06	5.26E+04	2.7%	1,000,000	1.92E+06	97.3%	0.00	3.28E+07
025	0.03	1.80E+04	3.0%	1,000,000	5.79E+05	97.0%	0.00	1.13E+07
026	0.07	5.54E+04	3.0%	1,000,000	1.80E+06	97.0%	0.00	3.46E+07
Ridley Creek	0.72	3.04E+06	11.5%	1,000,000	2.34E+07	88.5%	0.00	1.90E+09
Chester Creek	0.95	1.24E+06	4.7%	1,000,000	2.51E+07	95.3%	0.00	7.74E+08
Delaware River	2.41	7.05E+06	7.9%	1,000,000	8.25E+07	92.1%	0.00	4.40E+09
Total	4.08	1.13E+07	8.0%	1,000,000	1.31E+08	92.0%	0.00	7.08E+09

Table 2.5-11

Total Dissolved Oxygen Annual Load for Baseline Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (mg/l)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (mg/l)	Discharge Load (lbs)
002	0.20	4.84E+05	6.2%	6.21	7.39E+06	93.8%	8.51	4,111
003	0.24	2.81E+05	3.3%	6.21	8.33E+06	96.7%	8.51	4,535
004	0.11	1.34E+05	3.4%	6.21	3.80E+06	96.6%	8.51	2,071
005	0.41	2.17E+06	12.6%	6.21	1.51E+07	87.4%	8.51	8,838
006	0.04	3.80E+04	3.0%	6.21	1.24E+06	97.0%	8.51	675
007	0.11	1.74E+05	3.8%	6.21	4.36E+06	96.2%	8.51	2,384
008	0.57	2.91E+06	12.7%	6.21	1.99E+07	87.3%	8.51	11,718
009	0.25	3.53E+05	4.5%	6.21	7.49E+06	95.5%	8.51	4,116
011	0.13	9.70E+04	2.6%	6.21	3.62E+06	97.4%	8.51	1,962
012	0.01	8.10E+02	1.6%	6.21	4.99E+04	98.4%	8.51	27
013	0.21	3.45E+05	3.8%	6.21	8.75E+06	96.2%	8.51	4,782
014	0.14	6.93E+04	2.7%	6.21	2.48E+06	97.3%	8.51	1,344
015	0.05	7.96E+04	5.1%	6.21	1.47E+06	94.9%	8.51	812
016	0.07	8.34E+04	1.8%	6.21	4.57E+06	98.2%	8.51	2,460
017	0.27	1.31E+06	22.5%	6.21	4.50E+06	77.5%	8.51	2,896
018	0.33	1.57E+06	10.9%	6.21	1.28E+07	89.1%	8.51	7,415
019	0.67	1.04E+06	5.8%	6.21	1.68E+07	94.2%	8.51	9,342
020	0.05	3.76E+04	3.6%	6.21	9.96E+05	96.4%	8.51	543
021	0.03	1.53E+04	2.7%	6.21	5.50E+05	97.3%	8.51	298
022	0.08	6.60E+04	3.1%	6.21	2.09E+06	96.9%	8.51	1,138
023	0.02	4.84E+03	2.1%	6.21	2.26E+05	97.9%	8.51	122
024	0.06	5.26E+04	2.7%	6.21	1.92E+06	97.3%	8.51	1,041
025	0.03	1.80E+04	3.0%	6.21	5.79E+05	97.0%	8.51	314
026	0.07	5.54E+04	3.0%	6.21	1.80E+06	97.0%	8.51	976
Ridley Creek	0.72	3.04E+06	11.5%	6.21	2.34E+07	88.5%	8.51	13,583
Chester Creek	0.95	1.24E+06	4.7%	6.21	2.51E+07	95.3%	8.51	13,809
Delaware River	2.41	7.05E+06	7.9%	6.21	8.25E+07	92.1%	8.51	46,537
Total	4.08	1.13E+07	8.0%	6.21	1.31E+08	92.0%	8.51	73,929

Table 2.5-12

Total Oil and Grease Annual Load for Baseline Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (mg/l)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (mg/l)	Discharge Load (lbs)
002	0.20	4.84E+05	6.2%	22.30	7.39E+06	93.8%	17.56	8,774
003	0.24	2.81E+05	3.3%	22.30	8.33E+06	96.7%	17.56	9,529
004	0.11	1.34E+05	3.4%	22.30	3.80E+06	96.6%	17.56	4,356
005	0.41	2.17E+06	12.6%	22.30	1.51E+07	87.4%	17.56	19,534
006	0.04	3.80E+04	3.0%	22.30	1.24E+06	97.0%	17.56	1,415
007	0.11	1.74E+05	3.8%	22.30	4.36E+06	96.2%	17.56	5,025
008	0.57	2.91E+06	12.7%	22.30	1.99E+07	87.3%	17.56	25,915
009	0.25	3.53E+05	4.5%	22.30	7.49E+06	95.5%	17.56	8,707
011	0.13	9.70E+04	2.6%	22.30	3.62E+06	97.4%	17.56	4,109
012	0.01	8.10E+02	1.6%	22.30	4.99E+04	98.4%	17.56	56
013	0.21	3.45E+05	3.8%	22.30	8.75E+06	96.2%	17.56	10,077
014	0.14	6.93E+04	2.7%	22.30	2.48E+06	97.3%	17.56	2,816
015	0.05	7.96E+04	5.1%	22.30	1.47E+06	94.9%	17.56	1,724
016	0.07	8.34E+04	1.8%	22.30	4.57E+06	98.2%	17.56	5,129
017	0.27	1.31E+06	22.5%	22.30	4.50E+06	77.5%	17.56	6,753
018	0.33	1.57E+06	10.9%	22.30	1.28E+07	89.1%	17.56	16,240
019	0.67	1.04E+06	5.8%	22.30	1.68E+07	94.2%	17.56	19,906
020	0.05	3.76E+04	3.6%	22.30	9.96E+05	96.4%	17.56	1,144
021	0.03	1.53E+04	2.7%	22.30	5.50E+05	97.3%	17.56	624
022	0.08	6.60E+04	3.1%	22.30	2.09E+06	96.9%	17.56	2,389
023	0.02	4.84E+03	2.1%	22.30	2.26E+05	97.9%	17.56	254
024	0.06	5.26E+04	2.7%	22.30	1.92E+06	97.3%	17.56	2,180
025	0.03	1.80E+04	3.0%	22.30	5.79E+05	97.0%	17.56	660
026	0.07	5.54E+04	3.0%	22.30	1.80E+06	97.0%	17.56	2,047
Ridley Creek	0.72	3.04E+06	11.5%	22.30	2.34E+07	88.5%	17.56	29,846
Chester Creek	0.95	1.24E+06	4.7%	22.30	2.51E+07	95.3%	17.56	29,244
Delaware River	2.41	7.05E+06	7.9%	22.30	8.25E+07	92.1%	17.56	100,255
Total	4.08	1.13E+07	8.0%	22.30	1.31E+08	92.0%	17.56	159,345

Table 2.5-13

Total Kjeldahl Nitrogen Annual Load for Baseline Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (mg/l)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (mg/l)	Discharge Load (lbs)
002	0.20	4.84E+05	6.2%	11.99	7.39E+06	93.8%	7.20	3,683
003	0.24	2.81E+05	3.3%	11.99	8.33E+06	96.7%	7.20	3,957
004	0.11	1.34E+05	3.4%	11.99	3.80E+06	96.6%	7.20	1,809
005	0.41	2.17E+06	12.6%	11.99	1.51E+07	87.4%	7.20	8,394
006	0.04	3.80E+04	3.0%	11.99	1.24E+06	97.0%	7.20	587
007	0.11	1.74E+05	3.8%	11.99	4.36E+06	96.2%	7.20	2,091
008	0.57	2.91E+06	12.7%	11.99	1.99E+07	87.3%	7.20	11,141
009	0.25	3.53E+05	4.5%	11.99	7.49E+06	95.5%	7.20	3,632
011	0.13	9.70E+04	2.6%	11.99	3.62E+06	97.4%	7.20	1,702
012	0.01	8.10E+02	1.6%	11.99	4.99E+04	98.4%	7.20	23
013	0.21	3.45E+05	3.8%	11.99	8.75E+06	96.2%	7.20	4,193
014	0.14	6.93E+04	2.7%	11.99	2.48E+06	97.3%	7.20	1,167
015	0.05	7.96E+04	5.1%	11.99	1.47E+06	94.9%	7.20	721
016	0.07	8.34E+04	1.8%	11.99	4.57E+06	98.2%	7.20	2,118
017	0.27	1.31E+06	22.5%	11.99	4.50E+06	77.5%	7.20	3,001
018	0.33	1.57E+06	10.9%	11.99	1.28E+07	89.1%	7.20	6,938
019	0.67	1.04E+06	5.8%	11.99	1.68E+07	94.2%	7.20	8,347
020	0.05	3.76E+04	3.6%	11.99	9.96E+05	96.4%	7.20	476
021	0.03	1.53E+04	2.7%	11.99	5.50E+05	97.3%	7.20	259
022	0.08	6.60E+04	3.1%	11.99	2.09E+06	96.9%	7.20	991
023	0.02	4.84E+03	2.1%	11.99	2.26E+05	97.9%	7.20	105
024	0.06	5.26E+04	2.7%	11.99	1.92E+06	97.3%	7.20	903
025	0.03	1.80E+04	3.0%	11.99	5.79E+05	97.0%	7.20	274
026	0.07	5.54E+04	3.0%	11.99	1.80E+06	97.0%	7.20	849
Ridley Creek	0.72	3.04E+06	11.5%	11.99	2.34E+07	88.5%	7.20	12,777
Chester Creek	0.95	1.24E+06	4.7%	11.99	2.51E+07	95.3%	7.20	12,210
Delaware River	2.41	7.05E+06	7.9%	11.99	8.25E+07	92.1%	7.20	42,357
Total	4.08	1.13E+07	8.0%	11.99	1.31E+08	92.0%	7.20	67,344

Table 2.5-14

Total Phosphorus Annual Load for Baseline Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (mg/l)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (mg/l)	Discharge Load (lbs)
002	0.20	4.84E+05	6.2%	1.68	7.39E+06	93.8%	1.08	549
003	0.24	2.81E+05	3.3%	1.68	8.33E+06	96.7%	1.08	591
004	0.11	1.34E+05	3.4%	1.68	3.80E+06	96.6%	1.08	270
005	0.41	2.17E+06	12.6%	1.68	1.51E+07	87.4%	1.08	1,243
006	0.04	3.80E+04	3.0%	1.68	1.24E+06	97.0%	1.08	88
007	0.11	1.74E+05	3.8%	1.68	4.36E+06	96.2%	1.08	312
008	0.57	2.91E+06	12.7%	1.68	1.99E+07	87.3%	1.08	1,649
009	0.25	3.53E+05	4.5%	1.68	7.49E+06	95.5%	1.08	542
011	0.13	9.70E+04	2.6%	1.68	3.62E+06	97.4%	1.08	255
012	0.01	8.10E+02	1.6%	1.68	4.99E+04	98.4%	1.08	3
013	0.21	3.45E+05	3.8%	1.68	8.75E+06	96.2%	1.08	626
014	0.14	6.93E+04	2.7%	1.68	2.48E+06	97.3%	1.08	175
015	0.05	7.96E+04	5.1%	1.68	1.47E+06	94.9%	1.08	108
016	0.07	8.34E+04	1.8%	1.68	4.57E+06	98.2%	1.08	317
017	0.27	1.31E+06	22.5%	1.68	4.50E+06	77.5%	1.08	440
018	0.33	1.57E+06	10.9%	1.68	1.28E+07	89.1%	1.08	1,029
019	0.67	1.04E+06	5.8%	1.68	1.68E+07	94.2%	1.08	1,244
020	0.05	3.76E+04	3.6%	1.68	9.96E+05	96.4%	1.08	71
021	0.03	1.53E+04	2.7%	1.68	5.50E+05	97.3%	1.08	39
022	0.08	6.60E+04	3.1%	1.68	2.09E+06	96.9%	1.08	148
023	0.02	4.84E+03	2.1%	1.68	2.26E+05	97.9%	1.08	16
024	0.06	5.26E+04	2.7%	1.68	1.92E+06	97.3%	1.08	135
025	0.03	1.80E+04	3.0%	1.68	5.79E+05	97.0%	1.08	41
026	0.07	5.54E+04	3.0%	1.68	1.80E+06	97.0%	1.08	127
Ridley Creek	0.72	3.04E+06	11.5%	1.68	2.34E+07	88.5%	1.08	1,894
Chester Creek	0.95	1.24E+06	4.7%	1.68	2.51E+07	95.3%	1.08	1,822
Delaware River	2.41	7.05E+06	7.9%	1.68	8.25E+07	92.1%	1.08	6,301
Total	4.08	1.13E+07	8.0%	1.68	1.31E+08	92.0%	1.08	10,016

Table 2.5-15

Total Zinc Annual Load for Baseline Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (mg/l)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (mg/l)	Discharge Load (lbs)
002	0.20	4.84E+05	6.2%	0.1737	7.39E+06	93.8%	0.3970	188
003	0.24	2.81E+05	3.3%	0.1737	8.33E+06	96.7%	0.3970	210
004	0.11	1.34E+05	3.4%	0.1737	3.80E+06	96.6%	0.3970	96
005	0.41	2.17E+06	12.6%	0.1737	1.51E+07	87.4%	0.3970	397
006	0.04	3.80E+04	3.0%	0.1737	1.24E+06	97.0%	0.3970	31
007	0.11	1.74E+05	3.8%	0.1737	4.36E+06	96.2%	0.3970	110
008	0.57	2.91E+06	12.7%	0.1737	1.99E+07	87.3%	0.3970	526
009	0.25	3.53E+05	4.5%	0.1737	7.49E+06	95.5%	0.3970	190
011	0.13	9.70E+04	2.6%	0.1737	3.62E+06	97.4%	0.3970	91
012	0.01	8.10E+02	1.6%	0.1737	4.99E+04	98.4%	0.3970	1
013	0.21	3.45E+05	3.8%	0.1737	8.75E+06	96.2%	0.3970	221
014	0.14	6.93E+04	2.7%	0.1737	2.48E+06	97.3%	0.3970	62
015	0.05	7.96E+04	5.1%	0.1737	1.47E+06	94.9%	0.3970	37
016	0.07	8.34E+04	1.8%	0.1737	4.57E+06	98.2%	0.3970	114
017	0.27	1.31E+06	22.5%	0.1737	4.50E+06	77.5%	0.3970	126
018	0.33	1.57E+06	10.9%	0.1737	1.28E+07	89.1%	0.3970	335
019	0.67	1.04E+06	5.8%	0.1737	1.68E+07	94.2%	0.3970	428
020	0.05	3.76E+04	3.6%	0.1737	9.96E+05	96.4%	0.3970	25
021	0.03	1.53E+04	2.7%	0.1737	5.50E+05	97.3%	0.3970	14
022	0.08	6.60E+04	3.1%	0.1737	2.09E+06	96.9%	0.3970	53
023	0.02	4.84E+03	2.1%	0.1737	2.26E+05	97.9%	0.3970	6
024	0.06	5.26E+04	2.7%	0.1737	1.92E+06	97.3%	0.3970	48
025	0.03	1.80E+04	3.0%	0.1737	5.79E+05	97.0%	0.3970	15
026	0.07	5.54E+04	3.0%	0.1737	1.80E+06	97.0%	0.3970	45
Ridley Creek	0.72	3.04E+06	11.5%	0.1737	2.34E+07	88.5%	0.3970	612
Chester Creek	0.95	1.24E+06	4.7%	0.1737	2.51E+07	95.3%	0.3970	636
Delaware River	2.41	7.05E+06	7.9%	0.1737	8.25E+07	92.1%	0.3970	2,121
Total	4.08	1.13E+07	8.0%	0.1737	1.31E+08	92.0%	0.3970	3,368

Table 2.5-16

Total Copper Annual Load for Baseline Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (mg/l)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (mg/l)	Discharge Load (lbs)
002	0.20	4.84E+05	6.2%	0.0417	7.39E+06	93.8%	0.1050	50
003	0.24	2.81E+05	3.3%	0.0417	8.33E+06	96.7%	0.1050	55
004	0.11	1.34E+05	3.4%	0.0417	3.80E+06	96.6%	0.1050	25
005	0.41	2.17E+06	12.6%	0.0417	1.51E+07	87.4%	0.1050	104
006	0.04	3.80E+04	3.0%	0.0417	1.24E+06	97.0%	0.1050	8
007	0.11	1.74E+05	3.8%	0.0417	4.36E+06	96.2%	0.1050	29
008	0.57	2.91E+06	12.7%	0.0417	1.99E+07	87.3%	0.1050	138
009	0.25	3.53E+05	4.5%	0.0417	7.49E+06	95.5%	0.1050	50
011	0.13	9.70E+04	2.6%	0.0417	3.62E+06	97.4%	0.1050	24
012	0.01	8.10E+02	1.6%	0.0417	4.99E+04	98.4%	0.1050	0
013	0.21	3.45E+05	3.8%	0.0417	8.75E+06	96.2%	0.1050	58
014	0.14	6.93E+04	2.7%	0.0417	2.48E+06	97.3%	0.1050	16
015	0.05	7.96E+04	5.1%	0.0417	1.47E+06	94.9%	0.1050	10
016	0.07	8.34E+04	1.8%	0.0417	4.57E+06	98.2%	0.1050	30
017	0.27	1.31E+06	22.5%	0.0417	4.50E+06	77.5%	0.1050	33
018	0.33	1.57E+06	10.9%	0.0417	1.28E+07	89.1%	0.1050	88
019	0.67	1.04E+06	5.8%	0.0417	1.68E+07	94.2%	0.1050	113
020	0.05	3.76E+04	3.6%	0.0417	9.96E+05	96.4%	0.1050	7
021	0.03	1.53E+04	2.7%	0.0417	5.50E+05	97.3%	0.1050	4
022	0.08	6.60E+04	3.1%	0.0417	2.09E+06	96.9%	0.1050	14
023	0.02	4.84E+03	2.1%	0.0417	2.26E+05	97.9%	0.1050	1
024	0.06	5.26E+04	2.7%	0.0417	1.92E+06	97.3%	0.1050	13
025	0.03	1.80E+04	3.0%	0.0417	5.79E+05	97.0%	0.1050	4
026	0.07	5.54E+04	3.0%	0.0417	1.80E+06	97.0%	0.1050	12
Ridley Creek	0.72	3.04E+06	11.5%	0.0417	2.34E+07	88.5%	0.1050	161
Chester Creek	0.95	1.24E+06	4.7%	0.0417	2.51E+07	95.3%	0.1050	168
Delaware River	2.41	7.05E+06	7.9%	0.0417	8.25E+07	92.1%	0.1050	559
Total	4.08	1.13E+07	8.0%	0.0417	1.31E+08	92.0%	0.1050	888

Table 2.5-17

Total Aluminum Annual Load for Baseline Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (mg/l)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (mg/l)	Discharge Load (lbs)
002	0.20	4.84E+05	6.2%	1.4114	7.39E+06	93.8%	2.8276	1,347
003	0.24	2.81E+05	3.3%	1.4114	8.33E+06	96.7%	2.8276	1,496
004	0.11	1.34E+05	3.4%	1.4114	3.80E+06	96.6%	2.8276	683
005	0.41	2.17E+06	12.6%	1.4114	1.51E+07	87.4%	2.8276	2,850
006	0.04	3.80E+04	3.0%	1.4114	1.24E+06	97.0%	2.8276	223
007	0.11	1.74E+05	3.8%	1.4114	4.36E+06	96.2%	2.8276	785
008	0.57	2.91E+06	12.7%	1.4114	1.99E+07	87.3%	2.8276	3,777
009	0.25	3.53E+05	4.5%	1.4114	7.49E+06	95.5%	2.8276	1,354
011	0.13	9.70E+04	2.6%	1.4114	3.62E+06	97.4%	2.8276	648
012	0.01	8.10E+02	1.6%	1.4114	4.99E+04	98.4%	2.8276	9
013	0.21	3.45E+05	3.8%	1.4114	8.75E+06	96.2%	2.8276	1,576
014	0.14	6.93E+04	2.7%	1.4114	2.48E+06	97.3%	2.8276	444
015	0.05	7.96E+04	5.1%	1.4114	1.47E+06	94.9%	2.8276	267
016	0.07	8.34E+04	1.8%	1.4114	4.57E+06	98.2%	2.8276	814
017	0.27	1.31E+06	22.5%	1.4114	4.50E+06	77.5%	2.8276	910
018	0.33	1.57E+06	10.9%	1.4114	1.28E+07	89.1%	2.8276	2,401
019	0.67	1.04E+06	5.8%	1.4114	1.68E+07	94.2%	2.8276	3,063
020	0.05	3.76E+04	3.6%	1.4114	9.96E+05	96.4%	2.8276	179
021	0.03	1.53E+04	2.7%	1.4114	5.50E+05	97.3%	2.8276	98
022	0.08	6.60E+04	3.1%	1.4114	2.09E+06	96.9%	2.8276	376
023	0.02	4.84E+03	2.1%	1.4114	2.26E+05	97.9%	2.8276	40
024	0.06	5.26E+04	2.7%	1.4114	1.92E+06	97.3%	2.8276	344
025	0.03	1.80E+04	3.0%	1.4114	5.79E+05	97.0%	2.8276	104
026	0.07	5.54E+04	3.0%	1.4114	1.80E+06	97.0%	2.8276	322
Ridley Creek	0.72	3.04E+06	11.5%	1.4114	2.34E+07	88.5%	2.8276	4,392
Chester Creek	0.95	1.24E+06	4.7%	1.4114	2.51E+07	95.3%	2.8276	4,540
Delaware River	2.41	7.05E+06	7.9%	1.4114	8.25E+07	92.1%	2.8276	15,183
Total	4.08	1.13E+07	8.0%	1.4114	1.31E+08	92.0%	2.8276	24,114

Table 2.5-18

Total Lead Annual Load for Baseline Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (mg/l)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (mg/l)	Discharge Load (lbs)
002	0.20	4.84E+05	6.2%	0.0173	7.39E+06	93.8%	0.1820	84
003	0.24	2.81E+05	3.3%	0.0173	8.33E+06	96.7%	0.1820	95
004	0.11	1.34E+05	3.4%	0.0173	3.80E+06	96.6%	0.1820	43
005	0.41	2.17E+06	12.6%	0.0173	1.51E+07	87.4%	0.1820	173
006	0.04	3.80E+04	3.0%	0.0173	1.24E+06	97.0%	0.1820	14
007	0.11	1.74E+05	3.8%	0.0173	4.36E+06	96.2%	0.1820	50
008	0.57	2.91E+06	12.7%	0.0173	1.99E+07	87.3%	0.1820	230
009	0.25	3.53E+05	4.5%	0.0173	7.49E+06	95.5%	0.1820	86
011	0.13	9.70E+04	2.6%	0.0173	3.62E+06	97.4%	0.1820	41
012	0.01	8.10E+02	1.6%	0.0173	4.99E+04	98.4%	0.1820	1
013	0.21	3.45E+05	3.8%	0.0173	8.75E+06	96.2%	0.1820	100
014	0.14	6.93E+04	2.7%	0.0173	2.48E+06	97.3%	0.1820	28
015	0.05	7.96E+04	5.1%	0.0173	1.47E+06	94.9%	0.1820	17
016	0.07	8.34E+04	1.8%	0.0173	4.57E+06	98.2%	0.1820	52
017	0.27	1.31E+06	22.5%	0.0173	4.50E+06	77.5%	0.1820	53
018	0.33	1.57E+06	10.9%	0.0173	1.28E+07	89.1%	0.1820	147
019	0.67	1.04E+06	5.8%	0.0173	1.68E+07	94.2%	0.1820	192
020	0.05	3.76E+04	3.6%	0.0173	9.96E+05	96.4%	0.1820	11
021	0.03	1.53E+04	2.7%	0.0173	5.50E+05	97.3%	0.1820	6
022	0.08	6.60E+04	3.1%	0.0173	2.09E+06	96.9%	0.1820	24
023	0.02	4.84E+03	2.1%	0.0173	2.26E+05	97.9%	0.1820	3
024	0.06	5.26E+04	2.7%	0.0173	1.92E+06	97.3%	0.1820	22
025	0.03	1.80E+04	3.0%	0.0173	5.79E+05	97.0%	0.1820	7
026	0.07	5.54E+04	3.0%	0.0173	1.80E+06	97.0%	0.1820	20
Ridley Creek	0.72	3.04E+06	11.5%	0.0173	2.34E+07	88.5%	0.1820	269
Chester Creek	0.95	1.24E+06	4.7%	0.0173	2.51E+07	95.3%	0.1820	287
Delaware River	2.41	7.05E+06	7.9%	0.0173	8.25E+07	92.1%	0.1820	945
Total	4.08	1.13E+07	8.0%	0.0173	1.31E+08	92.0%	0.1820	1,500

Table 2.5-19

Total Mercury Annual Load for Baseline Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (mg/l)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (mg/l)	Discharge Load (lbs)
002	0.20	4.84E+05	6.2%	0.0003	7.39E+06	93.8%	0.0003	0.13
003	0.24	2.81E+05	3.3%	0.0003	8.33E+06	96.7%	0.0003	0.14
004	0.11	1.34E+05	3.4%	0.0003	3.80E+06	96.6%	0.0003	0.06
005	0.41	2.17E+06	12.6%	0.0003	1.51E+07	87.4%	0.0003	0.28
006	0.04	3.80E+04	3.0%	0.0003	1.24E+06	97.0%	0.0003	0.02
007	0.11	1.74E+05	3.8%	0.0003	4.36E+06	96.2%	0.0003	0.07
008	0.57	2.91E+06	12.7%	0.0003	1.99E+07	87.3%	0.0003	0.37
009	0.25	3.53E+05	4.5%	0.0003	7.49E+06	95.5%	0.0003	0.13
011	0.13	9.70E+04	2.6%	0.0003	3.62E+06	97.4%	0.0003	0.06
012	0.01	8.10E+02	1.6%	0.0003	4.99E+04	98.4%	0.0003	0.00
013	0.21	3.45E+05	3.8%	0.0003	8.75E+06	96.2%	0.0003	0.15
014	0.14	6.93E+04	2.7%	0.0003	2.48E+06	97.3%	0.0003	0.04
015	0.05	7.96E+04	5.1%	0.0003	1.47E+06	94.9%	0.0003	0.02
016	0.07	8.34E+04	1.8%	0.0003	4.57E+06	98.2%	0.0003	0.07
017	0.27	1.31E+06	22.5%	0.0003	4.50E+06	77.5%	0.0003	0.09
018	0.33	1.57E+06	10.9%	0.0003	1.28E+07	89.1%	0.0003	0.23
019	0.67	1.04E+06	5.8%	0.0003	1.68E+07	94.2%	0.0003	0.29
020	0.05	3.76E+04	3.6%	0.0003	9.96E+05	96.4%	0.0003	0.02
021	0.03	1.53E+04	2.7%	0.0003	5.50E+05	97.3%	0.0003	0.01
022	0.08	6.60E+04	3.1%	0.0003	2.09E+06	96.9%	0.0003	0.03
023	0.02	4.84E+03	2.1%	0.0003	2.26E+05	97.9%	0.0003	0.00
024	0.06	5.26E+04	2.7%	0.0003	1.92E+06	97.3%	0.0003	0.03
025	0.03	1.80E+04	3.0%	0.0003	5.79E+05	97.0%	0.0003	0.01
026	0.07	5.54E+04	3.0%	0.0003	1.80E+06	97.0%	0.0003	0.03
Ridley Creek	0.72	3.04E+06	11.5%	0.0003	2.34E+07	88.5%	0.0003	0.43
Chester Creek	0.95	1.24E+06	4.7%	0.0003	2.51E+07	95.3%	0.0003	0.42
Delaware River	2.41	7.05E+06	7.9%	0.0003	8.25E+07	92.1%	0.0003	1.45
Total	4.08	1.13E+07	8.0%	0.0003	1.31E+08	92.0%	0.0003	2.30

Table 2.5-20

Total Silver Annual Load for Baseline Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (mg/l)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (mg/l)	Discharge Load (lbs)
002	0.20	4.84E+05	6.2%	0.0080	7.39E+06	93.8%	0.0100	4.85
003	0.24	2.81E+05	3.3%	0.0080	8.33E+06	96.7%	0.0100	5.34
004	0.11	1.34E+05	3.4%	0.0080	3.80E+06	96.6%	0.0100	2.44
005	0.41	2.17E+06	12.6%	0.0080	1.51E+07	87.4%	0.0100	10.49
006	0.04	3.80E+04	3.0%	0.0080	1.24E+06	97.0%	0.0100	0.79
007	0.11	1.74E+05	3.8%	0.0080	4.36E+06	96.2%	0.0100	2.81
008	0.57	2.91E+06	12.7%	0.0080	1.99E+07	87.3%	0.0100	13.91
009	0.25	3.53E+05	4.5%	0.0080	7.49E+06	95.5%	0.0100	4.85
011	0.13	9.70E+04	2.6%	0.0080	3.62E+06	97.4%	0.0100	2.31
012	0.01	8.10E+02	1.6%	0.0080	4.99E+04	98.4%	0.0100	0.03
013	0.21	3.45E+05	3.8%	0.0080	8.75E+06	96.2%	0.0100	5.64
014	0.14	6.93E+04	2.7%	0.0080	2.48E+06	97.3%	0.0100	1.58
015	0.05	7.96E+04	5.1%	0.0080	1.47E+06	94.9%	0.0100	0.96
016	0.07	8.34E+04	1.8%	0.0080	4.57E+06	98.2%	0.0100	2.90
017	0.27	1.31E+06	22.5%	0.0080	4.50E+06	77.5%	0.0100	3.46
018	0.33	1.57E+06	10.9%	0.0080	1.28E+07	89.1%	0.0100	8.79
019	0.67	1.04E+06	5.8%	0.0080	1.68E+07	94.2%	0.0100	11.03
020	0.05	3.76E+04	3.6%	0.0080	9.96E+05	96.4%	0.0100	0.64
021	0.03	1.53E+04	2.7%	0.0080	5.50E+05	97.3%	0.0100	0.35
022	0.08	6.60E+04	3.1%	0.0080	2.09E+06	96.9%	0.0100	1.34
023	0.02	4.84E+03	2.1%	0.0080	2.26E+05	97.9%	0.0100	0.14
024	0.06	5.26E+04	2.7%	0.0080	1.92E+06	97.3%	0.0100	1.23
025	0.03	1.80E+04	3.0%	0.0080	5.79E+05	97.0%	0.0100	0.37
026	0.07	5.54E+04	3.0%	0.0080	1.80E+06	97.0%	0.0100	1.15
Ridley Creek	0.72	3.04E+06	11.5%	0.0080	2.34E+07	88.5%	0.0100	16.11
Chester Creek	0.95	1.24E+06	4.7%	0.0080	2.51E+07	95.3%	0.0100	16.29
Delaware River	2.41	7.05E+06	7.9%	0.0080	8.25E+07	92.1%	0.0100	55.03
Total	4.08	1.13E+07	8.0%	0.0080	1.31E+08	92.0%	0.0100	87.43

Table 2.5-21

Total Phenols Annual Load for Baseline Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (mg/l)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (mg/l)	Discharge Load (lbs)
002	0.20	4.84E+05	6.2%	0.1538	7.39E+06	93.8%	0.0719	38
003	0.24	2.81E+05	3.3%	0.1538	8.33E+06	96.7%	0.0719	40
004	0.11	1.34E+05	3.4%	0.1538	3.80E+06	96.6%	0.0719	18
005	0.41	2.17E+06	12.6%	0.1538	1.51E+07	87.4%	0.0719	88
006	0.04	3.80E+04	3.0%	0.1538	1.24E+06	97.0%	0.0719	6
007	0.11	1.74E+05	3.8%	0.1538	4.36E+06	96.2%	0.0719	21
008	0.57	2.91E+06	12.7%	0.1538	1.99E+07	87.3%	0.0719	117
009	0.25	3.53E+05	4.5%	0.1538	7.49E+06	95.5%	0.0719	37
011	0.13	9.70E+04	2.6%	0.1538	3.62E+06	97.4%	0.0719	17
012	0.01	8.10E+02	1.6%	0.1538	4.99E+04	98.4%	0.0719	0
013	0.21	3.45E+05	3.8%	0.1538	8.75E+06	96.2%	0.0719	43
014	0.14	6.93E+04	2.7%	0.1538	2.48E+06	97.3%	0.0719	12
015	0.05	7.96E+04	5.1%	0.1538	1.47E+06	94.9%	0.0719	7
016	0.07	8.34E+04	1.8%	0.1538	4.57E+06	98.2%	0.0719	21
017	0.27	1.31E+06	22.5%	0.1538	4.50E+06	77.5%	0.0719	33
018	0.33	1.57E+06	10.9%	0.1538	1.28E+07	89.1%	0.0719	73
019	0.67	1.04E+06	5.8%	0.1538	1.68E+07	94.2%	0.0719	86
020	0.05	3.76E+04	3.6%	0.1538	9.96E+05	96.4%	0.0719	5
021	0.03	1.53E+04	2.7%	0.1538	5.50E+05	97.3%	0.0719	3
022	0.08	6.60E+04	3.1%	0.1538	2.09E+06	96.9%	0.0719	10
023	0.02	4.84E+03	2.1%	0.1538	2.26E+05	97.9%	0.0719	1
024	0.06	5.26E+04	2.7%	0.1538	1.92E+06	97.3%	0.0719	9
025	0.03	1.80E+04	3.0%	0.1538	5.79E+05	97.0%	0.0719	3
026	0.07	5.54E+04	3.0%	0.1538	1.80E+06	97.0%	0.0719	9
Ridley Creek	0.72	3.04E+06	11.5%	0.1538	2.34E+07	88.5%	0.0719	134
Chester Creek	0.95	1.24E+06	4.7%	0.1538	2.51E+07	95.3%	0.0719	125
Delaware River	2.41	7.05E+06	7.9%	0.1538	8.25E+07	92.1%	0.0719	438
Total	4.08	1.13E+07	8.0%	0.1538	1.31E+08	92.0%	0.0719	697

SECTION 3
RECEIVING WATER QUALITY AND CSO IMPACTS

3.1 WATER QUALITY CRITERIA AND EXISTING WATER QUALITY

To assess the impact of the CSOs on receiving waters, the water quality of the receiving waters must be evaluated. This assessment is accomplished by reviewing the water quality criteria for the receiving waters and summarizing the existing water quality based on previously reported sampling efforts.

The water quality for the Delaware River and its tributaries is detailed in the Administrative Manual - Part III Water Quality Regulations published by the Delaware River Basin Commission (DRBC), Title 25 Chapter 93 - Water Quality Standards of the Pennsylvania Code, and Title 25 Chapter 16 - Water Quality Toxics Management Strategy of the Pennsylvania Code. Table 3.1-1 presents a summary of the water quality criteria for the receiving waters, Chester Creek, Ridley Creek, and the Delaware River. It is important to note that for the tidal portions of Chester Creek, Ridley Creek, and the Delaware River that potable water supply, livestock water supply, and industrial water supply are not protected uses and that above River Mile 81.8 (Commodore Barry Bridge) water contact sports (swimming and related activities) are not protected uses.

Tables 3.1-2 through 3.1-4 present a summary of the previously reported water quality sampling for the receiving waters as found in the EPA's STORET database. A copy of the STORET data can be found in Appendix E. DRBC regulations allow the use of water quality data obtained from other sites in the same ecoregion if the available data are insufficient to determine the existing water quality. Instances where this occurred are noted on the tables.

3.2 IMPACTS OF CSOs ON RECEIVING WATERS

Since the purpose of this plan is to develop a long-term strategy to control the impact of CSOs, this analysis is a gross scale annual estimate of the impact of the total annual CSO load on the total annual receiving water flows. The DRBC has not yet completed the wet weather modeling; thus,

there is no valid way to estimate the CSO impact on wet weather receiving water conditions. This approached was agreed to by the PADEP.

The impacts of the CSOs on the receiving waters were evaluated by comparing the total annual load of selected parameters to the background load in the receiving water during the typical year. The mass of a parameter found in the receiving water was calculated by multiplying the background concentration by the harmonic mean flow annual volume. Additionally, an average concentration for selected parameters is predicted for the receiving water during the annual overflows. To aid in the selection of alternatives to evaluate, the mass balance for Ridley and Chester Creeks was also applied incrementally to analyze the impact of each successive outfall. Tables 3.2-1 through 3.2-3 present the results of this mass balance analysis with the lettered tables being the incremental analysis.

Tables 3.2-1 through 3.2-3 provide estimates of projected impacts of CSO discharges on the Chester and Ridley Creeks, and on the Delaware River. These tables show mass loading impacts as well as resultant estimated pollutant concentrations and comparisons with the existing Water Quality Criteria. This data demonstrates that the impact of pollutants of concern upon the Delaware River is negligible, and that while greater impacts are evident upon the smaller streams, the loadings from the sanitary sewage portion of the discharges are relatively insignificant. If we factor in the percentages of the total stream flow that comprise the overflow component, the volume of sanitary sewage discharged to the receiving streams is only 0.075% of the total flow for Chester Creek and 0.334% for Ridley Creek. Also, in all cases where exceedances of water quality criteria are indicated, those parameters are already elevated above the criteria due to receiving water background conditions.

These factors, as well as the limited additional capacity in the system indicated by the frequent and widespread surcharging, were carefully considered in determining what actions DELCORA should consider in developing its LTCP.

3.3 IMPACT ON SENSITIVE AREAS

A search for sensitive areas along Chester Creek, Ridley Creek, and the Delaware River in the vicinity of the CSO outfalls was conducted by reviewing the Environmental Sensitivity Index Map for Delaware, New Jersey, and Pennsylvania as well as contacting the John Heinz National Wildlife Refuge, Delaware Bay Estuary Committee (DBEC), PADEP Coastal Zone Program, Delaware River Basin Commission (DRBC), and the Delaware County Planning Commission. The Environmental Sensitivity Index was prepared by Research Planning, Inc. for the National Oceanic and Atmospheric Administration (NOAA) in Seattle, Washington. A copy of the index is contained in Appendix F.

There are no areas along the Chester waterfront that support primary contact recreation but there is a public boat launch 1.25 miles south of the Chester Creek mouth. Three water intakes along the Chester waterfront were identified but all are used for industrial water supply only. No public water supply intakes were identified. The index also identifies two historical sites and one archaeological site along Chester Creek within 0.5 miles of the mouth. Blue crab is common in the area but the index did not identify any specific beds. The peregrine falcon, a state and federal endangered species, has a habitat identified along the New Jersey side of the Delaware River on Raccoon Island. This habitat, however, is located across the river from Chester and the habitat should not be affected by the CSO discharge.

The information the DBEC has on environmentally sensitive areas was provided to NOAA and incorporated into the Environmental Sensitivity Index. The DRBC has a Regional Information Management System (RIMS) database that was reviewed for additional information. The database indicated that a Natural Areas Inventory was prepared for Delaware County by the Nature Conservancy. A review of the inventory revealed that no sensitive areas near the CSO outfalls exist.

Based on the review of the above sources, there are no environmentally sensitive areas near the CSO outfalls.

Table 3.1-1

Summary of Water Quality Criteria for Receiving Waters[1] (Delaware River and Tidal Portions of Chester and Ridley Creeks)

Parameter[2]	Units	Chester Creek	Ridley Creek	Delaware River and Tidal Tributaries
Total Suspended Solids	mg/l	No Criteria	No Criteria	No Criteria
BOD_5	mg/l	No Criteria	No Criteria	No Criteria
COD	mg/l	No Criteria	No Criteria	No Criteria
Fecal Coliform [3,4]	#/100ml	770	770	770
Enterococcus [3,4]	#/100ml	88	88	88
Fecal Coliform [3,5]	#/100ml			200
Enterococcus [3,5]	#/100ml			33
Dissolved Oxygen [6]	mg/l	> 6.5	> 6.5	>6.5
Oil & Grease	mg/l	No Criteria	No Criteria	No Criteria
Total Kjeldahl Nitrogen	mg/l	No Criteria	No Criteria	No Criteria
Total Phosphorus	mg/l	No Criteria	No Criteria	No Criteria
Total Zinc [7]	mg/l	0.1012	0.0866	0.0810
Total Copper [7]	mg/l	0.0110	0.0094	0.0088
Total Aluminum	mg/l	0.0870	0.0870	0.0870
Lead (Total) [7]	mg/l	0.0024	0.0020	0.0018
Mercury (Total)	mg/l	0.000012	0.000012	0.000012
Silver	mg/l	No Criteria	No Criteria	No Criteria
Total Phenols	mg/l	0.02	0.02	0.02

[1] Fish and aquatic life criteria continuous concentrations.

[2] Selected parameters of interest.

[3] Maximum geometric average.

[4] Above River Mile 81.8.

[5] Below River Mile 81.8.

[6] Seasonal average. 24-hour average limit is 3.5 mg/l.

[7] Criteria for is based on hardness. As per 27 June 1997 letter from PADEP, average of values provided was used for Ridley and Chester Creeks. A hardness of 74 mg/l of CaCO3 was used for the Delaware River and tidal portions of tributaries.

Table 3.1-2

Summary of Water Quality Sampling on Chester Creek (Station 422094 - Chester Creek at Route 291)

Parameter	Reporting Units	Mean	# of Samples	Period of Record	
Total Suspended Solids	mg/L	27.99	111	81/07/21	97/09/17
BOD_5	mg/L	3.1389	113	81/07/21	96/09/16
COD [1]	mg/L	10	1	85/08/15	85/08/15
Fecal Coliform	#/100ml	9,877	70	81/10/15	97/09/17
Dissolved Oxygen	mg/L	7.863	46	83/06/27	94/06/28
Oil & Grease [2]	mg/L	2	1	86/06/24	86/06/24
Total Kjeldahl Nitrogen	mg/L	1.432	111	81/07/21	97/08/19
Total Phosphorus	mg/L	0.7178	114	81/07/21	97/09/17
Total Zinc	mg/L	0.0334	99	81/08/17	97/09/17
Total Copper	mg/L	0.0272	78	81/07/21	97/09/17
Total Aluminum [1]	mg/L	0.302	10	80/08/18	87/08/12
Lead Total	mg/L	0.0149	66	81/07/21	97/09/17
Mercury Total	mg/L	0.0011	19	92/07/15	96/09/16
Silver [3]	mg/L	0.03792	25	80/02/28	91/06/25
Total Phenols [3]	mg/L	0.005315	153	80/02/28	88/06/14

[1] Value from upstream Station WQN0158 - Ridley Crk-150yds dwn jct Watervl/Cobbl .

[2] From Station 422120 - Ridley Creek at Route 291

[3] From Station 892062 - Delaware River at Eddystone, PA, RM 83.98

Table 3.1-3

Summary of Water Quality Sampling on Ridley Creek (Station 422120 - Ridley Creek at Route 291)

Parameter	Reporting Units	Mean	# of Samples	Period of Record	
Total Suspended Solids	mg/l	35.477	109	81/07/21	97/09/17
BOD_5	mg/L	3.1228	108	81/07/21	96/09/17
COD Hi Level [1]	mg/L	10	1	85/08/15	85/08/15
Fecal Coliform	#/100ml	16,104	64	81/12/15	97/09/17
Dissolved Oxygen	mg/L	8.1312	48	82/07/07	94/06/28
Oil & Grease	mg/L	2	1	86/06/24	86/06/24
Total Kjeldahl Nitrogen	mg/L	0.98057	105	81/07/21	96/09/17
Total Phosphorus	mg/L	0.37348	112	81/07/21	97/09/17
Total Zinc	mg/L	0.034589	97	81/08/17	97/09/17
Total Copper	mg/L	0.02753	66	81/07/21	97/08/19
Total Aluminum [1]	mg/L	0.302	10	80/08/18	87/08/12
Total Lead	mg/L	0.016369	74	81/07/21	97/09/17
Mercury Total	mg/L	0.0014364	11	92/05/18	96/03/25
Silver [2]	mg/L	0.03792	25	80/02/28	91/06/25
Total Phenols [2]	mg/L	0.005315	153	80/02/28	88/06/14

[1] Value from upstream Station WQN0158 - Ridley Crk-150yds dwn jct Watervl/Cobbl .

[2] From Station 892062 - Delaware River at Eddystone, PA, RM 83.98

Table 3.1-4

Summary of Water Quality Sampling on Delaware River (Station 892062 - Delaware River at Eddystone, PA, RM 83.98)

Parameter	Reporting Units	Mean	# of Samples	Period of Record	
Total Suspended Solids	mg/L	19.8	333	80/04/22	98/09/17
BOD_5	mg/L	2.6375	176	80/02/28	95/11/20
COD Hi Level [1]	mg/L	25.678	12	80/01/17	81/06/25
Fecal Coliform	#/100ml	834	135	80/02/28	87/06/18
Dissolved Oxygen	mg/L	6.4632	332	80/02/28	98/09/17
Oil & Grease [1]	mg/L	2	5	80/10/06	81/06/25
Total Kjeldahl Nitrogen	mg/L	0.7097	288	80/02/28	98/09/17
Total Phosphorus	mg/L	0.1652	277	81/07/14	98/09/17
Total Zinc	mg/L	0.03655	234	80/02/28	98/08/24
Total Copper	mg/L	0.016193	238	80/02/28	98/08/24
Total Aluminum [1]	mg/L	0.42	6	80/04/25	81/07/30
Total Lead	mg/L	0.02036	245	80/02/28	95/11/27
Total Mercury	mg/L	0.00111	71	80/02/28	92/11/17
Total Silver	mg/L	0.03792	25	80/02/28	91/06/25
Total Phenols	mg/L	0.00532	153	80/02/28	88/06/14

[1] From Station 0422107 - Delaware River at Walnut Street.

Table 3.2-1

Impact of CSO Discharge on Chester Creek Water Quality for Baseline Typical Year

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	295,305	26,337,608	27.99	51.8	1,634,837,317	2,857,019	1.6%	9.4%	30.39	No Criteria
BOD_5	28,034	26,337,608	3.14	51.8	1,634,837,317	320,385	1.6%	8.0%	3.36	No Criteria
COD	283,141	26,337,608	10	51.8	1,634,837,317	1,020,692	1.6%	21.7%	12.57	No Criteria
Fecal Coliform (#/100ml)	7.74E+08	26,337,608	9,877	51.8	1,634,837,317	1.0E+10	1.6%	7.1%	10,467	770
Dissolved Oxygen	13,809	26,337,608	7.863	51.8	1,634,837,317	802,570	1.6%	1.7%	7.87	> 6.5
Oil & Grease	29,244	26,337,608	2.00	51.8	1,634,837,317	204,138	1.6%	12.5%	2.25	No Criteria
Total Kjeldahl Nitrogen	12,210	26,337,608	1.43	51.8	1,634,837,317	146,163	1.6%	7.7%	1.53	No Criteria
Total Phosphorus	1,822	26,337,608	0.7178	51.8	1,634,837,317	73,265	1.6%	2.4%	0.724	No Criteria
Total Zinc	636	26,337,608	0.0334	51.8	1,634,837,317	3,411	1.6%	15.7%	0.0390	0.1011924
Total Copper	168	26,337,608	0.0272	51.8	1,634,837,317	2,775	1.6%	5.7%	0.0284	0.0109878
Total Aluminum	4,540	26,337,608	0.3020	51.8	1,634,837,317	30,825	1.6%	12.8%	0.3410	0.087
Total Lead	287	26,337,608	0.0149	51.8	1,634,837,317	1,519	1.6%	15.9%	0.0174	0.0024145
Mercury	0.42	26,337,608	0.0011	51.8	1,634,837,317	111	1.6%	0.4%	0.0011	0.000012
Silver	16	26,337,608	0.0379	51.8	1,634,837,317	3,870	1.6%	0.4%	0.0375	No Criteria
Total Phenols	125	26,337,608	0.005315	51.8	1,634,837,317	542	1.6%	18.7%	0.0064	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Chester Creek near Chester, PA (01477000) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 3.2-1a

Impact of CSO Discharge on Chester Creek Water Quality for Baseline Typical Year at Regulator 20

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	11,592	1,033,310	27.99	51.8	1,634,837,317	2,857,019	0.1%	0.4%	28.09	No Criteria
BOD_5	1,026	1,033,310	3.14	51.8	1,634,837,317	320,385	0.1%	0.3%	3.15	No Criteria
COD	10,974	1,033,310	10	51.8	1,634,837,317	1,020,692	0.1%	1.1%	10.10	No Criteria
Fecal Coliform (#/100ml)	2.35E+07	1,033,310	9,877	51.8	1,634,837,317	1.0E+10	0.1%	0.2%	9,894	770
Dissolved Oxygen	543	1,033,310	7.863	51.8	1,634,837,317	802,570	0.1%	0.1%	7.86	> 6.5
Oil & Grease	1,144	1,033,310	2.00	51.8	1,634,837,317	204,138	0.1%	0.6%	2.01	No Criteria
Total Kjeldahl Nitrogen	476	1,033,310	1.43	51.8	1,634,837,317	146,163	0.1%	0.3%	1.44	No Criteria
Total Phosphorus	71.1	1,033,310	0.7178	51.8	1,634,837,317	73,265	0.1%	0.1%	0.718	No Criteria
Total Zinc	25.1	1,033,310	0.0334	51.8	1,634,837,317	3,411	0.1%	0.7%	0.0336	0.1011924
Total Copper	6.6	1,033,310	0.0272	51.8	1,634,837,317	2,775	0.1%	0.2%	0.0272	0.0109878
Total Aluminum	179.1	1,033,310	0.3020	51.8	1,634,837,317	30,825	0.1%	0.6%	0.3036	0.087
Total Lead	11.4	1,033,310	0.0149	51.8	1,634,837,317	1,519	0.1%	0.7%	0.0150	0.0024145
Mercury	0.02	1,033,310	0.0011	51.8	1,634,837,317	111	0.1%	0.0%	0.0011	0.000012
Silver	0.6	1,033,310	0.0379	51.8	1,634,837,317	3,870	0.1%	0.0%	0.0379	No Criteria
Total Phenols	4.8	1,033,310	0.005315	51.8	1,634,837,317	542	0.1%	0.9%	0.0054	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Chester Creek near Chester, PA (01477000) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 3.2-1b

Impact of CSO Discharge on Chester Creek Water Quality for Baseline Typical Year at Regulator 19

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	200,295	17,873,866	28.09	51.8	1,635,870,627	2,868,611	1.1%	7.0%	29.72	No Criteria
BOD_5	20,386	17,873,866	3.15	51.8	1,635,870,627	321,411	1.1%	6.3%	3.31	No Criteria
COD	194,629	17,873,866	10.10	51.8	1,635,870,627	1,031,667	1.1%	18.9%	11.88	No Criteria
Fecal Coliform (#/100ml)	6.52E+08	17,873,866	9,894	51.8	1,635,870,627	1.0E+10	1.1%	6.5%	10,419	770
Dissolved Oxygen	9,342	17,873,866	7.86	51.8	1,635,870,627	803,114	1.1%	1.2%	7.87	> 6.5
Oil & Grease	19,906	17,873,866	2.01	51.8	1,635,870,627	205,282	1.1%	9.7%	2.18	No Criteria
Total Kjeldahl Nitrogen	8,347	17,873,866	1.44	51.8	1,635,870,627	146,639	1.1%	5.7%	1.50	No Criteria
Total Phosphorus	1,244.2	17,873,866	0.7180	51.8	1,635,870,627	73,336	1.1%	1.7%	0.722	No Criteria
Total Zinc	428.5	17,873,866	0.0336	51.8	1,635,870,627	3,436	1.1%	12.5%	0.0374	0.1011924
Total Copper	113.0	17,873,866	0.0272	51.8	1,635,870,627	2,782	1.1%	4.1%	0.0280	0.0109878
Total Aluminum	3,063.1	17,873,866	0.3036	51.8	1,635,870,627	31,004	1.1%	9.9%	0.3299	0.087
Total Lead	192.4	17,873,866	0.0150	51.8	1,635,870,627	1,531	1.1%	12.6%	0.0167	0.0024145
Mercury	0.29	17,873,866	0.0011	51.8	1,635,870,627	111	1.1%	0.3%	0.0011	0.000012
Silver	11.0	17,873,866	0.0379	51.8	1,635,870,627	3,871	1.1%	0.3%	0.0376	No Criteria
Total Phenols	85.6	17,873,866	0.005359	51.8	1,635,870,627	547	1.1%	15.6%	0.0061	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Chester Creek near Chester, PA (01477000) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 3.2-1c

Impact of CSO Discharge on Chester Creek Water Quality for Baseline Typical Year at Regulator 21

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	6,344	565,233	29.72	51.8	1,653,744,493	3,068,906	0.0%	0.2%	29.77	No Criteria
BOD_5	526	565,233	3.31	51.8	1,653,744,493	341,797	0.0%	0.2%	3.31	No Criteria
COD	5,939	565,233	11.88	51.8	1,653,744,493	1,226,296	0.0%	0.5%	11.93	No Criteria
Fecal Coliform (#/100ml)	9.55E+06	565,233	10,419	51.8	1,653,744,493	1.1E+10	0.0%	0.1%	10,425	770
Dissolved Oxygen	298	565,233	7.87	51.8	1,653,744,493	812,456	0.0%	0.0%	7.87	> 6.5
Oil & Grease	624	565,233	2.18	51.8	1,653,744,493	225,189	0.0%	0.3%	2.19	No Criteria
Total Kjeldahl Nitrogen	259	565,233	1.50	51.8	1,653,744,493	154,986	0.0%	0.2%	1.50	No Criteria
Total Phosphorus	38.7	565,233	0.7223	51.8	1,653,744,493	74,581	0.0%	0.1%	0.722	No Criteria
Total Zinc	13.8	565,233	0.0374	51.8	1,653,744,493	3,864	0.0%	0.4%	0.0375	0.1011924
Total Copper	3.6	565,233	0.0280	51.8	1,653,744,493	2,895	0.0%	0.1%	0.0281	0.0109878
Total Aluminum	98.4	565,233	0.3299	51.8	1,653,744,493	34,067	0.0%	0.3%	0.3308	0.087
Total Lead	6.3	565,233	0.0167	51.8	1,653,744,493	1,723	0.0%	0.4%	0.0167	0.0024145
Mercury	0.01	565,233	0.0011	51.8	1,653,744,493	111	0.0%	0.0%	0.0011	0.000012
Silver	0.4	565,233	0.0376	51.8	1,653,744,493	3,882	0.0%	0.0%	0.0376	No Criteria
Total Phenols	2.6	565,233	0.006130	51.8	1,653,744,493	633	0.0%	0.4%	0.0062	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Chester Creek near Chester, PA (01477000) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 3.2-1d

Impact of CSO Discharge on Chester Creek Water Quality for Baseline Typical Year at Regulator 26

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	20,785	1,852,210	29.77	51.8	1,654,309,726	3,075,250	0.1%	0.7%	29.94	No Criteria
BOD_5	1,759	1,852,210	3.31	51.8	1,654,309,726	342,323	0.1%	0.5%	3.33	No Criteria
COD	19,524	1,852,210	11.93	51.8	1,654,309,726	1,232,234	0.1%	1.6%	12.11	No Criteria
Fecal Coliform (#/100ml)	3.46E+07	1,852,210	10,425	51.8	1,654,309,726	1.1E+10	0.1%	0.3%	10,446	770
Dissolved Oxygen	976	1,852,210	7.87	51.8	1,654,309,726	812,754	0.1%	0.1%	7.87	> 6.5
Oil & Grease	2,047	1,852,210	2.19	51.8	1,654,309,726	225,813	0.1%	0.9%	2.20	No Criteria
Total Kjeldahl Nitrogen	849	1,852,210	1.50	51.8	1,654,309,726	155,245	0.1%	0.5%	1.51	No Criteria
Total Phosphorus	127.0	1,852,210	0.7225	51.8	1,654,309,726	74,619	0.1%	0.2%	0.723	No Criteria
Total Zinc	45.1	1,852,210	0.0375	51.8	1,654,309,726	3,878	0.1%	1.2%	0.0379	0.1011924
Total Copper	11.9	1,852,210	0.0281	51.8	1,654,309,726	2,898	0.1%	0.4%	0.0281	0.0109878
Total Aluminum	322.1	1,852,210	0.3308	51.8	1,654,309,726	34,165	0.1%	0.9%	0.3335	0.087
Total Lead	20.5	1,852,210	0.0167	51.8	1,654,309,726	1,729	0.1%	1.2%	0.0169	0.0024145
Mercury	0.03	1,852,210	0.0011	51.8	1,654,309,726	111	0.1%	0.0%	0.0011	0.000012
Silver	1.1	1,852,210	0.0376	51.8	1,654,309,726	3,882	0.1%	0.0%	0.0376	No Criteria
Total Phenols	8.6	1,852,210	0.006153	51.8	1,654,309,726	636	0.1%	1.3%	0.0062	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Chester Creek near Chester, PA (01477000) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 3.2-1e

Impact of CSO Discharge on Chester Creek Water Quality for Baseline Typical Year at Regulator 22

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	24,247	2,160,832	29.94	51.8	1,656,161,935	3,096,035	0.1%	0.8%	30.14	No Criteria
BOD_5	2,061	2,160,832	3.33	51.8	1,656,161,935	344,082	0.1%	0.6%	3.34	No Criteria
COD	22,794	2,160,832	12.11	51.8	1,656,161,935	1,251,759	0.1%	1.8%	12.31	No Criteria
Fecal Coliform (#/100ml)	4.12E+07	2,160,832	10,446	51.8	1,656,161,935	1.1E+10	0.1%	0.4%	10,473	770
Dissolved Oxygen	1,138	2,160,832	7.87	51.8	1,656,161,935	813,730	0.1%	0.1%	7.87	> 6.5
Oil & Grease	2,389	2,160,832	2.20	51.8	1,656,161,935	227,860	0.1%	1.0%	2.22	No Criteria
Total Kjeldahl Nitrogen	991	2,160,832	1.51	51.8	1,656,161,935	156,094	0.1%	0.6%	1.52	No Criteria
Total Phosphorus	148.2	2,160,832	0.7229	51.8	1,656,161,935	74,746	0.1%	0.2%	0.723	No Criteria
Total Zinc	52.6	2,160,832	0.0379	51.8	1,656,161,935	3,923	0.1%	1.3%	0.0384	0.1011924
Total Copper	13.9	2,160,832	0.0281	51.8	1,656,161,935	2,910	0.1%	0.5%	0.0282	0.0109878
Total Aluminum	375.6	2,160,832	0.3335	51.8	1,656,161,935	34,488	0.1%	1.1%	0.3367	0.087
Total Lead	23.9	2,160,832	0.0169	51.8	1,656,161,935	1,750	0.1%	1.3%	0.0171	0.0024145
Mercury	0.03	2,160,832	0.0011	51.8	1,656,161,935	111	0.1%	0.0%	0.0011	0.000012
Silver	1.3	2,160,832	0.0376	51.8	1,656,161,935	3,884	0.1%	0.0%	0.0375	No Criteria
Total Phenols	10.0	2,160,832	0.006230	51.8	1,656,161,935	644	0.1%	1.5%	0.0063	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Chester Creek near Chester, PA (01477000) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 3.2-1f

Impact of CSO Discharge on Chester Creek Water Quality for Baseline Typical Year at Regulator 25

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	6,697	596,799	30.14	51.8	1,658,322,767	3,120,283	0.0%	0.2%	30.19	No Criteria
BOD_5	568	596,799	3.34	51.8	1,658,322,767	346,143	0.0%	0.2%	3.35	No Criteria
COD	6,293	596,799	12.31	51.8	1,658,322,767	1,274,553	0.0%	0.5%	12.37	No Criteria
Fecal Coliform (#/100ml)	1.13E+07	596,799	10,473	51.8	1,658,322,767	1.1E+10	0.0%	0.1%	10,480	770
Dissolved Oxygen	314	596,799	7.87	51.8	1,658,322,767	814,868	0.0%	0.0%	7.87	> 6.5
Oil & Grease	660	596,799	2.22	51.8	1,658,322,767	230,249	0.0%	0.3%	2.23	No Criteria
Total Kjeldahl Nitrogen	274	596,799	1.52	51.8	1,658,322,767	157,085	0.0%	0.2%	1.52	No Criteria
Total Phosphorus	40.9	596,799	0.7234	51.8	1,658,322,767	74,894	0.0%	0.1%	0.724	No Criteria
Total Zinc	14.5	596,799	0.0384	51.8	1,658,322,767	3,976	0.0%	0.4%	0.0385	0.1011924
Total Copper	3.8	596,799	0.0282	51.8	1,658,322,767	2,924	0.0%	0.1%	0.0283	0.0109878
Total Aluminum	103.8	596,799	0.3367	51.8	1,658,322,767	34,863	0.0%	0.3%	0.3376	0.087
Total Lead	6.6	596,799	0.0171	51.8	1,658,322,767	1,774	0.0%	0.4%	0.0172	0.0024145
Mercury	0.01	596,799	0.0011	51.8	1,658,322,767	111	0.0%	0.0%	0.0011	0.000012
Silver	0.4	596,799	0.0375	51.8	1,658,322,767	3,885	0.0%	0.0%	0.0375	No Criteria
Total Phenols	2.8	596,799	0.006319	51.8	1,658,322,767	654	0.0%	0.4%	0.0063	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Chester Creek near Chester, PA (01477000) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 3.2-1g

Impact of CSO Discharge on Chester Creek Water Quality for Baseline Typical Year at Regulator 23

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	2,590	230,735	30.19	51.8	1,658,919,566	3,126,979	0.0%	0.1%	30.21	No Criteria
BOD_5	205	230,735	3.35	51.8	1,658,919,566	346,710	0.0%	0.1%	3.35	No Criteria
COD	2,407	230,735	12.37	51.8	1,658,919,566	1,280,846	0.0%	0.2%	12.39	No Criteria
Fecal Coliform (#/100ml)	3.02E+06	230,735	10,480	51.8	1,658,919,566	1.1E+10	0.0%	0.0%	10,481	770
Dissolved Oxygen	122	230,735	7.87	51.8	1,658,919,566	815,182	0.0%	0.0%	7.87	> 6.5
Oil & Grease	254	230,735	2.23	51.8	1,658,919,566	230,909	0.0%	0.1%	2.23	No Criteria
Total Kjeldahl Nitrogen	105	230,735	1.52	51.8	1,658,919,566	157,359	0.0%	0.1%	1.52	No Criteria
Total Phosphorus	15.7	230,735	0.7235	51.8	1,658,919,566	74,935	0.0%	0.0%	0.724	No Criteria
Total Zinc	5.7	230,735	0.0385	51.8	1,658,919,566	3,991	0.0%	0.1%	0.0386	0.1011924
Total Copper	1.5	230,735	0.0283	51.8	1,658,919,566	2,928	0.0%	0.1%	0.0283	0.0109878
Total Aluminum	40.3	230,735	0.3376	51.8	1,658,919,566	34,967	0.0%	0.1%	0.3380	0.087
Total Lead	2.6	230,735	0.0172	51.8	1,658,919,566	1,780	0.0%	0.1%	0.0172	0.0024145
Mercury	0.00	230,735	0.0011	51.8	1,658,919,566	111	0.0%	0.0%	0.0011	0.000012
Silver	0.1	230,735	0.0375	51.8	1,658,919,566	3,885	0.0%	0.0%	0.0375	No Criteria
Total Phenols	1.1	230,735	0.006343	51.8	1,658,919,566	657	0.0%	0.2%	0.0064	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Chester Creek near Chester, PA (01477000) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 3.2-1h

Impact of CSO Discharge on Chester Creek Water Quality for Baseline Typical Year at Regulator 24

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	22,154	1,973,915	30.21	51.8	1,659,150,301	3,129,570	0.1%	0.7%	30.39	No Criteria
BOD_5	1,831	1,973,915	3.35	51.8	1,659,150,301	346,916	0.1%	0.5%	3.36	No Criteria
COD	20,729	1,973,915	12.39	51.8	1,659,150,301	1,283,254	0.1%	1.6%	12.57	No Criteria
Fecal Coliform (#/100ml)	3.28E+07	1,973,915	10,481	51.8	1,659,150,301	1.1E+10	0.1%	0.3%	10,500	770
Dissolved Oxygen	1,041	1,973,915	7.87	51.8	1,659,150,301	815,304	0.1%	0.1%	7.87	> 6.5
Oil & Grease	2,180	1,973,915	2.23	51.8	1,659,150,301	231,163	0.1%	0.9%	2.25	No Criteria
Total Kjeldahl Nitrogen	903	1,973,915	1.52	51.8	1,659,150,301	157,464	0.1%	0.6%	1.53	No Criteria
Total Phosphorus	135.1	1,973,915	0.7236	51.8	1,659,150,301	74,951	0.1%	0.2%	0.724	No Criteria
Total Zinc	48.2	1,973,915	0.0386	51.8	1,659,150,301	3,996	0.1%	1.2%	0.0390	0.1011924
Total Copper	12.7	1,973,915	0.0283	51.8	1,659,150,301	2,930	0.1%	0.4%	0.0284	0.0109878
Total Aluminum	343.8	1,973,915	0.3380	51.8	1,659,150,301	35,007	0.1%	1.0%	0.3409	0.087
Total Lead	21.9	1,973,915	0.0172	51.8	1,659,150,301	1,783	0.1%	1.2%	0.0174	0.0024145
Mercury	0.03	1,973,915	0.0011	51.8	1,659,150,301	111	0.1%	0.0%	0.0011	0.000012
Silver	1.2	1,973,915	0.0375	51.8	1,659,150,301	3,885	0.1%	0.0%	0.0375	No Criteria
Total Phenols	9.1	1,973,915	0.006352	51.8	1,659,150,301	658	0.1%	1.4%	0.0064	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Chester Creek near Chester, PA (01477000) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 3.2-1i

Impact of CSO Discharge on Chester Creek Water Quality for Baseline Typical Year at Regulator 12

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	569	50,710	30.39	51.8	1,661,124,216	3,151,724	0.0%	0.0%	30.39	No Criteria
BOD_5	43	50,710	3.36	51.8	1,661,124,216	348,747	0.0%	0.0%	3.36	No Criteria
COD	526	50,710	12.57	51.8	1,661,124,216	1,303,982	0.0%	0.0%	12.58	No Criteria
Fecal Coliform (#/100ml)	5.06E+05	50,710	10,500	51.8	1,661,124,216	1.1E+10	0.0%	0.0%	10,500	770
Dissolved Oxygen	27	50,710	7.87	51.8	1,661,124,216	816,345	0.0%	0.0%	7.87	> 6.5
Oil & Grease	56	50,710	2.25	51.8	1,661,124,216	233,343	0.0%	0.0%	2.25	No Criteria
Total Kjeldahl Nitrogen	23	50,710	1.53	51.8	1,661,124,216	158,367	0.0%	0.0%	1.53	No Criteria
Total Phosphorus	3.4	50,710	0.7240	51.8	1,661,124,216	75,086	0.0%	0.0%	0.724	No Criteria
Total Zinc	1.2	50,710	0.0390	51.8	1,661,124,216	4,044	0.0%	0.0%	0.0390	0.1011924
Total Copper	0.3	50,710	0.0284	51.8	1,661,124,216	2,942	0.0%	0.0%	0.0284	0.0109878
Total Aluminum	8.9	50,710	0.3409	51.8	1,661,124,216	35,351	0.0%	0.0%	0.3409	0.087
Total Lead	0.6	50,710	0.0174	51.8	1,661,124,216	1,805	0.0%	0.0%	0.0174	0.0024145
Mercury	0.00	50,710	0.0011	51.8	1,661,124,216	111	0.0%	0.0%	0.0011	0.000012
Silver	0.0	50,710	0.0375	51.8	1,661,124,216	3,887	0.0%	0.0%	0.0375	No Criteria
Total Phenols	0.2	50,710	0.006433	51.8	1,661,124,216	667	0.0%	0.0%	0.0064	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Chester Creek near Chester, PA (01477000) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 3.2-2

Impact of CSO Discharge on Ridley Creek Water Quality for Baseline Typical Year

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	295,015	26,399,804	35.48	27.6	870,621,189	1,928,396	2.9%	13.3%	39.70	No Criteria
BOD_5	40,150	26,399,804	3.12	27.6	870,621,189	169,744	2.9%	19.1%	3.75	No Criteria
COD	305,743	26,399,804	10	27.6	870,621,189	543,562	2.9%	36.0%	15.16	No Criteria
Fecal Coliform (#/100ml)	1.90E+09	26,399,804	16,104	27.6	870,621,189	8.8E+09	2.9%	17.8%	19,022	770
Dissolved Oxygen	13,583	26,399,804	8.1312	27.6	870,621,189	441,981	2.9%	3.0%	8.13	> 6.5
Oil & Grease	29,846	26,399,804	2.00	27.6	870,621,189	108,712	2.9%	21.5%	2.47	No Criteria
Total Kjeldahl Nitrogen	12,777	26,399,804	0.98	27.6	870,621,189	53,300	2.9%	19.3%	1.18	No Criteria
Total Phosphorus	1,894	26,399,804	0.3735	27.6	870,621,189	20,301	2.9%	8.5%	0.396	No Criteria
Total Zinc	612	26,399,804	0.0346	27.6	870,621,189	1,880	2.9%	24.6%	0.0445	0.0866451
Total Copper	161	26,399,804	0.0275	27.6	870,621,189	1,496	2.9%	9.7%	0.0296	0.0093958
Total Aluminum	4,392	26,399,804	0.3020	27.6	870,621,189	16,416	2.9%	21.1%	0.3715	0.087
Total Lead	269	26,399,804	0.0164	27.6	870,621,189	890	2.9%	23.2%	0.0207	0.0019764
Mercury	0.43	26,399,804	0.00144	27.6	870,621,189	78	2.9%	0.5%	0.0014	0.000012
Silver	16	26,399,804	0.0379	27.6	870,621,189	2,061	2.9%	0.8%	0.0371	No Criteria
Total Phenols	134	26,399,804	0.005315	27.6	870,621,189	289	2.9%	31.7%	0.0076	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Ridley Creek at Media, PA (01476480) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 3.2-2a

Impact of CSO Discharge on Ridley Creek Water Quality for Baseline Typical Year at Regulator 18

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	160,820	14,387,055	35.48	27.6	870,621,189	1,928,396	1.6%	7.7%	37.81	No Criteria
BOD_5	21,318	14,387,055	3.12	27.6	870,621,189	169,744	1.6%	11.2%	3.46	No Criteria
COD	165,596	14,387,055	10	27.6	870,621,189	543,562	1.6%	23.4%	12.83	No Criteria
Fecal Coliform (#/100ml)	9.83E+08	14,387,055	16,104	27.6	870,621,189	8.8E+09	1.6%	10.1%	17,621	770
Dissolved Oxygen	7,415	14,387,055	8.1312	27.6	870,621,189	441,981	1.6%	1.6%	8.13	> 6.5
Oil & Grease	16,240	14,387,055	2.00	27.6	870,621,189	108,712	1.6%	13.0%	2.26	No Criteria
Total Kjeldahl Nitrogen	6,938	14,387,055	0.98	27.6	870,621,189	53,300	1.6%	11.5%	1.09	No Criteria
Total Phosphorus	1,029	14,387,055	0.3735	27.6	870,621,189	20,301	1.6%	4.8%	0.386	No Criteria
Total Zinc	335	14,387,055	0.0346	27.6	870,621,189	1,880	1.6%	15.1%	0.0401	0.0866451
Total Copper	88	14,387,055	0.0275	27.6	870,621,189	1,496	1.6%	5.6%	0.0287	0.0093958
Total Aluminum	2,401	14,387,055	0.3020	27.6	870,621,189	16,416	1.6%	12.8%	0.3405	0.087
Total Lead	147	14,387,055	0.0164	27.6	870,621,189	890	1.6%	14.2%	0.0188	0.0019764
Mercury	0.23	14,387,055	0.0014	27.6	870,621,189	78	1.6%	0.3%	0.0014	0.000012
Silver	8.8	14,387,055	0.0379	27.6	870,621,189	2,061	1.6%	0.4%	0.0375	No Criteria
Total Phenols	73	14,387,055	0.00532	27.6	870,621,189	289	1.6%	20.1%	0.0065	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Ridley Creek at Media, PA (01476480) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 3.2-2b

Impact of CSO Discharge on Ridley Creek Water Quality for Baseline Typical Year at Regulator 17

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	64,543	5,806,898	37.81	27.6	885,008,244	2,089,216	0.7%	3.0%	38.72	No Criteria
BOD_5	13,092	5,806,898	3.46	27.6	885,008,244	191,062	0.7%	6.4%	3.67	No Criteria
COD	75,006	5,806,898	12.83	27.6	885,008,244	709,158	0.7%	9.6%	14.10	No Criteria
Fecal Coliform (#/100ml)	8.15E+08	5,806,898	17,621	27.6	885,008,244	9.7E+09	0.7%	7.7%	18,972	770
Dissolved Oxygen	2,896	5,806,898	8.13	27.6	885,008,244	449,396	0.7%	0.6%	8.13	> 6.5
Oil & Grease	6,753	5,806,898	2.26	27.6	885,008,244	124,953	0.7%	5.1%	2.37	No Criteria
Total Kjeldahl Nitrogen	3,001	5,806,898	1.09	27.6	885,008,244	60,238	0.7%	4.7%	1.14	No Criteria
Total Phosphorus	440	5,806,898	0.386	27.6	885,008,244	21,330	0.7%	2.0%	0.391	No Criteria
Total Zinc	126	5,806,898	0.0401	27.6	885,008,244	2,215	0.7%	5.4%	0.0421	0.0866451
Total Copper	33	5,806,898	0.0287	27.6	885,008,244	1,585	0.7%	2.0%	0.0291	0.0093958
Total Aluminum	910	5,806,898	0.3405	27.6	885,008,244	18,816	0.7%	4.6%	0.3547	0.087
Total Lead	53	5,806,898	0.0188	27.6	885,008,244	1,037	0.7%	4.8%	0.0196	0.0019764
Mercury	0.09	5,806,898	0.0014	27.6	885,008,244	78	0.7%	0.1%	0.0014	0.000012
Silver	3.5	5,806,898	0.0375	27.6	885,008,244	2,070	0.7%	0.2%	0.0373	No Criteria
Total Phenols	33	5,806,898	0.00654	27.6	885,008,244	362	0.7%	8.3%	0.0071	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Ridley Creek at Media, PA (01476480) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 3.2-2c

Impact of CSO Discharge on Ridley Creek Water Quality for Baseline Typical Year at Regulator 16

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	52,271	4,655,316	38.72	27.6	890,815,142	2,153,759	0.5%	2.4%	39.46	No Criteria
BOD_5	4,046	4,655,316	3.67	27.6	890,815,142	204,153	0.5%	1.9%	3.72	No Criteria
COD	48,392	4,655,316	14.10	27.6	890,815,142	784,164	0.5%	5.8%	14.89	No Criteria
Fecal Coliform (#/100ml)	5.21E+07	4,655,316	18,972	27.6	890,815,142	1.1E+10	0.5%	0.5%	18,966	770
Dissolved Oxygen	2,460	4,655,316	8.13	27.6	890,815,142	452,292	0.5%	0.5%	8.13	> 6.5
Oil & Grease	5,129	4,655,316	2.37	27.6	890,815,142	131,706	0.5%	3.7%	2.45	No Criteria
Total Kjeldahl Nitrogen	2,118	4,655,316	1.14	27.6	890,815,142	63,239	0.5%	3.2%	1.17	No Criteria
Total Phosphorus	317	4,655,316	0.391	27.6	890,815,142	21,770	0.5%	1.4%	0.395	No Criteria
Total Zinc	114	4,655,316	0.0421	27.6	890,815,142	2,341	0.5%	4.7%	0.0439	0.0866451
Total Copper	30	4,655,316	0.0291	27.6	890,815,142	1,617	0.5%	1.8%	0.0295	0.0093958
Total Aluminum	814	4,655,316	0.3547	27.6	890,815,142	19,726	0.5%	4.0%	0.3674	0.087
Total Lead	52	4,655,316	0.0196	27.6	890,815,142	1,090	0.5%	4.6%	0.0204	0.0019764
Mercury	0.07	4,655,316	0.0014	27.6	890,815,142	78	0.5%	0.1%	0.0014	0.000012
Silver	2.9	4,655,316	0.0373	27.6	890,815,142	2,073	0.5%	0.1%	0.0371	No Criteria
Total Phenols	21	4,655,316	0.00709	27.6	890,815,142	394	0.5%	5.1%	0.0074	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Ridley Creek at Media, PA (01476480) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 3.2-2d

Impact of CSO Discharge on Ridley Creek Water Quality for Baseline Typical Year at Regulator 15

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	17,381	1,550,536	39.46	27.6	895,470,458	2,206,030	0.2%	0.8%	39.70	No Criteria
BOD_5	1,695	1,550,536	3.72	27.6	895,470,458	208,199	0.2%	0.8%	3.75	No Criteria
COD	16,749	1,550,536	14.89	27.6	895,470,458	832,556	0.2%	2.0%	15.16	No Criteria
Fecal Coliform (#/100ml)	4.97E+07	1,550,536	18,966	27.6	895,470,458	1.1E+10	0.2%	0.5%	19,022	770
Dissolved Oxygen	812	1,550,536	8.13	27.6	895,470,458	454,753	0.2%	0.2%	8.13	> 6.5
Oil & Grease	1,724	1,550,536	2.45	27.6	895,470,458	136,835	0.2%	1.2%	2.47	No Criteria
Total Kjeldahl Nitrogen	721	1,550,536	1.17	27.6	895,470,458	65,356	0.2%	1.1%	1.18	No Criteria
Total Phosphorus	108	1,550,536	0.395	27.6	895,470,458	22,087	0.2%	0.5%	0.396	No Criteria
Total Zinc	37	1,550,536	0.0439	27.6	895,470,458	2,455	0.2%	1.5%	0.0445	0.0866451
Total Copper	10	1,550,536	0.0295	27.6	895,470,458	1,648	0.2%	0.6%	0.0296	0.0093958
Total Aluminum	267	1,550,536	0.3674	27.6	895,470,458	20,540	0.2%	1.3%	0.3715	0.087
Total Lead	17	1,550,536	0.0204	27.6	895,470,458	1,142	0.2%	1.5%	0.0207	0.0019764
Mercury	0.02	1,550,536	0.0014	27.6	895,470,458	78	0.2%	0.0%	0.0014	0.000012
Silver	1.0	1,550,536	0.0371	27.6	895,470,458	2,076	0.2%	0.0%	0.0371	No Criteria
Total Phenols	7.4	1,550,536	0.00743	27.6	895,470,458	416	0.2%	1.7%	0.0076	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Ridley Creek at Media, PA (01476480) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 3.2-3

Impact of CSO Discharge on Delaware River Water Quality for Baseline Typical Year

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	1,002,331	89,534,625	19.82	8711.0	274,710,096,000	339,988,482	0.0%	0.3%	19.87	No Criteria
BOD_5	114,306	89,534,625	2.64	8711.0	274,710,096,000	45,236,323	0.0%	0.3%	2.64	No Criteria
COD	997,128	89,534,625	25.678	8711.0	274,710,096,000	440,408,831	0.0%	0.2%	25.73	No Criteria
Fecal Coliform (#/100ml)[4]	4.40E+09	89,534,625	834	8711.0	274,710,096,000	1.4E+11	0.0%	3.0%	859	770/200
Dissolved Oxygen	46,537	89,534,625	6.4632	8711.0	274,710,096,000	110,851,716	0.0%	0.0%	6.46	>6.5
Oil & Grease	100,255	89,534,625	2.00	8711.0	274,710,096,000	34,302,425	0.0%	0.3%	2.01	No Criteria
Total Kjeldahl Nitrogen	42,357	89,534,625	0.71	8711.0	274,710,096,000	12,171,701	0.0%	0.3%	0.71	No Criteria
Total Phosphorus	6,301	89,534,625	0.1652	8711.0	274,710,096,000	2,833,380	0.0%	0.2%	0.166	No Criteria
Total Zinc	2,121	89,534,625	0.0365	8711.0	274,710,096,000	626,808	0.0%	0.3%	0.0367	0.0809746
Total Copper	559	89,534,625	0.0162	8711.0	274,710,096,000	277,730	0.0%	0.2%	0.0162	0.0087758
Total Aluminum	15,183	89,534,625	0.4200	8711.0	274,710,096,000	7,203,509	0.0%	0.2%	0.4207	0.087
Total Lead	945	89,534,625	0.0204	8711.0	274,710,096,000	349,130	0.0%	0.3%	0.0204	0.0018105
Mercury	1.45	89,534,625	0.0011	8711.0	274,710,096,000	19,036	0.0%	0.0%	0.0011	0.000012
Silver	55	89,534,625	0.0379	8711.0	274,710,096,000	650,374	0.0%	0.0%	0.0379	No Criteria
Total Phenols	438	89,534,625	0.005315	8711.0	274,710,096,000	91,159	0.0%	0.5%	0.0053	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow is sum from USGS gages Delaware River at Trenton (01463500) and Schuykill River at Philadelphia (01474500) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

[4] Criteria below RM 81.8 is 200 #/100ml and 770 #/100ml above RM 81.8.

SECTION 4
PROPOSED CONTROL ALTERNATIVES

4.1 INTRODUCTION

The development and evaluation of alternatives for CSO control in the DELCORA system was based on a review of the previously presented characterization of the DELCORA system and of CSO impacts upon receiving waters. This section of the LTCP provides site-specific analysis of various CSO control alternatives. The following steps were taken during the development of alternatives to meet CSO control goals:

- Identification of control alternatives.
- Preliminary sizing of control alternatives.
- Preliminary development of benefit/cost/performance relationships.
- Identification of preliminary site options and issues.
- Identification of preliminary operating strategies.
- Implementation timetables.
- Review of affordability to customers.

4.1.1 Identification of Control Alternatives

Control measures can include technologies, operating strategies, public policies and regulations, or other measures that would contribute to CSO control. A successful CSO control alternative will include combinations of various measures that provide the desired control, yet are technically, economically, and politically feasible. Control measures have been classified by US EPA (1995) as follows:

- Source controls--actions that affect the quantity or quality of runoff that enters the collection system.
- Collection system controls--actions that reduce CSO volume and frequency by removing or diverting runoff, maximizing the volume of flow stored in the collection system, or maximizing the capacity of the system to convey flow to a POTW.
- Storage technologies--actions that provide temporary storage of wet weather flows for subsequent treatment at the POTW.

- Treatment technologies--actions intended to reduce the pollutant loading to the receiving waters.

In selecting specific alternatives for consideration by DELCORA, the following observations from the previously presented sewer system characterization and baseline water quality impact analysis were considered:

- As discussed in Section 3.3, no environmentally sensitive areas were identified in the areas around the CSO outfalls.
- Water quality impacts from CSOs discharging to the Delaware River are negligible as indicated in Table 3.2-3.
- Based on the information presented in the Tables 3.2-1, 3.2-2, and 3.2-3, the potential for water quality improvement from CSO control is greatest along Ridley Creek given that the CSO discharge is a larger percentage of the flow and load. Lesser potential exists along Chester Creek.
- Based on the information presented in the Tables 3.2-1, 3.2-2, and 3.2-3, loadings from the sanitary sewage component of CSO discharges are minimal in comparison to stormwater loadings.
- In-system storage capacity is minimal, and isolated to certain portions of the sewer system.
- The potential to deliver more CSO to the WRTP is limited by sewer system capacity as depicted in Figure 2.5-1.
- The combination of the rapidly rising flow rates from the urban areas and the lack of additional interceptor capacity cause many of the regulators to close quickly in the modeled storms and slowly re-open as flows drop following a storm because of the limited interceptor capacity.
- Based on the information presented in the Tables 3.2-1, 3.2-2, and 3.2-3, the CSOs do not create any water use impairments that do not already exist based on background concentrations exceeding the specific water quality standard.

4.2 SOURCE CONTROL ALTERNATIVES

As stated above, source controls are actions that affect the quantity or quality of runoff that enters the collection system. Source controls are typically non-structural control measures and include street sweeping, solid waste/litter management, catch basin cleaning, and soil erosion control. Due to the highly urbanized development of the area, soil erosion is not considered to be significant, thus soil erosion control was not evaluated.

4.2.1 Street Sweeping

Street sweeping can be used to address two CSO pollution control concerns, pollutant removal and floatables control. The effectiveness of street sweeping corresponds to a number of factors including: the frequency of sweeping, particle size/type of equipment used, condition of the streets, the accumulation rate, and parking controls. The particle size is important since pound per pound, more pollutants are bound to fine particles than large particles. A study conducted by the EPA entitled Characterizing and Controlling Urban Runoff Through Street and Sewerage Cleaning (Pitt, 1985) indicated that street cleaning improved the quality of urban runoff by a maximum of only 10 percent. It should be noted however, that new equipment has been refined to collect a higher percentage of fine material than older equipment. The study examined the effectiveness of various types of cleaners and concluded that regenerative air street cleaners performed better at removing fine particles than mechanical-broom street cleaners. Mechanical-broom street cleaners were effective, however, in removing the larger particles and litter from the streets.

It is also important to note that this study was conducted in Bellevue, Washington, where the precipitation patterns are different. Subsequent studies in other areas of the country, including Wisconsin and California, have indicated that street cleaning has little or no impact on stormwater runoff quality. A study conducted by the City of Portland entitled Combined Sewer Overflow SFO Compliance: Interim Control Measures Study (Portland, 1993) found that a light-spray flusher truck immediately preceding a broom sweeper resulted in an average pickup efficiency of 39.4 percent while following the flusher truck and broom sweeper with a vacuum-type sweeper increased the pickup efficiency to 74.2 percent.

Based on these facts, there are two possible alternatives for street sweeping. The first alternative, which is based solely on contributing to the control of floatables, would be a sweeping program that covers the entire city at least once every three weeks. The second alternative, based on the study conducted in Portland, would involve a sweeping program employing a three-vehicle sweeping train that covers the entire city at least once a month. This will help to control floatables as well as to potentially improve runoff water quality.

4.2.1.1 Current Practices

All street sweeping falls under the jurisdiction of the City of Chester. Current sweeping practices of the City utilize two mechanical sweepers each with a designated area and route. This program, weather permitting, is designed to clean all the City streets once each week. This current practice should be sufficient to reduce floatables.

4.2.1.2 Cost of Additional Street Sweeping

A sweeping program focusing on both floatable/litter control and runoff quality improvement would require one sweeping train needing 9 days to cover the entire City. This alternative, coupled with the need to have a spare sweeper, would require the purchase of one vacuum sweeper at the cost of approximately $150,000, the purchase of a light-spray flush truck at a cost of $100,000, and the hiring of one additional employee to operate the sweepers full time at an annual cost of approximately $45,000 (salary plus benefits). The Portland study estimated sweeping costs using the three vehicle train to be $46.01 per curb mile swept, which for the City of Chester would translate to approximately $75,000, assuming nine sweepings per year.

Additionally, sweeping equipment has high maintenance requirements and would require between $10,000 and $15,000 annually per sweeper for operation and maintenance. Additional debris disposal costs were not estimated.

4.2.2 Inlet Cleaning

As with street sweeping, regular inlet cleaning can potentially improve CSO discharge quality. Pitt (1985) estimated that cleaning catch basins and sewers twice a year can reduce TSS and some heavy metals by 10 to 25 percent and reduce COD, nutrients, and light metals by 5 to 10 percent as compared to not cleaning at all. The study observed that sump inlets collected a greater amount of solids than those inlets with the outlet located on the bottom of the structure but it is important to note that catch basins will trap the larger particles which, as stated above, contain fewer pollutants than fine particles.

A benefit of the trapping and removal of the larger particles is that removal of this material will lessen the potential of deposition and blockages in the collectors and interceptors. As more debris is deposited, more pollutants will accumulate that can be washed out of the system during a large storm event. An additional benefit is the capture of additional floatable material.

4.2.2.1 Current Practices

Inlet cleaning in the City of Chester is conducted on a limited as-needed basis and concentrates on blocked or poor performing inlets. All inlets are inspected twice a year and those with significant accumulation are cleaned. The City of Chester has one vacuum truck available for inlet cleaning but personnel are not always available to field the required 3-man crew.

4.2.2.2 Cost of Additional Inlet Cleaning

The City of Chester contains approximately 1,200 inlets that require cleaning, of which 1,140 are curb open types and 60 are PADOT Type M inlets. If an additional cleaning crew is fielded, each crew would need to clean approximately 6 inlets per day in order to clean each inlet twice a year. One additional crew would require the purchase of an additional vacuum truck at a cost of $180,000, the hiring of three employees (at $45,000 each), and approximately $10,000 for annual operation and maintenance costs.

All inlet cleaning falls under the jurisdiction of the City of Chester. DELCORA can only encourage more frequent inlet cleaning.

4.2.3 Inlet Replacement

One proposal to reduce the floatables being discharged through the CSO system is to replace the curb opening inlets with grate inlets. In the City of Chester there are approximately 1,140 inlets that would need to be replaced. The inlet change would not only require the installation of a new inlet, but would necessitate replacement of curbing to facilitate easier turning and incorporate

depressed curbing for handicapped access. To increase the effectiveness of the inlets to remove sediments, a one-foot-deep sump is recommended for all new inlets.

Based on correspondence with the City (see Appendix G), 100 inlets have been replaced in the last three years.

4.2.3.1 Typical Design

Figure 4.2-1 shows a typical PADOT inlet with a 1-foot sump. The sump and elbow function to keep sewer gases from escaping.

4.2.3.2 Cost of Improvements

The replacement of an existing open-face inlet with a PADOT inlet with a Type M, bicycle-safe grate, sidewalk, and curbing improvements would cost approximately $12,120 per inlet. This alternative would need to be coupled with increased street sweeping to collect accumulated floatables. The total project cost of program to replace all open-face inlets in the City would be approximately $13,816,800. This program would need to be coupled with increased street sweeping to collect the floatables accumulating on the grates.

All inlet replacement or repair falls under the jurisdiction of the City of Chester.

4.3 COLLECTION SYSTEM CONTROL ALTERNATIVES

Collection system controls, storage and treatment technologies are typically referred to as structural control measures since they require structural changes to the system to implement. These controls include maximizing use of the existing system, sewer separation, infiltration/inflow control, coarse screening, and disinfection.

4.3.1 Sewer Cleaning

DELCORA maintains the interceptors, combined sewers, and separated sanitary sewers. The storm sewers and all storm drain interconnects are maintained by the City of Chester. Sewer cleaning is important in that a number of the interceptors and combined sewers have flat slopes that accelerate sediment accumulation in the lines.

4.3.1.1 Current Practices

DELCORA has two vacuum trucks equipped to clean sewer lines. The procedure to clean the lines typically consists of jet washing the line and trapping the solids for removal with the vacuum truck. For sewers that have a particularly large amount of deposited material, a bucket on a cable is run through the sewer to remove the material. DELCORA currently cleans most of the sewers for which it is responsible approximately once a year.

4.3.1.2 Cost of Additional Sewer Cleaning

In order to clean the sewers twice a year on average, DELCORA would need one additional crew (three employees at $45,000 each) and would need to purchase an additional vacuum truck equipped to clean sewers at a cost of $180,000. Additionally approximately $10,000 would be required for annual operation and maintenance costs.

4.3.2 Regulator Replacement

Reliable, functioning regulators and tide gates at all outfalls help to eliminate the possibility of dry-weather overflows and river water intrusion into the interceptor system and to maximize flow to the WRTP during storms. An option to achieve this is to replace all McNulty regulators with Brown & Brown regulators. Figure 4.3-1 shows a typical Brown & Brown design. The new Brown & Brown design incorporates an orifice plate that can be changed as future conditions allow more flow to be directed to the interceptors. Incorporated with this replacement of the regulators and tide gates would be the installation of a remote monitoring system. The

system's sensors would relay status information to WRTP for each regulator. This would enable plant operation personnel to monitor the regulator and tide gate conditions during storms, quickly identify malfunctioning equipment, and to dispatch a repair crew.

4.3.2.1 Prioritizing of Regulator Replacement

The ranking of the regulators for replacement is based on replacing the McNulty regulators first. The ranking also establishes priority based upon the modeled CSO water quality impacts. Beginning with Ridley Creek, followed by Chester Creek and the Delaware River, the ranking on each receiving water is set by replacing those receiving the most flow first. The ranking begins with Regulator 16 on Ridley Creek then moves to Regulators 26, 22, 20, 25, 21, 24, and 12 on Chester Creek. After Regulators 8, 5, 3, 2, 9, 13, 10, 11, 14, 4, and 6 on the Delaware River have been replaced, the ranking of the regulators concludes with the replacement of the existing Brown & Brown regulators, specifically Regulators 18, 17, and 15 on Ridley Creek, Regulator 7 on the Delaware River, and Regulator 19 on Chester Creek. Regulator 23 will be combined with Regulator 12.

4.3.2.2 Cost of Regulator Replacement

Table 4.3-1 lists the type of regulators that will be replaced/rehabilitated, assesses the access difficulties, and notes the type of tide gate present, if any. A typical regulator replacement is estimated to cost $75,000. The total regulator replacement program is estimated to be $1,875,000. This cost includes the regulator mechanism, installation, and the remote monitoring system. Annual O&M costs should remain approximately the same since the monitoring system will allow better targeting of maintenance work.

4.3.3 Sewer Separation

There are currently two major projects underway in the City of Chester that incorporates the separation of sanitary sewage and stormwater flows. The first project, currently under construction, is a new prison complex for Delaware County. The new complex incorporates new

storm sewers on a site of approximately 4.24 acres. The second project is the reconstruction of the S.R. 0291 (Industrial Highway), which will incorporate new storm sewers and replace sanitary sewers. The first section stretches from Ridley Creek to Franklin Street and is currently under construction. The remaining portion, while not yet designed, is expected to be completed within the next ten years. Figure 4.3-2 shows the extent of the separation expected from these projects. Only the projects currently being planned are being taken into account in this plan. No new projects are being considered. Costs are not included for sewer separation since this work is already funded by Delaware County and PADOT.

4.3.4 Consolidation/Elimination of Regulators

A close examination of the sanitary/storm water flow separation projects currently underway or planned for completion in the twenty-year planning period of the LTCP reveals that the potential exists to eliminate several regulators and outfalls. The reconstruction of SR 0291 (Industrial Highway) and the new Delaware County prison complex will separate a large portion of the flows being generated tributary to Regulator 15. The reduction of flow, however, is not sufficient to eliminate the regulator given the current capacity of the Ridley Creek Interceptor and it cannot be combined with another regulator without a significant sewer reconstruction. The Industrial Highway work will also eliminate significant combined portions of the areas draining to Regulators 04, 12, and 23. The reduction of flow, however, is not sufficient to immediately eliminate any regulators given the current capacity of the interceptors and they cannot be combined with other regulators without a significant sewer reconstruction. Coupling the separation work with the diversion of the area draining to Regulator 06 may allow the removal of the regulator mechanism at Outfall 06, however, other system wide hydraulic constraints on the western side of the collection system preclude the diversion of these areas.

Given the current capacity of EPS-1 (through which all gravity sewers on the west side of the City of Chester flow), the limited capacity of the interceptor under the railroad tracks leading into EPS-1, and the peak capacity of the WRTP, any project that will increase flow from the west side of the City to the WRTP must incorporate conveyance system improvements, EPS-1 capacity expansion and provisions for bypassing secondary treatment. Secondary treatment bypassing

and the changes to the WRTP that are required to incorporate this are discussed in more detail in Subsection 4.6.

4.3.5 Outfall Interceptor Along Ridley Creek

Since Ridley Creek has the lowest harmonic mean flow, the CSO discharge to Ridley Creek has the largest impact of all receiving waters. To alleviate the impact, an alternative consisting of an outfall interceptor was evaluated. The purpose of this outfall interceptor is to divert CSO away from Ridley Creek, which has a limited assimilative capacity, to the Delaware River, which has a larger assimilative capacity.

4.3.5.1 Conceptual Design and Siting

The proposed outfall interceptor will run from Regulator 17 on 9th Street to the confluence of Ridley Creek with the Delaware River. Figure 4.3-4 shows the approximate alignment of the interceptor. Initial investigations indicate that the interceptor can possibly run under the three railroad bridges as well as under the Essington Avenue and 2nd Street Bridges. Using the flows generated from Storm #73, the interceptor would be 42" in diameter for the 500 feet from Regulator 17 to Regulator 16 and 66" diameter for the remaining 2,200 feet to the discharge point. It is not economically feasible to extend the outfall interceptor to Regulator 18, which would still discharge to Ridley Creek.

4.3.5.2 Cost of Outfall Interceptor

The cost of constructing the Ridley Creek outfall interceptor is estimated to be $1,247,800. Appendix H provides a breakdown of the expected costs associated with this project. Annual O&M cost associated with the Outfall interceptor is estimated at 1% of project costs.

4.3.6 Maximizing Capacity of the Existing System

In an effort to take advantage of the available capacity in the West End Interceptor, the diversion of Subareas 6A, 4A, and a portion of 4B were evaluated to direct more flow toward the WRTP without impairing the operation of the West End Interceptor. An examination of the SWMM model results indicate that these diversions will not impair the West End Interceptor; however, they will increase the peak flow rate to the WRTP, and such increases will necessitate improvements to eliminate downstream bottlenecks and provide a secondary treatment bypass at WRTP. This is further described in Subsection 4.6.

4.3.6.1 Conceptual Design of Potential Areas for Directing Additional Flow to the Interceptors

Figures 4.3-5 and 4.3-6 show schematics of the intersections where insertion of a manhole would provide the connection needed to divert these areas. Before these connections can be considered, downstream capacity issues must be resolved and a more detailed hydraulic assessment of the system should be conducted.

4.3.6.2 Cost of Connections

The cost of the connection of Subarea 6A is estimated to be $19,300 and the connection of Subareas 4A and a portion of 4B is estimated to be $20,600. Appendix H provides a breakdown of the expected costs associated with this project. For purposes of program planning these costs must be added to the costs in Subsection 4.6.

4.3.7 Floatables Containment

The primary purpose of the below alternatives is the reduction of floatables to receiving waters to improve water quality and aesthetics. The installed traps are considered for the 12 outfalls on Ridley and Chester Creeks only at this time.

4.3.7.1 Outfall Containment Booms

One alternative to floatables control is to install floating collection nets and containment booms around the outfalls to contain floatables. The floating containment boom technology has been used across the waterways around the Fresh Kills Landfill on Staten Island, NY. These systems have no moving parts and a typical trap efficiency in excess of 90%. The problems with these types of systems are as follows:

1) Requires an in-stream construction that would result in an impediment to creek flow or navigation on the Delaware River.
2) Such an installation may be susceptible to ice damage during the winter and large debris damage during large storm events.
3) In-stream devices cannot be easily used under bridges because of the difficulty in removing the collected debris.

The floating types of systems (i.e., Fresh Creek Technologies, Inc. Netting TrashTrap system) cost approximately $214,900 per outfall to install. Annual maintenance of this system is approximately $10,800 exclusive of the disposal of the collected material. Assuming that three of this type will be needed, the total project cost for the outfall boom portion is estimated to be $644,600.

4.3.7.2 In-Line Netting

Another alternative for floatables control is to install a chamber in the sewer between the regulator and the outfall. Fresh Creek Technologies, Inc., has developed a product with a lifting basket in a precast concrete chamber. These systems have no moving parts and a typical trap efficiency in excess of 90%. The difficulty with using this type of technology in the City of Chester CSO system is that many regulators are located in the center of streets and that periodic removal of the basket for cleaning would be difficult. The City of Philadelphia is currently undertaking a pilot study to determine the effectiveness of this type of control.

A typical in-street, in-line netting chamber costs approximately $168,200 with approximately $11,100 needed for annual maintenance exclusive of the cost of disposing of the collected debris. The debris removed can be disposed of with the grit from the WRTP. Assuming that four chambers of this type will be needed, the total project cost for the end-of-pipe netting portion is estimated to be $672,800.

4.3.7.3 End-of-Pipe Netting

A third alternative for floatables control is to install a collection device at the outfall. This type of system attaches directly to the headwall. These systems have no moving parts and a typical trap efficiency in excess of 90%. The difficulty with this type of system is that access for debris removal can be very difficult if the outfall is under a bridge, as is the case with a number of the outfalls in the City of Chester. These systems could also impede creek flow and navigation (Delaware River).

A typical end-of-pipe system, such as the product developed by Fresh Creek Technologies, Inc., costs approximately $154,200 with approximately $11,300 needed for annual maintenance exclusive of the cost of disposing of the collected debris. Assuming that five of this type will be needed, the total project cost for the end-of-pipe netting portion is estimated to be $770,900.

4.3.7.4 Skimming of Public Areas

The City of Philadelphia is undertaking a pilot study to determine if operating a skimming boat is effective in controlling floatables in public areas such as Penns Landing and the Schuylkill River Park. If this study determines that skimming is an effective control method, the City may implement skimming as a permanent control.

DELCORA's most impacted waters are the shallow creeks in which a skimmer boat cannot operate. It is cost prohibitive for DELCORA to consider owning/operating its own boat for the limited value of skimming the Delaware River waterfront.

4.3.8 Summary of Collection System Control Alternatives

In summary, seven collection system control alternatives were evaluated.

Alternative	Capital Cost	Annual Cost
Increased Sewer Cleaning	180,000	145,000
Regulator Replacement	1,875,000	-
Sewer Separation	Not Estimated	Not Estimated
Consolidation/Elimination of Regulators	Not Estimated	Not Estimated
Ridley Creek Outfall Interceptor	1,247,800	12,478
Maximizing Collection System	39,900	-
Floatables Containment	2,095,300	133,300

4.4 STORAGE CONTROL ALTERNATIVES

Storage control alternatives are based on storing wet weather flows for subsequent treatment at the WRTP. Typical technologies used to accomplish storage include in-line measures, off-line near surface structures, and deep tunnel storage. The consideration of the in-line storage measures was immediately discounted since lateral connections to residences and businesses exist in all interceptors, so purposeful surcharging of the interceptors may cause property damage. Based on the estimated cost information presented in Manual - Combined Sewer Overflow Control (EPA, 1993), off-line storage for all four outfalls to Ridley Creek for the peak volume observed during the typical year for Regulators 15-18, would cost approximately $21 million dollars and a deep tunnel project would cost in more than of $27 million dollars (see Table 4.4-1). The alternatives are very capital intensive and thus completely unaffordable by the customer base in the City of Chester.

4.5 REMOTE TREATMENT CONTROL ALTERNATIVES

Treatment control alternatives are based on reducing the pollutant loads to the receiving waters during wet weather flows. Typical technologies used to accomplish treatment include coarse

screening, off-line near surface sedimentation structures, swirl/vortex separators, and disinfection. Table 4.5-1 shows the estimated costs for the remote treatment control alternatives for CSOs to Ridley Creek for the peak flow rate observed during the typical year for Regulators 15-18, based on US EPA (1993). As with the storage control alternatives, the remote treatment control alternatives are very capital intensive and thus completely unaffordable by the customer base in the City of Chester.

4.6 WRTP TREATMENT CAPACITY

4.6.1 Impact of the Proposed CDPS Diversion Project

DELCORA has entered a peak flow reduction agreement with the Philadelphia Water Department that calls for the diversion of the Central Delaware County Authority's service area flows to DELCORA's WRTP. While the project focuses on peak (storm) flow reduction, it also results in the diversion of additional dry-weather flow to the WRTP as well. Projected flow quantities are a maximum of 12 MGD dry-weather to the WRTP and wet weather peak flow above 12 MGD will be diverted to PSWPCP.

This diversion will be accomplished by modifying DELCORA'S Central Delaware County Pumping Station (CDPS), constructing a new force main from CDPS to DELCORA's existing Chester Force Main, and using available capacity in that force main to convey the flow to WRTP. Previous studies by WESTON, Feasibility Study, Partial Diversion of Eastern Service Area Flows to WRTP-Phase 3 Report, February 1997, determined that both the Chester Force Main and WRTP have capacity for the additional volumes and loadings related to this project.

This project will not increase combined sewer overflows tributary to the CPS since:

(1) The CPS will not re-pump the flow,

(2) the CPS will still have capacity to pump up to a 30 MGD rate to the force main before activating the bypass pumps, and

(3) flow split to PSWPCP can be increases during peak events.

Also, it will not increase combined sewer overflows tributary to WRTP, since it will not use influent pumping capacity at WRTP, and since sewer system flows to WRTP are primarily limited by conveyance capacity, not in-plant treatment capacity. The project will also shift the treated effluent loading to the Delaware River from the Philadelphia area southward.

Additional benefits of this project include reducing the potential for storm-related sewer backups in the CDCA Service Area, and making additional capacity available in the Philadelphia Southwest Water Pollution Control Plant (PSWPCP) for treatment of City of Philadelphia CSO.

4.6.2 Maximum Treatment Capacity And Potential Secondary Bypassing At The WRTP

US EPA's LTCP Guidance states:

> Third, the CSO Control Policy addresses the specific case where existing primary treatment capacity at a POTW exceeds secondary treatment capacity and it is not possible to utilize the full primary treatment capacity without overloading the secondary facilities. For such cases, the CSO Control Policy states that at the request of the municipality, EPA may allow an NPDES permit "...to authorize a CSO-related bypass of the secondary treatment portion of the POTW treatment plant for combined sewer flows in certain identified circumstances" (II.C.7.). Under this provision, flows to the POTW within the capacity of primary treatment facilities but in excess of the capacity of secondary treatment facilities may be diverted around the secondary facilities, provided that "...all wet weather flows passing the headworks of the POTW treatment plant will receive at least primary clarification and solids and floatables removal and disposal, and disinfection, where necessary, and any other treatment that can reasonably be provided" (II.C.7). In addition, the CSO-related bypass should not cause exceedance of WQS.

This evaluation includes an examination of the grit chamber, primary settling tanks and chlorination facilities (with the assumption that post-aeration facilities may be converted to chlorine contact tanks). Previously it has been established that the aeration/clarification system could handle a peak flow of 85 MGD. At this flow rate, the surface loading rate of the secondary clarifiers would be the limiting factor per the PADEP "Domestic Wastewater Facilities Manual" (August 1991). The surface overflow rate per the manual is 1,200 gpd/ft^2, which is the surface overflow rate of the WRTP at a peak flow of 85 MGD. For this evaluation, it is assumed that up

to 85 MGD can be treated in the WRTP. The rest needs to be bypassed from the effluent channels of the primaries to the existing post-aeration facilities.

4.6.2.1 Primary Tanks

Per "Greeley and Hanson's (G&H) "Plant Operations and Re-Rating Study", June 1984, there are 8 primary tanks, each 155.5 ft by 41.5 ft wide by 8.75 ft in depth. The total surface area is 51,626 ft^2. The total weir in length is 1,400 ft. The "Wastewater Facility Manual" states:

> "Surface overflow rates for primary tanks not receiving waste activated sludge should not exceed 1,000 gallons per day per square foot at maximum monthly average flow (including recirculation flows) or 2,500 gallons per day per square foot for peak hourly flow (including recirculation flows)."

Therefore, the primaries could handle a peak hourly flow of (2500 gpd/ft^2) x (51,624 ft^2) = 129.06 MGD (including recycle flows), and still meet the State Criteria for the primary treatment.

The hydraulics of the primaries were checked to confirm that they can handle this flow without overflowing. This analysis assumed a flow of 129 MGD.

Per drawing of WRTP Plot Plan, the wall evaluation of the primary tanks is 27.00 ft, and the water level evaluation is 24.75 ft at a flow rate to the plant of 42 MGD. If we assume that the existing V-Notch weirs would be flowing full, then additional flows will behave similarly to the discharge from rectangular weirs with end contractions. The incremental flow is:

$$129 \text{ MGD} - 42 \text{ MGD} = 87 \text{ MGD}$$

$$\frac{87 \text{ MGD} \times 10^6}{1440 \text{ mm/day}} = 60{,}417 \text{ gpm}$$

The flow per ft of weir length is :

$$\frac{60{,}417 \text{ gpm}}{1400 \text{ ft}} = 43 \text{ gpm/ft}$$

Per "Cameron Hydraulic Data" (sheet 9) this equates to an additional ~ 1¼ inches over the weir. Therefore, the new water surface evaluation would be

$$24.75 + \frac{1.25"}{12"/\text{ft}} = 24.854 \text{ ft}$$

which is well below the wall elevation of 27 ft.

According to DELCORA, the primaries have overflowed on one occasion when flow exceeded 85 MGD. According to this analysis, this would not be due to hydraulic head over the weirs of the primary tanks or the grit chamber. The outlet structure from the primaries to the secondary system was not evaluated or inspected as part of this evaluation; but this may be a potential cause of the overflow. If it was the cause, then this bottleneck may be corrected as part of the project to construct the bypass from the primaries to the secondary system.

4.6.2.2 Aerated Grit Chamber (Upstream of Primary Clarifiers)

At the 129 MGD, the flow through velocity would be,

$$30 \text{ ft} \times 16.25 \text{ ft} = 487.5 \text{ ft}^2 = \text{Area/Tank}$$

$$487.5 \text{ ft}^2 \times 2 \text{ Tanks} = 975 \text{ ft}^2$$

$$\frac{129 \text{ MGD} \times 10^6}{(7.489 \text{ gal/ft}^3)(1440 \text{ min/day})(60 \text{ sec/min})} = 199.4 \text{ cfs}$$

$$\frac{199.4 \text{ ft}^3/\text{sec}}{975 \text{ ft}^2} = 0.204 \text{ ft/sec}$$

This is almost two times the design peak flow - through velocity per Greeley and Hanson's 1994 report. Therefore, for accepting CSO flows at 129 MGD, while maintaining the same amount of

flexibility as with a present peak flow of 90 MGD, we can assume that a third aerated grit chamber (similar in design to the two existing aerated grit and pre-aeration tanks) will be needed to maintain existing operating flexibility.

4.6.2.3 Chlorine Contact Tanks

There are two chlorine contact tanks. Each tank is 116 ft long by 36 ft wide by 12.5 ft SWD. The total volume is 780,912 gallons.

As 129 MGD the detention time is:

$$\frac{129 \times 10^6}{1{,}440} = 89{,}583 \text{ gpm}$$

$$\frac{780.912 \text{ gal}}{89{,}583 \text{ gal/min}} = 8.72 \text{ minutes}$$

This is substantially less than the PADEP criteria which states, "A minimum contact period of 15 minutes at peak hourly flow or a maximum rate of pumpage...". An option to resolve this is to consider the post-aeration tanks to chlorine contact tanks.

There are two tanks, each 48.5 x 48.5 x 11.5 x 7.48 = 202,340 gal. Total volume = 202,340 x 2 = 404,681 gal.

Total volume for chlorine contact tanks and post-aeration tanks is 750,912 gal + 404,681 gal = 1,185,593 gal.

With both tanks converted from post aeration to chlorine contact tanks detention time would be

$$\frac{1{,}185{,}593 \text{ gal}}{89{,}583 \text{ gal/min}} - 13.23 \text{ minutes}$$

This is only marginally less than the 15 minutes required per the State criteria.

Limiting forward flow to 113.8 MGD would be needed to meet the 15-minute contact period.

$$\frac{13.23}{15} \times 129 = 113.8 \text{ MGD}$$

Hydraulically, using a similar analysis as that used for the primaries and grit chamber, there should be ample freeboard to accept 113.8 MGD through the post aeration and chlorine contact tanks. At a flow of 42 MGD there is now 4 feet at free board.

4.6.2.4 Solids Handling

Sludge processing facilities include dissolved air floatation units for waste activated sludge, belt filter presses for dewatering, and sludge incineration. These facilities were previously reviewed by WESTON ("Feasibility Study, Partial Diversion of Eastern Service Area Flows to WRTP - Phase 3 Report, February 1997") and deemed adequate for the projected additional loadings associated with the diversion of CDPS flows to WRTP under average and peak flow (85 MGD) conditions.

A secondary treatment bypass to accommodate additional flow to the WRTP, will not increase waste activated sludge volumes, but will increase primary sludge volume. Given the short-term nature of such peaks and the reserved capacity previously determined to be available, we do not project the need for additional solids processing facilities.

4.6.2.5 Conclusions

1. Primaries can handle up to 129 MGD as a peak hourly flow and still meet the State criteria for primary treatment.
2. Grit removal will require a third tank to maintain the operational flexibility that presently exists. Cost = $923,200, plus additional annual costs for grit disposal.
3. A previous analysis indicated that the existing secondary system could handle a peak hourly flow of 85 MGD influent. This requires replacement of aerators, which is a planned capital improvement and therefore not considered as an incremental cost in this analysis.

4. The chlorine contact tanks will require additional capacity. By converting the post-aeration tanks to chlorine contact tanks, a peak hourly flow of 113.8 could be treated. Cost = $991,800.

5. The cost to construct a bypass from the primary effluent to the post-aeration tanks is $460,900.

6. The limiting factor for the secondary bypass is chlorine contact tank capacity, which after modification would be approximately 113.8 MGD. This indicates that a secondary bypass of 21.2 MGD (113.8 MGD - 92.6 MGD) could be provided, with an associated construction cost of $2,395,900.

Cost documentation is presented in Appendix H.

4.6.3 Preliminary Operating Strategies

Installation of a secondary bypass will not be effective unless additional conveyance capacity is provided in the tributary sewer system and at EPS-1. At this time, peak delivery (without system surcharging) of key system components is estimated as follows:

- Chester Force Main - 58.5 MGD
  (CPS-30 MGD, Kimberly Clark –16.5 MGD, CDPS - 12 MGD)

- Marcus Hook Force Main - 20.35 MGD
  (MHPS - 1.5 MGD, SUN - 18 MGD, FMC – 0.85 MGD)

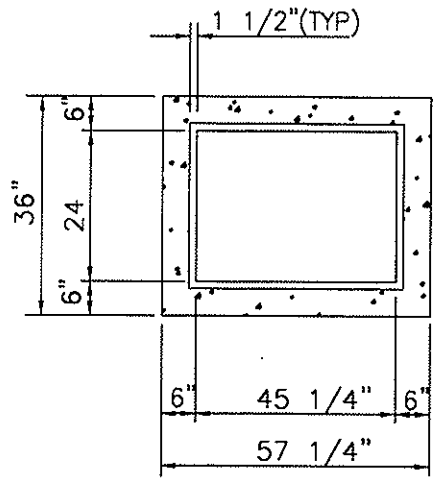
- EPS-1 - 2.3 MGD

  TOTAL 75.5 MGD

This is less than the functional treatment capacity of 85 MGD.

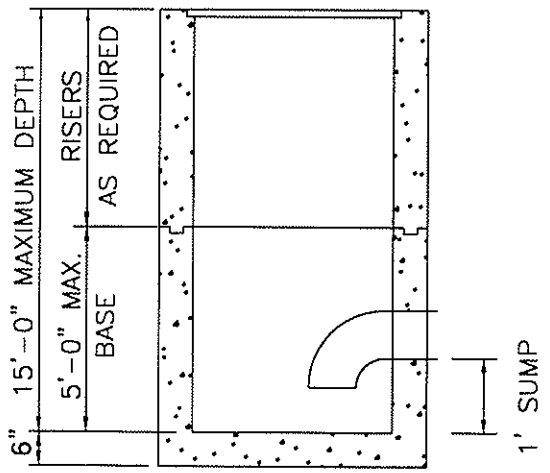
If cost-effective means of delivering more CSO flow to the WRTP were identified and the secondary bypass system was installed, the operating strategy for the plant would be to provide full treatment for flow rates up approximately 85 MGD, and to activate the bypass for flows above 85 MGD to a maximum of approximately 114 MGD. Further modeling would need to be done to determine how much additional CSO could actually be diverted to the plant.

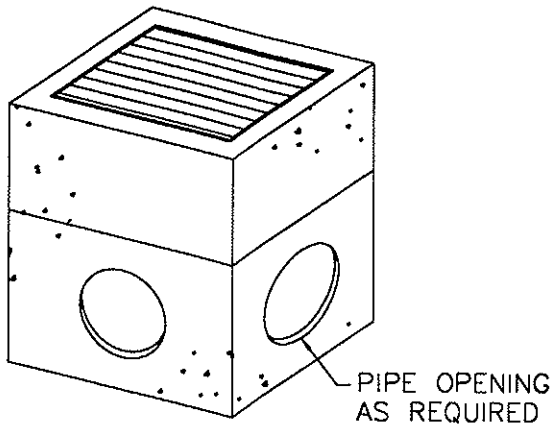
In-plant construction costs to accommodate this have been estimated at approximately $2.4 million and external costs for sewer system expansion and pumping upgrades may equal that amount. This would need to be determined through further study and is not included in the cost estimate.



NOTES:

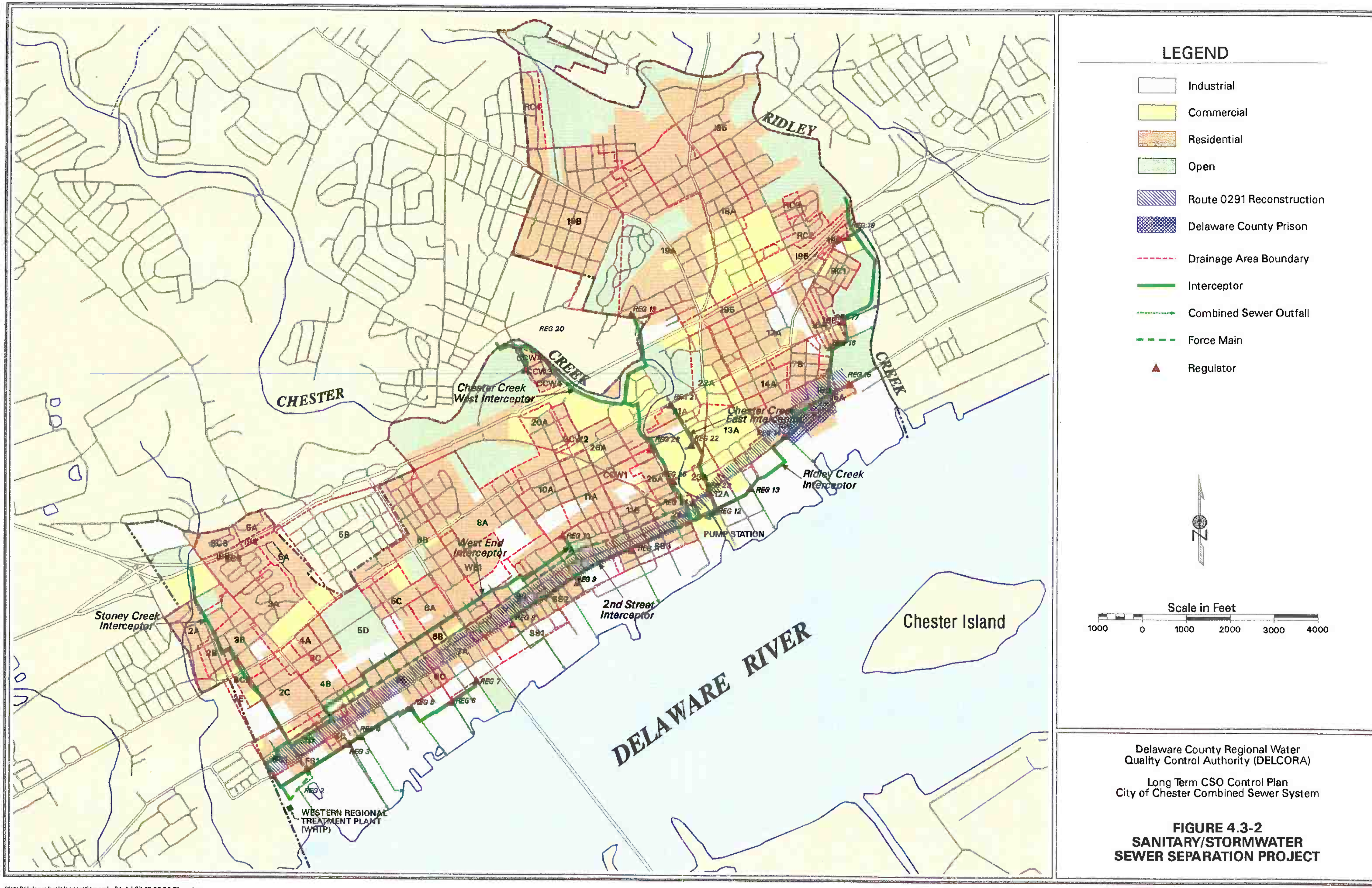
1. MATERIALS CONFORM TO P.A.D.O.T. "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION".
2. CONCRETE CONFORMS TO P.A.D.O.T. MIX TYPE "B".
3. DEFORMED STEEL CONFORMS TO ASTM A-615; WELDED WIRE FABRIC CONFORMS TO ASTM A-185.
4. LADDER RUNGS INSTALLED AS REQUIRED.
5. PRECAST STRUCTURES SHALL BE PLACED ON 6" OF COMPACTED AGGREGATE.





PADOT TYPE "M" INLET
N.T.S.

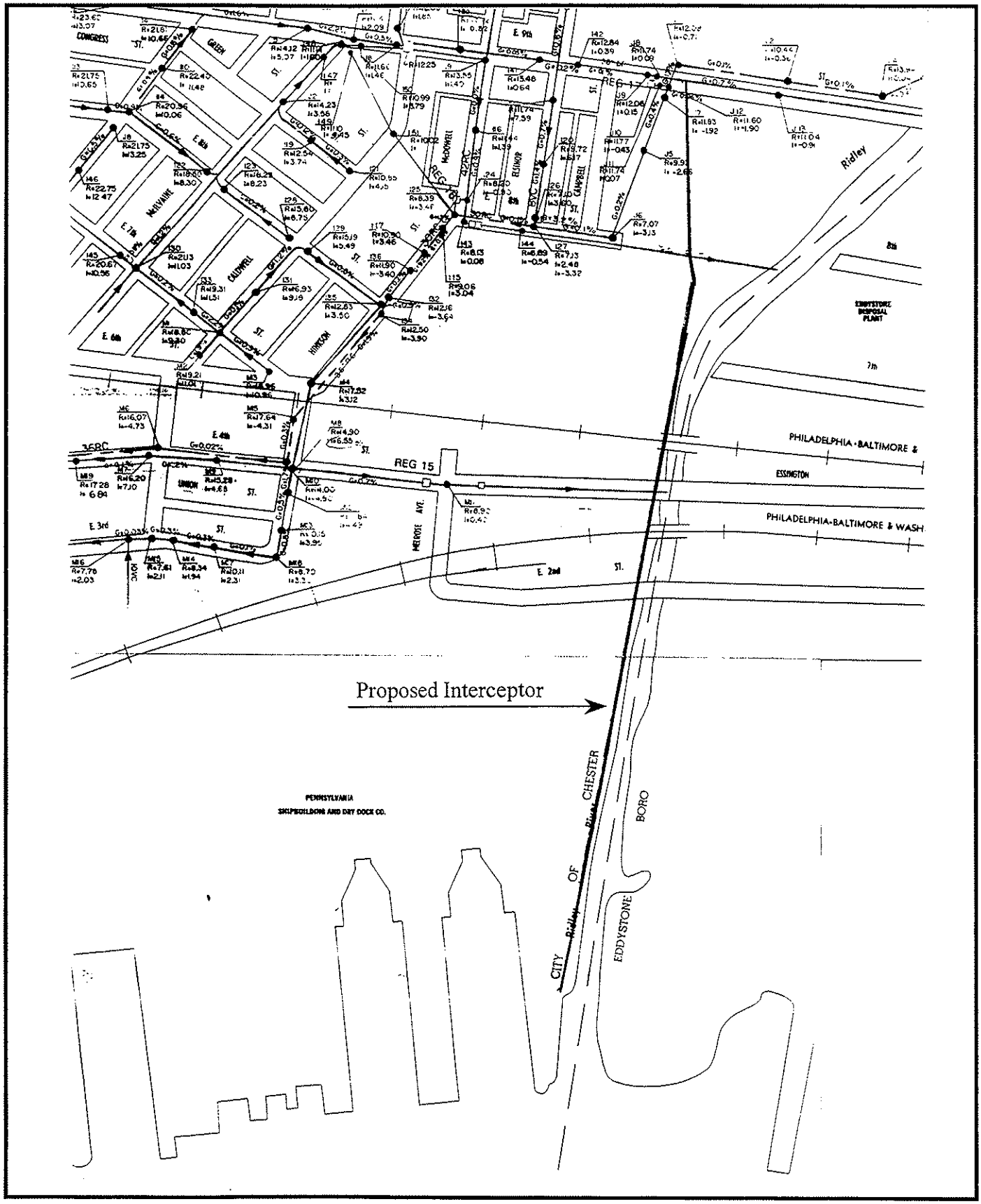
Delaware County Regional Water Quality Control Authority (DELCORA) Long Term CSO Control Plan City of Chester Combined Sewer System	WESTON MANAGERS DESIGNERS/CONSULTANTS	FIGURE 4.2-1 TYPICAL PADOT TYPE M INLET WITH SUMP



Delaware County Regional Water Quality Control Authority (DELCORA)

Long Term CSO Control Plan
City of Chester Combined Sewer System

FIGURE 4.3-2
SANITARY/STORMWATER SEWER SEPARATION PROJECT



Delaware County Regional Water Quality Control Authority (DELCORA) Long Term CSO Control Plan City of Chester Combined Sewer System	WESTON MANAGERS DESIGNERS/CONSULTANTS	FIGURE 4.3-3 SCHEMATIC SITING OF RIDLEY CREEK OUTFALL INTERCEPTOR

(B)

WESTON MANAGERS DESIGNERS/CONSULTANTS

SHEET 2 of ____

CLIENT/SUBJECT DELCORA W.O. NO. ____

TASK DESCRIPTION LTCP - PRELIMINARY DESIGN TASK NO. ____

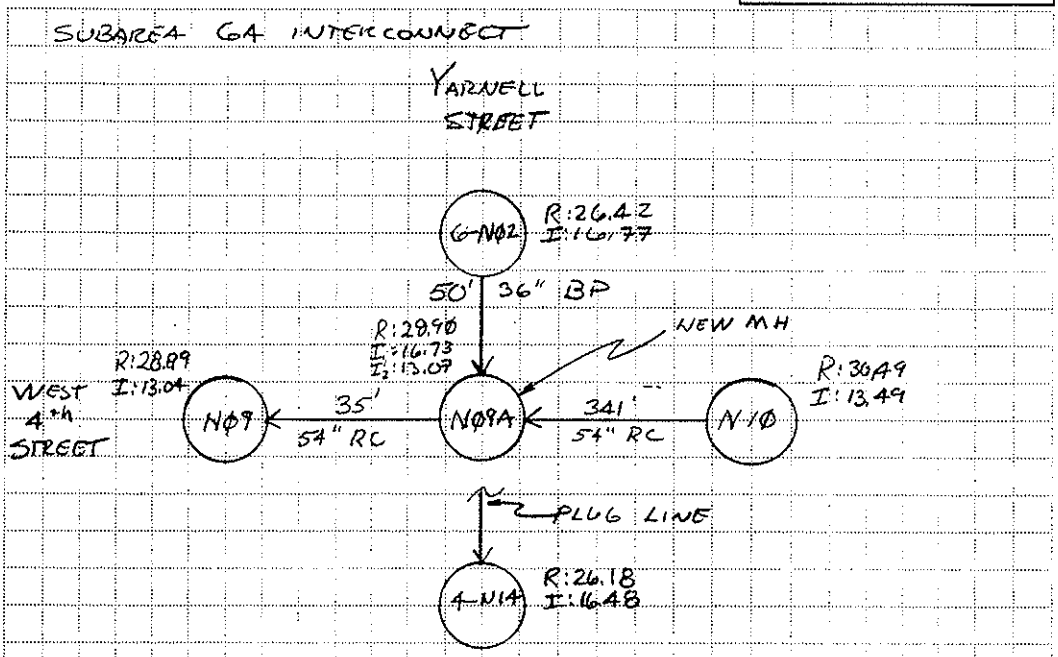
PREPARED BY R.W. LEHMAN DEPT 001131 DATE 6/26/97

MATH CHECK BY ____ DEPT ____ DATE ____

METHOD REV. BY ____ DEPT ____ DATE ____

APPROVED BY ____ DEPT ____ DATE ____

SUBAREA 6A INTERCONNECT



RFW 10-05-003/A-5/85
512-5643

Delaware County Regional Water Quality Control Authority (DELCORA) Long Term CSO Control Plan City of Chester Combined Sewer System	WESTON MANAGERS DESIGNERS/CONSULTANTS	FIGURE 4.3-4 SCHEMATIC OF SUBAREA 6A INTERCONNECT

WESTON MANAGERS DESIGNERS/CONSULTANTS

SHEET 1 of ____

CLIENT/SUBJECT DELCORA W.O. NO. ____

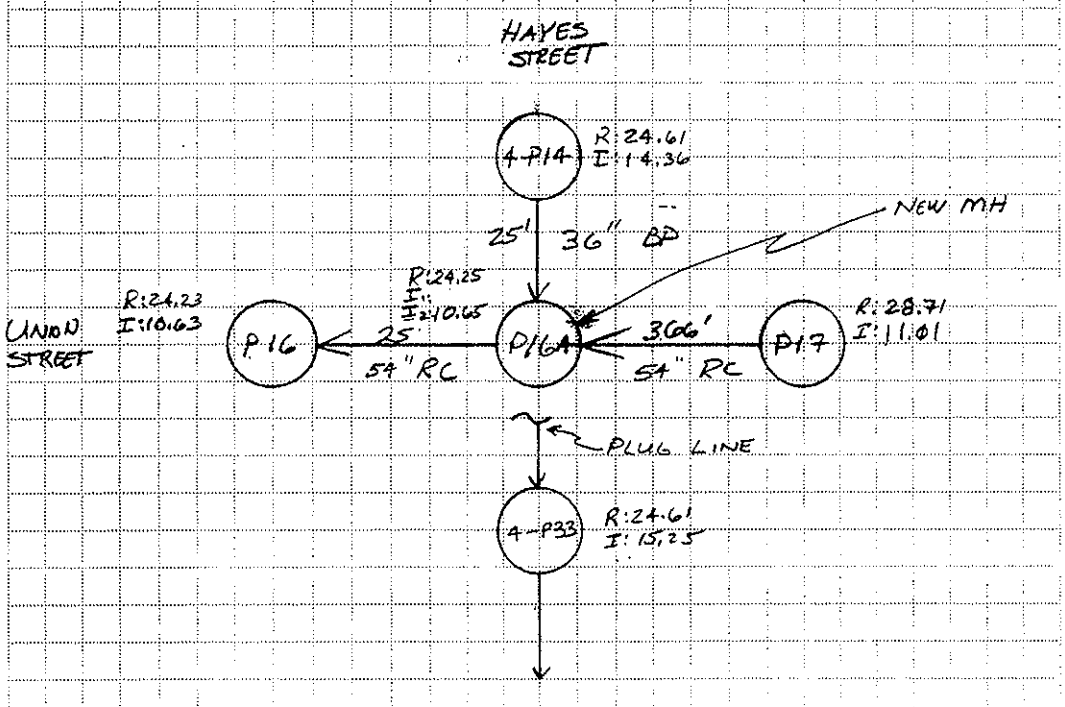
TASK DESCRIPTION LTCP - PRELIMINARY DESIGN TASK NO. ____

PREPARED BY R.W. LEHMAN DEPT 00131 DATE 6/26/97 | APPROVED BY

MATH CHECK BY ____ DEPT ____ DATE ____

METHOD REV. BY ____ DEPT ____ DATE ____ | DEPT ____ DATE ____

SUBAREAS 4A, 4B INTERCONNECT



RFW 10-05-003/A-5/85
512-5643

Delaware County Regional Water Quality Control Authority (DELCORA)

Long Term CSO Control Plan
City of Chester Combined Sewer System

WESTON MANAGERS DESIGNERS/CONSULTANTS

FIGURE 4.3-5

SCHEMATIC OF SUBAREAS 4A AND 4B INTERCONNECT

Table 4.3-1

Regulators for Replacement/Rehabilitation

Regulator	Type	Accessibility Difficulty[1]	Tide Gate
02	8" McNulty	Low	None
03	12" McNulty	Low	None
04	8" McNulty	Low	None
05	8" McNulty	Low	Double
06	8" McNulty	Low	Double
07	7.5" x 7.5" Brown & Brown	Low	Double
08	8" McNulty	Medium	Double
09	8" McNulty	Medium	Double
10	12" McNulty	High	None
11	12" McNulty	Medium	None
12	8" McNulty	High	Double
13	8" McNulty	High	Double
14	15" McNulty	Low	Double
15	5" x 6" Brown & Brown	High	Single
16	12" McNulty	Medium	Double
17	5" x 6" Brown & Brown	Medium	Single
18	5" x 6" Brown & Brown	Low	None
19	7.5" x 15.375" Brown & Brown	Low	None
20	8" McNulty	High	None
21	8" McNulty	Low	Double
22	8" McNulty	High	None
23	8" McNulty	Medium	Double
24	8" McNulty	Low	Double
25	8" McNulty	High	Double
26	8" McNulty	Medium	None

[1] Accessibility difficulty is based primarily on traffic conditions.

Table 4.4-1

Cost of Storage Alternatives for Ridley Creek

Alternative	Volume (MG)	Cost
Off-Line Storage	6.6	$21,100,000
Deep Tunnels	6.6	$27,200,000

Table 4.5-1

Cost of Remote Treatment Control Alternatives

Alternative	Flow Rate (MGD)	Cost
Swirl Concentrators	135.5	$4,300,000
Screens	135.5	$5,500,000
Sedimentation	135.5	$8,100,000
Disinfection	135.5	$1,500,000

SECTION 5

EVALUATION OF ALTERNATIVES

5.1 EVALUATION OF ALTERNATIVES

Several factors must be considered in selecting the LTCP for DELCORA's CSO system in the City of Chester. These include:

- As discussed in Section 3.3, no environmentally sensitive areas were identified in the areas around the CSO outfalls.
- Water quality impacts from CSOs discharging to the Delaware River are negligible as indicated in Table 3.2-3.
- Based on the information presented in the Tables 3.2-1, 3.2-2, and 3.2-3, the potential for water quality improvement from CSO control is greatest along Ridley Creek given that the CSO discharge is a larger percentage of the flow and load. Lesser potential exists along Chester Creek.
- Based on the information presented in the Tables 3.2-1, 3.2-2, and 3.2-3, loadings from the sanitary sewage component of CSO discharges are minimal in comparison to stormwater loadings.
- In-system storage capacity is minimal, and isolated to certain portions of the sewer system.
- The potential to deliver more CSO to the WRTP is limited by sewer system capacity as depicted in Figure 2.5-1.
- The combination of the rapidly rising flow rates from the urban areas and the lack of additional interceptor capacity cause many of the regulators to close quickly in the modeled storms and slowly re-open as flows drop following a storm because of the limited interceptor capacity.
- Based on the information presented in the Tables 3.2-1, 3.2-2, and 3.2-3, the CSOs do not create any water use impairments that do not already exist based on background concentrations exceeding the specific water quality standard.
- No "wet weather" water quality standards are in place for receiving streams, but DRBC is currently conducting "wet weather" studies and such standards may be implemented in the future.
- "Affordability" of CSO improvements is low, based upon current and projected future conditions (see Section 5.2).

Section 4 has identified three potential source control alternatives, seven potential collection system control alternatives, two storage control alternatives, and four remote treatment control alternatives. These alternatives are evaluated in this section.

5.1.1 Summary of Alternative Benefits

5.1.1.1 Source Control Alternatives

Street sweeping can be a benefit to surface water quality. In particular, sweeping can help control litter and other floatable material. The effectiveness of sweeping on improving runoff quality is of considerable debate. Various studies have indicated little or no benefit to improved water quality and some studies have suggested that improper sweeping can increase runoff loads. The Portland study found that it was better to sweep thoroughly infrequently than to sweep poorly frequently.

Inlet cleaning can help remove large particles from the system. In systems such as the one in the City of Chester where interceptors have flat slopes, the removal of the larger particles may help reduce deposition in the interceptors that are flushed out in larger storms. Reducing deposition of large particles in the interceptors can help in reducing the deposition of finer particles, which bond more pollutants, by eliminating pooling areas and blockages.

Inlet grate replacement benefits the removal of litter and other floatables that can discharge during storms and cause operational problems at the regulators. Litter and other large floatables cause blockages in collector sewers and trap pollutants that would otherwise flow to the interceptors. An inlet replacement program has an added benefit of improving handicap access through the curb improvements.

5.1.1.2 Collection System Control Alternatives

Sewer cleaning has several benefits including increased efficiency of the collector and interceptors and the removal of obstructions and blockages that trap pollutants for discharge during storm events. At this time, DELCORA sewers are cleaned once per year on average, and sewer

maintenance personnel have not reported significant build-ups that would suggest that the overall sewer cleaning frequency should be increased.

Regulator replacement has several benefits. New regulators will ensure that the maximum amount of flow is sent to the WRTP. Additionally, the proposed monitoring system will notify operators if a problem develops at a regulator that could cause a dry weather discharge, early regulator closure, or extended overflow following storm events. The current design of the regulators allows for a changeable orifice plate so additional flows can be added to the interceptors as more capacity becomes available.

Sewer separation benefits are obvious in that sanitary flows are removed from the stormwater runoff flows.

An outfall interceptor along Ridley Creek has the primary benefit of redirecting the CSO discharge from Ridley Creek, which has a limited assimilative capacity, to the Delaware River that has a large assimilative capacity.

Maximizing capacity of the existing system ensures that the maximum volume of combined stormwater/sanitary sewage as well as the first flush of pollutant laden stormwater runoff is directed to the WRTP for treatment.

Floatables containment at the outfall improves the esthetics of the receiving waters. Floatables control at the source helps to eliminate blockages, accelerated pollutant accumulation in the collectors and interceptors, and reduces regulator malfunction due to debris buildup.

5.1.1.3 Storage Control Alternatives

Off-Line storage has a benefit in that CSO discharges are sharply curtailed since the CSO volume is detained until capacity is available in the interceptors to send the stored volume to the WRTP for treatment.

Deep tunnel storage has a similar benefit.

5.1.1.4 Remote Treatment Control Alternatives

Swirl concentrators are designed to remove settleable solids and floatables from the CSO prior to discharge to the receiving water. Swirl concentrators operate without moving parts, thus maintenance costs are minimized.

Screening of the CSO discharge is an effective means to remove floatables and large solids. A typical screen device will require a mechanical means to clean the screen as well as disposal of the screenings.

Sedimentation basins, as with swirl concentrators, operate without moving parts, thus maintenance costs are minimized.

Disinfection will remove the pathogens from CSO discharge prior to release into the receiving stream. Disinfection would be included with each remote treatment alternative.

Secondary bypassing is designed to effectively screen the discharge for floatables, remove some of the coarse grit material, and treat for pathogens as it bypasses the secondary treatment processes.

5.1.1.5 Summary

It is difficult to precisely quantify specific health, water quality, and environmental benefits from each alternative, particularly in cases where current impacts of CSOs appear minimal. This being the case, we have prepared Table 5.1-1, which depicts but does not quantify the types of benefits anticipated for each alternative. The range of benefits must be carefully considered along with the related costs in developing an LTCP. Costs are presented in Subsection 5.1.2 and the cost/benefit relationships are discussed in Subsection 5.1.3.

5.1.2 Summary of Alternatives Costs

Conceptual cost estimates have been developed for the alternatives discussed in Subsection 5.1.1. Project cost totals include construction cost estimates in 1997 dollars (including contingency) plus a 20% allowance to reflect associated engineering, legal, and financial costs. Bond financing has been assumed and Annual Debt Service Costs have been calculated pursuant to *Combined Sewer Overflows – Guidance for Financial Capability Assessment and Schedule Development* (EPA, 1997). Annual O&M costs related to each alternative have also been estimated. These costs are summarized in Table 5.1-2.

The cost estimates included the activities and assumptions described in Subsection 4.2 through 4.6 of this report.

5.1.3 Selection of Alternatives

Both environmental and financial issues must be considered in selecting the LTCP. No major environmental issues related to DELCORA's CSOs have been identified, overflows do not impact sensitive areas, and the CSO discharges do not appear to be the critical difference between attainment and non-attainment of water quality standards. It is also clear that the impacts of DELCORA's CSO discharges to the Delaware River are negligible. DELCORA's CSO discharges have the most impact upon Ridley Creek and a lesser impact upon Chester Creek.

Financial capability issues related to existing sewer service and the proposed DELCORA CSO program area presented in Subsection 5.2. In selecting alternatives, existing economic conditions must be considered and the ability of the customer base to bear additional program costs is very limited. DELCORA's service agreements require recovery of all Chester sewer system costs from the City of Chester customers, and this customer base is already in the "high burden" financial category without considering additional CSO program costs. This is discussed further in Subsection 5.2. In addition, DELCORA's industrial user base is declining and service area flows have dropped approximately 25% over the past 15 years. This shifts more fixed costs to the

municipal (including City of Chester) users and elevates the importance of the diversion of additional flows from the Center Delaware County Service Area.

Considering these factors and the potential for future "wet weather" water quality standards when DRBC's studies are completed, a phased, non-capital intensive approach to CSO control for DELCORA's system has been developed. Capital-intensive alternatives eliminated from further consideration at this time include:

Alternative	Capital Cost
Conveyance system expansion and secondary treatment bypassing at WRTP	2,400,000
Off-line storage	21,100,000
Deep tunnel storage	27,200,000
Swirl concentration	4,300,000
Screens	5,500,000
Sedimentation	8,100,000
Disinfection	1,500,000
Ridley Creek outfall interceptor	1,247,800

A screening was conducted based upon the benefits associated with each remaining alternative (see Table 5.1-1) and the associated annual costs (see Table 5.1-2). The ranking presented in Table 5.1-3 reflects those with broadest benefit, their associated annual costs, and the cumulative annual costs.

After considering cost and benefit issues, and the fact that results of initial steps should be evaluated before proceeding with subsequent actions, the program shown in Table 5.1-4 was selected.

In addition, several other potential actions will be evaluated as part of the long-term program. These are described in Subsection 6.1.

5.2 FINANCIAL CAPABILITY

The CSO Policy recognizes the need to address the relative importance of environmental and financial issues when developing an implementation schedule for CSO controls. To assist in reviewing this, a series of guidance manuals have been developed. We have applied the elements of one of these manuals, (EPA, 1997), in determining financial capability for DELCORA and its customers.

DELCORA's CSOs are all within the City of Chester and under their service agreements they cannot distribute City of Chester sewer system costs to other users. The City of Chester is somewhat distressed economically, as evidenced by the high unemployment rate and low, median household income. DELCORA's City of Chester customers are generally stressed to support existing service charges and other municipal levies, let alone additional charges related to CSO abatement. The unemployment rate is almost twice the national average, the median household income is 31% less than the national average, and approximately 30% of the households are below the poverty level. The Residential Indicator (sewer charges/MHI) is at 1% without considering CSO additions. This is based on the EPA-prescribed escalation formula and we believe it unlikely that income in City of Chester has risen at the same rate as the regional CPI. If current sewer charges are considered as a percent of the last surveyed MHI, the Residential Indicator increases to 1.2% without any CSO abatement additions.

EPA's guidance document includes other indicators regarding the permittee's capability to bond additional debt. We have not completed all of these analyses since DELCORA's bonding strength is based upon its entire service area, includes County guarantees, and reflects bond insurance. The driving issues in determining affordability and financial capability related to improvements to the City of Chester CSO system focused upon the following factors:

- Residential indicator.
- Unemployment rate.
- Median household income.

These are calculated on worksheets numbered 1, 2, 5, 6, 9, and 10 (Tables 5.2-1 through 5.2-7) and the results are discussed in the following subsections.

5.2.1 Residential Indicator

Worksheets 1 and 2 were used to calculate a Residential Indicator of 1.05% with the recommended CSO abatement program. Based upon EPA's guidance this falls into the category of "mid-range" financial impact. If the assumption that MHI in the City of Chester has not escalated at the regional rate is accurate, then the Residential Indicator would rise to 1.29%. Table 5.2-2 provides the basis for determining the current cost burden upon the City of Chester.

5.2.2 Unemployment Rate

Worksheet 5 shows the current (5/97) unemployment rate to be 9.2%. This is nearly twice the national rate of 4.7% for the same time period. An employment rate of more than one point above the national average is viewed as a "weak" indicator; the variance in the City of Chester is well beyond the criteria.

5.2.3 Median Household Income

Worksheets 2 and 6 calculate the median household income for the City of Chester. The adjusted value of $25,725 (which may be skewed upwards, as previously discussed) is 31% below the adjusted national average of $37,059. An MHI more than 25% below the national MHI, is viewed at a "weak" indicator; again, the variance in the City of Chester is well beyond that criteria.

5.2.4 Summary of Financial Capacity Indicators

Worksheet 9 only partially applies to DELCORA's situation since DELCORA is a municipal authority utilizing revenue bonds, and the tax and market property value criteria do not apply. Also, DELCORA's bond ratings are based upon additional factors extending beyond its service to the

City of Chester customers (as discussed in Subsection 5.2). Therefore, only the Unemployment Rate and Median Household Income criteria apply. Both of these are "weak".

5.2.5 Financial Capability Matrix Score

Worksheet 10 has been completed, and the Financial Capability has been determined to be in the "high burden" category.

This poor financial picture is a major factor in selecting the alternatives to be implemented and in developing the implementation schedule.

Table 5.1-1

Summary of Benefits for Various Alternatives

Alternative	Volume Reduction	Pollutant Reduction	Floatables Reduction	Diversion to Lower Impact Areas	Elimination Dry Weather Overflows
Increased Street Sweeping		√	√		
Increased Inlet Cleaning		√	√		
Inlet Replacement			√		
Increased Sewer Cleaning		√	√		
Regulator Replacement and Monitoring	√	√	√		√
Sewer Separation [1]	√	√			√
Regulator Consolidation	√	√	√		√
Ridley Creek CSO Interceptor				√	
Secondary Bypass and Maximizing Existing System Capacity	√	√	√		
Floatables Containment (any alternative)			√		
Remote Treatment Options (any alternative)		√	√		
Off-line or Tunnel Storage	√	√	√		

[1] No new projects planned other than SR0291 and the prison complex.

Table 5.1-2

Summary of Costs for Various Alternatives

Alternative	Project Cost[1]	Annual Debt Service Costs[2]	Annual O&M Cost
Source Control			
Street sweeping	$ 300,000	$ 26,160	$ 60,000
Inlet Cleaning	$ 216,000	$ 18,835	$ 145,000
Inlet Replacement (25-Year Program)	$ 75,000	$ 75,000	N/A
Public Education/Information Program	$ 10,000	$ 10,000	N/A
Collection System Control			
Sewer Cleaning	$ 216,000	$ 18,835	$ 10,000
Regulator Replacement (25-Year Program)	$ 1,875,000	$ 75,000	N/A
Sewer Separation[4]	N/A	N/A	N/A
Consolidation/Elimination of Regulators[5]	N/A	N/A	N/A
Outfall Interceptor Along Ridley Creek	$ 1,497,360	$ 130,570	$ 7,487 [3]
Secondary Bypass at WRTP and Maximizing Capacity of the Existing System[6]	$ 2,875,080	$ 250,707	$ 14,375 [3]
Floatables Containment			
Floating Booms (3 assumed)	$ 644,627	$ 56,211	$ 10,800
End of Pipe Netting (4 assumed)	$ 672,804	$ 58,669	$ 11,100
In-Line Netting (5 assumed)	$ 770,929	$ 67,225	$ 11,300
Storage Control Alternatives			
Off-Line Storage[7]	$ 25,320,000	$ 2,207,904	$ 126,600 [3]
Deep Tunnels[7]	$ 32,640,000	$ 2,846,208	$ 163,200 [3]
Treatment Control Alternatives			
Swirl Concentrators[7]	$ 5,160,000	$ 449,952	$ 25,800 [3]
Screens[7]	$ 6,600,000	$ 575,520	$ 33,000 [3]
Sedimentation[7]	$ 9,720,000	$ 847,584	$ 220,000
Disinfection[7]	$ 1,800,000	$ 156,960	$ 185,000

[1] Reflects estimated construction costs, contingency and a 20% allowance for engineering, legal and finance costs.
[2] Based upon 20 yr., 6% bonds, and annualization factor in EPA CSO Financial Capability and Schedule Development Guidance.
[3] Based upon 0.5% of construction costs.
[4] No new projects are planned other than SR 0291 and the prison complex.
[5] No projects planned until after solution of hydraulic capacity limitations.
[6] Does not include costs of additional sewer system expansion to relieve bottlenecks.
[7] Based upon EPA (1993) escalated to 1997 costs.

Table 5.1-3

Summary of Remaining Alternatives and Associated Annual Costs

Alternative	Annual Cost	Cumulative Annual Cost
Regulator Replacement and Monitoring	$ 75,000	$ 75,000
Inlet Replacement	$ 75,000	$ 150,000
Public Education/Information Program	$ 10,000	$ 160,000
WQ Monitoring Program	$ 10,000	$ 170,000
Sewer Separation [1]	$ -	$ 170,000
Increased Sewer Cleaning	$ 28,835	$ 198,835
Increased Inlet Cleaning	$ 163,835	$ 362,670
Increased Street Sweeping	$ 86,160	$ 448,830
Floatables Containment	$ 215,305	$ 664,135

60000

[1] No new projects planned other than SR0291 and the prison complex.

Table 5.1-4

Selected Program Annual Costs and Cumulative Costs

Action	Annual Cost	Cumulative Annual Cost
Regulator Replacement with Monitoring	$ 75,000	$ 75,000
Inlet Replacement	$ 75,000	$ 150,000
Public Education/Information Program	$ 10,000	$ 160,000
WQ Monitoring Program	$ 10,000	$ 170,000
Sewer Separation [1]	$ -	$ 170,000
Increased Sewer Cleaning	$ 28,835	$ 198,835

[1] No new projects planned other than SR0291 and the prison complex.

Table 5.2-1

Cost per Household
(Worksheet 1)

		Line Number
Current WWT Costs	60000	
Annual Operations and Maintenance Expenses (Excluding Depreciation)	see Table 5.2-2	100
Annual Debt Service (Principal and Interest)	see Table 5.2-2	101
Subtotal (Line 100 + Line 101)	$ 4,323,475	102
Projected WWT and CSO Costs (Current Dollars)		
Estimated Annual Operations and Maintenance Expenses (Excluding Depreciation)	$ 10,000	103
Annual Debt Service (Principal and Interest)	$ 188,835	104
Subtotal (Line 103 + Line 104)	$ 198,835	105
Total Current and Projected WWT and CSO Costs (Line 102 + Line 105)	$ 4,522,310	106
Residential Share of Total WWT and CSO Costs	100%	107
Total number of Households in Service Area	14,537	108
Cost Per Household (Line 107 / Line 108)	$ 311.09	109

Table 5.2-2

Summary of 1997 Budget Expenses Allocated to City of Chester System Users

Expense Item	Western Share	Less Major Industry Share	Less Non-Chester Retail Share[1]	Net to Chester
Administration (Exhibit II-A)	$555,694	($353,200)	($60,749)	$141,745
Debt Service (Exhibit II-B)	$4,509,969	($2,653,196)	$60,000	$1,916,773
WRTP O&M (Exhibit I-C)	$7,019,563	($4,284,458)	($820,532)	$1,914,573
Chester P.S. (Section II)	$462,839	$0	($138,851)	$323,988
Sewer Maintenance (Section II)	$939,892	$0	($281,968)	$657,924
Chester Lift Stations (Section II)	$147,098	$0	($44,129)	$102,969
Customer Billing (Section II)	$275,244	$0	($82,573)	$192,671
Allowance for Uncollectables (Section II)	$110,000	$0	($33,000)	$77,000
Sub-Total				$5,327,643
Less: Costs Allocated to Wholesale Municipal Customers (Exhibit I-B)			Trainer	($139,580)
			Other	($864,588)
Net to City of Chester Customers				$4,323,475

[1] Based upon flow based shares for Parkside, Upland, Chester Twp., and permitted industries (526,630/1,751,230 = 0.30) per Exhibit 1-B of DELCORA Budget.

Table 5.2-3

Residential Indicator
(Worksheet 2)

Median Household Income (MHI)	60000		Line Number
Census Year MHI	$ 20,864	(1990)	201
MHI Adjustment Factor	1.233		202
Adjusted MHI (Line 201 x Line 202)	$ 25,725		203
Annual WWT and CSO Control Cost Per Household (CPH) (Line 109)	$ 311.09		204
Residential Indicator:			
Annual Wastewater and CSO Control Costs per Household as a percent of Adjusted Median Household Income (CPH as % MHI) (Line 204 / Line 203 x 100)	1.21%		205

CPI - 5/90 = 134.6
CPI - 5/97 = 166.0
Adjustment Factor = 166/134.6 = 1.233

Table 5.2-4

Unemployment Rate
(Worksheet 5)

		Line Number
		60000
Unemployment Rate - Permittee	9.20%	501
Source:	BLS (5/97)	
Unemployment Rate - County (use if permittee's rate is unavailable)	-	502
Source:	-	

Benchmark:

Average National Unemployment Rate:	4.70%	503
Source:	BLS (5/97)	

Table 5.2-5

Medial Household income
(Worksheet 6)

			Line Number
		60000	
Median Household Income - Permittee (Line 203)	$25,725		601
Source:	U.S. Census Bureau		
Benchmark			
Census Year National MHI	$30,056	(1990)	602
MHI Adjustment Factor (Line 202)	1.233		603
Adjusted National MHI: (Line 602 x Line 603)	$37,059		604
Source:	U.S. Census Bureau		

Table 2.5-6

Summary of Permittee Financial Capability Indicators
(Worksheet 9)

Indicator	Column A: Actual Value	Column B: 60000 Score	Line Number
Bond Rating (Line 303)	(1)	-	901
Overall Net Debt as a Percent of Full Market Property Value (Line 405)	NA	-	902
Unemployment Rate (Line 501)	9.20%	1	903
Median Household Income (Line 601)	$25,725	1	904
Property Tax Revenues as a Percent of Full Market Property Value (Line 703)	NA	NA	905
Property Tax Revenue Collection Rate (Line 803)	NA	NA	906
Permittee Indicators Score (Sum of Column B / Number of Entries)		1	907

(1) Not representative of City of Chester service area. Current ratings reflect countywide conditions, county guarantees, and bond insurance.

Table 5.2-7

Financial Capability Matrix Score
(Worksheet 10)

		Line Number
	60000	
Residential Indicator Score (Line 205)	1.21%	1001
Permittee Financial Capability Indicators Score (Line 907)	1	1002
Financial Capability Matrix Category (see matrix below)	High Burden	1003

FINANCIAL CAPABILITY MATRIX

Table 3

Permittee Financial Capability Indicators Score (Socioeconomic, Debt and Financial Indicators)	**Residential Indicator** (Cost Per Household as a % of MHI)		
	Low (Below 1.0%)	Mid-Range (Between 1.0% and 2.0%)	High (Above 2.0%)
Weak (Below 1.5)	Medium Burden	Hign Burden	Hign Burden
Mid-Range (Between 1.5 and 2.5)	Low Burden	Medium Burden	Hign Burden
Strong (Above 2.5)	Low Burden	Low Burden	Medium Burden

SECTION 6

ALTERNATIVES SELECTED FOR IMPLEMENTATION

6.1 PROGRAM AND IMPLEMENTATION SCHEDULE OF SELECTED ALTERNATIVES

Subsection 5.1.3 of this report identified the initial list of programs that would be undertaken as part of the CSO LTCP. These programs, plus additional actions to be taken by DELCORA, are further described in this section, as is the overall implementation schedule. The overall program of system improvements and management actions comprising the LTCP is:

- Regulator and tide gate monitoring
- Regulator replacement
- Sewer separation
- Inlet replacement
- Modified sewer cleaning program
- Ongoing monitoring of program impacts and modifications to water quality standards
- Public information/education program

Specific actions to be undertaken for each of these activities, along with implementation schedules are described in the following subsections.

6.1.1 Regulator and Tide Gate Monitoring

A remote monitoring system will be designed in 1999 and a pilot system installed in 2000. It is anticipated that the monitoring system will sense regulator and tide gate status and transmit this information to WRTP. Status alarms will identify closed regulators or open tide gates. Anticipated benefits of this system are described in Subsection 5.1.1.2.

The initial system, currently in the planning stages, will be installed in selected chambers that currently have Brown & Brown regulators (15, 17, 18, 7, and 19), and monitoring will subsequently be installed in other regulators as they are converted from McNulty regulators to Brown & Brown regulators over a 20-year period (see Subsection 6.1.2).

6.1.2 Regulator Replacement

A program to replace all McNulty regulators with Brown & Brown regulators, and to subsequently evaluate the condition and recondition/replace the existing Brown & Brown regulators will begin in 1999, and be completed over a 25-year period. All McNulty regulators will be replaced over the first 20 years of the program. The schedule for replacement/rehabilitation is based upon modeled CSO Impacts (as described in Subsection 4.3.2.1) and is as follows:

Year	Regulator	Year	Regulator
1999	Regulator #16 on Ridley Creek	2012	Regulator #9 on the Delaware River
2000	Regulator #26 on Chester Creek	2013	Regulator #13 on the Delaware River
2001	Regulator #22 on Chester Creek	2014	Regulator #10 on the Delaware River
2002	Regulator #20 on Chester Creek	2015	Regulator #11 on the Delaware River
2003	Regulator #25 on Chester Creek	2016	Regulator #14 on the Delaware River
2004	Regulator #21 on Chester Creek	2017	Regulator #4 on the Delaware River
2005	Regulator #24 on Chester Creek	2018	Regulator #6 on the Delaware River
2006	Regulator #23 on Chester Creek	2019	Regulator #18 on Ridley Creek
2007	Regulator #12 on Chester Creek	2020	Regulator #17 on Ridley Creek
2008	Regulator #8 on the Delaware River	2021	Regulator #15 on Ridley Creek
2009	Regulator #5 on the Delaware River	2022	Regulator #7 on the Delaware River
2010	Regulator #3 on the Delaware River	2023	Regulator #19 on Ridley Creek
2011	Regulator #2 on the Delaware River		

The sequencing of regulators will be subject to adjustment based upon additional information collected over the duration of the program.

6.1.3 Regulator Consolidation and Sewer Separation

The regulator consolidation and sewer separation planning efforts described in Subsection 4.3.3 and 4.3.4 will be implemented over a ten-year period in parallel with sewer-related activities at the Delaware County Prison in Chester and the Route 0291 reconstruction project. At this time, the elimination of any regulators is not being contemplated primarily due to severe hydraulic constraints in the system. There is the potential for the future diversion of flows from a regulator to

an interceptor, (i.e., Subarea 6A being directed to the West End Interceptor) but at the current time the same hydraulic constraints that prevent regulator elimination also prohibit diversions. The potential to implement regulator consolidation and diversions will be reviewed as part of the ongoing monitoring program and re-examined after the completion of the Route 0291 reconstruction project.

6.1.4 Inlet Replacement

The City of Chester has on-going program to replace the open curb-face inlets with grated inlets as discussed in Section 4.2.3. After discussions with PADEP and USEPA, DELCORA plans to augment this program by reimbursing the City for inlets it replaces beyond those currently funded up to an amount not to exceed $75,000 per year for a period of twelve years. This corresponds to the period of time in which DELCORA had originally planned to replace all McNulty regulators. It is intended that the inlets replaced with these funds be located in areas with severe debris problems or in areas tributary to Chester and Ridley Creeks.

6.1.5 Modified Sewer-Cleaning Program

DELCORA currently cleans combined and separate sanitary sewers on an average frequency of once per year. This does not mean that each stretch of sewer is cleaned once per year since some segments require more frequent cleaning and some segments require less frequent cleaning.

Beginning in 1999, DELCORA will modify its sewer-cleaning program to give highest priority to cleaning of sewer segments that have the most potential impact upon CSO. The program will be developed by mid 2000, and supplemented in 2001. It will be monitored and adjusted periodically over the planning period as additional information on debris accumulation and water quality impacts are collected.

6.1.6 Ongoing Monitoring of Program Impacts

This program is described in Subsection 6.3.

6.1.7 Public Information/Education Program

DELCORA will initiate public information and public participation programs related to CSOs in 1999. By the end of 1999, DELCORA anticipates the development a newsletter describing CSO issues, the LTCP, and the projected benefits of the program. This newsletter will encourage public input, and will include forms and contact information to encourage such input. Subsequent newsletters describing programs and related program issues will be prepared annually and distributed with customer billings. Public input will be considered in annual program reviews conducted by DELCORA. Any resultant program modification plans will be reviewed with PADEP and other regulatory agencies.

6.2 IMPACT OF THE IMPLEMENTATION OF THE SELECTED ALTERNATIVES

A reanalysis of the typical year precipitation events was performed using a revised SWMM model. The revisions included in the analysis incorporated the diversion of Subarea 6A to the West End Interceptor, the diversion of Subareas 4A and 4B to the West End Interceptor, removal of runoff from the area where separation of the stormwater and sanitary sewage flows are planned, and the combination of flows from the area draining to Regulator 23 with the flow through Regulator 12. The revised model also included clarified information on the interceptors leading into EPS-1 at the WRTP.

Benefits from regulator replacement and monitoring, and from expanded sewer cleaning are not reflected in the model analysis and will yield benefits beyond that described in Subsection 6.2.1. These benefits include:

- Rapid detection and response to malfunctions that could cause dry weather overflow.
- Rapid detection and response to conditions that result in early closure or late opening of regulators during storms.
- Increase "first flush" capture.
- Reduce total volumes and loadings to receiving streams.
- Reduced floatable discharges.

It is important to note however, that the improvements included in the future year modeling will need to be preceded by interceptor improvements to remove bottlenecks and other improvements to ease hydraulic constraints.

6.2.1 Combined Sewer Overflow Hydraulic Characterization for Future Typical Year

The re-analysis of the 87 events in a typical year clearly show constraints/bottlenecks in the interceptor system, however, the implementation of the selected alternatives does show improvement over the baseline analysis. Overall, the modeled improvements reduce overflow volume by 18.6%, TSS loadings by 18.5%, and BOD_5 loading by 12.8%. Reductions in parameters that exceed Water Quality Standards were 90.5 % reduction in fecal coliform 19.1% reduction in copper, 19.0% reduction in aluminum, 19.5% in lead and 18.3% reduction in mercury. Table 6.2-1 shows the junctions and the corresponding interceptors that are subject to frequent surcharging and Figure 6.2-1 shows the interceptor reaches that frequently surcharge. The frequency and widespread nature of the surcharging clearly demonstrates that little or no additional capacity is available in most of the system to store combined flows. The potential storage and additional capacity in the West End Interceptor was evaluated and in fact overfilled the interceptor. Table 6.2-2 shows a monthly and annual summary by outfall of the overflows experienced in a typical year. Table 6.2-3 summarizes the annual overflow by receiving water.

Table 6.2-4 summarizes the monthly and annual of the flows from the interceptor system to CPS and to EPS-1 at the WRTP for the future typical year.

6.2.2 Combined Sewer Overflow Quality Characterization for Future Typical Year

Using the same methodology as outlined in Subsection 2.5.3, the total load of a specified pollutant to the receiving water was estimated. Using the selected concentrations for wastewater and stormwater from Table 2.5-6 and the CSO discharge volumes from Table 6.2-2, the annual load was computed by outfall and by receiving water for the specified pollutants as presented in Tables 6.2-5 through 6.2-22.

6.3 POST-IMPLEMENTATION MONITORING PROGRAM

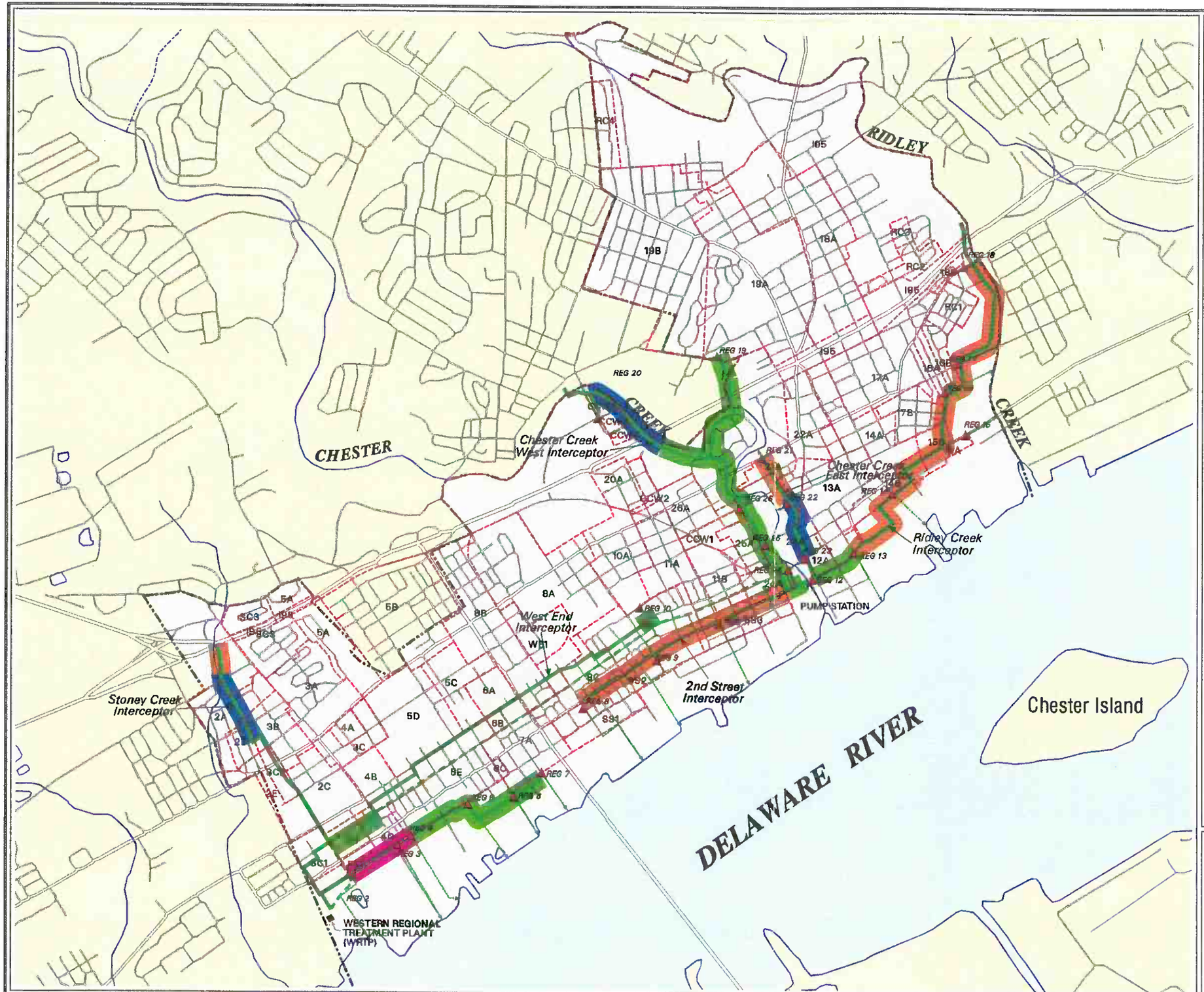
An ongoing monitoring program will be implemented in 1999. This monitoring program will address:

- Further quantification of CSO frequency and volume.
- Further quantification of CSO quality and loadings.
- Sampling of the system will occur annually during wet weather months. Samples will be collected once a year at EPS-1 and the CPS.
- Ability to divert additional flow to the West End Interceptor and WRTP.
- Further sewer separation or regulator consolidation related to highway reconstruction projects.
- DRBC's review of CSO impacts and potential development of "wet-weather" water quality standards.
- Periodic review of other CSO abatement options (including those identified and not selected in this plan) if additional CSO abatement is warranted.
- Further development of CSO abatement technology and "lessons learned" in other CSO programs.

A detailed monitoring program will be completed in 1999 following review of this LTCP by PADEP, EPA, and DRBC.

6.4 IMPLEMENTATION SCHEDULE

Action	Date
Identify and prioritize areas for inlet replacement.	PID + 2 mo.
Complete an agreement with the City regarding reimbursement for inlet replacement.	PID + 3 mo.
Coordinate candidate inlets with the City.	PID + 3 mo. annually thereafter
Develop the on-going monitoring program including selection of monitoring locations.	PID + 5 mo.
Preparation of plans and specifications for regulator replacement/rehabilitation.	PID + 6 mo. annually thereafter
Commence implementation of the on-going monitoring program.	PID + 6 mo. annually thereafter
Complete design and specification for regulator monitoring system.	PID + 9 mo.
Complete regulator replacement/rehabilitation.	PID + 12 mo. annually thereafter
Track and review sanitary sewer cleaning records. Identify areas needing more or less cleaning.	PID + 12 mo. annually thereafter
Develop and commence implementation of the public information/education program.	PID + 12 mo.
Complete installation of pilot for regulator monitoring system.	PID + 15 mo.
Complete evaluation of regulator monitoring system and adjust design as necessary.	PID + 21 mo.
Re-examine potential for regulator consolidation and subarea diversion.	Completion of Rt. 0291 project + 12 mo.



LEGEND

- City of Chester
- Drainage Area Boundary
- Interceptor
- Combined Sewer Outfall
- Force Main
- Regulator

Percent of Time Surcharging

- 75-100
- 50-75
- 25-50
- 1-25

N

Scale in Feet

1000 0 1000 2000 3000 4000

Delaware County Regional Water
Quality Control Authority (DELCORA)

Long Term CSO Control Plan
City of Chester Combined Sewer System

FIGURE 6.2-1
INTERCEPTORS EXPERIENCING FREQUENT SURCHARGING DURING THE FUTURE TYPICAL YEAR

/data2/delcora/emle/surchpost.aml ..24 Jul 97 13:10:36 Thursday

Table 6.2-1

Interceptor Surcharging During Future Typical Year Storm Events

Storm Number (storms 1–29)

Junction Name	Interceptor Name	Conduit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
C15	Front St.	A																													
C10	Front St.;West End	B;10F							X																						
C12	Front St.	C	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
D16	Front St.	D	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
D17	Front St.	E			X	X	X		X		X	X	X	X		X	X	X	X	X	X	X		X	X	X	X	X	X	X	
A9	Front St.	F			X	X	X		X		X	X	X	X		X	X	X	X	X	X	X		X	X		X		X	X	
A16	Front St.	G1							X								X														
B18	Front St.	G2							X								X														
B19	Front St.	G2							X																						
O28	West End	10E																													
O12	West End;Stoney Cr.	10D;SC1							X																						
P13	West End	10C																													
N08	West End	10B																													
P12	West End	10B																													
10-P01	West End	10A																													
G17	Stoney Cr.	SC2																													
O05	Stoney Cr.	SC3			X				X		X		X			X	X	X	X		X		X	X		X	X	X		X	
K03	Stoney Cr.	SC3			X				X		X		X			X		X	X		X		X	X		X	X	X			
B17	2nd St.	P																													
B13	2nd St.	O;N			X				X															X				X			
N41	2nd St.	O							X																						
B11	Chester Cr.-W;2nd St.	M1;J			X				X																			X			
N18	Chester Cr.-W	M2							X																			X			
N15	Chester Cr.-W	L							X																			X			
J07	Chester Cr.-W	K2							X																			X			
F04	Chester Cr.-W	K3;K1A							X																			X			
O18	Chester Cr.-W	K3																													
B02	Chester Cr.-W	K1B							X																			X			
N05	Chester Cr.-W	K1C			X				X		X		X			X	X	X	X		X		X	X		X	X	X		X	
I18	Chester Cr.-W	K			X				X		X		X			X	X	X	X		X		X	X		X	X	X		X	
M02	Chester Cr.-W	K			X				X							X			X				X	X		X		X			
A07	2nd St.	I			X				X															X		X		X			
P56	2nd St.	H1			X				X															X		X		X			
P50	2nd St.	H2			X				X							X			X				X	X		X		X			
O38	2nd St.	H2			X				X															X		X		X			
B22	2nd St.																														
B27	2nd St.	Z																													
B18E	Chester Cr.-E;Ridley Cr.	Y;V																													
N31	Chester Cr.-E	X																													
K33	Chester Cr.-E	W			X						X		X			X	X	X	X	X	X	X	X	X		X	X	X	X	X	
G05	Chester Cr.-E	W			X																		X	X		X		X			
C14	Ridley Cr.	U			X											X			X				X	X		X					
P38	Ridley Cr.	T			X				X				X			X			X				X	X		X		X			
M10	Ridley Cr.	S1			X				X		X		X			X			X		X		X	X		X		X			
I32	Ridley Cr.	S2			X				X				X			X			X				X	X		X		X			
I25	Ridley Cr.	RT1			X				X				X			X			X				X	X		X		X			
I27	Ridley Cr.	16C;RT2			X											X							X	X		X		X			
J12	Ridley Cr.	Q1			X				X				X			X			X				X	X		X		X			
G02	Ridley Cr.	Q2			X				X				X			X			X				X	X		X		X			
C04	Ridley Cr.	Q3			X				X							X			X				X	X		X		X			
C02	Ridley Cr.	Q3			X				X							X			X				X	X		X		X			

Storm Number (storms 30–58)

Junction Name	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58
C15																													
C10																		X			X				X				
C12	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
D16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
D17	X	X	X	X	X	X	X	X	X		X	X	X		X		X	X	X	X	X	X	X	X	X				
A9	X	X	X		X	X	X	X			X	X	X		X		X	X	X	X	X	X		X	X				
A16																								X	X				
B18																		X						X	X				
B19																								X	X				
O28																													
O12																									X				
P13																									X				
N08																													
P12																													
10-P01																													
G17																													
O05					X		X		X	X				X	X	X	X	X	X		X		X	X	X		X	X	
K03					X		X		X	X				X	X	X	X	X			X		X	X	X		X	X	
B17																													
B13					X				X					X	X			X			X		X	X	X		X		
N41																		X							X				
B11									X					X	X			X			X		X		X		X		
N18									X					X	X			X			X		X		X		X		
N15															X			X			X		X		X				
J07																		X			X		X		X				
F04																		X					X	X	X				
O18																									X				
B02														X	X			X			X		X	X	X				
N05					X		X		X	X				X	X	X	X	X	X		X		X	X	X		X	X	
I18					X		X		X	X				X	X	X	X	X	X		X		X	X	X		X	X	
M02					X				X	X				X	X		X	X			X		X		X		X		
A07					X				X					X	X		X	X			X		X	X	X		X		
P56					X				X					X	X		X	X			X		X	X	X		X		
P50					X				X	X				X	X		X	X			X		X	X	X		X	X	
O38					X				X					X	X		X	X			X		X	X	X		X		
B22																													
B27																													
B18E																													
N31																													
K33			X	X	X	X	X		X	X		X		X	X	X	X	X	X	X	X	X	X	X	X		X	X	
G05					X				X	X				X	X		X	X			X		X				X	X	
C14					X					X							X				X								
P38					X		X		X	X				X	X		X	X			X		X	X	X		X	X	
M10					X		X		X	X				X	X		X	X			X		X	X	X		X	X	
I32					X				X	X				X	X		X	X			X		X	X	X		X	X	
I25					X		X		X	X				X	X		X	X			X		X	X	X		X	X	
I27					X					X							X	X			X		X				X		
J12					X				X	X				X	X		X	X			X		X		X		X	X	
G02					X				X	X				X	X		X	X			X		X		X		X	X	
C04					X				X	X				X	X		X	X			X		X		X		X		
C02					X				X	X				X	X		X	X			X		X		X		X		

Storm Number (storms 59–87) and Frequency

Junction Name	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	Frequency #	Frequency %
C15																														0	0%
C10			X	X											X						X									8	9%
C12	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	84	97%
D16	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X	X	X		X	81	93%
D17		X	X	X		X	X	X	X	X	X	X	X		X		X	X	X	X	X	X		X	X	X	X		X	67	77%
A9		X	X	X		X	X	X	X	X	X	X	X		X		X	X	X	X	X			X	X	X	X		X	61	70%
A16																														4	5%
B18																									X					6	7%
B19																														3	3%
O28																														0	0%
O12																														2	2%
P13																														1	1%
N08																														0	0%
P12																														0	0%
10-P01																														0	0%
G17																														0	0%
O05	X		X	X	X		X			X	X	X			X		X			X	X	X		X			X			46	53%
K03	X		X	X	X					X	X	X			X		X			X	X	X		X			X			42	48%
B17																														0	0%
B13	X		X	X	X										X		X			X	X			X						23	26%
N41			X												X															5	6%
B11	X		X	X	X										X		X			X	X			X						20	23%
N18	X		X	X	X										X		X			X	X									18	21%
N15			X		X										X															10	11%
J07			X												X															8	9%
F04			X												X															8	9%
O18																														1	1%
B02	X		X		X										X						X									14	16%
N05	X		X	X	X		X			X	X	X			X		X			X	X	X		X			X			46	53%
I18	X		X	X	X		X			X	X	X			X		X			X	X	X		X			X			46	53%
M02	X		X	X	X					X	X	X			X		X			X	X			X			X			32	37%
A07	X		X	X	X					X	X	X			X		X			X	X			X						28	32%
P56	X		X	X	X					X	X	X			X		X			X	X			X						28	32%
P50	X		X	X	X					X	X	X			X		X			X	X			X			X			34	39%
O38	X		X	X	X					X	X	X			X		X			X	X			X						28	32%
B22																														0	0%
B27																														0	0%
B18E																														0	0%
N31																														0	0%
K33	X		X	X	X	X	X			X	X	X			X		X		X	X	X	X		X	X		X			57	66%
G05	X		X	X	X					X	X	X			X		X			X	X			X						28	32%
C14				X	X					X	X	X			X		X			X				X			X			20	23%
P38	X		X	X	X					X	X	X			X		X			X	X			X			X			36	41%
M10	X		X	X	X					X	X	X			X		X			X	X			X			X			38	44%
I32	X		X	X	X					X	X	X			X		X			X	X			X			X			35	40%
I25	X		X	X	X					X	X	X			X		X			X	X			X			X			36	41%
I27	X			X	X					X	X	X			X		X			X	X			X			X			25	29%
J12	X		X	X	X					X	X	X			X		X			X	X			X			X			34	39%
G02	X		X	X	X					X	X	X			X		X			X	X			X			X			34	39%
C04	X		X	X	X					X	X	X			X		X			X	X			X			X			32	37%
C02	X		X	X	X					X	X	X			X		X			X	X			X			X			32	37%

Table 6.2-2

Monthly and Annual Summary of Overflows by Outfall for Future Typical Year

Outfall	January		February		March		April		May		June		July		August		September		October		November		December		Annual	
	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)
002	2,759.9	577,605	2,832.7	487,779	4,524.9	693,787	3,261.8	629,954	4,504.0	600,393	3,539.6	616,165	3,238.6	724,850	4,012.9	886,017	3,593.3	647,423	2,320.0	459,780	2,727.1	562,912	3,556.4	682,487	40,871.3	7,569,152
003	818.5	674,330	1,516.7	488,017	2,429.0	710,369	2,033.6	686,669	1,947.4	596,074	1,200.8	749,104	1,025.7	853,332	1,921.0	1,071,745	1,696.1	718,952	1,072.8	599,307	1,561.1	697,253	2,036.9	722,535	19,259.7	8,567,686
004	684.9	62,811	236.5	841	292.5	2,080	395.7	17,363	409.2	12,151	531.2	55,955	625.1	84,272	1,332.1	80,917	322.2	4,330	656.1	33,839	600.6	61,020	503.6	18,146	6,589.8	433,723
005	4,742.8	1,186,809	5,388.1	947,907	10,285.5	1,402,056	7,388.4	1,204,900	11,689.9	1,214,902	9,049.7	1,230,224	7,268.2	1,478,826	7,033.1	1,618,231	6,795.7	1,259,222	5,697.2	999,460	5,574.5	1,191,216	6,178.9	1,296,414	87,091.8	15,030,166
006	624.3	29,802	104.2	771	153.9	4,341	239.9	9,201	242.9	8,093	464.1	24,401	554.7	37,153	816.5	35,678	550.2	15,912	605.4	20,106	496.4	26,028	328.2	8,017	5,180.6	219,502
007	936.7	231,677	1,899.9	176,460	3,044.7	238,128	2,343.3	227,169	2,433.9	199,372	1,552.8	232,653	1,328.2	303,290	2,063.7	330,912	1,938.7	231,538	1,276.3	187,405	1,842.4	228,740	2,381.4	248,099	23,041.9	2,835,443
008	3,220.0	1,332,724	5,428.0	1,163,973	10,305.7	1,662,992	7,434.4	1,507,348	11,766.1	1,448,972	9,063.1	1,603,441	6,501.7	1,777,141	6,296.7	2,152,033	6,835.8	1,530,397	5,110.0	1,262,762	5,599.5	1,550,391	5,450.1	1,606,435	83,010.9	18,598,609
009	850.9	574,050	1,670.8	276,907	2,674.1	400,019	2,200.7	410,187	1,849.0	393,233	1,379.1	546,215	1,144.7	735,438	2,075.5	799,696	1,791.7	500,606	1,143.7	456,795	1,671.8	531,261	2,092.0	451,031	20,543.9	6,075,438
011	683.4	417,780	926.4	194,545	1,485.9	252,609	1,303.3	265,966	1,088.4	267,961	793.4	373,480	771.3	526,159	1,598.8	550,384	1,416.6	341,442	905.9	322,100	1,103.4	377,294	1,558.1	335,022	13,634.9	4,224,742
012	373.1	56,800	375.1	5,527	403.7	8,328	252.8	18,324	457.7	17,482	341.2	44,982	453.1	81,768	556.7	56,178	625.9	13,276	415.5	26,746	423.0	37,853	631.1	12,202	5,309.0	379,467
013	912.8	452,738	1,956.6	354,919	3,045.1	477,080	2,408.2	453,732	2,506.4	394,463	1,563.8	469,819	1,310.2	582,596	2,111.7	667,277	1,890.4	456,534	1,270.3	367,769	1,850.2	436,872	2,364.0	477,173	23,189.8	5,590,973
014	400.3	197,360	184.9	12,516	303.3	22,558	346.9	51,363	375.4	52,908	518.4	178,779	613.5	294,547	1,202.5	244,640	354.4	38,504	465.5	100,857	517.9	195,776	295.4	28,324	5,578.2	1,418,132
015	751.2	19,953	883.0	2,477	1,178.7	3,767	1,020.8	5,507	827.1	5,408	743.7	13,111	700.5	26,249	1,454.7	17,838	1,135.3	5,754	680.5	9,184	583.8	12,596	1,190.1	4,870	11,149.3	126,715
016	871.3	384,730	1,613.9	157,520	2,009.0	205,499	1,999.2	248,959	1,515.6	204,646	1,145.7	334,405	1,148.8	500,970	1,832.9	481,017	1,776.6	269,504	963.3	272,342	1,095.0	314,028	1,830.7	265,736	17,802.0	3,639,355
017	3,807.7	344,419	5,735.8	293,674	9,661.9	437,680	6,768.7	397,227	8,699.5	351,863	8,268.1	389,218	5,773.0	437,688	6,420.2	539,111	6,148.4	405,286	4,058.3	310,262	5,392.1	377,049	5,084.0	411,557	75,817.8	4,695,033
018	3,933.0	1,023,859	5,806.5	801,735	9,678.6	1,159,423	6,818.1	1,051,060	11,194.3	1,031,739	8,327.7	1,105,658	5,828.9	1,335,352	6,439.3	1,472,677	6,145.5	1,056,832	4,290.8	846,993	5,411.2	1,031,676	5,201.9	1,093,689	79,075.8	13,010,692
019	974.5	1,415,710	2,191.0	1,332,910	3,254.4	1,780,211	2,587.9	1,494,554	2,752.9	1,348,589	1,730.9	1,410,261	1,579.5	1,018,796	2,440.6	1,884,912	2,164.5	1,689,854	1,151.5	1,025,141	2,000.7	1,025,862	2,488.3	1,841,365	25,316.8	17,268,166
020	734.2	100,106	898.9	29,377	1,194.1	39,476	1,024.5	49,487	869.6	48,015	739.6	86,180	652.9	137,531	1,177.1	112,066	1,121.3	55,072	683.8	60,934	574.1	78,880	1,203.8	49,735	10,873.9	846,860
021	703.9	74,080	763.4	31,633	1,023.2	41,723	897.6	47,397	582.9	42,139	615.5	70,032	585.9	98,101	1,136.5	96,638	1,031.8	54,838	662.7	53,730	540.3	65,740	1,111.7	52,747	9,655.5	728,798
022	784.1	214,838	1,169.7	82,067	1,578.2	110,548	1,172.1	125,153	912.7	115,876	817.3	191,669	764.5	288,653	1,271.6	253,130	1,152.1	139,934	742.1	140,406	639.9	176,072	1,386.1	129,485	12,390.4	1,967,830
023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
024	663.1	56,678	143.3	56	221.0	648	406.2	17,852	476.3	18,508	491.5	52,402	541.3	75,810	1,155.9	75,668	546.0	20,539	715.2	37,520	544.5	53,657	361.6	16,446	6,265.9	425,782
025	667.2	78,505	517.3	8,344	792.5	12,639	1,109.9	29,917	545.2	23,997	660.9	67,334	684.1	103,961	1,441.0	100,672	967.4	19,114	728.2	49,892	896.9	71,376	925.3	29,449	9,935.9	595,201
026	735.1	202,700	899.0	53,881	1,191.1	72,073	1,321.1	114,808	1,083.7	110,781	805.1	180,286	739.6	258,481	1,621.9	276,737	1,173.1	134,535	937.4	153,120	1,087.7	185,267	1,324.3	114,257	12,919.2	1,856,926
Total	**31,632.7**	**9,710,064**	**43,141.7**	**6,903,833**	**70,730.9**	**9,738,034**	**54,735.1**	**9,064,095**	**68,730.0**	**8,507,565**	**54,343.0**	**10,025,772**	**43,833.9**	**11,760,963**	**57,413.2**	**13,804,174**	**51,173.1**	**9,609,398**	**36,552.5**	**7,796,452**	**42,734.1**	**9,288,817**	**49,483.9**	**9,895,221**	**604,504.1**	**116,104,390**

Table 6.2-3

Monthly and Annual Summary of Overflows by Receiving Water for Future Typical Year

Receiving Water	January		February		March		April		May		June		July		August		September		October		November		December		Annual	
	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)	Length of Wet Flow (min)	Total Flow (cu ft)
Ridley Creek	9,363.2	1,772,961	14,039.2	1,255,407	22,528.2	1,806,369	16,606.9	1,702,752	22,236.5	1,593,656	18,485.3	1,842,392	13,451.2	2,300,259	16,147.1	2,510,642	15,205.8	1,737,376	9,992.9	1,438,781	12,482.1	1,735,349	13,306.7	1,775,851	183,844.8	21,471,795
Chester Creek	5,635.3	2,199,417	6,957.8	1,543,794	9,658.2	2,065,647	8,772.1	1,897,492	7,681.0	1,725,387	6,201.9	2,103,145	6,000.9	2,063,101	10,801.5	2,856,001	8,782.2	2,127,163	6,036.4	1,547,490	6,707.1	1,694,706	9,432.3	2,245,686	92,666.7	24,069,030
Delaware River	16,634.3	5,737,686	22,144.7	4,104,633	38,544.5	5,866,019	29,356.1	5,463,850	38,812.5	5,188,522	29,655.8	6,080,234	24,381.9	7,397,603	30,464.6	8,437,531	27,185.1	5,744,860	20,523.2	4,810,181	23,545.0	5,858,762	26,745.0	5,873,683	327,992.6	70,563,565
Total	**31,632.7**	**9,710,064**	**43,141.7**	**6,903,833**	**70,730.9**	**9,738,034**	**54,735.1**	**9,064,095**	**68,730.0**	**8,507,565**	**54,343.0**	**10,025,772**	**43,833.9**	**11,760,963**	**57,413.2**	**13,804,174**	**51,173.1**	**9,609,398**	**36,552.5**	**7,796,452**	**42,734.1**	**9,288,817**	**49,483.9**	**9,895,221**	**604,504.1**	**116,104,390**

Table 6.2-4

Monthly and Annual Summary of Wet Weather Flows to 2nd and Dock Pump Station and EPS-1 at WRTP for Future Typical Year

Outfall	January	February	March	April	May	June	July	August	September	October	November	December	Annual
	Total Flow (cu ft)	Total Flow (cu ft)	Total Flow (cu ft)	Total Flow (cu ft)	Total Flow (cu ft)	Total Flow (cu ft)	Total Flow (cu ft)	Total Flow (cu ft)	Total Flow (cu ft)	Total Flow (cu ft)	Total Flow (cu ft)	Total Flow (cu ft)	Total Flow (cu ft)
WRTP	2,989,610	2,910,510	3,618,400	3,253,830	4,051,030	3,105,350	3,020,150	3,054,960	2,759,310	2,643,130	2,338,280	3,088,820	36,833,380
2nd & Dock	7,588,240	7,738,790	9,926,500	8,656,610	11,349,870	8,306,590	7,608,620	7,689,750	7,378,500	6,989,550	6,012,590	8,075,790	97,321,400
Total	**10,577,850**	**10,649,300**	**13,544,900**	**11,910,440**	**15,400,900**	**11,411,940**	**10,628,770**	**10,744,710**	**10,137,810**	**9,632,680**	**8,350,870**	**11,164,610**	**134,154,780**

Table 6.2-5

Total Suspended Solids Annual Load for Future Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (mg/l)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (mg/l)	Discharge Load (lbs)
002	0.20	4.90E+05	6.5%	171.2	7.08E+06	93.5%	180.00	84,794
003	0.24	2.77E+05	3.2%	171.2	8.29E+06	96.8%	180.00	96,132
004	0.11	4.35E+04	10.0%	171.2	3.90E+05	90.0%	180.00	4,850
005	0.41	2.14E+06	14.3%	171.2	1.29E+07	85.7%	180.00	167,736
006	0.04	1.24E+04	5.7%	171.2	2.07E+05	94.3%	180.00	2,460
007	0.11	1.52E+05	5.4%	171.2	2.68E+06	94.6%	180.00	31,782
008	0.57	2.84E+06	15.3%	171.2	1.58E+07	84.7%	180.00	207,456
009	0.25	3.08E+05	5.1%	171.2	5.77E+06	94.9%	180.00	68,107
011	0.13	1.06E+05	2.5%	171.2	4.12E+06	97.5%	180.00	47,420
012	0.03	9.56E+03	2.5%	171.2	3.70E+05	97.5%	180.00	4,259
013	0.21	2.92E+05	5.2%	171.2	5.30E+06	94.8%	180.00	62,672
014	0.14	4.69E+04	3.3%	171.2	1.37E+06	96.7%	180.00	15,911
015	0.05	3.34E+04	26.4%	171.2	9.33E+04	73.6%	180.00	1,406
016	0.07	7.48E+04	2.1%	171.2	3.56E+06	97.9%	180.00	40,858
017	0.27	1.23E+06	26.2%	171.2	3.47E+06	73.8%	180.00	52,090
018	0.33	1.57E+06	12.0%	171.2	1.14E+07	88.0%	180.00	145,357
019	0.67	1.02E+06	5.9%	171.2	1.63E+07	94.1%	180.00	193,503
020	0.05	3.26E+04	3.9%	171.2	8.14E+05	96.1%	180.00	9,499
021	0.03	1.74E+04	2.4%	171.2	7.11E+05	97.6%	180.00	8,181
022	0.08	5.95E+04	3.0%	171.2	1.91E+06	97.0%	180.00	22,082
024	0.06	2.26E+04	5.3%	171.2	4.03E+05	94.7%	180.00	4,773
025	0.03	1.79E+04	3.0%	171.2	5.77E+05	97.0%	180.00	6,679
026	0.07	5.43E+04	2.9%	171.2	1.80E+06	97.1%	180.00	20,839
Ridley Creek	0.72	2.90E+06	13.5%	171.2	1.86E+07	86.5%	180.00	239,711
Chester Creek	0.95	1.18E+06	4.9%	171.2	2.29E+07	95.1%	180.00	269,845
Delaware River	2.41	6.71E+06	9.5%	171.2	6.39E+07	90.5%	180.00	789,321
Total	**4.08**	**1.08E+07**	**9.3%**	**171.2**	**1.05E+08**	**90.7%**	**180.00**	**1,298,877**

Table 6.2-6

Total Biochemical Oxygen Demand Annual Load for Future Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (mg/l)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (mg/l)	Discharge Load (lbs)
002	0.20	4.90E+05	6.5%	119.2	7.08E+06	93.5%	12	8,954
003	0.24	2.77E+05	3.2%	119.2	8.29E+06	96.8%	12	8,276
004	0.11	4.35E+04	10.0%	119.2	3.90E+05	90.0%	12	616
005	0.41	2.14E+06	14.3%	119.2	1.29E+07	85.7%	12	25,604
006	0.04	1.24E+04	5.7%	119.2	2.07E+05	94.3%	12	248
007	0.11	1.52E+05	5.4%	119.2	2.68E+06	94.6%	12	3,142
008	0.57	2.84E+06	15.3%	119.2	1.58E+07	84.7%	12	32,940
009	0.25	3.08E+05	5.1%	119.2	5.77E+06	94.9%	12	6,615
011	0.13	1.06E+05	2.5%	119.2	4.12E+06	97.5%	12	3,877
012	0.03	9.56E+03	2.5%	119.2	3.70E+05	97.5%	12	348
013	0.21	2.92E+05	5.2%	119.2	5.30E+06	94.8%	12	6,145
014	0.14	4.69E+04	3.3%	119.2	1.37E+06	96.7%	12	1,376
015	0.05	3.34E+04	26.4%	119.2	9.33E+04	73.6%	12	319
016	0.07	7.48E+04	2.1%	119.2	3.56E+06	97.9%	12	3,227
017	0.27	1.23E+06	26.2%	119.2	3.47E+06	73.8%	12	11,740
018	0.33	1.57E+06	12.0%	119.2	1.14E+07	88.0%	12	20,229
019	0.67	1.02E+06	5.9%	119.2	1.63E+07	94.1%	12	19,751
020	0.05	3.26E+04	3.9%	119.2	8.14E+05	96.1%	12	853
021	0.03	1.74E+04	2.4%	119.2	7.11E+05	97.6%	12	662
022	0.08	5.95E+04	3.0%	119.2	1.91E+06	97.0%	12	1,872
024	0.06	2.26E+04	5.3%	119.2	4.03E+05	94.7%	12	470
025	0.03	1.79E+04	3.0%	119.2	5.77E+05	97.0%	12	566
026	0.07	5.43E+04	2.9%	119.2	1.80E+06	97.1%	12	1,754
Ridley Creek	0.72	2.90E+06	13.5%	119.2	1.86E+07	86.5%	12	35,516
Chester Creek	0.95	1.18E+06	4.9%	119.2	2.29E+07	95.1%	12	25,914
Delaware River	2.41	6.71E+06	9.5%	119.2	6.39E+07	90.5%	12	97,793
Total	**4.08**	**1.08E+07**	**9.3%**	**119.2**	**1.05E+08**	**90.7%**	**12**	**159,222**

Table 6.2-7

Total Chemical Oxygen Demand Annual Load for Future Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (mg/l)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (mg/l)	Discharge Load (lbs)
002	0.20	4.90E+05	6.5%	358.2	7.08E+06	93.5%	163	83,005
003	0.24	2.77E+05	3.2%	358.2	8.29E+06	96.8%	163	90,570
004	0.11	4.35E+04	10.0%	358.2	3.90E+05	90.0%	163	4,944
005	0.41	2.14E+06	14.3%	358.2	1.29E+07	85.7%	163	179,064
006	0.04	1.24E+04	5.7%	358.2	2.07E+05	94.3%	163	2,385
007	0.11	1.52E+05	5.4%	358.2	2.68E+06	94.6%	163	30,709
008	0.57	2.84E+06	15.3%	358.2	1.58E+07	84.7%	163	223,866
009	0.25	3.08E+05	5.1%	358.2	5.77E+06	94.9%	163	65,583
011	0.13	1.06E+05	2.5%	358.2	4.12E+06	97.5%	163	44,290
012	0.03	9.56E+03	2.5%	358.2	3.70E+05	97.5%	163	3,978
013	0.21	2.92E+05	5.2%	358.2	5.30E+06	94.8%	163	60,458
014	0.14	4.69E+04	3.3%	358.2	1.37E+06	96.7%	163	15,003
015	0.05	3.34E+04	26.4%	358.2	9.33E+04	73.6%	163	1,697
016	0.07	7.48E+04	2.1%	358.2	3.56E+06	97.9%	163	37,948
017	0.27	1.23E+06	26.2%	358.2	3.47E+06	73.8%	163	62,747
018	0.33	1.57E+06	12.0%	358.2	1.14E+07	88.0%	163	151,485
019	0.67	1.02E+06	5.9%	358.2	1.63E+07	94.1%	163	188,135
020	0.05	3.26E+04	3.9%	358.2	8.14E+05	96.1%	163	9,016
021	0.03	1.74E+04	2.4%	358.2	7.11E+05	97.6%	163	7,629
022	0.08	5.95E+04	3.0%	358.2	1.91E+06	97.0%	163	20,751
024	0.06	2.26E+04	5.3%	358.2	4.03E+05	94.7%	163	4,608
025	0.03	1.79E+04	3.0%	358.2	5.77E+05	97.0%	163	6,275
026	0.07	5.43E+04	2.9%	358.2	1.80E+06	97.1%	163	19,559
Ridley Creek	0.72	2.90E+06	13.5%	358.2	1.86E+07	86.5%	163	253,876
Chester Creek	0.95	1.18E+06	4.9%	358.2	2.29E+07	95.1%	163	259,288
Delaware River	2.41	6.71E+06	9.5%	358.2	6.39E+07	90.5%	163	799,878
Total	**4.08**	**1.08E+07**	**9.3%**	**358.2**	**1.05E+08**	**90.7%**	**163**	**1,313,042**

Table 6.2-8

Fecal Coliform Bacteria Annual Load for Future Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (#/100ml)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (#/100ml)	Discharge Load (colonies)
002	0.20	4.90E+05	6.5%	1,000,000	7.08E+06	93.5%	0.00	3.06E+07
003	0.24	2.77E+05	3.2%	1,000,000	8.29E+06	96.8%	0.00	1.73E+07
004	0.11	4.35E+04	10.0%	1,000,000	3.90E+05	90.0%	0.00	2.72E+06
005	0.41	2.14E+06	14.3%	1,000,000	1.29E+07	85.7%	0.00	1.34E+08
006	0.04	1.24E+04	5.7%	1,000,000	2.07E+05	94.3%	0.00	7.76E+05
007	0.11	1.52E+05	5.4%	1,000,000	2.68E+06	94.6%	0.00	9.49E+06
008	0.57	2.84E+06	15.3%	1,000,000	1.58E+07	84.7%	0.00	1.77E+08
009	0.25	3.08E+05	5.1%	1,000,000	5.77E+06	94.9%	0.00	1.92E+07
011	0.13	1.06E+05	2.5%	1,000,000	4.12E+06	97.5%	0.00	6.64E+06
012	0.03	9.56E+03	2.5%	1,000,000	3.70E+05	97.5%	0.00	5.97E+05
013	0.21	2.92E+05	5.2%	1,000,000	5.30E+06	94.8%	0.00	1.82E+07
014	0.14	4.69E+04	3.3%	1,000,000	1.37E+06	96.7%	0.00	2.93E+06
015	0.05	3.34E+04	26.4%	1,000,000	9.33E+04	73.6%	0.00	2.09E+06
016	0.07	7.48E+04	2.1%	1,000,000	3.56E+06	97.9%	0.00	4.67E+06
017	0.27	1.23E+06	26.2%	1,000,000	3.47E+06	73.8%	0.00	7.67E+07
018	0.33	1.57E+06	12.0%	1,000,000	1.14E+07	88.0%	0.00	9.78E+07
019	0.67	1.02E+06	5.9%	1,000,000	1.63E+07	94.1%	0.00	6.35E+07
020	0.05	3.26E+04	3.9%	1,000,000	8.14E+05	96.1%	0.00	2.04E+06
021	0.03	1.74E+04	2.4%	1,000,000	7.11E+05	97.6%	0.00	1.09E+06
022	0.08	5.95E+04	3.0%	1,000,000	1.91E+06	97.0%	0.00	3.71E+06
024	0.06	2.26E+04	5.3%	1,000,000	4.03E+05	94.7%	0.00	1.41E+06
025	0.03	1.79E+04	3.0%	1,000,000	5.77E+05	97.0%	0.00	1.12E+06
026	0.07	5.43E+04	2.9%	1,000,000	1.80E+06	97.1%	0.00	3.39E+06
Ridley Creek	0.72	2.90E+06	13.5%	1,000,000	1.86E+07	86.5%	0.00	1.81E+08
Chester Creek	0.95	1.18E+06	4.9%	1,000,000	2.29E+07	95.1%	0.00	7.35E+07
Delaware River	2.41	6.71E+06	9.5%	1,000,000	6.39E+07	90.5%	0.00	4.19E+08
Total	**4.08**	**1.08E+07**	**9.3%**	**1,000,000**	**1.05E+08**	**90.7%**	**0.00**	**6.74E+08**

Table 6.2-9

Total Dissolved Oxygen Annual Load for Future Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (mg/l)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (mg/l)	Discharge Load (lbs)
002	0.20	4.90E+05	6.5%	6.21	7.08E+06	93.5%	8.51	3,949
003	0.24	2.77E+05	3.2%	6.21	8.29E+06	96.8%	8.51	4,510
004	0.11	4.35E+04	10.0%	6.21	3.90E+05	90.0%	8.51	224
005	0.41	2.14E+06	14.3%	6.21	1.29E+07	85.7%	8.51	7,675
006	0.04	1.24E+04	5.7%	6.21	2.07E+05	94.3%	8.51	115
007	0.11	1.52E+05	5.4%	6.21	2.68E+06	94.6%	8.51	1,484
008	0.57	2.84E+06	15.3%	6.21	1.58E+07	84.7%	8.51	9,470
009	0.25	3.08E+05	5.1%	6.21	5.77E+06	94.9%	8.51	3,182
011	0.13	1.06E+05	2.5%	6.21	4.12E+06	97.5%	8.51	2,228
012	0.03	9.56E+03	2.5%	6.21	3.70E+05	97.5%	8.51	200
013	0.21	2.92E+05	5.2%	6.21	5.30E+06	94.8%	8.51	2,927
014	0.14	4.69E+04	3.3%	6.21	1.37E+06	96.7%	8.51	746
015	0.05	3.34E+04	26.4%	6.21	9.33E+04	73.6%	8.51	62
016	0.07	7.48E+04	2.1%	6.21	3.56E+06	97.9%	8.51	1,922
017	0.27	1.23E+06	26.2%	6.21	3.47E+06	73.8%	8.51	2,317
018	0.33	1.57E+06	12.0%	6.21	1.14E+07	88.0%	8.51	6,685
019	0.67	1.02E+06	5.9%	6.21	1.63E+07	94.1%	8.51	9,025
020	0.05	3.26E+04	3.9%	6.21	8.14E+05	96.1%	8.51	445
021	0.03	1.74E+04	2.4%	6.21	7.11E+05	97.6%	8.51	385
022	0.08	5.95E+04	3.0%	6.21	1.91E+06	97.0%	8.51	1,037
024	0.06	2.26E+04	5.3%	6.21	4.03E+05	94.7%	8.51	223
025	0.03	1.79E+04	3.0%	6.21	5.77E+05	97.0%	8.51	314
026	0.07	5.43E+04	2.9%	6.21	1.80E+06	97.1%	8.51	978
Ridley Creek	0.72	2.90E+06	13.5%	6.21	1.86E+07	86.5%	8.51	10,986
Chester Creek	0.95	1.18E+06	4.9%	6.21	2.29E+07	95.1%	8.51	12,613
Delaware River	2.41	6.71E+06	9.5%	6.21	6.39E+07	90.5%	8.51	36,511
Total	**4.08**	**1.08E+07**	**9.3%**	**6.21**	**1.05E+08**	**90.7%**	**8.51**	**60,111**

Table 6.2-10

Oil and Grease Annual Load for Future Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (mg/l)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (mg/l)	Discharge Load (lbs)
002	0.20	4.90E+05	6.5%	22.30	7.08E+06	93.5%	17.56	8,444
003	0.24	2.77E+05	3.2%	22.30	8.29E+06	96.8%	17.56	9,476
004	0.11	4.35E+04	10.0%	22.30	3.90E+05	90.0%	17.56	488
005	0.41	2.14E+06	14.3%	22.30	1.29E+07	85.7%	17.56	17,114
006	0.04	1.24E+04	5.7%	22.30	2.07E+05	94.3%	17.56	244
007	0.11	1.52E+05	5.4%	22.30	2.68E+06	94.6%	17.56	3,154
008	0.57	2.84E+06	15.3%	22.30	1.58E+07	84.7%	17.56	21,232
009	0.25	3.08E+05	5.1%	22.30	5.77E+06	94.9%	17.56	6,752
011	0.13	1.06E+05	2.5%	22.30	4.12E+06	97.5%	17.56	4,664
012	0.03	9.56E+03	2.5%	22.30	3.70E+05	97.5%	17.56	419
013	0.21	2.92E+05	5.2%	22.30	5.30E+06	94.8%	17.56	6,216
014	0.14	4.69E+04	3.3%	22.30	1.37E+06	96.7%	17.56	1,569
015	0.05	3.34E+04	26.4%	22.30	9.33E+04	73.6%	17.56	149
016	0.07	7.48E+04	2.1%	22.30	3.56E+06	97.9%	17.56	4,012
017	0.27	1.23E+06	26.2%	22.30	3.47E+06	73.8%	17.56	5,511
018	0.33	1.57E+06	12.0%	22.30	1.14E+07	88.0%	17.56	14,729
019	0.67	1.02E+06	5.9%	22.30	1.63E+07	94.1%	17.56	19,234
020	0.05	3.26E+04	3.9%	22.30	8.14E+05	96.1%	17.56	938
021	0.03	1.74E+04	2.4%	22.30	7.11E+05	97.6%	17.56	804
022	0.08	5.95E+04	3.0%	22.30	1.91E+06	97.0%	17.56	2,175
024	0.06	2.26E+04	5.3%	22.30	4.03E+05	94.7%	17.56	474
025	0.03	1.79E+04	3.0%	22.30	5.77E+05	97.0%	17.56	658
026	0.07	5.43E+04	2.9%	22.30	1.80E+06	97.1%	17.56	2,052
Ridley Creek	0.72	2.90E+06	13.5%	22.30	1.86E+07	86.5%	17.56	24,401
Chester Creek	0.95	1.18E+06	4.9%	22.30	2.29E+07	95.1%	17.56	26,738
Delaware River	2.41	6.71E+06	9.5%	22.30	6.39E+07	90.5%	17.56	79,353
Total	**4.08**	**1.08E+07**	**9.3%**	**22.30**	**1.05E+08**	**90.7%**	**17.56**	**130,492**

Table 6.2-11

Total Kjeldahl Nitrogen Annual Load for Future Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (mg/l)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (mg/l)	Discharge Load (lbs)
002	0.20	4.90E+05	6.5%	11.99	7.08E+06	93.5%	7.20	3,549
003	0.24	2.77E+05	3.2%	11.99	8.29E+06	96.8%	7.20	3,934
004	0.11	4.35E+04	10.0%	11.99	3.90E+05	90.0%	7.20	208
005	0.41	2.14E+06	14.3%	11.99	1.29E+07	85.7%	7.20	7,397
006	0.04	1.24E+04	5.7%	11.99	2.07E+05	94.3%	7.20	102
007	0.11	1.52E+05	5.4%	11.99	2.68E+06	94.6%	7.20	1,320
008	0.57	2.84E+06	15.3%	11.99	1.58E+07	84.7%	7.20	9,209
009	0.25	3.08E+05	5.1%	11.99	5.77E+06	94.9%	7.20	2,823
011	0.13	1.06E+05	2.5%	11.99	4.12E+06	97.5%	7.20	1,931
012	0.03	9.56E+03	2.5%	11.99	3.70E+05	97.5%	7.20	173
013	0.21	2.92E+05	5.2%	11.99	5.30E+06	94.8%	7.20	2,601
014	0.14	4.69E+04	3.3%	11.99	1.37E+06	96.7%	7.20	651
015	0.05	3.34E+04	26.4%	11.99	9.33E+04	73.6%	7.20	67
016	0.07	7.48E+04	2.1%	11.99	3.56E+06	97.9%	7.20	1,658
017	0.27	1.23E+06	26.2%	11.99	3.47E+06	73.8%	7.20	2,478
018	0.33	1.57E+06	12.0%	11.99	1.14E+07	88.0%	7.20	6,317
019	0.67	1.02E+06	5.9%	11.99	1.63E+07	94.1%	7.20	8,067
020	0.05	3.26E+04	3.9%	11.99	8.14E+05	96.1%	7.20	390
021	0.03	1.74E+04	2.4%	11.99	7.11E+05	97.6%	7.20	333
022	0.08	5.95E+04	3.0%	11.99	1.91E+06	97.0%	7.20	902
024	0.06	2.26E+04	5.3%	11.99	4.03E+05	94.7%	7.20	198
025	0.03	1.79E+04	3.0%	11.99	5.77E+05	97.0%	7.20	273
026	0.07	5.43E+04	2.9%	11.99	1.80E+06	97.1%	7.20	851
Ridley Creek	0.72	2.90E+06	13.5%	11.99	1.86E+07	86.5%	7.20	10,520
Chester Creek	0.95	1.18E+06	4.9%	11.99	2.29E+07	95.1%	7.20	11,172
Delaware River	2.41	6.71E+06	9.5%	11.99	6.39E+07	90.5%	7.20	33,726
Total	**4.08**	**1.08E+07**	**9.3%**	**11.99**	**1.05E+08**	**90.7%**	**7.20**	**55,418**

Table 6.2-12

Total Phosphorus Annual Load for Future Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (mg/l)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (mg/l)	Discharge Load (lbs)
002	0.20	4.90E+05	6.5%	1.68	7.08E+06	93.5%	1.08	529
003	0.24	2.77E+05	3.2%	1.68	8.29E+06	96.8%	1.08	588
004	0.11	4.35E+04	10.0%	1.68	3.90E+05	90.0%	1.08	31
005	0.41	2.14E+06	14.3%	1.68	1.29E+07	85.7%	1.08	1,093
006	0.04	1.24E+04	5.7%	1.68	2.07E+05	94.3%	1.08	15
007	0.11	1.52E+05	5.4%	1.68	2.68E+06	94.6%	1.08	197
008	0.57	2.84E+06	15.3%	1.68	1.58E+07	84.7%	1.08	1,360
009	0.25	3.08E+05	5.1%	1.68	5.77E+06	94.9%	1.08	421
011	0.13	1.06E+05	2.5%	1.68	4.12E+06	97.5%	1.08	289
012	0.03	9.56E+03	2.5%	1.68	3.70E+05	97.5%	1.08	26
013	0.21	2.92E+05	5.2%	1.68	5.30E+06	94.8%	1.08	388
014	0.14	4.69E+04	3.3%	1.68	1.37E+06	96.7%	1.08	97
015	0.05	3.34E+04	26.4%	1.68	9.33E+04	73.6%	1.08	10
016	0.07	7.48E+04	2.1%	1.68	3.56E+06	97.9%	1.08	248
017	0.27	1.23E+06	26.2%	1.68	3.47E+06	73.8%	1.08	362
018	0.33	1.57E+06	12.0%	1.68	1.14E+07	88.0%	1.08	936
019	0.67	1.02E+06	5.9%	1.68	1.63E+07	94.1%	1.08	1,202
020	0.05	3.26E+04	3.9%	1.68	8.14E+05	96.1%	1.08	58
021	0.03	1.74E+04	2.4%	1.68	7.11E+05	97.6%	1.08	50
022	0.08	5.95E+04	3.0%	1.68	1.91E+06	97.0%	1.08	135
024	0.06	2.26E+04	5.3%	1.68	4.03E+05	94.7%	1.08	30
025	0.03	1.79E+04	3.0%	1.68	5.77E+05	97.0%	1.08	41
026	0.07	5.43E+04	2.9%	1.68	1.80E+06	97.1%	1.08	127
Ridley Creek	0.72	2.90E+06	13.5%	1.68	1.86E+07	86.5%	1.08	1,556
Chester Creek	0.95	1.18E+06	4.9%	1.68	2.29E+07	95.1%	1.08	1,667
Delaware River	2.41	6.71E+06	9.5%	1.68	6.39E+07	90.5%	1.08	5,008
Total	**4.08**	**1.08E+07**	**9.3%**	**1.68**	**1.05E+08**	**90.7%**	**1.08**	**8,232**

Table 6.2-13

Total Zinc Annual Load for Future Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (mg/l)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (mg/l)	Discharge Load (lbs)
002	0.20	4.90E+05	6.5%	0.1737	7.08E+06	93.5%	0.3970	181
003	0.24	2.77E+05	3.2%	0.1737	8.29E+06	96.8%	0.3970	208
004	0.11	4.35E+04	10.0%	0.1737	3.90E+05	90.0%	0.3970	10
005	0.41	2.14E+06	14.3%	0.1737	1.29E+07	85.7%	0.3970	343
006	0.04	1.24E+04	5.7%	0.1737	2.07E+05	94.3%	0.3970	5
007	0.11	1.52E+05	5.4%	0.1737	2.68E+06	94.6%	0.3970	68
008	0.57	2.84E+06	15.3%	0.1737	1.58E+07	84.7%	0.3970	421
009	0.25	3.08E+05	5.1%	0.1737	5.77E+06	94.9%	0.3970	146
011	0.13	1.06E+05	2.5%	0.1737	4.12E+06	97.5%	0.3970	103
012	0.03	9.56E+03	2.5%	0.1737	3.70E+05	97.5%	0.3970	9
013	0.21	2.92E+05	5.2%	0.1737	5.30E+06	94.8%	0.3970	135
014	0.14	4.69E+04	3.3%	0.1737	1.37E+06	96.7%	0.3970	34
015	0.05	3.34E+04	26.4%	0.1737	9.33E+04	73.6%	0.3970	3
016	0.07	7.48E+04	2.1%	0.1737	3.56E+06	97.9%	0.3970	89
017	0.27	1.23E+06	26.2%	0.1737	3.47E+06	73.8%	0.3970	99
018	0.33	1.57E+06	12.0%	0.1737	1.14E+07	88.0%	0.3970	301
019	0.67	1.02E+06	5.9%	0.1737	1.63E+07	94.1%	0.3970	414
020	0.05	3.26E+04	3.9%	0.1737	8.14E+05	96.1%	0.3970	21
021	0.03	1.74E+04	2.4%	0.1737	7.11E+05	97.6%	0.3970	18
022	0.08	5.95E+04	3.0%	0.1737	1.91E+06	97.0%	0.3970	48
024	0.06	2.26E+04	5.3%	0.1737	4.03E+05	94.7%	0.3970	10
025	0.03	1.79E+04	3.0%	0.1737	5.77E+05	97.0%	0.3970	15
026	0.07	5.43E+04	2.9%	0.1737	1.80E+06	97.1%	0.3970	45
Ridley Creek	0.72	2.90E+06	13.5%	0.1737	1.86E+07	86.5%	0.3970	492
Chester Creek	0.95	1.18E+06	4.9%	0.1737	2.29E+07	95.1%	0.3970	580
Delaware River	2.41	6.71E+06	9.5%	0.1737	6.39E+07	90.5%	0.3970	1,655
Total	**4.08**	**1.08E+07**	**9.3%**	**0.1737**	**1.05E+08**	**90.7%**	**0.3970**	**2,727**

Table 6.2-14

Total Copper Annual Load for Future Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (mg/l)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (mg/l)	Discharge Load (lbs)
002	0.20	4.90E+05	6.5%	0.0417	7.08E+06	93.5%	0.1050	48
003	0.24	2.77E+05	3.2%	0.0417	8.29E+06	96.8%	0.1050	55
004	0.11	4.35E+04	10.0%	0.0417	3.90E+05	90.0%	0.1050	3
005	0.41	2.14E+06	14.3%	0.0417	1.29E+07	85.7%	0.1050	90
006	0.04	1.24E+04	5.7%	0.0417	2.07E+05	94.3%	0.1050	1
007	0.11	1.52E+05	5.4%	0.0417	2.68E+06	94.6%	0.1050	18
008	0.57	2.84E+06	15.3%	0.0417	1.58E+07	84.7%	0.1050	111
009	0.25	3.08E+05	5.1%	0.0417	5.77E+06	94.9%	0.1050	39
011	0.13	1.06E+05	2.5%	0.0417	4.12E+06	97.5%	0.1050	27
012	0.03	9.56E+03	2.5%	0.0417	3.70E+05	97.5%	0.1050	2
013	0.21	2.92E+05	5.2%	0.0417	5.30E+06	94.8%	0.1050	35
014	0.14	4.69E+04	3.3%	0.0417	1.37E+06	96.7%	0.1050	9
015	0.05	3.34E+04	26.4%	0.0417	9.33E+04	73.6%	0.1050	1
016	0.07	7.48E+04	2.1%	0.0417	3.56E+06	97.9%	0.1050	24
017	0.27	1.23E+06	26.2%	0.0417	3.47E+06	73.8%	0.1050	26
018	0.33	1.57E+06	12.0%	0.0417	1.14E+07	88.0%	0.1050	79
019	0.67	1.02E+06	5.9%	0.0417	1.63E+07	94.1%	0.1050	109
020	0.05	3.26E+04	3.9%	0.0417	8.14E+05	96.1%	0.1050	5
021	0.03	1.74E+04	2.4%	0.0417	7.11E+05	97.6%	0.1050	5
022	0.08	5.95E+04	3.0%	0.0417	1.91E+06	97.0%	0.1050	13
024	0.06	2.26E+04	5.3%	0.0417	4.03E+05	94.7%	0.1050	3
025	0.03	1.79E+04	3.0%	0.0417	5.77E+05	97.0%	0.1050	4
026	0.07	5.43E+04	2.9%	0.0417	1.80E+06	97.1%	0.1050	12
Ridley Creek	0.72	2.90E+06	13.5%	0.0417	1.86E+07	86.5%	0.1050	129
Chester Creek	0.95	1.18E+06	4.9%	0.0417	2.29E+07	95.1%	0.1050	153
Delaware River	2.41	6.71E+06	9.5%	0.0417	6.39E+07	90.5%	0.1050	436
Total	**4.08**	**1.08E+07**	**9.3%**	**0.0417**	**1.05E+08**	**90.7%**	**0.1050**	**718**

Table 6.2-15

Total Aluminum Annual Load for Future Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (mg/l)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (mg/l)	Discharge Load (lbs)
002	0.20	4.90E+05	6.5%	1.4114	7.08E+06	93.5%	2.8276	1,293
003	0.24	2.77E+05	3.2%	1.4114	8.29E+06	96.8%	2.8276	1,488
004	0.11	4.35E+04	10.0%	1.4114	3.90E+05	90.0%	2.8276	73
005	0.41	2.14E+06	14.3%	1.4114	1.29E+07	85.7%	2.8276	2,464
006	0.04	1.24E+04	5.7%	1.4114	2.07E+05	94.3%	2.8276	38
007	0.11	1.52E+05	5.4%	1.4114	2.68E+06	94.6%	2.8276	487
008	0.57	2.84E+06	15.3%	1.4114	1.58E+07	84.7%	2.8276	3,032
009	0.25	3.08E+05	5.1%	1.4114	5.77E+06	94.9%	2.8276	1,045
011	0.13	1.06E+05	2.5%	1.4114	4.12E+06	97.5%	2.8276	736
012	0.03	9.56E+03	2.5%	1.4114	3.70E+05	97.5%	2.8276	66
013	0.21	2.92E+05	5.2%	1.4114	5.30E+06	94.8%	2.8276	961
014	0.14	4.69E+04	3.3%	1.4114	1.37E+06	96.7%	2.8276	246
015	0.05	3.34E+04	26.4%	1.4114	9.33E+04	73.6%	2.8276	19
016	0.07	7.48E+04	2.1%	1.4114	3.56E+06	97.9%	2.8276	636
017	0.27	1.23E+06	26.2%	1.4114	3.47E+06	73.8%	2.8276	720
018	0.33	1.57E+06	12.0%	1.4114	1.14E+07	88.0%	2.8276	2,158
019	0.67	1.02E+06	5.9%	1.4114	1.63E+07	94.1%	2.8276	2,959
020	0.05	3.26E+04	3.9%	1.4114	8.14E+05	96.1%	2.8276	147
021	0.03	1.74E+04	2.4%	1.4114	7.11E+05	97.6%	2.8276	127
022	0.08	5.95E+04	3.0%	1.4114	1.91E+06	97.0%	2.8276	342
024	0.06	2.26E+04	5.3%	1.4114	4.03E+05	94.7%	2.8276	73
025	0.03	1.79E+04	3.0%	1.4114	5.77E+05	97.0%	2.8276	103
026	0.07	5.43E+04	2.9%	1.4114	1.80E+06	97.1%	2.8276	323
Ridley Creek	0.72	2.90E+06	13.5%	1.4114	1.86E+07	86.5%	2.8276	3,534
Chester Creek	0.95	1.18E+06	4.9%	1.4114	2.29E+07	95.1%	2.8276	4,145
Delaware River	2.41	6.71E+06	9.5%	1.4114	6.39E+07	90.5%	2.8276	11,864
Total	**4.08**	**1.08E+07**	**9.3%**	**1.4114**	**1.05E+08**	**90.7%**	**2.8276**	**19,543**

Table 6.2-16

Total Lead Annual Load for Future Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (mg/l)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (mg/l)	Discharge Load (lbs)
002	0.20	4.90E+05	6.5%	0.0173	7.08E+06	93.5%	0.1820	81
003	0.24	2.77E+05	3.2%	0.0173	8.29E+06	96.8%	0.1820	95
004	0.11	4.35E+04	10.0%	0.0173	3.90E+05	90.0%	0.1820	4
005	0.41	2.14E+06	14.3%	0.0173	1.29E+07	85.7%	0.1820	149
006	0.04	1.24E+04	5.7%	0.0173	2.07E+05	94.3%	0.1820	2
007	0.11	1.52E+05	5.4%	0.0173	2.68E+06	94.6%	0.1820	31
008	0.57	2.84E+06	15.3%	0.0173	1.58E+07	84.7%	0.1820	182
009	0.25	3.08E+05	5.1%	0.0173	5.77E+06	94.9%	0.1820	66
011	0.13	1.06E+05	2.5%	0.0173	4.12E+06	97.5%	0.1820	47
012	0.03	9.56E+03	2.5%	0.0173	3.70E+05	97.5%	0.1820	4
013	0.21	2.92E+05	5.2%	0.0173	5.30E+06	94.8%	0.1820	61
014	0.14	4.69E+04	3.3%	0.0173	1.37E+06	96.7%	0.1820	16
015	0.05	3.34E+04	26.4%	0.0173	9.33E+04	73.6%	0.1820	1
016	0.07	7.48E+04	2.1%	0.0173	3.56E+06	97.9%	0.1820	41
017	0.27	1.23E+06	26.2%	0.0173	3.47E+06	73.8%	0.1820	41
018	0.33	1.57E+06	12.0%	0.0173	1.14E+07	88.0%	0.1820	132
019	0.67	1.02E+06	5.9%	0.0173	1.63E+07	94.1%	0.1820	186
020	0.05	3.26E+04	3.9%	0.0173	8.14E+05	96.1%	0.1820	9
021	0.03	1.74E+04	2.4%	0.0173	7.11E+05	97.6%	0.1820	8
022	0.08	5.95E+04	3.0%	0.0173	1.91E+06	97.0%	0.1820	22
024	0.06	2.26E+04	5.3%	0.0173	4.03E+05	94.7%	0.1820	5
025	0.03	1.79E+04	3.0%	0.0173	5.77E+05	97.0%	0.1820	7
026	0.07	5.43E+04	2.9%	0.0173	1.80E+06	97.1%	0.1820	21
Ridley Creek	0.72	2.90E+06	13.5%	0.0173	1.86E+07	86.5%	0.1820	214
Chester Creek	0.95	1.18E+06	4.9%	0.0173	2.29E+07	95.1%	0.1820	261
Delaware River	2.41	6.71E+06	9.5%	0.0173	6.39E+07	90.5%	0.1820	733
Total	**4.08**	**1.08E+07**	**9.3%**	**0.0173**	**1.05E+08**	**90.7%**	**0.1820**	**1,208**

Table 6.2-17

Total Mercury Annual Load for Future Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (mg/l)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (mg/l)	Discharge Load (lbs)
002	0.20	4.90E+05	6.5%	0.0003	7.08E+06	93.5%	0.0003	0.12
003	0.24	2.77E+05	3.2%	0.0003	8.29E+06	96.8%	0.0003	0.14
004	0.11	4.35E+04	10.0%	0.0003	3.90E+05	90.0%	0.0003	0.01
005	0.41	2.14E+06	14.3%	0.0003	1.29E+07	85.7%	0.0003	0.24
006	0.04	1.24E+04	5.7%	0.0003	2.07E+05	94.3%	0.0003	0.00
007	0.11	1.52E+05	5.4%	0.0003	2.68E+06	94.6%	0.0003	0.05
008	0.57	2.84E+06	15.3%	0.0003	1.58E+07	84.7%	0.0003	0.30
009	0.25	3.08E+05	5.1%	0.0003	5.77E+06	94.9%	0.0003	0.10
011	0.13	1.06E+05	2.5%	0.0003	4.12E+06	97.5%	0.0003	0.07
012	0.03	9.56E+03	2.5%	0.0003	3.70E+05	97.5%	0.0003	0.01
013	0.21	2.92E+05	5.2%	0.0003	5.30E+06	94.8%	0.0003	0.09
014	0.14	4.69E+04	3.3%	0.0003	1.37E+06	96.7%	0.0003	0.02
015	0.05	3.34E+04	26.4%	0.0003	9.33E+04	73.6%	0.0003	0.00
016	0.07	7.48E+04	2.1%	0.0003	3.56E+06	97.9%	0.0003	0.06
017	0.27	1.23E+06	26.2%	0.0003	3.47E+06	73.8%	0.0003	0.08
018	0.33	1.57E+06	12.0%	0.0003	1.14E+07	88.0%	0.0003	0.21
019	0.67	1.02E+06	5.9%	0.0003	1.63E+07	94.1%	0.0003	0.28
020	0.05	3.26E+04	3.9%	0.0003	8.14E+05	96.1%	0.0003	0.01
021	0.03	1.74E+04	2.4%	0.0003	7.11E+05	97.6%	0.0003	0.01
022	0.08	5.95E+04	3.0%	0.0003	1.91E+06	97.0%	0.0003	0.03
024	0.06	2.26E+04	5.3%	0.0003	4.03E+05	94.7%	0.0003	0.01
025	0.03	1.79E+04	3.0%	0.0003	5.77E+05	97.0%	0.0003	0.01
026	0.07	5.43E+04	2.9%	0.0003	1.80E+06	97.1%	0.0003	0.03
Ridley Creek	0.72	2.90E+06	13.5%	0.0003	1.86E+07	86.5%	0.0003	0.35
Chester Creek	0.95	1.18E+06	4.9%	0.0003	2.29E+07	95.1%	0.0003	0.39
Delaware River	2.41	6.71E+06	9.5%	0.0003	6.39E+07	90.5%	0.0003	1.14
Total	**4.08**	**1.08E+07**	**9.3%**	**0.0003**	**1.05E+08**	**90.7%**	**0.0003**	**1.88**

Table 6.2-18

Total Silver Annual Load for Future Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (mg/l)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (mg/l)	Discharge Load (lbs)
002	0.20	4.90E+05	6.5%	0.0080	7.08E+06	93.5%	0.0100	4.67
003	0.24	2.77E+05	3.2%	0.0080	8.29E+06	96.8%	0.0100	5.31
004	0.11	4.35E+04	10.0%	0.0080	3.90E+05	90.0%	0.0100	0.27
005	0.41	2.14E+06	14.3%	0.0080	1.29E+07	85.7%	0.0100	9.12
006	0.04	1.24E+04	5.7%	0.0080	2.07E+05	94.3%	0.0100	0.14
007	0.11	1.52E+05	5.4%	0.0080	2.68E+06	94.6%	0.0100	1.75
008	0.57	2.84E+06	15.3%	0.0080	1.58E+07	84.7%	0.0100	11.26
009	0.25	3.08E+05	5.1%	0.0080	5.77E+06	94.9%	0.0100	3.76
011	0.13	1.06E+05	2.5%	0.0080	4.12E+06	97.5%	0.0100	2.62
012	0.03	9.56E+03	2.5%	0.0080	3.70E+05	97.5%	0.0100	0.24
013	0.21	2.92E+05	5.2%	0.0080	5.30E+06	94.8%	0.0100	3.45
014	0.14	4.69E+04	3.3%	0.0080	1.37E+06	96.7%	0.0100	0.88
015	0.05	3.34E+04	26.4%	0.0080	9.33E+04	73.6%	0.0100	0.07
016	0.07	7.48E+04	2.1%	0.0080	3.56E+06	97.9%	0.0100	2.26
017	0.27	1.23E+06	26.2%	0.0080	3.47E+06	73.8%	0.0100	2.78
018	0.33	1.57E+06	12.0%	0.0080	1.14E+07	88.0%	0.0100	7.93
019	0.67	1.02E+06	5.9%	0.0080	1.63E+07	94.1%	0.0100	10.66
020	0.05	3.26E+04	3.9%	0.0080	8.14E+05	96.1%	0.0100	0.52
021	0.03	1.74E+04	2.4%	0.0080	7.11E+05	97.6%	0.0100	0.45
022	0.08	5.95E+04	3.0%	0.0080	1.91E+06	97.0%	0.0100	1.22
024	0.06	2.26E+04	5.3%	0.0080	4.03E+05	94.7%	0.0100	0.26
025	0.03	1.79E+04	3.0%	0.0080	5.77E+05	97.0%	0.0100	0.37
026	0.07	5.43E+04	2.9%	0.0080	1.80E+06	97.1%	0.0100	1.15
Ridley Creek	0.72	2.90E+06	13.5%	0.0080	1.86E+07	86.5%	0.0100	13.05
Chester Creek	0.95	1.18E+06	4.9%	0.0080	2.29E+07	95.1%	0.0100	14.88
Delaware River	2.41	6.71E+06	9.5%	0.0080	6.39E+07	90.5%	0.0100	43.23
Total	**4.08**	**1.08E+07**	**9.3%**	**0.0080**	**1.05E+08**	**90.7%**	**0.0100**	**71.16**

Table 6.2-19

Total Phenols Annual Load for Future Typical Year

Outfall	Sewage Base Flow (cfs)	Sewage Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Sewage Concentration (mg/l)	Stormwater Overflow Volume (cu. ft.)	Percent of Total Flow	Selected Storm Water Concentration (mg/l)	Discharge Load (lbs)
002	0.20	4.90E+05	6.5%	0.1538	7.08E+06	93.5%	0.0719	36
003	0.24	2.77E+05	3.2%	0.1538	8.29E+06	96.8%	0.0719	40
004	0.11	4.35E+04	10.0%	0.1538	3.90E+05	90.0%	0.0719	2
005	0.41	2.14E+06	14.3%	0.1538	1.29E+07	85.7%	0.0719	78
006	0.04	1.24E+04	5.7%	0.1538	2.07E+05	94.3%	0.0719	1
007	0.11	1.52E+05	5.4%	0.1538	2.68E+06	94.6%	0.0719	14
008	0.57	2.84E+06	15.3%	0.1538	1.58E+07	84.7%	0.0719	98
009	0.25	3.08E+05	5.1%	0.1538	5.77E+06	94.9%	0.0719	29
011	0.13	1.06E+05	2.5%	0.1538	4.12E+06	97.5%	0.0719	20
012	0.03	9.56E+03	2.5%	0.1538	3.70E+05	97.5%	0.0719	2
013	0.21	2.92E+05	5.2%	0.1538	5.30E+06	94.8%	0.0719	27
014	0.14	4.69E+04	3.3%	0.1538	1.37E+06	96.7%	0.0719	7
015	0.05	3.34E+04	26.4%	0.1538	9.33E+04	73.6%	0.0719	1
016	0.07	7.48E+04	2.1%	0.1538	3.56E+06	97.9%	0.0719	17
017	0.27	1.23E+06	26.2%	0.1538	3.47E+06	73.8%	0.0719	27
018	0.33	1.57E+06	12.0%	0.1538	1.14E+07	88.0%	0.0719	66
019	0.67	1.02E+06	5.9%	0.1538	1.63E+07	94.1%	0.0719	83
020	0.05	3.26E+04	3.9%	0.1538	8.14E+05	96.1%	0.0719	4
021	0.03	1.74E+04	2.4%	0.1538	7.11E+05	97.6%	0.0719	3
022	0.08	5.95E+04	3.0%	0.1538	1.91E+06	97.0%	0.0719	9
024	0.06	2.26E+04	5.3%	0.1538	4.03E+05	94.7%	0.0719	2
025	0.03	1.79E+04	3.0%	0.1538	5.77E+05	97.0%	0.0719	3
026	0.07	5.43E+04	2.9%	0.1538	1.80E+06	97.1%	0.0719	9
Ridley Creek	0.72	2.90E+06	13.5%	0.1538	1.86E+07	86.5%	0.0719	111
Chester Creek	0.95	1.18E+06	4.9%	0.1538	2.29E+07	95.1%	0.0719	114
Delaware River	2.41	6.71E+06	9.5%	0.1538	6.39E+07	90.5%	0.0719	351
Total	**4.08**	**1.08E+07**	**9.3%**	**0.1538**	**1.05E+08**	**90.7%**	**0.0719**	**577**

Table 6.2-20

Impact of CSO Discharge on Chester Creek Water Quality for Future Typical Year

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	269,845	24,069,030	27.99	51.8	1,634,837,317	2,857,019	1.5%	8.6%	30.19	No Criteria
BOD_5	25,914	24,069,030	3.14	51.8	1,634,837,317	320,385	1.5%	7.5%	3.34	No Criteria
COD	259,288	24,069,030	10	51.8	1,634,837,317	1,020,692	1.5%	20.3%	12.36	No Criteria
Fecal Coliform (#/100ml)	7.35E+07	24,069,030	9,877	51.8	1,634,837,317	1.0E+10	1.5%	0.7%	9,805	770
Dissolved Oxygen	12,613	24,069,030	7.863	51.8	1,634,837,317	802,570	1.5%	1.5%	7.87	> 6.5
Oil & Grease	26,738	24,069,030	2.00	51.8	1,634,837,317	204,138	1.5%	11.6%	2.23	No Criteria
Total Kjeldahl Nitrogen	11,172	24,069,030	1.43	51.8	1,634,837,317	146,163	1.5%	7.1%	1.52	No Criteria
Total Phosphorus	1,667	24,069,030	0.7178	51.8	1,634,837,317	73,265	1.5%	2.2%	0.723	No Criteria
Total Zinc	580	24,069,030	0.0334	51.8	1,634,837,317	3,411	1.5%	14.5%	0.0385	0.1011924
Total Copper	153	24,069,030	0.0272	51.8	1,634,837,317	2,775	1.5%	5.2%	0.0283	0.0109878
Total Aluminum	4,145	24,069,030	0.3020	51.8	1,634,837,317	30,825	1.5%	11.9%	0.3376	0.087
Total Lead	261	24,069,030	0.0149	51.8	1,634,837,317	1,519	1.5%	14.7%	0.0172	0.0024145
Mercury	0.39	24,069,030	0.0011	51.8	1,634,837,317	111	1.5%	0.3%	0.0011	0.000012
Silver	15	24,069,030	0.0379	51.8	1,634,837,317	3,870	1.5%	0.4%	0.0375	No Criteria
Total Phenols	114	24,069,030	0.005315	51.8	1,634,837,317	542	1.5%	17.4%	0.0063	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Chester Creek near Chester, PA (01477000) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 6.2-20a

Impact of CSO Discharge on Chester Creek Water Quality for Future Typical Year at Regulator 20

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	9,499	846,860	27.99	51.8	1,634,837,317	2,857,019	0.1%	0.3%	28.07	No Criteria
BOD_5	853	846,860	3.14	51.8	1,634,837,317	320,385	0.1%	0.3%	3.15	No Criteria
COD	9,016	846,860	10	51.8	1,634,837,317	1,020,692	0.1%	0.9%	10.08	No Criteria
Fecal Coliform (#/100ml)	2.04E+06	846,860	9,877	51.8	1,634,837,317	1.0E+10	0.1%	0.0%	9,874	770
Dissolved Oxygen	445	846,860	7.863	51.8	1,634,837,317	802,570	0.1%	0.1%	7.86	> 6.5
Oil & Grease	938	846,860	2.00	51.8	1,634,837,317	204,138	0.1%	0.5%	2.01	No Criteria
Total Kjeldahl Nitrogen	390	846,860	1.43	51.8	1,634,837,317	146,163	0.1%	0.3%	1.44	No Criteria
Total Phosphorus	58	846,860	0.7178	51.8	1,634,837,317	73,265	0.1%	0.1%	0.718	No Criteria
Total Zinc	21	846,860	0.0334	51.8	1,634,837,317	3,411	0.1%	0.6%	0.0336	0.1011924
Total Copper	5	846,860	0.0272	51.8	1,634,837,317	2,775	0.1%	0.2%	0.0272	0.0109878
Total Aluminum	147	846,860	0.3020	51.8	1,634,837,317	30,825	0.1%	0.5%	0.3033	0.087
Total Lead	9	846,860	0.0149	51.8	1,634,837,317	1,519	0.1%	0.6%	0.0150	0.0024145
Mercury	0.01	846,860	0.0011	51.8	1,634,837,317	111	0.1%	0.0%	0.0011	0.000012
Silver	1	846,860	0.0379	51.8	1,634,837,317	3,870	0.1%	0.0%	0.0379	No Criteria
Total Phenols	4	846,860	0.005315	51.8	1,634,837,317	542	0.1%	0.7%	0.0054	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Chester Creek near Chester, PA (01477000) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 6.2-20b

Impact of CSO Discharge on Chester Creek Water Quality for Future Typical Year at Regulator 19

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	193,503	17,268,166	28.07	51.8	1,635,684,177	2,866,518	1.0%	6.8%	29.65	No Criteria
BOD_5	19,751	17,268,166	3.15	51.8	1,635,684,177	321,238	1.0%	6.1%	3.30	No Criteria
COD	188,135	17,268,166	10.08310669	51.8	1,635,684,177	1,029,708	1.0%	18.3%	11.80	No Criteria
Fecal Coliform (#/100ml)	6.35E+07	17,268,166	9,874	51.8	1,635,684,177	1.0E+10	1.0%	0.6%	9,832	770
Dissolved Oxygen	9,025	17,268,166	7.863287171	51.8	1,635,684,177	803,015	1.0%	1.1%	7.87	> 6.5
Oil & Grease	19,234	17,268,166	2.01	51.8	1,635,684,177	205,077	1.0%	9.4%	2.17	No Criteria
Total Kjeldahl Nitrogen	8,067	17,268,166	1.44	51.8	1,635,684,177	146,554	1.0%	5.5%	1.50	No Criteria
Total Phosphorus	1,202	17,268,166	0.717999449	51.8	1,635,684,177	73,324	1.0%	1.6%	0.722	No Criteria
Total Zinc	414	17,268,166	0.0336	51.8	1,635,684,177	3,431	1.0%	12.1%	0.0373	0.1011924
Total Copper	109	17,268,166	0.0272	51.8	1,635,684,177	2,781	1.0%	3.9%	0.0280	0.0109878
Total Aluminum	2,959	17,268,166	0.3033	51.8	1,635,684,177	30,972	1.0%	9.6%	0.3288	0.087
Total Lead	186	17,268,166	0.0150	51.8	1,635,684,177	1,529	1.0%	12.2%	0.0166	0.0024145
Mercury	0.28	17,268,166	0.0011	51.8	1,635,684,177	111	1.0%	0.3%	0.0011	0.000012
Silver	11	17,268,166	0.0379	51.8	1,635,684,177	3,871	1.0%	0.3%	0.0376	No Criteria
Total Phenols	83	17,268,166	0.005351121	51.8	1,635,684,177	546	1.0%	15.1%	0.0061	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Chester Creek near Chester, PA (01477000) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 6.2-20c

Impact of CSO Discharge on Chester Creek Water Quality for Future Typical Year at Regulator 21

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	8,181	728,798	29.65	51.8	1,652,952,343	3,060,022	0.0%	0.3%	29.72	No Criteria
BOD_5	662	728,798	3.30	51.8	1,652,952,343	340,989	0.0%	0.2%	3.31	No Criteria
COD	7,629	728,798	11.80077619	51.8	1,652,952,343	1,217,842	0.0%	0.6%	11.87	No Criteria
Fecal Coliform (#/100ml)	1.09E+06	728,798	9,832	51.8	1,652,952,343	1.0E+10	0.0%	0.0%	9,829	770
Dissolved Oxygen	385	728,798	7.868588004	51.8	1,652,952,343	812,040	0.0%	0.0%	7.87	> 6.5
Oil & Grease	804	728,798	2.17	51.8	1,652,952,343	224,311	0.0%	0.4%	2.18	No Criteria
Total Kjeldahl Nitrogen	333	728,798	1.50	51.8	1,652,952,343	154,620	0.0%	0.2%	1.50	No Criteria
Total Phosphorus	50	728,798	0.722149328	51.8	1,652,952,343	74,526	0.0%	0.1%	0.722	No Criteria
Total Zinc	18	728,798	0.0373	51.8	1,652,952,343	3,845	0.0%	0.5%	0.0374	0.1011924
Total Copper	5	728,798	0.0280	51.8	1,652,952,343	2,890	0.0%	0.2%	0.0280	0.0109878
Total Aluminum	127	728,798	0.3288	51.8	1,652,952,343	33,930	0.0%	0.4%	0.3299	0.087
Total Lead	8	728,798	0.0166	51.8	1,652,952,343	1,714	0.0%	0.5%	0.0167	0.0024145
Mercury	0.01	728,798	0.0011	51.8	1,652,952,343	111	0.0%	0.0%	0.0011	0.000012
Silver	0	728,798	0.0376	51.8	1,652,952,343	3,882	0.0%	0.0%	0.0376	No Criteria
Total Phenols	3	728,798	0.006097063	51.8	1,652,952,343	629	0.0%	0.5%	0.0061	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Chester Creek near Chester, PA (01477000) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 6.2-20d

Impact of CSO Discharge on Chester Creek Water Quality for Future Typical Year at Regulator 26

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	20,839	1,856,926	29.72	51.8	1,653,681,141	3,068,203	0.1%	0.7%	29.89	No Criteria
BOD_5	1,754	1,856,926	3.31	51.8	1,653,681,141	341,651	0.1%	0.5%	3.32	No Criteria
COD	19,559	1,856,926	11.86946279	51.8	1,653,681,141	1,225,471	0.1%	1.6%	12.05	No Criteria
Fecal Coliform (#/100ml)	3.39E+06	1,856,926	9,829	51.8	1,653,681,141	1.0E+10	0.1%	0.0%	9,821	770
Dissolved Oxygen	978	1,856,926	7.868844864	51.8	1,653,681,141	812,424	0.1%	0.1%	7.87	> 6.5
Oil & Grease	2,052	1,856,926	2.18	51.8	1,653,681,141	225,115	0.1%	0.9%	2.20	No Criteria
Total Kjeldahl Nitrogen	851	1,856,926	1.50	51.8	1,653,681,141	154,953	0.1%	0.5%	1.51	No Criteria
Total Phosphorus	127	1,856,926	0.722313321	51.8	1,653,681,141	74,576	0.1%	0.2%	0.723	No Criteria
Total Zinc	45	1,856,926	0.0374	51.8	1,653,681,141	3,863	0.1%	1.2%	0.0378	0.1011924
Total Copper	12	1,856,926	0.0280	51.8	1,653,681,141	2,894	0.1%	0.4%	0.0281	0.0109878
Total Aluminum	323	1,856,926	0.3299	51.8	1,653,681,141	34,057	0.1%	0.9%	0.3326	0.087
Total Lead	21	1,856,926	0.0167	51.8	1,653,681,141	1,723	0.1%	1.2%	0.0169	0.0024145
Mercury	0.03	1,856,926	0.0011	51.8	1,653,681,141	111	0.1%	0.0%	0.0011	0.000012
Silver	1	1,856,926	0.0376	51.8	1,653,681,141	3,882	0.1%	0.0%	0.0376	No Criteria
Total Phenols	9	1,856,926	0.006126936	51.8	1,653,681,141	633	0.1%	1.3%	0.0062	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Chester Creek near Chester, PA (01477000) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 6.2-20e

Impact of CSO Discharge on Chester Creek Water Quality for Future Typical Year at Regulator 22

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	22,082	1,967,830	29.89	51.8	1,655,538,067	3,089,041	0.1%	0.7%	30.06	No Criteria
BOD_5	1,872	1,967,830	3.32	51.8	1,655,538,067	343,405	0.1%	0.5%	3.34	No Criteria
COD	20,751	1,967,830	12.04537435	51.8	1,655,538,067	1,245,030	0.1%	1.6%	12.23	No Criteria
Fecal Coliform (#/100ml)	3.71E+06	1,967,830	9,821	51.8	1,655,538,067	1.0E+10	0.1%	0.0%	9,813	770
Dissolved Oxygen	1,037	1,967,830	7.86948444	51.8	1,655,538,067	813,403	0.1%	0.1%	7.87	> 6.5
Oil & Grease	2,175	1,967,830	2.20	51.8	1,655,538,067	227,167	0.1%	0.9%	2.22	No Criteria
Total Kjeldahl Nitrogen	902	1,967,830	1.51	51.8	1,655,538,067	155,804	0.1%	0.6%	1.51	No Criteria
Total Phosphorus	135	1,967,830	0.722734114	51.8	1,655,538,067	74,703	0.1%	0.2%	0.723	No Criteria
Total Zinc	48	1,967,830	0.0378	51.8	1,655,538,067	3,908	0.1%	1.2%	0.0382	0.1011924
Total Copper	13	1,967,830	0.0281	51.8	1,655,538,067	2,906	0.1%	0.4%	0.0282	0.0109878
Total Aluminum	342	1,967,830	0.3326	51.8	1,655,538,067	34,380	0.1%	1.0%	0.3355	0.087
Total Lead	22	1,967,830	0.0169	51.8	1,655,538,067	1,743	0.1%	1.2%	0.0171	0.0024145
Mercury	0.03	1,967,830	0.0011	51.8	1,655,538,067	111	0.1%	0.0%	0.0011	0.000012
Silver	1	1,967,830	0.0376	51.8	1,655,538,067	3,883	0.1%	0.0%	0.0375	No Criteria
Total Phenols	9	1,967,830	0.006203425	51.8	1,655,538,067	641	0.1%	1.4%	0.0063	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Chester Creek near Chester, PA (01477000) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 6.2-20f

Impact of CSO Discharge on Chester Creek Water Quality for Future Typical Year at Regulator 25

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	6,679	595,201	30.06	51.8	1,657,505,897	3,111,123	0.0%	0.2%	30.12	No Criteria
BOD_5	566	595,201	3.34	51.8	1,657,505,897	345,278	0.0%	0.2%	3.34	No Criteria
COD	6,275	595,201	12.23159426	51.8	1,657,505,897	1,265,780	0.0%	0.5%	12.29	No Criteria
Fecal Coliform (#/100ml)	1.12E+06	595,201	9,813	51.8	1,657,505,897	1.0E+10	0.0%	0.0%	9,811	770
Dissolved Oxygen	314	595,201	7.870157912	51.8	1,657,505,897	814,439	0.0%	0.0%	7.87	> 6.5
Oil & Grease	658	595,201	2.22	51.8	1,657,505,897	229,342	0.0%	0.3%	2.22	No Criteria
Total Kjeldahl Nitrogen	273	595,201	1.51	51.8	1,657,505,897	156,706	0.0%	0.2%	1.52	No Criteria
Total Phosphorus	41	595,201	0.72317972	51.8	1,657,505,897	74,838	0.0%	0.1%	0.723	No Criteria
Total Zinc	15	595,201	0.0382	51.8	1,657,505,897	3,956	0.0%	0.4%	0.0384	0.1011924
Total Copper	4	595,201	0.0282	51.8	1,657,505,897	2,919	0.0%	0.1%	0.0282	0.0109878
Total Aluminum	103	595,201	0.3355	51.8	1,657,505,897	34,722	0.0%	0.3%	0.3364	0.087
Total Lead	7	595,201	0.0171	51.8	1,657,505,897	1,765	0.0%	0.4%	0.0171	0.0024145
Mercury	0.01	595,201	0.0011	51.8	1,657,505,897	111	0.0%	0.0%	0.0011	0.000012
Silver	0	595,201	0.0375	51.8	1,657,505,897	3,884	0.0%	0.0%	0.0375	No Criteria
Total Phenols	3	595,201	0.006284392	51.8	1,657,505,897	650	0.0%	0.4%	0.0063	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Chester Creek near Chester, PA (01477000) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 6.2-20g

Impact of CSO Discharge on Chester Creek Water Quality for Future Typical Year at Regulator 24

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	4,773	425,782	30.12	51.8	1,658,101,098	3,117,802	0.0%	0.2%	30.16	No Criteria
BOD_5	470	425,782	3.34	51.8	1,658,101,098	345,844	0.0%	0.1%	3.34	No Criteria
COD	4,608	425,782	12.28782005	51.8	1,658,101,098	1,272,055	0.0%	0.4%	12.33	No Criteria
Fecal Coliform (#/100ml)	1.41E+06	425,782	9,811	51.8	1,658,101,098	1.0E+10	0.0%	0.0%	9,810	770
Dissolved Oxygen	223	425,782	7.870361444	51.8	1,658,101,098	814,753	0.0%	0.0%	7.87	> 6.5
Oil & Grease	474	425,782	2.22	51.8	1,658,101,098	230,000	0.0%	0.2%	2.23	No Criteria
Total Kjeldahl Nitrogen	198	425,782	1.52	51.8	1,658,101,098	156,979	0.0%	0.1%	1.52	No Criteria
Total Phosphorus	30	425,782	0.723314255	51.8	1,658,101,098	74,879	0.0%	0.0%	0.723	No Criteria
Total Zinc	10	425,782	0.0384	51.8	1,658,101,098	3,971	0.0%	0.3%	0.0384	0.1011924
Total Copper	3	425,782	0.0282	51.8	1,658,101,098	2,923	0.0%	0.1%	0.0283	0.0109878
Total Aluminum	73	425,782	0.3364	51.8	1,658,101,098	34,826	0.0%	0.2%	0.3370	0.087
Total Lead	5	425,782	0.0171	51.8	1,658,101,098	1,771	0.0%	0.3%	0.0172	0.0024145
Mercury	0.01	425,782	0.0011	51.8	1,658,101,098	111	0.0%	0.0%	0.0011	0.000012
Silver	0	425,782	0.0375	51.8	1,658,101,098	3,885	0.0%	0.0%	0.0375	No Criteria
Total Phenols	2	425,782	0.006308839	51.8	1,658,101,098	653	0.0%	0.3%	0.0063	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Chester Creek near Chester, PA (01477000) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 6.2-20h

Impact of CSO Discharge on Chester Creek Water Quality for Future Typical Year at Regulator 12

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	4,259	379,467	30.16	51.8	1,658,526,880	3,122,575	0.0%	0.1%	30.19	No Criteria
BOD_5	348	379,467	3.34	51.8	1,658,526,880	346,314	0.0%	0.1%	3.35	No Criteria
COD	3,978	379,467	12.32916585	51.8	1,658,526,880	1,276,663	0.0%	0.3%	12.36	No Criteria
Fecal Coliform (#/100ml)	5.97E+05	379,467	9,810	51.8	1,658,526,880	1.0E+10	0.0%	0.0%	9,808	770
Dissolved Oxygen	200	379,467	7.870493411	51.8	1,658,526,880	814,976	0.0%	0.0%	7.87	> 6.5
Oil & Grease	419	379,467	2.23	51.8	1,658,526,880	230,474	0.0%	0.2%	2.23	No Criteria
Total Kjeldahl Nitrogen	173	379,467	1.52	51.8	1,658,526,880	157,177	0.0%	0.1%	1.52	No Criteria
Total Phosphorus	26	379,467	0.723413956	51.8	1,658,526,880	74,908	0.0%	0.0%	0.723	No Criteria
Total Zinc	9	379,467	0.0384	51.8	1,658,526,880	3,981	0.0%	0.2%	0.0385	0.1011924
Total Copper	2	379,467	0.0283	51.8	1,658,526,880	2,926	0.0%	0.1%	0.0283	0.0109878
Total Aluminum	66	379,467	0.3370	51.8	1,658,526,880	34,899	0.0%	0.2%	0.3376	0.087
Total Lead	4	379,467	0.0172	51.8	1,658,526,880	1,776	0.0%	0.2%	0.0172	0.0024145
Mercury	0.01	379,467	0.0011	51.8	1,658,526,880	111	0.0%	0.0%	0.0011	0.000012
Silver	0	379,467	0.0375	51.8	1,658,526,880	3,885	0.0%	0.0%	0.0375	No Criteria
Total Phenols	2	379,467	0.006326799	51.8	1,658,526,880	655	0.0%	0.3%	0.0063	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Chester Creek near Chester, PA (01477000) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 6.2-21

Impact of CSO Discharge on Ridley Creek Water Quality for Future Typical Year

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	239,711	21,471,795	35.48	27.6	870,621,189	1,928,396	2.4%	11.1%	38.93	No Criteria
BOD_5	35,516	21,471,795	3.12	27.6	870,621,189	169,744	2.4%	17.3%	3.69	No Criteria
COD	253,876	21,471,795	10	27.6	870,621,189	543,562	2.4%	31.8%	14.32	No Criteria
Fecal Coliform (#/100ml)	1.81E+08	21,471,795	16,104	27.6	870,621,189	8.8E+09	2.4%	2.0%	16,042	770
Dissolved Oxygen	10,986	21,471,795	8.1312	27.6	870,621,189	441,981	2.4%	2.4%	8.13	> 6.5
Oil & Grease	24,401	21,471,795	2.00	27.6	870,621,189	108,712	2.4%	18.3%	2.39	No Criteria
Total Kjeldahl Nitrogen	10,520	21,471,795	0.98	27.6	870,621,189	53,300	2.4%	16.5%	1.15	No Criteria
Total Phosphorus	1,556	21,471,795	0.37348	27.6	870,621,189	20,301	2.4%	7.1%	0.392	No Criteria
Total Zinc	492	21,471,795	0.0346	27.6	870,621,189	1,880	2.4%	20.7%	0.0426	0.0866451
Total Copper	129	21,471,795	0.0275	27.6	870,621,189	1,496	2.4%	8.0%	0.0292	0.0093958
Total Aluminum	3,534	21,471,795	0.3020	27.6	870,621,189	16,416	2.4%	17.7%	0.3582	0.087
Total Lead	214	21,471,795	0.0164	27.6	870,621,189	890	2.4%	19.4%	0.0198	0.0019764
Mercury	0.35	21,471,795	0.0014	27.6	870,621,189	78	2.4%	0.4%	0.0014	0.000012
Silver	13	21,471,795	0.0379	27.6	870,621,189	2,061	2.4%	0.6%	0.0372	No Criteria
Total Phenols	111	21,471,795	0.005315	27.6	870,621,189	289	2.4%	27.8%	0.0072	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Ridley Creek at Media, PA (01476480) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 6.2-21a

Impact of CSO Discharge on Ridley Creek Water Quality for Future Typical Year at Regulator 18

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	145,357	13,010,692	35.48	27.6	870,621,189	1,928,396	1.5%	7.0%	37.59	No Criteria
BOD_5	20,229	13,010,692	3.12	27.6	870,621,189	169,744	1.5%	10.6%	3.44	No Criteria
COD	151,485	13,010,692	10	27.6	870,621,189	543,562	1.5%	21.8%	12.60	No Criteria
Fecal Coliform (#/100ml)	9.78E+07	13,010,692	16,104	27.6	870,621,189	8.8E+09	1.5%	1.1%	16,044	770
Dissolved Oxygen	6,685	13,010,692	8.1312	27.6	870,621,189	441,981	1.5%	1.5%	8.13	> 6.5
Oil & Grease	14,729	13,010,692	2.00	27.6	870,621,189	108,712	1.5%	11.9%	2.24	No Criteria
Total Kjeldahl Nitrogen	6,317	13,010,692	0.98	27.6	870,621,189	53,300	1.5%	10.6%	1.08	No Criteria
Total Phosphorus	936	13,010,692	0.37348	27.6	870,621,189	20,301	1.5%	4.4%	0.385	No Criteria
Total Zinc	301	13,010,692	0.0346	27.6	870,621,189	1,880	1.5%	13.8%	0.0395	0.0866451
Total Copper	79	13,010,692	0.0275	27.6	870,621,189	1,496	1.5%	5.0%	0.0286	0.0093958
Total Aluminum	2,158	13,010,692	0.3020	27.6	870,621,189	16,416	1.5%	11.6%	0.3367	0.087
Total Lead	132	13,010,692	0.0164	27.6	870,621,189	890	1.5%	12.9%	0.0185	0.0019764
Mercury	0.21	13,010,692	0.0014	27.6	870,621,189	78	1.5%	0.3%	0.0014	0.000012
Silver	8	13,010,692	0.0379	27.6	870,621,189	2,061	1.5%	0.4%	0.0375	No Criteria
Total Phenols	66	13,010,692	0.005315	27.6	870,621,189	289	1.5%	18.7%	0.0064	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Ridley Creek at Media, PA (01476480) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 6.2-21b

Impact of CSO Discharge on Ridley Creek Water Quality for Future Typical Year at Regulator 17

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	52,090	4,695,033	37.59	27.6	883,631,881	2,073,753	0.5%	2.5%	38.33	No Criteria
BOD_5	11,740	4,695,033	3.44	27.6	883,631,881	189,973	0.5%	5.8%	3.64	No Criteria
COD	62,747	4,695,033	12.59860876	27.6	883,631,881	695,047	0.5%	8.3%	13.66	No Criteria
Fecal Coliform (#/100ml)	7.67E+07	4,695,033	16,044	27.6	883,631,881	8.9E+09	0.5%	0.9%	16,098	770
Dissolved Oxygen	2,317	4,695,033	8.132646547	27.6	883,631,881	448,666	0.5%	0.5%	8.13	> 6.5
Oil & Grease	5,511	4,695,033	2.24	27.6	883,631,881	123,441	0.5%	4.3%	2.33	No Criteria
Total Kjeldahl Nitrogen	2,478	4,695,033	1.08	27.6	883,631,881	59,617	0.5%	4.0%	1.12	No Criteria
Total Phosphorus	362	4,695,033	0.384942226	27.6	883,631,881	21,237	0.5%	1.7%	0.389	No Criteria
Total Zinc	99	4,695,033	0.0395	27.6	883,631,881	2,181	0.5%	4.4%	0.0411	0.0866451
Total Copper	26	4,695,033	0.0286	27.6	883,631,881	1,576	0.5%	1.6%	0.0289	0.0093958
Total Aluminum	720	4,695,033	0.3367	27.6	883,631,881	18,574	0.5%	3.7%	0.3479	0.087
Total Lead	41	4,695,033	0.0185	27.6	883,631,881	1,021	0.5%	3.8%	0.0192	0.0019764
Mercury	0.08	4,695,033	0.0014	27.6	883,631,881	78	0.5%	0.1%	0.0014	0.000012
Silver	3	4,695,033	0.0375	27.6	883,631,881	2,069	0.5%	0.1%	0.0374	No Criteria
Total Phenols	27	4,695,033	0.006440947	27.6	883,631,881	355	0.5%	7.2%	0.0069	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Ridley Creek at Media, PA (01476480) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 6.2-21c

Impact of CSO Discharge on Ridley Creek Water Quality for Future Typical Year at Regulator 16

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	40,858	3,639,355	38.33	27.6	888,326,914	2,125,843	0.4%	1.9%	38.91	No Criteria
BOD_5	3,227	3,639,355	3.64	27.6	888,326,914	201,713	0.4%	1.6%	3.68	No Criteria
COD	37,948	3,639,355	13.66337063	27.6	888,326,914	757,793	0.4%	4.8%	14.29	No Criteria
Fecal Coliform (#/100ml)	4.67E+06	3,639,355	16,098	27.6	888,326,914	8.9E+09	0.4%	0.1%	16,040	770
Dissolved Oxygen	1,922	3,639,355	8.131440567	27.6	888,326,914	450,983	0.4%	0.4%	8.13	> 6.5
Oil & Grease	4,012	3,639,355	2.33	27.6	888,326,914	128,952	0.4%	3.0%	2.39	No Criteria
Total Kjeldahl Nitrogen	1,658	3,639,355	1.12	27.6	888,326,914	62,095	0.4%	2.6%	1.14	No Criteria
Total Phosphorus	248	3,639,355	0.38944242	27.6	888,326,914	21,599	0.4%	1.1%	0.392	No Criteria
Total Zinc	89	3,639,355	0.0411	27.6	888,326,914	2,280	0.4%	3.8%	0.0425	0.0866451
Total Copper	24	3,639,355	0.0289	27.6	888,326,914	1,601	0.4%	1.4%	0.0292	0.0093958
Total Aluminum	636	3,639,355	0.3479	27.6	888,326,914	19,294	0.4%	3.2%	0.3579	0.087
Total Lead	41	3,639,355	0.0192	27.6	888,326,914	1,062	0.4%	3.7%	0.0198	0.0019764
Mercury	0.06	3,639,355	0.0014	27.6	888,326,914	78	0.4%	0.1%	0.0014	0.000012
Silver	2	3,639,355	0.0374	27.6	888,326,914	2,072	0.4%	0.1%	0.0372	No Criteria
Total Phenols	17	3,639,355	0.006900321	27.6	888,326,914	383	0.4%	4.2%	0.0072	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Ridley Creek at Media, PA (01476480) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 6.2-21d

Impact of CSO Discharge on Ridley Creek Water Quality for Future Typical Year at Regulator 15

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	1,406	126,715	38.91	27.6	891,966,269	2,166,702	0.0%	0.1%	38.93	No Criteria
BOD_5	319	126,715	3.68	27.6	891,966,269	204,940	0.0%	0.2%	3.69	No Criteria
COD	1,697	126,715	14.2890462	27.6	891,966,269	795,741	0.0%	0.2%	14.32	No Criteria
Fecal Coliform (#/100ml)	2.09E+06	126,715	16,040	27.6	891,966,269	8.9E+09	0.0%	0.0%	16,042	770
Dissolved Oxygen	62	126,715	8.132777126	27.6	891,966,269	452,905	0.0%	0.0%	8.13	> 6.5
Oil & Grease	149	126,715	2.39	27.6	891,966,269	132,965	0.0%	0.1%	2.39	No Criteria
Total Kjeldahl Nitrogen	67	126,715	1.14	27.6	891,966,269	63,753	0.0%	0.1%	1.15	No Criteria
Total Phosphorus	10	126,715	0.392310113	27.6	891,966,269	21,847	0.0%	0.0%	0.392	No Criteria
Total Zinc	3	126,715	0.0425	27.6	891,966,269	2,369	0.0%	0.1%	0.0426	0.0866451
Total Copper	1	126,715	0.0292	27.6	891,966,269	1,625	0.0%	0.0%	0.0292	0.0093958
Total Aluminum	19	126,715	0.3579	27.6	891,966,269	19,930	0.0%	0.1%	0.3582	0.087
Total Lead	1	126,715	0.0198	27.6	891,966,269	1,103	0.0%	0.1%	0.0198	0.0019764
Mercury	0.00	126,715	0.0014	27.6	891,966,269	78	0.0%	0.0%	0.0014	0.000012
Silver	0	126,715	0.0372	27.6	891,966,269	2,074	0.0%	0.0%	0.0372	No Criteria
Total Phenols	1	126,715	0.007172504	27.6	891,966,269	399	0.0%	0.2%	0.0072	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow from USGS gage Ridley Creek at Media, PA (01476480) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

Table 6.2-22

Impact of CSO Discharge on Delaware River Water Quality for Future Typical Year

Pollutant	CSO Loading (lbs/yr)	CSO Volume (cu.ft/yr)	Stream Background Concentration[1] (mg/l)	Harmonic Mean Flow[2] (cfs)	Average Stream Volume (cu.ft./yr)	Stream Background Load[3] (lbs/yr)	CSO Percent of Background Volume	CSO Percent of Background Load	Estimated Concentration (mg/l)	Water Quality Standard (mg/l)
Total Suspended Solids	789,321	70,563,565	19.82	8711.0	274,710,096,000	339,988,482	0.0%	0.2%	19.86	No Criteria
BOD_5	97,793	70,563,565	2.64	8711.0	274,710,096,000	45,236,323	0.0%	0.2%	2.64	No Criteria
COD	799,878	70,563,565	25.678	8711.0	274,710,096,000	440,408,831	0.0%	0.2%	25.72	No Criteria
Fecal Coliform (#/100ml)[4]	4.19E+08	70,563,565	834	8711.0	274,710,096,000	1.4E+11	0.0%	0.3%	836	770/200
Dissolved Oxygen	36,511	70,563,565	6.4632	8711.0	274,710,096,000	110,851,716	0.0%	0.0%	6.46	> 6.5
Oil & Grease	79,353	70,563,565	2.00	8711.0	274,710,096,000	34,302,425	0.0%	0.2%	2.00	No Criteria
Total Kjeldahl Nitrogen	33,726	70,563,565	0.71	8711.0	274,710,096,000	12,171,701	0.0%	0.3%	0.71	No Criteria
Total Phosphorus	5,008	70,563,565	0.1652	8711.0	274,710,096,000	2,833,380	0.0%	0.2%	0.165	No Criteria
Total Zinc	1,655	70,563,565	0.0365	8711.0	274,710,096,000	626,808	0.0%	0.3%	0.0366	0.0809746
Total Copper	436	70,563,565	0.0162	8711.0	274,710,096,000	277,730	0.0%	0.2%	0.0162	0.0087758
Total Aluminum	11,864	70,563,565	0.4200	8711.0	274,710,096,000	7,203,509	0.0%	0.2%	0.4206	0.087
Total Lead	733	70,563,565	0.0204	8711.0	274,710,096,000	349,130	0.0%	0.2%	0.0204	0.0018105
Mercury	1.14	70,563,565	0.0011	8711.0	274,710,096,000	19,036	0.0%	0.0%	0.0011	0.000012
Silver	43	70,563,565	0.0379	8711.0	274,710,096,000	650,374	0.0%	0.0%	0.0379	No Criteria
Total Phenols	351	70,563,565	0.005315	8711.0	274,710,096,000	91,159	0.0%	0.4%	0.0053	0.02

[1] Based on STORET retrieved actual data.

[2] Harmonic mean flow is sum from USGS gages Delaware River at Trenton (01463500) and Schuykill River at Philadelphia (01474500) transfered to mouth.

[3] Background load based on total annual flow = 525,600 min

[4] Criteria below RM 81.8 is 200 #/100ml and 770 #/100ml above RM 81.8

APPENDIX A

CSO SAMPLING RESULTS

Table A-1

Summary of WRTP Influent Sampling

Pollutant	1995 Sewage Concentrations (mg/l)	1996 Sewage Concentrations (mg/l)	Flow Weighted Sewage Concentrations (mg/l)
Flow	27.09	29.28	28.19
Total Suspended Solids	182.08	161.17	171.22
Ammonia as N	8.71	4.96	6.76
BOD_5	125.33	113.58	119.23
$CBOD_5$	N/A	N/A	N/A
COD	N/A	358.17	358.17
Fecal Coliform	N/A	N/A	1,000,000
Oil & Grease	23.82	20.9	22.30
Total Kjeldahl Nitrogen	13.89	10.23	11.99
Total Phosphorus	1.735	1.625	1.68
pH	N/A	N/A	N/A
Total Hardness	N/A	N/A	N/A
Total Zinc	0.17833	0.1695	0.1737
Total Copper	0.047	0.03675	0.0417
Total Aluminum	0.84917	1.93167	1.41
Total Lead	0.025	0.01017	0.0173
Mercury	0.00033	0.00023	0.00028
Silver	0.005	0.01083	0.0080
Total Phenols	3.2125	4.31111	3.78

Notes: 1. Sampling conducted at grit removal station.
2. Waste stream included industrial discharge for Sun Oil Company and Kimberly-Clark.
3. Grab sample for fecal coliform taken 7 July 1997.

Table A-2

Storm Event Sampling Results (mg/l)

(1 March 1997 - rain amount = 0.27")

Pollutant	2nd & Dock PS First Hour	2nd & Dock PS Composite	EPS-1 First Hour[1]	EPS-1 Composite[1]	Regulator 5 Front & Townsend First Hour	Regulator 5 Front & Townsend Composite
Total Suspended Solids	162	259	267	221	147	80
BOD_5	144	150	127	139	80	64
COD	391	427	409	518	183	159
Fecal Coliform	NS	NS	NS	NS	NS	NS
Dissolved Oxygen	6.16	NS	6.24	NS	8.6	8.82
Oil & Grease	21.5	57	48.5	54.5	16.4	14.8
Total Kjeldahl Nitrogen	7.56	6.23	18.32	13.5	24.32	13.86
Total Phosphorus	3.8	2.5	4.6	2	1.6	0.94
pH	6.91	NS	6.89	NS	6.68	6.79
Total Hardness	140	100	170	120	120	83
Total Zinc	0.123	0.237	0.177	0.282	0.243	0.115
Total Copper	0.046	0.08	0.074	0.066	0.085	0.032
Total Aluminum	1.11	4.1	1.75	3.03	3.56	1.99
Total Lead	0.03	0.079	0.032	0.042	0.088	<0.024
Mercury	<0.0002	0.001	<0.0002	0.002	<0.0002	<0.0002
Silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Phenols	0.29	<0.05	0.07	0.09	0.07	0.07

[1] Waste stream includes industrial discharge from Medford Meats and American Re-Fuel.

NS - No sample collected.

Table A-3

Storm Event Sampling Results (mg/l)

(10 March 1997 - rain amount = 0.54")

Pollutant	2nd & Dock PS First Hour	2nd & Dock PS Composite	EPS-1 First Hour[1]	EPS-1 Composite[1]	Regulator 25 5th & Penn First Hour[2]	Regulator 25 5th & Penn Composite[2]
Total Suspended Solids	208	188	448	166	20	62
BOD_5	76	33	115	29	<20	<20
COD	159	22	371	116	0	13
Fecal Coliform	NS	NS	NS	NS	NS	NS
Dissolved Oxygen	7.84	NS	NS	NS	11.48	11.53
Oil & Grease	14.6	37.9	21.2	23.8	1.5	16.1
Total Kjeldahl Nitrogen	9.72	7.25	8.23	6.85	1.21	2.28
Total Phosphorus	NS	NS	NS	NS	NS	NS
pH	6.93	NS	6.95	NS	9.04	6.89
Total Hardness	110	75	120	80	95	48
Total Zinc	0.094	0.124	0.144	0.155	0.029	0.184
Total Copper	0.035	0.041	0.041	0.032	0.012	0.057
Total Aluminum	1.39	2.05	1.22	1.24	0.772	1.49
Total Lead	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024
Mercury	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0002
Silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Phenols	0.18	0.16	<0.05	<0.05	0.05	<0.05

[1] Waste stream includes industrial discharge from Medford Meats and American Re-Fuel.

[2] Sample believed to be contaminated with river water.

NS - No sample collected.

Table A-4

Storm Event Sampling Results (mg/l)

(14 March 1997 - rain amount = 0.89")

Pollutant	2nd & Dock PS First Hour	2nd & Dock PS Composite	EPS-1 First Hour[1]	EPS-1 Composite[1]	Regulator 5 Front & Townsend First Hour	Regulator 5 Front & Townsend Composite	Regulator 25 5th & Penn First Hour	Regulator 25 5th & Penn Composite
Total Suspended Solids	210	123	192	177	105	50	162	63
BOD_5	104	49	99	77	<27	21	42	<19
COD	277	150	438	371	141	60	132	85
Fecal Coliform	NS	NS	NS	NS	NS	NS	NS	NS
Dissolved Oxygen	6.93	NS	7.97	NS	9.63	9.69	10.41	10.53
Oil & Grease	30.3	16.4	28.6	34	13.3	8.5	5.6	6.7
Total Kjeldahl Nitrogen	13.51	8.23	12.38	10.02	4.74	3.57	4.44	2.23
Total Phosphorus	2.7	1.9	2.2	1.82	1.1	0.63	1.5	0.54
pH	6.99	NS	6.72	NS	7	7.1	6.9	6.98
Total Hardness	110	98	100	98	85	90	83	85
Total Zinc	0.195	0.115	0.182	0.169	0.15	0.091	0.364	0.198
Total Copper	0.059	0.036	0.068	0.048	0.032	0.013	0.214	0.169
Total Aluminum	2.65	2.47	2.91	2.54	2.7	1.98	3.45	2.64
Total Lead	0.051	<0.024	0.032	<0.024	0.027	<0.024	0.088	0.089
Mercury	0.0003	<0.0002	0.0006	0.0003	<0.0002	<0.0002	0.0002	<0.0002
Silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01
Total Phenols	0.1	0.06	0.19	<0.05	0.11	0.08	0.05	0.1

[1] Waste stream includes industrial discharge from Medford Meats and American Re-Fuel.

NS - No sample collected.

Table A-5

Storm Event Sampling Results (mg/l)

(26 March 1997 - rain amount = 0.44")

Pollutant	2nd & Dock PS First Hour	2nd & Dock PS Composite	EPS-1 First Hour[1]	EPS-1 Composite[1]	Regulator 5 Front & Townsend First Hour	Regulator 5 Front & Townsend Composite	Regulator 25 5th & Penn First Hour	Regulator 25 5th & Penn Composite	Regulator 19 12th & Crozer First Hour	Regulator 19 14th & Crozer Composite
Total Suspended Solids	No samples	No samples	No samples	No samples	277	54	374	679	575	No samples
BOD_5					51	30	118	137	172	
COD					190	67	471	326	485	
Fecal Coliform					NS	NS	NS	NS	NS	
Dissolved Oxygen					NS	NS	NS	NS	NS	
Oil & Grease					25.6	9.4	34.8	7	13.6	
Total Kjeldahl Nitrogen					3.98	4.99	10.14	9.22	16.9	
Total Phosphorus					1.6	0.64	4.7	4	NS	
pH					NS	NS	NS	NS	NS	
Total Hardness					120	68	120	93	140	
Total Zinc					0.919	0.104	0.851	0.442	0.764	
Total Copper					0.561	0.022	0.379	0.073	0.232	
Total Aluminum					7.95	1.1	9.32	5.69	8.81	
Total Lead					0.349	0.028	0.273	0.133	0.325	
Mercury					0.0003	<0.0002	<0.0002	0.0002	0.0004	
Silver					<0.01	<0.01	<0.01	<0.01	<0.01	
Total Phenols					<0.05	<0.05	0.26	0.13	NS	

[1] Waste stream includes industrial discharge from Medford Meats and American Re-Fuel.

NS - No sample collected.

Table A-6

Storm Event Sampling Results (mg/l)

(12 April 1997 - rain amount = 0.48")

Pollutant	2nd & Dock PS First Hour[1]	2nd & Dock PS Composite[1]	EPS-1 First Hour[1,2]	EPS-1 Composite[1,2]	Regulator 5 Front & Townsend First Hour	Regulator 5 Front & Townsend Composite	Regulator 25 5th & Penn First Hour[3]	Regulator 25 5th & Penn Composite[3]
Total Suspended Solids	2437	60	911	21	143	87	20	13
BOD_5	>228	>227	>226	142	82	42	39	<20
COD	1300	199	1265	226	248	127	36	13
Fecal Coliform	NS	NS	NS	NS	93,636	270,000	60,909	5,456
Dissolved Oxygen	5.42	NS	6.12	NS	7.64	7.63	8.21	9.91
Oil & Grease	35.5	45.5	17.9	24.1	NS	NS	NS	NS
Total Kjeldahl Nitrogen	21.79	8.76	18.49	8.3	5.15	3.93	3.37	0.16
Total Phosphorus	3.5	1.7	2.7	1.3	1.2	1.2	0.68	0.71
pH	6.86	NS	6.78	NS	6.68	6.71	7	7.41
Total Hardness	110	93	120	180	78	72	110	120
Total Zinc	0.302	0.096	0.336	0.111	0.169	0.128	0.03	0.024
Total Copper	0.125	0.042	0.139	0.035	0.043	0.032	0.017	0.014
Total Aluminum	4.7	1.41	3.92	1.31	3.09	1.88	0.387	0.343
Total Lead	0.107	<0.024	0.075	<0.024	0.06	0.042	<0.024	0.032
Mercury	<0.0002	0.0013	0.0021	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Phenols	0.13	0.14	<0.05	0.09	0.06	0.14	<0.05	0.09

[1] Sample results believed to be influenced by an industrial discharge slug load.

[2] Waste stream includes industrial discharge from Medford Meats and American Re-Fuel.

[3] Sample believed to be contaminated with river water.

NS - No sample collected.

Table A-7

Storm Event Sampling Results (mg/l)

(27-28 April 1997 - rain amount = 1.35")

Pollutant	2nd & Dock PS First Hour	2nd & Dock PS Composite	EPS-1 First Hour[1]	EPS-1 Composite[1]	Regulator 5 Front & Townsend First Hour	Regulator 5 Front & Townsend Composite	Regulator 25 5th & Penn First Hour	Regulator 25 5th & Penn Composite
Total Suspended Solids	543	318	397	317	83	70	80	47
BOD_5	136	43	84	87	61	51	<21	<21
COD	757	210	465	614	118	71	47	40
Fecal Coliform	NS	NS	NS	NS	28,182	13,636	10,909	12,727
Dissolved Oxygen	5.84	NS	5.88	NS	8.19	9.82	9.89	9.00
Oil & Grease	23.9	14.5	19.3	19.0	129.6	6.4	11.6	4.9
Total Kjeldahl Nitrogen	17.41	7.95	13.26	12.53	6.66	4.06	1.11	1.29
Total Phosphorus	2.7	1.7	1.5	2	0.77	1.2	0.9	0.65
pH	6.9	NS	6.84	NS	6.82	7.02	6.98	7.03
Total Hardness	110	73	120	85	105	70	58	45
Total Zinc	0.211	0.246	0.16	0.251	0.102	0.111	0.177	0.12
Total Copper	0.075	0.07	0.053	0.071	0.023	0.026	0.104	0.079
Total Aluminum	5.49	5.87	1.68	4.09	0.919	1.38	3.59	2.5
Total Lead	0.031	0.073	0.05	0.06	<0.024	<0.024	0.06	0.028
Mercury	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Phenols	0.27	0.07	0.15	0.15	0.11	0.09	<0.05	<0.05

[1] Waste stream includes industrial discharge from Medford Meats and American Re-Fuel.

NS - No sample collected.

Table A-8

Storm Event Sampling Results (mg/l)

(3 May 1997 - rain amount = 0.48")

Pollutant	2nd & Dock PS First Hour	2nd & Dock PS Composite	EPS-1 First Hour[1]	EPS-1 Composite[1]	Regulator 5 Front & Townsend First Hour	Regulator 5 Front & Townsend Composite	Regulator 25 5th & Penn First Hour	Regulator 25 5th & Penn Composite
Total Suspended Solids	220	108	312	176	264	64	No samples	No samples
BOD_5	63	51	84	87	91	56		
COD	167	219	451	297	210	109		
Fecal Coliform	NS	NS	NS	NS	111,818	133,636		
Dissolved Oxygen	7.78	NS	6.74	NS	4.42	8.46		
Oil & Grease	10.1	23.5	23.9	21.3	14.2	4.5		
Total Kjeldahl Nitrogen	7.64	8.05	9.53	10.9	7.64	4.89		
Total Phosphorus	1.9	1.8	2	2.4	1.8	0.92		
pH	6.78	NS	6.86	NS	6.69	6.79		
Total Hardness	83	80	100	100	78	80		
Total Zinc	0.156	0.106	0.191	0.131	0.166	0.074		
Total Copper	0.039	0.019	0.061	0.036	0.033	0.008		
Total Aluminum	1.78	1.12	1.11	1.2	1.5	0.423		
Total Lead	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024		
Mercury	<0.0002	0.0003	0.0003	<0.0002	<0.0002	<0.0002		
Silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Total Phenols	0.1	0.11	0.17	0.13	0.13	0.13		

[1] Waste stream includes industrial discharge from Medford Meats and American Re-Fuel.

NS - No sample collected.

Table A-9

Storm Event Sampling Results (mg/l)

(9 May 1997 - rain amount = 0.31")

Pollutant	2nd & Dock PS First Hour	2nd & Dock PS Composite	EPS-1 First Hour[1]	EPS-1 Composite[1]	Regulator 5 Front & Townsend First Hour	Regulator 5 Front & Townsend Composite	Regulator 25 5th & Penn First Hour	Regulator 25 5th & Penn Composite
Total Suspended Solids	195	153	155	163	51	62	No samples	No samples
BOD_5	119	80	69	132	38	<25		
COD	176	172	308	310	136	87		
Fecal Coliform	NS	NS	NS	NS	30,909	39,091		
Dissolved Oxygen	4.89	NS	6.5	NS	8.18	8.45		
Oil & Grease	27.5	16.1	21.4	13.7	12.3	4.6		
Total Kjeldahl Nitrogen	11.71	6.83	9.27	14.46	4.89	3.62		
Total Phosphorus	3.4	4.9	1.3	1.6	0.76	0.52		
pH	6.78	NS	6.84	NS	6.86	6.78		
Total Hardness	103	120	85	90	55	75		
Total Zinc	0.131	0.136	0.12	0.128	0.087	0.099		
Total Copper	0.035	0.028	0.02	0.5	0.008	0.005		
Total Aluminum	0.83	1.36	1.14	1.65	0.666	1.07		
Total Lead	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024		
Mercury	0.0006	<0.0002	<0.0002	0.0009	0.0004	0.0013		
Silver	<0.01	0.02	<0.01	<0.01	<0.01	<0.01		
Total Phenols	0.18	0.055	0.14	0.082	0.054	<0.05		

[1] Waste stream includes industrial discharge from Medford Meats and American Re-Fuel.

NS - No sample collected.

Table A-10

Storm Event Sampling Results (mg/l)

(25 May 1997 - rain amount = 0.85")

Pollutant	2nd & Dock PS First Hour[1]	2nd & Dock PS Composite	EPS-1 First Hour[2]	EPS-1 Composite[2]	Regulator 5 Front & Townsend First Hour	Regulator 5 Front & Townsend Composite	Regulator 25 5th & Penn First Hour	Regulator 25 5th & Penn Composite
Total Suspended Solids	905	242	363	193	135	No samples	119	No samples
BOD_5	>245	76	116	112	73		34	
COD	1271	266	436	322	205		103	
Fecal Coliform	NS	NS	NS	NS	224,545		45,455	
Dissolved Oxygen	3.7	NS	1.7	NS	4.99		6.72	
Oil & Grease	56.8	18.4	16.1	9.9	NS		NS	
Total Kjeldahl Nitrogen	22.2	11.12	16.7	11.05	7.23		3.57	
Total Phosphorus	3.1	2.6	2	1.7	1.5		0.66	
pH	7	NS	6.79	NS	6.75		7.03	
Total Hardness	130	85	170	120	85		95	
Total Zinc	0.344	0.212	0.222	0.199	0.158		0.147	
Total Copper	0.142	0.094	0.081	0.061	0.043		0.072	
Total Aluminum	3.7	2.44	1.73	2.67	1.61		1.54	
Total Lead	0.108	0.071	0.033	0.032	0.064		0.041	
Mercury	0.0004	<0.0002	0.0002	<0.0002	<0.0002		<0.0002	
Silver	0.02	<0.01	<0.01	<0.01	<0.01		<0.01	
Total Phenols	0.12	<0.05	0.16	<0.05	0.09		<0.05	

[1] Sample results believed to be influenced by an industrial discharge slug load.

[2] Waste stream includes industrial discharge from Medford Meats and American Re-Fuel.

NS - No sample collected.

APPENDIX B

TYPICAL YEAR PRECIPITATION EVENTS

Table B-1

Typical Year Precipitation Events

Event	Year	Month	Day	Hour	Precip.	Total Precip.
1	98	1	1	0	0.04	
1	98	1	1	1	0.01	
1	98	1	1	3	0.03	
1	98	1	1	4	0.03	
1	98	1	1	5	0.02	0.13
2	98	1	2	4	0.04	
2	98	1	2	5	0.02	
2	98	1	2	6	0.01	0.07
3	98	1	6	17	0.05	
3	98	1	6	18	0.06	
3	98	1	6	19	0.07	
3	98	1	6	20	0.2	
3	98	1	6	21	0.27	
3	98	1	6	22	0.25	
3	98	1	6	23	0.23	
3	98	1	7	0	0.11	
3	98	1	7	1	0.11	
3	98	1	7	2	0.07	
3	98	1	7	3	0.01	1.43
4	98	1	11	15	0.03	
4	98	1	11	16	0.01	
4	98	1	11	17	0.01	
4	98	1	11	18	0.01	0.06
5	98	1	14	0	0.03	
5	98	1	14	1	0.02	0.05
6	98	1	15	15	0.01	
6	98	1	15	16	0.01	
6	98	1	15	17	0.01	
6	98	1	15	20	0.01	0.04
7	98	1	20	4	0.01	
7	98	1	20	5	0.01	
7	98	1	20	6	0.04	
7	98	1	20	7	1	
7	98	1	20	8	0.18	1.24
8	98	1	20	21	0.01	
8	98	1	20	22	0.02	
8	98	1	20	23	0.01	
8	98	1	21	0	0.02	
8	98	1	21	1	0.01	0.07
9	98	2	3	20	0.03	
9	98	2	3	21	0.07	
9	98	2	3	22	0.09	
9	98	2	3	23	0.14	

Table B-1
(continued)
Typical Year Precipitation Events

Event	Year	Month	Day	Hour	Precip.	Total Precip.
9	98	2	4	0	0.01	0.34
10	98	2	11	4	0.02	
10	98	2	11	5	0.03	0.05
11	98	2	14	17	0.02	
11	98	2	14	18	0.01	
11	98	2	14	19	0	
11	98	2	14	20	0	
11	98	2	14	21	0.07	
11	98	2	14	22	0.07	
11	98	2	14	23	0.06	
11	98	2	15	0	0.01	
11	98	2	15	1	0.01	
11	98	2	15	2	0.13	
11	98	2	15	3	0.09	
11	98	2	15	4	0	
11	98	2	15	5	0.01	
11	98	2	15	6	0.06	
11	98	2	15	7	0.1	
11	98	2	15	8	0.09	
11	98	2	15	9	0.17	
11	98	2	15	10	0.01	
11	98	2	15	11	0.05	0.96
12	98	2	15	18	0.01	
12	98	2	15	19	0.01	
12	98	2	15	22	0.03	
12	98	2	15	23	0.01	0.06
13	98	2	18	0	0.01	
13	98	2	18	1	0.01	
13	98	2	18	2	0.01	0.03
14	98	2	23	19	0.15	
14	98	2	23	20	0.19	
14	98	2	23	21	0.19	
14	98	2	23	22	0.17	0.7
15	98	2	27	23	0.01	
15	98	2	28	0	0.02	
15	98	2	28	1	0.06	
15	98	2	28	2	0.06	
15	98	2	28	3	0.05	
15	98	2	28	4	0.06	
15	98	2	28	5	0.03	
15	98	2	28	6	0.05	
15	98	2	28	7	0.03	

Table B-1
(continued)
Typical Year Precipitation Events

Event	Year	Month	Day	Hour	Precip.	Total Precip.
15	98	2	28	8	0.04	
15	98	2	28	9	0.09	
15	98	2	28	10	0.1	0.6
16	98	3	4	18	0.09	
16	98	3	4	19	0.1	
16	98	3	4	20	0.12	
16	98	3	4	21	0.07	
16	98	3	4	22	0.02	
16	98	3	4	23	0.01	0.41
17	98	3	12	15	0.1	
17	98	3	12	16	0.09	
17	98	3	12	17	0.18	
17	98	3	12	18	0.06	
17	98	3	12	19	0	
17	98	3	12	20	0	
17	98	3	12	21	0.01	
17				22 - 5	0	
17	98	3	13	6	0.01	
17	98	3	13	7	0.01	0.46
18	98	3	18	6	0.01	
18				7 - 10	0	
18	98	3	18	11	0.01	
18	98	3	18	12	0.06	
18	98	3	18	13	0.07	
18	98	3	18	14	0.06	
18	98	3	18	15	0.05	
18	98	3	18	16	0.01	
18	98	3	18	17	0.08	
18	98	3	18	18	0.04	
18	98	3	18	19	0.02	0.41
19	98	3	20	12	0.08	
19	98	3	20	13	0.05	
19	98	3	20	14	0.1	
19	98	3	20	15	0.14	
19	98	3	20	16	0.01	
19	98	3	20	17	0.06	
19	98	3	20	18	0.01	
19	98	3	20	19	0.03	
19	98	3	20	20	0.03	
19	98	3	20	21	0.01	0.52
20	98	3	22	12	0.09	
20	98	3	22	13	0.07	

Table B-1
(continued)
Typical Year Precipitation Events

Event	Year	Month	Day	Hour	Precip.	Total Precip.
20	98	3	22	14	0.04	
20	98	3	22	15	0.01	
20	98	3	22	16	0.01	
20	98	3	22	17	0.06	
20	98	3	22	18	0.03	
20	98	3	22	19	0.01	
20	98	3	22	20	0.01	
20	98	3	22	21	0.01	
20	98	3	22	22	0.01	0.35
21	98	3	26	19	0.21	
21	98	3	26	20	0.1	
21	98	3	26	21	0.01	0.32
22	98	3	29	4	0.01	
22	98	3	29	5	0.01	
22	98	3	29	6	0.01	
22	98	3	29	7	0.05	
22	98	3	29	8	0.1	
22	98	3	29	9	0.13	
22	98	3	29	10	0.2	
22	98	3	29	11	0.2	
22	98	3	29	12	0.18	
22	98	3	29	13	0.11	
22	98	3	29	14	0.03	
22	98	3	29	15	0.06	
22	98	3	29	16	0.06	
22	98	3	29	17	0.03	
22	98	3	29	18	0.01	1.19
23	98	3	31	2	0.05	
23	98	3	31	3	0.04	
23	98	3	31	4	0.02	
23	98	3	31	5	0.01	
23	98	3	31	6	0.02	
23	98	3	31	7	0.02	
23	98	3	31	8	0.01	0.17
24	98	4	1	0	0.04	
24	98	4	1	1	0.11	
24	98	4	1	2	0.2	
24	98	4	1	3	0.1	
24	98	4	1	4	0.18	
24	98	4	1	5	0.01	
24	98	4	1	6	0.01	
24	98	4	1	7	0.27	

Table B-1
(continued)
Typical Year Precipitation Events

Event	Year	Month	Day	Hour	Precip.	Total Precip.
24	98	4	1	8	0.1	
24	98	4	1	9	0.01	
24	98	4	1	10	0	
24	98	4	1	11	0.02	
24	98	4	1	12	0.06	
24	98	4	1	13	0.01	1.12
25	98	4	7	7	0.06	
25	98	4	7	8	0.1	
25	98	4	7	9	0.12	
25	98	4	7	10	0.1	
25	98	4	7	11	0.05	0.43
26	98	4	7	19	0.51	
26	98	4	7	20	0.1	
26	98	4	7	21	0.04	
26	98	4	7	22	0.02	
26	98	4	7	23	0.06	
26	98	4	8	0	0.02	
26	98	4	8	1	0.04	
26	98	4	8	2	0	
26	98	4	8	3	0.01	0.8
27	98	4	11	8	0.02	
27	98	4	11	9	0.06	
27	98	4	11	10	0.08	
27	98	4	11	11	0.05	0.21
28	98	4	12	14	0.04	
28	98	4	12	15	0.1	
28	98	4	12	16	0.11	
28	98	4	12	17	0.1	
28	98	4	12	18	0.04	
28	98	4	12	19	0.03	
28	98	4	12	20	0.03	
28	98	4	12	21	0.04	
28	98	4	12	22	0.04	
28	98	4	12	23	0.07	
28	98	4	13	0	0.1	
28	98	4	13	1	0.01	0.71
29	98	4	13	12	0.02	
29	98	4	13	13	0	
29	98	4	13	14	0	
29	98	4	13	15	0.01	
29	98	4	13	16	0	
29	98	4	13	17	0	

Table B-1
(continued)
Typical Year Precipitation Events

Event	Year	Month	Day	Hour	Precip.	Total Precip.
29	98	4	13	18	0.01	0.04
30	98	4	15	9	0.01	
30	98	4	15	10	0.03	0.04
31	98	4	20	14	0.03	
31	98	4	20	15	0.05	0.08
32	98	5	2	3	0.02	
32				4 - 22	0	
32	98	5	2	23	0.01	
32	98	5	3	0	0	
32	98	5	3	1	0.05	
32	98	5	3	2	0.07	0.15
33	98	5	6	6	0.06	
33	98	5	6	7	0.02	
33	98	5	6	8	0.02	
33	98	5	6	9	0.07	
33	98	5	6	10	0.03	0.2
34	98	5	7	4	0.06	
34	98	5	7	5	0.01	
34	98	5	7	6	0.01	
34	98	5	7	7	0.04	
34	98	5	7	8	0.19	
34	98	5	7	9	0.17	
34	98	5	7	10	0.19	
34	98	5	7	11	0.24	
34	98	5	7	12	0.04	
34	98	5	7	13	0.07	
34	98	5	7	14	0.11	
34	98	5	7	15	0	
34	98	5	7	16	0.15	
34	98	5	7	17	0.02	
34	98	5	7	18	0	
34	98	5	7	19	0	
34	98	5	7	20	0.05	
34	98	5	7	21	0.04	
34	98	5	7	22	0.01	1.4
35	98	5	8	14	0.01	
35	98	5	8	15	0.02	
35	98	5	8	16	0	
35	98	5	8	17	0	
35	98	5	8	18	0	
35	98	5	8	19	0.09	
35	98	5	8	20	0.01	0.13

Table B-1
(continued)
Typical Year Precipitation Events

Event	Year	Month	Day	Hour	Precip.	Total Precip.
36	98	5	11	10	0.02	
36	98	5	11	11	0.07	
36	98	5	11	12	0.16	
36	98	5	11	13	0.03	
36	98	5	11	14	0.03	
36	98	5	11	15	0.02	
36	98	5	11	16	0	
36	98	5	11	17	0	
36	98	5	11	18	0	
36	98	5	11	19	0.04	0.37
37	98	5	14	14	0.01	
37	98	5	14	15	0	
37	98	5	14	16	0	
37	98	5	14	17	0.02	
37	98	5	14	18	0.03	
37	98	5	14	19	0.04	
37	98	5	14	20	0.01	0.11
38	98	5	15	17	0.01	
38	98	5	15	18	0.39	
38	98	5	15	19	0.01	0.41
39	98	5	19	17	0.22	
39	98	5	19	18	0.02	
39	98	5	19	19	0	
39	98	5	19	20	0	
39	98	5	19	21	0	
39	98	5	19	22	0	
39	98	5	19	23	0	
39	98	5	20	0	0.02	
39	98	5	20	1	0.05	0.31
40	98	5	22	2	0.02	
40	98	5	22	3	0.03	
40	98	5	22	4	0.01	
40	98	5	22	5	0.02	0.08
41	98	5	29	7	0.02	
41	98	5	29	8	0.03	
41	98	5	29	9	0.07	
41	98	5	29	10	0.04	
41	98	5	29	11	0	
41	98	5	29	12	0.02	
41	98	5	29	13	0	
41	98	5	29	14	0	
41	98	5	29	15	0.01	

Table B-1
(continued)
Typical Year Precipitation Events

Event	Year	Month	Day	Hour	Precip.	Total Precip.
41	98	5	29	16	0.01	
41	98	5	29	17	0.03	
41	98	5	29	18	0.07	
41	98	5	29	19	0.02	0.32
42	98	6	3	20	0.07	
42	98	6	3	21	0.05	
42	98	6	3	22	0	
42	98	6	3	23	0	
42	98	6	4	0	0.01	0.13
43	98	6	6	13	0.44	0.44
44	98	6	10	19	0.01	
44	98	6	10	20	0	
44	98	6	10	21	0	
44	98	6	10	22	0.01	
44	98	6	10	23	0.02	
44	98	6	11	0	0	
44	98	6	11	1	0	
44	98	6	11	2	0.02	
44	98	6	11	3	0.01	
44	98	6	11	4	0.02	
44	98	6	11	5	0.03	
44	98	6	11	6	0.41	
44	98	6	11	7	0.11	
44	98	6	11	8	0.1	
44	98	6	11	9	0.06	
44	98	6	11	10	0.01	0.81
	98	6	13	23	0.02	
45	98	6	14	20	0.14	0.14
46	98	6	17	11	0.09	
46	98	6	17	12	0	
46	98	6	17	13	0	
46	98	6	17	14	0	
46	98	6	17	15	0	
46	98	6	17	16	0	
46	98	6	17	17	0.01	
46	98	6	17	18	0	
46	98	6	17	19	0.03	
46	98	6	17	20	0	
46	98	6	17	21	0.1	
46	98	6	17	22	0.22	0.45
47	98	6	21	21	0.53	
47	98	6	21	22	0.49	1.02

Table B-1
(continued)
Typical Year Precipitation Events

Event	Year	Month	Day	Hour	Precip.	Total Precip.
48	98	6	28	4	0.04	
48	98	6	28	5	0.01	
48	98	6	28	6	0.03	
48	98	6	28	7	0.03	
48	98	6	28	8	0.09	
48	98	6	28	9	0.11	
48	98	6	28	10	0.02	
48	98	6	28	11	0	
48	98	6	28	12	0.01	
48	98	6	28	13	0.01	
48	98	6	28	14	0	
48	98	6	28	15	0.01	0.36
49	98	6	30	17	0.02	
49	98	6	30	18	0.08	
49	98	6	30	19	0.02	
49	98	6	30	20	0.01	
49	98	6	30	21	0	
49	98	6	30	22	0	
49	98	6	30	23	0.01	0.14
50	98	7	2	0	0.05	
50	98	7	2	1	0.27	
50	98	7	2	2	0.41	
50	98	7	2	3	0.02	
50	98	7	2	4	0.44	
50	98	7	2	5	0.06	
50	98	7	2	6	0.08	1.33
51	98	7	9	16	0.06	
51	98	7	9	17	0.06	
51	98	7	9	18	0.01	0.13
	98	7	11	16	0.01	
52	98	7	13	17	0.51	0.51
	98	7	16	18	0.01	
53	98	7	18	1	0.14	
53	98	7	18	2	0	
53	98	7	18	3	0.08	0.22
54	98	7	18	23	0.05	
54	98	7	19	0	0.04	
54	98	7	19	1	1.05	
54	98	7	19	2	0	
54	98	7	19	3	0	
54	98	7	19	4	0.01	
54	98	7	19	5	0	

Table B-1
(continued)
Typical Year Precipitation Events

Event	Year	Month	Day	Hour	Precip.	Total Precip.
54	98	7	19	6	0.01	1.16
55	98	7	20	19	0.04	
55	98	7	20	20	0.02	
55	98	7	20	21	0.01	0.07
56	98	7	26	12	0.34	
56	98	7	26	13	0.02	
56	98	7	26	14	0.01	0.37
57	98	7	26	22	0.19	
57	98	7	26	23	0.05	
57	98	7	27	0	0.01	0.25
58	98	8	1	13	0.01	
58	98	8	1	14	0.04	0.05
59	98	8	5	12	0.41	
59	98	8	5	13	0.07	
59	98	8	5	14	0.17	
59	98	8	5	15	0.02	
59	98	8	5	16	0.01	0.68
60	98	8	11	21	0.02	
60	98	8	11	22	0.03	
60	98	8	11	23	0.01	
60	98	8	12	0	0.01	0.07
61	98	8	14	14	0.05	
61	98	8	14	15	0.65	
61	98	8	14	16	0.05	
61	98	8	14	17	0.02	
61	98	8	14	18	0	
61	98	8	14	19	0.05	
61	98	8	14	20	0.03	0.85
	98	8	16	22	0.01	
62	98	8	17	12	0.12	
62	98	8	17	13	0.23	
62	98	8	17	14	0.26	
62	98	8	17	15	0.32	
62	98	8	17	16	0.08	
62	98	8	17	21	0.01	1.02
63	98	8	21	18	0.49	
63	98	8	21	19	0.21	
63	98	8	21	20	0.08	
63	98	8	21	21	0.03	
63	98	8	21	22	0.05	
63	98	8	21	23	0	
63	98	8	22	0	0.02	

Table B-1
(continued)
Typical Year Precipitation Events

Event	Year	Month	Day	Hour	Precip.	Total Precip.
63	98	8	22	1	0.02	
63	98	8	22	2	0	
63	98	8	22	3	0.04	
63	98	8	22	4	0.09	
63	98	8	22	5	0.09	
63	98	8	22	6	0.06	
63	98	8	22	7	0.08	
63	98	8	22	8	0.1	
63	98	8	22	9	0.08	
63	98	8	22	10	0.25	
63	98	8	22	11	0.07	1.76
64	98	8	29	12	0.1	0.1
65	98	9	8	16	0.11	
65	98	9	8	17	0.09	0.2
66	98	9	9	22	0.03	
66	98	9	9	23	0.01	0.04
67	98	9	13	19	0.04	
67	98	9	13	20	0.05	0.09
68	98	9	16	21	0.04	
68	98	9	16	22	0.1	
68	98	9	16	23	0.1	
68	98	9	17	0	0.07	
68	98	9	17	1	0.14	
68	98	9	17	2	0.24	
68	98	9	17	3	0.22	
68	98	9	17	4	0.11	
68	98	9	17	5	0.17	
68	98	9	17	6	0.12	
68	98	9	17	7	0.1	
68	98	9	17	8	0.14	
68	98	9	17	9	0.05	1.6
69	98	9	22	6	0.02	
69	98	9	22	7	0.04	
69	98	9	22	8	0.02	
69	98	9	22	9	0.04	
69	98	9	22	10	0.15	
69	98	9	22	11	0.02	
69	98	9	22	12	0.04	
69	98	9	22	13	0.04	
69	98	9	22	14	0	
69	98	9	22	15	0	
69	98	9	22	16	0.13	

Table B-1
(continued)
Typical Year Precipitation Events

Event	Year	Month	Day	Hour	Precip.	Total Precip.
69	98	9	22	17	0.22	
69	98	9	22	18	0	
69	98	9	22	19	0	
69	98	9	22	20	0	
69	98	9	22	21	0.01	0.73
70	98	9	24	18	0.01	
70	98	9	24	19	0	
70	98	9	24	20	0	
70	98	9	24	21	0.01	
70	98	9	24	22	0	
70	98	9	24	23	0	
70	98	9	25	0	0.01	
70	98	9	25	1	0	
70	98	9	25	2	0.01	
70				3 - 11	0	
70	98	9	25	12	0.02	
70	98	9	25	13	0.12	
70	98	9	25	14	0.06	
70	98	9	25	15	0	
70	98	9	25	16	0	
70	98	9	25	17	0.01	
70	98	9	25	18	0.01	
70	98	9	25	19	0.09	
70	98	9	25	20	0.14	
70	98	9	25	21	0.25	
70	98	9	25	22	0.02	
70	98	9	25	23	0.03	
70	98	9	26	0	0.02	
70				1 - 10	0	
70	98	9	26	11	0.05	
70	98	9	26	12	0.02	
70	98	9	26	13	0.01	0.89
71	98	10	2	22	0.07	0.07
72	98	10	6	6	0.01	
72	98	10	6	7	0.01	
72	98	10	6	8	0	
72	98	10	6	9	0.01	0.03
73	98	10	19	12	0.05	
73	98	10	19	13	0.02	
73				14 - 23	0	
73	98	10	20	0	0.25	
73	98	10	20	1	0.06	

Table B-1
(continued)
Typical Year Precipitation Events

Event	Year	Month	Day	Hour	Precip.	Total Precip.
73	98	10	20	2	0.15	
73	98	10	20	3	0.17	
73	98	10	20	4	0.54	
73	98	10	20	5	0.1	
73	98	10	20	6	0.04	
73	98	10	20	7	0.08	
73	98	10	20	8	0.03	
73	98	10	20	9	0.01	1.5
74	98	10	23	14	0.02	
74				15 - 23	0	
74	98	10	24	0	0.02	
74	98	10	24	1	0.01	0.05
	98	10	27	20	0.01	
75	98	10	28	13	0.03	
75	98	10	28	14	0.01	
75	98	10	28	15	0	
75	98	10	28	16	0.01	
75	98	10	28	17	0.01	
75	98	10	28	18	0.01	
75	98	10	28	19	0.01	
75	98	10	28	20	0.01	
75	98	10	28	21	0.04	
75	98	10	28	22	0.23	
75	98	10	28	23	0.29	
75	98	10	29	0	0.13	
75	98	10	29	1	0.1	
75	98	10	29	2	0.07	
75	98	10	29	3	0.02	
75	98	10	29	4	0.03	
75				5 - 10	0	
75	98	10	29	11	0.03	1.03
76	98	10	31	20	0.01	
76	98	10	31	21	0.04	
76	98	10	31	22	0	
76	98	10	31	23	0.05	0.1
77	98	11	8	3	0.08	
77	98	11	8	4	0.03	0.11
78	98	11	10	10	0.06	
78	98	11	10	11	0.05	
78	98	11	10	12	0.01	
78	98	11	10	13 - 17	0	
78	98	11	10	18	0.36	0.48

Table B-1
(continued)
Typical Year Precipitation Events

Event	Year	Month	Day	Hour	Precip.	Total Precip.
79	98	11	12	14	0.02	
79	98	11	12	15	0.38	
79	98	11	12	16	0.1	
79	98	11	12	17	0.14	
79	98	11	12	18	0.36	
79	98	11	12	19	0.34	
79	98	11	12	20	0.22	
79	98	11	12	21	0.3	
79	98	11	12	22	0.04	
79	98	11	12	23	0	
79	98	11	13	0	0.04	
79	98	11	13	1	0.01	
79	98	11	13	2	0.04	
79	98	11	13	3	0.03	
79	98	11	13	4	0.01	
79	98	11	13	5	0.03	
79	98	11	13	6	0.04	
79	98	11	13	7	0.02	
79	98	11	13	8	0.04	
79	98	11	13	9	0.06	
79	98	11	13	10	0.02	2.24
80	98	11	21	7	0.01	
80	98	11	21	8	0.01	
80	98	11	21	9	0.04	
80	98	11	21	10	0.12	
80	98	11	21	11	0.04	
80	98	11	21	12	0	
80	98	11	21	13	0	
80	98	11	21	14	0.02	
80	98	11	21	15	0.02	
80	98	11	21	16	0	
80	98	11	21	17	0.02	0.28
81	98	11	27	9	0.03	0.03
82	98	12	4	11	0.01	
82	98	12	4	12	0.03	
82	98	12	4	13	0.04	
82	98	12	4	14	0.02	
82	98	12	4	15	0.05	
82	98	12	4	16	0.04	
82	98	12	4	17	0.07	
82	98	12	4	18	0.04	
82	98	12	4	19	0.09	

Table B-1
(continued)
Typical Year Precipitation Events

Event	Year	Month	Day	Hour	Precip.	Total Precip.
82	98	12	4	20	0.13	
82	98	12	4	21	0.11	
82	98	12	4	22	0.13	
82	98	12	4	23	0.08	
82	98	12	5	0	0.13	
82	98	12	5	1	0.17	
82	98	12	5	2	0.07	
82	98	12	5	3	0.03	
82	98	12	5	4	0.02	
82	98	12	5	5	0.04	
82	98	12	5	6	0.06	
82	98	12	5	7	0	
82	98	12	5	8	0.04	
82	98	12	5	9	0.31	
82	98	12	5	10	0.1	
82	98	12	5	11	0.03	
82	98	12	5	12	0.05	
82	98	12	5	13	0.13	
82	98	12	5	14	0.25	
82	98	12	5	15	0.08	
82	98	12	5	16	0	
82	98	12	5	17	0.01	2.36
83	98	12	10	17	0.03	
83	98	12	10	18	0.01	
83	98	12	10	19	0.02	
83	98	12	10	20	0	
83	98	12	10	21	0.06	
83	98	12	10	22	0.06	
83	98	12	10	23	0.02	
83	98	12	11	0	0.02	
83	98	12	11	1	0.01	0.23
84	98	12	18	22	0.01	
84	98	12	18	23	0.01	
84	98	12	19	1	0.01	
84	98	12	19	2	0.02	
84	98	12	19	3	0.03	
84	98	12	19	4	0.01	0.08
85	98	12	20	21	0.01	
85	98	12	20	22	0.04	
85	98	12	20	23	0.05	
85	98	12	21	0	0.08	
85	98	12	21	1	0.08	

Table B-1
(continued)
Typical Year Precipitation Events

Event	Year	Month	Day	Hour	Precip.	Total Precip.
85	98	12	21	2	0.15	
85	98	12	21	3	0.13	
85	98	12	21	4	0.19	
85	98	12	21	5	0.14	
85	98	12	21	6	0.03	
85	98	12	21	7	0.02	0.92
86	98	12	25	23	0.02	0.02
87	98	12	29	16	0.01	
87	98	12	29	17	0.03	
87	98	12	29	18	0.01	
87	98	12	29	19	0.01	
87	98	12	29	20	0.01	0.07
			Total Precipitation			41.78

APPENDIX C

SWMM SUMMARY OUTPUT FOR BASELINE TYPICAL YEAR

STORM 1

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1451.27	348.67	0.07	348.74	0.17	1.84E+04
R03	1800	0	0	0	0	0.00E+00
R04	1800	0	0	0	0	0.00E+00
R05	735.8	1064.2	0	1064.2	0.49	5.35E+04
R06	1800	0	0	0	0	0.00E+00
R07	1586.93	213.07	0	213.07	0.06	6.42E+03
R08	752.6	1047.33	0.07	1047.4	0.44	4.77E+04
R09	1800	0	0	0	0	0.00E+00
R11	1800	0	0	0	0	0.00E+00
R12	1800	0	0	0	0	0.00E+00
R13	1609.53	190.4	0.07	190.47	0.02	2.02E+03
R14	1800	0	0	0	0	0.00E+00
R15	1581.4	218.6	0	218.6	0	3.40E+02
R16	1800	0	0	0	0	0.00E+00
R17	1476.2	323.8	0	323.8	0.06	6.85E+03
R18	1458.6	341.4	0	341.4	0.21	2.30E+04
R19	1800	0	0	0	0	0.00E+00
R20	1800	0	0	0	0	0.00E+00
R21	1800	0	0	0	0	0.00E+00
R22	1800	0	0	0	0	0.00E+00
R23	1800	0	0	0	0	0.00E+00
R24	1800	0	0	0	0	0.00E+00
R25	1800	0	0	0	0	0.00E+00
R26	1800	0	0	0	0	0.00E+00
9A	1800	0	0	0	0	0.00E+00
A	0	1800	0	1800	2.67	2.89E+05
PS	0	1800	0	1800	8.69	9.39E+05

STORM 2

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1471.53	208.4	0.07	208.47	0.06	6.55E+03
R03	1680	0	0	0	0	0.00E+00
R04	1680	0	0	0	0	0.00E+00
R05	735.8	944.2	0	944.2	0.26	2.67E+04
R06	1680	0	0	0	0	0.00E+00
R07	1640.47	39.53	0	39.53	0	3.07E+01
R08	1494.73	185.2	0.07	185.27	0.06	5.89E+03
R09	1680	0	0	0	0	0.00E+00
R11	1680	0	0	0	0	0.00E+00
R12	1680	0	0	0	0	0.00E+00
R13	1640.2	39.8	0	39.8	0	4.66E+01
R14	1680	0	0	0	0	0.00E+00
R15	1621.93	58.07	0	58.07	0	2.97E+01
R16	1680	0	0	0	0	0.00E+00
R17	1486.87	193.13	0	193.13	0.02	1.83E+03
R18	1469.4	210.6	0	210.6	0.08	7.57E+03
R19	1680	0	0	0	0	0.00E+00
R20	1680	0	0	0	0	0.00E+00
R21	1680	0	0	0	0	0.00E+00
R22	1680	0	0	0	0	0.00E+00
R23	1680	0	0	0	0	0.00E+00
R24	1680	0	0	0	0	0.00E+00
R25	1680	0	0	0	0	0.00E+00
R26	1680	0	0	0	0	0.00E+00
9A	1680	0	0	0	0	0.00E+00
A	0	1680	0	1680	2.47	2.49E+05
PS	0	1680	0	1680	7.73	7.79E+05

STORM 3

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1405.47	814.53	0	814.53	2.11	2.81E+05
R03	1551.47	668.53	0	668.53	3.06	4.07E+05
R04	1543.13	676.87	0	676.87	1.34	1.79E+05
R05	732.33	1487.67	0	1487.67	5.37	7.16E+05
R06	1566.07	653.87	0.07	653.94	0.45	6.06E+04
R07	1474	746	0	746	1.48	1.97E+05
R08	728.07	1491.87	0.07	1491.94	7.5	9.99E+05
R09	1525	694.93	0.07	695	2.81	3.74E+05
R11	1671.67	548.27	0.07	548.34	1.45	1.93E+05
R12	2220	0	0	0	0	0.00E+00
R13	1472	748	0	748	2.95	3.94E+05
R14	1665	554.93	0.07	555	1.1	1.47E+05
R15	1454.2	765.8	0	765.8	0.57	7.60E+04
R16	1534.93	684.93	0.13	685.06	1.64	2.18E+05
R17	729.4	1490.6	0	1490.6	1.88	2.50E+05
R18	737.67	1482.33	0	1482.33	4.45	5.93E+05
R19	1516.47	703.47	0.07	703.54	6.5	8.65E+05
R20	1576.73	643.27	0	643.27	0.34	4.48E+04
R21	1782.47	437.53	0	437.53	0.2	2.61E+04
R22	1569.6	650.4	0	650.4	0.73	9.76E+04
R23	1979.67	240.33	0	240.33	0.05	6.88E+03
R24	1620.8	599.2	0	599.2	0.72	9.64E+04
R25	1677.47	542.53	0	542.53	0.26	3.47E+04
R26	1614.67	605.33	0	605.33	0.74	9.80E+04
9A	1672.53	547.47	0	547.47	1.08	1.43E+05
A	0	2220	0	2220	3.9	5.20E+05
PS	0	2220	0	2220	13.55	1.80E+06

STORM 4

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1511.73	228.27	0	228.27	0.02	1.59E+03
R03	1740	0	0	0	0	0.00E+00
R04	1740	0	0	0	0	0.00E+00
R05	1661.73	78.27	0	78.27	0.01	1.17E+03
R06	1740	0	0	0	0	0.00E+00
R07	1740	0	0	0	0	0.00E+00
R08	1653.33	86.67	0	86.67	0.02	2.16E+03
R09	1740	0	0	0	0	0.00E+00
R11	1740	0	0	0	0	0.00E+00
R12	1740	0	0	0	0	0.00E+00
R13	1740	0	0	0	0	0.00E+00
R14	1740	0	0	0	0	0.00E+00
R15	1715.53	24.47	0	24.47	0	2.28E-01
R16	1740	0	0	0	0	0.00E+00
R17	1499.4	240.6	0	240.6	0.01	7.56E+02
R18	1485.13	254.87	0	254.87	0.04	4.11E+03
R19	1740	0	0	0	0	0.00E+00
R20	1740	0	0	0	0	0.00E+00
R21	1740	0	0	0	0	0.00E+00
R22	1740	0	0	0	0	0.00E+00
R23	1740	0	0	0	0	0.00E+00
R24	1740	0	0	0	0	0.00E+00
R25	1740	0	0	0	0	0.00E+00
R26	1740	0	0	0	0	0.00E+00
9A	1740	0	0	0	0	0.00E+00
A	0	1740	0	1740	2.61	2.73E+05
PS	0	1740	0	1740	7.47	7.80E+05

STORM 5

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1468.2	151.8	0	151.8	0.03	3.24E+03
R03	1620	0	0	0	0	0.00E+00
R04	1620	0	0	0	0	0.00E+00
R05	1500.93	119.07	0	119.07	0.02	1.73E+03
R06	1620	0	0	0	0	0.00E+00
R07	1620	0	0	0	0	0.00E+00
R08	1493.53	126.47	0	126.47	0.03	3.16E+03
R09	1620	0	0	0	0	0.00E+00
R11	1620	0	0	0	0	0.00E+00
R12	1620	0	0	0	0	0.00E+00
R13	1620	0	0	0	0	0.00E+00
R14	1620	0	0	0	0	0.00E+00
R15	1594.73	25.27	0	25.27	0	2.36E-01
R16	1620	0	0	0	0	0.00E+00
R17	1485.2	134.8	0	134.8	0.01	1.05E+03
R18	1469.07	150.93	0	150.93	0.05	4.53E+03
R19	1620	0	0	0	0	0.00E+00
R20	1620	0	0	0	0	0.00E+00
R21	1620	0	0	0	0	0.00E+00
R22	1620	0	0	0	0	0.00E+00
R23	1620	0	0	0	0	0.00E+00
R24	1620	0	0	0	0	0.00E+00
R25	1620	0	0	0	0	0.00E+00
R26	1620	0	0	0	0	0.00E+00
9A	1620	0	0	0	0	0.00E+00
A	0	1620	0	1620	2.59	2.52E+05
PS	0	1620	0	1620	7.44	7.23E+05

STORM 6

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1740	0	0	0	0	0.00E+00
R03	1740	0	0	0	0	0.00E+00
R04	1740	0	0	0	0	0.00E+00
R05	1740	0	0	0	0	0.00E+00
R06	1740	0	0	0	0	0.00E+00
R07	1740	0	0	0	0	0.00E+00
R08	1740	0	0	0	0	0.00E+00
R09	1740	0	0	0	0	0.00E+00
R11	1740	0	0	0	0	0.00E+00
R12	1740	0	0	0	0	0.00E+00
R13	1740	0	0	0	0	0.00E+00
R14	1740	0	0	0	0	0.00E+00
R15	1740	0	0	0	0	0.00E+00
R16	1740	0	0	0	0	0.00E+00
R17	1534.87	205.13	0	205.13	0	5.73E+01
R18	1521.93	218.07	0	218.07	0.01	1.34E+03
R19	1740	0	0	0	0	0.00E+00
R20	1740	0	0	0	0	0.00E+00
R21	1740	0	0	0	0	0.00E+00
R22	1740	0	0	0	0	0.00E+00
R23	1740	0	0	0	0	0.00E+00
R24	1740	0	0	0	0	0.00E+00
R25	1740	0	0	0	0	0.00E+00
R26	1740	0	0	0	0	0.00E+00
9A	1740	0	0	0	0	0.00E+00
A	0	1740	0	1740	2.5	2.61E+05
PS	0	1740	0	1740	7.2	7.51E+05

STORM 7

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1163.47	636.53	0	636.53	2.17	2.35E+05
R03	1649.93	150	0.07	150.07	2.48	2.67E+05
R04	1647.8	152.2	0	152.2	1.49	1.61E+05
R05	848.07	951.87	0.07	951.94	4.98	5.38E+05
R06	1645.13	154.8	0.07	154.87	0.51	5.48E+04
R07	1592.4	207.6	0	207.6	1.54	1.66E+05
R08	845.13	954.87	0	954.87	4.93	5.33E+05
R09	1631.27	168.73	0	168.73	3.09	3.34E+05
R11	1666.53	133.47	0	133.47	1.72	1.86E+05
R12	1737.4	62.6	0	62.6	0.1	1.05E+04
R13	1591.47	208.53	0	208.53	2.98	3.22E+05
R14	1654.53	145.47	0	145.47	1.79	1.94E+05
R15	1571	229	0	229	0.72	7.79E+04
R16	1598.27	201.73	0	201.73	2.43	2.62E+05
R17	769	1031	0	1031	1.42	1.53E+05
R18	781.07	1018.93	0	1018.93	4.58	4.94E+05
R19	1547.33	252.67	0	252.67	5.34	5.77E+05
R20	1662.87	137.13	0	137.13	0.66	7.16E+04
R21	1673	127	0	127	0.34	3.62E+04
R22	1664.27	135.73	0	135.73	1.23	1.33E+05
R23	1680	120	0	120	0.22	2.37E+04
R24	1668.47	131.53	0	131.53	0.82	8.89E+04
R25	1675.33	124.67	0	124.67	0.4	4.37E+04
R26	1670.47	129.53	0	129.53	0.92	9.98E+04
9A	1663.87	136.07	0.07	136.14	1.24	1.34E+05
A	0	1800	0	1800	3.23	3.49E+05
PS	0	1800	0	1800	9.82	1.06E+06

STORM 8

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1660.13	139.73	0.13	139.86	0	2.52E+01
R03	1800	0	0	0	0	0.00E+00
R04	1800	0	0	0	0	0.00E+00
R05	1658	142	0	142	0	4.67E+02
R06	1800	0	0	0	0	0.00E+00
R07	1800	0	0	0	0	0.00E+00
R08	1634.8	165.2	0	165.2	0.01	1.18E+03
R09	1800	0	0	0	0	0.00E+00
R11	1800	0	0	0	0	0.00E+00
R12	1800	0	0	0	0	0.00E+00
R13	1800	0	0	0	0	0.00E+00
R14	1800	0	0	0	0	0.00E+00
R15	1800	0	0	0	0	0.00E+00
R16	1800	0	0	0	0	0.00E+00
R17	1533.73	266.27	0	266.27	0.01	6.69E+02
R18	1520.8	279.2	0	279.2	0.04	4.60E+03
R19	1800	0	0	0	0	0.00E+00
R20	1800	0	0	0	0	0.00E+00
R21	1800	0	0	0	0	0.00E+00
R22	1800	0	0	0	0	0.00E+00
R23	1800	0	0	0	0	0.00E+00
R24	1800	0	0	0	0	0.00E+00
R25	1800	0	0	0	0	0.00E+00
R26	1800	0	0	0	0	0.00E+00
9A	1800	0	0	0	0	0.00E+00
A	0	1800	0	1800	2.67	2.88E+05
PS	0	1800	0	1800	7.55	8.15E+05

STORM 9

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1456.6	343.4	0	343.4	0.59	6.37E+04
R03	1612.2	187.8	0	187.8	0.61	6.63E+04
R04	1597.87	202.13	0	202.13	0.26	2.75E+04
R05	740.73	1059.27	0	1059.27	1.31	1.42E+05
R06	1625.4	174.6	0	174.6	0.09	9.82E+03
R07	1552.93	247.07	0	247.07	0.31	3.36E+04
R08	733.4	1066.6	0	1066.6	1.66	1.79E+05
R09	1558.8	241.13	0.07	241.2	0.46	4.99E+04
R11	1671.53	128.47	0	128.47	0.16	1.71E+04
R12	1800	0	0	0	0	0.00E+00
R13	1537.13	262.87	0	262.87	0.64	6.93E+04
R14	1744.33	55.6	0.07	55.67	0	0.00E+00
R15	1569.87	230.13	0	230.13	0.07	7.42E+03
R16	1587.07	212.87	0.07	212.94	0.24	2.61E+04
R17	733.53	1066.47	0	1066.47	0.45	4.90E+04
R18	744.27	1055.73	0	1055.73	1.06	1.14E+05
R19	1522.8	277.13	0.07	277.2	1.61	1.74E+05
R20	1643.27	156.73	0	156.73	0.04	4.59E+03
R21	1700.8	99.2	0	99.2	0.02	2.19E+03
R22	1640.13	159.87	0	159.87	0.11	1.14E+04
R23	1800	0	0	0	0	0.00E+00
R24	1646.6	153.4	0	153.4	0.09	9.96E+03
R25	1739	61	0	61	0.01	6.08E+02
R26	1646.4	153.6	0	153.6	0.06	6.24E+03
9A	1726.4	73.6	0	73.6	0.12	1.28E+04
A	0	1800	0	1800	2.9	3.14E+05
PS	0	1800	0	1800	9.51	1.03E+06

STORM 10

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1550.47	129.47	0.07	129.54	0.03	2.80E+03
R03	1680	0	0	0	0	0.00E+00
R04	1680	0	0	0	0	0.00E+00
R05	1566.67	113.33	0	113.33	0.02	1.82E+03
R06	1680	0	0	0	0	0.00E+00
R07	1680	0	0	0	0	0.00E+00
R08	1556.8	123.2	0	123.2	0.03	3.20E+03
R09	1680	0	0	0	0	0.00E+00
R11	1680	0	0	0	0	0.00E+00
R12	1680	0	0	0	0	0.00E+00
R13	1680	0	0	0	0	0.00E+00
R14	1680	0	0	0	0	0.00E+00
R15	1643.8	36.2	0	36.2	0	4.28E-01
R16	1680	0	0	0	0	0.00E+00
R17	1546.13	133.87	0	133.87	0.01	1.05E+03
R18	1531.87	148.13	0	148.13	0.04	4.53E+03
R19	1680	0	0	0	0	0.00E+00
R20	1680	0	0	0	0	0.00E+00
R21	1680	0	0	0	0	0.00E+00
R22	1680	0	0	0	0	0.00E+00
R23	1680	0	0	0	0	0.00E+00
R24	1680	0	0	0	0	0.00E+00
R25	1680	0	0	0	0	0.00E+00
R26	1680	0	0	0	0	0.00E+00
9A	1680	0	0	0	0	0.00E+00
A	0	1680	0	1680	2.59	2.61E+05
PS	0	1680	0	1680	7.42	7.48E+05

STORM 11

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1656.93	983	0.07	983.07	1.2	1.89E+05
R03	1980.13	659.87	0	659.87	1.26	1.99E+05
R04	1974.13	665.87	0	665.87	0.49	7.75E+04
R05	912.6	1727.4	0	1727.4	2.52	3.99E+05
R06	2024.07	615.93	0	615.93	0.17	2.73E+04
R07	1787.27	852.73	0	852.73	0.64	1.01E+05
R08	894.53	1745.4	0.07	1745.47	3.3	5.23E+05
R09	1825.6	814.33	0.07	814.4	0.84	1.33E+05
R11	2204.47	435.53	0	435.53	0.4	6.39E+04
R12	2640	0	0	0	0	0.00E+00
R13	1752.87	887.13	0	887.13	1.32	2.09E+05
R14	2571.67	68.27	0.07	68.34	0.01	1.93E+03
R15	1970.53	669.47	0	669.47	0.13	2.12E+04
R16	1875.4	764.53	0.07	764.6	0.48	7.58E+04
R17	851.4	1788.6	0	1788.6	0.9	1.43E+05
R18	844.67	1795.33	0	1795.33	2.05	3.25E+05
R19	1726.4	913.53	0.07	913.6	3.44	5.44E+05
R20	2148.8	491.2	0	491.2	0.07	1.17E+04
R21	2385.67	254.33	0	254.33	0.03	5.07E+03
R22	2094	546	0	546	0.19	3.02E+04
R23	2583.27	56.73	0	56.73	0	1.15E+02
R24	2131.53	508.47	0	508.47	0.24	3.81E+04
R25	2461	179	0	179	0.01	1.73E+03
R26	2254.33	385.67	0	385.67	0.1	1.59E+04
9A	2447.07	192.93	0	192.93	0.12	1.88E+04
A	0	2640	0	2640	3.68	5.83E+05
PS	0	2640	0	2640	11.89	1.88E+06

STORM 12

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1597.07	142.93	0	142.93	0.02	2.28E+03
R03	1740	0	0	0	0	0.00E+00
R04	1740	0	0	0	0	0.00E+00
R05	1651.8	88.2	0	88.2	0.01	1.44E+03
R06	1740	0	0	0	0	0.00E+00
R07	1740	0	0	0	0	0.00E+00
R08	1646.4	93.6	0	93.6	0.02	2.49E+03
R09	1740	0	0	0	0	0.00E+00
R11	1740	0	0	0	0	0.00E+00
R12	1740	0	0	0	0	0.00E+00
R13	1740	0	0	0	0	0.00E+00
R14	1740	0	0	0	0	0.00E+00
R15	1710.2	29.8	0	29.8	0	3.14E-01
R16	1740	0	0	0	0	0.00E+00
R17	1533.2	206.8	0	206.8	0.01	8.58E+02
R18	1520.33	219.67	0	219.67	0.04	4.29E+03
R19	1740	0	0	0	0	0.00E+00
R20	1740	0	0	0	0	0.00E+00
R21	1740	0	0	0	0	0.00E+00
R22	1740	0	0	0	0	0.00E+00
R23	1740	0	0	0	0	0.00E+00
R24	1740	0	0	0	0	0.00E+00
R25	1740	0	0	0	0	0.00E+00
R26	1740	0	0	0	0	0.00E+00
9A	1740	0	0	0	0	0.00E+00
A	0	1740	0	1740	2.61	2.72E+05
PS	0	1740	0	1740	7.46	7.79E+05

STORM 13

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1680	0	0	0	0	0.00E+00
R03	1680	0	0	0	0	0.00E+00
R04	1680	0	0	0	0	0.00E+00
R05	1680	0	0	0	0	0.00E+00
R06	1680	0	0	0	0	0.00E+00
R07	1680	0	0	0	0	0.00E+00
R08	1680	0	0	0	0	0.00E+00
R09	1680	0	0	0	0	0.00E+00
R11	1680	0	0	0	0	0.00E+00
R12	1680	0	0	0	0	0.00E+00
R13	1680	0	0	0	0	0.00E+00
R14	1680	0	0	0	0	0.00E+00
R15	1680	0	0	0	0	0.00E+00
R16	1680	0	0	0	0	0.00E+00
R17	1534.87	145.13	0	145.13	0	3.74E+01
R18	1521.93	158.07	0	158.07	0.01	8.92E+02
R19	1680	0	0	0	0	0.00E+00
R20	1680	0	0	0	0	0.00E+00
R21	1680	0	0	0	0	0.00E+00
R22	1680	0	0	0	0	0.00E+00
R23	1680	0	0	0	0	0.00E+00
R24	1680	0	0	0	0	0.00E+00
R25	1680	0	0	0	0	0.00E+00
R26	1680	0	0	0	0	0.00E+00
9A	1680	0	0	0	0	0.00E+00
A	0	1680	0	1680	2.47	2.49E+05
PS	0	1680	0	1680	7.11	7.17E+05

STORM 14

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1131.13	608.87	0	608.87	1.41	1.47E+05
R03	1482	257.93	0.07	258	1.64	1.71E+05
R04	1475.53	264.47	0	264.47	0.73	7.66E+04
R05	844.87	895.13	0	895.13	2.74	2.86E+05
R06	1491.8	248.2	0	248.2	0.23	2.43E+04
R07	1455.73	284.27	0	284.27	0.77	8.07E+04
R08	843.6	896.4	0	896.4	3.86	4.03E+05
R09	1458	281.93	0.07	282	1.57	1.64E+05
R11	1507.07	232.87	0.07	232.94	0.82	8.60E+04
R12	1740	0	0	0	0	0.00E+00
R13	1453.53	286.47	0	286.47	1.59	1.66E+05
R14	1517.2	222.8	0	222.8	0.37	3.87E+04
R15	1443.07	296.93	0	296.93	0.22	2.33E+04
R16	1443.93	296	0.07	296.07	0.83	8.67E+04
R17	844.93	895.07	0	895.07	1.01	1.06E+05
R18	849.47	890.53	0	890.53	2.38	2.49E+05
R19	1398.07	341.93	0	341.93	3.48	3.64E+05
R20	1500.8	239.2	0	239.2	0.19	1.99E+04
R21	1522	218	0	218	0.11	1.12E+04
R22	1500.4	239.6	0	239.6	0.4	4.18E+04
R23	1559.87	180.13	0	180.13	0.01	1.10E+03
R24	1497.73	242.27	0	242.27	0.41	4.30E+04
R25	1519.07	220.93	0	220.93	0.06	5.99E+03
R26	1501.33	238.67	0	238.67	0.26	2.77E+04
9A	1507.53	232.47	0	232.47	0.67	6.97E+04
A	0	1740	0	1740	2.94	3.07E+05
PS	0	1740	0	1740	10.82	1.13E+06

STORM 15

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1511.2	708.8	0	708.8	0.89	1.19E+05
R03	1811.27	408.67	0.07	408.74	0.39	5.14E+04
R04	1786.07	433.93	0	433.93	0.18	2.43E+04
R05	800.13	1419.87	0	1419.87	1.91	2.54E+05
R06	1798.67	421.27	0.07	421.34	0.12	1.56E+04
R07	1584.07	635.93	0	635.93	0.48	6.39E+04
R08	790.93	1429.07	0	1429.07	2.43	3.24E+05
R09	1606.2	613.8	0	613.8	0.49	6.57E+04
R11	2106.13	113.8	0.07	113.87	0.01	7.87E+02
R12	2220	0	0	0	0	0.00E+00
R13	1578.47	641.47	0.07	641.54	0.97	1.30E+05
R14	2220	0	0	0	0	0.00E+00
R15	1605.27	614.73	0	614.73	0.08	1.01E+04
R16	1613.2	606.73	0.07	606.8	0.21	2.85E+04
R17	769	1451	0	1451	0.66	8.82E+04
R18	781.07	1438.93	0	1438.93	1.38	1.84E+05
R19	1601.6	618.4	0	618.4	2.4	3.20E+05
R20	1963.8	256.2	0	256.2	0.02	2.53E+03
R21	2140.13	79.87	0	79.87	0.01	8.37E+02
R22	1844.6	375.4	0	375.4	0.07	8.66E+03
R23	2220	0	0	0	0	0.00E+00
R24	2100.73	119.27	0	119.27	0.01	1.95E+03
R25	2163.67	56.33	0	56.33	0	1.52E+01
R26	2100.07	119.93	0	119.93	0.03	3.36E+03
9A	2220	0	0	0	0	0.00E+00
A	0	2220	0	2220	3.99	5.32E+05
PS	0	2220	0	2220	11.43	1.52E+06

STORM 16

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1449	410.93	0.07	411	0.71	7.94E+04
R03	1565.13	294.87	0	294.87	0.74	8.30E+04
R04	1545.47	314.53	0	314.53	0.33	3.74E+04
R05	727.47	1132.47	0.07	1132.54	1.57	1.75E+05
R06	1635.73	224.27	0	224.27	0.1	1.17E+04
R07	1502.73	357.27	0	357.27	0.38	4.22E+04
R08	725	1134.93	0.07	1135	2	2.23E+05
R09	1503	357	0	357	0.42	4.74E+04
R11	1717.2	142.73	0.07	142.8	0.03	3.20E+03
R12	1860	0	0	0	0	0.00E+00
R13	1484.93	375.07	0	375.07	0.79	8.83E+04
R14	1860	0	0	0	0	0.00E+00
R15	1555.8	304.2	0	304.2	0.08	8.78E+03
R16	1579.73	280.27	0	280.27	0.3	3.35E+04
R17	726.6	1133.4	0	1133.4	0.55	6.13E+04
R18	732.53	1127.47	0	1127.47	1.26	1.41E+05
R19	1493.93	366	0.07	366.07	2.02	2.26E+05
R20	1654.13	205.87	0	205.87	0.04	4.70E+03
R21	1735.2	124.8	0	124.8	0.02	1.96E+03
R22	1650.53	209.47	0	209.47	0.11	1.26E+04
R23	1860	0	0	0	0	0.00E+00
R24	1639.27	220.73	0	220.73	0.11	1.27E+04
R25	1741.27	118.73	0	118.73	0	2.73E+02
R26	1656.47	203.53	0	203.53	0.06	6.26E+03
9A	1795.73	64.27	0	64.27	0	4.25E+02
A	0	1860	0	1860	3.08	3.44E+05
PS	0	1860	0	1860	9.99	1.12E+06

STORM 17

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1986.6	473.33	0.07	473.4	0.58	8.51E+04
R03	2214.4	245.53	0.07	245.6	0.65	9.53E+04
R04	2206.67	253.33	0	253.33	0.29	4.25E+04
R05	816.87	1643.13	0	1643.13	1.29	1.91E+05
R06	2237.6	222.4	0	222.4	0.09	1.37E+04
R07	2188.27	271.73	0	271.73	0.31	4.63E+04
R08	814.67	1645.33	0	1645.33	1.67	2.46E+05
R09	2188.27	271.73	0	271.73	0.5	7.32E+04
R11	2250.27	209.73	0	209.73	0.19	2.77E+04
R12	2460	0	0	0	0	0.00E+00
R13	2182.67	277.27	0.07	277.34	0.65	9.63E+04
R14	2386.87	73.07	0.07	73.14	0.03	4.25E+03
R15	2208.6	251.4	0	251.4	0.07	1.08E+04
R16	2194.07	265.87	0.07	265.94	0.28	4.19E+04
R17	816.27	1643.73	0	1643.73	0.46	6.72E+04
R18	821.87	1638.13	0	1638.13	1.07	1.58E+05
R19	2152.07	307.87	0.07	307.94	1.59	2.35E+05
R20	2250.73	209.27	0	209.27	0.05	7.21E+03
R21	2336.27	123.73	0	123.73	0.02	3.66E+03
R22	2231	229	0	229	0.12	1.71E+04
R23	2402.27	57.73	0	57.73	0	2.65E+02
R24	2247	213	0	213	0.11	1.58E+04
R25	2374.33	85.67	0	85.67	0.01	1.59E+03
R26	2301.13	158.87	0	158.87	0.07	9.88E+03
9A	2332.8	127.2	0	127.2	0.14	2.06E+04
A	0	2460	0	2460	2.72	4.01E+05
PS	0	2460	0	2460	9.08	1.34E+06

STORM 18

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1796.8	543.2	0	543.2	0.54	7.61E+04
R03	1942.33	397.6	0.07	397.67	0.45	6.35E+04
R04	1954.67	385.33	0	385.33	0.1	1.47E+04
R05	1086.2	1253.73	0.07	1253.8	1.21	1.70E+05
R06	2030.73	309.27	0	309.27	0.07	9.21E+03
R07	1845.47	494.53	0	494.53	0.28	3.95E+04
R08	1083.8	1256.2	0	1256.2	1.51	2.12E+05
R09	1878.13	461.87	0	461.87	0.29	4.09E+04
R11	2340	0	0	0	0	0.00E+00
R12	2340	0	0	0	0	0.00E+00
R13	1836.4	503.6	0	503.6	0.57	7.98E+04
R14	2340	0	0	0	0	0.00E+00
R15	1900.47	439.53	0	439.53	0.04	6.00E+03
R16	1947.47	392.47	0.07	392.54	0.13	1.80E+04
R17	1047.13	1292.87	0	1292.87	0.42	5.87E+04
R18	1048.93	1291.07	0	1291.07	0.95	1.33E+05
R19	1863.73	476.2	0.07	476.27	1.47	2.06E+05
R20	2157.2	182.8	0	182.8	0.01	8.64E+02
R21	2340	0	0	0	0	0.00E+00
R22	2094.27	245.73	0	245.73	0.03	4.29E+03
R23	2340	0	0	0	0	0.00E+00
R24	2237.2	102.8	0	102.8	0	2.61E+02
R25	2340	0	0	0	0	0.00E+00
R26	2220.67	119.33	0	119.33	0.01	9.79E+02
9A	2340	0	0	0	0	0.00E+00
A	0	2340	0	2340	3.13	4.39E+05
PS	0	2340	0	2340	9.65	1.36E+06

STORM 19

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1450.67	649.33	0	649.33	0.81	1.03E+05
R03	1647.6	452.4	0	452.4	0.7	8.82E+04
R04	1584.67	515.33	0	515.33	0.33	4.18E+04
R05	728.27	1371.73	0	1371.73	1.78	2.24E+05
R06	1818.33	281.67	0	281.67	0.09	1.19E+04
R07	1503.07	596.93	0	596.93	0.42	5.32E+04
R08	725.47	1374.47	0.07	1374.54	2.25	2.83E+05
R09	1503.53	596.47	0	596.47	0.55	6.98E+04
R11	1906.4	193.6	0	193.6	0.16	2.03E+04
R12	2100	0	0	0	0	0.00E+00
R13	1485.8	614.2	0	614.2	0.86	1.08E+05
R14	2043.4	56.53	0.07	56.6	0	0.00E+00
R15	1627.93	472.07	0	472.07	0.08	9.79E+03
R16	1747.93	352.07	0	352.07	0.23	2.89E+04
R17	727.07	1372.93	0	1372.93	0.61	7.71E+04
R18	733.4	1366.6	0	1366.6	1.39	1.76E+05
R19	1501.13	598.8	0.07	598.87	2.04	2.57E+05
R20	1903.87	196.13	0	196.13	0.04	5.03E+03
R21	2002.33	97.67	0	97.67	0.02	2.32E+03
R22	1842.67	257.33	0	257.33	0.1	1.28E+04
R23	2100	0	0	0	0	0.00E+00
R24	1769.53	330.47	0	330.47	0.11	1.34E+04
R25	1983.2	116.8	0	116.8	0.01	8.82E+02
R26	1958	142	0	142	0.05	6.87E+03
9A	1963.4	136.6	0	136.6	0.11	1.41E+04
A	0	2100	0	2100	3.21	4.05E+05
PS	0	2100	0	2100	10.75	1.36E+06

STORM 20

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1461.6	698.33	0.07	698.4	0.49	6.29E+04
R03	1835.47	324.53	0	324.53	0.34	4.36E+04
R04	1802.47	357.53	0	357.53	0.16	2.11E+04
R05	727.47	1432.47	0.07	1432.54	1.12	1.46E+05
R06	1950.07	209.93	0	209.93	0.04	4.92E+03
R07	1504.8	655.2	0	655.2	0.23	2.94E+04
R08	725	1434.93	0.07	1435	1.38	1.78E+05
R09	1700.6	459.33	0.07	459.4	0.23	2.96E+04
R11	2141.2	18.73	0.07	18.8	0	2.11E+01
R12	2160	0	0	0	0	0.00E+00
R13	1485.47	674.53	0	674.53	0.5	6.49E+04
R14	2160	0	0	0	0	0.00E+00
R15	1830.93	329.07	0	329.07	0.03	4.40E+03
R16	1848.07	311.87	0.07	311.94	0.07	9.61E+03
R17	726.6	1433.4	0	1433.4	0.38	4.98E+04
R18	732.53	1427.47	0	1427.47	0.88	1.14E+05
R19	1516.87	643.13	0	643.13	1.15	1.49E+05
R20	2026.73	133.27	0	133.27	0.01	6.66E+02
R21	2159.47	0.53	0	0.53	0	2.46E+00
R22	2013	147	0	147	0.02	3.20E+03
R23	2160	0	0	0	0	0.00E+00
R24	2079.6	80.4	0	80.4	0	2.46E+02
R25	2160	0	0	0	0	0.00E+00
R26	2075.8	84.2	0	84.2	0.01	7.85E+02
9A	2160	0	0	0	0	0.00E+00
A	0	2160	0	2160	3.02	3.91E+05
PS	0	2160	0	2160	9.56	1.24E+06

STORM 21

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1380.33	299.67	0	299.67	0.61	6.18E+04
R03	1533.47	146.47	0.07	146.54	0.69	6.98E+04
R04	1519.87	160.13	0	160.13	0.31	3.17E+04
R05	843.67	836.27	0.07	836.34	1.29	1.30E+05
R06	1546.93	133.07	0	133.07	0.09	9.05E+03
R07	1493	187	0	187	0.33	3.36E+04
R08	842.93	837	0.07	837.07	1.73	1.74E+05
R09	1490.33	189.6	0.07	189.67	0.61	6.14E+04
R11	1554	125.93	0.07	126	0.34	3.39E+04
R12	1680	0	0	0	0	0.00E+00
R13	1478.53	201.4	0.07	201.47	0.69	6.95E+04
R14	1610.87	69.13	0	69.13	0.03	3.33E+03
R15	1463.07	216.93	0	216.93	0.12	1.19E+04
R16	1483.53	196.4	0.07	196.47	0.33	3.30E+04
R17	844.13	835.87	0	835.87	0.46	4.65E+04
R18	847.93	832.07	0	832.07	1.09	1.10E+05
R19	1446.07	233.93	0	233.93	1.63	1.64E+05
R20	1559.73	120.27	0	120.27	0.07	7.01E+03
R21	1571.07	108.93	0	108.93	0.03	3.25E+03
R22	1559.87	120.13	0	120.13	0.15	1.55E+04
R23	1634.33	45.67	0	45.67	0.01	6.39E+02
R24	1551.47	128.53	0	128.53	0.17	1.72E+04
R25	1564.67	115.33	0	115.33	0.02	1.89E+03
R26	1561.07	118.93	0	118.93	0.1	9.77E+03
9A	1560.07	119.93	0	119.93	0.22	2.24E+04
A	0	1680	0	1680	2.68	2.70E+05
PS	0	1680	0	1680	8.88	8.96E+05

STORM 22

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1396.87	823.13	0	823.13	1.71	2.28E+05
R03	1595.53	624.4	0.07	624.47	2.02	2.69E+05
R04	1576.53	643.47	0	643.47	0.92	1.23E+05
R05	906.47	1313.47	0.07	1313.54	3.8	5.06E+05
R06	1691.73	528.2	0.07	528.27	0.28	3.73E+04
R07	1508.07	711.93	0	711.93	1.02	1.36E+05
R08	904.33	1315.67	0	1315.67	5.18	6.90E+05
R09	1538	681.93	0.07	682	1.77	2.36E+05
R11	1685.87	534.13	0	534.13	0.9	1.19E+05
R12	2220	0	0	0	0	0.00E+00
R13	1489.87	730.13	0	730.13	2.08	2.77E+05
R14	2003.2	216.8	0	216.8	0.36	4.80E+04
R15	1469.07	750.93	0	750.93	0.34	4.53E+04
R16	1594.47	625.53	0	625.53	1.04	1.39E+05
R17	769	1451	0	1451	1.36	1.81E+05
R18	781.07	1438.93	0	1438.93	3.15	4.20E+05
R19	1513.2	706.73	0.07	706.8	4.91	6.55E+05
R20	1744.27	475.73	0	475.73	0.2	2.65E+04
R21	1891.07	328.93	0	328.93	0.11	1.50E+04
R22	1733.33	486.67	0	486.67	0.44	5.85E+04
R23	2039.4	180.6	0	180.6	0.01	1.78E+03
R24	1616.47	603.53	0	603.53	0.47	6.32E+04
R25	1863.93	356.07	0	356.07	0.06	7.71E+03
R26	1857.6	362.4	0	362.4	0.27	3.66E+04
9A	1766.87	453.13	0	453.13	0.6	8.03E+04
A	0	2220	0	2220	3.8	5.06E+05
PS	0	2220	0	2220	13.06	1.74E+06

STORM 23

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1463.2	456.8	0	456.8	0.24	2.79E+04
R03	1920	0	0	0	0	0.00E+00
R04	1920	0	0	0	0	0.00E+00
R05	732.33	1187.67	0	1187.67	0.62	7.11E+04
R06	1920	0	0	0	0	0.00E+00
R07	1512.73	407.27	0	407.27	0.08	9.11E+03
R08	728.07	1191.87	0.07	1191.94	0.65	7.49E+04
R09	1866.67	53.33	0	53.33	0	1.01E+02
R11	1920	0	0	0	0	0.00E+00
R12	1920	0	0	0	0	0.00E+00
R13	1494.47	425.53	0	425.53	0.14	1.56E+04
R14	1920	0	0	0	0	0.00E+00
R15	1625.27	294.73	0	294.73	0	5.40E+02
R16	1920	0	0	0	0	0.00E+00
R17	1484.87	435.13	0	435.13	0.08	9.58E+03
R18	1466.6	453.4	0	453.4	0.28	3.23E+04
R19	1880.73	39.27	0	39.27	0	3.85E+02
R20	1920	0	0	0	0	0.00E+00
R21	1920	0	0	0	0	0.00E+00
R22	1920	0	0	0	0	0.00E+00
R23	1920	0	0	0	0	0.00E+00
R24	1920	0	0	0	0	0.00E+00
R25	1920	0	0	0	0	0.00E+00
R26	1920	0	0	0	0	0.00E+00
9A	1920	0	0	0	0	0.00E+00
A	0	1920	0	1920	2.79	3.22E+05
PS	0	1920	0	1920	9.08	1.05E+06

STORM 24

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1415	924.93	0.07	925	1.65	2.31E+05
R03	1804.07	535.87	0.07	535.94	1.8	2.53E+05
R04	1757.2	582.8	0	582.8	0.81	1.14E+05
R05	735.8	1604.2	0	1604.2	3.25	4.57E+05
R06	1873.27	466.73	0	466.73	0.26	3.60E+04
R07	1588.07	751.93	0	751.93	0.88	1.23E+05
R08	729.8	1610.13	0.07	1610.2	4.48	6.30E+05
R09	1639.8	700.07	0.13	700.2	1.62	2.27E+05
R11	1900.2	439.67	0.13	439.8	0.83	1.17E+05
R12	2340	0	0	0	0	0.00E+00
R13	1555.07	784.93	0	784.93	1.81	2.55E+05
R14	1983.33	356.53	0.13	356.66	0.33	4.65E+04
R15	1596.73	743.27	0	743.27	0.27	3.83E+04
R16	1725.33	614.67	0	614.67	0.87	1.23E+05
R17	730.93	1609.07	0	1609.07	1.18	1.66E+05
R18	740.27	1599.73	0	1599.73	2.78	3.91E+05
R19	1520.2	819.8	0	819.8	4.39	6.17E+05
R20	1930.6	409.4	0	409.4	0.19	2.66E+04
R21	2011.4	328.6	0	328.6	0.1	1.43E+04
R22	1922.53	417.47	0	417.47	0.41	5.70E+04
R23	2161.4	178.6	0	178.6	0.02	3.24E+03
R24	1894.53	445.47	0	445.47	0.43	6.03E+04
R25	1927.07	412.93	0	412.93	0.08	1.09E+04
R26	1907.07	432.93	0	432.93	0.35	4.87E+04
9A	1907.33	432.67	0	432.67	0.61	8.56E+04
A	0	2340	0	2340	3.4	4.77E+05
PS	0	2340	0	2340	12.12	1.70E+06

STORM 25

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1393.53	406.4	0.07	406.47	0.78	8.40E+04
R03	1540.27	259.73	0	259.73	0.82	8.90E+04
R04	1533.6	266.4	0	266.4	0.37	4.00E+04
R05	730.47	1069.53	0	1069.53	1.7	1.84E+05
R06	1547.93	252.07	0	252.07	0.12	1.30E+04
R07	1475.07	324.93	0	324.93	0.42	4.51E+04
R08	726.93	1073.07	0	1073.07	2.19	2.37E+05
R09	1514.8	285.2	0	285.2	0.48	5.14E+04
R11	1620.6	179.4	0	179.4	0.04	3.88E+03
R12	1800	0	0	0	0	0.00E+00
R13	1470.13	329.87	0	329.87	0.86	9.25E+04
R14	1800	0	0	0	0	0.00E+00
R15	1493.4	306.6	0	306.6	0.09	9.67E+03
R16	1505.8	294.2	0	294.2	0.35	3.79E+04
R17	728.4	1071.6	0	1071.6	0.6	6.44E+04
R18	735.87	1064.13	0	1064.13	1.37	1.48E+05
R19	1466.93	333.07	0	333.07	2.22	2.40E+05
R20	1609.87	190.13	0	190.13	0.05	5.49E+03
R21	1650.73	149.27	0	149.27	0.02	2.42E+03
R22	1560.93	239.07	0	239.07	0.13	1.41E+04
R23	1800	0	0	0	0	0.00E+00
R24	1555.4	244.6	0	244.6	0.16	1.74E+04
R25	1624.53	175.47	0	175.47	0	2.94E+02
R26	1616.6	183.4	0	183.4	0.07	7.46E+03
9A	1726.6	73.4	0	73.4	0	4.45E+02
A	0	1800	0	1800	3.17	3.43E+05
PS	0	1800	0	1800	10.23	1.10E+06

STORM 26

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1348.13	691.87	0	691.87	1.4	1.71E+05
R03	1603.27	436.67	0.07	436.74	1.45	1.77E+05
R04	1598.07	441.93	0	441.93	0.67	8.22E+04
R05	721.93	1318	0.07	1318.07	2.62	3.21E+05
R06	1748.6	291.33	0.07	291.4	0.2	2.43E+04
R07	1584.6	455.4	0	455.4	0.76	9.26E+04
R08	721.93	1318.07	0	1318.07	3.83	4.68E+05
R09	1584.73	455.27	0	455.27	1.37	1.67E+05
R11	1723.47	316.47	0.07	316.54	0.69	8.48E+04
R12	1983.6	56.4	0	56.4	0.01	1.83E+03
R13	1533.53	506.47	0	506.47	1.52	1.86E+05
R14	1819.6	220.33	0.07	220.4	0.59	7.24E+04
R15	1488.33	551.67	0	551.67	0.29	3.59E+04
R16	1608.67	431.27	0.07	431.34	0.8	9.84E+04
R17	722.67	1317.33	0	1317.33	0.92	1.13E+05
R18	725.13	1314.87	0	1314.87	2.34	2.87E+05
R19	1481.33	558.67	0	558.67	3.28	4.01E+05
R20	1866.33	173.67	0	173.67	0.19	2.36E+04
R21	1917.4	122.6	0	122.6	0.11	1.37E+04
R22	1858.53	181.47	0	181.47	0.38	4.66E+04
R23	1978.47	61.53	0	61.53	0.07	8.16E+03
R24	1702.93	337.07	0	337.07	0.36	4.45E+04
R25	1739.6	300.4	0	300.4	0.15	1.85E+04
R26	1694.53	345.47	0	345.47	0.39	4.81E+04
9A	1746.4	293.6	0	293.6	0.52	6.36E+04
A	0	2040	0	2040	3.13	3.84E+05
PS	0	2040	0	2040	10.18	1.25E+06

STORM 27

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1472.2	267.8	0	267.8	0.35	3.63E+04
R03	1586.07	153.93	0	153.93	0.28	2.97E+04
R04	1576.93	163.07	0	163.07	0.12	1.29E+04
R05	753.07	986.93	0	986.93	0.83	8.62E+04
R06	1598.07	141.93	0	141.93	0.04	4.69E+03
R07	1529.13	210.87	0	210.87	0.18	1.84E+04
R08	741.53	998.47	0	998.47	1	1.04E+05
R09	1556.93	183.07	0	183.07	0.18	1.88E+04
R11	1740	0	0	0	0	0.00E+00
R12	1740	0	0	0	0	0.00E+00
R13	1523.53	216.47	0	216.47	0.36	3.73E+04
R14	1740	0	0	0	0	0.00E+00
R15	1548.67	191.33	0	191.33	0.03	3.13E+03
R16	1569.53	170.4	0.07	170.47	0.11	1.10E+04
R17	739	1001	0	1001	0.27	2.84E+04
R18	751.8	988.2	0	988.2	0.65	6.76E+04
R19	1518.93	221	0.07	221.07	0.85	8.88E+04
R20	1661.87	78.13	0	78.13	0.01	6.19E+02
R21	1739.27	0.73	0	0.73	0	2.97E+00
R22	1605.73	134.27	0	134.27	0.02	2.51E+03
R23	1740	0	0	0	0	0.00E+00
R24	1679.6	60.4	0	60.4	0	2.89E+02
R25	1740	0	0	0	0	0.00E+00
R26	1677.13	62.87	0	62.87	0.01	7.90E+02
9A	1740	0	0	0	0	0.00E+00
A	0	1740	0	1740	2.79	2.91E+05
PS	0	1740	0	1740	8.77	9.16E+05

STORM 28

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1462.33	757.6	0.07	757.67	1.06	1.41E+05
R03	1596.4	623.53	0.07	623.6	1.04	1.38E+05
R04	1582.47	637.53	0	637.53	0.47	6.31E+04
R05	735.8	1484.2	0	1484.2	2.29	3.05E+05
R06	1739.07	480.93	0	480.93	0.13	1.73E+04
R07	1515.33	704.67	0	704.67	0.57	7.63E+04
R08	729.8	1490.13	0.07	1490.2	2.93	3.91E+05
R09	1550.53	669.4	0.07	669.47	0.61	8.14E+04
R11	1991.87	228.13	0	228.13	0.03	3.46E+03
R12	2220	0	0	0	0	0.00E+00
R13	1503.93	716.07	0	716.07	1.19	1.58E+05
R14	2220	0	0	0	0	0.00E+00
R15	1549.07	670.93	0	670.93	0.1	1.38E+04
R16	1557.87	662.07	0.07	662.14	0.37	4.89E+04
R17	730.93	1489.07	0	1489.07	0.81	1.08E+05
R18	740.27	1479.73	0	1479.73	1.84	2.45E+05
R19	1518.87	701.07	0.07	701.14	2.89	3.85E+05
R20	1922.07	297.93	0	297.93	0.05	6.40E+03
R21	2030.73	189.27	0	189.27	0.02	2.51E+03
R22	1917.07	302.93	0	302.93	0.13	1.78E+04
R23	2220	0	0	0	0	0.00E+00
R24	1939.67	280.33	0	280.33	0.04	5.38E+03
R25	1999.13	220.87	0	220.87	0	1.64E+02
R26	1929.73	290.27	0	290.27	0.06	8.66E+03
9A	2150.6	69.4	0	69.4	0	1.28E+02
A	0	2220	0	2220	3.59	4.78E+05
PS	0	2220	0	2220	11.97	1.59E+06

STORM 29

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1920	0	0	0	0	0.00E+00
R03	1920	0	0	0	0	0.00E+00
R04	1920	0	0	0	0	0.00E+00
R05	1874.07	45.93	0	45.93	0	1.09E+02
R06	1920	0	0	0	0	0.00E+00
R07	1920	0	0	0	0	0.00E+00
R08	1861.8	58.2	0	58.2	0	3.65E+02
R09	1920	0	0	0	0	0.00E+00
R11	1920	0	0	0	0	0.00E+00
R12	1920	0	0	0	0	0.00E+00
R13	1920	0	0	0	0	0.00E+00
R14	1920	0	0	0	0	0.00E+00
R15	1920	0	0	0	0	0.00E+00
R16	1920	0	0	0	0	0.00E+00
R17	1807.2	112.8	0	112.8	0	1.90E+02
R18	1764.27	155.73	0	155.73	0.01	1.23E+03
R19	1920	0	0	0	0	0.00E+00
R20	1920	0	0	0	0	0.00E+00
R21	1920	0	0	0	0	0.00E+00
R22	1920	0	0	0	0	0.00E+00
R23	1920	0	0	0	0	0.00E+00
R24	1920	0	0	0	0	0.00E+00
R25	1920	0	0	0	0	0.00E+00
R26	1920	0	0	0	0	0.00E+00
9A	1920	0	0	0	0	0.00E+00
A	0	1920	0	1920	2.5	2.88E+05
PS	0	1920	0	1920	7.17	8.26E+05

STORM 30

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1513.07	106.87	0.07	106.94	0.01	1.39E+03
R03	1620	0	0	0	0	0.00E+00
R04	1620	0	0	0	0	0.00E+00
R05	1545.47	74.53	0	74.53	0.01	1.30E+03
R06	1620	0	0	0	0	0.00E+00
R07	1620	0	0	0	0	0.00E+00
R08	1542.13	77.87	0	77.87	0.02	2.32E+03
R09	1620	0	0	0	0	0.00E+00
R11	1620	0	0	0	0	0.00E+00
R12	1620	0	0	0	0	0.00E+00
R13	1620	0	0	0	0	0.00E+00
R14	1620	0	0	0	0	0.00E+00
R15	1590.67	29.33	0	29.33	0	3.08E-01
R16	1620	0	0	0	0	0.00E+00
R17	1516.2	103.8	0	103.8	0.01	7.37E+02
R18	1501.13	118.87	0	118.87	0.03	3.19E+03
R19	1620	0	0	0	0	0.00E+00
R20	1620	0	0	0	0	0.00E+00
R21	1620	0	0	0	0	0.00E+00
R22	1620	0	0	0	0	0.00E+00
R23	1620	0	0	0	0	0.00E+00
R24	1620	0	0	0	0	0.00E+00
R25	1620	0	0	0	0	0.00E+00
R26	1620	0	0	0	0	0.00E+00
9A	1620	0	0	0	0	0.00E+00
A	0	1620	0	1620	2.54	2.47E+05
PS	0	1620	0	1620	7.29	7.09E+05

STORM 31

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1451.6	168.4	0	168.4	0.09	8.86E+03
R03	1606.47	13.53	0	13.53	0	1.00E+01
R04	1596.13	23.87	0	23.87	0	4.90E+01
R05	740.73	879.27	0	879.27	0.3	2.96E+04
R06	1620	0	0	0	0	0.00E+00
R07	1526.87	93.13	0	93.13	0.03	3.06E+03
R08	733.4	886.6	0	886.6	0.28	2.74E+04
R09	1585.87	34.07	0.07	34.14	0	1.63E+02
R11	1620	0	0	0	0	0.00E+00
R12	1620	0	0	0	0	0.00E+00
R13	1521.33	98.67	0	98.67	0.04	4.37E+03
R14	1620	0	0	0	0	0.00E+00
R15	1521.73	98.27	0	98.27	0	3.40E+02
R16	1620	0	0	0	0	0.00E+00
R17	1470.33	149.67	0	149.67	0.04	3.92E+03
R18	1453.4	166.6	0	166.6	0.13	1.26E+04
R19	1620	0	0	0	0	0.00E+00
R20	1620	0	0	0	0	0.00E+00
R21	1620	0	0	0	0	0.00E+00
R22	1608.2	11.8	0	11.8	0	8.05E+00
R23	1620	0	0	0	0	0.00E+00
R24	1620	0	0	0	0	0.00E+00
R25	1620	0	0	0	0	0.00E+00
R26	1620	0	0	0	0	0.00E+00
9A	1620	0	0	0	0	0.00E+00
A	0	1620	0	1620	2.53	2.46E+05
PS	0	1620	0	1620	7.87	7.65E+05

STORM 32

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	2752.6	187.4	0	187.4	0.1	1.83E+04
R03	2866.4	73.53	0.07	73.6	0.07	1.27E+04
R04	2877.13	62.87	0	62.87	0.01	1.62E+03
R05	2006.4	933.6	0	933.6	0.29	5.05E+04
R06	2882.33	57.67	0	57.67	0.01	1.71E+03
R07	2798.53	141.47	0	141.47	0.05	8.40E+03
R08	1989.87	950.07	0.07	950.14	0.32	5.66E+04
R09	2841.67	98.33	0	98.33	0.05	8.00E+03
R11	2940	0	0	0	0	0.00E+00
R12	2940	0	0	0	0	0.00E+00
R13	2792	148	0	148	0.09	1.63E+04
R14	2940	0	0	0	0	0.00E+00
R15	2813.6	126.4	0	126.4	0.01	1.42E+03
R16	2871.67	68.33	0	68.33	0	0.00E+00
R17	1958.47	981.53	0	981.53	0.08	1.48E+04
R18	1937.2	1002.8	0	1002.8	0.22	3.90E+04
R19	2831.67	108.27	0.07	108.34	0.17	3.00E+04
R20	2887.8	52.2	0	52.2	0	2.17E+02
R21	2940	0	0	0	0	0.00E+00
R22	2885.2	54.8	0	54.8	0.01	1.18E+03
R23	2940	0	0	0	0	0.00E+00
R24	2901.13	38.87	0	38.87	0	9.00E+00
R25	2940	0	0	0	0	0.00E+00
R26	2889.87	50.13	0	50.13	0	2.19E+02
9A	2940	0	0	0	0	0.00E+00
A	0	2940	0	2940	2.59	4.57E+05
PS	0	2940	0	2940	7.77	1.37E+06

STORM 33

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1433.87	366.07	0.07	366.14	0.32	3.49E+04
R03	1672.4	127.6	0	127.6	0.16	1.72E+04
R04	1728.87	71.13	0	71.13	0.02	1.76E+03
R05	730.47	1069.53	0	1069.53	0.8	8.59E+04
R06	1730.8	69.2	0	69.2	0.02	1.91E+03
R07	1483.27	316.73	0	316.73	0.16	1.73E+04
R08	726.93	1073.07	0	1073.07	0.93	9.99E+04
R09	1632.4	167.6	0	167.6	0.1	1.09E+04
R11	1800	0	0	0	0	0.00E+00
R12	1800	0	0	0	0	0.00E+00
R13	1474.87	325.13	0	325.13	0.23	2.47E+04
R14	1800	0	0	0	0	0.00E+00
R15	1497.07	302.93	0	302.93	0.02	1.91E+03
R16	1685.53	114.4	0.07	114.47	0.02	2.62E+03
R17	728.4	1071.6	0	1071.6	0.22	2.32E+04
R18	735.87	1064.13	0	1064.13	0.56	6.01E+04
R19	1610.13	189.8	0.07	189.87	0.52	5.60E+04
R20	1743.6	56.4	0	56.4	0	2.36E+02
R21	1800	0	0	0	0	0.00E+00
R22	1741.13	58.87	0	58.87	0.01	1.27E+03
R23	1800	0	0	0	0	0.00E+00
R24	1757.87	42.13	0	42.13	0	9.90E+00
R25	1800	0	0	0	0	0.00E+00
R26	1747	53	0	53	0	2.35E+02
9A	1800	0	0	0	0	0.00E+00
A	0	1800	0	1800	2.86	3.09E+05
PS	0	1800	0	1800	9.07	9.79E+05

STORM 34

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1405.33	1234.6	0.07	1234.67	1.79	2.83E+05
R03	1934.47	705.53	0	705.53	1.98	3.13E+05
R04	1905.47	734.53	0	734.53	0.89	1.41E+05
R05	730.47	1909.53	0	1909.53	3.8	6.01E+05
R06	1998.8	641.2	0	641.2	0.28	4.51E+04
R07	1625.53	1014.47	0	1014.47	1.01	1.60E+05
R08	726.93	1913.07	0	1913.07	5.21	8.25E+05
R09	1786.67	853.27	0.07	853.34	1.85	2.92E+05
R11	2024.07	615.93	0	615.93	0.91	1.45E+05
R12	2640	0	0	0	0	0.00E+00
R13	1702.47	937.33	0.2	937.53	2	3.18E+05
R14	2132.13	507.73	0.13	507.86	0.52	8.22E+04
R15	1649.33	990.67	0	990.67	0.34	5.39E+04
R16	1878.13	761.87	0	761.87	1	1.58E+05
R17	728.4	1911.6	0	1911.6	1.33	2.10E+05
R18	735.87	1904.13	0	1904.13	3.13	4.95E+05
R19	1729.07	910.93	0	910.93	4.58	7.25E+05
R20	2082.2	557.8	0	557.8	0.22	3.49E+04
R21	2238.87	401.13	0	401.13	0.11	1.76E+04
R22	2079.27	560.73	0	560.73	0.47	7.51E+04
R23	2401.33	238.67	0	238.67	0.02	2.89E+03
R24	2012.4	627.6	0	627.6	0.48	7.65E+04
R25	2172.87	467.13	0	467.13	0.07	1.11E+04
R26	2011.4	628.6	0	628.6	0.43	6.74E+04
9A	2032.6	607.4	0	607.4	0.73	1.15E+05
A	0	2640	0	2640	3.66	5.79E+05
PS	0	2640	0	2640	12.95	2.05E+06

STORM 35

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1726.67	193.33	0	193.33	0.13	1.51E+04
R03	1847.2	72.8	0	72.8	0.09	1.06E+04
R04	1831.87	88.13	0	88.13	0.04	4.59E+03
R05	968.2	951.73	0.07	951.8	0.38	4.41E+04
R06	1874.07	45.87	0.07	45.94	0.01	1.60E+03
R07	1800	120	0	120	0.06	7.01E+03
R08	956.13	963.8	0.07	963.87	0.42	4.87E+04
R09	1798.2	121.8	0	121.8	0.06	6.70E+03
R11	1897.33	22.6	0.07	22.67	0	3.30E+01
R12	1920	0	0	0	0	0.00E+00
R13	1784	136	0	136	0.14	1.56E+04
R14	1920	0	0	0	0	0.00E+00
R15	1840.27	79.73	0	79.73	0.01	1.31E+03
R16	1850.93	69	0.07	69.07	0	0.00E+00
R17	927.4	992.6	0	992.6	0.12	1.34E+04
R18	918.07	1001.93	0	1001.93	0.31	3.52E+04
R19	1772.47	147.53	0	147.53	0.36	4.19E+04
R20	1886.93	33.07	0	33.07	0	3.97E+02
R21	1920	0	0	0	0	0.00E+00
R22	1882.33	37.67	0	37.67	0.01	1.41E+03
R23	1920	0	0	0	0	0.00E+00
R24	1891.27	28.73	0	28.73	0	2.75E+02
R25	1920	0	0	0	0	0.00E+00
R26	1889.4	30.6	0	30.6	0.01	5.95E+02
9A	1920	0	0	0	0	0.00E+00
A	0	1920	0	1920	2.6	3.00E+05
PS	0	1920	0	1920	7.94	9.14E+05

STORM 36

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1595.8	504.2	0	504.2	0.52	6.57E+04
R03	1768.4	331.6	0	331.6	0.44	5.54E+04
R04	1745.8	354.2	0	354.2	0.21	2.60E+04
R05	753.07	1346.93	0	1346.93	1.2	1.52E+05
R06	1964.93	135.07	0	135.07	0.06	7.32E+03
R07	1711.33	388.67	0	388.67	0.27	3.46E+04
R08	741.53	1358.47	0	1358.47	1.52	1.91E+05
R09	1699.93	400	0.07	400.07	0.4	5.10E+04
R11	1968.4	131.6	0	131.6	0.16	2.04E+04
R12	2100	0	0	0	0	0.00E+00
R13	1678.67	421.27	0.07	421.34	0.56	7.11E+04
R14	2034.67	65.33	0	65.33	0	0.00E+00
R15	1687.87	412.13	0	412.13	0.06	7.32E+03
R16	1850.87	249.07	0.07	249.14	0.18	2.22E+04
R17	739	1361	0	1361	0.41	5.14E+04
R18	751.8	1348.2	0	1348.2	0.97	1.23E+05
R19	1674.87	425.07	0.07	425.14	1.31	1.65E+05
R20	1957	143	0	143	0.04	5.02E+03
R21	2037.6	62.4	0	62.4	0.02	2.12E+03
R22	1952.33	147.67	0	147.67	0.09	1.13E+04
R23	2047.93	52.07	0	52.07	0	1.12E+01
R24	1851.93	248.07	0	248.07	0.1	1.23E+04
R25	2001.4	98.6	0	98.6	0.01	1.13E+03
R26	1965.47	134.53	0	134.53	0.06	7.01E+03
9A	1993.73	106.27	0	106.27	0.13	1.65E+04
A	0	2100	0	2100	2.93	3.70E+05
PS	0	2100	0	2100	9.4	1.18E+06

STORM 37

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1684	236	0	236	0.11	1.24E+04
R03	1920	0	0	0	0	0.00E+00
R04	1920	0	0	0	0	0.00E+00
R05	933.07	986.93	0	986.93	0.29	3.37E+04
R06	1920	0	0	0	0	0.00E+00
R07	1800.33	119.67	0	119.67	0.03	3.60E+03
R08	921.53	998.47	0	998.47	0.28	3.17E+04
R09	1877.33	42.67	0	42.67	0	6.84E+01
R11	1920	0	0	0	0	0.00E+00
R12	1920	0	0	0	0	0.00E+00
R13	1785.4	134.6	0	134.6	0.04	4.58E+03
R14	1920	0	0	0	0	0.00E+00
R15	1804.8	115.2	0	115.2	0	2.98E+02
R16	1920	0	0	0	0	0.00E+00
R17	1652.13	267.87	0	267.87	0.04	4.53E+03
R18	1626.07	293.93	0	293.93	0.14	1.57E+04
R19	1920	0	0	0	0	0.00E+00
R20	1920	0	0	0	0	0.00E+00
R21	1920	0	0	0	0	0.00E+00
R22	1920	0	0	0	0	0.00E+00
R23	1920	0	0	0	0	0.00E+00
R24	1920	0	0	0	0	0.00E+00
R25	1920	0	0	0	0	0.00E+00
R26	1920	0	0	0	0	0.00E+00
9A	1920	0	0	0	0	0.00E+00
A	0	1920	0	1920	2.62	3.01E+05
PS	0	1920	0	1920	8.1	9.33E+05

STORM 38

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1309.33	370.6	0.07	370.67	0.82	8.25E+04
R03	1583.67	96.33	0	96.33	0.93	9.39E+04
R04	1573.13	106.87	0	106.87	0.42	4.25E+04
R05	781.4	898.53	0.07	898.6	1.48	1.50E+05
R06	1586.4	93.53	0.07	93.6	0.14	1.38E+04
R07	1549	131	0	131	0.44	4.45E+04
R08	781.4	898.53	0.07	898.6	2.25	2.27E+05
R09	1546.47	133.53	0	133.53	0.9	9.10E+04
R11	1606	73.93	0.07	74	0.48	4.88E+04
R12	1630.4	49.6	0	49.6	0	3.71E+02
R13	1535.27	144.67	0.07	144.74	0.91	9.20E+04
R14	1595.33	84.6	0.07	84.67	0.39	3.94E+04
R15	1521.4	158.6	0	158.6	0.18	1.77E+04
R16	1533.47	146.47	0.07	146.54	0.57	5.70E+04
R17	769	911	0	911	0.54	5.45E+04
R18	780.93	899.07	0	899.07	1.42	1.44E+05
R19	1480.53	199.47	0	199.47	1.94	1.96E+05
R20	1612.8	67.2	0	67.2	0.15	1.48E+04
R21	1613.6	66.4	0	66.4	0.08	8.43E+03
R22	1613.4	66.6	0	66.6	0.28	2.82E+04
R23	1620.47	59.53	0	59.53	0.05	4.87E+03
R24	1605.33	74.67	0	74.67	0.24	2.45E+04
R25	1616.33	63.67	0	63.67	0.09	9.36E+03
R26	1608.27	71.73	0	71.73	0.26	2.65E+04
9A	1604	76	0	76	0.39	3.91E+04
A	0	1680	0	1680	2.6	2.62E+05
PS	0	1680	0	1680	8.47	8.54E+05

STORM 39

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1609.07	430.93	0	430.93	0.45	5.56E+04
R03	1842.73	197.27	0	197.27	0.45	5.47E+04
R04	1824.47	215.53	0	215.53	0.21	2.57E+04
R05	723.53	1316.47	0	1316.47	1.03	1.26E+05
R06	1905.07	134.93	0	134.93	0.05	6.35E+03
R07	1765.27	274.73	0	274.73	0.24	2.96E+04
R08	722.87	1317.07	0.07	1317.14	1.34	1.63E+05
R09	1767	272.93	0.07	273	0.42	5.14E+04
R11	1908.8	131.13	0.07	131.2	0.19	2.38E+04
R12	2040	0	0	0	0	0.00E+00
R13	1743.33	296.6	0.07	296.67	0.5	6.14E+04
R14	1982.87	57.13	0	57.13	0.04	4.64E+03
R15	1707.53	332.47	0	332.47	0.09	1.06E+04
R16	1818.47	221.47	0.07	221.54	0.19	2.35E+04
R17	724.07	1315.93	0	1315.93	0.35	4.32E+04
R18	727.73	1312.27	0	1312.27	0.86	1.06E+05
R19	1711.87	328.13	0	328.13	1.13	1.38E+05
R20	1975.8	64.2	0	64.2	0.05	5.87E+03
R21	1986	54	0	54	0.02	2.69E+03
R22	1937.07	102.93	0	102.93	0.1	1.22E+04
R23	1994.33	45.67	0	45.67	0.01	8.16E+02
R24	1898.53	141.47	0	141.47	0.11	1.34E+04
R25	1981.4	58.6	0	58.6	0.02	2.09E+03
R26	1978.73	61.27	0	61.27	0.07	8.27E+03
9A	1917.67	122.33	0	122.33	0.15	1.89E+04
A	0	2040	0	2040	2.63	3.22E+05
PS	0	2040	0	2040	8.65	1.06E+06

STORM 40

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1494.4	245.53	0.07	245.6	0.06	6.76E+03
R03	1740	0	0	0	0	0.00E+00
R04	1740	0	0	0	0	0.00E+00
R05	789.93	950.07	0	950.07	0.17	1.73E+04
R06	1740	0	0	0	0	0.00E+00
R07	1740	0	0	0	0	0.00E+00
R08	1524.67	215.33	0	215.33	0.06	6.09E+03
R09	1740	0	0	0	0	0.00E+00
R11	1740	0	0	0	0	0.00E+00
R12	1740	0	0	0	0	0.00E+00
R13	1740	0	0	0	0	0.00E+00
R14	1740	0	0	0	0	0.00E+00
R15	1663.87	76.13	0	76.13	0	8.50E+00
R16	1740	0	0	0	0	0.00E+00
R17	1484.6	255.4	0	255.4	0.02	1.96E+03
R18	1470.2	269.8	0	269.8	0.08	8.67E+03
R19	1740	0	0	0	0	0.00E+00
R20	1740	0	0	0	0	0.00E+00
R21	1740	0	0	0	0	0.00E+00
R22	1740	0	0	0	0	0.00E+00
R23	1740	0	0	0	0	0.00E+00
R24	1740	0	0	0	0	0.00E+00
R25	1740	0	0	0	0	0.00E+00
R26	1740	0	0	0	0	0.00E+00
9A	1740	0	0	0	0	0.00E+00
A	0	1740	0	1740	2.63	2.74E+05
PS	0	1740	0	1740	7.86	8.21E+05

STORM 41

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1594.8	685.13	0.07	685.2	0.39	5.29E+04
R03	1940.93	339	0.07	339.07	0.27	3.65E+04
R04	2122.87	157.13	0	157.13	0.02	3.37E+03
R05	753.07	1526.93	0	1526.93	0.93	1.27E+05
R06	2095.8	184.2	0	184.2	0.03	4.63E+03
R07	1861.4	418.6	0	418.6	0.18	2.50E+04
R08	741.53	1538.47	0	1538.47	1.1	1.51E+05
R09	1855.67	424.13	0.2	424.33	0.18	2.44E+04
R11	2280	0	0	0	0	0.00E+00
R12	2280	0	0	0	0	0.00E+00
R13	1772.33	507.67	0	507.67	0.38	5.14E+04
R14	2280	0	0	0	0	0.00E+00
R15	1892.73	387.27	0	387.27	0.02	3.37E+03
R16	2118.93	160.4	0.67	161.07	0.02	2.81E+03
R17	739	1541	0	1541	0.31	4.25E+04
R18	751.8	1528.2	0	1528.2	0.73	1.00E+05
R19	1794.4	485.47	0.13	485.6	0.95	1.31E+05
R20	2173.33	106.67	0	106.67	0	4.39E+02
R21	2280	0	0	0	0	0.00E+00
R22	2166.47	113.53	0	113.53	0.02	2.40E+03
R23	2280	0	0	0	0	0.00E+00
R24	2202.8	77.2	0	77.2	0	1.79E+01
R25	2280	0	0	0	0	0.00E+00
R26	2180	100	0	100	0	4.35E+02
9A	2280	0	0	0	0	0.00E+00
A	0	2280	0	2280	3.04	4.16E+05
PS	0	2280	0	2280	9.34	1.28E+06

STORM 42

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1586.4	213.6	0	213.6	0.17	1.85E+04
R03	1727.8	72.2	0	72.2	0.01	5.82E+02
R04	1720.53	79.47	0	79.47	0.01	6.93E+02
R05	729.2	1070.8	0	1070.8	0.5	5.45E+04
R06	1731.2	68.8	0	68.8	0.02	1.89E+03
R07	1652.8	147.2	0	147.2	0.08	8.82E+03
R08	726.07	1073.87	0.07	1073.94	0.55	5.98E+04
R09	1658.87	141.07	0.07	141.14	0.07	7.75E+03
R11	1800	0	0	0	0	0.00E+00
R12	1800	0	0	0	0	0.00E+00
R13	1647.8	152.2	0	152.2	0.16	1.74E+04
R14	1800	0	0	0	0	0.00E+00
R15	1672.07	127.93	0	127.93	0.01	1.29E+03
R16	1773.87	26	0.13	26.13	0	0.00E+00
R17	1620.53	179.47	0	179.47	0.08	9.16E+03
R18	1584.47	215.53	0	215.53	0.24	2.64E+04
R19	1711.13	88.87	0	88.87	0.1	1.08E+04
R20	1786.27	13.73	0	13.73	0	1.56E+01
R21	1800	0	0	0	0	0.00E+00
R22	1731	69	0	69	0	2.75E+02
R23	1800	0	0	0	0	0.00E+00
R24	1800	0	0	0	0	0.00E+00
R25	1800	0	0	0	0	0.00E+00
R26	1791.67	8.33	0	8.33	0	1.70E+01
9A	1800	0	0	0	0	0.00E+00
A	0	1800	0	1800	2.67	2.89E+05
PS	0	1800	0	1800	8.4	9.07E+05

STORM 43

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1154.6	405.4	0	405.4	0.98	9.16E+04
R03	1471.07	88.87	0.07	88.94	1.15	1.07E+05
R04	1467.93	92.07	0	92.07	0.51	4.79E+04
R05	722.13	837.8	0.07	837.87	1.71	1.60E+05
R06	1468.27	91.73	0	91.73	0.17	1.56E+04
R07	1451	109	0	109	0.53	4.96E+04
R08	722.07	837.93	0	837.93	2.68	2.51E+05
R09	1450.93	109.07	0	109.07	1.1	1.03E+05
R11	1487.4	72.6	0	72.6	0.57	5.37E+04
R12	1507.27	52.73	0	52.73	0.01	8.44E+02
R13	1445.67	114.33	0	114.33	1.09	1.02E+05
R14	1476.87	83.07	0.07	83.14	0.52	4.88E+04
R15	1438.27	121.73	0	121.73	0.21	1.99E+04
R16	1421.07	138.93	0	138.93	0.7	6.54E+04
R17	722.87	837.13	0	837.13	0.62	5.85E+04
R18	725.47	834.53	0	834.53	1.68	1.57E+05
R19	1366.47	193.53	0	193.53	1.22	1.14E+05
R20	1493.2	66.8	0	66.8	0.18	1.73E+04
R21	1493.8	66.2	0	66.2	0.11	1.00E+04
R22	1493.67	66.33	0	66.33	0.35	3.28E+04
R23	1499.87	60.13	0	60.13	0.07	6.14E+03
R24	1488	72	0	72	0.3	2.78E+04
R25	1490.87	69.13	0	69.13	0.12	1.13E+04
R26	1490.87	69.13	0	69.13	0.32	3.00E+04
9A	1484.73	75.27	0	75.27	0.47	4.44E+04
A	0	1560	0	1560	2.58	2.42E+05
PS	0	1560	0	1560	8.56	8.01E+05

STORM 44

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1937.07	522.93	0	522.93	0.9	1.32E+05
R03	2188.73	271.27	0	271.27	1.21	1.78E+05
R04	2177.4	282.6	0	282.6	0.54	8.04E+04
R05	1162.27	1297.73	0	1297.73	2.04	3.01E+05
R06	2193.73	266.27	0	266.27	0.18	2.59E+04
R07	2102.53	357.47	0	357.47	0.58	8.54E+04
R08	1129.73	1330.27	0	1330.27	2.96	4.37E+05
R09	2146.47	313.53	0	313.53	1.09	1.62E+05
R11	2211.27	248.67	0.07	248.74	0.59	8.77E+04
R12	2401.53	58.47	0	58.47	0.01	7.77E+02
R13	2086.73	373.27	0	373.27	1.17	1.73E+05
R14	2207.27	252.73	0	252.73	0.43	6.37E+04
R15	2065.87	394.13	0	394.13	0.22	3.27E+04
R16	2144.27	315.73	0	315.73	0.67	9.84E+04
R17	1037.93	1422.07	0	1422.07	0.73	1.08E+05
R18	1019.6	1440.4	0	1440.4	1.84	2.72E+05
R19	2101.93	358.07	0	358.07	2.07	3.05E+05
R20	2219.13	240.87	0	240.87	0.15	2.15E+04
R21	2271.6	188.4	0	188.4	0.08	1.25E+04
R22	2217.27	242.73	0	242.73	0.3	4.40E+04
R23	2397.27	62.73	0	62.73	0.04	6.04E+03
R24	2210.07	249.93	0	249.93	0.3	4.43E+04
R25	2217.4	242.6	0	242.6	0.12	1.72E+04
R26	2211.53	248.47	0	248.47	0.32	4.65E+04
9A	2212.07	247.93	0	247.93	0.43	6.31E+04
A	0	2460	0	2460	3.15	4.65E+05
PS	0	2460	0	2460	9.94	1.47E+06

STORM 45

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1394	166	0	166	0.25	2.29E+04
R03	1483.53	76.4	0.07	76.47	0.27	2.55E+04
R04	1476.93	83.07	0	83.07	0.11	1.07E+04
R05	725.13	834.8	0.07	834.87	0.64	5.95E+04
R06	1499.6	60.4	0	60.4	0.03	3.14E+03
R07	1460.47	99.53	0	99.53	0.14	1.28E+04
R08	723.73	836.27	0	836.27	0.76	7.09E+04
R09	1459.8	100.2	0	100.2	0.22	2.03E+04
R11	1511.47	48.47	0.07	48.54	0.1	9.22E+03
R12	1560	0	0	0	0	0.00E+00
R13	1454.87	105.07	0.07	105.14	0.28	2.64E+04
R14	1530.13	29.87	0	29.87	0	0.00E+00
R15	1483.53	76.47	0	76.47	0.03	2.98E+03
R16	1447.4	112.6	0	112.6	0.08	7.57E+03
R17	725.13	834.87	0	834.87	0.21	1.96E+04
R18	729.8	830.2	0	830.2	0.51	4.76E+04
R19	1411.53	148.4	0.07	148.47	0.56	5.20E+04
R20	1502.33	57.67	0	57.67	0.02	2.07E+03
R21	1531	29	0	29	0.01	5.25E+02
R22	1501.87	58.13	0	58.13	0.05	4.99E+03
R23	1560	0	0	0	0	0.00E+00
R24	1501.93	58.07	0	58.07	0.06	5.33E+03
R25	1521.53	38.47	0	38.47	0	3.56E+02
R26	1504.13	55.87	0	55.87	0.03	2.91E+03
9A	1513.13	46.87	0	46.87	0.07	6.30E+03
A	0	1560	0	1560	2.48	2.32E+05
PS	0	1560	0	1560	7.92	7.41E+05

STORM 46

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1725.2	494.73	0.07	494.8	0.5	6.66E+04
R03	1974.8	245.2	0	245.2	0.57	7.59E+04
R04	1939.73	280.27	0	280.27	0.27	3.63E+04
R05	727.47	1492.47	0.07	1492.54	1.32	1.76E+05
R06	2043.47	176.53	0	176.53	0.07	9.50E+03
R07	1907.27	312.73	0	312.73	0.31	4.09E+04
R08	725	1494.93	0.07	1495	1.78	2.37E+05
R09	1887.33	332.67	0	332.67	0.52	6.88E+04
R11	2075.33	144.6	0.07	144.67	0.24	3.13E+04
R12	2156.93	63.07	0	63.07	0.01	1.51E+03
R13	1864.93	355	0.07	355.07	0.66	8.86E+04
R14	2082.6	137.4	0	137.4	0.17	2.31E+04
R15	1792.67	427.33	0	427.33	0.12	1.54E+04
R16	2022.93	196.93	0.13	197.06	0.25	3.29E+04
R17	726.6	1493.4	0	1493.4	0.47	6.26E+04
R18	732.53	1487.47	0	1487.47	1.15	1.53E+05
R19	1921.93	298	0.07	298.07	1.26	1.67E+05
R20	2036.8	183.2	0	183.2	0.11	1.48E+04
R21	2099.2	120.8	0	120.8	0.05	7.25E+03
R22	2015.13	204.87	0	204.87	0.21	2.82E+04
R23	2100.67	119.33	0	119.33	0.05	6.00E+03
R24	2053.33	166.67	0	166.67	0.13	1.79E+04
R25	2095.07	124.93	0	124.93	0.06	7.46E+03
R26	2051.2	168.8	0	168.8	0.15	2.05E+04
9A	2091.33	128.67	0	128.67	0.17	2.32E+04
A	0	2220	0	2220	3.05	4.06E+05
PS	0	2220	0	2220	9.31	1.24E+06

STORM 47

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	842.8	777.2	0	777.2	2.33	2.27E+05
R03	1470.2	149.73	0.07	149.8	2.98	2.90E+05
R04	1467.27	152.73	0	152.73	1.35	1.31E+05
R05	721.93	898.07	0	898.07	4.64	4.51E+05
R06	1463.67	156.27	0.07	156.34	0.45	4.41E+04
R07	1450.53	169.47	0	169.47	1.4	1.36E+05
R08	721.93	898.07	0	898.07	6.9	6.71E+05
R09	1450.27	169.73	0	169.73	2.96	2.88E+05
R11	1486.93	133.07	0	133.07	1.57	1.52E+05
R12	1503.73	116.27	0	116.27	0.05	5.26E+03
R13	1444.93	175.07	0	175.07	2.72	2.65E+05
R14	1475.73	144.2	0.07	144.27	1.62	1.57E+05
R15	1437.73	182.27	0	182.27	0.64	6.22E+04
R16	1420.4	199.6	0	199.6	1.98	1.92E+05
R17	722.6	897.4	0	897.4	1.5	1.46E+05
R18	725.07	894.93	0	894.93	4.16	4.05E+05
R19	1373.87	246.13	0	246.13	0.06	5.50E+03
R20	1492.6	127.4	0	127.4	0.51	4.92E+04
R21	1492.6	127.4	0	127.4	0.3	2.94E+04
R22	1492.93	127.07	0	127.07	0.99	9.63E+04
R23	1499.2	120.8	0	120.8	0.18	1.76E+04
R24	1487.47	132.53	0	132.53	0.76	7.35E+04
R25	1483.53	136.47	0	136.47	0.37	3.55E+04
R26	1490.47	129.53	0	129.53	0.84	8.18E+04
9A	1483.87	136.13	0	136.13	1.29	1.25E+05
A	0	1620	0	1620	3	2.92E+05
PS	0	1620	0	1620	10.08	9.79E+05

STORM 48

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1556.6	663.33	0.07	663.4	0.46	6.13E+04
R03	2033.73	186.2	0.07	186.27	0.37	4.99E+04
R04	2024.6	195.4	0	195.4	0.17	2.29E+04
R05	735.8	1484.2	0	1484.2	1.12	1.49E+05
R06	2078.67	141.27	0.07	141.34	0.06	7.36E+03
R07	1842.33	377.67	0	377.67	0.23	3.01E+04
R08	752.6	1467.33	0.07	1467.4	1.3	1.73E+05
R09	2011.07	208.93	0	208.93	0.21	2.85E+04
R11	2105.8	114.13	0.07	114.2	0.01	1.63E+03
R12	2220	0	0	0	0	0.00E+00
R13	1736.8	483.13	0.07	483.2	0.42	5.53E+04
R14	2220	0	0	0	0	0.00E+00
R15	1881.33	338.67	0	338.67	0.04	5.55E+03
R16	2019.87	200.13	0	200.13	0.14	1.89E+04
R17	730.93	1489.07	0	1489.07	0.34	4.57E+04
R18	740.27	1479.73	0	1479.73	0.84	1.12E+05
R19	1836.93	383	0.07	383.07	1.07	1.43E+05
R20	2097.67	122.33	0	122.33	0.02	2.91E+03
R21	2145.4	74.6	0	74.6	0.01	1.10E+03
R22	2096.6	123.4	0	123.4	0.06	7.89E+03
R23	2220	0	0	0	0	0.00E+00
R24	2100.6	119.4	0	119.4	0.02	2.50E+03
R25	2161	59	0	59	0	1.14E+02
R26	2099.93	120.07	0	120.07	0.03	4.00E+03
9A	2162.2	57.8	0	57.8	0	1.13E+02
A	0	2220	0	2220	2.99	3.99E+05
PS	0	2220	0	2220	9.69	1.29E+06

STORM 49

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1674.27	245.73	0	245.73	0.17	1.91E+04
R03	1812.87	107.13	0	107.13	0.08	9.08E+03
R04	1788.27	131.73	0	131.73	0.04	4.28E+03
R05	753.07	1166.93	0	1166.93	0.47	5.47E+04
R06	1867.07	52.93	0	52.93	0.01	1.48E+03
R07	1739.47	180.53	0	180.53	0.07	8.49E+03
R08	741.53	1178.47	0	1178.47	0.51	5.92E+04
R09	1742.07	177.93	0	177.93	0.06	7.09E+03
R11	1920	0	0	0	0	0.00E+00
R12	1920	0	0	0	0	0.00E+00
R13	1720.67	199.33	0	199.33	0.15	1.70E+04
R14	1920	0	0	0	0	0.00E+00
R15	1793.13	126.87	0	126.87	0.01	1.17E+03
R16	1892.93	26.93	0.13	27.06	0	0.00E+00
R17	739	1181	0	1181	0.14	1.64E+04
R18	751.8	1168.2	0	1168.2	0.37	4.23E+04
R19	1836.6	83.4	0	83.4	0.09	9.93E+03
R20	1887.67	32.33	0	32.33	0	2.40E+02
R21	1920	0	0	0	0	0.00E+00
R22	1884	36	0	36	0.01	1.03E+03
R23	1920	0	0	0	0	0.00E+00
R24	1893.07	26.93	0	26.93	0	1.06E+02
R25	1920	0	0	0	0	0.00E+00
R26	1890.53	29.47	0	29.47	0	3.40E+02
9A	1920	0	0	0	0	0.00E+00
A	0	1920	0	1920	2.58	2.97E+05
PS	0	1920	0	1920	8.2	9.44E+05

STORM 50

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1167.47	752.53	0	752.53	2.18	2.52E+05
R03	1536.13	383.87	0	383.87	3.11	3.58E+05
R04	1532.13	387.87	0	387.87	1.4	1.62E+05
R05	732.33	1187.67	0	1187.67	5.08	5.85E+05
R06	1554.6	365.33	0.07	365.4	0.47	5.41E+04
R07	1473.93	446.07	0	446.07	1.47	1.69E+05
R08	728.07	1191.87	0.07	1191.94	7.54	8.69E+05
R09	1516.87	403.13	0	403.13	3	3.46E+05
R11	1592.6	327.33	0.07	327.4	1.54	1.77E+05
R12	1800.93	119.07	0	119.07	0.03	3.26E+03
R13	1471.07	448.93	0	448.93	2.9	3.34E+05
R14	1569.73	350.2	0.07	350.27	1.44	1.66E+05
R15	1453.53	466.47	0	466.47	0.64	7.37E+04
R16	1490.07	429.93	0	429.93	1.9	2.19E+05
R17	729.4	1190.6	0	1190.6	1.71	1.98E+05
R18	737.67	1182.33	0	1182.33	4.42	5.09E+05
R19	1454.87	465.13	0	465.13	4.48	5.17E+05
R20	1607.4	312.6	0	312.6	0.45	5.17E+04
R21	1685.4	234.6	0	234.6	0.26	2.99E+04
R22	1606.6	313.4	0	313.4	0.91	1.04E+05
R23	1737.07	182.93	0	182.93	0.14	1.57E+04
R24	1585.07	334.93	0	334.93	0.76	8.79E+04
R25	1602.93	317.07	0	317.07	0.32	3.73E+04
R26	1584.4	335.6	0	335.6	0.85	9.77E+04
9A	1591.4	328.6	0	328.6	1.26	1.45E+05
A	0	1920	0	1920	3.42	3.93E+05
PS	0	1920	0	1920	11.79	1.36E+06

STORM 51

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1451.73	228.2	0.07	228.27	0.2	2.04E+04
R03	1617.07	62.93	0	62.93	0.01	1.29E+03
R04	1609.67	70.33	0	70.33	0.01	1.06E+03
R05	730.47	949.53	0	949.53	0.54	5.49E+04
R06	1622.07	57.93	0	57.93	0.02	1.75E+03
R07	1505.87	174.13	0	174.13	0.09	9.24E+03
R08	726.93	953.07	0	953.07	0.61	6.16E+04
R09	1541.93	138.07	0	138.07	0.07	7.44E+03
R11	1680	0	0	0	0	0.00E+00
R12	1680	0	0	0	0	0.00E+00
R13	1489.33	190.67	0	190.67	0.17	1.75E+04
R14	1680	0	0	0	0	0.00E+00
R15	1545.53	134.47	0	134.47	0.01	1.34E+03
R16	1607.27	72.67	0.07	72.74	0	0.00E+00
R17	728.4	951.6	0	951.6	0.15	1.52E+04
R18	1464.47	215.53	0	215.53	0.28	2.80E+04
R19	1591.4	88.6	0	88.6	0.13	1.32E+04
R20	1627.6	52.4	0	52.4	0	3.52E+01
R21	1680	0	0	0	0	0.00E+00
R22	1619.47	60.53	0	60.53	0.01	6.20E+02
R23	1680	0	0	0	0	0.00E+00
R24	1680	0	0	0	0	0.00E+00
R25	1680	0	0	0	0	0.00E+00
R26	1680	0	0	0	0	0.00E+00
9A	1680	0	0	0	0	0.00E+00
A	0	1680	0	1680	2.73	2.75E+05
PS	0	1680	0	1680	8.53	8.60E+05

STORM 52

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1079.2	480.8	0	480.8	1.2	1.12E+05
R03	1470.2	89.73	0.07	89.8	1.39	1.30E+05
R04	1467.27	92.73	0	92.73	0.62	5.83E+04
R05	721.93	838	0.07	838.07	2.05	1.92E+05
R06	1463.8	96.13	0.07	96.2	0.21	1.93E+04
R07	1450.6	109.4	0	109.4	0.64	6.03E+04
R08	721.93	838.07	0	838.07	3.26	3.05E+05
R09	1450.27	109.73	0	109.73	1.34	1.26E+05
R11	1486.93	73.07	0	73.07	0.72	6.72E+04
R12	1504	56	0	56	0.02	1.82E+03
R13	1444.87	115.13	0	115.13	1.31	1.22E+05
R14	1475.93	84	0.07	84.07	0.71	6.67E+04
R15	1437.73	122.27	0	122.27	0.27	2.52E+04
R16	1420.47	139.47	0.07	139.54	0.88	8.21E+04
R17	722.67	837.33	0	837.33	0.73	6.82E+04
R18	725.13	834.87	0	834.87	2.01	1.88E+05
R19	1363.4	196.6	0	196.6	2.56	2.40E+05
R20	1492.6	67.4	0	67.4	0.23	2.17E+04
R21	1492.6	67.4	0	67.4	0.14	1.27E+04
R22	1492.93	67.07	0	67.07	0.44	4.15E+04
R23	1499.2	60.8	0	60.8	0.09	8.10E+03
R24	1487.47	72.53	0	72.53	0.36	3.35E+04
R25	1485.73	74.27	0	74.27	0.16	1.53E+04
R26	1490.47	69.53	0	69.53	0.39	3.65E+04
9A	1483.87	76.13	0	76.13	0.58	5.45E+04
A	0	1560	0	1560	2.63	2.46E+05
PS	0	1560	0	1560	8.62	8.06E+05

STORM 53

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1414.27	265.73	0	265.73	0.39	3.98E+04
R03	1526.67	153.27	0.07	153.34	0.42	4.28E+04
R04	1513.8	166.2	0	166.2	0.18	1.85E+04
R05	1205.13	474.8	0.07	474.87	0.87	8.73E+04
R06	1539.6	140.4	0	140.4	0.05	5.46E+03
R07	1479.33	200.67	0	200.67	0.21	2.15E+04
R08	1203.73	476.27	0	476.27	1.12	1.13E+05
R09	1481.07	198.87	0.07	198.94	0.33	3.32E+04
R11	1567.53	112.4	0.07	112.47	0.14	1.42E+04
R12	1680	0	0	0	0	0.00E+00
R13	1470.47	209.4	0.13	209.53	0.44	4.43E+04
R14	1650.13	29.87	0	29.87	0	0.00E+00
R15	1530.27	149.73	0	149.73	0.05	4.56E+03
R16	1466	214	0	214	0.11	1.11E+04
R17	1205.13	474.87	0	474.87	0.3	3.06E+04
R18	1209.8	470.2	0	470.2	0.7	7.02E+04
R19	1458.07	221.87	0.07	221.94	0.98	9.85E+04
R20	1568.2	111.8	0	111.8	0.03	2.56E+03
R21	1651	29	0	29	0.01	5.25E+02
R22	1567.07	112.93	0	112.93	0.07	6.90E+03
R23	1680	0	0	0	0	0.00E+00
R24	1557.6	122.4	0	122.4	0.09	8.64E+03
R25	1641.53	38.47	0	38.47	0	3.56E+02
R26	1571	109	0	109	0.04	3.57E+03
9A	1570.93	109.07	0	109.07	0.09	9.31E+03
A	0	1680	0	1680	2.71	2.73E+05
PS	0	1680	0	1680	8.62	8.69E+05

STORM 54

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1227.47	752.53	0	752.53	2	2.37E+05
R03	1883.53	96.4	0.07	96.47	1.83	2.18E+05
R04	1882.67	97.33	0	97.33	1.23	1.46E+05
R05	732.33	1247.67	0	1247.67	4.08	4.84E+05
R06	1879.33	100.67	0	100.67	0.42	5.03E+04
R07	1764.6	215.4	0	215.4	1.31	1.56E+05
R08	728.07	1251.87	0.07	1251.94	3.73	4.43E+05
R09	1825.87	154.13	0	154.13	2.47	2.94E+05
R11	1904.2	75.73	0.07	75.8	1.43	1.70E+05
R12	1917.8	62.2	0	62.2	0.1	1.14E+04
R13	1716.27	263.73	0	263.73	2.48	2.95E+05
R14	1889.93	90	0.07	90.07	1.48	1.76E+05
R15	1602.4	377.6	0	377.6	0.61	7.24E+04
R16	1837.27	142.67	0.07	142.74	2.11	2.50E+05
R17	729.4	1250.6	0	1250.6	1.13	1.34E+05
R18	737.67	1242.33	0	1242.33	3.91	4.64E+05
R19	1702.33	277.67	0	277.67	0.97	1.15E+05
R20	1898.6	81.4	0	81.4	0.56	6.60E+04
R21	1908.87	71.13	0	71.13	0.3	3.58E+04
R22	1900.33	79.67	0	79.67	1.03	1.22E+05
R23	1916.27	63.73	0	63.73	0.21	2.48E+04
R24	1904.6	75.4	0	75.4	0.68	8.07E+04
R25	1900.4	79.6	0	79.6	0.34	4.01E+04
R26	1907.33	72.67	0	72.67	0.76	9.08E+04
9A	1898.87	81.13	0	81.13	0.94	1.11E+05
A	0	1980	0	1980	3.13	3.72E+05
PS	0	1980	0	1980	9.43	1.12E+06

STORM 55

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1471.53	208.4	0.07	208.47	0.06	6.55E+03
R03	1680	0	0	0	0	0.00E+00
R04	1680	0	0	0	0	0.00E+00
R05	735.8	944.2	0	944.2	0.26	2.67E+04
R06	1680	0	0	0	0	0.00E+00
R07	1640.47	39.53	0	39.53	0	3.07E+01
R08	1494.73	185.2	0.07	185.27	0.06	5.89E+03
R09	1680	0	0	0	0	0.00E+00
R11	1680	0	0	0	0	0.00E+00
R12	1680	0	0	0	0	0.00E+00
R13	1640.2	39.8	0	39.8	0	4.66E+01
R14	1680	0	0	0	0	0.00E+00
R15	1621.93	58.07	0	58.07	0	2.97E+01
R16	1680	0	0	0	0	0.00E+00
R17	1486.87	193.13	0	193.13	0.02	1.83E+03
R18	1469.4	210.6	0	210.6	0.08	7.57E+03
R19	1680	0	0	0	0	0.00E+00
R20	1680	0	0	0	0	0.00E+00
R21	1680	0	0	0	0	0.00E+00
R22	1680	0	0	0	0	0.00E+00
R23	1680	0	0	0	0	0.00E+00
R24	1680	0	0	0	0	0.00E+00
R25	1680	0	0	0	0	0.00E+00
R26	1680	0	0	0	0	0.00E+00
9A	1680	0	0	0	0	0.00E+00
A	0	1680	0	1680	2.47	2.49E+05
PS	0	1680	0	1680	7.73	7.79E+05

STORM 56

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1334.33	345.67	0	345.67	0.74	7.45E+04
R03	1548.87	131.13	0	131.13	0.8	8.11E+04
R04	1532.2	147.8	0	147.8	0.37	3.70E+04
R05	722.53	957.4	0.07	957.47	1.39	1.40E+05
R06	1587.47	92.47	0.07	92.54	0.11	1.14E+04
R07	1494.8	185.2	0	185.2	0.39	3.97E+04
R08	722.33	957.67	0	957.67	2.03	2.05E+05
R09	1494	186	0	186	0.78	7.90E+04
R11	1603.27	76.67	0.07	76.74	0.4	4.04E+04
R12	1634.13	45.87	0	45.87	0	3.87E+01
R13	1477.87	202.07	0.07	202.14	0.81	8.18E+04
R14	1594	86	0	86	0.32	3.25E+04
R15	1462.47	217.53	0	217.53	0.15	1.54E+04
R16	1522.73	157.2	0.07	157.27	0.46	4.59E+04
R17	723.27	956.73	0	956.73	0.5	5.06E+04
R18	726.2	953.8	0	953.8	1.29	1.30E+05
R19	1453.2	226.73	0.07	226.8	1.36	1.37E+05
R20	1612.93	67.07	0	67.07	0.12	1.20E+04
R21	1614.67	65.33	0	65.33	0.07	6.60E+03
R22	1613.6	66.4	0	66.4	0.23	2.33E+04
R23	1621.2	58.8	0	58.8	0.03	3.49E+03
R24	1596.07	83.93	0	83.93	0.21	2.10E+04
R25	1616.87	63.13	0	63.13	0.07	7.44E+03
R26	1594.2	85.8	0	85.8	0.22	2.22E+04
9A	1602.93	77.07	0	77.07	0.33	3.34E+04
A	0	1680	0	1680	2.6	2.63E+05
PS	0	1680	0	1680	8.57	8.64E+05

STORM 57

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1427.93	252.07	0	252.07	0.46	4.67E+04
R03	1539.07	140.87	0.07	140.94	0.48	4.87E+04
R04	1524.33	155.67	0	155.67	0.22	2.18E+04
R05	724	956	0	956	1.03	1.04E+05
R06	1555.53	124.47	0	124.47	0.07	6.62E+03
R07	1494.53	185.47	0	185.47	0.25	2.52E+04
R08	723.13	956.87	0	956.87	1.33	1.34E+05
R09	1492.33	187.67	0	187.67	0.44	4.40E+04
R11	1559.73	120.2	0.07	120.27	0.21	2.08E+04
R12	1680	0	0	0	0	0.00E+00
R13	1479.4	200.53	0.07	200.6	0.52	5.20E+04
R14	1624.2	55.73	0.07	55.8	0.01	5.46E+02
R15	1540.67	139.33	0	139.33	0.06	5.90E+03
R16	1498.53	181.47	0	181.47	0.21	2.14E+04
R17	724.4	955.6	0	955.6	0.36	3.64E+04
R18	728.33	951.67	0	951.67	0.86	8.63E+04
R19	1457.07	222.93	0	222.93	1.23	1.24E+05
R20	1610.2	69.8	0	69.8	0.04	4.49E+03
R21	1628.33	51.67	0	51.67	0.02	1.84E+03
R22	1566.4	113.6	0	113.6	0.1	9.75E+03
R23	1638.33	41.67	0	41.67	0	2.98E+02
R24	1555.67	124.33	0	124.33	0.11	1.13E+04
R25	1631.33	48.67	0	48.67	0.01	1.34E+03
R26	1616.47	63.53	0	63.53	0.06	6.30E+03
9A	1568.53	111.47	0	111.47	0.15	1.54E+04
A	0	1680	0	1680	2.61	2.63E+05
PS	0	1680	0	1680	8.57	8.63E+05

STORM 58

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1503.07	116.93	0	116.93	0.03	3.05E+03
R03	1620	0	0	0	0	0.00E+00
R04	1620	0	0	0	0	0.00E+00
R05	788.93	831	0.07	831.07	0.2	1.94E+04
R06	1620	0	0	0	0	0.00E+00
R07	1579.4	40.6	0	40.6	0	3.27E+01
R08	1538.13	81.8	0.07	81.87	0.05	4.53E+03
R09	1620	0	0	0	0	0.00E+00
R11	1620	0	0	0	0	0.00E+00
R12	1620	0	0	0	0	0.00E+00
R13	1578	42	0	42	0	5.51E+01
R14	1620	0	0	0	0	0.00E+00
R15	1563.93	56.07	0	56.07	0	3.08E+01
R16	1620	0	0	0	0	0.00E+00
R17	1513.47	106.53	0	106.53	0.01	1.28E+03
R18	1498.4	121.6	0	121.6	0.05	4.78E+03
R19	1620	0	0	0	0	0.00E+00
R20	1620	0	0	0	0	0.00E+00
R21	1620	0	0	0	0	0.00E+00
R22	1620	0	0	0	0	0.00E+00
R23	1620	0	0	0	0	0.00E+00
R24	1620	0	0	0	0	0.00E+00
R25	1620	0	0	0	0	0.00E+00
R26	1620	0	0	0	0	0.00E+00
9A	1620	0	0	0	0	0.00E+00
A	0	1620	0	1620	2.42	2.35E+05
PS	0	1620	0	1620	7.41	7.21E+05

STORM 59

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1214.8	585.2	0	585.2	1.31	1.42E+05
R03	1548	251.93	0.07	252	1.5	1.62E+05
R04	1531.67	268.33	0	268.33	0.67	7.28E+04
R05	722.27	1077.73	0	1077.73	2.44	2.64E+05
R06	1586.47	213.53	0	213.53	0.22	2.36E+04
R07	1494.27	305.73	0	305.73	0.71	7.69E+04
R08	722.13	1077.87	0	1077.87	3.59	3.87E+05
R09	1493.53	306.47	0	306.47	1.41	1.53E+05
R11	1604	195.93	0.07	196	0.73	7.91E+04
R12	1749.87	50.13	0	50.13	0.01	5.52E+02
R13	1477.4	322.6	0	322.6	1.46	1.58E+05
R14	1594.13	205.87	0	205.87	0.52	5.62E+04
R15	1462.2	337.8	0	337.8	0.27	2.95E+04
R16	1522.07	277.93	0	277.93	0.85	9.13E+04
R17	722.93	1077.07	0	1077.07	0.9	9.67E+04
R18	725.67	1074.33	0	1074.33	2.23	2.41E+05
R19	1452.67	347.33	0	347.33	3.42	3.69E+05
R20	1614.4	185.6	0	185.6	0.2	2.11E+04
R21	1651.33	148.67	0	148.67	0.11	1.20E+04
R22	1614.53	185.47	0	185.47	0.39	4.21E+04
R23	1683.13	116.87	0	116.87	0.05	5.47E+03
R24	1597.47	202.53	0	202.53	0.38	4.06E+04
R25	1617.13	182.87	0	182.87	0.14	1.50E+04
R26	1595.4	204.6	0	204.6	0.39	4.25E+04
9A	1603.67	196.33	0	196.33	0.59	6.34E+04
A	0	1800	0	1800	2.86	3.09E+05
PS	0	1800	0	1800	9.77	1.05E+06

STORM 60

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1525.67	214.27	0.07	214.34	0.04	3.71E+03
R03	1740	0	0	0	0	0.00E+00
R04	1740	0	0	0	0	0.00E+00
R05	1614	126	0	126	0.02	1.94E+03
R06	1740	0	0	0	0	0.00E+00
R07	1740	0	0	0	0	0.00E+00
R08	1583.93	156.07	0	156.07	0.03	3.36E+03
R09	1740	0	0	0	0	0.00E+00
R11	1740	0	0	0	0	0.00E+00
R12	1740	0	0	0	0	0.00E+00
R13	1740	0	0	0	0	0.00E+00
R14	1740	0	0	0	0	0.00E+00
R15	1703.4	36.6	0	36.6	0	4.33E-01
R16	1740	0	0	0	0	0.00E+00
R17	1497.53	242.47	0	242.47	0.01	1.19E+03
R18	1483.73	256.27	0	256.27	0.06	5.87E+03
R19	1740	0	0	0	0	0.00E+00
R20	1740	0	0	0	0	0.00E+00
R21	1740	0	0	0	0	0.00E+00
R22	1740	0	0	0	0	0.00E+00
R23	1740	0	0	0	0	0.00E+00
R24	1740	0	0	0	0	0.00E+00
R25	1740	0	0	0	0	0.00E+00
R26	1740	0	0	0	0	0.00E+00
9A	1740	0	0	0	0	0.00E+00
A	0	1740	0	1740	2.67	2.78E+05
PS	0	1740	0	1740	7.63	7.96E+05

STORM 61

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1167.33	752.67	0	752.67	1.65	1.90E+05
R03	1604.53	315.4	0.07	315.47	1.77	2.04E+05
R04	1589.27	330.73	0	330.73	0.82	9.47E+04
R05	732.33	1187.67	0	1187.67	3.08	3.55E+05
R06	1718.6	201.4	0	201.4	0.26	3.02E+04
R07	1525	395	0	395	0.9	1.03E+05
R08	728.07	1191.87	0.07	1191.94	4.09	4.71E+05
R09	1562.8	357.13	0.07	357.2	1.75	2.02E+05
R11	1713.47	206.53	0	206.53	0.87	1.00E+05
R12	1859.4	60.6	0	60.6	0.04	4.39E+03
R13	1510.53	409.47	0	409.47	1.78	2.05E+05
R14	1792.67	127.27	0.07	127.34	0.87	1.01E+05
R15	1473.73	446.27	0	446.27	0.38	4.41E+04
R16	1604.93	315	0.07	315.07	1.15	1.32E+05
R17	729.4	1190.6	0	1190.6	1	1.15E+05
R18	737.67	1182.33	0	1182.33	2.77	3.19E+05
R19	1479.33	440.67	0	440.67	3.67	4.23E+05
R20	1841.13	78.87	0	78.87	0.28	3.28E+04
R21	1846.13	73.87	0	73.87	0.17	1.96E+04
R22	1758.53	161.47	0	161.47	0.55	6.30E+04
R23	1856.87	63.13	0	63.13	0.11	1.28E+04
R24	1666.27	253.73	0	253.73	0.44	5.11E+04
R25	1738	182	0	182	0.21	2.38E+04
R26	1662.47	257.53	0	257.53	0.5	5.73E+04
9A	1733.53	186.47	0	186.47	0.72	8.26E+04
A	0	1920	0	1920	3.15	3.63E+05
PS	0	1920	0	1920	9.97	1.15E+06

STORM 62

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1090.4	769.6	0	769.6	1.93	2.15E+05
R03	1540.8	319.2	0	319.2	2.39	2.67E+05
R04	1525.73	334.27	0	334.27	1.08	1.20E+05
R05	725.93	1134.07	0	1134.07	3.99	4.46E+05
R06	1569.4	290.53	0.07	290.6	0.35	3.94E+04
R07	1496.47	363.53	0	363.53	1.13	1.27E+05
R08	724.13	1135.87	0	1135.87	5.78	6.45E+05
R09	1494.4	365.6	0	365.6	2.27	2.53E+05
R11	1578.13	281.87	0	281.87	1.14	1.27E+05
R12	1799.6	60.4	0	60.4	0	4.42E+02
R13	1481.73	378.27	0	378.27	2.26	2.53E+05
R14	1596.27	263.67	0.07	263.74	0.93	1.04E+05
R15	1464.8	395.2	0	395.2	0.47	5.29E+04
R16	1510.33	349.67	0	349.67	1.37	1.53E+05
R17	725.6	1134.4	0	1134.4	1.4	1.56E+05
R18	730.73	1129.27	0	1129.27	3.44	3.84E+05
R19	1461.67	398.27	0.07	398.34	4.04	4.50E+05
R20	1567.4	292.6	0	292.6	0.32	3.55E+04
R21	1609	251	0	251	0.19	2.10E+04
R22	1565.13	294.87	0	294.87	0.66	7.33E+04
R23	1677.53	182.47	0	182.47	0.07	7.60E+03
R24	1574.13	285.87	0	285.87	0.6	6.68E+04
R25	1584.6	275.4	0	275.4	0.2	2.24E+04
R26	1574.67	285.33	0	285.33	0.58	6.51E+04
9A	1582.87	277.13	0	277.13	0.93	1.04E+05
A	0	1860	0	1860	3.2	3.57E+05
PS	0	1860	0	1860	11.34	1.27E+06

STORM 63

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1378.53	1201.47	0	1201.47	2.26	3.49E+05
R03	1616.2	963.73	0.07	963.8	2.77	4.29E+05
R04	1586.2	993.8	0	993.8	1.26	1.94E+05
R05	722	1858	0	1858	4.72	7.31E+05
R06	1764.8	815.13	0.07	815.2	0.39	6.02E+04
R07	1548.13	1031.87	0	1031.87	1.33	2.06E+05
R08	722	1858	0	1858	6.74	1.04E+06
R09	1539.87	1040.13	0	1040.13	2.44	3.78E+05
R11	1772	808	0	808	1.16	1.80E+05
R12	2523.13	56.87	0	56.87	0.01	1.56E+03
R13	1517.4	1062.4	0.2	1062.6	2.74	4.25E+05
R14	1875.2	704.8	0	704.8	0.84	1.31E+05
R15	1472	1108	0	1108	0.52	8.04E+04
R16	1658.67	921.27	0.07	921.34	1.43	2.22E+05
R17	722.73	1857.27	0	1857.27	1.71	2.65E+05
R18	725.27	1854.73	0	1854.73	4.1	6.35E+05
R19	1438.2	1141.8	0	1141.8	4.81	7.45E+05
R20	1916.8	663.2	0	663.2	0.28	4.38E+04
R21	2090.67	489.27	0.07	489.34	0.16	2.45E+04
R22	1868.73	711.27	0	711.27	0.61	9.41E+04
R23	2399.93	180.07	0	180.07	0.07	1.05E+04
R24	1737.6	842.4	0	842.4	0.64	9.92E+04
R25	1800.33	779.67	0	779.67	0.25	3.89E+04
R26	1738.87	841.13	0	841.13	0.71	1.09E+05
9A	1800.07	779.93	0	779.93	0.9	1.39E+05
A	0	2580	0	2580	3.75	5.81E+05
PS	0	2580	0	2580	13.16	2.04E+06

STORM 64

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1414.13	145.8	0.07	145.87	0.15	1.41E+04
R03	1491.27	68.67	0.07	68.74	0.12	1.12E+04
R04	1484	76	0	76	0.05	4.88E+03
R05	726.87	833.13	0	833.13	0.45	4.19E+04
R06	1512.13	47.87	0	47.87	0.02	1.67E+03
R07	1463.33	96.67	0	96.67	0.08	7.30E+03
R08	724.67	835.33	0	835.33	0.51	4.74E+04
R09	1464.8	95.2	0	95.2	0.07	6.92E+03
R11	1535.47	24.53	0	24.53	0	1.82E+02
R12	1560	0	0	0	0	0.00E+00
R13	1459.2	100.73	0.07	100.8	0.17	1.55E+04
R14	1560	0	0	0	0	0.00E+00
R15	1486.27	73.73	0	73.73	0.02	1.46E+03
R16	1482.13	77.8	0.07	77.87	0.01	6.17E+02
R17	726.27	833.73	0	833.73	0.13	1.26E+04
R18	731.87	828.13	0	828.13	0.35	3.23E+04
R19	1438.07	121.87	0.07	121.94	0.28	2.65E+04
R20	1526.87	33.13	0	33.13	0.01	5.35E+02
R21	1560	0	0	0	0	0.00E+00
R22	1508.27	51.73	0	51.73	0.02	1.75E+03
R23	1560	0	0	0	0	0.00E+00
R24	1532.07	27.93	0	27.93	0	4.40E+02
R25	1538.93	21.07	0	21.07	0	5.50E+00
R26	1530	30	0	30	0.01	7.99E+02
9A	1560	0	0	0	0	0.00E+00
A	0	1560	0	1560	2.5	2.34E+05
PS	0	1560	0	1560	7.76	7.27E+05

STORM 65

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1403.67	216.33	0	216.33	0.36	3.53E+04
R03	1489.67	130.27	0.07	130.34	0.38	3.73E+04
R04	1482.4	137.6	0	137.6	0.17	1.65E+04
R05	726.33	893.6	0.07	893.67	0.88	8.53E+04
R06	1507.53	112.47	0	112.47	0.05	5.34E+03
R07	1462.6	157.4	0	157.4	0.2	1.96E+04
R08	724.33	895.6	0.07	895.67	1.08	1.05E+05
R09	1464.13	155.87	0	155.87	0.22	2.17E+04
R11	1531.47	88.47	0.07	88.54	0.01	8.12E+02
R12	1620	0	0	0	0	0.00E+00
R13	1459.07	160.93	0	160.93	0.42	4.04E+04
R14	1620	0	0	0	0	0.00E+00
R15	1486.2	133.8	0	133.8	0.04	4.08E+03
R16	1463.07	156.93	0	156.93	0.13	1.24E+04
R17	725.93	894.07	0	894.07	0.3	2.88E+04
R18	731.2	888.8	0	888.8	0.7	6.79E+04
R19	1422.67	197.27	0.07	197.34	0.95	9.19E+04
R20	1519.6	100.4	0	100.4	0.02	1.95E+03
R21	1553.87	66.13	0	66.13	0.01	4.98E+02
R22	1506.33	113.67	0	113.67	0.06	5.76E+03
R23	1620	0	0	0	0	0.00E+00
R24	1528.27	91.73	0	91.73	0.02	1.60E+03
R25	1590	30	0	30	0	5.43E+01
R26	1526.8	93.2	0	93.2	0.03	2.71E+03
9A	1594.6	25.4	0	25.4	0	3.29E+01
A	0	1620	0	1620	2.7	2.62E+05
PS	0	1620	0	1620	8.61	8.37E+05

STORM 66

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1493.93	126.07	0	126.07	0.01	1.32E+03
R03	1620	0	0	0	0	0.00E+00
R04	1620	0	0	0	0	0.00E+00
R05	1541.73	78.27	0	78.27	0.01	1.17E+03
R06	1620	0	0	0	0	0.00E+00
R07	1620	0	0	0	0	0.00E+00
R08	1533.33	86.67	0	86.67	0.02	2.16E+03
R09	1620	0	0	0	0	0.00E+00
R11	1620	0	0	0	0	0.00E+00
R12	1620	0	0	0	0	0.00E+00
R13	1620	0	0	0	0	0.00E+00
R14	1620	0	0	0	0	0.00E+00
R15	1595.53	24.47	0	24.47	0	2.28E-01
R16	1620	0	0	0	0	0.00E+00
R17	1497.73	122.27	0	122.27	0.01	7.14E+02
R18	1483.53	136.47	0	136.47	0.03	3.22E+03
R19	1620	0	0	0	0	0.00E+00
R20	1620	0	0	0	0	0.00E+00
R21	1620	0	0	0	0	0.00E+00
R22	1620	0	0	0	0	0.00E+00
R23	1620	0	0	0	0	0.00E+00
R24	1620	0	0	0	0	0.00E+00
R25	1620	0	0	0	0	0.00E+00
R26	1620	0	0	0	0	0.00E+00
9A	1620	0	0	0	0	0.00E+00
A	0	1620	0	1620	2.55	2.48E+05
PS	0	1620	0	1620	7.31	7.10E+05

STORM 67

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1437.33	182.6	0.07	182.67	0.12	1.14E+04
R03	1592.87	27.13	0	27.13	0	5.92E+01
R04	1582.87	37.13	0	37.13	0	1.37E+02
R05	735.8	884.2	0	884.2	0.38	3.70E+04
R06	1617.27	2.67	0.07	2.74	0	2.76E+00
R07	1486	134	0	134	0.05	4.42E+03
R08	729.8	890.13	0.07	890.2	0.35	3.39E+04
R09	1572.6	47.4	0	47.4	0	3.88E+02
R11	1620	0	0	0	0	0.00E+00
R12	1620	0	0	0	0	0.00E+00
R13	1485.07	134.93	0	134.93	0.07	7.13E+03
R14	1620	0	0	0	0	0.00E+00
R15	1499.53	120.47	0	120.47	0.01	5.26E+02
R16	1620	0	0	0	0	0.00E+00
R17	1467.47	152.53	0	152.53	0.05	5.17E+03
R18	1449.13	170.87	0	170.87	0.16	1.60E+04
R19	1588.8	31.2	0	31.2	0.01	6.96E+02
R20	1620	0	0	0	0	0.00E+00
R21	1620	0	0	0	0	0.00E+00
R22	1595.13	24.87	0	24.87	0	1.70E+01
R23	1620	0	0	0	0	0.00E+00
R24	1620	0	0	0	0	0.00E+00
R25	1620	0	0	0	0	0.00E+00
R26	1620	0	0	0	0	0.00E+00
9A	1620	0	0	0	0	0.00E+00
A	0	1620	0	1620	2.56	2.49E+05
PS	0	1620	0	1620	8.06	7.84E+05

STORM 68

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1411.33	868.6	0.07	868.67	2.09	2.86E+05
R03	1549.13	730.8	0.07	730.87	2.98	4.08E+05
R04	1542	738	0	738	1.34	1.83E+05
R05	735.8	1544.2	0	1544.2	5.22	7.14E+05
R06	1558.13	721.87	0	721.87	0.44	5.96E+04
R07	1485.73	794.27	0	794.27	1.41	1.93E+05
R08	729.8	1550.13	0.07	1550.2	7.09	9.71E+05
R09	1524.67	755.27	0.07	755.34	2.64	3.61E+05
R11	1623.4	656.53	0.07	656.6	1.29	1.77E+05
R12	2280	0	0	0	0	0.00E+00
R13	1485	795	0	795	2.85	3.90E+05
R14	1742.73	537.2	0.07	537.27	0.74	1.01E+05
R15	1460.07	819.93	0	819.93	0.51	7.04E+04
R16	1516.4	763.6	0	763.6	1.52	2.07E+05
R17	730.93	1549.07	0	1549.07	1.85	2.53E+05
R18	740.27	1539.73	0	1539.73	4.28	5.85E+05
R19	1512.13	767.8	0.07	767.87	7.01	9.59E+05
R20	1616.8	663.2	0	663.2	0.29	4.01E+04
R21	1701.93	578.07	0	578.07	0.16	2.24E+04
R22	1569.93	710.07	0	710.07	0.65	8.96E+04
R23	2099.13	180.87	0	180.87	0.02	3.17E+03
R24	1565.27	714.73	0	714.73	0.66	8.99E+04
R25	1693.53	586.47	0	586.47	0.08	1.12E+04
R26	1565.07	714.93	0	714.93	0.65	8.84E+04
9A	1736.93	543.07	0	543.07	0.99	1.35E+05
A	0	2280	0	2280	3.84	5.25E+05
PS	0	2280	0	2280	13.99	1.91E+06

STORM 69

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1574.4	885.53	0.07	885.6	0.98	1.45E+05
R03	2056.73	403.27	0	403.27	0.93	1.37E+05
R04	2046.53	413.47	0	413.47	0.43	6.27E+04
R05	753.07	1706.93	0	1706.93	2.04	3.01E+05
R06	2120.87	339.07	0.07	339.14	0.13	1.85E+04
R07	1870.67	589.33	0	589.33	0.5	7.45E+04
R08	741.53	1718.47	0	1718.47	2.63	3.89E+05
R09	1967.67	492.33	0	492.33	0.84	1.24E+05
R11	2135.6	324.33	0.07	324.4	0.43	6.35E+04
R12	2460	0	0	0	0	0.00E+00
R13	1864.8	595.2	0	595.2	1.01	1.49E+05
R14	2328.93	131	0.07	131.07	0.09	1.28E+04
R15	1786.67	673.33	0	673.33	0.14	2.00E+04
R16	2003.87	456.07	0.07	456.14	0.41	6.00E+04
R17	739	1721	0	1721	0.69	1.02E+05
R18	751.8	1708.2	0	1708.2	1.66	2.45E+05
R19	1863.33	596.53	0.13	596.66	2.36	3.48E+05
R20	2272.53	187.47	0	187.47	0.09	1.38E+04
R21	2310.53	149.47	0	149.47	0.05	6.79E+03
R22	2271.4	188.6	0	188.6	0.2	2.92E+04
R23	2399.27	60.73	0	60.73	0.01	1.11E+03
R24	2124.4	335.6	0	335.6	0.23	3.39E+04
R25	2284.53	175.47	0	175.47	0.03	3.92E+03
R26	2277.73	182.27	0	182.27	0.13	1.92E+04
9A	2148.73	311.27	0	311.27	0.31	4.62E+04
A	0	2460	0	2460	3.18	4.70E+05
PS	0	2460	0	2460	10.95	1.62E+06

STORM 70

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	3169	1030.93	0.07	1031	0.66	1.65E+05
R03	3583.73	616.27	0	616.27	0.67	1.68E+05
R04	3545.47	654.53	0	654.53	0.31	7.77E+04
R05	1880.13	2319.87	0	2319.87	1.39	3.51E+05
R06	3870	329.93	0.07	330	0.09	2.33E+04
R07	3477.67	722.33	0	722.33	0.35	8.87E+04
R08	1870.93	2329.07	0	2329.07	1.84	4.65E+05
R09	3475.13	724.67	0.2	724.87	0.55	1.39E+05
R11	3952.8	247.13	0.07	247.2	0.21	5.35E+04
R12	4200	0	0	0	0	0.00E+00
R13	3387.73	812.27	0	812.27	0.71	1.78E+05
R14	4055.4	144.6	0	144.6	0.09	2.38E+04
R15	3443.6	756.4	0	756.4	0.1	2.63E+04
R16	3709.93	490	0.07	490.07	0.3	7.51E+04
R17	1761.53	2438.47	0	2438.47	0.49	1.24E+05
R18	1714.2	2485.8	0	2485.8	1.16	2.93E+05
R19	3394.33	805.6	0.07	805.67	1.67	4.20E+05
R20	3905.67	294.33	0	294.33	0.06	1.55E+04
R21	4038.67	161.33	0	161.33	0.03	8.11E+03
R22	3902.4	297.6	0	297.6	0.14	3.42E+04
R23	4138	62	0	62	0.01	1.89E+03
R24	3753.13	446.87	0	446.87	0.15	3.88E+04
R25	4023.13	176.87	0	176.87	0.02	5.22E+03
R26	3795.07	404.93	0	404.93	0.11	2.81E+04
9A	4019.6	180.4	0	180.4	0.17	4.19E+04
A	0	4200	0	4200	2.92	7.37E+05
PS	0	4200	0	4200	9.5	2.40E+06

STORM 71

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1420.93	139.07	0	139.07	0.08	7.64E+03
R03	1544.6	15.4	0	15.4	0	9.07E+01
R04	1538	22	0	22	0	1.48E+02
R05	729.2	830.8	0	830.8	0.31	2.91E+04
R06	1559.13	0.87	0	0.87	0	5.26E-02
R07	1472.6	87.4	0	87.4	0.03	2.89E+03
R08	726.07	833.87	0.07	833.94	0.31	2.86E+04
R09	1477.67	82.27	0.07	82.34	0.01	1.04E+03
R11	1560	0	0	0	0	0.00E+00
R12	1560	0	0	0	0	0.00E+00
R13	1466.47	93.53	0	93.53	0.06	5.38E+03
R14	1560	0	0	0	0	0.00E+00
R15	1490.53	69.47	0	69.47	0.01	4.71E+02
R16	1560	0	0	0	0	0.00E+00
R17	1462.8	97.2	0	97.2	0.04	3.80E+03
R18	1441.6	118.4	0	118.4	0.12	1.14E+04
R19	1548.53	11.47	0	11.47	0	3.28E+01
R20	1551.2	8.8	0	8.8	0	8.25E+00
R21	1560	0	0	0	0	0.00E+00
R22	1547.07	12.93	0	12.93	0	1.45E+02
R23	1560	0	0	0	0	0.00E+00
R24	1560	0	0	0	0	0.00E+00
R25	1560	0	0	0	0	0.00E+00
R26	1553.2	6.8	0	6.8	0	1.35E+01
9A	1560	0	0	0	0	0.00E+00
A	0	1560	0	1560	2.47	2.31E+05
PS	0	1560	0	1560	7.67	7.18E+05

STORM 72

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1740	0	0	0	0	0.00E+00
R03	1740	0	0	0	0	0.00E+00
R04	1740	0	0	0	0	0.00E+00
R05	1740	0	0	0	0	0.00E+00
R06	1740	0	0	0	0	0.00E+00
R07	1740	0	0	0	0	0.00E+00
R08	1740	0	0	0	0	0.00E+00
R09	1740	0	0	0	0	0.00E+00
R11	1740	0	0	0	0	0.00E+00
R12	1740	0	0	0	0	0.00E+00
R13	1740	0	0	0	0	0.00E+00
R14	1740	0	0	0	0	0.00E+00
R15	1740	0	0	0	0	0.00E+00
R16	1740	0	0	0	0	0.00E+00
R17	1633.13	106.87	0	106.87	0	1.88E+01
R18	1597	143	0	143	0.01	5.33E+02
R19	1740	0	0	0	0	0.00E+00
R20	1740	0	0	0	0	0.00E+00
R21	1740	0	0	0	0	0.00E+00
R22	1740	0	0	0	0	0.00E+00
R23	1740	0	0	0	0	0.00E+00
R24	1740	0	0	0	0	0.00E+00
R25	1740	0	0	0	0	0.00E+00
R26	1740	0	0	0	0	0.00E+00
9A	1740	0	0	0	0	0.00E+00
A	0	1740	0	1740	2.46	2.56E+05
PS	0	1740	0	1740	7.09	7.40E+05

STORM 73

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1868.2	951.73	0.07	951.8	1.62	2.75E+05
R03	2262.67	557.33	0	557.33	2.23	3.78E+05
R04	2247.13	572.87	0	572.87	1.01	1.71E+05
R05	732.33	2087.67	0	2087.67	3.94	6.67E+05
R06	2309.07	510.93	0	510.93	0.33	5.54E+04
R07	2088.73	731.27	0	731.27	1.08	1.83E+05
R08	728.07	2091.87	0.07	2091.94	5.31	8.98E+05
R09	2212.87	607.13	0	607.13	2.11	3.57E+05
R11	2314.2	505.73	0.07	505.8	1.08	1.82E+05
R12	2758.67	61.33	0	61.33	0.02	3.67E+03
R13	2143.33	676.67	0	676.67	2.13	3.61E+05
R14	2389	430.87	0.13	431	0.69	1.16E+05
R15	2081.47	738.53	0	738.53	0.44	7.53E+04
R16	2241.93	578.07	0	578.07	1.3	2.20E+05
R17	1298.87	1521.13	0	1521.13	1.3	2.20E+05
R18	1283.27	1536.73	0	1536.73	3.27	5.52E+05
R19	2180	640	0	640	3.36	5.69E+05
R20	2393.93	426.07	0	426.07	0.28	4.80E+04
R21	2513.47	306.53	0	306.53	0.16	2.74E+04
R22	2390.73	429.27	0	429.27	0.59	9.92E+04
R23	2645.27	174.73	0	174.73	0.07	1.18E+04
R24	2277.87	542.13	0	542.13	0.55	9.24E+04
R25	2394.8	425.2	0	425.2	0.18	2.97E+04
R26	2278.13	541.87	0	541.87	0.58	9.84E+04
9A	2329.13	490.87	0	490.87	0.86	1.45E+05
A	0	2820	0	2820	3.27	5.54E+05
PS	0	2820	0	2820	11.5	1.95E+06

STORM 74

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	2220	0	0	0	0	0.00E+00
R03	2220	0	0	0	0	0.00E+00
R04	2220	0	0	0	0	0.00E+00
R05	2117.47	102.53	0	102.53	0	2.47E+02
R06	2220	0	0	0	0	0.00E+00
R07	2220	0	0	0	0	0.00E+00
R08	2090.27	129.73	0	129.73	0.01	7.88E+02
R09	2220	0	0	0	0	0.00E+00
R11	2220	0	0	0	0	0.00E+00
R12	2220	0	0	0	0	0.00E+00
R13	2220	0	0	0	0	0.00E+00
R14	2220	0	0	0	0	0.00E+00
R15	2220	0	0	0	0	0.00E+00
R16	2220	0	0	0	0	0.00E+00
R17	2034.67	185.33	0	185.33	0	4.38E+02
R18	2008.27	211.73	0	211.73	0.02	2.85E+03
R19	2220	0	0	0	0	0.00E+00
R20	2220	0	0	0	0	0.00E+00
R21	2220	0	0	0	0	0.00E+00
R22	2220	0	0	0	0	0.00E+00
R23	2220	0	0	0	0	0.00E+00
R24	2220	0	0	0	0	0.00E+00
R25	2220	0	0	0	0	0.00E+00
R26	2220	0	0	0	0	0.00E+00
9A	2220	0	0	0	0	0.00E+00
A	0	2220	0	2220	2.55	3.39E+05
PS	0	2220	0	2220	7.28	9.69E+05

STORM 75

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1547	1333	0	1333	1.2	2.07E+05
R03	2412.47	467.53	0	467.53	1.28	2.21E+05
R04	2380.73	499.27	0	499.27	0.58	1.00E+05
R05	1104.07	1775.93	0	1775.93	2.37	4.09E+05
R06	2553.87	326.07	0.07	326.14	0.18	3.15E+04
R07	2314.6	565.4	0	565.4	0.64	1.10E+05
R08	1071.07	1808.93	0	1808.93	3.29	5.68E+05
R09	2307.07	572.93	0	572.93	1.2	2.07E+05
R11	2567.67	312.33	0	312.33	0.62	1.08E+05
R12	2858.4	21.6	0	21.6	0	3.27E+01
R13	2286.2	593.67	0.13	593.8	1.29	2.22E+05
R14	2560.07	319.87	0.07	319.94	0.51	8.74E+04
R15	2225.47	654.53	0	654.53	0.25	4.30E+04
R16	2455.47	424.53	0	424.53	0.68	1.17E+05
R17	826.73	2053.27	0	2053.27	0.84	1.45E+05
R18	813.6	2066.4	0	2066.4	2.03	3.51E+05
R19	2375.13	504.87	0	504.87	2.79	4.82E+05
R20	2576.93	303.07	0	303.07	0.15	2.51E+04
R21	2624.2	255.8	0	255.8	0.08	1.44E+04
R22	2575.2	304.8	0	304.8	0.31	5.29E+04
R23	2758.4	121.6	0	121.6	0.03	4.38E+03
R24	2499.2	380.8	0	380.8	0.32	5.48E+04
R25	2577	303	0	303	0.11	1.96E+04
R26	2493.53	386.47	0	386.47	0.31	5.37E+04
9A	2569.67	310.33	0	310.33	0.48	8.24E+04
A	0	2880	0	2880	3.22	5.56E+05
PS	0	2880	0	2880	10.48	1.81E+06

STORM 76

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1490.53	249.47	0	249.47	0.11	1.15E+04
R03	1710.47	29.53	0	29.53	0	6.86E+01
R04	1701.47	38.53	0	38.53	0	1.51E+02
R05	788.93	951	0.07	951.07	0.37	3.83E+04
R06	1740	0	0	0	0	0.00E+00
R07	1617.4	122.6	0	122.6	0.03	3.37E+03
R08	826.2	913.67	0.13	913.8	0.31	3.20E+04
R09	1691.6	48.33	0.07	48.4	0	4.25E+02
R11	1740	0	0	0	0	0.00E+00
R12	1740	0	0	0	0	0.00E+00
R13	1611.73	128.2	0.07	128.27	0.07	6.97E+03
R14	1740	0	0	0	0	0.00E+00
R15	1619.4	120.6	0	120.6	0	5.16E+02
R16	1740	0	0	0	0	0.00E+00
R17	1539.2	200.8	0	200.8	0.05	4.98E+03
R18	1489.93	250.07	0	250.07	0.15	1.61E+04
R19	1720.6	19.4	0	19.4	0	1.53E+02
R20	1740	0	0	0	0	0.00E+00
R21	1740	0	0	0	0	0.00E+00
R22	1712.8	27.2	0	27.2	0	1.82E+01
R23	1740	0	0	0	0	0.00E+00
R24	1740	0	0	0	0	0.00E+00
R25	1740	0	0	0	0	0.00E+00
R26	1740	0	0	0	0	0.00E+00
9A	1740	0	0	0	0	0.00E+00
A	0	1740	0	1740	2.58	2.70E+05
PS	0	1740	0	1740	8.1	8.46E+05

STORM 77

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1428	192	0	192	0.17	1.63E+04
R03	1524.73	95.27	0	95.27	0.08	7.39E+03
R04	1500.67	119.33	0	119.33	0.04	3.70E+03
R05	728.27	891.73	0	891.73	0.48	4.66E+04
R06	1576	44	0	44	0.01	8.53E+02
R07	1479	141	0	141	0.08	7.55E+03
R08	725.47	894.47	0.07	894.54	0.54	5.21E+04
R09	1479.6	140.4	0	140.4	0.06	5.69E+03
R11	1620	0	0	0	0	0.00E+00
R12	1620	0	0	0	0	0.00E+00
R13	1470.93	149.07	0	149.07	0.17	1.67E+04
R14	1620	0	0	0	0	0.00E+00
R15	1494.67	125.33	0	125.33	0.01	1.04E+03
R16	1543	76.93	0.07	77	0	0.00E+00
R17	727.07	892.93	0	892.93	0.14	1.34E+04
R18	733.4	886.6	0	886.6	0.36	3.49E+04
R19	1536.27	83.73	0	83.73	0.06	5.78E+03
R20	1599.07	20.93	0	20.93	0	1.10E+02
R21	1620	0	0	0	0	0.00E+00
R22	1595.67	24.33	0	24.33	0.01	5.78E+02
R23	1620	0	0	0	0	0.00E+00
R24	1605.6	14.4	0	14.4	0	4.14E+01
R25	1620	0	0	0	0	0.00E+00
R26	1601.87	18.13	0	18.13	0	1.72E+02
9A	1620	0	0	0	0	0.00E+00
A	0	1620	0	1620	2.57	2.50E+05
PS	0	1620	0	1620	8.13	7.90E+05

STORM 78

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1513.47	526.4	0.13	526.53	0.73	8.92E+04
R03	1895.47	144.47	0.07	144.54	0.73	8.97E+04
R04	1880.33	159.67	0	159.67	0.33	4.03E+04
R05	730.47	1309.53	0	1309.53	1.5	1.83E+05
R06	1899.87	140.13	0	140.13	0.12	1.41E+04
R07	1757.33	282.67	0	282.67	0.41	4.98E+04
R08	726.93	1313.07	0	1313.07	2.16	2.64E+05
R09	1852.07	187.93	0	187.93	0.71	8.65E+04
R11	1967.73	72.27	0	72.27	0.36	4.46E+04
R12	1988.13	51.87	0	51.87	0	1.56E+02
R13	1734.87	305.13	0	305.13	0.82	1.01E+05
R14	1957.27	82.73	0	82.73	0.3	3.62E+04
R15	1785.47	254.53	0	254.53	0.14	1.76E+04
R16	1881.87	157.87	0.27	158.14	0.43	5.23E+04
R17	1006.2	1033.8	0	1033.8	0.48	5.90E+04
R18	990.07	1049.93	0	1049.93	1.29	1.58E+05
R19	1770.53	269.4	0.07	269.47	1.03	1.26E+05
R20	1973.73	66.27	0	66.27	0.11	1.38E+04
R21	1974.4	65.6	0	65.6	0.06	7.73E+03
R22	1918.27	121.73	0	121.73	0.22	2.65E+04
R23	1980.2	59.8	0	59.8	0.04	4.34E+03
R24	1968.47	71.53	0	71.53	0.19	2.32E+04
R25	1976.73	63.27	0	63.27	0.07	8.75E+03
R26	1971.2	68.8	0	68.8	0.2	2.49E+04
9A	1965.33	74.67	0	74.67	0.3	3.68E+04
A	0	2040	0	2040	2.85	3.49E+05
PS	0	2040	0	2040	9.49	1.16E+06

STORM 79

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1440.2	1319.8	0	1319.8	2.67	4.42E+05
R03	1696.47	1063.47	0.07	1063.54	3.42	5.66E+05
R04	1643.87	1116.13	0	1116.13	1.57	2.61E+05
R05	753.07	2006.93	0	2006.93	6.18	1.02E+06
R06	2047.93	712.07	0	712.07	0.48	8.00E+04
R07	1567.4	1192.6	0	1192.6	1.72	2.86E+05
R08	741.53	2018.47	0	2018.47	8.85	1.47E+06
R09	1563.93	1196	0.07	1196.07	3.34	5.53E+05
R11	1957.2	802.8	0	802.8	1.69	2.81E+05
R12	2530.73	229.27	0	229.27	0.01	2.24E+03
R13	1550.4	1209.47	0.13	1209.6	3.38	5.59E+05
R14	2231.4	528.53	0.07	528.6	1.6	2.65E+05
R15	1521.8	1238.2	0	1238.2	0.74	1.23E+05
R16	1838.47	921.53	0	921.53	1.96	3.25E+05
R17	739	2021	0	2021	2.08	3.45E+05
R18	751.8	2008.2	0	2008.2	5.15	8.53E+05
R19	1504.87	1255.13	0	1255.13	4.95	8.20E+05
R20	2277.4	482.6	0	482.6	0.46	7.68E+04
R21	2332.67	427.33	0	427.33	0.28	4.57E+04
R22	2270.6	489.4	0	489.4	0.95	1.57E+05
R23	2456.6	303.4	0	303.4	0.12	1.92E+04
R24	1834.67	925.33	0	925.33	0.85	1.41E+05
R25	1987.33	772.67	0	772.67	0.38	6.22E+04
R26	1823.93	936.07	0	936.07	0.94	1.56E+05
9A	2030.47	729.53	0	729.53	1.36	2.25E+05
A	0	2760	0	2760	4.03	6.67E+05
PS	0	2760	0	2760	13.76	2.28E+06

STORM 80

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1621.73	538.27	0	538.27	0.34	4.40E+04
R03	1905.73	254.27	0	254.27	0.27	3.52E+04
R04	1863.47	296.53	0	296.53	0.13	1.68E+04
R05	848.07	1311.87	0.07	1311.94	0.86	1.11E+05
R06	2051.33	108.6	0.07	108.67	0.04	4.96E+03
R07	1795.73	364.27	0	364.27	0.16	2.03E+04
R08	845.13	1314.87	0	1314.87	0.99	1.29E+05
R09	1813.93	346	0.07	346.07	0.17	2.22E+04
R11	2101.33	58.67	0	58.67	0.02	2.09E+03
R12	2160	0	0	0	0	0.00E+00
R13	1746.6	413.4	0	413.4	0.34	4.44E+04
R14	2160	0	0	0	0	0.00E+00
R15	1795.13	364.87	0	364.87	0.03	4.16E+03
R16	1995.6	164.4	0	164.4	0.09	1.23E+04
R17	769	1391	0	1391	0.28	3.62E+04
R18	781.07	1378.93	0	1378.93	0.67	8.74E+04
R19	1711.27	448.73	0	448.73	0.81	1.05E+05
R20	2068.4	91.6	0	91.6	0.02	2.24E+03
R21	2125.47	34.53	0	34.53	0	5.80E+02
R22	2055.53	104.47	0	104.47	0.04	5.62E+03
R23	2160	0	0	0	0	0.00E+00
R24	2038.4	121.6	0	121.6	0.06	7.84E+03
R25	2103.13	56.87	0	56.87	0	2.36E+02
R26	2098.8	61.2	0	61.2	0.02	3.10E+03
9A	2106.93	53.07	0	53.07	0	3.42E+02
A	0	2160	0	2160	2.87	3.71E+05
PS	0	2160	0	2160	8.92	1.16E+06

STORM 81

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1466.27	93.73	0	93.73	0.01	7.03E+02
R03	1560	0	0	0	0	0.00E+00
R04	1560	0	0	0	0	0.00E+00
R05	1494.4	65.6	0	65.6	0.01	1.05E+03
R06	1560	0	0	0	0	0.00E+00
R07	1560	0	0	0	0	0.00E+00
R08	1488.67	71.33	0	71.33	0.02	2.00E+03
R09	1560	0	0	0	0	0.00E+00
R11	1560	0	0	0	0	0.00E+00
R12	1560	0	0	0	0	0.00E+00
R13	1560	0	0	0	0	0.00E+00
R14	1560	0	0	0	0	0.00E+00
R15	1535.93	24.07	0	24.07	0	2.24E-01
R16	1560	0	0	0	0	0.00E+00
R17	1480.73	79.27	0	79.27	0.01	6.21E+02
R18	1464.33	95.67	0	95.67	0.03	2.56E+03
R19	1560	0	0	0	0	0.00E+00
R20	1560	0	0	0	0	0.00E+00
R21	1560	0	0	0	0	0.00E+00
R22	1560	0	0	0	0	0.00E+00
R23	1560	0	0	0	0	0.00E+00
R24	1560	0	0	0	0	0.00E+00
R25	1560	0	0	0	0	0.00E+00
R26	1560	0	0	0	0	0.00E+00
9A	1560	0	0	0	0	0.00E+00
A	0	1560	0	1560	2.52	2.36E+05
PS	0	1560	0	1560	7.21	6.75E+05

STORM 82

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1476.53	1883.4	0.07	1883.47	2.36	4.76E+05
R03	1953.87	1406.07	0.07	1406.14	2.56	5.17E+05
R04	1931.07	1428.93	0	1428.93	1.13	2.28E+05
R05	791.87	2568.13	0	2568.13	4.92	9.93E+05
R06	2097.67	1262.33	0	1262.33	0.36	7.34E+04
R07	1741.53	1618.47	0	1618.47	1.35	2.72E+05
R08	786.87	2573.13	0	2573.13	6.73	1.36E+06
R09	1823.67	1536.27	0.07	1536.34	2.02	4.07E+05
R11	2292.67	1067.27	0.07	1067.34	1.08	2.18E+05
R12	3344.8	15.2	0	15.2	0	6.14E+01
R13	1676.2	1683.8	0	1683.8	2.72	5.48E+05
R14	2927.4	432.53	0.07	432.6	0.42	8.40E+04
R15	1628.2	1731.8	0	1731.8	0.38	7.67E+04
R16	1976.4	1383.53	0.07	1383.6	1.21	2.44E+05
R17	769	2591	0	2591	1.75	3.53E+05
R18	781.07	2578.93	0	2578.93	4.08	8.23E+05
R19	1721.67	1638.33	0	1638.33	6.66	1.34E+06
R20	2456.73	903.27	0	903.27	0.23	4.57E+04
R21	2675.27	684.73	0	684.73	0.12	2.49E+04
R22	2349.07	1010.93	0	1010.93	0.5	1.02E+05
R23	3178.13	181.87	0	181.87	0.03	5.41E+03
R24	2161.2	1198.8	0	1198.8	0.59	1.19E+05
R25	2675.13	684.87	0	684.87	0.13	2.54E+04
R26	2397.87	962.13	0	962.13	0.44	8.83E+04
9A	2450.47	909.53	0	909.53	0.56	1.13E+05
A	0	3360	0	3360	4.56	9.20E+05
PS	0	3360	0	3360	15.43	3.11E+06

STORM 83

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1482.33	557.67	0	557.67	0.3	3.67E+04
R03	1931.87	108.13	0	108.13	0.02	2.75E+03
R04	1925.4	114.6	0	114.6	0.02	1.99E+03
R05	829.93	1210.07	0	1210.07	0.68	8.36E+04
R06	1948	91.93	0.07	92	0.03	3.07E+03
R07	1745.33	294.67	0	294.67	0.14	1.72E+04
R08	810.4	1229.6	0	1229.6	0.79	9.73E+04
R09	1744.93	295	0.07	295.07	0.13	1.58E+04
R11	2040	0	0	0	0	0.00E+00
R12	2040	0	0	0	0	0.00E+00
R13	1727.8	312.13	0.07	312.2	0.27	3.31E+04
R14	2040	0	0	0	0	0.00E+00
R15	1773.87	266.13	0	266.13	0.02	2.10E+03
R16	1894.27	145.73	0	145.73	0.02	2.08E+03
R17	773.53	1266.47	0	1266.47	0.22	2.70E+04
R18	1485.67	554.33	0	554.33	0.41	4.97E+04
R19	1736.73	303.2	0.07	303.27	0.58	7.07E+04
R20	1941.87	98.13	0	98.13	0	7.23E+01
R21	2040	0	0	0	0	0.00E+00
R22	1933.07	106.93	0	106.93	0.01	1.15E+03
R23	2040	0	0	0	0	0.00E+00
R24	2040	0	0	0	0	0.00E+00
R25	2040	0	0	0	0	0.00E+00
R26	2040	0	0	0	0	0.00E+00
9A	2040	0	0	0	0	0.00E+00
A	0	2040	0	2040	3.09	3.78E+05
PS	0	2040	0	2040	9.12	1.12E+06

STORM 84

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1673.27	186.73	0	186.73	0.05	5.89E+03
R03	1860	0	0	0	0	0.00E+00
R04	1860	0	0	0	0	0.00E+00
R05	918.8	941.2	0	941.2	0.19	2.17E+04
R06	1860	0	0	0	0	0.00E+00
R07	1838.93	21.07	0	21.07	0	2.82E+01
R08	1674.53	185.4	0.07	185.47	0.05	5.78E+03
R09	1860	0	0	0	0	0.00E+00
R11	1860	0	0	0	0	0.00E+00
R12	1860	0	0	0	0	0.00E+00
R13	1834.27	25.73	0	25.73	0	6.56E+01
R14	1860	0	0	0	0	0.00E+00
R15	1808.6	51.4	0	51.4	0	2.89E+01
R16	1860	0	0	0	0	0.00E+00
R17	1524.27	335.73	0	335.73	0.02	1.88E+03
R18	1509.93	350.07	0	350.07	0.08	8.73E+03
R19	1860	0	0	0	0	0.00E+00
R20	1860	0	0	0	0	0.00E+00
R21	1860	0	0	0	0	0.00E+00
R22	1860	0	0	0	0	0.00E+00
R23	1860	0	0	0	0	0.00E+00
R24	1860	0	0	0	0	0.00E+00
R25	1860	0	0	0	0	0.00E+00
R26	1860	0	0	0	0	0.00E+00
9A	1860	0	0	0	0	0.00E+00
A	0	1860	0	1860	2.6	2.91E+05
PS	0	1860	0	1860	7.87	8.79E+05

STORM 85

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1463.67	696.33	0	696.33	1.35	1.75E+05
R03	1638.53	521.4	0.07	521.47	1.56	2.03E+05
R04	1624.73	535.27	0	535.27	0.7	9.11E+04
R05	788.93	1371	0.07	1371.07	3	3.89E+05
R06	1749.47	410.53	0	410.53	0.23	2.95E+04
R07	1554.87	605.13	0	605.13	0.79	1.03E+05
R08	785.4	1374.53	0.07	1374.6	3.99	5.17E+05
R09	1607.87	552.13	0	552.13	1.38	1.78E+05
R11	1887.53	272.47	0	272.47	0.62	8.07E+04
R12	2160	0	0	0	0	0.00E+00
R13	1549.33	610.67	0	610.67	1.61	2.08E+05
R14	1913.53	246.4	0.07	246.47	0.14	1.75E+04
R15	1565.33	594.67	0	594.67	0.19	2.45E+04
R16	1679.8	480.13	0.07	480.2	0.75	9.77E+04
R17	769	1391	0	1391	1.06	1.38E+05
R18	781.07	1378.93	0	1378.93	2.46	3.19E+05
R19	1599.13	560.8	0.07	560.87	3.97	5.15E+05
R20	1793.27	366.73	0	366.73	0.14	1.81E+04
R21	1852.73	307.27	0	307.27	0.08	9.99E+03
R22	1757.8	402.2	0	402.2	0.31	4.07E+04
R23	2098.6	61.4	0	61.4	0	4.57E+02
R24	1731.67	428.33	0	428.33	0.32	4.20E+04
R25	1918.93	241.07	0	241.07	0.03	4.03E+03
R26	1798.13	361.87	0	361.87	0.19	2.48E+04
9A	1899.53	260.47	0	260.47	0.5	6.51E+04
A	0	2160	0	2160	3.39	4.40E+05
PS	0	2160	0	2160	12.2	1.58E+06

STORM 86

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1560	0	0	0	0	0.00E+00
R03	1560	0	0	0	0	0.00E+00
R04	1560	0	0	0	0	0.00E+00
R05	1514.07	45.93	0	45.93	0	1.09E+02
R06	1560	0	0	0	0	0.00E+00
R07	1560	0	0	0	0	0.00E+00
R08	1501.8	58.2	0	58.2	0	3.65E+02
R09	1560	0	0	0	0	0.00E+00
R11	1560	0	0	0	0	0.00E+00
R12	1560	0	0	0	0	0.00E+00
R13	1560	0	0	0	0	0.00E+00
R14	1560	0	0	0	0	0.00E+00
R15	1560	0	0	0	0	0.00E+00
R16	1560	0	0	0	0	0.00E+00
R17	1490.93	69.07	0	69.07	0	1.88E+02
R18	1476.73	83.27	0	83.27	0.01	1.13E+03
R19	1560	0	0	0	0	0.00E+00
R20	1560	0	0	0	0	0.00E+00
R21	1560	0	0	0	0	0.00E+00
R22	1560	0	0	0	0	0.00E+00
R23	1560	0	0	0	0	0.00E+00
R24	1560	0	0	0	0	0.00E+00
R25	1560	0	0	0	0	0.00E+00
R26	1560	0	0	0	0	0.00E+00
9A	1560	0	0	0	0	0.00E+00
A	0	1560	0	1560	2.46	2.30E+05
PS	0	1560	0	1560	7.07	6.62E+05

STORM 87

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1562	237.93	0.07	238	0.02	2.32E+03
R03	1800	0	0	0	0	0.00E+00
R04	1800	0	0	0	0	0.00E+00
R05	1712.8	87.2	0	87.2	0.01	1.41E+03
R06	1800	0	0	0	0	0.00E+00
R07	1800	0	0	0	0	0.00E+00
R08	1706.8	93.2	0	93.2	0.02	2.47E+03
R09	1800	0	0	0	0	0.00E+00
R11	1800	0	0	0	0	0.00E+00
R12	1800	0	0	0	0	0.00E+00
R13	1800	0	0	0	0	0.00E+00
R14	1800	0	0	0	0	0.00E+00
R15	1770.27	29.73	0	29.73	0	3.12E-01
R16	1800	0	0	0	0	0.00E+00
R17	1534.87	265.13	0	265.13	0.01	8.73E+02
R18	1521.93	278.07	0	278.07	0.04	4.74E+03
R19	1800	0	0	0	0	0.00E+00
R20	1800	0	0	0	0	0.00E+00
R21	1800	0	0	0	0	0.00E+00
R22	1800	0	0	0	0	0.00E+00
R23	1800	0	0	0	0	0.00E+00
R24	1800	0	0	0	0	0.00E+00
R25	1800	0	0	0	0	0.00E+00
R26	1800	0	0	0	0	0.00E+00
9A	1800	0	0	0	0	0.00E+00
A	0	1800	0	1800	2.63	2.85E+05
PS	0	1800	0	1800	7.54	8.14E+05

APPENDIX D

SWMM SUMMARY OUTPUT FOR FUTURE TYPICAL YEAR

Storm 1

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1455.4	344.6	0	344.6	0.15	1.61E+04
R03	1800	0	0	0	0	0.00E+00
R04	1800	0	0	0	0	0.00E+00
R05	736.73	1063.2	0.07	1063.27	0.44	4.71E+04
R06	1800	0	0	0	0	0.00E+00
R07	1719.87	80.13	0	80.13	0	1.70E+01
R08	1524.07	275.87	0.07	275.94	0.16	1.71E+04
R09	1800	0	0	0	0	0.00E+00
R11	1800	0	0	0	0	0.00E+00
R12	1800	0	0	0	0	0.00E+00
R13	1733.2	66.8	0	66.8	0	8.37E+00
R14	1800	0	0	0	0	0.00E+00
R15	1800	0	0	0	0	0.00E+00
R16	1800	0	0	0	0	0.00E+00
R17	1479.8	320.2	0	320.2	0.05	4.94E+03
R18	1460.47	339.53	0	339.53	0.19	2.05E+04
R19	1800	0	0	0	0	0.00E+00
R20	1800	0	0	0	0	0.00E+00
R21	1800	0	0	0	0	0.00E+00
R22	1800	0	0	0	0	0.00E+00
R24	1800	0	0	0	0	0.00E+00
R25	1800	0	0	0	0	0.00E+00
R26	1800	0	0	0	0	0.00E+00
9A	1800	0	0	0	0	0.00E+00
A	0	1800	0	1800	2.85	3.08E+05
PS	0	1800	0	1800	8.62	9.31E+05

Storm 2

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1487.2	192.8	0	192.8	0.05	4.60E+03
R03	1680	0	0	0	0	0.00E+00
R04	1680	0	0	0	0	0.00E+00
R05	736.73	943.2	0.07	943.27	0.23	2.30E+04
R06	1680	0	0	0	0	0.00E+00
R07	1680	0	0	0	0	0.00E+00
R08	1504.8	175.2	0	175.2	0.03	3.41E+03
R09	1680	0	0	0	0	0.00E+00
R11	1680	0	0	0	0	0.00E+00
R12	1680	0	0	0	0	0.00E+00
R13	1680	0	0	0	0	0.00E+00
R14	1680	0	0	0	0	0.00E+00
R15	1680	0	0	0	0	0.00E+00
R16	1680	0	0	0	0	0.00E+00
R17	1490.53	189.47	0	189.47	0.01	1.23E+03
R18	1471.67	208.33	0	208.33	0.07	6.66E+03
R19	1680	0	0	0	0	0.00E+00
R20	1680	0	0	0	0	0.00E+00
R21	1680	0	0	0	0	0.00E+00
R22	1680	0	0	0	0	0.00E+00
R24	1680	0	0	0	0	0.00E+00
R25	1680	0	0	0	0	0.00E+00
R26	1680	0	0	0	0	0.00E+00
9A	1680	0	0	0	0	0.00E+00
A	0	1680	0	1680	2.55	2.58E+05
PS	0	1680	0	1680	7.58	7.64E+05

Storm 3

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	774.33	1445.67	0	1445.67	2.58	3.44E+05
R03	1551.67	668.27	0.07	668.34	3.06	4.07E+05
R04	1673.87	546.13	0	546.13	0.2	2.63E+04
R05	733.8	1486.13	0.07	1486.2	4.7	6.26E+05
R06	1736.4	483.6	0	483.6	0.11	1.45E+04
R07	1524.87	695.13	0	695.13	0.94	1.26E+05
R08	728.8	1491.2	0	1491.2	6.1	8.13E+05
R09	1535.2	684.73	0.07	684.8	2.23	2.98E+05
R11	1670.53	549.4	0.07	549.47	1.61	2.14E+05
R12	1975.27	244.73	0	244.73	0.1	1.35E+04
R13	1532.27	687.67	0.07	687.74	1.88	2.50E+05
R14	1964.2	255.73	0.07	255.8	0.43	5.66E+04
R15	1633.8	586.2	0	586.2	0.04	5.15E+03
R16	1545.87	674.13	0	674.13	1.3	1.73E+05
R17	729.6	1490.4	0	1490.4	1.53	2.04E+05
R18	738	1482	0	1482	4.03	5.37E+05
R19	1486.73	733.2	0.07	733.27	6.34	8.44E+05
R20	1621.33	598.67	0	598.67	0.27	3.65E+04
R21	1643.07	576.93	0	576.93	0.27	3.56E+04
R22	1571.07	648.93	0	648.93	0.67	8.94E+04
R24	1681.27	538.73	0	538.73	0.18	2.46E+04
R25	1677.47	542.53	0	542.53	0.26	3.48E+04
R26	1614.47	605.53	0	605.53	0.77	1.02E+05
9A	1672.67	547.33	0	547.33	1.08	1.43E+05
A	0	2220	0	2220	5.77	7.68E+05
PS	0	2220	0	2220	13.74	1.83E+06

Storm 4

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1684.53	55.47	0	55.47	0	1.74E+01
R03	1740	0	0	0	0	0.00E+00
R04	1740	0	0	0	0	0.00E+00
R05	1669.67	70.27	0.07	70.34	0.01	7.59E+02
R06	1740	0	0	0	0	0.00E+00
R07	1740	0	0	0	0	0.00E+00
R08	1665.47	74.47	0.07	74.54	0.01	1.22E+03
R09	1740	0	0	0	0	0.00E+00
R11	1740	0	0	0	0	0.00E+00
R12	1740	0	0	0	0	0.00E+00
R13	1740	0	0	0	0	0.00E+00
R14	1740	0	0	0	0	0.00E+00
R15	1740	0	0	0	0	0.00E+00
R16	1740	0	0	0	0	0.00E+00
R17	1505.67	234.33	0	234.33	0	4.85E+02
R18	1488.13	251.87	0	251.87	0.03	3.54E+03
R19	1740	0	0	0	0	0.00E+00
R20	1740	0	0	0	0	0.00E+00
R21	1740	0	0	0	0	0.00E+00
R22	1740	0	0	0	0	0.00E+00
R24	1740	0	0	0	0	0.00E+00
R25	1740	0	0	0	0	0.00E+00
R26	1740	0	0	0	0	0.00E+00
9A	1740	0	0	0	0	0.00E+00
A	0	1740	0	1740	2.68	2.80E+05
PS	0	1740	0	1740	7.34	7.67E+05

Storm 5

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1528.93	91.07	0	91.07	0	1.85E+02
R03	1620	0	0	0	0	0.00E+00
R04	1620	0	0	0	0	0.00E+00
R05	1506	113.93	0.07	114	0.01	1.07E+03
R06	1620	0	0	0	0	0.00E+00
R07	1620	0	0	0	0	0.00E+00
R08	1499.6	120.33	0.07	120.4	0.02	1.63E+03
R09	1620	0	0	0	0	0.00E+00
R11	1620	0	0	0	0	0.00E+00
R12	1620	0	0	0	0	0.00E+00
R13	1620	0	0	0	0	0.00E+00
R14	1620	0	0	0	0	0.00E+00
R15	1620	0	0	0	0	0.00E+00
R16	1620	0	0	0	0	0.00E+00
R17	1489.07	130.93	0	130.93	0.01	6.87E+02
R18	1471.2	148.8	0	148.8	0.04	3.96E+03
R19	1620	0	0	0	0	0.00E+00
R20	1620	0	0	0	0	0.00E+00
R21	1620	0	0	0	0	0.00E+00
R22	1620	0	0	0	0	0.00E+00
R24	1620	0	0	0	0	0.00E+00
R25	1620	0	0	0	0	0.00E+00
R26	1620	0	0	0	0	0.00E+00
9A	1620	0	0	0	0	0.00E+00
A	0	1620	0	1620	2.67	2.60E+05
PS	0	1620	0	1620	7.32	7.12E+05

Storm 6

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1740	0	0	0	0	0.00E+00
R03	1740	0	0	0	0	0.00E+00
R04	1740	0	0	0	0	0.00E+00
R05	1740	0	0	0	0	0.00E+00
R06	1740	0	0	0	0	0.00E+00
R07	1740	0	0	0	0	0.00E+00
R08	1740	0	0	0	0	0.00E+00
R09	1740	0	0	0	0	0.00E+00
R11	1740	0	0	0	0	0.00E+00
R12	1740	0	0	0	0	0.00E+00
R13	1740	0	0	0	0	0.00E+00
R14	1740	0	0	0	0	0.00E+00
R15	1740	0	0	0	0	0.00E+00
R16	1740	0	0	0	0	0.00E+00
R17	1558.07	181.93	0	181.93	0	1.05E+01
R18	1527.47	212.53	0	212.53	0.01	1.08E+03
R19	1740	0	0	0	0	0.00E+00
R20	1740	0	0	0	0	0.00E+00
R21	1740	0	0	0	0	0.00E+00
R22	1740	0	0	0	0	0.00E+00
R24	1740	0	0	0	0	0.00E+00
R25	1740	0	0	0	0	0.00E+00
R26	1740	0	0	0	0	0.00E+00
9A	1740	0	0	0	0	0.00E+00
A	0	1740	0	1740	2.56	2.67E+05
PS	0	1740	0	1740	7.1	7.42E+05

Storm 7

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1169.73	630.27	0	630.27	1.97	2.13E+05
R03	1649.87	150.07	0.07	150.14	2.48	2.67E+05
R04	1661.27	138.73	0	138.73	0.34	3.65E+04
R05	850	950	0	950	4.53	4.89E+05
R06	1659.33	140.67	0	140.67	0.14	1.53E+04
R07	1638.6	161.4	0	161.4	0.98	1.06E+05
R08	847	952.93	0.07	953	4.6	4.97E+05
R09	1633.93	166.07	0	166.07	2.56	2.76E+05
R11	1666.07	133.93	0	133.93	1.89	2.04E+05
R12	1671.6	128.4	0	128.4	0.4	4.33E+04
R13	1641.73	158.2	0.07	158.27	1.88	2.03E+05
R14	1655.53	144.4	0.07	144.47	1.3	1.41E+05
R15	1635	165	0	165	0.14	1.48E+04
R16	1602.87	197.13	0	197.13	1.96	2.12E+05
R17	786.33	1013.67	0	1013.67	1.23	1.33E+05
R18	784.13	1015.87	0	1015.87	4.14	4.47E+05
R19	1558.8	241.2	0	241.2	5.29	5.72E+05
R20	1664.47	135.53	0	135.53	0.59	6.36E+04
R21	1673	127	0	127	0.36	3.85E+04
R22	1664.8	135.2	0	135.2	1.16	1.25E+05
R24	1675.6	124.4	0	124.4	0.3	3.21E+04
R25	1675.33	124.67	0	124.67	0.4	4.37E+04
R26	1670.47	129.53	0	129.53	0.93	1.00E+05
9A	1663.6	136.33	0.07	136.4	1.29	1.39E+05
A	0	1800	0	1800	5.16	5.58E+05
PS	0	1800	0	1800	9.64	1.04E+06

Storm 8

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1800	0	0	0	0	0.00E+00
R03	1800	0	0	0	0	0.00E+00
R04	1800	0	0	0	0	0.00E+00
R05	1684.33	115.67	0	115.67	0	1.65E+02
R06	1800	0	0	0	0	0.00E+00
R07	1800	0	0	0	0	0.00E+00
R08	1670.27	129.73	0	129.73	0	2.92E+02
R09	1800	0	0	0	0	0.00E+00
R11	1800	0	0	0	0	0.00E+00
R12	1800	0	0	0	0	0.00E+00
R13	1800	0	0	0	0	0.00E+00
R14	1800	0	0	0	0	0.00E+00
R15	1800	0	0	0	0	0.00E+00
R16	1800	0	0	0	0	0.00E+00
R17	1553.2	246.8	0	246.8	0	3.84E+02
R18	1525.93	274.07	0	274.07	0.04	3.97E+03
R19	1800	0	0	0	0	0.00E+00
R20	1800	0	0	0	0	0.00E+00
R21	1800	0	0	0	0	0.00E+00
R22	1800	0	0	0	0	0.00E+00
R24	1800	0	0	0	0	0.00E+00
R25	1800	0	0	0	0	0.00E+00
R26	1800	0	0	0	0	0.00E+00
9A	1800	0	0	0	0	0.00E+00
A	0	1800	0	1800	2.71	2.92E+05
PS	0	1800	0	1800	7.41	8.01E+05

Storm 9

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1460.13	339.87	0	339.87	0.55	5.94E+04
R03	1611.87	188.13	0	188.13	0.61	6.64E+04
R04	1800	0	0	0	0	0.00E+00
R05	742.2	1057.73	0.07	1057.8	1.15	1.24E+05
R06	1800	0	0	0	0	0.00E+00
R07	1569.27	230.73	0	230.73	0.19	2.08E+04
R08	734.87	1065.07	0.07	1065.14	1.33	1.44E+05
R09	1584.93	215	0.07	215.07	0.33	3.54E+04
R11	1667.87	132.13	0	132.13	0.19	2.06E+04
R12	1745.67	54.33	0	54.33	0	1.56E+02
R13	1558.6	241.4	0	241.4	0.39	4.26E+04
R14	1800	0	0	0	0	0.00E+00
R15	1652.6	147.4	0	147.4	0	2.13E+02
R16	1589.67	210.27	0.07	210.34	0.18	1.95E+04
R17	734	1066	0	1066	0.36	3.92E+04
R18	744.8	1055.2	0	1055.2	0.96	1.04E+05
R19	1530.8	269.13	0.07	269.2	1.52	1.64E+05
R20	1647.27	152.73	0	152.73	0.03	3.30E+03
R21	1682.2	117.8	0	117.8	0.04	4.01E+03
R22	1641.4	158.6	0	158.6	0.09	1.01E+04
R24	1800	0	0	0	0	0.00E+00
R25	1739	61	0	61	0.01	6.08E+02
R26	1646.13	153.87	0	153.87	0.06	6.35E+03
9A	1726.47	73.53	0	73.53	0.12	1.28E+04
A	0	1800	0	1800	3.39	3.66E+05
PS	0	1800	0	1800	9.35	1.01E+06

Storm 10

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1561.87	118.13	0	118.13	0.01	1.36E+03
R03	1680	0	0	0	0	0.00E+00
R04	1680	0	0	0	0	0.00E+00
R05	1573.4	106.6	0	106.6	0.01	1.17E+03
R06	1680	0	0	0	0	0.00E+00
R07	1680	0	0	0	0	0.00E+00
R08	1565.13	114.87	0	114.87	0.02	1.71E+03
R09	1680	0	0	0	0	0.00E+00
R11	1680	0	0	0	0	0.00E+00
R12	1680	0	0	0	0	0.00E+00
R13	1680	0	0	0	0	0.00E+00
R14	1680	0	0	0	0	0.00E+00
R15	1680	0	0	0	0	0.00E+00
R16	1680	0	0	0	0	0.00E+00
R17	1550.47	129.53	0	129.53	0.01	7.09E+02
R18	1534.07	145.93	0	145.93	0.04	3.96E+03
R19	1680	0	0	0	0	0.00E+00
R20	1680	0	0	0	0	0.00E+00
R21	1680	0	0	0	0	0.00E+00
R22	1680	0	0	0	0	0.00E+00
R24	1680	0	0	0	0	0.00E+00
R25	1680	0	0	0	0	0.00E+00
R26	1680	0	0	0	0	0.00E+00
9A	1680	0	0	0	0	0.00E+00
A	0	1680	0	1680	2.65	2.67E+05
PS	0	1680	0	1680	7.31	7.36E+05

Storm 11

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1651	988.93	0.07	989	1.12	1.78E+05
R03	1979	660.93	0.07	661	1.26	1.99E+05
R04	2586.93	53.07	0	53.07	0	4.99E+01
R05	924.8	1715.2	0	1715.2	2.19	3.47E+05
R06	2640	0	0	0	0	0.00E+00
R07	1866	774	0	774	0.4	6.36E+04
R08	911.53	1728.47	0	1728.47	2.69	4.25E+05
R09	1893.4	746.47	0.13	746.6	0.57	8.97E+04
R11	2198.6	441.27	0.13	441.4	0.49	7.73E+04
R12	2534.6	105.4	0	105.4	0.01	9.07E+02
R13	1812.13	827.8	0.07	827.87	0.82	1.31E+05
R14	2640	0	0	0	0	0.00E+00
R15	2264.13	375.87	0	375.87	0	5.79E+02
R16	1910.73	729.2	0.07	729.27	0.35	5.61E+04
R17	857.73	1782.27	0	1782.27	0.68	1.08E+05
R18	847.93	1792.07	0	1792.07	1.86	2.95E+05
R19	1706.27	933.67	0.07	933.74	3.23	5.12E+05
R20	2251.8	388.2	0	388.2	0.05	8.37E+03
R21	2315.6	324.4	0	324.4	0.06	9.56E+03
R22	2141.6	498.4	0	498.4	0.17	2.65E+04
R24	2640	0	0	0	0	0.00E+00
R25	2461	179	0	179	0.01	1.73E+03
R26	2253.47	386.53	0	386.53	0.1	1.62E+04
9A	2447.07	192.93	0	192.93	0.12	1.88E+04
A	0	2640	0	2640	4.55	7.20E+05
PS	0	2640	0	2640	11.68	1.85E+06

Storm 12

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1668.33	71.6	0.07	71.67	0	1.51E+02
R03	1740	0	0	0	0	0.00E+00
R04	1740	0	0	0	0	0.00E+00
R05	1661	79	0	79	0.01	9.29E+02
R06	1740	0	0	0	0	0.00E+00
R07	1740	0	0	0	0	0.00E+00
R08	1659.8	80.2	0	80.2	0.01	1.38E+03
R09	1740	0	0	0	0	0.00E+00
R11	1740	0	0	0	0	0.00E+00
R12	1740	0	0	0	0	0.00E+00
R13	1740	0	0	0	0	0.00E+00
R14	1740	0	0	0	0	0.00E+00
R15	1740	0	0	0	0	0.00E+00
R16	1740	0	0	0	0	0.00E+00
R17	1555.47	184.53	0	184.53	0.01	5.61E+02
R18	1525.67	214.33	0	214.33	0.04	3.72E+03
R19	1740	0	0	0	0	0.00E+00
R20	1740	0	0	0	0	0.00E+00
R21	1740	0	0	0	0	0.00E+00
R22	1740	0	0	0	0	0.00E+00
R24	1740	0	0	0	0	0.00E+00
R25	1740	0	0	0	0	0.00E+00
R26	1740	0	0	0	0	0.00E+00
9A	1740	0	0	0	0	0.00E+00
A	0	1740	0	1740	2.67	2.79E+05
PS	0	1740	0	1740	7.34	7.66E+05

Storm 13

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1680	0	0	0	0	0.00E+00
R03	1680	0	0	0	0	0.00E+00
R04	1680	0	0	0	0	0.00E+00
R05	1680	0	0	0	0	0.00E+00
R06	1680	0	0	0	0	0.00E+00
R07	1680	0	0	0	0	0.00E+00
R08	1680	0	0	0	0	0.00E+00
R09	1680	0	0	0	0	0.00E+00
R11	1680	0	0	0	0	0.00E+00
R12	1680	0	0	0	0	0.00E+00
R13	1680	0	0	0	0	0.00E+00
R14	1680	0	0	0	0	0.00E+00
R15	1680	0	0	0	0	0.00E+00
R16	1680	0	0	0	0	0.00E+00
R17	1558.07	121.93	0	121.93	0	6.37E+00
R18	1527.47	152.53	0	152.53	0.01	7.14E+02
R19	1680	0	0	0	0	0.00E+00
R20	1680	0	0	0	0	0.00E+00
R21	1680	0	0	0	0	0.00E+00
R22	1680	0	0	0	0	0.00E+00
R24	1680	0	0	0	0	0.00E+00
R25	1680	0	0	0	0	0.00E+00
R26	1680	0	0	0	0	0.00E+00
9A	1680	0	0	0	0	0.00E+00
A	0	1680	0	1680	2.52	2.54E+05
PS	0	1680	0	1680	7.03	7.09E+05

Storm 14

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1133.13	606.87	0	606.87	1.32	1.38E+05
R03	1481.8	258.13	0.07	258.2	1.64	1.71E+05
R04	1556.53	183.47	0	183.47	0.01	7.91E+02
R05	725.07	1014.87	0.07	1014.94	2.42	2.53E+05
R06	1740	0	0	0	0	0.00E+00
R07	1467	273	0	273	0.49	5.13E+04
R08	723.93	1016.07	0	1016.07	3.15	3.29E+05
R09	1461.53	278.47	0	278.47	1.28	1.34E+05
R11	1504.87	235.13	0	235.13	0.91	9.46E+04
R12	1524.6	215.4	0	215.4	0.04	4.46E+03
R13	1469.73	270.2	0.07	270.27	1.02	1.07E+05
R14	1555.13	184.8	0.07	184.87	0.12	1.25E+04
R15	1500.73	239.27	0	239.27	0.02	1.61E+03
R16	1446.53	293.4	0.07	293.47	0.67	6.95E+04
R17	725.13	1014.87	0	1014.87	0.85	8.83E+04
R18	729.6	1010.4	0	1010.4	2.18	2.28E+05
R19	1406.67	333.27	0.07	333.34	3.45	3.60E+05
R20	1502.27	237.73	0	237.73	0.15	1.62E+04
R21	1520.67	219.33	0	219.33	0.15	1.59E+04
R22	1501	239	0	239	0.37	3.83E+04
R24	1596.67	143.33	0	143.33	0	5.57E+01
R25	1519.07	220.93	0	220.93	0.06	5.99E+03
R26	1501.33	238.67	0	238.67	0.27	2.79E+04
9A	1507.27	232.73	0	232.73	0.67	6.97E+04
A	0	1740	0	1740	4.13	4.31E+05
PS	0	1740	0	1740	10.8	1.13E+06

Storm 15

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1512.8	707.2	0	707.2	0.83	1.11E+05
R03	1810.67	409.27	0.07	409.34	0.38	5.12E+04
R04	2220	0	0	0	0	0.00E+00
R05	805.47	1414.53	0	1414.53	1.66	2.21E+05
R06	2115.8	104.2	0	104.2	0.01	7.71E+02
R07	1597.87	622.13	0	622.13	0.31	4.07E+04
R08	796.8	1423.2	0	1423.2	1.97	2.63E+05
R09	1789.33	430.6	0.07	430.67	0.13	1.79E+04
R11	2102.27	117.73	0	117.73	0.02	2.08E+03
R12	2220	0	0	0	0	0.00E+00
R13	1602.93	617.07	0	617.07	0.56	7.48E+04
R14	2220	0	0	0	0	0.00E+00
R15	2099.53	120.47	0	120.47	0	7.99E+01
R16	1839.2	379.2	1.6	380.8	0.09	1.24E+04
R17	783.33	1436.67	0	1436.67	0.42	5.64E+04
R18	783.93	1436.07	0	1436.07	1.25	1.66E+05
R19	1565.27	654.73	0	654.73	2.23	2.97E+05
R20	2099.73	120.27	0	120.27	0.01	1.54E+03
R21	2118.13	101.87	0	101.87	0.02	2.13E+03
R22	1946.27	273.73	0	273.73	0.05	7.10E+03
R24	2220	0	0	0	0	0.00E+00
R25	2163.67	56.33	0	56.33	0	1.52E+01
R26	2100.07	119.93	0	119.93	0.03	3.43E+03
9A	2220	0	0	0	0	0.00E+00
A	0	2220	0	2220	4.45	5.93E+05
PS	0	2220	0	2220	11.57	1.54E+06

Storm 16

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1446.93	413.07	0	413.07	0.67	7.44E+04
R03	1564.6	295.33	0.07	295.4	0.75	8.32E+04
R04	1860	0	0	0	0	0.00E+00
R05	727.87	1132.13	0	1132.13	1.37	1.53E+05
R06	1860	0	0	0	0	0.00E+00
R07	1538.33	321.67	0	321.67	0.24	2.63E+04
R08	725.4	1134.53	0.07	1134.6	1.62	1.81E+05
R09	1543.4	316.6	0	316.6	0.28	3.13E+04
R11	1646.27	213.67	0.07	213.74	0.21	2.37E+04
R12	1860	0	0	0	0	0.00E+00
R13	1503.33	356.6	0.07	356.67	0.49	5.43E+04
R14	1860	0	0	0	0	0.00E+00
R15	1659.6	200.4	0	200.4	0	1.85E+02
R16	1589.47	270.47	0.07	270.54	0.22	2.51E+04
R17	726.8	1133.2	0	1133.2	0.45	5.04E+04
R18	732.8	1127.2	0	1127.2	1.15	1.28E+05
R19	1500.07	359.87	0.07	359.94	1.89	2.11E+05
R20	1657.27	202.73	0	202.73	0.03	3.12E+03
R21	1678.4	181.6	0	181.6	0.04	4.22E+03
R22	1652.33	207.67	0	207.67	0.1	1.10E+04
R24	1860	0	0	0	0	0.00E+00
R25	1741.27	118.73	0	118.73	0	2.73E+02
R26	1656.33	203.67	0	203.67	0.06	6.39E+03
9A	1795.8	64.2	0	64.2	0	4.26E+02
A	0	1860	0	1860	3.67	4.09E+05
PS	0	1860	0	1860	9.65	1.08E+06

Storm 17

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1973.33	486.6	0.07	486.67	0.54	7.98E+04
R03	2214.2	245.73	0.07	245.8	0.65	9.54E+04
R04	2402.6	57.4	0	57.4	0	1.30E+02
R05	817.2	1642.73	0.07	1642.8	1.15	1.69E+05
R06	2460	0	0	0	0	0.00E+00
R07	2191.53	268.47	0	268.47	0.2	2.89E+04
R08	815.07	1644.93	0	1644.93	1.36	2.00E+05
R09	2198.13	261.8	0.07	261.87	0.38	5.57E+04
R11	2247.87	212.13	0	212.13	0.21	3.17E+04
R12	2399.4	60.6	0	60.6	0.01	1.17E+03
R13	2198.13	261.8	0.07	261.87	0.41	6.08E+04
R14	2408.6	51.33	0.07	51.4	0	0.00E+00
R15	2293.6	166.4	0	166.4	0	4.41E+02
R16	2204.07	255.87	0.07	255.94	0.21	3.15E+04
R17	816.4	1643.6	0	1643.6	0.38	5.61E+04
R18	822.07	1637.93	0	1637.93	0.99	1.45E+05
R19	2161.13	298.8	0.07	298.87	1.52	2.25E+05
R20	2297.53	162.47	0	162.47	0.04	5.47E+03
R21	2307.07	152.93	0	152.93	0.04	6.03E+03
R22	2233	227	0	227	0.1	1.52E+04
R24	2460	0	0	0	0	0.00E+00
R25	2374.33	85.67	0	85.67	0.01	1.59E+03
R26	2300.47	159.53	0	159.53	0.07	1.00E+04
9A	2332.93	127.07	0	127.07	0.14	2.06E+04
A	0	2460	0	2460	3.24	4.79E+05
PS	0	2460	0	2460	8.97	1.32E+06

Storm 18

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1793.8	546.2	0	546.2	0.51	7.11E+04
R03	1941.73	398.2	0.07	398.27	0.45	6.37E+04
R04	2340	0	0	0	0	0.00E+00
R05	1087.27	1252.73	0	1252.73	1.06	1.49E+05
R06	2340	0	0	0	0	0.00E+00
R07	1867.93	472.07	0	472.07	0.17	2.44E+04
R08	1084.93	1255	0.07	1255.07	1.22	1.71E+05
R09	1901	438.87	0.13	439	0.15	2.07E+04
R11	2292.07	47.87	0.07	47.94	0	4.97E+01
R12	2340	0	0	0	0	0.00E+00
R13	1856.73	483.27	0	483.27	0.33	4.70E+04
R14	2340	0	0	0	0	0.00E+00
R15	2237.33	102.67	0	102.67	0	9.58E+00
R16	2149	190.87	0.13	191	0	0.00E+00
R17	1081.93	1258.07	0	1258.07	0.27	3.77E+04
R18	1059.13	1280.87	0	1280.87	0.86	1.21E+05
R19	1859.33	480.67	0	480.67	1.36	1.91E+05
R20	2220.73	119.27	0	119.27	0	3.46E+02
R21	2291.8	48.2	0	48.2	0	1.75E+02
R22	2146.93	193.07	0	193.07	0.02	3.33E+03
R24	2340	0	0	0	0	0.00E+00
R25	2340	0	0	0	0	0.00E+00
R26	2220	120	0	120	0.01	1.03E+03
9A	2340	0	0	0	0	0.00E+00
A	0	2340	0	2340	3.42	4.81E+05
PS	0	2340	0	2340	9.69	1.36E+06

Storm 19

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1448.73	651.27	0	651.27	0.76	9.59E+04
R03	1646.33	453.67	0	453.67	0.7	8.85E+04
R04	2100	0	0	0	0	0.00E+00
R05	728.67	1371.27	0.07	1371.34	1.55	1.95E+05
R06	2100	0	0	0	0	0.00E+00
R07	1540.4	559.6	0	559.6	0.25	3.13E+04
R08	725.93	1374.07	0	1374.07	1.8	2.27E+05
R09	1565.07	534.87	0.07	534.94	0.35	4.36E+04
R11	1787.4	312.53	0.07	312.6	0.2	2.51E+04
R12	2044.87	55.13	0	55.13	0	1.58E+02
R13	1504.07	595.87	0.07	595.94	0.51	6.48E+04
R14	2100	0	0	0	0	0.00E+00
R15	1956.47	143.53	0	143.53	0	2.38E+02
R16	1836.47	263.47	0.07	263.54	0.16	2.04E+04
R17	727.27	1372.73	0	1372.73	0.5	6.29E+04
R18	733.67	1366.33	0	1366.33	1.27	1.60E+05
R19	1506.8	593.13	0.07	593.2	1.9	2.39E+05
R20	1956.67	143.33	0	143.33	0.03	3.63E+03
R21	1985.87	114.13	0	114.13	0.03	4.24E+03
R22	1892.53	207.47	0	207.47	0.09	1.12E+04
R24	2100	0	0	0	0	0.00E+00
R25	1983.27	116.73	0	116.73	0.01	1.18E+03
R26	1957.8	142.2	0	142.2	0.06	6.98E+03
9A	1963.6	136.4	0	136.4	0.11	1.42E+04
A	0	2100	0	2100	3.82	4.81E+05
PS	0	2100	0	2100	10.58	1.33E+06

Storm 20

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1465.8	694.2	0	694.2	0.45	5.89E+04
R03	1834.6	325.33	0.07	325.4	0.33	4.33E+04
R04	2160	0	0	0	0	0.00E+00
R05	727.87	1432.13	0	1432.13	0.99	1.28E+05
R06	2160	0	0	0	0	0.00E+00
R07	1779.13	380.87	0	380.87	0.14	1.76E+04
R08	725.4	1434.53	0.07	1434.6	1.11	1.44E+05
R09	1789.33	370.67	0	370.67	0.13	1.66E+04
R11	2134.07	25.87	0.07	25.94	0	1.45E+02
R12	2160	0	0	0	0	0.00E+00
R13	1641.2	518.73	0.07	518.8	0.26	3.43E+04
R14	2160	0	0	0	0	0.00E+00
R15	2079.4	80.6	0	80.6	0	1.02E+01
R16	1888.4	271.6	0	271.6	0.02	2.96E+03
R17	726.8	1433.2	0	1433.2	0.31	4.02E+04
R18	732.8	1427.2	0	1427.2	0.8	1.04E+05
R19	1521.67	638.27	0.07	638.34	1.06	1.38E+05
R20	2076.33	83.67	0	83.67	0	2.91E+02
R21	2102	58	0	58	0	3.16E+02
R22	2017.6	142.4	0	142.4	0.02	2.52E+03
R24	2160	0	0	0	0	0.00E+00
R25	2160	0	0	0	0	0.00E+00
R26	2075.67	84.33	0	84.33	0.01	8.18E+02
9A	2160	0	0	0	0	0.00E+00
A	0	2160	0	2160	3.34	4.33E+05
PS	0	2160	0	2160	9.4	1.22E+06

Storm 21

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1381.8	298.2	0	298.2	0.58	5.81E+04
R03	1533.2	146.8	0	146.8	0.69	6.99E+04
R04	1630.93	49.07	0	49.07	0	3.85E+02
R05	723.87	956.07	0.07	956.14	1.15	1.16E+05
R06	1680	0	0	0	0	0.00E+00
R07	1502.47	177.53	0	177.53	0.21	2.15E+04
R08	723.27	956.67	0.07	956.74	1.41	1.42E+05
R09	1505.87	174.13	0	174.13	0.5	5.02E+04
R11	1551.73	128.27	0	128.27	0.37	3.74E+04
R12	1629.87	50.13	0	50.13	0.02	1.54E+03
R13	1494	185.93	0.07	186	0.44	4.47E+04
R14	1624.07	55.87	0.07	55.94	0	0.00E+00
R15	1559.87	120.13	0	120.13	0.01	5.04E+02
R16	1490.47	189.47	0.07	189.54	0.25	2.51E+04
R17	724.27	955.73	0	955.73	0.39	3.91E+04
R18	728.07	951.93	0	951.93	1.01	1.02E+05
R19	1454.53	225.47	0	225.47	1.56	1.57E+05
R20	1560.93	119.07	0	119.07	0.05	5.49E+03
R21	1569.2	110.8	0	110.8	0.05	5.09E+03
R22	1560.47	119.53	0	119.53	0.14	1.41E+04
R24	1636.6	43.4	0	43.4	0	1.60E+02
R25	1564.67	115.33	0	115.33	0.02	1.89E+03
R26	1561.07	118.93	0	118.93	0.1	9.88E+03
9A	1560.2	119.8	0	119.8	0.24	2.37E+04
A	0	1680	0	1680	3.18	3.20E+05
PS	0	1680	0	1680	8.79	8.87E+05

Storm 22

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1236.13	983.8	0.07	983.87	1.73	2.30E+05
R03	1656.33	563.6	0.07	563.67	2	2.66E+05
R04	2033.93	186.07	0	186.07	0.01	1.57E+03
R05	908	1311.93	0.07	1312	3.22	4.29E+05
R06	2066.13	153.87	0	153.87	0.03	4.34E+03
R07	1629.47	590.53	0	590.53	0.63	8.45E+04
R08	905.53	1314.47	0	1314.47	4.09	5.44E+05
R09	1643.07	576.93	0	576.93	1.37	1.82E+05
R11	1674.73	545.2	0.07	545.27	1.01	1.34E+05
R12	1982.2	237.8	0	237.8	0.04	5.46E+03
R13	1634.4	585.53	0.07	585.6	1.28	1.71E+05
R14	2024.07	195.93	0	195.93	0.17	2.26E+04
R15	1855.07	364.93	0	364.93	0.02	2.38E+03
R16	1653.13	566.8	0.07	566.87	0.75	1.00E+05
R17	786.33	1433.67	0	1433.67	1.08	1.44E+05
R18	784.13	1435.87	0	1435.87	2.78	3.70E+05
R19	1591.4	628.53	0.07	628.6	4.64	6.19E+05
R20	1856.4	363.6	0	363.6	0.16	2.11E+04
R21	1862.47	357.53	0	357.53	0.16	2.17E+04
R22	1738.93	481.07	0	481.07	0.4	5.32E+04
R24	2042.4	177.6	0	177.6	0	4.88E+02
R25	1863.93	356.07	0	356.07	0.06	7.71E+03
R26	1857.53	362.47	0	362.47	0.28	3.70E+04
9A	1775.13	444.87	0	444.87	0.6	8.02E+04
A	0	2220	0	2220	5.11	6.81E+05
PS	0	2220	0	2220	12.77	1.70E+06

Storm 23

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1468.6	451.4	0	451.4	0.22	2.54E+04
R03	1920	0	0	0	0	0.00E+00
R04	1920	0	0	0	0	0.00E+00
R05	733.8	1186.13	0.07	1186.2	0.54	6.25E+04
R06	1920	0	0	0	0	0.00E+00
R07	1646.07	273.93	0	273.93	0.03	3.71E+03
R08	728.8	1191.2	0	1191.2	0.47	5.39E+04
R09	1920	0	0	0	0	0.00E+00
R11	1920	0	0	0	0	0.00E+00
R12	1920	0	0	0	0	0.00E+00
R13	1863.07	56.87	0.07	56.94	0	4.27E+02
R14	1920	0	0	0	0	0.00E+00
R15	1920	0	0	0	0	0.00E+00
R16	1920	0	0	0	0	0.00E+00
R17	1488.33	431.67	0	431.67	0.06	6.91E+03
R18	1468.73	451.27	0	451.27	0.25	2.87E+04
R19	1890.73	29.27	0	29.27	0	1.81E+02
R20	1920	0	0	0	0	0.00E+00
R21	1920	0	0	0	0	0.00E+00
R22	1920	0	0	0	0	0.00E+00
R24	1920	0	0	0	0	0.00E+00
R25	1920	0	0	0	0	0.00E+00
R26	1920	0	0	0	0	0.00E+00
9A	1920	0	0	0	0	0.00E+00
A	0	1920	0	1920	2.9	3.34E+05
PS	0	1920	0	1920	8.93	1.03E+06

Storm 24

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1409.2	930.8	0	930.8	1.54	2.17E+05
R03	1802.8	537.13	0.07	537.2	1.8	2.53E+05
R04	2151.93	188.07	0	188.07	0.02	2.25E+03
R05	736.73	1603.2	0.07	1603.27	2.83	3.97E+05
R06	2226.27	113.67	0.07	113.74	0.02	3.42E+03
R07	1699.87	640.13	0	640.13	0.56	7.81E+04
R08	730.8	1609.2	0	1609.2	3.64	5.12E+05
R09	1715.93	624.07	0	624.07	1.29	1.81E+05
R11	1895.27	444.6	0.13	444.73	0.92	1.30E+05
R12	2151.73	188.27	0	188.27	0.05	6.88E+03
R13	1623.27	716.73	0	716.73	1.15	1.62E+05
R14	2139.13	200.67	0.2	200.87	0.07	9.89E+03
R15	1977.8	362.2	0	362.2	0.01	2.10E+03
R16	1748.47	591.53	0	591.53	0.69	9.71E+04
R17	731.27	1608.73	0	1608.73	0.98	1.37E+05
R18	740.67	1599.33	0	1599.33	2.53	3.55E+05
R19	1516.27	823.73	0	823.73	4.28	6.01E+05
R20	1981.13	358.87	0	358.87	0.15	2.12E+04
R21	2000	340	0	340	0.15	2.05E+04
R22	1925.47	414.53	0	414.53	0.37	5.20E+04
R24	2109	231	0	231	0.04	5.08E+03
R25	1927.07	412.93	0	412.93	0.08	1.09E+04
R26	1906.6	433.4	0	433.4	0.35	4.92E+04
9A	1907.4	432.6	0	432.6	0.61	8.56E+04
A	0	2340	0	2340	4.71	6.61E+05
PS	0	2340	0	2340	12.1	1.70E+06

Storm 25

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1392.93	407.07	0	407.07	0.73	7.86E+04
R03	1540.07	259.87	0.07	259.94	0.83	8.92E+04
R04	1800	0	0	0	0	0.00E+00
R05	731.13	1068.87	0	1068.87	1.49	1.60E+05
R06	1800	0	0	0	0	0.00E+00
R07	1486.6	313.4	0	313.4	0.26	2.82E+04
R08	727.53	1072.47	0	1072.47	1.77	1.91E+05
R09	1526.33	273.6	0.07	273.67	0.32	3.41E+04
R11	1555.8	244.13	0.07	244.2	0.32	3.46E+04
R12	1800	0	0	0	0	0.00E+00
R13	1491.87	308.07	0.07	308.14	0.54	5.87E+04
R14	1800	0	0	0	0	0.00E+00
R15	1613	187	0	187	0	2.26E+02
R16	1522.2	277.73	0.07	277.8	0.28	3.00E+04
R17	728.6	1071.4	0	1071.4	0.49	5.28E+04
R18	736.13	1063.87	0	1063.87	1.25	1.35E+05
R19	1475.4	324.53	0.07	324.6	2.09	2.25E+05
R20	1614.4	185.6	0	185.6	0.03	3.75E+03
R21	1633.93	166.07	0	166.07	0.04	4.81E+03
R22	1607.07	192.93	0	192.93	0.12	1.24E+04
R24	1800	0	0	0	0	0.00E+00
R25	1624.53	175.47	0	175.47	0	2.94E+02
R26	1616.4	183.6	0	183.6	0.07	7.59E+03
9A	1726.87	73.13	0	73.13	0	4.45E+02
A	0	1800	0	1800	3.82	4.12E+05
PS	0	1800	0	1800	9.79	1.06E+06

Storm 26

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1286	693.93	0.07	694	1.36	1.61E+05
R03	1535.33	444.67	0	444.67	1.49	1.77E+05
R04	1772.4	207.6	0	207.6	0.13	1.51E+04
R05	722.13	1257.87	0	1257.87	2.35	2.79E+05
R06	1853.8	126.2	0	126.2	0.05	5.78E+03
R07	1507.33	472.67	0	472.67	0.5	5.99E+04
R08	722.2	1257.8	0	1257.8	3.23	3.83E+05
R09	1511.73	468.27	0	468.27	1.11	1.32E+05
R11	1653.47	326.47	0.07	326.54	0.8	9.48E+04
R12	1915.47	64.53	0	64.53	0.1	1.14E+04
R13	1492.47	487.53	0	487.53	0.98	1.17E+05
R14	1834	146	0	146	0.35	4.15E+04
R15	1854.27	125.73	0	125.73	0.02	2.94E+03
R16	1601.87	378.07	0.07	378.14	0.67	7.98E+04
R17	722.8	1257.2	0	1257.2	0.79	9.35E+04
R18	725.27	1254.73	0	1254.73	2.2	2.61E+05
R19	1457.6	522.4	0	522.4	1.89	2.25E+05
R20	1855.73	124.27	0	124.27	0.17	2.00E+04
R21	1853.73	126.27	0	126.27	0.13	1.60E+04
R22	1801.4	178.6	0	178.6	0.36	4.32E+04
R24	1804.8	175.2	0	175.2	0.11	1.28E+04
R25	1679.33	300.67	0	300.67	0.16	1.86E+04
R26	1629.47	350.53	0	350.53	0.41	4.84E+04
9A	1686.13	293.87	0	293.87	0.54	6.36E+04
A	0	1980	0	1980	4.14	4.92E+05
PS	0	1980	0	1980	10.35	1.23E+06

Storm 27

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1471.93	268.07	0	268.07	0.32	3.35E+04
R03	1585.87	154.13	0	154.13	0.28	2.94E+04
R04	1740	0	0	0	0	0.00E+00
R05	757.27	982.73	0	982.73	0.72	7.55E+04
R06	1740	0	0	0	0	0.00E+00
R07	1542.4	197.6	0	197.6	0.11	1.11E+04
R08	746.2	993.8	0	993.8	0.79	8.25E+04
R09	1570.87	169.13	0	169.13	0.1	1.02E+04
R11	1685.4	54.6	0	54.6	0	5.77E+01
R12	1740	0	0	0	0	0.00E+00
R13	1546.73	193.27	0	193.27	0.21	2.20E+04
R14	1740	0	0	0	0	0.00E+00
R15	1678.07	61.93	0	61.93	0	1.06E+01
R16	1590.73	149.2	0.07	149.27	0.07	7.82E+03
R17	739.93	1000.07	0	1000.07	0.22	2.29E+04
R18	752.47	987.53	0	987.53	0.59	6.18E+04
R19	1525.6	214.33	0.07	214.4	0.8	8.32E+04
R20	1675.33	64.67	0	64.67	0	3.05E+02
R21	1699.27	40.73	0	40.73	0	3.97E+02
R22	1653.8	86.2	0	86.2	0.02	2.02E+03
R24	1740	0	0	0	0	0.00E+00
R25	1740	0	0	0	0	0.00E+00
R26	1676.93	63.07	0	63.07	0.01	8.18E+02
9A	1740	0	0	0	0	0.00E+00
A	0	1740	0	1740	3.07	3.20E+05
PS	0	1740	0	1740	8.64	9.02E+05

Storm 28

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1462.47	757.53	0	757.53	0.99	1.32E+05
R03	1596.13	623.87	0	623.87	1.04	1.38E+05
R04	2220	0	0	0	0	0.00E+00
R05	736.73	1483.2	0.07	1483.27	2	2.66E+05
R06	2220	0	0	0	0	0.00E+00
R07	1562.27	657.73	0	657.73	0.37	4.89E+04
R08	730.8	1489.2	0	1489.2	2.39	3.18E+05
R09	1570.67	649.27	0.07	649.34	0.4	5.29E+04
R11	1986.8	233.2	0	233.2	0.05	6.80E+03
R12	2220	0	0	0	0	0.00E+00
R13	1552.8	667.13	0.07	667.2	0.71	9.40E+04
R14	2220	0	0	0	0	0.00E+00
R15	1936.07	283.93	0	283.93	0	2.31E+02
R16	1617.53	602.4	0.07	602.47	0.26	3.42E+04
R17	731.27	1488.73	0	1488.73	0.65	8.72E+04
R18	740.67	1479.33	0	1479.33	1.68	2.23E+05
R19	1517.2	702.73	0.07	702.8	2.7	3.60E+05
R20	1928.93	291.07	0	291.07	0.03	4.15E+03
R21	1995.47	224.53	0	224.53	0.04	5.63E+03
R22	1920.2	299.8	0	299.8	0.12	1.55E+04
R24	2220	0	0	0	0	0.00E+00
R25	1999.13	220.87	0	220.87	0	1.64E+02
R26	1929.47	290.53	0	290.53	0.07	8.83E+03
9A	2150.87	69.13	0	69.13	0	1.28E+02
A	0	2220	0	2220	4.37	5.83E+05
PS	0	2220	0	2220	11.61	1.55E+06

Storm 29

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1800	0	0	0	0	0.00E+00
R03	1800	0	0	0	0	0.00E+00
R04	1800	0	0	0	0	0.00E+00
R05	1755.13	44.87	0	44.87	0	4.52E+01
R06	1800	0	0	0	0	0.00E+00
R07	1800	0	0	0	0	0.00E+00
R08	1744.93	55.07	0	55.07	0	1.01E+02
R09	1800	0	0	0	0	0.00E+00
R11	1800	0	0	0	0	0.00E+00
R12	1800	0	0	0	0	0.00E+00
R13	1800	0	0	0	0	0.00E+00
R14	1800	0	0	0	0	0.00E+00
R15	1800	0	0	0	0	0.00E+00
R16	1800	0	0	0	0	0.00E+00
R17	1689.87	110.13	0	110.13	0	1.44E+02
R18	1645.67	154.33	0	154.33	0.01	1.50E+03
R19	1800	0	0	0	0	0.00E+00
R20	1800	0	0	0	0	0.00E+00
R21	1800	0	0	0	0	0.00E+00
R22	1800	0	0	0	0	0.00E+00
R24	1800	0	0	0	0	0.00E+00
R25	1800	0	0	0	0	0.00E+00
R26	1800	0	0	0	0	0.00E+00
9A	1800	0	0	0	0	0.00E+00
A	0	1800	0	1800	2.57	2.77E+05
PS	0	1800	0	1800	7.12	7.69E+05

Storm 30

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1576.8	43.2	0	43.2	0	6.37E+01
R03	1620	0	0	0	0	0.00E+00
R04	1620	0	0	0	0	0.00E+00
R05	1550.33	69.67	0	69.67	0.01	8.53E+02
R06	1620	0	0	0	0	0.00E+00
R07	1620	0	0	0	0	0.00E+00
R08	1548.33	71.67	0	71.67	0.01	1.31E+03
R09	1620	0	0	0	0	0.00E+00
R11	1620	0	0	0	0	0.00E+00
R12	1620	0	0	0	0	0.00E+00
R13	1620	0	0	0	0	0.00E+00
R14	1620	0	0	0	0	0.00E+00
R15	1620	0	0	0	0	0.00E+00
R16	1620	0	0	0	0	0.00E+00
R17	1533.2	86.8	0	86.8	0.01	4.99E+02
R18	1505.33	114.67	0	114.67	0.03	2.78E+03
R19	1620	0	0	0	0	0.00E+00
R20	1620	0	0	0	0	0.00E+00
R21	1620	0	0	0	0	0.00E+00
R22	1620	0	0	0	0	0.00E+00
R24	1620	0	0	0	0	0.00E+00
R25	1620	0	0	0	0	0.00E+00
R26	1620	0	0	0	0	0.00E+00
9A	1620	0	0	0	0	0.00E+00
A	0	1620	0	1620	2.61	2.53E+05
PS	0	1620	0	1620	7.19	6.99E+05

Storm 31

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1458.87	161.13	0	161.13	0.08	7.69E+03
R03	1606.2	13.8	0	13.8	0	1.06E+01
R04	1620	0	0	0	0	0.00E+00
R05	742.2	877.73	0.07	877.8	0.27	2.62E+04
R06	1620	0	0	0	0	0.00E+00
R07	1558.2	61.8	0	61.8	0.01	9.96E+02
R08	734.87	885.07	0.07	885.14	0.2	1.94E+04
R09	1603.8	16.2	0	16.2	0	2.00E+00
R11	1620	0	0	0	0	0.00E+00
R12	1620	0	0	0	0	0.00E+00
R13	1584.67	35.33	0	35.33	0	4.74E+02
R14	1620	0	0	0	0	0.00E+00
R15	1620	0	0	0	0	0.00E+00
R16	1620	0	0	0	0	0.00E+00
R17	1474.33	145.67	0	145.67	0.03	2.90E+03
R18	1455.67	164.33	0	164.33	0.12	1.13E+04
R19	1620	0	0	0	0	0.00E+00
R20	1620	0	0	0	0	0.00E+00
R21	1620	0	0	0	0	0.00E+00
R22	1620	0	0	0	0	0.00E+00
R24	1620	0	0	0	0	0.00E+00
R25	1620	0	0	0	0	0.00E+00
R26	1620	0	0	0	0	0.00E+00
9A	1620	0	0	0	0	0.00E+00
A	0	1620	0	1620	2.61	2.54E+05
PS	0	1620	0	1620	7.76	7.54E+05

Storm 32

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	2752.47	187.53	0	187.53	0.09	1.65E+04
R03	2866.67	73.27	0.07	73.34	0.07	1.24E+04
R04	2940	0	0	0	0	0.00E+00
R05	2015.8	924.13	0.07	924.2	0.26	4.51E+04
R06	2940	0	0	0	0	0.00E+00
R07	2841.8	98.2	0	98.2	0.03	4.56E+03
R08	2000.07	939.93	0	939.93	0.24	4.17E+04
R09	2877.47	62.53	0	62.53	0	6.94E+02
R11	2940	0	0	0	0	0.00E+00
R12	2940	0	0	0	0	0.00E+00
R13	2849.4	90.53	0.07	90.6	0.05	8.87E+03
R14	2940	0	0	0	0	0.00E+00
R15	2901.87	38.13	0	38.13	0	1.85E-01
R16	2905.07	34.8	0.13	34.93	0	0.00E+00
R17	2722.4	217.6	0	217.6	0.04	7.25E+03
R18	1947.93	992.07	0	992.07	0.2	3.55E+04
R19	2805.73	134.27	0	134.27	0.16	2.89E+04
R20	2892.07	47.93	0	47.93	0	6.22E+01
R21	2936.67	3.33	0	3.33	0	1.00E+01
R22	2886.4	53.6	0	53.6	0.01	9.24E+02
R24	2940	0	0	0	0	0.00E+00
R25	2940	0	0	0	0	0.00E+00
R26	2889.67	50.33	0	50.33	0	2.35E+02
9A	2940	0	0	0	0	0.00E+00
A	0	2940	0	2940	2.69	4.74E+05
PS	0	2940	0	2940	7.74	1.36E+06

Storm 33

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1431.73	368.27	0	368.27	0.3	3.24E+04
R03	1672.2	127.8	0	127.8	0.16	1.72E+04
R04	1800	0	0	0	0	0.00E+00
R05	731.13	1068.87	0	1068.87	0.71	7.64E+04
R06	1800	0	0	0	0	0.00E+00
R07	1605.87	194.13	0	194.13	0.07	7.10E+03
R08	727.53	1072.47	0	1072.47	0.72	7.82E+04
R09	1729.67	70.27	0.07	70.34	0.01	7.71E+02
R11	1800	0	0	0	0	0.00E+00
R12	1800	0	0	0	0	0.00E+00
R13	1605	194.93	0.07	195	0.12	1.30E+04
R14	1800	0	0	0	0	0.00E+00
R15	1759.4	40.6	0	40.6	0	2.00E-01
R16	1761.27	38.53	0.2	38.73	0	0.00E+00
R17	1472.87	327.13	0	327.13	0.11	1.20E+04
R18	736.13	1063.87	0	1063.87	0.51	5.48E+04
R19	1618.4	181.53	0.07	181.6	0.46	4.99E+04
R20	1748	52	0	52	0	6.79E+01
R21	1795.53	4.47	0	4.47	0	1.23E+01
R22	1742.4	57.6	0	57.6	0.01	9.93E+02
R24	1800	0	0	0	0	0.00E+00
R25	1800	0	0	0	0	0.00E+00
R26	1746.8	53.2	0	53.2	0	2.52E+02
9A	1800	0	0	0	0	0.00E+00
A	0	1800	0	1800	3.02	3.27E+05
PS	0	1800	0	1800	9.02	9.74E+05

Storm 34

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1315.47	1324.53	0	1324.53	1.78	2.82E+05
R03	1933.67	706.27	0.07	706.34	1.98	3.14E+05
R04	2401.2	238.8	0	238.8	0.02	2.49E+03
R05	131.13	2508.87	0	2508.87	3.38	5.35E+05
R06	2508.47	131.53	0	131.53	0.02	3.45E+03
R07	1788.4	851.6	0	851.6	0.63	1.00E+05
R08	127.53	2512.47	0	2512.47	4.25	6.74E+05
R09	1877	762.87	0.13	763	1.48	2.35E+05
R11	2017.33	622.67	0	622.67	1.03	1.63E+05
R12	2348.27	291.73	0	291.73	0.05	8.01E+03
R13	1770.33	869.6	0.07	869.67	1.25	1.98E+05
R14	2398	242	0	242	0.17	2.64E+04
R15	2212.8	427.2	0	427.2	0.02	3.08E+03
R16	1900.73	739.13	0.13	739.26	0.79	1.25E+05
R17	128.6	2511.4	0	2511.4	1.1	1.75E+05
R18	135.33	2504.67	0	2504.67	2.88	4.56E+05
R19	1744.07	895.93	0	895.93	4.41	6.99E+05
R20	2212.33	427.67	0	427.67	0.17	2.66E+04
R21	2257.6	382.4	0	382.4	0.16	2.50E+04
R22	2204.93	435.07	0	435.07	0.41	6.44E+04
R24	2278.47	361.53	0	361.53	0.06	1.00E+04
R25	2282.6	357.4	0	357.4	0.07	1.11E+04
R26	2009.93	630.07	0	630.07	0.43	6.80E+04
9A	2032.87	607.13	0	607.13	0.73	1.15E+05
A	0	2640	0	2640	4.97	7.88E+05
PS	0	2640	0	2640	12.87	2.04E+06

Storm 35

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1746.4	173.6	0	173.6	0.12	1.39E+04
R03	1846.8	73.13	0.07	73.2	0.09	1.06E+04
R04	1920	0	0	0	0	0.00E+00
R05	977.53	942.47	0	942.47	0.34	3.93E+04
R06	1920	0	0	0	0	0.00E+00
R07	1813.47	106.53	0	106.53	0.03	3.64E+03
R08	967.07	952.87	0.07	952.94	0.33	3.85E+04
R09	1826.07	93.93	0	93.93	0.03	3.21E+03
R11	1892.93	27.07	0	27.07	0	1.85E+02
R12	1920	0	0	0	0	0.00E+00
R13	1800.67	119.27	0.07	119.34	0.07	8.00E+03
R14	1920	0	0	0	0	0.00E+00
R15	1889.07	30.93	0	30.93	0	9.78E+00
R16	1857.93	62.07	0	62.07	0	0.00E+00
R17	945.33	974.67	0	974.67	0.1	1.11E+04
R18	922.73	997.27	0	997.27	0.28	3.26E+04
R19	1777.67	142.33	0	142.33	0.34	3.92E+04
R20	1889.27	30.73	0	30.73	0	2.31E+02
R21	1917.2	2.8	0	2.8	0	1.05E+01
R22	1884.87	35.13	0	35.13	0.01	1.19E+03
R24	1920	0	0	0	0	0.00E+00
R25	1920	0	0	0	0	0.00E+00
R26	1889.33	30.67	0	30.67	0.01	6.10E+02
9A	1920	0	0	0	0	0.00E+00
A	0	1920	0	1920	2.72	3.14E+05
PS	0	1920	0	1920	7.83	9.02E+05

Storm 36

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1589	511	0	511	0.5	6.29E+04
R03	1767.87	332.13	0	332.13	0.45	5.63E+04
R04	2056.6	43.4	0	43.4	0	6.33E+00
R05	757.27	1342.73	0	1342.73	1.08	1.36E+05
R06	2100	0	0	0	0	0.00E+00
R07	1733.6	366.4	0	366.4	0.17	2.13E+04
R08	746.2	1353.8	0	1353.8	1.23	1.55E+05
R09	1733.33	366.67	0	366.67	0.3	3.76E+04
R11	1872.47	227.47	0.07	227.54	0.18	2.30E+04
R12	2042.93	57.07	0	57.07	0	6.23E+02
R13	1711.47	388.4	0.13	388.53	0.32	4.08E+04
R14	2100	0	0	0	0	0.00E+00
R15	2019.07	80.93	0	80.93	0	2.66E+02
R16	1885.13	214.73	0.13	214.86	0.14	1.75E+04
R17	739.93	1360.07	0	1360.07	0.33	4.17E+04
R18	752.47	1347.53	0	1347.53	0.89	1.12E+05
R19	1689.13	410.87	0	410.87	1.24	1.56E+05
R20	2014.53	85.47	0	85.47	0.03	3.51E+03
R21	2035.33	64.67	0	64.67	0.03	3.46E+03
R22	2008.2	91.8	0	91.8	0.07	8.97E+03
R24	2100	0	0	0	0	0.00E+00
R25	2039.07	60.93	0	60.93	0.01	1.04E+03
R26	2014.4	85.6	0	85.6	0.05	6.26E+03
9A	1993.87	106.13	0	106.13	0.13	1.65E+04
A	0	2100	0	2100	3.29	4.15E+05
PS	0	2100	0	2100	9.27	1.17E+06

Storm 37

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1696.6	223.4	0	223.4	0.09	1.03E+04
R03	1920	0	0	0	0	0.00E+00
R04	1920	0	0	0	0	0.00E+00
R05	937.27	982.73	0	982.73	0.25	2.90E+04
R06	1920	0	0	0	0	0.00E+00
R07	1834.6	85.4	0	85.4	0.01	1.26E+03
R08	926.2	993.8	0	993.8	0.2	2.34E+04
R09	1920	0	0	0	0	0.00E+00
R11	1920	0	0	0	0	0.00E+00
R12	1920	0	0	0	0	0.00E+00
R13	1874.6	45.4	0	45.4	0	3.15E+02
R14	1920	0	0	0	0	0.00E+00
R15	1920	0	0	0	0	0.00E+00
R16	1920	0	0	0	0	0.00E+00
R17	1678.2	241.8	0	241.8	0.03	3.28E+03
R18	1636.53	283.47	0	283.47	0.12	1.39E+04
R19	1920	0	0	0	0	0.00E+00
R20	1920	0	0	0	0	0.00E+00
R21	1920	0	0	0	0	0.00E+00
R22	1920	0	0	0	0	0.00E+00
R24	1920	0	0	0	0	0.00E+00
R25	1920	0	0	0	0	0.00E+00
R26	1920	0	0	0	0	0.00E+00
9A	1920	0	0	0	0	0.00E+00
A	0	1920	0	1920	2.71	3.12E+05
PS	0	1920	0	1920	7.95	9.15E+05

Storm 38

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1311.27	368.73	0	368.73	0.77	7.72E+04
R03	1583.4	96.6	0	96.6	0.93	9.39E+04
R04	1601.13	78.87	0	78.87	0.09	9.16E+03
R05	781.67	898.33	0	898.33	1.28	1.30E+05
R06	1612.33	67.6	0.07	67.67	0.04	3.56E+03
R07	1557	123	0	123	0.28	2.84E+04
R08	781.8	898.13	0.07	898.2	1.83	1.85E+05
R09	1557.13	122.87	0	122.87	0.74	7.48E+04
R11	1604.87	75.07	0.07	75.14	0.53	5.36E+04
R12	1620	60	0	60	0.07	7.09E+03
R13	1550.33	129.67	0	129.67	0.59	5.94E+04
R14	1598.27	81.67	0.07	81.74	0.26	2.57E+04
R15	1611.13	68.87	0	68.87	0.02	1.57E+03
R16	1538.73	141.27	0	141.27	0.45	4.52E+04
R17	780.93	899.07	0	899.07	0.45	4.56E+04
R18	781.93	898.07	0	898.07	1.3	1.31E+05
R19	1490.73	189.27	0	189.27	1.21	1.22E+05
R20	1614	66	0	66	0.12	1.26E+04
R21	1612.6	67.4	0	67.4	0.1	9.87E+03
R22	1613.87	66.13	0	66.13	0.26	2.63E+04
R24	1614.13	65.87	0	65.87	0.08	7.94E+03
R25	1611.73	68.27	0	68.27	0.1	9.77E+03
R26	1608.13	71.87	0	71.87	0.26	2.66E+04
9A	1603.8	76.2	0	76.2	0.39	3.91E+04
A	0	1680	0	1680	3.19	3.22E+05
PS	0	1680	0	1680	8.45	8.52E+05

Storm 39

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1610.07	429.93	0	429.93	0.43	5.22E+04
R03	1842.2	197.73	0.07	197.8	0.45	5.56E+04
R04	1991.87	48.13	0	48.13	0	5.03E+02
R05	723.73	1316.2	0.07	1316.27	0.91	1.12E+05
R06	1996.33	43.67	0	43.67	0.01	1.09E+03
R07	1811.67	228.33	0	228.33	0.15	1.84E+04
R08	723.2	1316.73	0.07	1316.8	1.07	1.31E+05
R09	1810.13	229.8	0.07	229.87	0.33	4.01E+04
R11	1904.07	135.93	0	135.93	0.23	2.79E+04
R12	1991.07	48.93	0	48.93	0.01	1.76E+03
R13	1778.73	261.2	0.07	261.27	0.3	3.73E+04
R14	1988.33	51.67	0	51.67	0.01	7.91E+02
R15	1974.33	65.67	0	65.67	0	4.83E+02
R16	1835.4	204.53	0.07	204.6	0.14	1.69E+04
R17	724.2	1315.8	0	1315.8	0.3	3.62E+04
R18	727.87	1312.13	0	1312.13	0.79	9.68E+04
R19	1725.93	314.07	0	314.07	1.08	1.32E+05
R20	1977.27	62.73	0	62.73	0.04	4.81E+03
R21	1984.47	55.53	0	55.53	0.03	3.79E+03
R22	1976.8	63.2	0	63.2	0.09	1.12E+04
R24	1991.13	48.87	0	48.87	0	5.41E+02
R25	1981.4	58.6	0	58.6	0.02	2.09E+03
R26	1978.67	61.33	0	61.33	0.07	8.35E+03
9A	1917.67	122.33	0	122.33	0.15	1.89E+04
A	0	2040	0	2040	2.99	3.66E+05
PS	0	2040	0	2040	8.58	1.05E+06

Storm 40

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1498.2	241.8	0	241.8	0.04	4.30E+03
R03	1740	0	0	0	0	0.00E+00
R04	1740	0	0	0	0	0.00E+00
R05	1557.33	182.67	0	182.67	0.02	2.28E+03
R06	1740	0	0	0	0	0.00E+00
R07	1740	0	0	0	0	0.00E+00
R08	1548.13	191.8	0.07	191.87	0.03	3.45E+03
R09	1740	0	0	0	0	0.00E+00
R11	1740	0	0	0	0	0.00E+00
R12	1740	0	0	0	0	0.00E+00
R13	1740	0	0	0	0	0.00E+00
R14	1740	0	0	0	0	0.00E+00
R15	1740	0	0	0	0	0.00E+00
R16	1740	0	0	0	0	0.00E+00
R17	1488.8	251.2	0	251.2	0.01	1.33E+03
R18	1472.33	267.67	0	267.67	0.07	7.62E+03
R19	1740	0	0	0	0	0.00E+00
R20	1740	0	0	0	0	0.00E+00
R21	1740	0	0	0	0	0.00E+00
R22	1740	0	0	0	0	0.00E+00
R24	1740	0	0	0	0	0.00E+00
R25	1740	0	0	0	0	0.00E+00
R26	1740	0	0	0	0	0.00E+00
9A	1740	0	0	0	0	0.00E+00
A	0	1740	0	1740	2.81	2.94E+05
PS	0	1740	0	1740	7.69	8.03E+05

Storm 41

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1604.8	675.2	0	675.2	0.35	4.85E+04
R03	1939.8	340.13	0.07	340.2	0.27	3.63E+04
R04	2280	0	0	0	0	0.00E+00
R05	757.27	1522.73	0	1522.73	0.81	1.10E+05
R06	2280	0	0	0	0	0.00E+00
R07	1899.73	380.27	0	380.27	0.11	1.45E+04
R08	746.2	1533.8	0	1533.8	0.87	1.19E+05
R09	2140.2	139.73	0.07	139.8	0.01	1.45E+03
R11	2280	0	0	0	0	0.00E+00
R12	2280	0	0	0	0	0.00E+00
R13	1873.07	406.93	0	406.93	0.21	2.88E+04
R14	2280	0	0	0	0	0.00E+00
R15	2205.2	74.8	0	74.8	0	3.62E-01
R16	2200.13	79.33	0.53	79.86	0	0.00E+00
R17	1679.2	600.8	0	600.8	0.14	1.88E+04
R18	752.47	1527.53	0	1527.53	0.67	9.16E+04
R19	1795.47	484.4	0.13	484.53	0.88	1.21E+05
R20	2182.93	97.07	0	97.07	0	1.25E+02
R21	2277.67	2.33	0	2.33	0	6.48E+00
R22	2169.8	110.2	0	110.2	0.01	1.87E+03
R24	2280	0	0	0	0	0.00E+00
R25	2280	0	0	0	0	0.00E+00
R26	2179.4	100.6	0	100.6	0	4.69E+02
9A	2280	0	0	0	0	0.00E+00
A	0	2280	0	2280	3.22	4.40E+05
PS	0	2280	0	2280	9.38	1.28E+06

Storm 42

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1599.8	200.13	0.07	200.2	0.16	1.73E+04
R03	1727.67	72.33	0	72.33	0.01	5.99E+02
R04	1800	0	0	0	0	0.00E+00
R05	729.67	1070.33	0	1070.33	0.45	4.81E+04
R06	1800	0	0	0	0	0.00E+00
R07	1662.4	137.6	0	137.6	0.04	4.82E+03
R08	726.6	1073.4	0	1073.4	0.44	4.79E+04
R09	1724.67	75.33	0	75.33	0	1.34E+02
R11	1800	0	0	0	0	0.00E+00
R12	1800	0	0	0	0	0.00E+00
R13	1665.47	134.47	0.07	134.54	0.09	9.41E+03
R14	1800	0	0	0	0	0.00E+00
R15	1800	0	0	0	0	0.00E+00
R16	1800	0	0	0	0	0.00E+00
R17	1644.33	155.67	0	155.67	0.06	7.01E+03
R18	1592.67	207.33	0	207.33	0.22	2.37E+04
R19	1714.27	85.73	0	85.73	0.09	9.22E+03
R20	1794.13	5.87	0	5.87	0	8.83E-01
R21	1800	0	0	0	0	0.00E+00
R22	1779.6	20.4	0	20.4	0	1.70E+02
R24	1800	0	0	0	0	0.00E+00
R25	1800	0	0	0	0	0.00E+00
R26	1791.4	8.6	0	8.6	0	1.91E+01
9A	1800	0	0	0	0	0.00E+00
A	0	1800	0	1800	2.79	3.01E+05
PS	0	1800	0	1800	8.28	8.95E+05

Storm 43

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1157.47	402.47	0.07	402.54	0.92	8.60E+04
R03	1471	89	0	89	1.15	1.07E+05
R04	1481.6	78.4	0	78.4	0.11	1.05E+04
R05	722.33	837.67	0	837.67	1.48	1.38E+05
R06	1489.8	70.2	0	70.2	0.04	3.81E+03
R07	1456.8	103.2	0	103.2	0.34	3.18E+04
R08	722.33	837.67	0	837.67	2.18	2.04E+05
R09	1453.4	106.6	0	106.6	0.9	8.46E+04
R11	1486.67	73.27	0.07	73.34	0.65	6.07E+04
R12	1499.6	60.4	0	60.4	0.09	8.67E+03
R13	1462.4	97.6	0	97.6	0.71	6.65E+04
R14	1478.87	81.07	0.07	81.14	0.32	3.03E+04
R15	1490.87	69.13	0	69.13	0.02	1.94E+03
R16	1421.33	138.67	0	138.67	0.56	5.25E+04
R17	723	837	0	837	0.52	4.90E+04
R18	725.6	834.4	0	834.4	1.53	1.43E+05
R19	1377.53	182.47	0	182.47	2.15	2.02E+05
R20	1494.2	65.8	0	65.8	0.16	1.48E+04
R21	1492.67	67.33	0	67.33	0.12	1.15E+04
R22	1494.07	65.93	0	65.93	0.33	3.06E+04
R24	1497.6	62.4	0	62.4	0.1	9.48E+03
R25	1489.53	70.47	0	70.47	0.12	1.13E+04
R26	1490.8	69.2	0	69.2	0.32	3.02E+04
9A	1484.47	75.53	0	75.53	0.47	4.44E+04
A	0	1560	0	1560	3.29	3.08E+05
PS	0	1560	0	1560	8.53	7.99E+05

Storm 44

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1924.87	535.13	0	535.13	0.88	1.30E+05
R03	2188.47	271.53	0	271.53	1.21	1.78E+05
R04	2210.87	249.13	0	249.13	0.1	1.45E+04
R05	1189	1271	0	1271	1.76	2.60E+05
R06	2260.27	199.67	0.07	199.74	0.05	6.90E+03
R07	2123.73	336.27	0	336.27	0.36	5.38E+04
R08	1163	1297	0	1297	2.37	3.50E+05
R09	2164.87	295.13	0	295.13	0.89	1.31E+05
R11	2209.93	250	0.07	250.07	0.66	9.68E+04
R12	2392.47	67.53	0	67.53	0.06	8.71E+03
R13	2127	333	0	333	0.75	1.11E+05
R14	2231.47	228.53	0	228.53	0.26	3.78E+04
R15	2266.47	193.53	0	193.53	0.02	2.29E+03
R16	2154.47	305.53	0	305.53	0.54	7.91E+04
R17	1078.47	1381.53	0	1381.53	0.61	8.97E+04
R18	1032.93	1427.07	0	1427.07	1.67	2.47E+05
R19	2104.4	355.6	0	355.6	2	2.95E+05
R20	2267.53	192.47	0	192.47	0.12	1.78E+04
R21	2255.67	204.33	0	204.33	0.11	1.58E+04
R22	2218	242	0	242	0.27	4.05E+04
R24	2220.4	239.6	0	239.6	0.08	1.24E+04
R25	2217.4	242.6	0	242.6	0.12	1.73E+04
R26	2211.47	248.53	0	248.53	0.32	4.79E+04
9A	2212.2	247.8	0	247.8	0.43	6.31E+04
A	0	2460	0	2460	3.92	5.78E+05
PS	0	2460	0	2460	9.86	1.46E+06

Storm 45

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1394.87	165.13	0	165.13	0.23	2.15E+04
R03	1483.33	76.6	0.07	76.67	0.27	2.55E+04
R04	1560	0	0	0	0	0.00E+00
R05	725.4	834.53	0.07	834.6	0.56	5.28E+04
R06	1560	0	0	0	0	0.00E+00
R07	1467.6	92.4	0	92.4	0.08	7.37E+03
R08	724.07	835.93	0	835.93	0.61	5.71E+04
R09	1463.93	96.07	0	96.07	0.16	1.48E+04
R11	1509	51	0	51	0.12	1.14E+04
R12	1530.2	29.8	0	29.8	0	7.88E+01
R13	1471	88.93	0.07	89	0.18	1.66E+04
R14	1560	0	0	0	0	0.00E+00
R15	1506.07	53.93	0	53.93	0	1.01E+02
R16	1454.47	105.47	0.07	105.54	0.05	4.74E+03
R17	725.33	834.67	0	834.67	0.17	1.63E+04
R18	730	830	0	830	0.47	4.37E+04
R19	1419.33	140.67	0	140.67	0.53	4.97E+04
R20	1504.13	55.87	0	55.87	0.02	1.55E+03
R21	1529.53	30.47	0	30.47	0.01	1.16E+03
R22	1502.47	57.53	0	57.53	0.05	4.48E+03
R24	1560	0	0	0	0	0.00E+00
R25	1521.53	38.47	0	38.47	0	3.56E+02
R26	1503.93	56.07	0	56.07	0.03	2.95E+03
9A	1513.13	46.87	0	46.87	0.07	6.30E+03
A	0	1560	0	1560	2.72	2.54E+05
PS	0	1560	0	1560	7.84	7.34E+05

Storm 46

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1643.8	576.13	0.07	576.2	0.58	7.75E+04
R03	1972.93	247	0.07	247.07	0.66	8.84E+04
R04	2157.2	62.8	0	62.8	0.01	7.43E+02
R05	727.87	1492.13	0	1492.13	1.2	1.60E+05
R06	2162.07	57.93	0	57.93	0.01	1.67E+03
R07	1917.67	302.33	0	302.33	0.2	2.70E+04
R08	725.4	1494.53	0.07	1494.6	1.46	1.95E+05
R09	1914.53	305.4	0.07	305.47	0.42	5.65E+04
R11	2074	145.87	0.13	146	0.25	3.35E+04
R12	2158	62	0	62	0.02	2.36E+03
R13	1913.67	306.2	0.13	306.33	0.43	5.76E+04
R14	2153.87	66.07	0.07	66.14	0.03	4.41E+03
R15	2073.73	146.27	0	146.27	0.01	6.82E+02
R16	2031.73	188.13	0.13	188.26	0.2	2.71E+04
R17	726.8	1493.2	0	1493.2	0.4	5.29E+04
R18	732.8	1487.2	0	1487.2	1.05	1.40E+05
R19	1951.87	268.07	0.07	268.14	1.29	1.72E+05
R20	2076.87	143.13	0	143.13	0.05	7.09E+03
R21	2130.07	89.93	0	89.93	0.05	6.55E+03
R22	2072.2	147.8	0	147.8	0.13	1.78E+04
R24	2157.27	62.73	0	62.73	0.03	3.90E+03
R25	2106.53	113.47	0	113.47	0.02	2.72E+03
R26	2076.73	143.27	0	143.27	0.09	1.26E+04
9A	2142.47	77.53	0	77.53	0.18	2.42E+04
A	0	2220	0	2220	3.3	4.40E+05
PS	0	2220	0	2220	9.35	1.25E+06

Storm 47

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	845.33	774.67	0	774.67	2.16	2.10E+05
R03	1470.07	149.93	0	149.93	2.98	2.90E+05
R04	1479.13	140.87	0	140.87	0.31	3.02E+04
R05	722.07	897.93	0	897.93	4.03	3.92E+05
R06	1483.8	136.2	0	136.2	0.12	1.20E+04
R07	1456.73	163.27	0	163.27	0.89	8.67E+04
R08	722.13	897.8	0.07	897.87	5.91	5.74E+05
R09	1452.67	167.33	0	167.33	2.44	2.37E+05
R11	1486.2	133.73	0.07	133.8	1.73	1.68E+05
R12	1498.53	121.47	0	121.47	0.26	2.52E+04
R13	1461.73	158.27	0	158.27	1.73	1.68E+05
R14	1477.47	142.47	0.07	142.54	1.09	1.06E+05
R15	1489.53	130.47	0	130.47	0.08	7.98E+03
R16	1420.6	199.33	0.07	199.4	1.62	1.58E+05
R17	722.73	897.27	0	897.27	1.27	1.24E+05
R18	725.13	894.87	0	894.87	3.77	3.67E+05
R19	1372.8	247.2	0	247.2	5.56	5.41E+05
R20	1493.6	126.4	0	126.4	0.44	4.29E+04
R21	1491.73	128.27	0	128.27	0.34	3.27E+04
R22	1493.27	126.73	0	126.73	0.93	9.04E+04
R24	1493.2	126.8	0	126.8	0.27	2.66E+04
R25	1483.13	136.87	0	136.87	0.37	3.55E+04
R26	1490.4	129.6	0	129.6	0.85	8.22E+04
9A	1483.53	136.47	0	136.47	1.29	1.25E+05
A	0	1620	0	1620	4.78	4.65E+05
PS	0	1620	0	1620	10.13	9.85E+05

Storm 48

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1569.13	650.87	0	650.87	0.42	5.65E+04
R03	2033.47	186.47	0.07	186.54	0.38	5.00E+04
R04	2220	0	0	0	0	0.00E+00
R05	736.73	1483.2	0.07	1483.27	0.98	1.30E+05
R06	2220	0	0	0	0	0.00E+00
R07	1942.87	277.13	0	277.13	0.13	1.67E+04
R08	767.2	1452.73	0.07	1452.8	0.97	1.30E+05
R09	2019	201	0	201	0.14	1.88E+04
R11	2102.53	117.4	0.07	117.47	0.02	3.03E+03
R12	2220	0	0	0	0	0.00E+00
R13	1953.53	266.47	0	266.47	0.25	3.29E+04
R14	2220	0	0	0	0	0.00E+00
R15	2098.6	121.4	0	121.4	0	1.06E+02
R16	2032.8	187.13	0.07	187.2	0.1	1.32E+04
R17	731.27	1488.73	0	1488.73	0.28	3.75E+04
R18	740.67	1479.33	0	1479.33	0.77	1.02E+05
R19	1845.73	374.2	0.07	374.27	1	1.33E+05
R20	2099.47	120.53	0	120.53	0.01	1.92E+03
R21	2124.87	95.13	0	95.13	0.02	2.41E+03
R22	2097.47	122.53	0	122.53	0.05	6.93E+03
R24	2220	0	0	0	0	0.00E+00
R25	2161	59	0	59	0	1.14E+02
R26	2099.87	120.13	0	120.13	0.03	4.07E+03
9A	2162.27	57.73	0	57.73	0	1.13E+02
A	0	2220	0	2220	3.35	4.47E+05
PS	0	2220	0	2220	9.48	1.26E+06

Storm 49

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1685.13	234.8	0.07	234.87	0.15	1.74E+04
R03	1812.27	107.73	0	107.73	0.08	9.13E+03
R04	1920	0	0	0	0	0.00E+00
R05	757.27	1162.73	0	1162.73	0.43	4.90E+04
R06	1920	0	0	0	0	0.00E+00
R07	1779.4	140.6	0	140.6	0.04	4.51E+03
R08	746.2	1173.8	0	1173.8	0.4	4.56E+04
R09	1787.87	132.13	0	132.13	0.02	2.82E+03
R11	1898.27	21.73	0	21.73	0	1.54E+01
R12	1920	0	0	0	0	0.00E+00
R13	1741.4	178.6	0	178.6	0.07	8.11E+03
R14	1920	0	0	0	0	0.00E+00
R15	1891.07	28.93	0	28.93	0	3.70E+00
R16	1898.87	21.13	0	21.13	0	0.00E+00
R17	739.93	1180.07	0	1180.07	0.12	1.34E+04
R18	752.47	1167.53	0	1167.53	0.34	3.90E+04
R19	1843.2	76.8	0	76.8	0.08	8.64E+03
R20	1890.47	29.53	0	29.53	0	1.15E+02
R21	1920	0	0	0	0	0.00E+00
R22	1885.6	34.4	0	34.4	0.01	8.45E+02
R24	1920	0	0	0	0	0.00E+00
R25	1920	0	0	0	0	0.00E+00
R26	1890.33	29.67	0	29.67	0	3.52E+02
9A	1920	0	0	0	0	0.00E+00
A	0	1920	0	1920	2.71	3.12E+05
PS	0	1920	0	1920	8.09	9.32E+05

Storm 50

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1172.47	747.53	0	747.53	2	2.31E+05
R03	1536	384	0	384	3.11	3.59E+05
R04	1583.4	336.6	0	336.6	0.26	2.99E+04
R05	733.8	1186.13	0.07	1186.2	4.42	5.10E+05
R06	1686.47	233.47	0.07	233.54	0.12	1.39E+04
R07	1518.73	401.27	0	401.27	0.94	1.08E+05
R08	728.8	1191.2	0	1191.2	6.15	7.08E+05
R09	1521.4	398.53	0.07	398.6	2.46	2.83E+05
R11	1589.33	330.6	0.07	330.67	1.7	1.96E+05
R12	1733.73	186.27	0	186.27	0.21	2.38E+04
R13	1525.47	394.53	0	394.53	1.84	2.12E+05
R14	1592.67	327.33	0	327.33	0.94	1.08E+05
R15	1644.6	275.4	0	275.4	0.07	7.56E+03
R16	1495.67	424.27	0.07	424.34	1.55	1.79E+05
R17	729.6	1190.4	0	1190.4	1.43	1.65E+05
R18	738	1182	0	1182	4.01	4.62E+05
R19	1463.2	456.8	0	456.8	4.42	5.10E+05
R20	1652.27	267.73	0	267.73	0.39	4.44E+04
R21	1638.53	281.47	0	281.47	0.31	3.53E+04
R22	1607.6	312.4	0	312.4	0.84	9.72E+04
R24	1610.6	309.4	0	309.4	0.24	2.78E+04
R25	1600.13	319.87	0	319.87	0.33	3.83E+04
R26	1582.93	337.07	0	337.07	0.85	9.83E+04
9A	1591.33	328.67	0	328.67	1.26	1.45E+05
A	0	1920	0	1920	5.33	6.14E+05
PS	0	1920	0	1920	11.81	1.36E+06

Storm 51

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1452.93	227.07	0	227.07	0.19	1.87E+04
R03	1616.87	63.07	0.07	63.14	0.01	1.31E+03
R04	1680	0	0	0	0	0.00E+00
R05	731.13	948.87	0	948.87	0.48	4.87E+04
R06	1680	0	0	0	0	0.00E+00
R07	1528	152	0	152	0.05	4.88E+03
R08	727.53	952.47	0	952.47	0.47	4.76E+04
R09	1611.67	68.33	0	68.33	0	2.96E+02
R11	1680	0	0	0	0	0.00E+00
R12	1680	0	0	0	0	0.00E+00
R13	1512.6	167.33	0.07	167.4	0.08	7.88E+03
R14	1680	0	0	0	0	0.00E+00
R15	1680	0	0	0	0	0.00E+00
R16	1669.27	10.73	0	10.73	0	0.00E+00
R17	1486.6	193.4	0	193.4	0.07	7.34E+03
R18	1466.47	213.53	0	213.53	0.25	2.51E+04
R19	1596.07	83.93	0	83.93	0.11	1.15E+04
R20	1680	0	0	0	0	0.00E+00
R21	1680	0	0	0	0	0.00E+00
R22	1621.27	58.73	0	58.73	0	4.03E+02
R24	1680	0	0	0	0	0.00E+00
R25	1680	0	0	0	0	0.00E+00
R26	1680	0	0	0	0	0.00E+00
9A	1680	0	0	0	0	0.00E+00
A	0	1680	0	1680	2.85	2.87E+05
PS	0	1680	0	1680	8.49	8.56E+05

Storm 52

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1082.07	477.87	0.07	477.94	1.12	1.05E+05
R03	1470.13	89.87	0	89.87	1.39	1.30E+05
R04	1479.2	80.8	0	80.8	0.14	1.34E+04
R05	722.13	837.87	0	837.87	1.76	1.65E+05
R06	1485	75	0	75	0.05	4.70E+03
R07	1456.47	103.53	0	103.53	0.41	3.86E+04
R08	722.2	837.8	0	837.8	2.67	2.50E+05
R09	1452.73	107.27	0	107.27	1.11	1.04E+05
R11	1486.2	73.73	0.07	73.8	0.79	7.41E+04
R12	1498.6	61.4	0	61.4	0.12	1.13E+04
R13	1461.67	98.33	0	98.33	0.84	7.90E+04
R14	1477.6	82.33	0.07	82.4	0.42	3.96E+04
R15	1489.53	70.47	0	70.47	0.03	2.82E+03
R16	1420.73	139.27	0	139.27	0.71	6.68E+04
R17	722.8	837.2	0	837.2	0.61	5.73E+04
R18	725.27	834.73	0	834.73	1.83	1.71E+05
R19	1374.33	185.67	0	185.67	1.05	9.81E+04
R20	1493.6	66.4	0	66.4	0.2	1.88E+04
R21	1491.73	68.27	0	68.27	0.15	1.43E+04
R22	1493.27	66.73	0	66.73	0.41	3.88E+04
R24	1493.33	66.67	0	66.67	0.12	1.16E+04
R25	1483.2	76.8	0	76.8	0.16	1.54E+04
R26	1490.33	69.67	0	69.67	0.39	3.67E+04
9A	1483.53	76.47	0	76.47	0.58	5.45E+04
A	0	1560	0	1560	3.47	3.25E+05
PS	0	1560	0	1560	8.7	8.14E+05

Storm 53

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1432.93	247.07	0	247.07	0.35	3.53E+04
R03	1561.87	118	0.13	118.13	0.15	1.56E+04
R04	1680	0	0	0	0	0.00E+00
R05	1487.27	192.67	0.07	192.74	0.65	6.56E+04
R06	1593.13	86.87	0	86.87	0.01	1.35E+03
R07	1498.27	181.73	0	181.73	0.12	1.23E+04
R08	1500.2	179.8	0	179.8	0.74	7.44E+04
R09	1546.6	133.33	0.07	133.4	0.08	7.92E+03
R11	1591.6	88.4	0	88.4	0.03	3.27E+03
R12	1650.2	29.8	0	29.8	0	7.88E+01
R13	1544.4	135.47	0.13	135.6	0.15	1.48E+04
R14	1680	0	0	0	0	0.00E+00
R15	1574.6	105.4	0	105.4	0	1.10E+02
R16	1566.67	113.27	0.07	113.34	0.01	8.18E+02
R17	1479.93	200.07	0	200.07	0.17	1.74E+04
R18	1437	243	0	243	0.53	5.34E+04
R19	1524.53	155.4	0.07	155.47	0.51	5.15E+04
R20	1571.87	108.13	0	108.13	0.02	1.79E+03
R21	1637.6	42.4	0	42.4	0.01	1.22E+03
R22	1568.33	111.67	0	111.67	0.06	6.07E+03
R24	1680	0	0	0	0	0.00E+00
R25	1588.93	91.07	0	91.07	0.01	1.03E+03
R26	1570.73	109.27	0	109.27	0.04	3.64E+03
9A	1643.2	36.8	0	36.8	0.01	7.04E+02
A	0	1680	0	1680	3.54	3.56E+05
PS	0	1680	0	1680	9.88	9.96E+05

Storm 54

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1232.47	747.53	0	747.53	1.82	2.17E+05
R03	1882.2	97.8	0	97.8	1.84	2.18E+05
R04	1891.93	88.07	0	88.07	0.28	3.36E+04
R05	733.8	1246.13	0.07	1246.2	3.81	4.53E+05
R06	1884	95.93	0.07	96	0.12	1.45E+04
R07	1813.87	166.13	0	166.13	0.83	9.82E+04
R08	728.8	1251.2	0	1251.2	3.53	4.19E+05
R09	1867.8	112.2	0	112.2	2.04	2.43E+05
R11	1903.53	76.47	0	76.47	1.56	1.85E+05
R12	1907.93	72.07	0	72.07	0.34	4.02E+04
R13	1835.27	144.67	0.07	144.74	1.54	1.83E+05
R14	1892.2	87.8	0	87.8	1.07	1.27E+05
R15	1869	111	0	111	0.12	1.42E+04
R16	1837.6	142.33	0.07	142.4	1.71	2.03E+05
R17	729.6	1250.4	0	1250.4	0.98	1.17E+05
R18	738	1242	0	1242	3.53	4.20E+05
R19	1716.8	263.2	0	263.2	0.83	9.88E+04
R20	1900.47	79.53	0	79.53	0.5	5.88E+04
R21	1908.87	71.13	0	71.13	0.31	3.64E+04
R22	1900.93	79.07	0	79.07	0.97	1.16E+05
R24	1910.6	69.4	0	69.4	0.25	2.96E+04
R25	1900.2	79.8	0	79.8	0.34	4.01E+04
R26	1907.27	72.73	0	72.73	0.77	9.12E+04
9A	1898.4	81.6	0	81.6	0.99	1.17E+05
A	0	1980	0	1980	4.71	5.60E+05
PS	0	1980	0	1980	9.29	1.10E+06

Storm 55

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1487.2	192.8	0	192.8	0.05	4.60E+03
R03	1680	0	0	0	0	0.00E+00
R04	1680	0	0	0	0	0.00E+00
R05	736.73	943.2	0.07	943.27	0.23	2.30E+04
R06	1680	0	0	0	0	0.00E+00
R07	1680	0	0	0	0	0.00E+00
R08	1504.8	175.2	0	175.2	0.03	3.41E+03
R09	1680	0	0	0	0	0.00E+00
R11	1680	0	0	0	0	0.00E+00
R12	1680	0	0	0	0	0.00E+00
R13	1680	0	0	0	0	0.00E+00
R14	1680	0	0	0	0	0.00E+00
R15	1680	0	0	0	0	0.00E+00
R16	1680	0	0	0	0	0.00E+00
R17	1490.53	189.47	0	189.47	0.01	1.23E+03
R18	1471.67	208.33	0	208.33	0.07	6.66E+03
R19	1680	0	0	0	0	0.00E+00
R20	1680	0	0	0	0	0.00E+00
R21	1680	0	0	0	0	0.00E+00
R22	1680	0	0	0	0	0.00E+00
R24	1680	0	0	0	0	0.00E+00
R25	1680	0	0	0	0	0.00E+00
R26	1680	0	0	0	0	0.00E+00
9A	1680	0	0	0	0	0.00E+00
A	0	1680	0	1680	2.55	2.58E+05
PS	0	1680	0	1680	7.58	7.64E+05

Storm 56

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1335.93	344	0.07	344.07	0.7	7.02E+04
R03	1548.47	131.53	0	131.53	0.81	8.12E+04
R04	1602	78	0	78	0.07	7.26E+03
R05	722.73	957.2	0.07	957.27	1.21	1.22E+05
R06	1616.73	63.2	0.07	63.27	0.03	2.78E+03
R07	1525.4	154.6	0	154.6	0.25	2.53E+04
R08	722.6	957.4	0	957.4	1.64	1.66E+05
R09	1522.2	157.8	0	157.8	0.64	6.44E+04
R11	1600.87	79.13	0	79.13	0.44	4.44E+04
R12	1621.4	58.6	0	58.6	0.05	5.38E+03
R13	1495	184.93	0.07	185	0.52	5.23E+04
R14	1599.47	80.53	0	80.53	0.19	1.94E+04
R15	1611.13	68.87	0	68.87	0.01	1.22E+03
R16	1528.6	151.33	0.07	151.4	0.36	3.64E+04
R17	723.4	956.6	0	956.6	0.42	4.24E+04
R18	726.27	953.73	0	953.73	1.17	1.18E+05
R19	1460.93	219	0.07	219.07	1.31	1.32E+05
R20	1614.33	65.67	0	65.67	0.1	1.02E+04
R21	1613.27	66.73	0	66.73	0.08	7.95E+03
R22	1614.13	65.87	0	65.87	0.21	2.16E+04
R24	1620.6	59.4	0	59.4	0.07	6.69E+03
R25	1612.13	67.87	0	67.87	0.08	7.83E+03
R26	1592.8	87.2	0	87.2	0.22	2.23E+04
9A	1602.8	77.2	0	77.2	0.33	3.34E+04
A	0	1680	0	1680	3.14	3.17E+05
PS	0	1680	0	1680	8.54	8.61E+05

Storm 57

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1425.4	254.53	0.07	254.6	0.43	4.37E+04
R03	1538.8	141.2	0	141.2	0.48	4.88E+04
R04	1638.33	41.67	0	41.67	0	1.42E+02
R05	724.2	955.73	0.07	955.8	0.91	9.15E+04
R06	1680	0	0	0	0	0.00E+00
R07	1511.07	168.93	0	168.93	0.16	1.60E+04
R08	723.4	956.53	0.07	956.6	1.08	1.09E+05
R09	1512.93	167.07	0	167.07	0.33	3.36E+04
R11	1557.13	122.87	0	122.87	0.23	2.34E+04
R12	1635	45	0	45	0.01	1.01E+03
R13	1495.4	184.6	0	184.6	0.33	3.32E+04
R14	1644.6	35.33	0.07	35.4	0	0.00E+00
R15	1610.67	69.33	0	69.33	0	3.24E+02
R16	1512.67	167.27	0.07	167.34	0.16	1.57E+04
R17	724.53	955.47	0	955.47	0.3	3.02E+04
R18	728.47	951.53	0	951.53	0.78	7.91E+04
R19	1464.6	215.4	0	215.4	1.16	1.17E+05
R20	1614.6	65.4	0	65.4	0.04	3.60E+03
R21	1624.07	55.93	0	55.93	0.03	2.88E+03
R22	1610	70	0	70	0.09	8.86E+03
R24	1643.6	36.4	0	36.4	0	1.57E+01
R25	1631.33	48.67	0	48.67	0.01	1.34E+03
R26	1616.33	63.67	0	63.67	0.06	6.37E+03
9A	1568.67	111.33	0	111.33	0.15	1.54E+04
A	0	1680	0	1680	3.01	3.04E+05
PS	0	1680	0	1680	8.46	8.53E+05

Storm 58

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1512.93	107.07	0	107.07	0.02	1.95E+03
R03	1620	0	0	0	0	0.00E+00
R04	1620	0	0	0	0	0.00E+00
R05	790.53	829.47	0	829.47	0.17	1.69E+04
R06	1620	0	0	0	0	0.00E+00
R07	1620	0	0	0	0	0.00E+00
R08	1543.47	76.47	0.07	76.54	0.03	2.94E+03
R09	1620	0	0	0	0	0.00E+00
R11	1620	0	0	0	0	0.00E+00
R12	1620	0	0	0	0	0.00E+00
R13	1620	0	0	0	0	0.00E+00
R14	1620	0	0	0	0	0.00E+00
R15	1620	0	0	0	0	0.00E+00
R16	1620	0	0	0	0	0.00E+00
R17	1530.27	89.73	0	89.73	0.01	8.96E+02
R18	1502.33	117.67	0	117.67	0.04	4.21E+03
R19	1620	0	0	0	0	0.00E+00
R20	1620	0	0	0	0	0.00E+00
R21	1620	0	0	0	0	0.00E+00
R22	1620	0	0	0	0	0.00E+00
R24	1620	0	0	0	0	0.00E+00
R25	1620	0	0	0	0	0.00E+00
R26	1620	0	0	0	0	0.00E+00
9A	1620	0	0	0	0	0.00E+00
A	0	1620	0	1620	2.5	2.43E+05
PS	0	1620	0	1620	7.3	7.10E+05

Storm 59

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1217.73	582.27	0	582.27	1.23	1.33E+05
R03	1547.6	252.33	0.07	252.4	1.49	1.61E+05
R04	1602.93	197.07	0	197.07	0.13	1.36E+04
R05	722.4	1077.53	0.07	1077.6	2.12	2.29E+05
R06	1616.6	183.33	0.07	183.4	0.06	6.32E+03
R07	1524.8	275.2	0	275.2	0.46	4.92E+04
R08	722.4	1077.6	0	1077.6	2.91	3.14E+05
R09	1521.73	278.27	0	278.27	1.15	1.25E+05
R11	1601.87	198.13	0	198.13	0.81	8.74E+04
R12	1680.2	119.8	0	119.8	0.08	8.61E+03
R13	1494.53	305.47	0	305.47	0.94	1.02E+05
R14	1598.8	201.2	0	201.2	0.29	3.11E+04
R15	1612.2	187.8	0	187.8	0.02	2.07E+03
R16	1527.93	272.07	0	272.07	0.68	7.33E+04
R17	723.07	1076.93	0	1076.93	0.75	8.05E+04
R18	725.8	1074.2	0	1074.2	2.03	2.19E+05
R19	1461.8	338.2	0	338.2	2.38	2.57E+05
R20	1615.6	184.4	0	184.4	0.16	1.76E+04
R21	1613.67	186.33	0	186.33	0.14	1.52E+04
R22	1615.07	184.93	0	184.93	0.36	3.89E+04
R24	1618.27	181.73	0	181.73	0.11	1.14E+04
R25	1617.13	182.87	0	182.87	0.14	1.54E+04
R26	1593.93	206.07	0	206.07	0.4	4.28E+04
9A	1603.6	196.4	0	196.4	0.59	6.34E+04
A	0	1800	0	1800	3.82	4.12E+05
PS	0	1800	0	1800	9.77	1.05E+06

Storm 60

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1534.8	205.2	0	205.2	0.02	2.02E+03
R03	1740	0	0	0	0	0.00E+00
R04	1740	0	0	0	0	0.00E+00
R05	1624.67	115.33	0	115.33	0.01	1.23E+03
R06	1740	0	0	0	0	0.00E+00
R07	1740	0	0	0	0	0.00E+00
R08	1616.8	123.2	0	123.2	0.02	1.78E+03
R09	1740	0	0	0	0	0.00E+00
R11	1740	0	0	0	0	0.00E+00
R12	1740	0	0	0	0	0.00E+00
R13	1740	0	0	0	0	0.00E+00
R14	1740	0	0	0	0	0.00E+00
R15	1740	0	0	0	0	0.00E+00
R16	1740	0	0	0	0	0.00E+00
R17	1501.87	238.13	0	238.13	0.01	7.82E+02
R18	1486.33	253.67	0	253.67	0.05	5.12E+03
R19	1740	0	0	0	0	0.00E+00
R20	1740	0	0	0	0	0.00E+00
R21	1740	0	0	0	0	0.00E+00
R22	1740	0	0	0	0	0.00E+00
R24	1740	0	0	0	0	0.00E+00
R25	1740	0	0	0	0	0.00E+00
R26	1740	0	0	0	0	0.00E+00
9A	1740	0	0	0	0	0.00E+00
A	0	1740	0	1740	2.73	2.85E+05
PS	0	1740	0	1740	7.48	7.81E+05

Storm 61

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1172.47	747.53	0	747.53	1.54	1.77E+05
R03	1604.13	315.8	0.07	315.87	1.78	2.05E+05
R04	1765.67	154.33	0	154.33	0.17	1.98E+04
R05	733.8	1186.13	0.07	1186.2	2.68	3.09E+05
R06	1825.87	94.13	0	94.13	0.07	7.99E+03
R07	1582.13	337.87	0	337.87	0.57	6.57E+04
R08	728.8	1191.2	0	1191.2	3.61	4.16E+05
R09	1575.2	344.73	0.07	344.8	1.42	1.63E+05
R11	1672.8	247.13	0.07	247.2	0.98	1.13E+05
R12	1854.13	65.87	0	65.87	0.15	1.75E+04
R13	1576.27	343.73	0	343.73	1.1	1.27E+05
R14	1814.13	105.87	0	105.87	0.63	7.24E+04
R15	1565.47	354.53	0	354.53	0.06	6.54E+03
R16	1647.4	272.6	0	272.6	0.93	1.08E+05
R17	729.6	1190.4	0	1190.4	0.84	9.70E+04
R18	738	1182	0	1182	2.51	2.89E+05
R19	1484.2	435.73	0.07	435.8	1.35	1.55E+05
R20	1845.53	74.47	0	74.47	0.25	2.86E+04
R21	1842.33	77.67	0	77.67	0.19	2.15E+04
R22	1840.87	79.13	0	79.13	0.51	5.91E+04
R24	1847.87	72.13	0	72.13	0.15	1.72E+04
R25	1738	182	0	182	0.21	2.38E+04
R26	1660.87	259.13	0	259.13	0.5	5.76E+04
9A	1733.87	186.13	0	186.13	0.72	8.26E+04
A	0	1920	0	1920	4.27	4.91E+05
PS	0	1920	0	1920	9.91	1.14E+06

Storm 62

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1093.4	766.6	0	766.6	1.79	2.00E+05
R03	1540.47	319.47	0.07	319.54	2.39	2.67E+05
R04	1606.93	253.07	0	253.07	0.14	1.62E+04
R05	726.2	1133.8	0	1133.8	3.49	3.90E+05
R06	1626.87	233.13	0	233.13	0.09	1.03E+04
R07	1506.8	353.2	0	353.2	0.72	8.02E+04
R08	724.47	1135.47	0.07	1135.54	4.72	5.27E+05
R09	1512.6	347.33	0.07	347.4	1.84	2.06E+05
R11	1575.67	284.33	0	284.33	1.31	1.46E+05
R12	1672.87	187.13	0	187.13	0.12	1.34E+04
R13	1497.8	362.13	0.07	362.2	1.44	1.60E+05
R14	1609.33	250.6	0.07	250.67	0.57	6.38E+04
R15	1583.2	276.8	0	276.8	0.04	4.49E+03
R16	1517.87	342.13	0	342.13	1.09	1.22E+05
R17	725.73	1134.27	0	1134.27	1.17	1.30E+05
R18	730.87	1129.13	0	1129.13	3.12	3.48E+05
R19	1469.8	390.13	0.07	390.2	4.04	4.51E+05
R20	1581.73	278.27	0	278.27	0.27	2.98E+04
R21	1598.13	261.87	0	261.87	0.24	2.66E+04
R22	1566.07	293.93	0	293.93	0.61	6.79E+04
R24	1618.73	241.27	0	241.27	0.18	2.05E+04
R25	1584.6	275.4	0	275.4	0.2	2.25E+04
R26	1574.53	285.47	0	285.47	0.59	6.55E+04
9A	1583	277	0	277	0.93	1.04E+05
A	0	1860	0	1860	4.73	5.28E+05
PS	0	1860	0	1860	11.27	1.26E+06

Storm 63

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1123.8	1456.2	0	1456.2	2.32	3.59E+05
R03	1615.73	964.27	0	964.27	2.77	4.28E+05
R04	1852.33	727.67	0	727.67	0.2	3.14E+04
R05	722.13	1857.8	0.07	1857.87	4.1	6.35E+05
R06	2274.13	305.87	0	305.87	0.07	1.11E+04
R07	1571.27	1008.73	0	1008.73	0.85	1.32E+05
R08	722.27	1857.73	0	1857.73	5.51	8.52E+05
R09	1560.13	1019.8	0.07	1019.87	1.96	3.03E+05
R11	1737.67	842.27	0.07	842.34	1.31	2.03E+05
R12	2396.07	183.93	0	183.93	0.11	1.66E+04
R13	1564.33	1015.53	0.13	1015.66	1.74	2.69E+05
R14	1935.2	644.67	0.13	644.8	0.5	7.74E+04
R15	1975.4	604.6	0	604.6	0.03	4.73E+03
R16	1679.47	900.47	0.07	900.54	1.15	1.78E+05
R17	722.87	1857.13	0	1857.13	1.42	2.19E+05
R18	725.33	1854.67	0	1854.67	3.73	5.77E+05
R19	1419.93	1160.07	0	1160.07	6.44	9.96E+05
R20	1970.2	609.8	0	609.8	0.23	3.57E+04
R21	1979.93	600.07	0	600.07	0.22	3.33E+04
R22	1916.4	663.6	0	663.6	0.55	8.58E+04
R24	1919.2	660.8	0	660.8	0.17	2.66E+04
R25	1800.33	779.67	0	779.67	0.25	3.89E+04
R26	1738.8	841.2	0	841.2	0.71	1.10E+05
9A	1800.53	779.47	0	779.47	0.9	1.39E+05
A	0	2580	0	2580	5.48	8.48E+05
PS	0	2580	0	2580	13.08	2.02E+06

Storm 64

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1411.93	148	0.07	148.07	0.14	1.33E+04
R03	1491.07	68.87	0.07	68.94	0.12	1.13E+04
R04	1560	0	0	0	0	0.00E+00
R05	727.2	832.73	0.07	832.8	0.4	3.75E+04
R06	1560	0	0	0	0	0.00E+00
R07	1471.33	88.67	0	88.67	0.04	3.68E+03
R08	725.07	834.93	0	834.93	0.4	3.75E+04
R09	1474.87	85.07	0.07	85.14	0.04	3.39E+03
R11	1533.2	26.8	0	26.8	0	4.67E+02
R12	1560	0	0	0	0	0.00E+00
R13	1475.4	84.53	0.07	84.6	0.09	8.30E+03
R14	1560	0	0	0	0	0.00E+00
R15	1529	31	0	31	0	1.60E+01
R16	1514.47	45.47	0.07	45.54	0	0.00E+00
R17	726.4	833.6	0	833.6	0.11	1.04E+04
R18	732.07	827.93	0	827.93	0.32	3.01E+04
R19	1443.67	116.27	0.07	116.34	0.27	2.53E+04
R20	1529.8	30.2	0	30.2	0	3.36E+02
R21	1549.4	10.6	0	10.6	0	6.86E+01
R22	1510	50	0	50	0.02	1.48E+03
R24	1560	0	0	0	0	0.00E+00
R25	1538.93	21.07	0	21.07	0	5.50E+00
R26	1529.93	30.07	0	30.07	0.01	8.16E+02
9A	1560	0	0	0	0	0.00E+00
A	0	1560	0	1560	2.65	2.48E+05
PS	0	1560	0	1560	7.69	7.20E+05

Storm 65

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1400.93	219	0.07	219.07	0.34	3.31E+04
R03	1489.53	130.47	0	130.47	0.38	3.74E+04
R04	1620	0	0	0	0	0.00E+00
R05	726.67	893.33	0	893.33	0.77	7.51E+04
R06	1620	0	0	0	0	0.00E+00
R07	1470.2	149.8	0	149.8	0.12	1.15E+04
R08	724.73	895.27	0	895.27	0.88	8.51E+04
R09	1472.4	147.6	0	147.6	0.14	1.38E+04
R11	1529.2	90.73	0.07	90.8	0.02	1.76E+03
R12	1620	0	0	0	0	0.00E+00
R13	1474.93	145.07	0	145.07	0.25	2.46E+04
R14	1620	0	0	0	0	0.00E+00
R15	1526.13	93.87	0	93.87	0	6.75E+01
R16	1466.8	153.2	0	153.2	0.09	8.54E+03
R17	726.07	893.93	0	893.93	0.24	2.37E+04
R18	731.4	888.6	0	888.6	0.64	6.24E+04
R19	1429.67	190.33	0	190.33	0.91	8.87E+04
R20	1526.13	93.87	0	93.87	0.01	1.25E+03
R21	1543.07	76.93	0	76.93	0.02	1.54E+03
R22	1507.93	112.07	0	112.07	0.05	4.98E+03
R24	1620	0	0	0	0	0.00E+00
R25	1590	30	0	30	0	5.43E+01
R26	1526.47	93.53	0	93.53	0.03	2.76E+03
9A	1594.67	25.33	0	25.33	0	3.31E+01
A	0	1620	0	1620	3.02	2.94E+05
PS	0	1620	0	1620	8.43	8.20E+05

Storm 66

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1561.2	58.8	0	58.8	0	1.68E+01
R03	1620	0	0	0	0	0.00E+00
R04	1620	0	0	0	0	0.00E+00
R05	1549.67	70.27	0.07	70.34	0.01	7.59E+02
R06	1620	0	0	0	0	0.00E+00
R07	1620	0	0	0	0	0.00E+00
R08	1545.47	74.47	0.07	74.54	0.01	1.22E+03
R09	1620	0	0	0	0	0.00E+00
R11	1620	0	0	0	0	0.00E+00
R12	1620	0	0	0	0	0.00E+00
R13	1620	0	0	0	0	0.00E+00
R14	1620	0	0	0	0	0.00E+00
R15	1620	0	0	0	0	0.00E+00
R16	1620	0	0	0	0	0.00E+00
R17	1503.13	116.87	0	116.87	0	4.75E+02
R18	1486.27	133.73	0	133.73	0.03	2.80E+03
R19	1620	0	0	0	0	0.00E+00
R20	1620	0	0	0	0	0.00E+00
R21	1620	0	0	0	0	0.00E+00
R22	1620	0	0	0	0	0.00E+00
R24	1620	0	0	0	0	0.00E+00
R25	1620	0	0	0	0	0.00E+00
R26	1620	0	0	0	0	0.00E+00
9A	1620	0	0	0	0	0.00E+00
A	0	1620	0	1620	2.62	2.54E+05
PS	0	1620	0	1620	7.2	7.00E+05

Storm 67

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1443.27	176.73	0	176.73	0.1	1.01E+04
R03	1592.67	27.33	0	27.33	0	6.31E+01
R04	1620	0	0	0	0	0.00E+00
R05	736.73	883.2	0.07	883.27	0.33	3.24E+04
R06	1620	0	0	0	0	0.00E+00
R07	1545.93	74.07	0	74.07	0.02	1.91E+03
R08	730.8	889.2	0	889.2	0.26	2.51E+04
R09	1589.6	30.4	0	30.4	0	9.71E+00
R11	1620	0	0	0	0	0.00E+00
R12	1620	0	0	0	0	0.00E+00
R13	1571.67	48.27	0.07	48.34	0.01	9.05E+02
R14	1620	0	0	0	0	0.00E+00
R15	1620	0	0	0	0	0.00E+00
R16	1620	0	0	0	0	0.00E+00
R17	1471.27	148.73	0	148.73	0.04	3.86E+03
R18	1451.2	168.8	0	168.8	0.15	1.43E+04
R19	1592.2	27.8	0	27.8	0	4.71E+02
R20	1620	0	0	0	0	0.00E+00
R21	1620	0	0	0	0	0.00E+00
R22	1620	0	0	0	0	0.00E+00
R24	1620	0	0	0	0	0.00E+00
R25	1620	0	0	0	0	0.00E+00
R26	1620	0	0	0	0	0.00E+00
9A	1620	0	0	0	0	0.00E+00
A	0	1620	0	1620	2.66	2.58E+05
PS	0	1620	0	1620	7.95	7.73E+05

Storm 68

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	891.47	1388.53	0	1388.53	2.45	3.35E+05
R03	1549	731	0	731	2.98	4.08E+05
R04	2085.93	194.07	0	194.07	0.02	2.79E+03
R05	736.73	1543.2	0.07	1543.27	4.56	6.23E+05
R06	1845.67	434.33	0	434.33	0.09	1.26E+04
R07	1529.27	750.73	0	750.73	0.9	1.23E+05
R08	730.8	1549.2	0	1549.2	5.79	7.92E+05
R09	1535.4	744.53	0.07	744.6	2.12	2.90E+05
R11	1616.6	663.4	0	663.4	1.44	1.96E+05
R12	1976.07	303.93	0	303.93	0.06	7.72E+03
R13	1532.73	747.2	0.07	747.27	1.83	2.51E+05
R14	2060.4	219.53	0.07	219.6	0.2	2.79E+04
R15	1617.8	662.2	0	662.2	0.03	3.72E+03
R16	1529.27	750.73	0	750.73	1.22	1.67E+05
R17	731.27	1548.73	0	1548.73	1.53	2.10E+05
R18	740.67	1539.33	0	1539.33	3.88	5.31E+05
R19	1486.27	793.67	0.07	793.74	6.84	9.36E+05
R20	1622.07	657.93	0	657.93	0.23	3.17E+04
R21	1643.8	636.2	0	636.2	0.24	3.32E+04
R22	1614.6	665.4	0	665.4	0.6	8.16E+04
R24	1851.87	428.13	0	428.13	0.14	1.98E+04
R25	1693.53	586.47	0	586.47	0.08	1.12E+04
R26	1564.93	715.07	0	715.07	0.68	9.29E+04
9A	1737	543	0	543	0.99	1.35E+05
A	0	2280	0	2280	5.87	8.03E+05
PS	0	2280	0	2280	14.03	1.92E+06

Storm 69

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1584.93	875	0.07	875.07	0.91	1.35E+05
R03	2056.33	403.67	0	403.67	0.93	1.37E+05
R04	2395.93	64.07	0	64.07	0.01	7.68E+02
R05	757.27	1702.73	0	1702.73	1.79	2.64E+05
R06	2402.07	57.93	0	57.93	0.01	1.68E+03
R07	1977.93	482.07	0	482.07	0.32	4.75E+04
R08	746.2	1713.8	0	1713.8	2.12	3.13E+05
R09	2025.47	434.47	0.07	434.54	0.67	9.83E+04
R11	2128.8	331.2	0	331.2	0.49	7.17E+04
R12	2299	161	0	161	0.02	2.78E+03
R13	1985.13	474.8	0.07	474.87	0.61	9.03E+04
R14	2392.6	67.33	0.07	67.4	0.04	5.31E+03
R15	2270.4	189.6	0	189.6	0.01	9.85E+02
R16	2023.67	436.27	0.07	436.34	0.32	4.68E+04
R17	739.93	1720.07	0	1720.07	0.57	8.38E+04
R18	752.47	1707.53	0	1707.53	1.51	2.23E+05
R19	1883.67	576.33	0	576.33	2.25	3.32E+05
R20	2275.27	184.73	0	184.73	0.07	1.11E+04
R21	2300.67	159.33	0	159.33	0.07	1.00E+04
R22	2272.67	187.33	0	187.33	0.18	2.67E+04
R24	2401.07	58.93	0	58.93	0	3.53E+02
R25	2284.53	175.47	0	175.47	0.03	3.92E+03
R26	2277.73	182.27	0	182.27	0.13	1.94E+04
9A	2148.6	311.4	0	311.4	0.31	4.62E+04
A	0	2460	0	2460	3.9	5.75E+05
PS	0	2460	0	2460	10.73	1.58E+06

Storm 70

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1584.93	875	0.07	875.07	0.91	1.35E+05
R03	2056.33	403.67	0	403.67	0.93	1.37E+05
R04	2395.93	64.07	0	64.07	0.01	7.68E+02
R05	757.27	1702.73	0	1702.73	1.79	2.64E+05
R06	2402.07	57.93	0	57.93	0.01	1.68E+03
R07	1977.93	482.07	0	482.07	0.32	4.75E+04
R08	746.2	1713.8	0	1713.8	2.12	3.13E+05
R09	2025.47	434.47	0.07	434.54	0.67	9.83E+04
R11	2128.8	331.2	0	331.2	0.49	7.17E+04
R12	2299	161	0	161	0.02	2.78E+03
R13	1985.13	474.8	0.07	474.87	0.61	9.03E+04
R14	2392.6	67.33	0.07	67.4	0.04	5.31E+03
R15	2270.4	189.6	0	189.6	0.01	9.85E+02
R16	2023.67	436.27	0.07	436.34	0.32	4.68E+04
R17	739.93	1720.07	0	1720.07	0.57	8.38E+04
R18	752.47	1707.53	0	1707.53	1.51	2.23E+05
R19	1883.67	576.33	0	576.33	2.25	3.32E+05
R20	2275.27	184.73	0	184.73	0.07	1.11E+04
R21	2300.67	159.33	0	159.33	0.07	1.00E+04
R22	2272.67	187.33	0	187.33	0.18	2.67E+04
R24	2401.07	58.93	0	58.93	0	3.53E+02
R25	2284.53	175.47	0	175.47	0.03	3.92E+03
R26	2277.73	182.27	0	182.27	0.13	1.94E+04
9A	2148.6	311.4	0	311.4	0.31	4.62E+04
A	0	2460	0	2460	3.9	5.75E+05
PS	0	2460	0	2460	10.73	1.58E+06

Storm 71

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1423.8	136.13	0.07	136.2	0.08	7.08E+03
R03	1544.47	15.53	0	15.53	0	9.38E+01
R04	1560	0	0	0	0	0.00E+00
R05	729.67	830.33	0	830.33	0.28	2.60E+04
R06	1560	0	0	0	0	0.00E+00
R07	1482.07	77.93	0	77.93	0.01	1.03E+03
R08	726.6	833.4	0	833.4	0.24	2.25E+04
R09	1541	19	0	19	0	2.28E+01
R11	1560	0	0	0	0	0.00E+00
R12	1560	0	0	0	0	0.00E+00
R13	1503.6	56.33	0.07	56.4	0.01	7.78E+02
R14	1560	0	0	0	0	0.00E+00
R15	1560	0	0	0	0	0.00E+00
R16	1560	0	0	0	0	0.00E+00
R17	1466.6	93.4	0	93.4	0.03	2.89E+03
R18	1443.4	116.6	0	116.6	0.11	1.02E+04
R19	1554.07	5.93	0	5.93	0	4.81E+00
R20	1556.27	3.73	0	3.73	0	3.55E-01
R21	1560	0	0	0	0	0.00E+00
R22	1548.4	11.6	0	11.6	0	1.02E+02
R24	1560	0	0	0	0	0.00E+00
R25	1560	0	0	0	0	0.00E+00
R26	1553	7	0	7	0	1.52E+01
9A	1560	0	0	0	0	0.00E+00
A	0	1560	0	1560	2.55	2.39E+05
PS	0	1560	0	1560	7.59	7.10E+05

Storm 72

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1740	0	0	0	0	0.00E+00
R03	1740	0	0	0	0	0.00E+00
R04	1740	0	0	0	0	0.00E+00
R05	1740	0	0	0	0	0.00E+00
R06	1740	0	0	0	0	0.00E+00
R07	1740	0	0	0	0	0.00E+00
R08	1740	0	0	0	0	0.00E+00
R09	1740	0	0	0	0	0.00E+00
R11	1740	0	0	0	0	0.00E+00
R12	1740	0	0	0	0	0.00E+00
R13	1740	0	0	0	0	0.00E+00
R14	1740	0	0	0	0	0.00E+00
R15	1740	0	0	0	0	0.00E+00
R16	1740	0	0	0	0	0.00E+00
R17	1678.33	61.67	0	61.67	0	2.39E+00
R18	1608.67	131.33	0	131.33	0	4.02E+02
R19	1740	0	0	0	0	0.00E+00
R20	1740	0	0	0	0	0.00E+00
R21	1740	0	0	0	0	0.00E+00
R22	1740	0	0	0	0	0.00E+00
R24	1740	0	0	0	0	0.00E+00
R25	1740	0	0	0	0	0.00E+00
R26	1740	0	0	0	0	0.00E+00
9A	1740	0	0	0	0	0.00E+00
A	0	1740	0	1740	2.51	2.62E+05
PS	0	1740	0	1740	7.01	7.32E+05

Storm 73

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1876.2	943.8	0	943.8	1.49	2.52E+05
R03	2262.27	557.73	0	557.73	2.23	3.78E+05
R04	2474.53	345.47	0	345.47	0.12	2.09E+04
R05	733.8	2086.13	0.07	2086.2	3.45	5.84E+05
R06	2503.47	316.53	0	316.53	0.07	1.15E+04
R07	2238.07	581.93	0	581.93	0.68	1.15E+05
R08	1308.73	1511.27	0	1511.27	4.47	7.56E+05
R09	2237	582.93	0.07	583	1.71	2.90E+05
R11	2279.93	540.07	0	540.07	1.2	2.03E+05
R12	2582.07	237.93	0	237.93	0.11	1.89E+04
R13	2215.07	604.93	0	604.93	1.34	2.27E+05
R14	2516.87	303.07	0.07	303.14	0.44	7.46E+04
R15	2437.8	382.2	0	382.2	0.04	6.66E+03
R16	2256.4	563.53	0.07	563.6	1.05	1.78E+05
R17	1302.4	1517.6	0	1517.6	1.08	1.83E+05
R18	1285.27	1534.73	0	1534.73	2.96	5.00E+05
R19	2186.33	633.67	0	633.67	3.29	5.57E+05
R20	2441	379	0	379	0.24	4.04E+04
R21	2459.67	360.33	0	360.33	0.2	3.42E+04
R22	2393.47	426.53	0	426.53	0.54	9.18E+04
R24	2404.6	415.4	0	415.4	0.14	2.39E+04
R25	2394.8	425.2	0	425.2	0.18	2.97E+04
R26	2278.07	541.93	0	541.93	0.59	9.90E+04
9A	2329.4	490.6	0	490.6	0.86	1.45E+05
A	0	2820	0	2820	4.79	8.10E+05
PS	0	2820	0	2820	11.47	1.94E+06

Storm 74

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	2220	0	0	0	0	0.00E+00
R03	2220	0	0	0	0	0.00E+00
R04	2220	0	0	0	0	0.00E+00
R05	2137.13	82.87	0	82.87	0	8.13E+01
R06	2220	0	0	0	0	0.00E+00
R07	2220	0	0	0	0	0.00E+00
R08	2116.2	103.8	0	103.8	0	1.90E+02
R09	2220	0	0	0	0	0.00E+00
R11	2220	0	0	0	0	0.00E+00
R12	2220	0	0	0	0	0.00E+00
R13	2220	0	0	0	0	0.00E+00
R14	2220	0	0	0	0	0.00E+00
R15	2220	0	0	0	0	0.00E+00
R16	2220	0	0	0	0	0.00E+00
R17	2045.2	174.8	0	174.8	0	2.56E+02
R18	2013.47	206.53	0	206.53	0.02	2.44E+03
R19	2220	0	0	0	0	0.00E+00
R20	2220	0	0	0	0	0.00E+00
R21	2220	0	0	0	0	0.00E+00
R22	2220	0	0	0	0	0.00E+00
R24	2220	0	0	0	0	0.00E+00
R25	2220	0	0	0	0	0.00E+00
R26	2220	0	0	0	0	0.00E+00
9A	2220	0	0	0	0	0.00E+00
A	0	2220	0	2220	2.6	3.46E+05
PS	0	2220	0	2220	7.18	9.57E+05

Storm 75

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1884.2	995.8	0	995.8	1.11	1.91E+05
R03	2410.2	469.73	0.07	469.8	1.28	2.21E+05
R04	2569.4	310.6	0	310.6	0.07	1.30E+04
R05	1131.67	1748.27	0.07	1748.34	2.06	3.56E+05
R06	2591.13	288.87	0	288.87	0.05	8.62E+03
R07	2336.07	543.93	0	543.93	0.4	6.97E+04
R08	1126.27	1753.67	0.07	1753.74	2.66	4.60E+05
R09	2370.67	509.27	0.07	509.34	0.97	1.67E+05
R11	2514.13	365.8	0.07	365.87	0.69	1.19E+05
R12	2702.4	177.6	0	177.6	0.05	7.87E+03
R13	2319.13	560.8	0.07	560.87	0.8	1.39E+05
R14	2717.67	162.33	0	162.33	0.15	2.62E+04
R15	2581.67	298.33	0	298.33	0.01	2.52E+03
R16	2480.33	399.67	0	399.67	0.55	9.45E+04
R17	849.47	2030.53	0	2030.53	0.7	1.20E+05
R18	819.33	2060.67	0	2060.67	1.85	3.19E+05
R19	2383.53	496.47	0	496.47	2.71	4.68E+05
R20	2578.93	301.07	0	301.07	0.12	2.05E+04
R21	2577.67	302.33	0	302.33	0.11	1.95E+04
R22	2576.07	303.93	0	303.93	0.28	4.85E+04
R24	2580.2	299.8	0	299.8	0.08	1.36E+04
R25	2577	303	0	303	0.12	2.02E+04
R26	2491.53	388.47	0	388.47	0.31	5.41E+04
9A	2569.8	310.2	0	310.2	0.48	8.24E+04
A	0	2880	0	2880	4.09	7.07E+05
PS	0	2880	0	2880	10.52	1.82E+06

Storm 76

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1495.8	244.2	0	244.2	0.09	9.76E+03
R03	1710.27	29.73	0	29.73	0	7.29E+01
R04	1740	0	0	0	0	0.00E+00
R05	790.53	949.47	0	949.47	0.32	3.34E+04
R06	1740	0	0	0	0	0.00E+00
R07	1667.47	72.53	0	72.53	0.01	1.22E+03
R08	832.27	907.67	0.07	907.74	0.24	2.46E+04
R09	1707.6	32.33	0.07	32.4	0	1.19E+01
R11	1740	0	0	0	0	0.00E+00
R12	1740	0	0	0	0	0.00E+00
R13	1691.87	48.07	0.07	48.14	0.01	9.51E+02
R14	1740	0	0	0	0	0.00E+00
R15	1740	0	0	0	0	0.00E+00
R16	1740	0	0	0	0	0.00E+00
R17	1559.73	180.27	0	180.27	0.04	3.71E+03
R18	1499.07	240.93	0	240.93	0.14	1.44E+04
R19	1724.53	15.47	0	15.47	0	7.67E+01
R20	1740	0	0	0	0	0.00E+00
R21	1740	0	0	0	0	0.00E+00
R22	1740	0	0	0	0	0.00E+00
R24	1740	0	0	0	0	0.00E+00
R25	1740	0	0	0	0	0.00E+00
R26	1740	0	0	0	0	0.00E+00
9A	1740	0	0	0	0	0.00E+00
A	0	1740	0	1740	2.68	2.79E+05
PS	0	1740	0	1740	7.96	8.31E+05

Storm 77

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1428.8	191.2	0	191.2	0.15	1.49E+04
R03	1524.47	95.53	0	95.53	0.08	7.44E+03
R04	1620	0	0	0	0	0.00E+00
R05	728.67	891.27	0.07	891.34	0.43	4.17E+04
R06	1620	0	0	0	0	0.00E+00
R07	1488	132	0	132	0.04	4.31E+03
R08	725.93	894.07	0	894.07	0.42	4.10E+04
R09	1583.27	36.67	0.07	36.74	0	2.71E+02
R11	1611.2	8.73	0.07	8.8	0	3.24E+00
R12	1620	0	0	0	0	0.00E+00
R13	1485.93	134	0.07	134.07	0.07	7.24E+03
R14	1620	0	0	0	0	0.00E+00
R15	1603	17	0	17	0	1.43E+00
R16	1620	0	0	0	0	0.00E+00
R17	727.27	892.73	0	892.73	0.11	1.09E+04
R18	733.67	886.33	0	886.33	0.33	3.24E+04
R19	1539.53	80.47	0	80.47	0.05	4.73E+03
R20	1602.33	17.67	0	17.67	0	4.79E+01
R21	1620	0	0	0	0	0.00E+00
R22	1597.27	22.73	0	22.73	0	4.66E+02
R24	1620	0	0	0	0	0.00E+00
R25	1620	0	0	0	0	0.00E+00
R26	1601.73	18.27	0	18.27	0	1.79E+02
9A	1620	0	0	0	0	0.00E+00
A	0	1620	0	1620	2.69	2.62E+05
PS	0	1620	0	1620	8.05	7.82E+05

Storm 78

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1517.07	522.87	0.07	522.94	0.68	8.28E+04
R03	1895.13	144.87	0	144.87	0.72	8.81E+04
R04	1962.27	77.73	0	77.73	0.07	8.51E+03
R05	731.13	1308.87	0	1308.87	1.3	1.60E+05
R06	1972.6	67.33	0.07	67.4	0.03	3.25E+03
R07	1784.07	255.93	0	255.93	0.25	3.09E+04
R08	727.53	1312.47	0	1312.47	1.74	2.13E+05
R09	1872.13	167.87	0	167.87	0.57	7.03E+04
R11	1967	72.93	0.07	73	0.41	5.07E+04
R12	1980.07	59.93	0	59.93	0.05	6.44E+03
R13	1832.87	207.07	0.07	207.14	0.47	5.77E+04
R14	1973.47	66.53	0	66.53	0.12	1.47E+04
R15	1971.6	68.4	0	68.4	0.01	1.43E+03
R16	1901.4	138.6	0	138.6	0.34	4.19E+04
R17	1009.8	1030.2	0	1030.2	0.4	4.88E+04
R18	992.13	1047.87	0	1047.87	1.17	1.43E+05
R19	1786.8	253.2	0	253.2	1	1.22E+05
R20	1974.73	65.27	0	65.27	0.1	1.17E+04
R21	1973.4	66.6	0	66.6	0.07	9.13E+03
R22	1974.47	65.53	0	65.53	0.2	2.46E+04
R24	1977.6	62.4	0	62.4	0.06	7.81E+03
R25	1972.67	67.33	0	67.33	0.07	8.77E+03
R26	1971.13	68.87	0	68.87	0.2	2.50E+04
9A	1965	75	0	75	0.3	3.68E+04
A	0	2040	0	2040	3.38	4.13E+05
PS	0	2040	0	2040	9.45	1.16E+06

Storm 79

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1324.6	1435.33	0.07	1435.4	2.56	4.24E+05
R03	1695.13	1064.87	0	1064.87	3.42	5.66E+05
R04	2237.13	522.87	0	522.87	0.32	5.25E+04
R05	757.27	2002.73	0	2002.73	5.4	8.94E+05
R06	2331	428.93	0.07	429	0.14	2.28E+04
R07	1605.13	1154.87	0	1154.87	1.1	1.81E+05
R08	746.2	2013.8	0	2013.8	7.2	1.19E+06
R09	1608.47	1151.27	0.27	1151.54	2.7	4.47E+05
R11	1859.6	900.4	0	900.4	1.88	3.11E+05
R12	2396.93	363.07	0	363.07	0.19	3.14E+04
R13	1578.6	1181.33	0.07	1181.4	2.09	3.46E+05
R14	2308.67	451.33	0	451.33	1.09	1.81E+05
R15	2326.87	433.13	0	433.13	0.07	1.11E+04
R16	1957.8	802	0.2	802.2	1.59	2.64E+05
R17	739.93	2020.07	0	2020.07	1.73	2.87E+05
R18	752.47	2007.53	0	2007.53	4.67	7.73E+05
R19	1499.53	1260.4	0.07	1260.47	4.85	8.03E+05
R20	2331.6	428.4	0	428.4	0.4	6.55E+04
R21	2330.13	429.87	0	429.87	0.33	5.53E+04
R22	2273.87	486.13	0	486.13	0.88	1.46E+05
R24	2277.93	482.07	0	482.07	0.28	4.58E+04
R25	1987.33	772.67	0	772.67	0.38	6.24E+04
R26	1820.67	939.33	0	939.33	0.95	1.57E+05
9A	2030.93	729.07	0	729.07	1.36	2.25E+05
A	0	2760	0	2760	6.12	1.01E+06
PS	0	2760	0	2760	13.79	2.28E+06

Storm 80

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1617.47	542.53	0	542.53	0.32	4.11E+04
R03	1904.13	255.8	0.07	255.87	0.27	3.53E+04
R04	2160	0	0	0	0	0.00E+00
R05	850	1310	0	1310	0.73	9.51E+04
R06	2160	0	0	0	0	0.00E+00
R07	1860.4	299.6	0	299.6	0.09	1.22E+04
R08	847	1312.93	0.07	1313	0.79	1.03E+05
R09	1844.4	315.53	0.07	315.6	0.11	1.40E+04
R11	2038.8	121.2	0	121.2	0.12	1.59E+04
R12	2160	0	0	0	0	0.00E+00
R13	1832.4	327.6	0	327.6	0.2	2.58E+04
R14	2160	0	0	0	0	0.00E+00
R15	2094.73	65.27	0	65.27	0	9.75E+01
R16	2005.8	154.13	0.07	154.2	0.06	8.36E+03
R17	786.33	1373.67	0	1373.67	0.23	2.98E+04
R18	784.13	1375.87	0	1375.87	0.62	8.03E+04
R19	1753.4	406.6	0	406.6	0.74	9.62E+04
R20	2097.27	62.73	0	62.73	0.01	1.60E+03
R21	2116.13	43.87	0	43.87	0.01	1.32E+03
R22	2094.53	65.47	0	65.47	0.04	4.88E+03
R24	2160	0	0	0	0	0.00E+00
R25	2103.13	56.87	0	56.87	0	2.36E+02
R26	2098.73	61.27	0	61.27	0.02	3.15E+03
9A	2107	53	0	53	0	3.42E+02
A	0	2160	0	2160	3.15	4.08E+05
PS	0	2160	0	2160	8.68	1.12E+06

Storm 81

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1524.93	35.07	0	35.07	0	8.52E+00
R03	1560	0	0	0	0	0.00E+00
R04	1560	0	0	0	0	0.00E+00
R05	1498.4	61.53	0.07	61.6	0.01	6.94E+02
R06	1560	0	0	0	0	0.00E+00
R07	1560	0	0	0	0	0.00E+00
R08	1493.8	66.13	0.07	66.2	0.01	1.15E+03
R09	1560	0	0	0	0	0.00E+00
R11	1560	0	0	0	0	0.00E+00
R12	1560	0	0	0	0	0.00E+00
R13	1560	0	0	0	0	0.00E+00
R14	1560	0	0	0	0	0.00E+00
R15	1560	0	0	0	0	0.00E+00
R16	1560	0	0	0	0	0.00E+00
R17	1484.6	75.4	0	75.4	0	4.23E+02
R18	1466.4	93.6	0	93.6	0.02	2.23E+03
R19	1560	0	0	0	0	0.00E+00
R20	1560	0	0	0	0	0.00E+00
R21	1560	0	0	0	0	0.00E+00
R22	1560	0	0	0	0	0.00E+00
R24	1560	0	0	0	0	0.00E+00
R25	1560	0	0	0	0	0.00E+00
R26	1560	0	0	0	0	0.00E+00
9A	1560	0	0	0	0	0.00E+00
A	0	1560	0	1560	2.58	2.41E+05
PS	0	1560	0	1560	7.12	6.66E+05

Storm 82

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1296	2064	0	2064	2.33	4.69E+05
R03	1953.07	1406.93	0	1406.93	2.57	5.17E+05
R04	2929.67	430.33	0	430.33	0.09	1.79E+04
R05	794.2	2565.8	0	2565.8	4.28	8.63E+05
R06	3068.4	291.6	0	291.6	0.04	7.73E+03
R07	1777.6	1582.4	0	1582.4	0.86	1.74E+05
R08	789.4	2570.6	0	2570.6	5.48	1.11E+06
R09	1919.4	1440.47	0.13	1440.6	1.54	3.10E+05
R11	2218.4	1141.6	0	1141.6	1.21	2.44E+05
R12	2964.47	395.53	0	395.53	0.05	9.96E+03
R13	1837.93	1522.07	0	1522.07	1.64	3.30E+05
R14	3184.07	175.8	0.13	175.93	0.13	2.54E+04
R15	2535.27	824.73	0	824.73	0.02	3.67E+03
R16	2062.33	1297.13	0.53	1297.66	0.93	1.88E+05
R17	782.67	2577.33	0	2577.33	1.41	2.84E+05
R18	783.73	2576.27	0	2576.27	3.7	7.47E+05
R19	1730.53	1629.47	0	1629.47	6.33	1.28E+06
R20	2519.73	840.27	0	840.27	0.18	3.57E+04
R21	2592.4	767.6	0	767.6	0.18	3.70E+04
R22	2447.8	912.2	0	912.2	0.46	9.19E+04
R24	3054.87	305.13	0	305.13	0.08	1.64E+04
R25	2675.8	684.2	0	684.2	0.13	2.54E+04
R26	2397.6	962.4	0	962.4	0.44	8.91E+04
9A	2451.33	908.67	0	908.67	0.56	1.13E+05
A	0	3360	0	3360	6.3	1.27E+06
PS	0	3360	0	3360	15.34	3.09E+06

Storm 83

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1591.27	448.73	0	448.73	0.26	3.16E+04
R03	1931.8	108.2	0	108.2	0.02	2.60E+03
R04	2040	0	0	0	0	0.00E+00
R05	848.2	1191.73	0.07	1191.8	0.6	7.37E+04
R06	2003.4	36.6	0	36.6	0	2.84E+02
R07	1785.6	254.4	0	254.4	0.07	8.84E+03
R08	834	1205.87	0.13	1206	0.63	7.69E+04
R09	1925.6	114.33	0.07	114.4	0	6.11E+02
R11	2040	0	0	0	0	0.00E+00
R12	2040	0	0	0	0	0.00E+00
R13	1746.07	293.93	0	293.93	0.15	1.78E+04
R14	2040	0	0	0	0	0.00E+00
R15	2040	0	0	0	0	0.00E+00
R16	1971.53	68.07	0.4	68.47	0	0.00E+00
R17	1536.4	503.6	0	503.6	0.1	1.22E+04
R18	1490.07	549.93	0	549.93	0.36	4.44E+04
R19	1745.07	294.93	0	294.93	0.52	6.40E+04
R20	2040	0	0	0	0	0.00E+00
R21	2035.2	4.8	0	4.8	0	1.01E+01
R22	1934.6	105.4	0	105.4	0.01	7.58E+02
R24	2040	0	0	0	0	0.00E+00
R25	2040	0	0	0	0	0.00E+00
R26	2040	0	0	0	0	0.00E+00
9A	2040	0	0	0	0	0.00E+00
A	0	2040	0	2040	3.26	3.99E+05
PS	0	2040	0	2040	9.11	1.12E+06

Storm 84

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1694.8	165.2	0	165.2	0.04	4.36E+03
R03	1860	0	0	0	0	0.00E+00
R04	1860	0	0	0	0	0.00E+00
R05	924.6	935.4	0	935.4	0.17	1.85E+04
R06	1860	0	0	0	0	0.00E+00
R07	1860	0	0	0	0	0.00E+00
R08	1688.13	171.87	0	171.87	0.03	3.36E+03
R09	1860	0	0	0	0	0.00E+00
R11	1860	0	0	0	0	0.00E+00
R12	1860	0	0	0	0	0.00E+00
R13	1860	0	0	0	0	0.00E+00
R14	1860	0	0	0	0	0.00E+00
R15	1860	0	0	0	0	0.00E+00
R16	1860	0	0	0	0	0.00E+00
R17	1544.93	315.07	0	315.07	0.01	1.25E+03
R18	1514.73	345.27	0	345.27	0.07	7.64E+03
R19	1860	0	0	0	0	0.00E+00
R20	1860	0	0	0	0	0.00E+00
R21	1860	0	0	0	0	0.00E+00
R22	1860	0	0	0	0	0.00E+00
R24	1860	0	0	0	0	0.00E+00
R25	1860	0	0	0	0	0.00E+00
R26	1860	0	0	0	0	0.00E+00
9A	1860	0	0	0	0	0.00E+00
A	0	1860	0	1860	2.68	2.99E+05
PS	0	1860	0	1860	7.7	8.59E+05

Storm 85

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1347.67	812.33	0	812.33	1.37	1.78E+05
R03	1638.2	521.8	0	521.8	1.56	2.03E+05
R04	2086.73	73.27	0	73.27	0	2.82E+02
R05	790.53	1369.47	0	1369.47	2.63	3.41E+05
R06	2160	0	0	0	0	0.00E+00
R07	1615.4	544.6	0	544.6	0.5	6.54E+04
R08	787.13	1372.8	0.07	1372.87	3.24	4.19E+05
R09	1623	536.93	0.07	537	1.09	1.41E+05
R11	1743.47	416.53	0	416.53	0.7	9.08E+04
R12	1924.47	235.53	0	235.53	0.02	2.24E+03
R13	1612	547.93	0.07	548	1	1.30E+05
R14	2040.53	119.4	0.07	119.47	0.02	2.96E+03
R15	1794.67	365.33	0	365.33	0.01	1.20E+03
R16	1695.4	464.6	0	464.6	0.6	7.74E+04
R17	782.33	1377.67	0	1377.67	0.87	1.13E+05
R18	783.53	1376.47	0	1376.47	2.24	2.90E+05
R19	1596.07	563.87	0.07	563.94	3.87	5.02E+05
R20	1796.47	363.53	0	363.53	0.11	1.40E+04
R21	1820.67	339.33	0	339.33	0.12	1.57E+04
R22	1791.47	368.53	0	368.53	0.28	3.68E+04
R24	2103.53	56.47	0	56.47	0	2.47E+01
R25	1918.93	241.07	0	241.07	0.03	4.03E+03
R26	1798.07	361.93	0	361.93	0.19	2.52E+04
9A	1899.8	260.2	0	260.2	0.5	6.52E+04
A	0	2160	0	2160	4.58	5.94E+05
PS	0	2160	0	2160	12	1.56E+06

Storm 86

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1560	0	0	0	0	0.00E+00
R03	1560	0	0	0	0	0.00E+00
R04	1560	0	0	0	0	0.00E+00
R05	1522	38	0	38	0	3.61E+01
R06	1560	0	0	0	0	0.00E+00
R07	1560	0	0	0	0	0.00E+00
R08	1511.27	48.73	0	48.73	0	8.91E+01
R09	1560	0	0	0	0	0.00E+00
R11	1560	0	0	0	0	0.00E+00
R12	1560	0	0	0	0	0.00E+00
R13	1560	0	0	0	0	0.00E+00
R14	1560	0	0	0	0	0.00E+00
R15	1560	0	0	0	0	0.00E+00
R16	1560	0	0	0	0	0.00E+00
R17	1495.33	64.67	0	64.67	0	1.13E+02
R18	1479	81	0	81	0.01	9.63E+02
R19	1560	0	0	0	0	0.00E+00
R20	1560	0	0	0	0	0.00E+00
R21	1560	0	0	0	0	0.00E+00
R22	1560	0	0	0	0	0.00E+00
R24	1560	0	0	0	0	0.00E+00
R25	1560	0	0	0	0	0.00E+00
R26	1560	0	0	0	0	0.00E+00
9A	1560	0	0	0	0	0.00E+00
A	0	1560	0	1560	2.51	2.35E+05
PS	0	1560	0	1560	6.99	6.55E+05

Storm 87

CONDUIT NUMBER	LENGTH OF DRY FLOW(MIN)	LENGTH OF SUBCRITICAL FLOW(MIN)	LENGTH OF UPSTR. CRITICAL FLOW(MIN)	LENGTH OF WET FLOW(MIN)	MEAN FLOW (CFS)	TOTAL FLOW CUBIC FT
R02	1733.87	66.13	0	66.13	0	1.04E+02
R03	1800	0	0	0	0	0.00E+00
R04	1800	0	0	0	0	0.00E+00
R05	1721.6	78.4	0	78.4	0.01	9.18E+02
R06	1800	0	0	0	0	0.00E+00
R07	1800	0	0	0	0	0.00E+00
R08	1720	80	0	80	0.01	1.38E+03
R09	1800	0	0	0	0	0.00E+00
R11	1800	0	0	0	0	0.00E+00
R12	1800	0	0	0	0	0.00E+00
R13	1800	0	0	0	0	0.00E+00
R14	1800	0	0	0	0	0.00E+00
R15	1800	0	0	0	0	0.00E+00
R16	1800	0	0	0	0	0.00E+00
R17	1554.33	245.67	0	245.67	0.01	5.61E+02
R18	1527.07	272.93	0	272.93	0.04	4.09E+03
R19	1800	0	0	0	0	0.00E+00
R20	1800	0	0	0	0	0.00E+00
R21	1800	0	0	0	0	0.00E+00
R22	1800	0	0	0	0	0.00E+00
R24	1800	0	0	0	0	0.00E+00
R25	1800	0	0	0	0	0.00E+00
R26	1800	0	0	0	0	0.00E+00
9A	1800	0	0	0	0	0.00E+00
A	0	1800	0	1800	2.7	2.92E+05
PS	0	1800	0	1800	7.4	7.99E+05

APPENDIX E

STORET DATA

**** STORET SUMMARY SECTION ****

FOLLOWING IS A RETRIEVAL OF DATA FROM THE ENVIRONMENTAL PROTECTION AGENCY'S STORET SYSTEM, A DATABASE OF SAMPLING SITES AND THEIR ASSOCIATED QUALITY DATA. THE INFORMATION WAS RETRIEVED USING SPECIFIC STORET INSTRUCTION SETS IN COMBINATION TO SELECT ONLY THE DATA REQUESTED FOR THIS RETRIEVAL. BRIEF EXPLANATIONS OF THE INSTRUCTION SETS ARE INCLUDED BELOW. QUESTIONS MAY BE DIRECTED TO THE STORET USER ASSISTANCE SECTION AT (800) 424-9067.

****

FOLLOWING IS THE FORMAT FOR THE STATION HEADER INFORMATION WHICH APPEARS ON EACH PAGE OF THE RETRIEVAL UNLESS STATION AGGREGATION WAS PERFORMED

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*                                                                              *
*                                        STATION NUMBER(S)                     *
*                                        LATITUDE/LONGITUDE PRECISION CODE     *
*                                        STATION LOCATION                      *
*                                        STATE/COUNTY CODE STATE NAME COUNTY NAME *
*                                        MAJOR BASIN NAME MAJ/MIN/SUB BASIN CODE *
*                                        MINOR BASIN NAME                      *
*STATION TYPE                            AGENCY CODE  STORED DATE  HYDROLOGIC UNIT*
*                                        STATION DEPTH     ELEVATION           *
*                                        ECOREGION                             *
*                                        WATER BODY                            *
*                                        AQUIFERS                              *
*                                        LOCKED DATE                           *
*                                                                              *
*RIVER MILE INDEX                                                              *
*                                                                              *
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CONTINUED ON NEXT PAGE(S)

RETRIEVAL PROGRAM

PGM=INVENT
THIS IS AN INVENTORY RETRIEVAL SHOWING SUMMARY STATISTICS FOR ALL PARAMETERS

A BEGINNING DATE OF (YY/MM/DD) 80/01/01 WAS REQUESTED
AN ENDING DATE OF (YY/MM/DD) 99/12/31 WAS REQUESTED
STATION SELECTION WAS BY:

AGENCY CODE(S) AND STATION NUMBER(S) FOR THE FOLLOWING AGENCY(S):
31DELRBC 31DELRBC 31DELRBC 21PA 112WRD 31DELRBC 112WRD
STATIONS SELECTED WERE RESTRICTED TO:

AGENCIES WHOSE DATA HAS NOT BEEN 'RETIRED'
CONTACTS FOR AGENCY CODES RETRIEVED:

AGENCY	PRIMARY CONTACT NAME	ORGANIZATION	PHONE NUMBER(S)
31DELRBC	SANTORO, EDWARD D.	DELAWARE RIVER BASIN COMM	(609)883-9500
21PA	SCHREFFLER, TAMMY	PENNSYLVANIA DPT ENV PROT	(717)787-1511
112WRD	BRIGGS, JOHN	US GEOLOGICAL SURVEY	(703)648-5624

DATA RESTRICTIONS:

NOTE
NO DEPTH INDICATOR RESTRICTIONS WERE SPECIFIED - COMPUTATIONS WILL
BE PERFORMED WITHOUT REGARD TO DEPTH INDICATORS

NOTE
NO GRAB/COMPOSITE RESTRICTIONS WERE UTILIZED, SO BOTH GRAB AND COMPOSITE SAMPLE TYPES MAY HAVE
BEEN INCLUDED - COMPUTATIONS WILL BE PERFORMED WITHOUT REGARD TO SAMPLE TYPE

NOTE
NO COMPOSITE SAMPLE RESTRICTIONS WERE SPECIFIED - COMPUTATIONS WILL INCLUDE STATISTICAL FEATURES OF
THE COMPOSITING PROCESS, PRODUCING VALID RESULTS ONLY WHEN SOPHISTICATED COMPOSITES ARE NOT ENCOUNTERED.
SPECIFY COMPOSITE HANDLING KEYWORDS "ANC" AND/OR "DSROC" IF NEEDED

***** END OF SUMMARY SECTION *****

422094 DELCORA CSO LTCP
39 50 42.0 075 21 38.0 2
CHESTER CREEK AT ROUTE 291,CHESTER,PA
42045 PENNSYLVANIA DELAWARE
NORTH ATLANTIC 020800
DELAWARE RIVER ZONE 4 /TYPA/AMBNT/STREAM
31DELRBC 820130 02040202011 OFF
0000 FEET DEPTH

PARAMETER				MEDIUM
00008	LAB	IDENT.	NUMBER	WATER
00010	WATER	TEMP	CENT	WATER
00011	WATER	TEMP	FAHN	WATER
00018	DT FROM	NATURAL	FAHR	WATER
00021	AIR	TEMP	FAHN	WATER
00025	BAROMTRC	PRESSURE	MM OF HG	WATER
00043	CLOUD	TYPE	WMO CODE	WATER
00061	STREAM	FLOW,	INST-CFS	WATER
00065	STREAM	STAGE	FEET	WATER
00068	MAX SAMP	DEPTH	FEET	WATER
00093	SOLIDS	FLOAT	MG/L	WATER
00094	CNDUCTVY	FIELD	MICROMHO	WATER
00095	CNDUCTVY	AT 25C	MICROMHO	WATER
00098	VSAMPLOC	DEPTH	METERS	WATER
00103	SOLIDS	% ON	5U FILT	WATER
00108	IODINE-I	TOTAL	MG/L	WATER
00113	UNDW INC	SOL RAD	FT-CDS	WATER
00153	OIL AND	GREASE	LB/D/CFS	WATER
00172	DIGESTER	SOLIDS	PERCENT	WATER
00300	DO		MG/L	WATER
00301	DO	SATUR	PERCENT	WATER
00310	BOD	5 DAY	MG/L	WATER
00314	BOD INH	5 DAY TO T	MG/L	WATER
00400	PH		SU	WATER
00403	PH	LAB	SU	WATER
00410	T ALK	CACO3	MG/L	WATER
00515	RESIDUE	DISS-105 C	MG/L	WATER
00530	RESIDUE	TOT NFLT	MG/L	WATER
00600	TOTAL N	N	MG/L	WATER

RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
	39	47952.00	2124E+06	46091.00	123213	2654	81/07/21	92/09/28
	51	13.28800	59.18100	7.692900	28.0	.0	81/08/17	94/06/28
C	1	1.000000			1.0	1.0	87/01/27	87/01/27
TOT	52	13.05200	60.92400	7.805400	28.0	.0	81/08/17	94/06/28
$	52	55.49300	197.3900	14.05000	82.4	32.0	81/08/17	94/06/28
	1	7092E+60			7092E+60	7092E+60	96/03/21	96/03/21
	1	1828E+63			1828E+63	1828E+63	96/03/21	96/03/21
	1	1.600000			2	2	81/09/17	81/09/17
	1	9850E+60			9850E+60	9850E+60	96/03/21	96/03/21
	5	281.4400	133880.0	365.9000	909	33	81/07/21	84/03/22
	10	3.360000	.4991500	.7065100	5.10	2.60	81/07/21	85/09/17
	1	1694E+61			1694E+61	1694E+61	96/03/21	96/03/21
	1	2403E+59			2403E+59	2403E+59	96/03/21	96/03/21
	17	263.2400	22428.00	149.7600	800	160	85/11/13	94/06/28
	118	378.1800	15613.00	124.9500	825	130	81/07/21	97/09/17
	1	6304E+58			6304E+58	6304E+58	96/03/21	96/03/21
	1	1260E+58			1260E+58	1260E+58	96/03/21	96/03/21
	1	7249E+59			7249E+59	7249E+59	96/03/21	96/03/21
	1	3033E+59			3033E+59	3033E+59	96/03/21	96/03/21
	1	9062E+58			9062E+58	9062E+58	96/03/21	96/03/21
	2	9456E+60	.0000000	.0000000	9850E+60	9062E+60	95/11/27	96/03/21
	46	7.863000	10.43000	3.229600	16.8	3.2	83/06/27	94/06/28
$	46	70.24000	384.5000	19.60900	123.0	35.6	83/06/27	94/06/28
	113	3.138900	5.668300	2.380800	15.0	.5	81/07/21	96/09/16
K	2	2.000000	.0000000	.0000000	2.0	2.0	81/09/17	86/12/18
TOT	115	3.119100	5.591200	2.364600	15.0	.5	81/07/21	96/09/16
	23	1.639100	.7152300	.8457200	3.6	.4	87/07/16	96/09/16
K	1	.4000000			.4	.4	87/10/26	87/10/26
TOT	24	1.587500	.7481100	.8649300	3.6	.4	87/07/16	96/09/16
	42	7.283800	.2203400	.4694000	9.00	6.70	84/06/19	94/06/28
	118	7.011000	.6350800	.7969200	8.7	.0	81/07/21	97/09/17
	114	53.45600	165.2600	12.85600	100	0	81/07/21	96/09/16
	117	257.6700	7875.700	88.74500	558	56	81/07/21	97/09/17
K	1	2.000000			2	2	87/10/26	87/10/26
TOT	118	255.5000	8362.300	91.44500	558	2	81/07/21	97/09/17
	111	27.99100	5774.200	75.98800	772	2	81/07/21	97/09/17
K	7	2.000000	.0000000	.0000000	2	2	85/10/17	93/03/31
TOT	118	26.44900	5466.700	73.93700	772	2	81/07/21	97/09/17
	3	8.396700	4.353300	2.086500	10.80	7.05	97/07/08	97/09/17

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DELAWARE RIVER ZONE 4 /TYPA/AMBNT/STREAM
31DELRBC 820130 02040202011 OFF
0000 FEET DEPTH

	PARAMETER			MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
00605	ORG N	N	MG/L	WATER		44	.6675000	.1485000	.3853500	1.730	.060	87/07/16	96/09/16
					K	1	.3900000			.390	.390	87/11/23	87/11/23
					TOT	45	.6613300	.1468300	.3831900	1.730	.060	87/07/16	96/09/16
00610	NH3+NH4- N	TOTAL	MG/L	WATER		117	.6758900	.6511900	.8069600	4.510	.020	81/07/21	97/09/17
00612	UN-IONZD	NH3-N	MG/L	WATER	$	52	.0027995	.0000155	.0039471	.023	.0001	81/08/17	94/06/28
00615	NO2-N	TOTAL	MG/L	WATER		116	.0872670	.0147910	.1216200	1.008	.004	81/07/21	97/09/17
					K	1	.0880000			.088	.088	83/07/13	83/07/13
					TOT	117	.0872730	.0146630	.1210900	1.008	.004	81/07/21	97/09/17
00619	UN-IONZD	NH3-NH3	MG/L	WATER	$	52	.0034039	.0000230	.0047993	.028	.0002	81/08/17	94/06/28
00620	NO3-N	TOTAL	MG/L	WATER		117	3.680400	1.832600	1.353700	10.520	1.060	81/07/21	97/09/17
00625	TOT KJEL	N	MG/L	WATER		111	1.432000	2.092500	1.446500	12.000	.000	81/07/21	97/08/19
					K	3	1.000000	.0000000	.0000000	1.000	1.000	87/11/23	97/09/17
					TOT	114	1.420700	2.041700	1.428900	12.000	.000	81/07/21	97/09/17
00665	PHOS-TOT		MG/L P	WATER		114	.7178000	.2307100	.4803300	2.750	.050	81/07/21	97/09/17
00671	PHOS-DIS	ORTHO	MG/L P	WATER		3	.9166700	.0214340	.1464000	1.050	.760	97/07/08	97/09/17
00940	CHLORIDE	TOTAL	MG/L	WATER		116	50.90200	1128.100	33.58800	208	8	81/07/21	97/09/17
01002	ARSENIC	AS,TOT	UG/L	WATER		14	4.000000	.0000000	.0000000	4	4	93/11/16	96/09/16
					K	103	137.5400	106210.0	325.8900	1000	4	81/07/21	97/09/17
					TOT	117	121.5700	95283.00	308.6800	1000	4	81/07/21	97/09/17
01003	ARSENIC	SEDMG/KG	DRY WGT	WATER		1	4.000000			4.00	4.00	87/08/17	87/08/17
01027	CADMIUM	CD,TOT	UG/L	WATER		61	1.515600	46.99900	6.855600	53	.03	81/07/21	97/09/17
					K	56	4.132800	31.22400	5.587800	18	.02	81/08/17	94/06/28
					TOT	117	2.768200	40.83800	6.390500	53	.02	81/07/21	97/09/17
01034	CHROMIUM	CR,TOT	UG/L	WATER		35	20.99900	424.8400	20.61200	107	4	81/07/21	88/02/22
					K	44	38.02300	568.0200	23.83300	70	4	82/03/16	88/04/20
					TOT	79	30.48000	570.7600	23.89100	107	4	81/07/21	88/04/20
01042	COPPER	CU,TOT	UG/L	WATER		78	27.18900	1756.700	41.91300	359	8	81/07/21	97/09/17
					K	39	26.15400	892.7100	29.87800	80	10	83/04/14	93/06/22
					TOT	117	26.84400	1458.700	38.19400	359	8	81/07/21	97/09/17
01045	IRON	FE,TOT	UG/L	WATER		115	1208.600	11846000	3441.700	36500	70	81/07/21	97/09/17
					K	1	10.00000			10	10	86/06/24	86/06/24
					TOT	116	1198.300	11755000	3428.600	36500	10	81/07/21	97/09/17
01047	FERROUS	IRON	UG/L	WATER		1	.0000000			0	0	82/04/14	82/04/14
01051	LEAD	PB,TOT	UG/L	WATER		66	14.88600	615.5500	24.81000	136	1	81/07/21	97/09/17
					K	51	22.80900	891.0000	29.85000	100	.09	81/09/17	94/03/14
					TOT	117	18.34000	744.5400	27.28600	136	.09	81/07/21	97/09/17
01067	NICKEL	NI,TOTAL	UG/L	WATER		14	25.00000	.0000000	.0000000	25	25	93/11/16	96/09/16
					K	24	25.00000	.0000000	.0000000	25	25	92/01/09	97/09/17
					TOT	38	25.00000	.0000000	.0000000	25	25	92/01/09	97/09/17

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	PARAMETER			MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
01092	ZINC	ZN,TOT	UG/L	WATER		99	33.41700	383.4300	19.58100	107	10	81/08/17	97/09/17
					K	17	15.11800	90.48600	9.512400	32	10	84/11/13	88/01/11
					TOT	116	30.73500	381.5900	19.53400	107	10	81/08/17	97/09/17
01147	SELENIUM	SE,TOT	UG/L	WATER		15	7.133300	.6952600	.8338200	10	6	81/12/15	96/09/16
					K	88	153.6800	116450.0	341.2500	1002	6	81/07/21	97/09/17
					TOT	103	132.3400	102030.0	319.4200	1002	6	81/07/21	97/09/17
01330	ODOR	ATMOSPH	SEVERITY	WATER		3	1.000000	.0000000	.0000000	1	1	81/09/17	84/06/19
31501	TOT COLI	MFIMENDO	/100ML	WATER		1	4000.000			4000	4000	93/08/09	93/08/09
31616	FEC COLI	MFM-FCBR	/100ML	WATER		70	9877.200	7230E+05	26890.00	170000	20	81/10/15	97/09/17
					K	1	100.0000			100	100	87/01/27	87/01/27
					L	4	57750.00	9040E+06	95080.00	200000	5000	81/09/17	85/06/20
					TOT	75	12300.00	1159E+06	34058.00	200000	20	81/09/17	97/09/17
31673	FECSTREP	MFKFAGAR	/100ML	WATER		1	100.0000			100	100	93/08/09	93/08/09
46001	WATER	APPEAR	CODE	WATER		3	246.6700	3008.400	54.84900	310	215	81/09/17	84/06/19
71900	MERCURY	HG,TOTAL	UG/L	WATER		19	1.084700	.0291290	.1706700	1.5	1.0	92/07/15	96/09/16
					K	99	21.85900	40340.00	200.8500	2000.0	1.0	81/07/21	97/09/17
					TOT	118	18.51400	33848.00	183.9800	2000.0	1.0	81/07/21	97/09/17
74041	WQF	SAMPLE	UPDATED	WATER		66	928790.0	1959E+06	44270.00	980528	871231	86/04/28	97/09/17
82028	RATIO	FEC COL	FEC STRP	WATER	$	1	15.00000			15	15	93/08/09	93/08/09

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PARAMETER				MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
00008	LAB	IDENT.	NUMBER	WATER		39	52695.00	2369E+06	48676.00	123200	2136	81/07/21	92/08/19
00010	WATER	TEMP	CENT	WATER		53	13.74700	63.43900	7.964800	28.0	.0	81/08/17	94/06/28
					C	2	3.500000	4.500000	2.121300	5.0	2.0	87/01/27	87/02/04
					TOT	55	13.37500	64.92000	8.057300	28.0	.0	81/08/17	94/06/28
00011	WATER	TEMP	FAHN	WATER	$	55	56.07400	210.3300	14.50300	82.4	32.0	81/08/17	94/06/28
00065	STREAM	STAGE	FEET	WATER		1	12.80000			12.80	12.80	82/07/07	82/07/07
00094	CNDUCTVY	FIELD	MICROMHO	WATER		19	206.8400	7203.400	84.87300	390	0	82/07/07	94/06/28
00095	CNDUCTVY	AT 25C	MICROMHO	WATER		114	281.0300	8526.500	92.33900	730	85	81/07/21	97/09/17
00101	SOLIDS	% ON	74U FILT	WATER		1	13.60000			13.6	13.6	84/01/25	84/01/25
00140	BOD	5 DAY	LB/TON	WATER		1	40.00000			40.0	40.0	82/12/20	82/12/20
00300	DO		MG/L	WATER		48	8.131200	12.73500	3.568700	17.8	.0	82/07/07	94/06/28
00301	DO	SATUR	PERCENT	WATER	$	48	73.48200	573.3600	23.94500	127.9	.0	82/07/07	94/06/28
00310	BOD	5 DAY	MG/L	WATER		108	3.122800	9.563500	3.092500	29.0	.2	81/07/21	96/09/17
					K	2	1.500000	.5000000	.7071100	2.0	1.0	81/09/17	86/12/18
					TOT	110	3.093300	9.440000	3.072500	29.0	.2	81/07/21	96/09/17
00314	BOD INH	5 DAY TO T	MG/L	WATER		23	1.578300	.9090600	.9534500	3.7	.3	87/07/16	96/09/17
00332	BOD	17 DAY	MG/L	WATER		1	.4500000			.5	.5	82/12/20	82/12/20
00400	PH		SU	WATER		46	7.116700	1.273100	1.128300	8.10	.00	82/07/07	94/06/28
00403	PH	LAB	SU	WATER		115	6.932100	.1394600	.3734400	7.7	5.9	81/07/21	97/09/17
00410	T ALK	CACO3	MG/L	WATER		112	46.11600	86.52000	9.301600	70	17	81/07/21	96/09/17
00515	RESIDUE	DISS-105 C	MG/L	WATER		113	212.2700	39794.00	199.4900	2200	60	81/07/21	97/09/17
00530	RESIDUE	TOT NFLT	MG/L	WATER		109	35.47700	2533.200	50.33000	324	2	81/07/21	97/09/17
					K	5	2.000000	.0000000	.0000000	2	2	86/06/24	96/09/17
					TOT	114	34.00900	2468.500	49.68400	324	2	81/07/21	97/09/17
00556	OIL-GRSE	FREON-GR	MG/L	WATER	K	1	2.000000			2.00	2.00	86/06/24	86/06/24
00600	TOTAL N	N	MG/L	WATER		3	4.536700	1.922500	1.386600	6.03	3.29	97/07/08	97/09/17
00605	ORG N	N	MG/L	WATER		42	.5640500	.1325800	.3641100	1.740	.130	87/07/16	96/09/17
					K	1	.2800000			.280	.280	88/02/29	88/02/29
					TOT	43	.5574400	.1313000	.3623500	1.740	.130	87/07/16	96/09/17
00610	NH3+NH4- N	TOTAL	MG/L	WATER		115	.3748600	.1273600	.3568700	1.650	.020	81/07/21	97/09/17
00612	UN-IONZD	NH3-N	MG/L	WATER	$	55	.0020540	.0000083	.0028845	.015	8521E-15	81/08/17	94/06/28
00615	NO2-N	TOTAL	MG/L	WATER		114	.0562800	.0052668	.0725730	.682	.004	81/07/21	97/09/17
					K	1	.0660000			.066	.066	84/01/25	84/01/25
					TOT	115	.0563650	.0052214	.0722590	.682	.004	81/07/21	97/09/17
00619	UN-IONZD	NH3-NH3	MG/L	WATER	$	55	.0024975	.0000123	.0035073	.018	1036E-14	81/08/17	94/06/28
00620	NO3-N	TOTAL	MG/L	WATER		115	2.545900	.9338300	.9663500	7.040	.020	81/07/21	97/09/17
00625	TOT KJEL	N	MG/L	WATER		105	.9805700	.6918400	.8317700	7.300	.000	81/07/21	96/09/17
					K	6	1.000000	.0000000	.0000000	1.000	1.000	83/09/26	97/09/17
					TOT	111	.9816200	.6541300	.8087800	7.300	.000	81/07/21	97/09/17

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PARAMETER			MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
00665 PHOS-TOT		MG/L P	WATER		112	.3734800	.0515860	.2271300	1.320	.040	81/07/21	97/09/17
00671 PHOS-DIS	ORTHO	MG/L P	WATER		3	.2110000	.0014470	.0380390	.250	.174	97/07/08	97/09/17
00719 CN FREE	HBG METH	UG/L	WATER		1	42.00000			42.000	42.000	86/06/24	86/06/24
00720 CYANIDE	CN-TOT	MG/L	WATER		1	.0460000			.046	.046	86/06/24	86/06/24
00900 TOT HARD	CACO3	MG/L	WATER		1	60.00000			60	60	82/07/07	82/07/07
00916 CALCIUM	CA-TOT	MG/L	WATER		1	20.00000			20.0	20.0	82/07/07	82/07/07
00927 MGNSIUM	MG,TOT	MG/L	WATER		1	5.200000			5.2	5.2	82/07/07	82/07/07
00940 CHLORIDE	TOTAL	MG/L	WATER		115	35.97200	541.8900	23.27900	165	6	81/07/21	97/09/17
00945 SULFATE	SO4-TOT	MG/L	WATER		1	27.50000			28	28	82/07/07	82/07/07
01002 ARSENIC	AS,TOT	UG/L	WATER		10	4.200000	.1777900	.4216500	5	4	81/12/15	96/07/31
				K	104	144.9000	112510.0	335.4200	1000	4	81/07/21	97/09/17
				TOT	114	132.5500	104150.0	322.7200	1000	4	81/07/21	97/09/17
01024 CR MUD	WET WGTM	G/KG-CR	WATER	K	1	5.000000			5.00	5.00	82/04/14	82/04/14
01027 CADMIUM	CD,TOT	UG/L	WATER		43	1.433900	34.55300	5.878200	39	.2	81/11/16	97/09/17
				K	71	3.471200	27.47400	5.241600	18	.02	81/07/21	96/06/05
				TOT	114	2.702700	30.84600	5.553900	39	.02	81/07/21	97/09/17
01034 CHROMIUM	CR,TOT	UG/L	WATER		28	18.76700	453.1100	21.28700	88	4	81/07/21	88/05/17
				K	52	32.67300	560.9700	23.68500	70	4	81/11/16	88/03/22
				TOT	80	27.80600	561.5600	23.69700	88	4	81/07/21	88/05/17
01042 COPPER	CU,TOT	UG/L	WATER		66	27.53000	1317.200	36.29300	284	8	81/07/21	97/08/19
				K	47	21.78700	711.0000	26.66500	80	4	82/10/19	97/09/17
				TOT	113	25.14200	1064.500	32.62700	284	4	81/07/21	97/09/17
01045 IRON	FE,TOT	UG/L	WATER		113	1643.400	11559000	3399.800	34700	200	81/07/21	97/09/17
01047 FERROUS	IRON	UG/L	WATER		1	.0000000			0	0	82/04/14	82/04/14
01051 LEAD	PB,TOT	UG/L	WATER		74	16.36900	645.4500	25.40600	187	1	81/07/21	97/09/17
				K	40	25.98200	1023.100	31.98500	100	.09	81/09/17	93/09/20
				TOT	114	19.74200	791.2900	28.13000	187	.09	81/07/21	97/09/17
01067 NICKEL	NI,TOTAL	UG/L	WATER		9	24.11100	7.111800	2.666800	25	17	92/05/18	97/08/19
				K	24	25.00000	.0000000	.0000000	25	25	92/01/09	97/09/17
				TOT	33	24.75800	1.939800	1.392800	25	17	92/01/09	97/09/17
01092 ZINC	ZN,TOT	UG/L	WATER		97	34.58900	475.6300	21.80900	126	10	81/08/17	97/09/17
				K	15	15.86700	101.4100	10.07000	32	10	84/12/12	96/09/17
				TOT	112	32.08100	465.1700	21.56800	126	10	81/08/17	97/09/17
01147 SELENIUM	SE,TOT	UG/L	WATER		8	7.250000	1.357200	1.165000	10	6	81/12/15	96/03/25
				K	92	156.5500	120100.0	346.5500	1000	6	81/07/21	97/09/17
				TOT	100	144.6100	112050.0	334.7400	1000	6	81/07/21	97/09/17
01330 ODOR	ATMOSPH	SEVERITY	WATER		3	.6666700	.3333300	.5773500	1	0	81/09/17	84/06/19
10330 INVALID	PAR	NUMBER	WATER		1	1.000000			1.000000	1.000000	81/12/15	81/12/15
31501 TOT COLI	MFIMENDO	/100ML	WATER		1	3900.000			3900	3900	93/08/10	93/08/10

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	PARAMETER		MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
31616	FEC COLI MFM-FCBR	/100ML	WATER		64	16104.00	9939E+05	31527.00	190000	20	81/12/15	97/09/17
				K	3	6000.000	.0000000	.0000000	6000	6000	82/04/14	83/02/01
				L	7	75000.00	7575E+06	87035.00	200000	5000	81/09/17	86/08/21
				TOT	74	21266.00	1790E+06	42311.00	200000	20	81/09/17	97/09/17
31673	FECSTREP MFKFAGAR	/100ML	WATER		2	770.0000	369800.0	608.1100	1200	340	85/02/14	93/08/10
32730	PHENOLS TOTAL	UG/L	WATER		1	.0000000			0	0	86/06/24	86/06/24
46001	WATER APPEAR	CODE	WATER		5	150.0000	8787.500	93.74200	215	0	81/09/17	85/02/14
46570	CAL HARD CA MG	MG/L	WATER	$	1	71.35400			71	71	82/07/07	82/07/07
70508	T ACDITY AS CACO3	HOT-MG/L	WATER		1	.0000000			0	0	82/07/07	82/07/07
71871	BROMINE ELEMENTL	MG/L	WATER		2	.0250000	.0012500	.0353550	.05	.00	88/05/17	88/05/17
71900	MERCURY HG,TOTAL	UG/L	WATER		11	1.436400	1.419000	1.191200	5.0	1.0	92/05/18	96/03/25
				K	103	21.03900	38775.00	196.9100	2000.0	1.0	81/07/21	97/09/17
				TOT	114	19.14700	35034.00	187.1800	2000.0	1.0	81/07/21	97/09/17
74041	WQF SAMPLE	UPDATED	WATER		63	924570.0	1947E+06	44131.00	980528	870110	86/04/28	97/09/17
82028	RATIO FEC COL	FEC STRP	WATER	$	2	9.598000	159.5400	12.63100	19	.7	85/02/14	93/08/10
82079	TURBIDTY LAB	NTU	WATER		1	8.900000			8.9	8.9	82/07/07	82/07/07
82550	OSMOTIC PRES TOT	MOSM/KG	WATER		1	.1766000			.18	.18	82/07/07	82/07/07

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PARAMETER				MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
00008	LAB	IDENT.	NUMBER	BOTTOM	B	4	2993.500	88064.00	296.7600	3278	2634	81/07/14	81/08/12
				WATER		329	7122000	6445E+11	25387000	98042900	172	80/04/22	98/09/17
00010	WATER	TEMP	CENT	BOTTOM		4	26.50000	.3333300	.5773500	27.0	26.0	81/07/14	81/08/12
				WATER		344	17.84100	51.28200	7.161100	29.0	1.0	80/02/28	98/09/17
00011	WATER	TEMP	FAHN	BOTTOM	$	4	79.70000	1.083300	1.040800	80.6	78.8	81/07/14	81/08/12
				WATER	$	344	64.11200	166.2200	12.89300	84.2	33.8	80/02/28	98/09/17
00020	AIR	TEMP	CENT	BOTTOM		4	22.75000	12.91700	3.594000	28.0	20.0	81/07/14	81/08/12
				WATER		289	15.70600	56.11300	7.490900	32.0	-6.0	81/05/18	98/09/17
00041	WEATHER	WMO CODE	4501	WATER		59	.8474600	7.855600	2.802800	21	0	93/03/23	97/03/25
00062	WATER	SURF ELE	IN FEET	WATER		1	.4000000			.4	.4	82/07/21	82/07/21
00067	TIDE	STAGE	CODE	BOTTOM		4	2.000000	1.333300	1.154700	3	1	81/07/14	81/08/12
				WATER		310	34.69400	322420.0	567.8200	10000	0	80/02/28	97/03/25
00075	TURB	HLGE	PPM SIO2	WATER		127	12.00800	54.60700	7.389700	40.0	2.0	80/02/28	86/11/24
00076	TURB	TRBIDMTR	HACH FTU	WATER		212	8.999100	38.91400	6.238100	45.0	1.0	87/03/18	98/09/17
00077	TRANSP	SECCHI	INCHES	WATER		11	31.90900	301.0900	17.35200	60	12	81/06/17	95/11/27
00080	COLOR	PT-CO	UNITS	WATER		16	17.68800	133.0300	11.53400	56	8	80/02/28	96/09/26
00095	CNDUCTVY	AT 25C	MICROMHO	WATER		314	392.3000	133830.0	365.8300	3560	100	80/09/16	98/09/17
00145	TOTAL	PRODN	TONS/DAY	WATER		1	890.0000			890.000	890.000	82/05/05	82/05/05
00299	DO	PROBE	MG/L	WATER		13	6.725400	3.235100	1.798600	11.8	4.8	97/09/17	98/09/17
00300	DO		MG/L	BOTTOM		4	3.350000	1.796700	1.340400	4.6	2.0	81/07/14	81/08/12
				WATER		332	6.463200	5.408100	2.325500	12.7	1.6	80/02/28	98/09/17
00301	DO	SATUR	PERCENT	BOTTOM	$	4	41.11700	271.5600	16.47900	56.8	24.4	81/07/14	81/08/12
				WATER		188	69.46300	228.6700	15.12200	104.0	27.0	84/06/11	97/03/25
					$	142	60.85100	346.9100	18.62600	97.4	19.1	80/02/28	98/09/17
					TOT	330	65.75700	296.8900	17.23000	104.0	19.1	80/02/28	98/09/17
00303	BOD	1 DAY	MG/L	WATER		3	.7666700	.1233300	.3511900	1.100	.400	81/03/10	81/06/11
00304	BOD	2 DAY	MG/L	WATER		2	1.025000	.4512500	.6717500	1.5	.6	81/03/10	81/04/22
00305	BOD	3 DAY	MG/L	WATER		3	1.700000	.5700000	.7549800	2.5	1.0	81/03/10	81/06/11
00306	BOD	4 DAY	MG/L	WATER		3	2.100000	.9300000	.9643700	3.2	1.4	81/03/10	81/06/11
00310	BOD	5 DAY	MG/L	WATER		55	3.160000	.3853800	.6207900	4.7	2.4	80/02/28	95/11/20
					K	121	2.400000	.0000000	.0000000	2.4	2.4	80/04/15	95/10/30
					TOT	176	2.637500	.2436900	.4936400	4.7	2.4	80/02/28	95/11/20
00311	DISS BOD	5 DAY	MG/L	WATER	K	1	2.400000			2.4	2.4	94/08/30	94/08/30
00312	BOD	6 DAY	MG/L	WATER		3	3.133300	.7433400	.8621700	3.9	2.2	81/03/10	81/06/11
00315	BOD	7 DAY	MG/L	WATER		3	3.566700	1.243300	1.115100	4.4	2.3	81/03/10	81/06/11
					K	1	2.400000			2.4	2.4	86/07/15	86/07/15
					TOT	4	3.275000	1.169200	1.081300	4.4	2.3	81/03/10	86/07/15
00316	BOD	8 DAY	MG/L	WATER		3	4.033300	1.443300	1.201400	5.2	2.8	81/03/10	81/06/11
00317	BOD	9 DAY	MG/L	WATER		3	4.700000	1.990000	1.410700	6.2	3.4	81/03/10	81/06/11

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00320	BOD	ULT FRST	MG/L	WATER		1	.1000000			.1	.1	82/06/14	82/06/14
00322	BOD	10 DAY	MG/L	WATER		3	5.200000	1.030000	1.014900	6.3	4.3	81/03/10	81/06/11
00323	BOD	15 DAY	MG/L	WATER		3	6.000000	.4901300	.7000900	6.7	5.3	81/03/10	81/06/11
00324	BOD	20 DAY	MG/L	WATER		4	5.400000	2.553400	1.597900	6.7	3.1	80/04/22	81/06/11
00327	BOD	11 DAY	MG/L	WATER		3	5.500000	.4901300	.7000900	6.3	5.0	81/03/10	81/06/11
00328	BOD	12 DAY	MG/L	WATER		1	5.700000			5.7	5.7	81/03/10	81/03/10
00329	BOD	13 DAY	MG/L	WATER		2	5.750000	.6050100	.7778300	6.3	5.2	81/04/22	81/06/11
00331	BOD	16 DAY	MG/L	WATER		1	6.700000			6.7	6.7	81/04/22	81/04/22
00332	BOD	17 DAY	MG/L	WATER		2	5.800000	.3200100	.5656900	6.2	5.4	81/03/10	81/06/11
00334	BOD	19 DAY	MG/L	WATER		2	6.450000	.1249900	.3535300	6.7	6.2	81/03/10	81/04/22
00350	BOD	14 DAY	MG/L	WATER		1	5.900000			5.9	5.9	81/03/10	81/03/10
00400	PH		SU	WATER		294	7.325300	.1866900	.4320700	8.80	5.90	80/02/28	98/09/17
00403	PH	LAB	SU	WATER		37	7.101300	.4976100	.7054100	8.4	5.7	86/09/05	96/09/26
00410	T ALK	CACO3	MG/L	WATER		330	42.79200	98.61000	9.930300	67	10	80/02/28	98/09/17
00435	T ACDITY	CACO3	MG/L	WATER		329	3.841600	2.882500	1.697800	10	0	80/02/28	98/09/17
					K	1	1.000000			1	1	95/07/10	95/07/10
					TOT	330	3.833000	2.898200	1.702400	10	0	80/02/28	98/09/17
00500	RESIDUE	TOTAL	MG/L	WATER		1	120.0000			120	120	80/04/22	80/04/22
00505	RESIDUE	TOT VOL	MG/L	WATER		1	44.00000			44	44	80/04/22	80/04/22
00530	RESIDUE	TOT NFLT	MG/L	WATER		332	19.88000	144.1600	12.00700	86	0	80/04/22	98/09/17
					K	1	1.000000			1	1	95/06/26	95/06/26
					TOT	333	19.82300	144.7900	12.03300	86	0	80/04/22	98/09/17
00535	RESIDUE	VOL NFLT	MG/L	WATER		32	3.406300	4.442500	2.107700	9	1	80/04/22	98/09/17
					K	4	1.000000	.0000000	.0000000	1	1	96/09/09	98/05/18
					TOT	36	3.138900	4.523000	2.126700	9	1	80/04/22	98/09/17
00605	ORG N	N	MG/L	WATER		83	.6578300	.6183400	.7863400	7.300	.000	81/02/17	86/08/14
00610	NH3+NH4- N	TOTAL	MG/L	WATER		284	.3113200	.0946590	.3076700	1.800	.004	80/02/28	98/09/17
					K	56	.0703390	.0010587	.0325380	.100	.004	80/07/15	96/06/17
					TOT	340	.2716300	.0872070	.2953100	1.800	.004	80/02/28	98/09/17
00612	UN-IONZD	NH3-N	MG/L	WATER	$	320	.0022941	.0000291	.0054026	.072	.00002	80/02/28	98/09/17
00615	NO2-N	TOTAL	MG/L	WATER		329	.0803200	.0049075	.0700530	.630	.003	80/02/28	98/09/17
					K	2	.0050000	.0000000	.0000000	.005	.005	92/07/08	93/04/12
					TOT	331	.0798650	.0049119	.0700850	.630	.003	80/02/28	98/09/17
00619	UN-IONZD	NH3-NH3	MG/L	WATER	$	320	.0027893	.0000431	.0065690	.087	.00002	80/02/28	98/09/17
00620	NO3-N	TOTAL	MG/L	WATER		332	1.753800	.3396600	.5828000	3.400	.470	80/02/28	98/09/17
00625	TOT KJEL	N	MG/L	WATER		288	.7096700	.1394200	.3733900	2.600	.000	80/02/28	98/09/17
					K	3	.3666700	.0233340	.1527500	.500	.200	80/07/15	85/09/16
					TOT	291	.7061300	.1393400	.3732800	2.600	.000	80/02/28	98/09/17
00630	NO2&NO3	N-TOTAL	MG/L	WATER		71	1.747800	.3303100	.5747300	3.00	.66	93/03/31	98/09/17

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00650 T PO4	PO4	MG/L	WATER		75	.2030700	.1067200	.3266700	2.80	.02	80/02/28	83/11/14
00665 PHOS-TOT		MG/L P	WATER		277	.1652000	.0311390	.1764600	2.800	.030	81/07/14	98/09/17
00671 PHOS-DIS	ORTHO	MG/L P	WATER		155	.0743510	.0022318	.0472420	.317	.010	89/07/10	98/09/17
				K	3	.0116670	.0000583	.0076376	.020	.005	92/04/23	92/06/15
				TOT	158	.0731600	.0022636	.0475770	.317	.005	89/07/10	98/09/17
00680 T ORG C	C	MG/L	WATER		1	13.70000			13.7	13.7	80/08/25	80/08/25
00900 TOT HARD	CACO3	MG/L	WATER		329	121.0100	35618.00	188.7300	2400	36	80/02/28	98/09/17
00910 CALCIUM	CACO3	MG/L	WATER	K	1	15.00000			15.0	15.0	85/07/29	85/07/29
00929 SODIUM	NA,TOT	MG/L	WATER		115	32080.00	2740E+06	52351.00	279000.0	5.12	81/07/14	87/11/13
00940 CHLORIDE	TOTAL	MG/L	WATER		332	60.36500	13941.00	118.0700	1351	8	80/02/28	98/09/17
00955 SILICA	DISOLVED	MG/L	WATER		9	1.498000	.9944900	.9972400	2.8	.2	94/08/23	96/06/18
				K	7	.2000000	.0000000	.0000000	.2	.2	94/09/19	95/09/05
				TOT	16	.9301300	.9726500	.9862300	2.8	.2	94/08/23	96/06/18
01002 ARSENIC	AS,TOT	UG/L	WATER	K	46	21.63100	102.2800	10.11400	30	5	82/07/07	90/07/09
01024 CR MUD	WET WGTM	G/KG-CR	WATER	K	1	30.00000			30.00	30.00	82/09/13	82/09/13
01025 CADMIUM	CD,DISS	UG/L	WATER	K	9	1.000000	.0000000	.0000000	1	1	92/03/09	92/11/17
01027 CADMIUM	CD,TOT	UG/L	WATER	K	119	16.66400	1090.700	33.02600	100	1	80/02/28	92/11/17
01030 CHROMIUM	CR,DISS	UG/L	WATER	K	9	100.0000	.0000000	.0000000	100	100	92/03/09	92/11/17
01032 CHROMIUM	HEX-VAL	UG/L	WATER	K	23	10.00000	.0000000	.0000000	10	10	88/07/05	92/07/08
01034 CHROMIUM	CR,TOT	UG/L	WATER	K	86	51.31400	2007.900	44.81000	100	3	80/02/28	92/11/17
01040 COPPER	CU,DISS	UG/L	WATER		2	6.665000	3.672100	1.916300	8	5	96/07/08	96/11/13
				J	41	1.602400	1.349300	1.161600	5	0	92/03/09	98/08/24
				U	5	1.000000	5.000000	2.236100	5	0	94/09/19	97/07/07
				TOT	48	1.750600	2.758800	1.661000	8	0	92/03/09	98/08/24
01042 COPPER	CU,TOT	UG/L	WATER		35	7.981100	34.47400	5.871500	26	3	84/03/12	98/08/24
				J	114	2.469600	2.394600	1.547400	5	0	88/07/05	98/07/14
				K	89	37.00000	2041.100	45.17900	100	3	80/02/28	88/06/14
				TOT	238	16.19300	1027.100	32.04800	100	0	80/02/28	98/08/24
01045 IRON	FE,TOT	UG/L	WATER		187	737.4400	475520.0	689.5800	4510	100	80/02/28	90/06/20
				K	3	100.0000	.0000000	.0000000	100	100	86/08/06	90/07/09
				TOT	190	727.3700	474320.0	688.7100	4510	100	80/02/28	90/07/09
01046 IRON	FE,DISS	UG/L	WATER	K	37	100.0000	.0000000	.0000000	100	100	88/07/05	90/07/09
01049 LEAD	PB,DISS	UG/L	WATER	J	2	2.000000	.3200000	.5656900	2	2	95/05/08	95/09/25
				K	16	3.000000	.0000000	.0000000	3	3	92/03/09	94/05/23
				U	11	.0000000	.0000000	.0000000	0	0	94/07/25	95/11/27
				TOT	29	1.793100	2.110000	1.452600	3	0	92/03/09	95/11/27
01051 LEAD	PB,TOT	UG/L	WATER		10	16.78500	1082.700	32.90500	110	3	80/04/02	95/11/27
				J	8	2.050000	.3114300	.5580600	3	1	94/07/25	95/10/23
				K	225	21.34700	946.8800	30.77200	100	3	80/02/28	94/05/23

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01051 LEAD	PB,TOT	UG/L	WATER	U	2	.0000000	.0000000	.0000000	0	0	95/06/26	95/07/10
01051 LEAD	PB,TOT	UG/L	WATER	TOT	245	20.35600	925.0200	30.41400	110	0	80/02/28	95/11/27
01055 MANGNESE	MN	UG/L	WATER		55	166.6600	4618.600	67.96000	450.0	100.0	80/02/28	83/11/14
				K	20	96.50000	245.0000	15.65300	100.0	30.0	80/06/06	83/09/07
				TOT	75	147.9500	4408.700	66.39800	450.0	30.0	80/02/28	83/11/14
01065 NICKEL	NI,DISS	UG/L	WATER	K	9	10.00000	.0000000	.0000000	10	10	92/03/09	92/11/17
01067 NICKEL	NI,TOTAL	UG/L	WATER		1	13.10000			13	13	90/09/19	90/09/19
				K	81	43.33300	1912.500	43.73200	100	10	80/02/28	93/06/21
				TOT	82	42.96500	1900.000	43.58900	100	10	80/02/28	93/06/21
01077 SILVER	AG,TOT	UG/L	WATER	K	25	37.92000	2258.200	47.52000	100.0	3.0	80/02/28	91/06/25
01090 ZINC	ZN,DISS	UG/L	WATER		12	13.39200	8.522700	2.919400	21	11	92/03/09	97/03/25
				J	24	6.150400	3.940100	1.985000	9	3	94/07/25	98/08/24
				K	10	10.00000	.0000000	.0000000	10	10	92/05/04	94/05/23
				U	2	.0000000	.0000000	.0000000	0	0	95/08/29	95/09/25
				TOT	48	8.506500	16.40400	4.050200	21	0	92/03/09	98/08/24
01092 ZINC	ZN,TOT	UG/L	WATER		108	22.28600	164.7600	12.83600	88	10	82/07/07	98/08/24
				J	5	7.986000	.5310100	.7287000	9	7	95/06/26	98/06/24
				K	121	50.45500	1717.500	41.44300	100	10	80/02/28	94/05/23
				TOT	234	36.54600	1172.500	34.24100	100	7	80/02/28	98/08/24
01220 CR-DISS	.HEX VAL	UG/L	WATER	K	11	6.818200	6.363700	2.522600	10.0	5.0	92/08/10	97/05/08
				U	12	5.000000	.0000000	.0000000	5.0	5.0	97/06/09	98/08/24
				TOT	23	5.869600	3.755000	1.937800	10.0	5.0	92/08/10	98/08/24
01519 RAD GROS	ALPHA	TOT PC/L	WATER	K	11	2.545500	2.272700	1.507600	6.000	1.000	85/03/26	97/06/09
07000 H-3	TOTAL	PC/L	WATER	K	10	1437.400	990970.0	995.4700	3000.0	200.0	86/12/10	97/06/09
30201 CLRMTHAN	WTR,WHL	REC UG/L	WATER	U	15	1.266700	.2095300	.4577400	2	1	94/08/23	97/06/09
30202 BROMOETH	WTR,WHL	REC UG/L	WATER	U	15	1.266700	.2095300	.4577400	2	1	94/08/23	97/06/09
31505 TOT COLI	MPN CONF	/100ML	WATER		47	9727.900	5767E+05	24015.00	160000	330	87/07/01	89/06/19
				L	1	24000.00			24000	24000	88/01/22	88/01/22
				TOT	48	10025.00	5687E+05	23848.00	160000	330	87/07/01	89/06/19
31611 FEC COLI	M-TEC	#/100ML	WATER		202	182.7900	287280.0	535.9900	5800	2	87/03/18	98/09/17
				L	5	760.0000	8000.000	89.44300	800	600	87/04/10	97/10/06
				O	8	.0000000	.0000000	.0000000	0	0	95/08/29	96/08/12
				TOT	215	189.4100	278970.0	528.1800	5800	0	87/03/18	98/09/17
31615 FEC COLI	MPNECMED	/100ML	WATER		48	1663.800	4704400	2169.000	7900	33	87/07/01	89/06/19
31616 FEC COLI	MFM-FCBR	/100ML	WATER		134	835.3800	1767800	1329.600	9000	5	80/02/28	87/06/18
				L	1	600.0000			600	600	87/04/10	87/04/10
				TOT	135	833.6400	1755000	1324.800	9000	5	80/02/28	87/06/18
31633 E.COLI	THERMTOL	#/100ML	WATER		203	139.7300	140600.0	374.9700	3600	2	87/03/18	98/09/17
				K	1	1.000000			1	1	94/04/25	94/04/25

892062 42062 DELCORA CSO LTCP
39 50 48.0 075 20 18.0 2
RIVER MILE 83.98
42000 PENNSYLVANIA
AT EDDYSTONE, PA. 020792

/TYPA/AMBNT/ESTURY

31DELRBC 02040202012 0000.130 ON
0046 FEET DEPTH

	PARAMETER		MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
31633	E.COLI THERMTOL	#/100ML	WATER	L	3	733.3300	13334.00	115.4700	800	600	92/09/21	97/10/06
				O	8	.0000000	.0000000	.0000000	0	0	95/08/29	96/08/12
				TOT	215	142.1600	138600.0	372.2900	3600	0	87/03/18	98/09/17
31639	ENTCOCCI GR D,MF	#/100ML	WATER		204	29.58800	5195.300	72.07800	490	1	87/03/18	98/09/17
				K	9	1.000000	.0000000	.0000000	1	1	88/06/14	97/07/16
				L	1	600.0000			600	600	95/10/23	95/10/23
				O	1	.0000000			0	0	96/08/12	96/08/12
				TOT	215	30.90700	6485.400	80.53200	600	0	87/03/18	98/09/17
32101	DICLBRMT	TOTUG/L	WATER	U	55	1.072700	.0686880	.2620800	2.0	1.0	89/07/10	97/06/09
32102	CARBNTET	TOTUG/L	WATER	U	55	1.072700	.0686880	.2620800	2.0	1.0	89/07/10	97/06/09
32104	BROMOFRM WHL-WTR	UG/L	WATER	U	55	1.072700	.0686880	.2620800	2.0	1.0	89/07/10	97/06/09
32105	CLDIBRMT	TOTUG/L	WATER	U	55	1.072700	.0686880	.2620800	2.0	1.0	89/07/10	97/06/09
32106	CHLRFORM	TOTUG/L	WATER	J	2	.3000000	.0000000	.0000000	.3	.3	92/03/09	93/03/23
				K	3	1.000000	.0000000	.0000000	1.0	1.0	89/08/02	90/09/19
				U	50	1.080000	.0751030	.2740500	2.0	1.0	89/07/10	97/06/09
				TOT	55	1.047300	.0899480	.2999100	2.0	.3	89/07/10	97/06/09
32210	CHLRPHYL A	UG/L	WATER		44	7.028000	96.08700	9.802400	54.80	.00	87/03/18	89/06/19
32211	CHLRPHYL A UG/L	CORRECTD	WATER		97	11.17000	101.0300	10.05100	56.00	.00	89/07/10	96/06/18
				K	26	1.000000	.0000000	.0000000	1.00	1.00	91/03/20	95/11/27
				TOT	123	9.020300	96.87900	9.842700	56.00	.00	89/07/10	96/06/18
32218	PHEOPHTN A	UG/L	WATER		111	22.39700	412.3800	20.30700	104.00	.00	89/07/10	96/06/18
				B	1	39.00000			39.00	39.00	95/10/10	95/10/10
				K	11	1.000000	.0000000	.0000000	1.00	1.00	91/05/13	92/11/09
				TOT	123	20.61900	412.1700	20.30200	104.00	.00	89/07/10	96/06/18
32230	CHLRPHYL A	MG/L	WATER		109	313.2300	9984500	3159.800	33000.00	.000	80/02/28	86/11/24
32730	PHENOLS TOTAL	UG/L	WATER		16	8.012500	22.00300	4.690700	20	5	80/04/22	86/04/29
				K	137	5.000000	.0000000	.0000000	5	5	80/02/28	88/06/14
				TOT	153	5.315000	3.026700	1.739800	20	5	80/02/28	88/06/14
34010	TOLUENE	TOT UG/L	WATER		1	4.700000			4.70	4.70	90/09/19	90/09/19
				K	1	1.000000			1.00	1.00	89/10/03	89/10/03
				U	45	1.622200	.2404100	.4903100	2.00	1.00	89/07/10	97/06/09
				TOT	47	1.674500	.4415100	.6644600	4.70	1.00	89/07/10	97/06/09
34030	BENZENE	TOT UG/L	WATER	U	47	1.595800	.2460700	.4960600	2.00	1.00	89/07/10	97/06/09
34301	CHLOROBE NZENE	TOTWUG/L	WATER	U	55	1.236400	.1838400	.4287700	2.000	1.000	89/07/10	97/06/09
34311	CHLOROET HANE	TOTWUG/L	WATER	U	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
34371	ETHYLBEN ZENE	TOTWUG/L	WATER	U	36	1.500000	.2571400	.5070900	2.000	1.000	89/07/10	97/06/09
34413	METHYLBR OMIDE	TOTWUG/L	WATER	U	40	1.000000	.0000000	.0000000	1.000	1.000	89/07/10	93/10/25
34418	METHYLCH LORIDE	TOTWUG/L	WATER	U	40	1.000000	.0000000	.0000000	1.000	1.000	89/07/10	93/10/25
34423	METHYLEN ECHLORID	TOTWUG/L	WATER	J	1	.2000000			.200	.200	93/03/23	93/03/23

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0046 FEET DEPTH

PARAMETER	MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
34423 METHYLEN ECHLORID	TOTWUG/L WATER	U	54	1.074100	.0698820	.2643500	2.000	1.000	89/07/10	97/06/09
34423 METHYLEN ECHLORID	TOTWUG/L WATER	TOT	55	1.058200	.0824780	.2871900	2.000	.200	89/07/10	97/06/09
34475 TETRACHL OROETHYL	TOTWUG/L WATER	U	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
34488 TRICHLOR OFLUOROM	TOTWUG/L WATER	U	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
34496 11DICHLO ROETHANE	TOTWUG/L WATER	U	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
34501 11DICHLO ROETHYLE	TOTWUG/L WATER	U	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
34506 111TRICH LOROETHA	TOTWUG/L WATER	K	1	1.000000			1.000	1.000	89/08/02	89/08/02
		U	54	1.074100	.0698820	.2643500	2.000	1.000	89/07/10	97/06/09
		TOT	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
34511 112TRICH LOROETHA	TOTWUG/L WATER	U	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
34516 1122TETR ACHLOROE	TOTWUG/L WATER	U	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
34531 12DICHLO ROETHANE	TOTWUG/L WATER		2	1.250000	.1250000	.3535500	1.500	1.000	90/05/16	90/06/06
		K	2	1.000000	.0000000	.0000000	1.000	1.000	89/07/10	89/10/03
		U	51	1.078400	.0737260	.2715300	2.000	1.000	89/08/02	97/06/09
		TOT	55	1.081800	.0718870	.2681200	2.000	1.000	89/07/10	97/06/09
34536 12DICHLO ROBENZEN	TOTWUG/L WATER	U	55	1.236400	.1838400	.4287700	2.000	1.000	89/07/10	97/06/09
34541 12DICHLO ROPROPAN	TOTWUG/L WATER	U	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
34546 12DICHLO ROETHENE	TOTWUG/L WATER	U	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
34566 13DICHLO ROBENZEN	TOTWUG/L WATER	U	55	1.236400	.1838400	.4287700	2.000	1.000	89/07/10	97/06/09
34571 14DICHLO ROBENZEN	TOTWUG/L WATER	U	55	1.236400	.1838400	.4287700	2.000	1.000	89/07/10	97/06/09
34576 2CHLOROE THYLVINY	TOTWUG/L WATER	U	55	1.109100	.2101000	.4583700	4.000	1.000	89/07/10	97/06/09
34668 DICHLORO DIFLUORO	TOTWUG/L WATER	U	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
34699 T1,3-DCP TOT WAT	UG/L WATER	U	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
34704 C1,3-DCP TOT WAT	UG/L WATER	U	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
39175 VINYLCHL ORIDE	TOT UG/L WATER	U	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
39180 TRICHLOR ETHYLENE	TOT UG/L WATER	U	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
39300 P,P'DDT	TOT UG/L WATER	K	1	.0710000			.071	.071	80/05/29	80/05/29
39305 O,P' DDT WHL SMPL	UG/L WATER	K	1	.0570000			.057	.057	80/05/29	80/05/29
39310 P,P'DDD	TOT UG/L WATER	K	1	.0500000			.050	.050	80/05/29	80/05/29
39315 O,P' DDD WHL SMPL	UG/L WATER	K	1	.0520000			.052	.052	80/05/29	80/05/29
39320 P,P'DDE	TOT UG/L WATER	K	1	.0240000			.024	.024	80/05/29	80/05/29
39328 O,P'DDE MUD	UG/KG WATER	K	1	.0310000			.03	.03	80/05/29	80/05/29
39330 ALDRIN	TOT UG/L WATER	K	1	.0100000			.010	.010	80/05/29	80/05/29
39337 ALPHABHC	TOTUG/L WATER	K	1	.0100000			.010	.010	80/05/29	80/05/29
39338 BETA BHC	TOTUG/L WATER	K	1	.0430000			.043	.043	80/05/29	80/05/29
39380 DIELDRIN	TOTUG/L WATER	K	1	.0270000			.027	.027	80/05/29	80/05/29
39390 ENDRIN	TOT UG/L WATER	K	1	.0500000			.050	.050	80/05/29	80/05/29
39410 HEPTCHLR	TOTUG/L WATER	K	1	.0100000			.010	.010	80/05/29	80/05/29
39420 HPCHLREP	TOTUG/L WATER	K	1	.0150000			.015	.015	80/05/29	80/05/29

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39 50 48.0 075 20 18.0 2
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AT EDDYSTONE, PA. 020792

/TYPA/AMBNT/ESTURY

31DELRBC 02040202012 0000.130 ON
0046 FEET DEPTH

	PARAMETER		MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
39480	MTHXYCLR WHL SMPL	UG/L	WATER	K	1	.2100000			.210	.210	80/05/29	80/05/29
39700	HCB	TOT UG/L	WATER	K	1	.0100000			.010	.010	80/05/29	80/05/29
39755	MIREX WHL SMPL	UG/L	WATER	K	1	.0830000			.08	.08	80/05/29	80/05/29
39782	LINDANE WHL SMPL	UG/L	WATER	K	1	.0100000			.010	.010	80/05/29	80/05/29
71890	MERCURY HG,DISS	UG/L	WATER	K	9	.2000000	.0000000	.0000000	.2	.2	92/03/09	92/11/17
71900	MERCURY HG,TOTAL	UG/L	WATER	K	71	1.109900	.1771900	.4209400	1.5	.2	80/02/28	92/11/17
74041	WQF SAMPLE	UPDATED	WATER		283	924260.0	1511E+06	38880.00	981229	861126	85/03/26	98/09/17
78113	ETH BENZ WH WTR	UG/L	WATER	U	19	1.947400	.0526350	.2294200	2.00	1.00	93/03/23	96/11/13
78124	BENZENE HOH VOL	UG/L	WATER	J	1	.3000000			.30	.30	93/03/23	93/03/23
				U	7	2.000000	.0000000	.0000000	2.00	2.00	93/04/19	93/10/25
				TOT	8	1.787500	.3612500	.6010400	2.00	.30	93/03/23	93/10/25
78135	DIMETHYL CYCLOPNT HOH	UG/L	WATER	J	1	.3000000			.30	.30	93/03/23	93/03/23
				U	7	2.000000	.0000000	.0000000	2.00	2.00	93/04/19	93/10/25
				TOT	8	1.787500	.3612500	.6010400	2.00	.30	93/03/23	93/10/25
80087	BOD 20C 20DAYCAR	MG/L	WATER		1	1.800000			1.8	1.8	80/04/22	80/04/22
82033	MG TOTAL MG	UG/L	WATER		2	5084.000	31744.00	178.1700	5210	4958	94/08/30	94/08/30
82035	SODIUM TOTAL NA	UG/L	WATER		176	32268.00	3233E+06	56864.00	550810	6001	88/03/01	98/09/17
85817	BETAGROS WAT WHL	PC/L	WATER	K	5	3.240000	.1880200	.4336100	4.000	3.000	87/04/18	97/06/09

WQN0158 ABMS0158 01476510 DELCORA CSO LTCP
39 52 28.0 075 22 56.0 1
RIDLEY CRK-150YDS DWN JCT WATERVL/COBBL
42045 PENNSYLVANIA DELAWARE
DELAWARE RIVER 020300
RIDLEY CREEK /TYPA/AMBNT/STREAM
21PA 770419 02040202081 0003.760 ON
0000 FEET DEPTH

PARAMETER			MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
00010 WATER	TEMP	CENT	WATER		22	14.38600	69.26100	8.322300	27.0	.0	80/03/12	87/11/17
00011 WATER	TEMP	FAHN	WATER	$	22	57.89500	224.4100	14.98000	80.6	32.0	80/03/12	87/11/17
00076 TURB	TRBIDMTR	HACH FTU	WATER		9	10.83300	304.9400	17.46300	53.0	1.5	80/03/12	82/02/02
00094 CNDUCTVY	FIELD	MICROMHO	WATER		2	165.0000	2450.000	49.49800	200	130	80/03/12	86/05/19
00095 CNDUCTVY	AT 25C	MICROMHO	WATER		33	235.4600	1799.100	42.41600	370	140	80/03/12	87/11/17
00300 DO		MG/L	WATER		21	9.738100	7.702500	2.775300	14.6	5.0	80/03/12	87/11/17
00301 DO	SATUR	PERCENT	WATER	$	21	91.20700	297.7600	17.25600	121.0	58.0	80/03/12	87/11/17
00310 BOD	5 DAY	MG/L	WATER		21	2.390500	1.727900	1.314500	5.5	.7	80/08/18	85/11/06
00340 COD	HI LEVEL	MG/L	WATER		1	10.00000			10	10	85/08/15	85/08/15
00400 PH		SU	WATER		13	7.743900	.7310000	.8549800	10.00	7.00	80/03/12	87/11/17
00403 PH	LAB	SU	WATER		33	7.039400	.2636900	.5135100	7.9	5.9	80/03/12	87/11/17
00410 T ALK	CACO3	MG/L	WATER		33	38.84900	44.50800	6.671500	52	20	80/03/12	87/11/17
00515 RESIDUE	DISS-105 C	MG/L	WATER		33	178.6400	2479.500	49.79500	360	84	80/03/12	87/11/17
00530 RESIDUE	TOT NFLT	MG/L	WATER		2	10.00000	72.00000	8.485300	16	4	80/08/18	85/08/15
00610 NH3+NH4-	N TOTAL	MG/L	WATER		33	.4512100	.3083700	.5553100	2.640	.010	80/03/12	87/11/17
00612 UN-IONZD	NH3-N	MG/L	WATER	$	22	.0304960	.0163700	.1279500	.603	.0003	80/03/12	87/11/17
00615 NO2-N	TOTAL	MG/L	WATER		33	.0782420	.0064867	.0805400	.440	.002	80/03/12	87/11/17
00619 UN-IONZD	NH3-NH3	MG/L	WATER	$	22	.0370800	.0242020	.1555700	.733	.0004	80/03/12	87/11/17
00620 NO3-N	TOTAL	MG/L	WATER		32	2.710300	.8047600	.8970900	4.870	1.260	80/03/12	87/11/17
				L	1	2.000000			2.000	2.000	86/11/18	86/11/18
				TOT	33	2.688800	.7949000	.8915700	4.870	1.260	80/03/12	87/11/17
00625 TOT KJEL	N	MG/L	WATER		1	.4200000			.420	.420	85/08/15	85/08/15
00665 PHOS-TOT		MG/L P	WATER		33	.4724200	.0656190	.2561600	.950	.150	80/03/12	87/11/17
00900 TOT HARD	CACO3	MG/L	WATER		33	67.09100	74.15000	8.611100	81	45	80/03/12	87/11/17
00916 CALCIUM	CA-TOT	MG/L	WATER		32	14.43600	10.19200	3.192400	19.4	6.3	80/03/12	87/11/17
00927 MGNSIUM	MG,TOT	MG/L	WATER		32	8.127800	2.529700	1.590500	12.9	5.5	80/03/12	87/11/17
00940 CHLORIDE	TOTAL	MG/L	WATER		33	28.37900	132.4900	11.51000	73	7	80/03/12	87/11/17
00945 SULFATE	SO4-TOT	MG/L	WATER		33	24.77300	68.70500	8.288900	45	10	80/03/12	87/11/17
01002 ARSENIC	AS,TOT	UG/L	WATER	K	10	5.500000	5.833300	2.415200	10	4	80/08/18	87/08/12
01027 CADMIUM	CD,TOT	UG/L	WATER		2	1.205000	1.980100	1.407200	2	.2	86/08/19	87/08/12
				K	8	.9875000	.7898200	.8887200	3	.2	80/08/18	87/05/21
				TOT	10	1.031000	.8427200	.9180000	3	.2	80/08/18	87/08/12
01032 CHROMIUM	HEX-VAL	UG/L	WATER	K	2	10.00000	.0000000	.0000000	10	10	83/08/16	84/08/02
01034 CHROMIUM	CR,TOT	UG/L	WATER		3	8.200000	9.720100	3.117700	10	5	80/08/18	87/08/12
				K	7	13.14300	273.1400	16.52700	50	4	82/08/02	87/05/21
				TOT	10	11.66000	189.9600	13.78300	50	4	80/08/18	87/08/12
01042 COPPER	CU,TOT	UG/L	WATER		4	15.00000	33.33300	5.773500	20	10	80/08/18	83/08/16
				K	6	55.00000	150.0000	12.24800	80	50	84/08/02	87/08/12
				TOT	10	39.00000	521.1100	22.82800	80	10	80/08/18	87/08/12

WQN0158 ABMS0158 01476510 DELCORA CSO LTCP
39 52 28.0 075 22 56.0 1
RIDLEY CRK-150YDS DWN JCT WATERVL/COBBL
42045 PENNSYLVANIA DELAWARE
DELAWARE RIVER 020300
RIDLEY CREEK /TYPA/AMBNT/STREAM
21PA 770419 02040202081 0003.760 ON
0000 FEET DEPTH

PARAMETER			MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
01045 IRON	FE,TOT	UG/L	WATER		33	556.0600	631040.0	794.3800	4430	130	80/03/12	87/11/17
01051 LEAD	PB,TOT	UG/L	WATER		1	5.000000			5	5	87/08/12	87/08/12
				K	9	10.77800	222.2000	14.90600	50	4	80/08/18	87/05/21
				TOT	10	10.20000	200.8500	14.17200	50	4	80/08/18	87/08/12
01055 MANGNESE	MN	UG/L	WATER		6	46.66700	266.6700	16.33000	70.0	30.0	80/08/18	87/05/21
				K	4	50.00000	.0000000	.0000000	50.0	50.0	84/08/02	87/08/12
				TOT	10	48.00000	151.1100	12.29300	70.0	30.0	80/08/18	87/08/12
01067 NICKEL	NI,TOTAL	UG/L	WATER		3	26.66700	433.3400	20.81700	50	10	81/08/19	86/11/18
				K	7	51.42900	1881.000	43.37000	140	10	80/08/18	87/08/12
				TOT	10	44.00000	1493.300	38.64400	140	10	80/08/18	87/08/12
01092 ZINC	ZN,TOT	UG/L	WATER		9	21.11100	161.1100	12.69300	50	10	80/08/18	87/08/12
				K	1	10.00000			10	10	87/05/21	87/05/21
				TOT	10	20.00000	155.5600	12.47200	50	10	80/08/18	87/08/12
01105 ALUMINUM	AL,TOT	UG/L	WATER		8	346.2500	77541.00	278.4600	1000	140	80/08/18	87/08/12
				K	2	125.0000	1250.000	35.35500	150	100	84/08/02	86/08/19
				TOT	10	302.0000	69151.00	262.9700	1000	100	80/08/18	87/08/12
01330 ODOR	ATMOSPH	SEVERITY	WATER		2	.5000000	.5000000	.7071100	1	0	80/03/12	82/05/05
31616 FEC COLI	MFM-FCBR	/100ML	WATER		27	1072.000	2335000	1528.100	5500	25	80/03/12	87/11/17
				K	1	25.00000			25	25	81/02/17	81/02/17
				L	1	5000.000			5000	5000	82/08/02	82/08/02
				TOT	29	1171.400	2748200	1657.800	5500	25	80/03/12	87/11/17
46001 WATER	APPEAR	CODE	WATER		3	214.0000	29701.00	172.3400	413	114	80/03/12	84/11/29
46006 PLANARI	F WORM	NO/FT2	WATER	M	2	.0000000	.0000000	.0000000	0	0	85/08/14	87/10/20
46008 NEMATODA	R WORM	NO/FT2	WATER	M	1	.0000000			0	0	87/10/20	87/10/20
46014 HIRUD	LEECH	NO/FT2	WATER	M	1	.0000000			0	0	83/08/08	83/08/08
46015 ASELL	SOW BUG	NO/FT2	WATER	M	5	.0000000	.0000000	.0000000	0	0	81/11/23	87/10/20
46018 GAMMAR	SCUD	NO/FT2	WATER	M	2	.0000000	.0000000	.0000000	0	0	81/11/23	83/08/08
46019 ASTACIDA	CRAYFISH	NO/FT2	WATER	M	1	.0000000			0	0	87/10/20	87/10/20
46028 BAETIDAE	MAYFLY	NO/FT2	WATER	M	5	.0000000	.0000000	.0000000	0	0	81/11/23	87/10/20
46029 HEPTAGEN	MAYFLY	NO/FT2	WATER	M	5	.0000000	.0000000	.0000000	0	0	81/11/23	87/10/20
46037 COENAG	DAMSEL	NO/FT2	WATER	M	1	.0000000			0	0	83/08/08	83/08/08
46041 GERRIDAE	BUG	NO/FT2	WATER	M	1	.0000000			0	0	85/08/14	85/08/14
46048 CORIXI	BUG	NO/FT2	WATER	M	1	.0000000			0	0	87/10/20	87/10/20
46049 SIALIDAE	ALDER	NO/FT2	WATER	M	2	.0000000	.0000000	.0000000	0	0	83/08/08	85/08/14
46050 CORYDAL	FISHFLY	NO/FT2	WATER	M	1	.0000000			0	0	81/11/23	81/11/23
46051 HYDROPT	CADDIS	NO/FT2	WATER	M	1	.0000000			0	0	81/11/23	81/11/23
46053 HYDROPSY	CADDIS	NO/FT2	WATER	M	5	.0000000	.0000000	.0000000	0	0	81/11/23	87/10/20
46055 PHILOPT	CADDIS	NO/FT2	WATER	M	1	.0000000			0	0	83/08/08	83/08/08
46069 HALIPL	BEETLE	NO/FT2	WATER	M	1	.0000000			0	0	87/10/20	87/10/20

WQN0158 ABMS0158 01476510 DELCORA CSO LTCP
39 52 28.0 075 22 56.0 1
RIDLEY CRK-150YDS DWN JCT WATERVL/COBBL
42045 PENNSYLVANIA DELAWARE
DELAWARE RIVER 020300
RIDLEY CREEK /TYPA/AMBNT/STREAM
21PA 770419 02040202081 0003.760 ON
0000 FEET DEPTH

PARAMETER			MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
46071	PSEPHEN BEETLE	NO/FT2	WATER	M	1	.0000000			0	0	83/08/08	83/08/08
46075	ELMIDAE BEETLE	NO/FT2	WATER	M	4	.0000000	.0000000	.0000000	0	0	82/08/02	87/10/20
46078	TIPUL FLY	NO/FT2	WATER	M	5	.0000000	.0000000	.0000000	0	0	81/11/23	87/10/20
46083	CERATOPO FLY	NO/FT2	WATER	M	1	.0000000			0	0	83/08/08	83/08/08
46084	SIMULID FLY	NO/FT2	WATER	M	3	.0000000	.0000000	.0000000	0	0	81/11/23	87/10/20
46087	TENDIPED FLY	NO/FT2	WATER	M	5	.0000000	.0000000	.0000000	0	0	81/11/23	87/10/20
46095	PHYSID SNAIL	NO/FT2	WATER	M	4	.0000000	.0000000	.0000000	0	0	81/11/23	87/10/20
46097	PLANORB SNAIL	NO/FT2	WATER	M	1	.0000000			0	0	87/10/20	87/10/20
46098	ANCYL SNAIL	NO/FT2	WATER	M	2	.0000000	.0000000	.0000000	0	0	82/08/02	87/10/20
46104	SPHAERI CLAM	NO/FT2	WATER	M	1	.0000000			0	0	87/10/20	87/10/20
46106	OLIGOCHT AQ E WRM	NO/FT2	WATER	M	4	.0000000	.0000000	.0000000	0	0	81/11/23	87/10/20
46570	CAL HARD CA MG	MG/L	WATER	$	32	69.51800	122.5700	11.07100	93	40	80/03/12	87/11/17
70508	T ACDITY AS CACO3	HOT-MG/L	WATER		26	.0000000	.0000000	.0000000	0	0	80/03/12	87/11/17
				C	7	.0000000	.0000000	.0000000	0	0	84/05/03	85/11/06
				TOT	33	.0000000	.0000000	.0000000	0	0	80/03/12	87/11/17
71900	MERCURY HG,TOTAL	UG/L	WATER	K	10	1.500000	.2777800	.5270500	2.0	1.0	80/08/18	87/08/12
74041	WQF SAMPLE	UPDATED	WATER		12	870540.0	50141000	7081.000	880608	861017	85/08/14	87/11/17
82079	TURBIDTY LAB	NTU	WATER		23	3.873900	11.42700	3.380300	13.0	.8	82/05/05	87/11/17
				K	1	1.000000			1.0	1.0	82/11/08	82/11/08
				TOT	24	3.754200	11.27400	3.357700	13.0	.8	82/05/05	87/11/17

01482100
39 41 21.0 075 31 19.0 2
DELAWARE R AT DMB AT WILMINGTON, DE
10003 DELAWARE NEW CASTLE
020891

DELCORA CSO LTCP

/TYPA/AMBNT/STREAM

112WRD 02040204
0000 FEET DEPTH

PARAMETER				MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
00010	WATER	TEMP	CENT	WATER		1	7.200000			7.2	7.2	80/11/26	80/11/26
00011	WATER	TEMP	FAHN	WATER	$	1	44.96000			45.0	45.0	80/11/26	80/11/26
00028	ANALYZE	AGENCY	CODE	WATER		3	80010.00	.0000000	.0000000	80010	80010	80/05/22	80/11/26
00095	CNDUCTVY	AT 25C	MICROMHO	WATER		3	4424.300	12205000	3493.600	6800	413	80/05/22	80/11/26
00400	PH		SU	WATER		3	7.000000	.4300200	.6557600	7.70	6.40	80/05/22	80/11/26
00403	PH	LAB	SU	WATER		1	7.400000			7.4	7.4	80/11/26	80/11/26
00405	CO2		MG/L	WATER		3	12.63300	122.4000	11.06400	24.0	1.9	80/05/22	80/11/26
00410	T ALK	CACO3	MG/L	WATER		3	43.00000	127.0000	11.27000	50	30	80/05/22	80/11/26
00440	HCO3 ION	HCO3	MG/L	WATER		3	52.66700	184.3300	13.57700	61	37	80/05/22	80/11/26
00631	NO2&NO3	N-DISS	MG/L	WATER		3	1.806700	1.442100	1.200900	2.5	.4	80/05/22	80/11/26
00660	ORTHOPO4	PO4	MG/L	WATER		2	.0300000	.0018000	.0424270	.06	.00	80/05/22	80/11/26
00671	PHOS-DIS	ORTHO	MG/L P	WATER		2	.0100000	.0002000	.0141420	.020	.000	80/05/22	80/11/26
00681	D ORG C	C	MG/L	WATER		3	4.166700	2.303300	1.517700	5.8	2.8	80/05/22	80/11/26
00900	TOT HARD	CACO3	MG/L	WATER		2	315.5000	109980.0	331.6300	550	81	80/05/22	80/11/26
00902	NC HARD	CACO3	MG/L	WATER		2	275.5000	100800.0	317.4900	500	51	80/05/22	80/11/26
00915	CALCIUM	CA,DISS	MG/L	WATER		2	35.50000	684.5000	26.16300	54.0	17.0	80/05/22	80/11/26
00925	MGNSIUM	MG,DISS	MG/L	WATER		2	54.70000	4104.200	64.06400	100.0	9.4	80/05/22	80/11/26
00930	SODIUM	NA,DISS	MG/L	WATER		2	506.0000	412230.0	642.0500	960.00	52.00	80/05/22	80/11/26
00931	SODIUM	ADSBTION	RATIO	WATER		2	11.90000	165.6200	12.86900	21.0	2.8	80/05/22	80/11/26
00932	PERCENT	SODIUM	%	WATER		2	67.50000	220.5000	14.84900	78	57	80/05/22	80/11/26
00935	PTSSIUM	K,DISS	MG/L	WATER		2	22.20000	706.8800	26.58700	41.00	3.40	80/05/22	80/11/26
00940	CHLORIDE	TOTAL	MG/L	WATER		3	1325.700	1231900	1109.900	2200	77	80/05/22	80/11/26
00945	SULFATE	SO4-TOT	MG/L	WATER		3	250.3300	34090.00	184.6400	390	41	80/05/22	80/11/26
00955	SILICA	DISOLVED	MG/L	WATER		2	1.025000	1.201300	1.096000	1.8	.3	80/05/22	80/11/26
01003	ARSENIC	SEDMG/KG	DRY WGT	WATER		1	4.000000			4.00	4.00	80/05/22	80/05/22
01005	BARIUM	BA,DISS	UG/L	WATER		2	35.00000	50.00000	7.071100	40	30	80/05/22	80/11/26
01010	BERYLIUM	BE,DISS	UG/L	WATER		1	.0000000			.00	.00	80/11/26	80/11/26
					K	1	1.000000			1.00	1.00	80/05/22	80/05/22
					TOT	2	.5000000	.5000000	.7071100	1.00	.00	80/05/22	80/11/26
01025	CADMIUM	CD,DISS	UG/L	WATER		1	55.00000			55	55	80/11/26	80/11/26
					K	1	1.000000			1	1	80/05/22	80/05/22
					TOT	2	28.00000	1458.000	38.18400	55	1	80/05/22	80/11/26
01028	CD MUD	DRY WGT	MG/KG-CD	WATER	K	1	10.00000			10.00	10.00	80/05/22	80/05/22
01029	CHROMIUM	SEDMG/KG	DRY WGT	WATER	K	1	10.00000			10.00	10.00	80/05/22	80/05/22
01035	COBALT	CO,DISS	UG/L	WATER		1	.0000000			0	0	80/11/26	80/11/26
					K	1	3.000000			3	3	80/05/22	80/05/22
					TOT	2	1.500000	4.500000	2.121300	3	0	80/05/22	80/11/26
01038	CO MUD	DRY WGT	MG/KG-CO	WATER		1	30.00000			30.00	30.00	80/05/22	80/05/22
01040	COPPER	CU,DISS	UG/L	WATER		1	10.00000			10	10	80/11/26	80/11/26

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DELAWARE R AT DMB AT WILMINGTON, DE
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DELCORA CSO LTCP

/TYPA/AMBNT/STREAM

112WRD 02040204
0000 FEET DEPTH

PARAMETER			MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
01040	COPPER	CU,DISS UG/L	WATER	K	1	10.00000			10	10	80/05/22	80/05/22
01040	COPPER	CU,DISS UG/L	WATER	TOT	2	10.00000	.0000000	.0000000	10	10	80/05/22	80/11/26
01043	COPPER	SEDMG/KG DRY WGT	WATER		1	20.00000			20.00	20.00	80/05/22	80/05/22
01046	IRON	FE,DISS UG/L	WATER		2	17.50000	220.5000	14.84900	28	7	80/05/22	80/11/26
01049	LEAD	PB,DISS UG/L	WATER		1	.0000000			0	0	80/11/26	80/11/26
01052	LEAD	SEDMG/KG DRY WGT	WATER		1	60.00000			60.00	60.00	80/05/22	80/05/22
01053	MN MUD	DRY WGT MG/KG-MN	WATER		1	940.0000			940.00	940.00	80/05/22	80/05/22
01056	MANGNESE	MN,DISS UG/L	WATER		2	72.50000	4512.500	67.17500	120.0	25.0	80/05/22	80/11/26
01060	MOLY	MO,DISS UG/L	WATER		2	14.50000	420.5000	20.50600	29	0	80/05/22	80/11/26
01080	STRONTUM	SR,DISS UG/L	WATER		2	429.5000	218460.0	467.4000	760	99	80/05/22	80/11/26
01085	VANADIUM	V,DISS UG/L	WATER		1	.0000000			0	0	80/11/26	80/11/26
				K	1	6.000000			6	6	80/05/22	80/05/22
				TOT	2	3.000000	18.00000	4.242600	6	0	80/05/22	80/11/26
01090	ZINC	ZN,DISS UG/L	WATER		2	10.00000	18.00000	4.242600	13	7	80/05/22	80/11/26
01093	ZINC	SEDMG/KG DRY WGT	WATER		1	91.00000			91.00	91.00	80/05/22	80/05/22
01130	LITHIUM	LI,DISS UG/L	WATER		2	13.00000	98.00000	9.899500	20	6	80/05/22	80/11/26
01148	SELENIUM	SEDMG/KG DRY WGT	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
01170	FE MUD	DRY WGT MG/KG-FE	WATER		1	23000.00			23000.00	23000.00	80/05/22	80/05/22
32101	DICLBRMT	TOTUG/L	WATER		2	.0000000	.0000000	.0000000	.0	.0	80/09/03	80/11/26
32102	CARBNTET	TOTUG/L	WATER		2	.0000000	.0000000	.0000000	.0	.0	80/09/03	80/11/26
32103	12DICLET	TOTUG/L	WATER		2	.0000000	.0000000	.0000000	.0	.0	80/09/03	80/11/26
32105	CLDIBRMT	TOTUG/L	WATER		2	.0000000	.0000000	.0000000	.0	.0	80/09/03	80/11/26
32106	CHLRFORM	TOTUG/L	WATER		2	.0000000	.0000000	.0000000	.0	.0	80/09/03	80/11/26
34010	TOLUENE	TOT UG/L	WATER		1	10.00000			10.00	10.00	80/11/26	80/11/26
34030	BENZENE	TOT UG/L	WATER		2	.0000000	.0000000	.0000000	.00	.00	80/09/03	80/11/26
34475	TETRACHL	OROETHYL TOTWUG/L	WATER		2	.0000000	.0000000	.0000000	.000	.000	80/09/03	80/11/26
34496	11DICHLO	ROETHANE TOTWUG/L	WATER		2	.0000000	.0000000	.0000000	.000	.000	80/09/03	80/11/26
34506	111TRICH	LOROETHA TOTWUG/L	WATER		2	.0000000	.0000000	.0000000	.000	.000	80/09/03	80/11/26
34541	12DICHLO	ROPROPAN TOTWUG/L	WATER		2	.0000000	.0000000	.0000000	.000	.000	80/09/03	80/11/26
39180	TRICHLOR	ETHYLENE TOT UG/L	WATER		2	.0000000	.0000000	.0000000	.000	.000	80/09/03	80/11/26
39250	NAPTHAL	ENES, PC . UG/L	WATER		1	.0000000			.00	.00	80/11/26	80/11/26
39251	PCNS	MUD UG/KG	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39333	ALDRIN	SEDUG/KG DRY WGT	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39343	GBHC-MUD	LINDANE DRYUG/KG	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39351	CDANEDRY	TECH&MET MUDUG/KG	WATER		1	7.000000			7.00	7.00	80/05/22	80/05/22
39363	DDD	MUD UG/KG	WATER		1	12.00000			12.00	12.00	80/05/22	80/05/22
39368	DDE	MUD UG/KG	WATER		1	10.00000			10.00	10.00	80/05/22	80/05/22
39373	DDT	MUD UG/KG	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39383	DIELDRIN	SEDUG/KG DRY WGT	WATER		1	.0000000			.00	.00	80/05/22	80/05/22

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DELAWARE R AT DMB AT WILMINGTON, DE
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/TYPA/AMBNT/STREAM

112WRD 02040204
0000 FEET DEPTH

	PARAMETER			MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
39389	ENDOSULN	MUD	UG/KG	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39393	ENDRIN	SEDUG/KG	DRY WGT	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39399	ETHION	MUD	UG/KG	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39403	TOXAPHEN	SEDUG/KG	DRY WGT	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39413	HEPTCHLR	SEDUG/KG	DRY WGT	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39423	HPCHLREP	SEDUG/KG	DRY WGT	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39481	MTHXYCLR	MUD DRY	UG/KG	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39519	PCBS	MUD	UG/KG	WATER		1	42.00000			42.00	42.00	80/05/22	80/05/22
39531	MALATHN	MUD	UG/KG	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39541	PARATHN	MUD	UG/KG	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39571	DIAZINON	MUD	UG/KG	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39601	MPARATHN	MUD	UG/KG	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39758	MIREX	BOT MAT	UG/KG	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39787	TRITHION	MUD	UG/KG	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39791	MTRTHION	MUD	UG/KG	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
46570	CAL HARD	CA MG	MG/L	WATER	$	2	313.9000	108340.0	329.1400	547	81	80/05/22	80/11/26
70300	RESIDUE	DISS-180 C	MG/L	WATER		2	1785.000	4712500	2170.800	3320	250	80/05/22	80/11/26
70301	DISS SOL	SUM	MG/L	WATER		2	1720.000	4500000	2121.300	3220	220	80/05/22	80/11/26
70303	DISS SOL	TONS PER ACRE-FT		WATER		2	2.430000	8.736200	2.955700	4.52	.34	80/05/22	80/11/26
71921	MERCURY	SEDMG/KG	DRY WGT	WATER		1	.0000000			.0	.0	80/05/22	80/05/22
81886	PERTHANE	SED DRY WGT	UG/KG	WATER		1	.0000000			.000	.000	80/05/22	80/05/22

422107 DELCORA CSO LTCP
39 57 07.0 075 10 57.0 2

42000 PENNSYLVANIA
AT WALNUT STREET 020592

/TYPA/AMBNT/STREAM

31DELRBC HQ 02040203001 0007.190 OFF
0000 FEET DEPTH

PARAMETER				MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
00008	LAB	IDENT.	NUMBER	WATER		50	40475.00	2080E+06	45613.00	128241	1284	80/10/13	92/09/14
00010	WATER	TEMP	CENT	WATER		25	13.64000	75.79100	8.705800	28.8	1.0	80/09/24	92/05/05
00011	WATER	TEMP	FAHN	WATER	$	25	56.55200	245.5600	15.67100	83.8	33.8	80/09/24	92/05/05
00061	STREAM	FLOW,	INST-CFS	WATER		3	3295.400	5697700	2387.000	6004	1500	81/02/23	81/07/08
00065	STREAM	STAGE	FEET	WATER		65	6.313000	.1234300	.3513300	7.16	5.75	81/02/23	92/05/05
00070	TURB	JKSN	JTU	WATER		2	25.50000	612.5000	24.74900	43.0	8.0	81/04/29	81/06/25
00094	CNDUCTVY	FIELD	MICROMHO	WATER		23	231.7400	12095.00	109.9800	440	60	85/09/19	92/05/05
00095	CNDUCTVY	AT 25C	MICROMHO	WATER		91	387.1300	7554.700	86.91800	610	220	81/04/29	92/09/14
00224	INVALID	PAR	NUMBER	WATER		1	.0030000			.0030000	.0030000	81/02/23	81/02/23
00300	DO		MG/L	WATER		25	10.24800	7.930400	2.816100	15.7	5.7	80/09/24	92/05/05
00301	DO	SATUR	PERCENT	WATER	$	25	94.31500	208.1600	14.42800	115.1	65.5	80/09/24	92/05/05
00310	BOD	5 DAY	MG/L	WATER		105	2.466800	2.313200	1.520900	9.5	.2	80/01/17	92/09/14
					K	2	.2000000	.0000000	.0000000	.2	.2	84/07/30	86/08/26
					TOT	107	2.424400	2.364700	1.537800	9.5	.2	80/01/17	92/09/14
00314	BOD INH	5 DAY TO T	MG/L	WATER		7	1.000000	.2000000	.4472200	1.6	.4	87/07/13	88/04/20
					K	3	.4333300	.0033339	.0577400	.5	.4	87/09/24	87/12/21
					TOT	10	.8300000	.2090000	.4571700	1.6	.4	87/07/13	88/04/20
00340	COD	HI LEVEL	MG/L	WATER		12	25.67800	81.94300	9.052200	36	8	80/01/17	81/06/25
00400	PH		SU	WATER		25	7.556000	.2223200	.4715100	8.40	6.50	85/09/19	92/05/05
00403	PH	LAB	SU	WATER		108	7.296200	.2095500	.4577700	8.9	6.1	80/01/17	92/09/14
00410	T ALK	CACO3	MG/L	WATER		106	72.09400	258.8500	16.08900	118	40	80/01/17	92/09/14
00437	ACIDITY	FROM CO2	MG/L	WATER		1	.0000000			0	0	80/09/24	80/09/24
00500	RESIDUE	TOTAL	MG/L	WATER		2	429.0000	53138.00	230.5200	592	266	81/04/29	81/06/25
00505	RESIDUE	TOT VOL	MG/L	WATER		2	277.0000	55778.00	236.1700	444	110	81/04/29	81/06/25
00510	RESIDUE	TOT FIX	MG/L	WATER		3	101.7400	7595.200	87.15100	156	1	80/09/24	81/06/25
00515	RESIDUE	DISS-105 C	MG/L	WATER		91	256.3400	5320.200	72.94000	452	102	81/04/29	92/09/14
00525	RESIDUE	FIX FLT	MG/L	WATER		1	1.550000			2	2	81/08/18	81/08/18
00530	RESIDUE	TOT NFLT	MG/L	WATER		87	13.23000	72.24900	8.499900	44	1	80/12/09	92/08/17
					K	5	2.000000	.0000000	.0000000	2	2	84/11/14	92/09/14
					TOT	92	12.62000	74.83200	8.650500	44	1	80/12/09	92/09/14
00535	RESIDUE	VOL NFLT	MG/L	WATER		3	10.00000	16.00000	4.000000	14	6	80/09/24	81/06/25
00540	RESIDUE	FIX NFLT	MG/L	WATER		3	6.000000	28.00000	5.291500	12	2	80/09/24	81/06/25
00545	RESIDUE	SETTLBLE	ML/L	WATER		1	.5000000			.5	.5	80/09/24	80/09/24
					K	2	.5000000	.0000000	.0000000	.5	.5	81/04/29	81/06/25
					TOT	3	.5000000	.0000000	.0000000	.5	.5	80/09/24	81/06/25
00550	OIL-GRSE	TOT-SXLT	MG/L	WATER		1	2.000000			2.0	2.0	80/09/24	80/09/24
00556	OIL-GRSE	FREON-GR	MG/L	WATER	K	5	2.000000	.0000000	.0000000	2.00	2.00	80/10/06	81/06/25
00566	IMCO NOS	1,2,3,6	GPD	WATER		1	2.000000			2.00	2.00	81/02/23	81/02/23
00605	ORG N	N	MG/L	WATER		17	.5135300	.0502990	.2242800	1.090	.130	87/07/13	92/09/14

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42000 PENNSYLVANIA
AT WALNUT STREET 020592

/TYPA/AMBNT/STREAM

31DELRBC HQ 02040203001 0007.190 OFF
0000 FEET DEPTH

PARAMETER		MEDIUM		RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
00610	NH3+NH4- N TOTAL	MG/L	WATER		108	.5785100	.9577200	.9786300	9.240	.010	80/01/17	92/09/14
00612	UN-IONZD NH3-N	MG/L	WATER	$	25	.0044182	.0000324	.0056933	.027	.0001	80/09/24	92/05/05
00615	NO2-N TOTAL	MG/L	WATER		108	.0733050	.0038137	.0617550	.396	.010	80/01/17	92/09/14
00619	UN-IONZD NH3-NH3	MG/L	WATER	$	25	.0053721	.0000479	.0069224	.033	.0002	80/09/24	92/05/05
00620	NO3-N TOTAL	MG/L	WATER		107	2.785500	.6234200	.7895700	5.540	.100	80/01/17	92/09/14
				K	1	22.00000			22.000	22.000	83/08/11	83/08/11
				TOT	108	2.963400	4.036100	2.009000	22.000	.100	80/01/17	92/09/14
00625	TOT KJEL N	MG/L	WATER		89	1.493300	8.393200	2.897100	25.000	.000	80/09/24	92/09/14
00665	PHOS-TOT	MG/L P	WATER		90	.3380000	.0245870	.1568000	.990	.140	80/12/09	92/09/14
00720	CYANIDE CN-TOT	MG/L	WATER		15	.0080667	.0000169	.0041139	.015	.001	80/01/17	81/06/25
00722	CYANIDE FREE CN	MG/L	WATER		6	.0050000	.0000124	.0035214	.01	.002	80/02/29	80/10/06
00724	CYANIDE COMPLEX	UG/L	WATER		5	.0028000	.0000042	.0020494	.005	.001	81/01/29	81/06/25
00900	TOT HARD CACO3	MG/L	WATER		5	88.00000	6791.500	82.41100	186	2	80/09/24	81/06/25
00940	CHLORIDE TOTAL	MG/L	WATER		93	34.09100	177.8100	13.33500	96	4	80/09/24	92/09/14
01002	ARSENIC AS,TOT	UG/L	WATER		1	980.0000			980	980	85/06/18	85/06/18
				K	87	174.7400	135520.0	368.1400	1000	2	81/08/18	92/09/14
				TOT	88	183.8900	141340.0	375.9500	1000	2	81/08/18	92/09/14
01027	CADMIUM CD,TOT	UG/L	WATER		47	1.407700	10.08400	3.175500	17	.2	80/10/06	88/04/20
				K	55	4.861800	32.35800	5.688400	18	.2	80/01/17	92/09/14
				TOT	102	3.270200	24.88700	4.988700	18	.2	80/01/17	92/09/14
01034	CHROMIUM CR,TOT	UG/L	WATER		31	62.09700	37788.00	194.3900	1070	6	80/01/17	87/03/31
				K	65	28.73900	623.2600	24.96500	70	4	80/03/13	88/04/20
				TOT	96	39.51100	12599.00	112.2400	1070	4	80/01/17	88/04/20
01042	COPPER CU,TOT	UG/L	WATER		60	29.00800	683.2800	26.14000	140	9	80/01/17	92/09/14
				K	43	24.51200	835.2600	28.90100	80	4	81/01/29	92/05/05
				TOT	103	27.13100	744.1200	27.27900	140	4	80/01/17	92/09/14
01045	IRON FE,TOT	UG/L	WATER		104	506.5400	267120.0	516.8400	4255	30	80/01/17	92/09/14
				K	1	10.00000			10	10	86/01/16	86/01/16
				TOT	105	501.8100	266900.0	516.6300	4255	10	80/01/17	92/09/14
01047	FERROUS IRON	UG/L	WATER		1	30.00000			30	30	82/04/13	82/04/13
01051	LEAD PB,TOT	UG/L	WATER		52	28.94800	5967.000	77.24600	490	.6	80/10/13	92/07/15
				K	50	27.48000	686.7000	26.20500	90	4	80/01/17	92/09/14
				TOT	102	28.22800	3346.700	57.85100	490	.6	80/01/17	92/09/14
01054	MANGNESE MN,SUSP	UG/L	WATER		1	140.0000			140.0	140.0	80/10/13	80/10/13
01055	MANGNESE MN	UG/L	WATER		9	150.0000	5925.000	76.97400	330.0	80.0	80/03/13	81/08/18
01062	MOLY MO,TOT	UG/L	WATER		1	130.0000			130	130	81/01/29	81/01/29
01067	NICKEL NI,TOTAL	UG/L	WATER		13	20.00000	100.0000	10.00000	40	10	80/01/17	81/08/18
				K	10	20.50000	52.50000	7.245700	25	10	80/06/19	92/09/14
				TOT	23	20.21700	76.08800	8.722800	40	10	80/01/17	92/09/14

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0000 FEET DEPTH

PARAMETER			MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
01092 ZINC	ZN,TOT	UG/L	WATER		87	42.61600	1323.500	36.37900	210	.4	80/01/17	92/09/14
				K	16	15.50000	96.80000	9.838700	32	10	84/12/13	88/01/26
				TOT	103	38.40400	1227.500	35.03600	210	.4	80/01/17	92/09/14
01105 ALUMINUM	AL,TOT	UG/L	WATER		6	420.0000	46080.00	214.6600	720	150	80/04/25	81/07/30
01147 SELENIUM	SE,TOT	UG/L	WATER		3	140.3300	50960.00	225.7400	401	10	81/12/16	85/06/18
				K	69	217.3300	159720.0	399.6500	1000	6	81/08/18	92/09/14
				TOT	72	214.1300	154650.0	393.2500	1000	6	81/08/18	92/09/14
01330 ODOR	ATMOSPH	SEVERITY	WATER		3	1.000000	.0000000	.0000000	1	1	81/04/29	81/06/25
31616 FEC COLI	MFM-FCBR	/100ML	WATER		33	17565.00	1284E+06	35842.00	190000	0	82/03/15	92/09/14
				K	4	7775.000	73069000	8548.100	20000	100	82/05/11	92/05/05
				L	10	12900.00	56100000	7490.000	20000	5000	81/08/18	87/06/03
				TOT	47	15739.00	9190E+05	30316.00	190000	0	81/08/18	92/09/14
32730 PHENOLS	TOTAL	UG/L	WATER		12	.1666700	.3333300	.5773500	2	0	80/01/17	81/06/25
46001 WATER	APPEAR	CODE	WATER		3	244.3300	3749.400	61.23200	315	207	81/04/29	81/06/25
46002 PHENOLS	PHOTOMET	UG/L	WATER		1	5.000000			5	5	81/03/09	81/03/09
71900 MERCURY	HG,TOTAL	UG/L	WATER		3	1.436700	.2620300	.5118900	2.0	1.0	81/12/16	92/09/14
				K	95	24.73700	42363.00	205.8200	2000.0	1.0	80/01/17	92/07/15
				TOT	98	24.02400	41069.00	202.6600	2000.0	1.0	80/01/17	92/09/14
74041 WQF	SAMPLE	UPDATED	WATER		36	889660.0	6773E+05	26025.00	940621	860606	86/02/17	92/09/14

6 TOTAL STATIONS PROCESSED
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	STA BEG	STA END	# OF OBS	# OF SAMPLE	STA END-PERIOD OF RECD IN YRS =0	<.5	<3	>=3
<1980	0	0	0	0	1	0	0	0
1980	4	1	1114	39	0	0	1	0
1981	2	0	1421	54	0	0	0	0
1982	0	0	1455	63	0	0	0	0
1983	0	0	1377	54	0	0	0	0
1984	0	0	1619	60	0	0	0	0
1985	0	0	1687	70	0	0	0	0
1986	0	0	1678	61	0	0	0	0
1987	0	1	1864	68	0	0	0	1
1988	0	0	1258	40	0	0	0	0
1989	0	0	872	23	0	0	0	0
1990	0	0	909	18	0	0	0	0
1991	0	0	921	20	0	0	0	0
1992	0	1	1653	43	0	0	0	1
1993	0	0	1212	36	0	0	0	0
1994	0	0	942	30	0	0	0	0
1995	0	0	1240	41	0	0	0	0
1996	0	0	934	32	0	0	0	0
1997	0	2	697	25	0	0	0	2
1998	0	1	359	11	0	0	0	1
1999	0	0	0	0	0	0	0	0
TOTAL	6	6	23212	788	1	0	1	5

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6 TOTAL STATIONS PROCESSED
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PARAMETER				MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
00008	LAB	IDENT.	NUMBER	BOTTOM	B	4	2993.500	88064.00	296.7600	3278	2634	81/07/14	81/08/12
				WATER		457	5140300	4737E+11	21765000	98042900	172	80/04/22	98/09/17
00010	WATER	TEMP	CENT	BOTTOM		4	26.50000	.3333300	.5773500	27.0	26.0	81/07/14	81/08/12
				WATER		496	16.54900	58.69800	7.661500	29.0	.0	80/02/28	98/09/17
					C	3	2.666700	4.333400	2.081700	5.0	1.0	87/01/27	87/02/04
					TOT	499	16.46600	59.51600	7.714700	29.0	.0	80/02/28	98/09/17
00011	WATER	TEMP	FAHN	BOTTOM	$	4	79.70000	1.083300	1.040800	80.6	78.8	81/07/14	81/08/12
				WATER	$	499	61.63700	192.8700	13.88800	84.2	32.0	80/02/28	98/09/17
00018	DT FROM	NATURAL	FAHR	WATER		1	7092E+60			7092E+60	7092E+60	96/03/21	96/03/21
00020	AIR	TEMP	CENT	BOTTOM		4	22.75000	12.91700	3.594000	28.0	20.0	81/07/14	81/08/12
				WATER		289	15.70600	56.11300	7.490900	32.0	-6.0	81/05/18	98/09/17
00021	AIR	TEMP	FAHN	WATER		1	1828E+63			1828E+63	1828E+63	96/03/21	96/03/21
00025	BAROMTRC	PRESSURE	MM OF HG	WATER		1	1.600000			2	2	81/09/17	81/09/17
00028	ANALYZE	AGENCY	CODE	WATER		3	80010.00	.0000000	.0000000	80010	80010	80/05/22	80/11/26
00041	WEATHER	WMO CODE	4501	WATER		59	.8474600	7.855600	2.802800	21	0	93/03/23	97/03/25
00043	CLOUD	TYPE	WMO CODE	WATER		1	9850E+60			9850E+60	9850E+60	96/03/21	96/03/21
00061	STREAM	FLOW,	INST-CFS	WATER		8	1411.700	4137600	2034.100	6004	33	81/02/23	84/03/22
00062	WATER	SURF ELE	IN FEET	WATER		1	.4000000			.4	.4	82/07/21	82/07/21
00065	STREAM	STAGE	FEET	WATER		76	6.009800	1.795900	1.340100	12.80	2.60	81/02/23	92/05/05
00067	TIDE	STAGE	CODE	BOTTOM		4	2.000000	1.333300	1.154700	3	1	81/07/14	81/08/12
				WATER		310	34.69400	322420.0	567.8200	10000	0	80/02/28	97/03/25
00068	MAX SAMP	DEPTH	FEET	WATER		1	1694E+61			1694E+61	1694E+61	96/03/21	96/03/21
00070	TURB	JKSN	JTU	WATER		2	25.50000	612.5000	24.74900	43.0	8.0	81/04/29	81/06/25
00075	TURB	HLGE	PPM SIO2	WATER		127	12.00800	54.60700	7.389700	40.0	2.0	80/02/28	86/11/24
00076	TURB	TRBIDMTR	HACH FTU	WATER		221	9.073800	48.54300	6.967300	53.0	1.0	80/03/12	98/09/17
00077	TRANSP	SECCHI	INCHES	WATER		11	31.90900	301.0900	17.35200	60	12	81/06/17	95/11/27
00080	COLOR	PT-CO	UNITS	WATER		16	17.68800	133.0300	11.53400	56	8	80/02/28	96/09/26
00093	SOLIDS	FLOAT	MG/L	WATER		1	2403E+59			2403E+59	2403E+59	96/03/21	96/03/21
00094	CNDUCTVY	FIELD	MICROMHO	WATER		61	230.5700	13242.00	115.0700	800	0	80/03/12	94/06/28
00095	CNDUCTVY	AT 25C	MICROMHO	WATER		673	380.5600	179700.0	423.9100	6800	85	80/03/12	98/09/17
00098	VSAMPLOC	DEPTH	METERS	WATER		1	6304E+58			6304E+58	6304E+58	96/03/21	96/03/21
00101	SOLIDS	% ON	74U FILT	WATER		1	13.60000			13.6	13.6	84/01/25	84/01/25
00103	SOLIDS	% ON	5U FILT	WATER		1	1260E+58			1260E+58	1260E+58	96/03/21	96/03/21
00108	IODINE-I	TOTAL	MG/L	WATER		1	7249E+59			7249E+59	7249E+59	96/03/21	96/03/21
00113	UNDW INC	SOL RAD	FT-CDS	WATER		1	3033E+59			3033E+59	3033E+59	96/03/21	96/03/21
00140	BOD	5 DAY	LB/TON	WATER		1	40.00000			40.0	40.0	82/12/20	82/12/20
00145	TOTAL	PRODN	TONS/DAY	WATER		1	890.0000			890.000	890.000	82/05/05	82/05/05
00153	OIL AND	GREASE	LB/D/CFS	WATER		1	9062E+58			9062E+58	9062E+58	96/03/21	96/03/21
00172	DIGESTER	SOLIDS	PERCENT	WATER		2	9456E+60	.0000000	.0000000	9850E+60	9062E+60	95/11/27	96/03/21
00224	INVALID	PAR	NUMBER	WATER		1	.0030000			.0030000	.0030000	81/02/23	81/02/23
00299	DO	PROBE	MG/L	WATER		13	6.725400	3.235100	1.798600	11.8	4.8	97/09/17	98/09/17
00300	DO		MG/L	BOTTOM		4	3.350000	1.796700	1.340400	4.6	2.0	81/07/14	81/08/12

6 TOTAL STATIONS PROCESSED
DELCORA CSO LTCP

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	PARAMETER			MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
00300	DO		MG/L	WATER		472	7.115400	8.086300	2.843600	17.8	.0	80/02/28	98/09/17
00301	DO	SATUR	PERCENT	BOTTOM WATER	$	4	41.11700	271.5600	16.47900	56.8	24.4	81/07/14	81/08/12
						188	69.46300	228.6700	15.12200	104.0	27.0	84/06/11	97/03/25
					$	282	69.76000	501.0500	22.38400	127.9	.0	80/02/28	98/09/17
					TOT	470	69.64100	391.4000	19.78400	127.9	.0	80/02/28	98/09/17
00303	BOD	1 DAY	MG/L	WATER		3	.7666700	.1233300	.3511900	1.100	.400	81/03/10	81/06/11
00304	BOD	2 DAY	MG/L	WATER		2	1.025000	.4512500	.6717500	1.5	.6	81/03/10	81/04/22
00305	BOD	3 DAY	MG/L	WATER		3	1.700000	.5700000	.7549800	2.5	1.0	81/03/10	81/06/11
00306	BOD	4 DAY	MG/L	WATER		3	2.100000	.9300000	.9643700	3.2	1.4	81/03/10	81/06/11
00310	BOD	5 DAY	MG/L	WATER		402	2.922800	4.974000	2.230200	29.0	.2	80/01/17	96/09/17
					K	127	2.344900	.0930700	.3050700	2.4	.2	80/04/15	95/10/30
					TOT	529	2.784100	3.860800	1.964900	29.0	.2	80/01/17	96/09/17
00311	DISS BOD	5 DAY	MG/L	WATER	K	1	2.400000			2.4	2.4	94/08/30	94/08/30
00312	BOD	6 DAY	MG/L	WATER		3	3.133300	.7433400	.8621700	3.9	2.2	81/03/10	81/06/11
00314	BOD INH	5 DAY TO T	MG/L	WATER		53	1.528300	.7543900	.8685500	3.7	.3	87/07/13	96/09/17
					K	4	.4250000	.0025003	.0500030	.5	.4	87/09/24	87/12/21
					TOT	57	1.450900	.7814800	.8840100	3.7	.3	87/07/13	96/09/17
00315	BOD	7 DAY	MG/L	WATER		3	3.566700	1.243300	1.115100	4.4	2.3	81/03/10	81/06/11
					K	1	2.400000			2.4	2.4	86/07/15	86/07/15
					TOT	4	3.275000	1.169200	1.081300	4.4	2.3	81/03/10	86/07/15
00316	BOD	8 DAY	MG/L	WATER		3	4.033300	1.443300	1.201400	5.2	2.8	81/03/10	81/06/11
00317	BOD	9 DAY	MG/L	WATER		3	4.700000	1.990000	1.410700	6.2	3.4	81/03/10	81/06/11
00320	BOD	ULT FRST	MG/L	WATER		1	.1000000			.1	.1	82/06/14	82/06/14
00322	BOD	10 DAY	MG/L	WATER		3	5.200000	1.030000	1.014900	6.3	4.3	81/03/10	81/06/11
00323	BOD	15 DAY	MG/L	WATER		3	6.000000	.4901300	.7000900	6.7	5.3	81/03/10	81/06/11
00324	BOD	20 DAY	MG/L	WATER		4	5.400000	2.553400	1.597900	6.7	3.1	80/04/22	81/06/11
00327	BOD	11 DAY	MG/L	WATER		3	5.500000	.4901300	.7000900	6.3	5.0	81/03/10	81/06/11
00328	BOD	12 DAY	MG/L	WATER		1	5.700000			5.7	5.7	81/03/10	81/03/10
00329	BOD	13 DAY	MG/L	WATER		2	5.750000	.6050100	.7778300	6.3	5.2	81/04/22	81/06/11
00331	BOD	16 DAY	MG/L	WATER		1	6.700000			6.7	6.7	81/04/22	81/04/22
00332	BOD	17 DAY	MG/L	WATER		3	4.016700	9.700800	3.114600	6.2	.5	81/03/10	82/12/20
00334	BOD	19 DAY	MG/L	WATER		2	6.450000	.1249900	.3535300	6.7	6.2	81/03/10	81/04/22
00340	COD	HI LEVEL	MG/L	WATER		13	24.47200	94.02200	9.696500	36	8	80/01/17	85/08/15
00350	BOD	14 DAY	MG/L	WATER		1	5.900000			5.9	5.9	81/03/10	81/03/10
00400	PH		SU	WATER		423	7.322700	.3364600	.5800500	10.00	.00	80/02/28	98/09/17
00403	PH	LAB	SU	WATER		412	7.075100	.3582700	.5985600	8.9	.0	80/01/17	97/09/17
00405	CO2		MG/L	WATER		3	12.63300	122.4000	11.06400	24.0	1.9	80/05/22	80/11/26
00410	T ALK	CACO3	MG/L	WATER		698	49.33100	237.3900	15.40700	118	0	80/01/17	98/09/17
00435	T ACDITY	CACO3	MG/L	WATER		329	3.841600	2.882500	1.697800	10	0	80/02/28	98/09/17
					K	1	1.000000			1	1	95/07/10	95/07/10
					TOT	330	3.833000	2.898200	1.702400	10	0	80/02/28	98/09/17
00437	ACIDITY	FROM CO2	MG/L	WATER		1	.0000000			0	0	80/09/24	80/09/24

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00440	HCO3 ION	HCO3	MG/L	WATER		3	52.66700	184.3300	13.57700	61	37	80/05/22	80/11/26
00500	RESIDUE	TOTAL	MG/L	WATER		3	326.0000	58396.00	241.6500	592	120	80/04/22	81/06/25
00505	RESIDUE	TOT VOL	MG/L	WATER		3	199.3300	45985.00	214.4400	444	44	80/04/22	81/06/25
00510	RESIDUE	TOT FIX	MG/L	WATER		3	101.7400	7595.200	87.15100	156	1	80/09/24	81/06/25
00515	RESIDUE	DISS-105 C	MG/L	WATER		354	235.4700	17545.00	132.4600	2200	56	80/03/12	97/09/17
					K	1	2.000000			2	2	87/10/26	87/10/26
					TOT	355	234.8100	17649.00	132.8500	2200	2	80/03/12	97/09/17
00525	RESIDUE	FIX FLT	MG/L	WATER		1	1.550000			2	2	81/08/18	81/08/18
00530	RESIDUE	TOT NFLT	MG/L	WATER		641	23.00300	1553.700	39.41700	772	0	80/04/22	98/09/17
					K	18	1.944500	.0555590	.2357100	2	1	84/11/14	96/09/17
					TOT	659	22.42800	1523.000	39.02500	772	0	80/04/22	98/09/17
00535	RESIDUE	VOL NFLT	MG/L	WATER		35	3.971400	8.499200	2.915300	14	1	80/04/22	98/09/17
					K	4	1.000000	.0000000	.0000000	1	1	96/09/09	98/05/18
					TOT	39	3.666700	8.438600	2.904900	14	1	80/04/22	98/09/17
00540	RESIDUE	FIX NFLT	MG/L	WATER		3	6.000000	28.00000	5.291500	12	2	80/09/24	81/06/25
00545	RESIDUE	SETTLBLE	ML/L	WATER		1	.5000000			.5	.5	80/09/24	80/09/24
					K	2	.5000000	.0000000	.0000000	.5	.5	81/04/29	81/06/25
					TOT	3	.5000000	.0000000	.0000000	.5	.5	80/09/24	81/06/25
00550	OIL-GRSE	TOT-SXLT	MG/L	WATER		1	2.000000			2.0	2.0	80/09/24	80/09/24
00556	OIL-GRSE	FREON-GR	MG/L	WATER	K	6	2.000000	.0000000	.0000000	2.00	2.00	80/10/06	86/06/24
00566	IMCO NOS	1,2,3,6	GPD	WATER		1	2.000000			2.00	2.00	81/02/23	81/02/23
00600	TOTAL N	N	MG/L	WATER		6	6.466700	6.980200	2.642000	10.80	3.29	97/07/08	97/09/17
00605	ORG N	N	MG/L	WATER		186	.6257500	.3452200	.5875500	7.300	.000	81/02/17	96/09/17
					K	2	.3350000	.0060500	.0777820	.390	.280	87/11/23	88/02/29
					TOT	188	.6226600	.3424500	.5852000	7.300	.000	81/02/17	96/09/17
00610	NH3+NH4-	N TOTAL	MG/L	WATER		657	.4383100	.3703700	.6085800	9.240	.004	80/01/17	98/09/17
					K	56	.0703390	.0010587	.0325380	.100	.004	80/07/15	96/06/17
					TOT	713	.4094100	.3511400	.5925700	9.240	.004	80/01/17	98/09/17
00612	UN-IONZD	NH3-N	MG/L	WATER	$	474	.0037426	.0007859	.0280340	.603	8521E-15	80/02/28	98/09/17
00615	NO2-N	TOTAL	MG/L	WATER		700	.0763760	.0065628	.0810110	1.008	.002	80/01/17	98/09/17
					K	4	.0410000	.0018087	.0425290	.088	.005	83/07/13	93/04/12
					TOT	704	.0761750	.0065403	.0808720	1.008	.002	80/01/17	98/09/17
00619	UN-IONZD	NH3-NH3	MG/L	WATER	$	474	.0045506	.0011619	.0340870	.733	1036E-14	80/02/28	98/09/17
00620	NO3-N	TOTAL	MG/L	WATER		703	2.404600	1.245500	1.116000	10.520	.020	80/01/17	98/09/17
					K	1	22.00000			22.000	22.000	83/08/11	83/08/11
					L	1	2.000000			2.000	2.000	86/11/18	86/11/18
					TOT	705	2.431800	1.786900	1.336800	22.000	.020	80/01/17	98/09/17
00625	TOT KJEL	N	MG/L	WATER		594	1.009500	1.935400	1.391200	25.000	.000	80/02/28	98/09/17
					K	12	.8416700	.0862880	.2937500	1.000	.200	80/07/15	97/09/17
					TOT	606	1.006100	1.899200	1.378100	25.000	.000	80/02/28	98/09/17
00630	NO2&NO3	N-TOTAL	MG/L	WATER		71	1.747800	.3303100	.5747300	3.00	.66	93/03/31	98/09/17
00631	NO2&NO3	N-DISS	MG/L	WATER		3	1.806700	1.442100	1.200900	2.5	.4	80/05/22	80/11/26

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00650	T PO4	PO4	MG/L	WATER		75	.2030700	.1067200	.3266700	2.80	.02	80/02/28	83/11/14
00660	ORTHOPO4	PO4	MG/L	WATER		2	.0300000	.0018000	.0424270	.06	.00	80/05/22	80/11/26
00665	PHOS-TOT		MG/L P	WATER		626	.3441300	.1121700	.3349200	2.800	.030	80/03/12	98/09/17
00671	PHOS-DIS	ORTHO	MG/L P	WATER		163	.0915790	.0156420	.1250700	1.050	.000	80/05/22	98/09/17
					K	3	.0116670	.0000583	.0076376	.020	.005	92/04/23	92/06/15
					TOT	166	.0901350	.0154730	.1243900	1.050	.000	80/05/22	98/09/17
00680	T ORG C	C	MG/L	WATER		1	13.70000			13.7	13.7	80/08/25	80/08/25
00681	D ORG C	C	MG/L	WATER		3	4.166700	2.303300	1.517700	5.8	2.8	80/05/22	80/11/26
00719	CN FREE	HBG METH	UG/L	WATER		1	42.00000			42.000	42.000	86/06/24	86/06/24
00720	CYANIDE	CN-TOT	MG/L	WATER		16	.0104380	.0001057	.0102830	.046	.001	80/01/17	86/06/24
00722	CYANIDE	FREE CN	MG/L	WATER		6	.0050000	.0000124	.0035214	.01	.002	80/02/29	80/10/06
00724	CYANIDE	COMPLEX	UG/L	WATER		5	.0028000	.0000042	.0020494	.005	.001	81/01/29	81/06/25
00900	TOT HARD	CACO3	MG/L	WATER		370	116.6400	32509.00	180.3000	2400	2	80/02/28	98/09/17
00902	NC HARD	CACO3	MG/L	WATER		2	275.5000	100800.0	317.4900	500	51	80/05/22	80/11/26
00910	CALCIUM	CACO3	MG/L	WATER	K	1	15.00000			15.0	15.0	85/07/29	85/07/29
00915	CALCIUM	CA,DISS	MG/L	WATER		2	35.50000	684.5000	26.16300	54.0	17.0	80/05/22	80/11/26
00916	CALCIUM	CA-TOT	MG/L	WATER		33	14.60500	10.81100	3.288000	20.0	6.3	80/03/12	87/11/17
00925	MGNSIUM	MG,DISS	MG/L	WATER		2	54.70000	4104.200	64.06400	100.0	9.4	80/05/22	80/11/26
00927	MGNSIUM	MG,TOT	MG/L	WATER		33	8.039100	2.710500	1.646400	12.9	5.2	80/03/12	87/11/17
00929	SODIUM	NA,TOT	MG/L	WATER		115	32080.00	2740E+06	52351.00	279000.0	5.12	81/07/14	87/11/13
00930	SODIUM	NA,DISS	MG/L	WATER		2	506.0000	412230.0	642.0500	960.00	52.00	80/05/22	80/11/26
00931	SODIUM	ADSBTION	RATIO	WATER		2	11.90000	165.6200	12.86900	21.0	2.8	80/05/22	80/11/26
00932	PERCENT	SODIUM	%	WATER		2	67.50000	220.5000	14.84900	78	57	80/05/22	80/11/26
00935	PTSSIUM	K,DISS	MG/L	WATER		2	22.20000	706.8800	26.58700	41.00	3.40	80/05/22	80/11/26
00940	CHLORIDE	TOTAL	MG/L	WATER		692	55.15400	17730.00	133.1500	2200	4	80/02/28	98/09/17
00945	SULFATE	SO4-TOT	MG/L	WATER		37	43.13500	5848.400	76.47500	390	10	80/03/12	87/11/17
00955	SILICA	DISOLVED	MG/L	WATER		11	1.412000	.9523200	.9758700	2.8	.2	80/05/22	96/06/18
					K	7	.2000000	.0000000	.0000000	.2	.2	94/09/19	95/09/05
					TOT	18	.9406700	.9298300	.9642800	2.8	.2	80/05/22	96/06/18
01002	ARSENIC	AS,TOT	UG/L	WATER		25	43.12000	38097.00	195.1800	980	4	81/12/15	96/09/16
					K	350	129.9700	100230.0	316.5900	1000	2	80/08/18	97/09/17
					TOT	375	124.1800	96442.00	310.5500	1000	2	80/08/18	97/09/17
01003	ARSENIC	SEDMG/KG	DRY WGT	WATER		2	4.000000	.0000000	.0000000	4.00	4.00	80/05/22	87/08/17
01005	BARIUM	BA,DISS	UG/L	WATER		2	35.00000	50.00000	7.071100	40	30	80/05/22	80/11/26
01010	BERYLIUM	BE,DISS	UG/L	WATER		1	.0000000			.00	.00	80/11/26	80/11/26
					K	1	1.000000			1.00	1.00	80/05/22	80/05/22
					TOT	2	.5000000	.5000000	.7071100	1.00	.00	80/05/22	80/11/26
01024	CR MUD	WET WGTM	G/KG-CR	WATER	K	2	17.50000	312.5000	17.67800	30.00	5.00	82/04/14	82/09/13
01025	CADMIUM	CD,DISS	UG/L	WATER		1	55.00000			55	55	80/11/26	80/11/26
					K	10	1.000000	.0000000	.0000000	1	1	80/05/22	92/11/17
					TOT	11	5.909100	265.0900	16.28200	55	1	80/05/22	92/11/17
01027	CADMIUM	CD,TOT	UG/L	WATER		153	1.455400	31.16700	5.582800	53	.03	80/10/06	97/09/17

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01027	CADMIUM	CD,TOT	UG/L	WATER	K	309	8.855000	474.1300	21.77500	100	.02	80/01/17	96/06/05
01027	CADMIUM	CD,TOT	UG/L	WATER	TOT	462	6.404500	339.2000	18.41700	100	.02	80/01/17	97/09/17
01028	CD MUD	DRY WGT	MG/KG-CD	WATER	K	1	10.00000			10.00	10.00	80/05/22	80/05/22
01029	CHROMIUM	SEDMG/KG	DRY WGT	WATER	K	1	10.00000			10.00	10.00	80/05/22	80/05/22
01030	CHROMIUM	CR,DISS	UG/L	WATER	K	9	100.0000	.0000000	.0000000	100	100	92/03/09	92/11/17
01032	CHROMIUM	HEX-VAL	UG/L	WATER	K	25	10.00000	.0000000	.0000000	10	10	83/08/16	92/07/08
01034	CHROMIUM	CR,TOT	UG/L	WATER		97	33.09300	12491.00	111.7600	1070	4	80/01/17	88/05/17
					K	254	38.36600	1153.400	33.96200	100	3	80/02/28	92/11/17
					TOT	351	36.90900	4265.400	65.31000	1070	3	80/01/17	92/11/17
01035	COBALT	CO,DISS	UG/L	WATER		1	.0000000			0	0	80/11/26	80/11/26
					K	1	3.000000			3	3	80/05/22	80/05/22
					TOT	2	1.500000	4.500000	2.121300	3	0	80/05/22	80/11/26
01038	CO MUD	DRY WGT	MG/KG-CO	WATER		1	30.00000			30.00	30.00	80/05/22	80/05/22
01040	COPPER	CU,DISS	UG/L	WATER		3	7.776700	5.543600	2.354500	10	5	80/11/26	96/11/13
					J	41	1.602400	1.349300	1.161600	5	0	92/03/09	98/08/24
					K	1	10.00000			10	10	80/05/22	80/05/22
					U	5	1.000000	5.000000	2.236100	5	0	94/09/19	97/07/07
					TOT	50	2.080600	5.312800	2.304900	10	0	80/05/22	98/08/24
01042	COPPER	CU,TOT	UG/L	WATER		243	24.76400	1135.300	33.69500	359	3	80/01/17	98/08/24
					J	114	2.469600	2.394600	1.547400	5	0	88/07/05	98/07/14
					K	224	30.00500	1323.900	36.38600	100	3	80/02/28	97/09/17
					TOT	581	22.41000	1085.900	32.95400	359	0	80/01/17	98/08/24
01043	COPPER	SEDMG/KG	DRY WGT	WATER		1	20.00000			20.00	20.00	80/05/22	80/05/22
01045	IRON	FE,TOT	UG/L	WATER		552	966.7200	5221500	2285.100	36500	30	80/01/17	97/09/17
					K	5	64.00000	2430.000	49.29500	100	10	86/01/16	90/07/09
					TOT	557	958.6200	5181800	2276.400	36500	10	80/01/17	97/09/17
01046	IRON	FE,DISS	UG/L	WATER		2	17.50000	220.5000	14.84900	28	7	80/05/22	80/11/26
					K	37	100.0000	.0000000	.0000000	100	100	88/07/05	90/07/09
					TOT	39	95.76900	345.6600	18.59200	100	7	80/05/22	90/07/09
01047	FERROUS	IRON	UG/L	WATER		3	10.00000	300.0000	17.32100	30	0	82/04/13	82/04/14
01049	LEAD	PB,DISS	UG/L	WATER		1	.0000000			0	0	80/11/26	80/11/26
					J	2	2.000000	.3200000	.5656900	2	2	95/05/08	95/09/25
					K	16	3.000000	.0000000	.0000000	3	3	92/03/09	94/05/23
					U	11	.0000000	.0000000	.0000000	0	0	94/07/25	95/11/27
					TOT	30	1.733300	2.144400	1.464400	3	0	80/11/26	95/11/27
01051	LEAD	PB,TOT	UG/L	WATER		203	19.07400	2020.800	44.95400	490	.6	80/04/02	97/09/17
					J	8	2.050000	.3114300	.5580600	3	1	94/07/25	95/10/23
					K	375	22.60400	896.3600	29.93900	100	.09	80/01/17	94/05/23
					U	2	.0000000	.0000000	.0000000	0	0	95/06/26	95/07/10
					TOT	588	21.02900	1275.900	35.71900	490	0	80/01/17	97/09/17
01052	LEAD	SEDMG/KG	DRY WGT	WATER		1	60.00000			60.00	60.00	80/05/22	80/05/22
01053	MN MUD	DRY WGT	MG/KG-MN	WATER		1	940.0000			940.00	940.00	80/05/22	80/05/22

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01054	MANGNESE	MN,SUSP	UG/L	WATER		1	140.0000			140.0	140.0	80/10/13	80/10/13
01055	MANGNESE	MN	UG/L	WATER		70	154.2300	5452.300	73.83900	450.0	30.0	80/02/28	87/05/21
					K	24	88.75000	515.7600	22.71000	100.0	30.0	80/06/06	87/08/12
					TOT	94	137.5100	4996.700	70.68800	450.0	30.0	80/02/28	87/08/12
01056	MANGNESE	MN,DISS	UG/L	WATER		2	72.50000	4512.500	67.17500	120.0	25.0	80/05/22	80/11/26
01060	MOLY	MO,DISS	UG/L	WATER		2	14.50000	420.5000	20.50600	29	0	80/05/22	80/11/26
01062	MOLY	MO,TOT	UG/L	WATER		1	130.0000			130	130	81/01/29	81/01/29
01065	NICKEL	NI,DISS	UG/L	WATER	K	9	10.00000	.0000000	.0000000	10	10	92/03/09	92/11/17
01067	NICKEL	NI,TOTAL	UG/L	WATER		40	23.00300	62.71900	7.919500	50	10	80/01/17	97/08/19
					K	146	36.13000	1234.400	35.13400	140	10	80/02/28	97/09/17
					TOT	186	33.30700	1010.000	31.78000	140	10	80/01/17	97/09/17
01077	SILVER	AG,TOT	UG/L	WATER	K	25	37.92000	2258.200	47.52000	100.0	3.0	80/02/28	91/06/25
01080	STRONTUM	SR,DISS	UG/L	WATER		2	429.5000	218460.0	467.4000	760	99	80/05/22	80/11/26
01085	VANADIUM	V,DISS	UG/L	WATER		1	.0000000			0	0	80/11/26	80/11/26
					K	1	6.000000			6	6	80/05/22	80/05/22
					TOT	2	3.000000	18.00000	4.242600	6	0	80/05/22	80/11/26
01090	ZINC	ZN,DISS	UG/L	WATER		14	12.90700	10.11300	3.180100	21	7	80/05/22	97/03/25
					J	24	6.150400	3.940100	1.985000	9	3	94/07/25	98/08/24
					K	10	10.00000	.0000000	.0000000	10	10	92/05/04	94/05/23
					U	2	.0000000	.0000000	.0000000	0	0	95/08/29	95/09/25
					TOT	50	8.566200	16.19000	4.023600	21	0	80/05/22	98/08/24
01092	ZINC	ZN,TOT	UG/L	WATER		400	32.42000	596.0200	24.41400	210	.4	80/01/17	98/08/24
					J	5	7.986000	.5310100	.7287000	9	7	95/06/26	98/06/24
					K	170	40.34100	1499.400	38.72200	100	10	80/02/28	96/09/17
					TOT	575	34.54900	875.0000	29.58100	210	.4	80/01/17	98/08/24
01093	ZINC	SEDMG/KG	DRY WGT	WATER		1	91.00000			91.00	91.00	80/05/22	80/05/22
01105	ALUMINUM	AL,TOT	UG/L	WATER		14	377.8600	60911.00	246.8000	1000	140	80/04/25	87/08/12
					K	2	125.0000	1250.000	35.35500	150	100	84/08/02	86/08/19
					TOT	16	346.2500	60332.00	245.6300	1000	100	80/04/25	87/08/12
01130	LITHIUM	LI,DISS	UG/L	WATER		2	13.00000	98.00000	9.899500	20	6	80/05/22	80/11/26
01147	SELENIUM	SE,TOT	UG/L	WATER		26	22.53900	5959.900	77.20000	401	6	81/12/15	96/09/16
					K	249	172.3800	129490.0	359.8500	1002	6	81/07/21	97/09/17
					TOT	275	158.2100	119680.0	345.9500	1002	6	81/07/21	97/09/17
01148	SELENIUM	SEDMG/KG	DRY WGT	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
01170	FE MUD	DRY WGT	MG/KG-FE	WATER		1	23000.00			23000.00	23000.00	80/05/22	80/05/22
01220	CR-DISS	.HEX VAL	UG/L	WATER	K	11	6.818200	6.363700	2.522600	10.0	5.0	92/08/10	97/05/08
					U	12	5.000000	.0000000	.0000000	5.0	5.0	97/06/09	98/08/24
					TOT	23	5.869600	3.755000	1.937800	10.0	5.0	92/08/10	98/08/24
01330	ODOR	ATMOSPH	SEVERITY	WATER		11	.8181800	.1636400	.4045200	1	0	80/03/12	84/06/19
01519	RAD GROS	ALPHA	TOT PC/L	WATER	K	11	2.545500	2.272700	1.507600	6.000	1.000	85/03/26	97/06/09
07000	H-3	TOTAL	PC/L	WATER	K	10	1437.400	990970.0	995.4700	3000.0	200.0	86/12/10	97/06/09
10330	INVALID	PAR	NUMBER	WATER		1	1.000000			1.000000	1.000000	81/12/15	81/12/15

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	PARAMETER	MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
30201	CLRMTHAN WTR,WHL	REC UG/L WATER	U	15	1.266700	.2095300	.4577400	2	1	94/08/23	97/06/09
30202	BROMOETH WTR,WHL	REC UG/L WATER	U	15	1.266700	.2095300	.4577400	2	1	94/08/23	97/06/09
31501	TOT COLI MFIMENDO	/100ML WATER		2	3950.000	5008.000	70.76700	4000	3900	93/08/09	93/08/10
31505	TOT COLI MPN CONF	/100ML WATER		47	9727.900	5767E+05	24015.00	160000	330	87/07/01	89/06/19
			L	1	24000.00			24000	24000	88/01/22	88/01/22
			TOT	48	10025.00	5687E+05	23848.00	160000	330	87/07/01	89/06/19
31611	FEC COLI M-TEC	#/100ML WATER		202	182.7900	287280.0	535.9900	5800	2	87/03/18	98/09/17
			L	5	760.0000	8000.000	89.44300	800	600	87/04/10	97/10/06
			O	8	.0000000	.0000000	.0000000	0	0	95/08/29	96/08/12
			TOT	215	189.4100	278970.0	528.1800	5800	0	87/03/18	98/09/17
31615	FEC COLI MPNECMED	/100ML WATER		48	1663.800	4704400	2169.000	7900	33	87/07/01	89/06/19
31616	FEC COLI MFM-FCBR	/100ML WATER		328	7446.900	5182E+05	22764.00	190000	0	80/02/28	97/09/17
			K	9	5469.500	37474000	6121.600	20000	25	81/02/17	92/05/05
			L	23	38722.00	4227E+06	65016.00	200000	600	81/08/18	87/06/03
			TOT	360	9395.600	7908E+05	28122.00	200000	0	80/02/28	97/09/17
31633	E.COLI THERMTOL	#/100ML WATER		203	139.7300	140600.0	374.9700	3600	2	87/03/18	98/09/17
			K	1	1.000000			1	1	94/04/25	94/04/25
			L	3	733.3300	13334.00	115.4700	800	600	92/09/21	97/10/06
			O	8	.0000000	.0000000	.0000000	0	0	95/08/29	96/08/12
			TOT	215	142.1600	138600.0	372.2900	3600	0	87/03/18	98/09/17
31639	ENTCOCCI GR D,MF	#/100ML WATER		204	29.58800	5195.300	72.07800	490	1	87/03/18	98/09/17
			K	9	1.000000	.0000000	.0000000	1	1	88/06/14	97/07/16
			L	1	600.0000			600	600	95/10/23	95/10/23
			O	1	.0000000			0	0	96/08/12	96/08/12
			TOT	215	30.90700	6485.400	80.53200	600	0	87/03/18	98/09/17
31673	FECSTREP MFKFAGAR	/100ML WATER		3	546.6700	334530.0	578.3900	1200	100	85/02/14	93/08/10
32101	DICLBRMT	TOTUG/L WATER		2	.0000000	.0000000	.0000000	.0	.0	80/09/03	80/11/26
			U	55	1.072700	.0686880	.2620800	2.0	1.0	89/07/10	97/06/09
			TOT	57	1.035100	.1058900	.3254100	2.0	.0	80/09/03	97/06/09
32102	CARBNTET	TOTUG/L WATER		2	.0000000	.0000000	.0000000	.0	.0	80/09/03	80/11/26
			U	55	1.072700	.0686880	.2620800	2.0	1.0	89/07/10	97/06/09
			TOT	57	1.035100	.1058900	.3254100	2.0	.0	80/09/03	97/06/09
32103	12DICLET	TOTUG/L WATER		2	.0000000	.0000000	.0000000	.0	.0	80/09/03	80/11/26
32104	BROMOFRM WHL-WTR	UG/L WATER	U	55	1.072700	.0686880	.2620800	2.0	1.0	89/07/10	97/06/09
32105	CLDIBRMT	TOTUG/L WATER		2	.0000000	.0000000	.0000000	.0	.0	80/09/03	80/11/26
			U	55	1.072700	.0686880	.2620800	2.0	1.0	89/07/10	97/06/09
			TOT	57	1.035100	.1058900	.3254100	2.0	.0	80/09/03	97/06/09
32106	CHLRFORM	TOTUG/L WATER		2	.0000000	.0000000	.0000000	.0	.0	80/09/03	80/11/26
			J	2	.3000000	.0000000	.0000000	.3	.3	92/03/09	93/03/23
			K	3	1.000000	.0000000	.0000000	1.0	1.0	89/08/02	90/09/19
			U	50	1.080000	.0751030	.2740500	2.0	1.0	89/07/10	97/06/09
			TOT	57	1.010500	.1245300	.3528900	2.0	.0	80/09/03	97/06/09

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32210	CHLRPHYL	A	UG/L	WATER		44	7.028000	96.08700	9.802400	54.80	.00	87/03/18	89/06/19
32211	CHLRPHYL	A UG/L	CORRECTD	WATER		97	11.17000	101.0300	10.05100	56.00	.00	89/07/10	96/06/18
					K	26	1.000000	.0000000	.0000000	1.00	1.00	91/03/20	95/11/27
					TOT	123	9.020300	96.87900	9.842700	56.00	.00	89/07/10	96/06/18
32218	PHEOPHTN	A	UG/L	WATER		111	22.39700	412.3800	20.30700	104.00	.00	89/07/10	96/06/18
					B	1	39.00000			39.00	39.00	95/10/10	95/10/10
					K	11	1.000000	.0000000	.0000000	1.00	1.00	91/05/13	92/11/09
					TOT	123	20.61900	412.1700	20.30200	104.00	.00	89/07/10	96/06/18
32230	CHLRPHYL	A	MG/L	WATER		109	313.2300	9984500	3159.800	33000.00	.000	80/02/28	86/11/24
32730	PHENOLS	TOTAL	UG/L	WATER		29	4.489700	27.73900	5.266800	20	0	80/01/17	86/06/24
					K	137	5.000000	.0000000	.0000000	5	5	80/02/28	88/06/14
					TOT	166	4.910900	4.745000	2.178300	20	0	80/01/17	88/06/14
34010	TOLUENE		TOT UG/L	WATER		2	7.350000	14.04500	3.747700	10.00	4.70	80/11/26	90/09/19
					K	1	1.000000			1.00	1.00	89/10/03	89/10/03
					U	45	1.622200	.2404100	.4903100	2.00	1.00	89/07/10	97/06/09
					TOT	48	1.847900	1.876200	1.369700	10.00	1.00	80/11/26	97/06/09
34030	BENZENE		TOT UG/L	WATER		2	.0000000	.0000000	.0000000	.00	.00	80/09/03	80/11/26
					U	47	1.595800	.2460700	.4960600	2.00	1.00	89/07/10	97/06/09
					TOT	49	1.530600	.3375900	.5810200	2.00	.00	80/09/03	97/06/09
34301	CHLOROBE NZENE		TOTWUG/L	WATER	U	55	1.236400	.1838400	.4287700	2.000	1.000	89/07/10	97/06/09
34311	CHLOROET HANE		TOTWUG/L	WATER	U	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
34371	ETHYLBEN ZENE		TOTWUG/L	WATER	U	36	1.500000	.2571400	.5070900	2.000	1.000	89/07/10	97/06/09
34413	METHYLBR OMIDE		TOTWUG/L	WATER	U	40	1.000000	.0000000	.0000000	1.000	1.000	89/07/10	93/10/25
34418	METHYLCH LORIDE		TOTWUG/L	WATER	U	40	1.000000	.0000000	.0000000	1.000	1.000	89/07/10	93/10/25
34423	METHYLEN ECHLORID		TOTWUG/L	WATER	J	1	.2000000			.200	.200	93/03/23	93/03/23
					U	54	1.074100	.0698820	.2643500	2.000	1.000	89/07/10	97/06/09
					TOT	55	1.058200	.0824780	.2871900	2.000	.200	89/07/10	97/06/09
34475	TETRACHL OROETHYL		TOTWUG/L	WATER		2	.0000000	.0000000	.0000000	.000	.000	80/09/03	80/11/26
					U	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
					TOT	57	1.035100	.1058900	.3254100	2.000	.000	80/09/03	97/06/09
34488	TRICHLOR OFLUOROM		TOTWUG/L	WATER	U	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
34496	11DICHLO ROETHANE		TOTWUG/L	WATER		2	.0000000	.0000000	.0000000	.000	.000	80/09/03	80/11/26
					U	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
					TOT	57	1.035100	.1058900	.3254100	2.000	.000	80/09/03	97/06/09
34501	11DICHLO ROETHYLE		TOTWUG/L	WATER	U	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
34506	111TRICH LOROETHA		TOTWUG/L	WATER		2	.0000000	.0000000	.0000000	.000	.000	80/09/03	80/11/26
					K	1	1.000000			1.000	1.000	89/08/02	89/08/02
					U	54	1.074100	.0698820	.2643500	2.000	1.000	89/07/10	97/06/09
					TOT	57	1.035100	.1058900	.3254100	2.000	.000	80/09/03	97/06/09
34511	112TRICH LOROETHA		TOTWUG/L	WATER	U	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
34516	1122TETR ACHLOROE		TOTWUG/L	WATER	U	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
34531	12DICHLO ROETHANE		TOTWUG/L	WATER		2	1.250000	.1250000	.3535500	1.500	1.000	90/05/16	90/06/06

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	PARAMETER	MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
34531	12DICHLO ROETHANE TOTWUG/L	WATER	K	2	1.000000	.0000000	.0000000	1.000	1.000	89/07/10	89/10/03
			U	51	1.078400	.0737260	.2715300	2.000	1.000	89/08/02	97/06/09
			TOT	55	1.081800	.0718870	.2681200	2.000	1.000	89/07/10	97/06/09
34536	12DICHLO ROBENZEN TOTWUG/L	WATER	U	55	1.236400	.1838400	.4287700	2.000	1.000	89/07/10	97/06/09
34541	12DICHLO ROPROPAN TOTWUG/L	WATER		2	.0000000	.0000000	.0000000	.000	.000	80/09/03	80/11/26
			U	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
			TOT	57	1.035100	.1058900	.3254100	2.000	.000	80/09/03	97/06/09
34546	12DICHLO ROETHENE TOTWUG/L	WATER	U	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
34566	13DICHLO ROBENZEN TOTWUG/L	WATER	U	55	1.236400	.1838400	.4287700	2.000	1.000	89/07/10	97/06/09
34571	14DICHLO ROBENZEN TOTWUG/L	WATER	U	55	1.236400	.1838400	.4287700	2.000	1.000	89/07/10	97/06/09
34576	2CHLOROE THYLVINY TOTWUG/L	WATER	U	55	1.109100	.2101000	.4583700	4.000	1.000	89/07/10	97/06/09
34668	DICHLORO DIFLUORO TOTWUG/L	WATER	U	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
34699	T1,3-DCP TOT WAT UG/L	WATER	U	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
34704	C1,3-DCP TOT WAT UG/L	WATER	U	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
39175	VINYLCHL ORIDE TOT UG/L	WATER	U	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
39180	TRICHLOR ETHYLENE TOT UG/L	WATER		2	.0000000	.0000000	.0000000	.000	.000	80/09/03	80/11/26
			U	55	1.072700	.0686880	.2620800	2.000	1.000	89/07/10	97/06/09
			TOT	57	1.035100	.1058900	.3254100	2.000	.000	80/09/03	97/06/09
39250	NAPTHAL ENES, PC . UG/L	WATER		1	.0000000			.00	.00	80/11/26	80/11/26
39251	PCNS MUD UG/KG	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39300	P,P'DDT TOT UG/L	WATER	K	1	.0710000			.071	.071	80/05/29	80/05/29
39305	O,P' DDT WHL SMPL UG/L	WATER	K	1	.0570000			.057	.057	80/05/29	80/05/29
39310	P,P'DDD TOT UG/L	WATER	K	1	.0500000			.050	.050	80/05/29	80/05/29
39315	O,P' DDD WHL SMPL UG/L	WATER	K	1	.0520000			.052	.052	80/05/29	80/05/29
39320	P,P'DDE TOT UG/L	WATER	K	1	.0240000			.024	.024	80/05/29	80/05/29
39328	O,P'DDE MUD UG/KG	WATER	K	1	.0310000			.03	.03	80/05/29	80/05/29
39330	ALDRIN TOT UG/L	WATER	K	1	.0100000			.010	.010	80/05/29	80/05/29
39333	ALDRIN SEDUG/KG DRY WGT	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39337	ALPHABHC TOTUG/L	WATER	K	1	.0100000			.010	.010	80/05/29	80/05/29
39338	BETA BHC TOTUG/L	WATER	K	1	.0430000			.043	.043	80/05/29	80/05/29
39343	GBHC-MUD LINDANE DRYUG/KG	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39351	CDANEDRY TECH&MET MUDUG/KG	WATER		1	7.000000			7.00	7.00	80/05/22	80/05/22
39363	DDD MUD UG/KG	WATER		1	12.00000			12.00	12.00	80/05/22	80/05/22
39368	DDE MUD UG/KG	WATER		1	10.00000			10.00	10.00	80/05/22	80/05/22
39373	DDT MUD UG/KG	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39380	DIELDRIN TOTUG/L	WATER	K	1	.0270000			.027	.027	80/05/29	80/05/29
39383	DIELDRIN SEDUG/KG DRY WGT	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39389	ENDOSULN MUD UG/KG	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39390	ENDRIN TOT UG/L	WATER	K	1	.0500000			.050	.050	80/05/29	80/05/29
39393	ENDRIN SEDUG/KG DRY WGT	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39399	ETHION MUD UG/KG	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39403	TOXAPHEN SEDUG/KG DRY WGT	WATER		1	.0000000			.00	.00	80/05/22	80/05/22

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39410	HEPTCHLR		TOTUG/L	WATER	K	1	.0100000			.010	.010	80/05/29	80/05/29
39413	HEPTCHLR	SEDUG/KG	DRY WGT	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39420	HPCHLREP		TOTUG/L	WATER	K	1	.0150000			.015	.015	80/05/29	80/05/29
39423	HPCHLREP	SEDUG/KG	DRY WGT	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39480	MTHXYCLR	WHL SMPL	UG/L	WATER	K	1	.2100000			.210	.210	80/05/29	80/05/29
39481	MTHXYCLR	MUD DRY	UG/KG	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39519	PCBS	MUD	UG/KG	WATER		1	42.00000			42.00	42.00	80/05/22	80/05/22
39531	MALATHN	MUD	UG/KG	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39541	PARATHN	MUD	UG/KG	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39571	DIAZINON	MUD	UG/KG	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39601	MPARATHN	MUD	UG/KG	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39700	HCB		TOT UG/L	WATER	K	1	.0100000			.010	.010	80/05/29	80/05/29
39755	MIREX	WHL SMPL	UG/L	WATER	K	1	.0830000			.08	.08	80/05/29	80/05/29
39758	MIREX	BOT MAT	UG/KG	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39782	LINDANE	WHL SMPL	UG/L	WATER	K	1	.0100000			.010	.010	80/05/29	80/05/29
39787	TRITHION	MUD	UG/KG	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
39791	MTRTHION	MUD	UG/KG	WATER		1	.0000000			.00	.00	80/05/22	80/05/22
46001	WATER	APPEAR	CODE	WATER		14	204.6400	10253.00	101.2600	413	0	80/03/12	85/02/14
46002	PHENOLS	PHOTOMET	UG/L	WATER		1	5.000000			5	5	81/03/09	81/03/09
46006	PLANARI	F WORM	NO/FT2	WATER	M	2	.0000000	.0000000	.0000000	0	0	85/08/14	87/10/20
46008	NEMATODA	R WORM	NO/FT2	WATER	M	1	.0000000			0	0	87/10/20	87/10/20
46014	HIRUD	LEECH	NO/FT2	WATER	M	1	.0000000			0	0	83/08/08	83/08/08
46015	ASELL	SOW BUG	NO/FT2	WATER	M	5	.0000000	.0000000	.0000000	0	0	81/11/23	87/10/20
46018	GAMMAR	SCUD	NO/FT2	WATER	M	2	.0000000	.0000000	.0000000	0	0	81/11/23	83/08/08
46019	ASTACIDA	CRAYFISH	NO/FT2	WATER	M	1	.0000000			0	0	87/10/20	87/10/20
46028	BAETIDAE	MAYFLY	NO/FT2	WATER	M	5	.0000000	.0000000	.0000000	0	0	81/11/23	87/10/20
46029	HEPTAGEN	MAYFLY	NO/FT2	WATER	M	5	.0000000	.0000000	.0000000	0	0	81/11/23	87/10/20
46037	COENAG	DAMSEL	NO/FT2	WATER	M	1	.0000000			0	0	83/08/08	83/08/08
46041	GERRIDAE	BUG	NO/FT2	WATER	M	1	.0000000			0	0	85/08/14	85/08/14
46048	CORIXI	BUG	NO/FT2	WATER	M	1	.0000000			0	0	87/10/20	87/10/20
46049	SIALIDAE	ALDER	NO/FT2	WATER	M	2	.0000000	.0000000	.0000000	0	0	83/08/08	85/08/14
46050	CORYDAL	FISHFLY	NO/FT2	WATER	M	1	.0000000			0	0	81/11/23	81/11/23
46051	HYDROPT	CADDIS	NO/FT2	WATER	M	1	.0000000			0	0	81/11/23	81/11/23
46053	HYDROPSY	CADDIS	NO/FT2	WATER	M	5	.0000000	.0000000	.0000000	0	0	81/11/23	87/10/20
46055	PHILOPT	CADDIS	NO/FT2	WATER	M	1	.0000000			0	0	83/08/08	83/08/08
46069	HALIPL	BEETLE	NO/FT2	WATER	M	1	.0000000			0	0	87/10/20	87/10/20
46071	PSEPHEN	BEETLE	NO/FT2	WATER	M	1	.0000000			0	0	83/08/08	83/08/08
46075	ELMIDAE	BEETLE	NO/FT2	WATER	M	4	.0000000	.0000000	.0000000	0	0	82/08/02	87/10/20
46078	TIPUL	FLY	NO/FT2	WATER	M	5	.0000000	.0000000	.0000000	0	0	81/11/23	87/10/20
46083	CERATOPO	FLY	NO/FT2	WATER	M	1	.0000000			0	0	83/08/08	83/08/08
46084	SIMULID	FLY	NO/FT2	WATER	M	3	.0000000	.0000000	.0000000	0	0	81/11/23	87/10/20
46087	TENDIPED	FLY	NO/FT2	WATER	M	5	.0000000	.0000000	.0000000	0	0	81/11/23	87/10/20

GROSS

6 TOTAL STATIONS PROCESSED
DELCORA CSO LTCP

	PARAMETER			MEDIUM	RMK	NUMBER	MEAN	VARIANCE	STAN DEV	MAXIMUM	MINIMUM	BEG DATE	END DATE
46095	PHYSID	SNAIL	NO/FT2	WATER	M	4	.0000000	.0000000	.0000000	0	0	81/11/23	87/10/20
46097	PLANORB	SNAIL	NO/FT2	WATER	M	1	.0000000			0	0	87/10/20	87/10/20
46098	ANCYL	SNAIL	NO/FT2	WATER	M	2	.0000000	.0000000	.0000000	0	0	82/08/02	87/10/20
46104	SPHAERI	CLAM	NO/FT2	WATER	M	1	.0000000			0	0	87/10/20	87/10/20
46106	OLIGOCHT	AQ E WRM	NO/FT2	WATER	M	4	.0000000	.0000000	.0000000	0	0	81/11/23	87/10/20
46570	CAL HARD	CA MG	MG/L	WATER	$	35	83.53500	6609.000	81.29600	547	40	80/03/12	87/11/17
70300	RESIDUE	DISS-180 C	MG/L	WATER		2	1785.000	4712500	2170.800	3320	250	80/05/22	80/11/26
70301	DISS SOL	SUM	MG/L	WATER		2	1720.000	4500000	2121.300	3220	220	80/05/22	80/11/26
70303	DISS SOL	TONS PER	ACRE-FT	WATER		2	2.430000	8.736200	2.955700	4.52	.34	80/05/22	80/11/26
70508	T ACDITY	AS CACO3	HOT-MG/L	WATER		27	.0000000	.0000000	.0000000	0	0	80/03/12	87/11/17
					C	7	.0000000	.0000000	.0000000	0	0	84/05/03	85/11/06
					TOT	34	.0000000	.0000000	.0000000	0	0	80/03/12	87/11/17
71871	BROMINE	ELEMENTL	MG/L	WATER		2	.0250000	.0012500	.0353550	.05	.00	88/05/17	88/05/17
71890	MERCURY	HG,DISS	UG/L	WATER	K	9	.2000000	.0000000	.0000000	.2	.2	92/03/09	92/11/17
71900	MERCURY	HG,TOTAL	UG/L	WATER		33	1.233900	.5073500	.7122800	5.0	1.0	81/12/16	96/09/16
					K	378	17.92300	31619.00	177.8200	2000.0	.2	80/01/17	97/09/17
					TOT	411	16.58300	29095.00	170.5700	2000.0	.2	80/01/17	97/09/17
71921	MERCURY	SEDMG/KG	DRY WGT	WATER		1	.0000000			.0	.0	80/05/22	80/05/22
74041	WQF	SAMPLE	UPDATED	WATER		460	920840.0	1684E+06	41040.00	981229	860606	85/03/26	98/09/17
78113	ETH BENZ	WH WTR	UG/L	WATER	U	19	1.947400	.0526350	.2294200	2.00	1.00	93/03/23	96/11/13
78124	BENZENE	HOH VOL	UG/L	WATER	J	1	.3000000			.30	.30	93/03/23	93/03/23
					U	7	2.000000	.0000000	.0000000	2.00	2.00	93/04/19	93/10/25
					TOT	8	1.787500	.3612500	.6010400	2.00	.30	93/03/23	93/10/25
78135	DIMETHYL CYCLOPNT	HOH	UG/L	WATER	J	1	.3000000			.30	.30	93/03/23	93/03/23
					U	7	2.000000	.0000000	.0000000	2.00	2.00	93/04/19	93/10/25
					TOT	8	1.787500	.3612500	.6010400	2.00	.30	93/03/23	93/10/25
80087	BOD 20C	20DAYCAR	MG/L	WATER		1	1.800000			1.8	1.8	80/04/22	80/04/22
81886	PERTHANE	SED DRY	WGTUG/KG	WATER		1	.0000000			.000	.000	80/05/22	80/05/22
82028	RATIO	FEC COL	FEC STRP	WATER	$	3	11.39900	89.49700	9.460300	19	.7	85/02/14	93/08/10
82033	MG	TOTAL MG	UG/L	WATER		2	5084.000	31744.00	178.1700	5210	4958	94/08/30	94/08/30
82035	SODIUM	TOTAL NA	UG/L	WATER		176	32268.00	3233E+06	56864.00	550810	6001	88/03/01	98/09/17
82079	TURBIDTY	LAB	NTU	WATER		24	4.083300	11.98200	3.461600	13.0	.8	82/05/05	87/11/17
					K	1	1.000000			1.0	1.0	82/11/08	82/11/08
					TOT	25	3.960000	11.86300	3.444300	13.0	.8	82/05/05	87/11/17
82550	OSMOTIC	PRES TOT	MOSM/KG	WATER		1	.1766000			.18	.18	82/07/07	82/07/07
85817	BETAGROS	WAT WHL	PC/L	WATER	K	5	3.240000	.1880200	.4336100	4.000	3.000	87/04/18	97/06/09

THAT'S ALL FOLKS

APPENDIX F

NOAA ENVIRONMENTAL SENSITIVITY INDEX MAPS

City of
CHESTER
PENNSYLVANIA

DEPARTMENT OF STREETS &
PUBLIC IMPROVEMENTS
City Engineer, Charles J. Catania, Sr., P.E.
City Hall, 36 East Fifth Street
Chester, Pennsylvania 19013-4430
Telephone (610) 447-7742
Facsimile (610) 447-7721

February 16, 1999

Michael B. Freedman, Chief Engineer
Delcora
100 E. 5th Street
Chester, PA 19013

RE: Inlet Reconstruction/Street Cleaning

Dear Mr. Freedman:

As requested, we are submitting the list of storm sewer inlets which have been reconstructed over the last three year period. A mylar of the inlet system is also enclosed.

The street cleaning program for the City utilizes two mechanical street sweepers which are scheduled to clean two areas each as shown on the map enclosed. This program, weather permitting, is designed to clean all the City streets each week.

Very truly yours,

Charles J. Catania, Sr., P.E.
City Engineer

CJC,Sr./flw

Encl. (3)
CC: File

City of
CHESTER
PENNSYLVANIA

DEPARTMENT OF STREETS &
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Inlet Reconstruction 1996 - 1997 - 1998

February 15, 1999
File #80300-236

10th & Hyatt Streets, SE, NE
21st & Madison Streets, NE
10th & Elsinore Streets, NW
7th & Hinkson Streets, SW
8th & Potter Streets, NW
Rose & Upland Streets, NW
3rd & Concord Streets, NW
3rd & Franklin Streets, NW
6th & Butler Streets, NE
7th & Butler Streets, NE
3rd & Ulrich Streets, NW, NE, SE
3rd & Clayton Streets, NW
3100 Block W. 3rd Street
5th & Franklin Streets, NW
11th & Upland Streets, NE, NW
7th & Lincoln Streets, NE, SE
Front & Central Avenue
3rd & Crosby Streets, NW, NE
7th & Concord Avenue, NW
6th & Kerlin Streets, NE, NW, SW
3rd & Parker Streets, NE, SW, NW
2nd & Hayes Streets, NW
3rd & Townsend Streets, NE
900 Block W. 3rd Street, NW
3rd & Pennell Streets, NE, SW
5th & Franklin Streets, NW
3rd & Central Avenue, NW
700 Block W. 3rd Street, S, N
2800 Block W. 9th Street, N
3rd & Edwards Streets, SW
Front & Highland Avenue, NW
Nolan & Perkins Streets, NE
16th & Washington Streets, SW
Unit Block W. 7th Street, N
3rd & Fulton Streets, NE
7th & Kerlin Streets, NW
8th & Sproul Street, NE
Green & Caldwell Streets, SW, NW
8th & Caldwell Streets, NW
6th & Parker NW
8th & Butler Streets, NW
8th & Lloyd Streets, NW
9th & Lloyd Streets, SE
6th & Wilson Streets, NE
6th & Flower Streets, NW
Gray & Edgmont Avenue, SW
2nd & Bunting Streets, SE
2nd & Ward Streets, NW
2nd & Palmer Streets, NW
4th & Hayes Streets, NE
3100 Block West 3rd Street
4th & Central Avenue, SW
400 Block of Yarnall Street
9th & Penn Streets, NW
9th & Fulton Streets, NW
Crozer & W. Elkinton Streets, SW
Crozer & W. Parkway NE, NW, SW
7th & Jeffrey Streets, NE, NW
7th & Yarnall Streets, NE
11th & Kerlin Streets, SW
10th & Pennell Streets, NE
8th & Barclay, NE
7th & Barclay, NE, NW, SW
6th & Jeffrey Streets, NE, NW
6th & Harwick Strets, NE
2nd & Reaney Streets, SE
2nd & Edgmont Streets, SE
2nd & Trainer Streets,
14th & Melrose Streets, NW
3rd & Hayes Streets, SW
4th & Booth Streets, SW
2700 Block W. 3rd Street, N, S
11th & Upland Streets, NW, NE
9th & McIlvain Streets, SE, SW
2nd & Booth Streets, SW
10th & Upland Streets, NW
3rd & Madison Streets, NW
3rd & Yarnall Streets, NW

APPENDIX G

CORRESPONDENCE WITH THE CITY OF CHESTER REGARDING STREET SWEEPING AND INLET REPLACEMENT

DELAWARE, NEW JERSEY, AND PENNSYLVANIA

SHORELINE HABITAT RANKINGS

- 1 - EXPOSED SEAWALLS AND OTHER SOLID STRUCTURES MADE OF CONCRETE, WOOD, OR METAL
- 2A,2B - ERODING BLUFFS; WAVE-CUT CLAY PLATFORMS
- 3 - FINE-GRAINED SAND BEACHES
- 4 - MEDIUM- TO COARSE-GRAINED SAND BEACHES
- 5 - MIXED SAND AND GRAVEL BEACHES
- 6A - GRAVEL BEACHES
- 6B - RIPRAP STRUCTURES
- 7 - EXPOSED TIDAL FLATS
- 8A - VEGETATED, STEEPLY SLOPING RIVERINE BLUFFS
- 8B - SHELTERED SEAWALLS AND OTHER SOLID STRUCTURES MADE OF CONCRETE, WOOD, OR METAL
- 9 - SHELTERED TIDAL FLATS
- 10 - SALT AND BRACKISH WATER MARSHES

HUMAN-USE FEATURES

- ACCESS POINT
- AIRPORT
- ARCHAEOLOGICAL SITE
- BOAT RAMP
- COAST GUARD
- FERRY
- HISTORICAL SITE
- MARINA
- PARK
- RECREATIONAL FISHING
- WATER INTAKE
- WILDLIFE REFUGE
- H123 ID NUMBER

PARK/REFUGE BOUNDARY

STATE BOUNDARY

SENSITIVE BIOLOGICAL RESOURCES

BIRDS

- DIVING BIRDS
- GULLS & TERNS
- RAPTORS
- SHOREBIRDS
- WADING BIRDS
- WATERFOWL
- NESTING SITES

FISH

- FISH

MARINE MAMMALS

- DOLPHINS
- SEALS
- WHALES

TERRESTRIAL MAMMALS

- SMALL MAMMALS

REPTILES

- TURTLES

SHELLFISH

- BIVALVES
- CEPHALOPODS
- CRABS
- GASTROPODS
- LOBSTERS

HABITATS

- SUBMERGED AQUATIC VEGETATION
- TERRESTRIAL VEGETATION

MULTI-GROUP

- THREATENED/ENDANGERED
- 123 ID NUMBER

SPECIES LIST*

Common Name	Species Name
MARINE MAMMALS	
DOLPHINS	
Atlantic white-sided dolphin	*Lagenorhynchus acutus*
Bottlenose dolphin	*Tursiops truncatus*
Common dolphin	*Delphinus delphis*
Harbor porpoise	*Phocoena phocoena*
Risso's dolphin	*Grampus griseus*
Rough-toothed dolphin	*Steno bredanensis*
Stenellid dolphin	*Stenella sp.*
SEALS	
Gray seal	*Halichoerus grypus*
Harbor seal	*Phoca vitulina*
Harp seal	*Pagophilus groenlandicus*
Hooded seal	*Cystophora cristata*
WHALES	
Bryde's whale	*Balaenoptera edeni*
Dwarf sperm whale	*Kogia simus*
Fin whale (DE, NJ)	*Balaenoptera physalus*
Humpback whale (DE, NJ)	*Megaptera novaeangliae*
Long-finned pilot whale	*Globicephala melaena*
Minke whale	*Balaenoptera acutorostrata*
Northern right whale (DE, NJ)	*Eubalaena glacialis*
Pygmy sperm whale	*Kogia breviceps*
Sei whale (DE, NJ)	*Balaenoptera borealis*
Shortfin pilot whale	*Globicephala macrorhynchus*
Sperm whale (NJ)	*Physeter catodon*
TERRESTRIAL MAMMALS	
SMALL MAMMALS	
Mink	*Mustela vison*
Muskrat	*Ondatra zibethicus*
Northern raccoon	*Procyon lotor*
River otter	*Lutra canadensis*
BIRDS	
DIVING BIRDS	
Brown pelican (DE)	*Pelecanus occidentalis*
Double-crested cormorant	*Phalacrocorax auritus*
Great cormorant	*Phalacrocorax carbo*
Pied-billed grebe	*Podilymbus podiceps*
GULLS AND TERNS	
Black skimmer (NJ)	*Rynchops niger*
Black tern	*Chlidonias niger*
Common tern	*Sterna hirundo*
Forster's tern	*Sterna fosteri*
Great black-backed gull	*Larus marinus*
Gull-billed tern	*Sterna nilotica*
Herring gull	*Larus argentatus*
Laughing gull	*Larus atricilla*
Least tern (NJ)	*Sterna antillarum*
Ring-billed gull	*Larus delawarensis*
Roseate tern (NJ)	*Sterna dougallii*
RAPTORS	
Bald eagle (DE, NJ)	*Haliaeetus leucocephalus*
Northern harrier	*Circus cyaneus*
Osprey (NJ)	*Pandion haliaetus*
Peregrine falcon (DE, NJ)	*Falco peregrinus*
SHOREBIRDS	
American oystercatcher	*Haematopus palliatus*
Greater yellowlegs	*Tringa melanaleuca*
Least sandpiper	*Calidris minutilla*
Lesser yellowlegs	*Tringa flavipes*
Piping plover (DE, NJ)	*Charadrius melodus*
Semipalmated sandpiper	*Calidris pusilla*
Solitary sandpiper	*Tringa solitaria*
Spotted sandpiper	*Actitis macularia*
WADING BIRDS	
Black-crowned night heron	*Nycticorax nycticorax*
Cattle egret	*Bubulcus ibis*
Glossy ibis	*Plegadis falcinellus*
Great blue heron	*Ardea herodias*
Great egret	*Casmerodius albus*
Green-backed heron	*Butorides striatus*
King rail	*Rallus elegans*
Least bittern	*Ixobrychus exilis*
Little blue heron	*Egretta caerulea*
Snowy egret	*Egretta thula*
Sora rail	*Porzana carolina*
Tricolored heron	*Egretta tricolor*
Virginia rail	*Rallus limicola*
Yellow-crowned night heron (NJ)	*Nyctanassa violacea*

SPECIES LIST*

Common Name	Species Name
BIRDS (continued)	
WATERFOWL	
American coot	*Fulica americana*
American wigeon	*Anas americana*
Black duck	*Anas rubripes*
Blue-winged teal	*Anas discors*
Brant	*Branta bernicla*
Bufflehead	*Bucephala albeola*
Canada goose	*Branta canadensis*
Canvasback	*Aythya valisineria*
Common eider	*Somateria mollissima*
Common goldeneye	*Bucephala clangula*
Common merganser	*Mergus merganser*
Common moorhen	*Gallinula chloropus*
Gadwall	*Anas strepera*
Goldeneye	*Bucephala spp.*
Greater scaup	*Aythya marila*
Green-winged teal	*Anas crecca*
Hooded merganser	*Lophodytes cucullatus*
Lesser scaup	*Aythya affinis*
Mallard	*Anas platyrhynchos*
Merganser	*Mergus spp.*
Mute swan	*Lygnus olor*
Northern pintail	*Anas acuta*
Northern shoveler	*Anas clypeata*
Oldsquaw	*Clangula hyemalis*
Redhead	*Aythya americana*
Ring-necked duck	*Aythya collaris*
Ruddy duck	*Oxyura jamaicensis*
Scaup	*Aythya spp.*
Scoter	*Melanitta spp.*
Snow goose	*Chen caerulescens*
Surf scoter	*Melanitta perspicillata*
Whistling swan (tundra swan)	*Olor columbianus*
White-winged scoter	*Melanitta deglandi*
Wood duck	*Aix sponsa*
REPTILES	
TURTLES	
Diamondback terrapin	*Malaclemys terrapin*
Green sea turtle (DE)	*Chelonia mydas*
Kemp's ridley sea turtle (DE, NJ)	*Lepidochelys kempi*
Loggerhead sea turtle (DE, NJ)	*Caretta caretta*
FISH	
ANADROMOUS	
Alewife	*Alosa pseudoharengus*
American shad	*Alosa sapidissima*
Atlantic sturgeon	*Acipenser oxyrhynchus*
Blueback herring	*Alosa aestivalis*
Shortnose sturgeon (DE, NJ, PA)	*Acipenser brevirostrum*
Striped bass	*Morone saxatilis*
SPECIAL CONCENTRATIONS	
Atlantic croaker	*Micropogonias undulatus*
Atlantic herring	*Clupea harengus harengus*
Atlantic menhaden	*Brevoortia tyrannus*
Bay anchovy	*Anchoa mitchilli*
Black drum	*Pogonias cromis*
Black seabass	*Centropristis striata*
Bluefish	*Pomatomus saltatrix*
Channel catfish	*Ictalurus punctatus*
Largemouth bass	*Micropterus salmoides*
Northern kingfish	*Menticirrhus saxatilis*
Porgy (scup)	*Stenotomus chrysops*
Seatrout (weakfish)	*Cynoscion regalis*
Spot	*Leiostomus xanthurus*
Squirrel (red) hake (ling)	*Urophycis chuss*
Summer flounder	*Paralichthys dentatus*
Tautog	*Tautoga onitis*
White perch	*Morone americana*
Winter flounder	*Pseudopleuronectes americanus*
Yellow perch	*Perca flavescens*
SHELLFISH	
BIVALVES	
American oyster (eastern)	*Crassostrea virginica*
Northern quahog (hard clam)	*Mercenaria mercenaria*
CEPHALOPOD	
Squid	*Loligo sp.*
CRABS	
Blue crab	*Callinectes sapidus*
Horseshoe crab	*Limulus polyphemus*

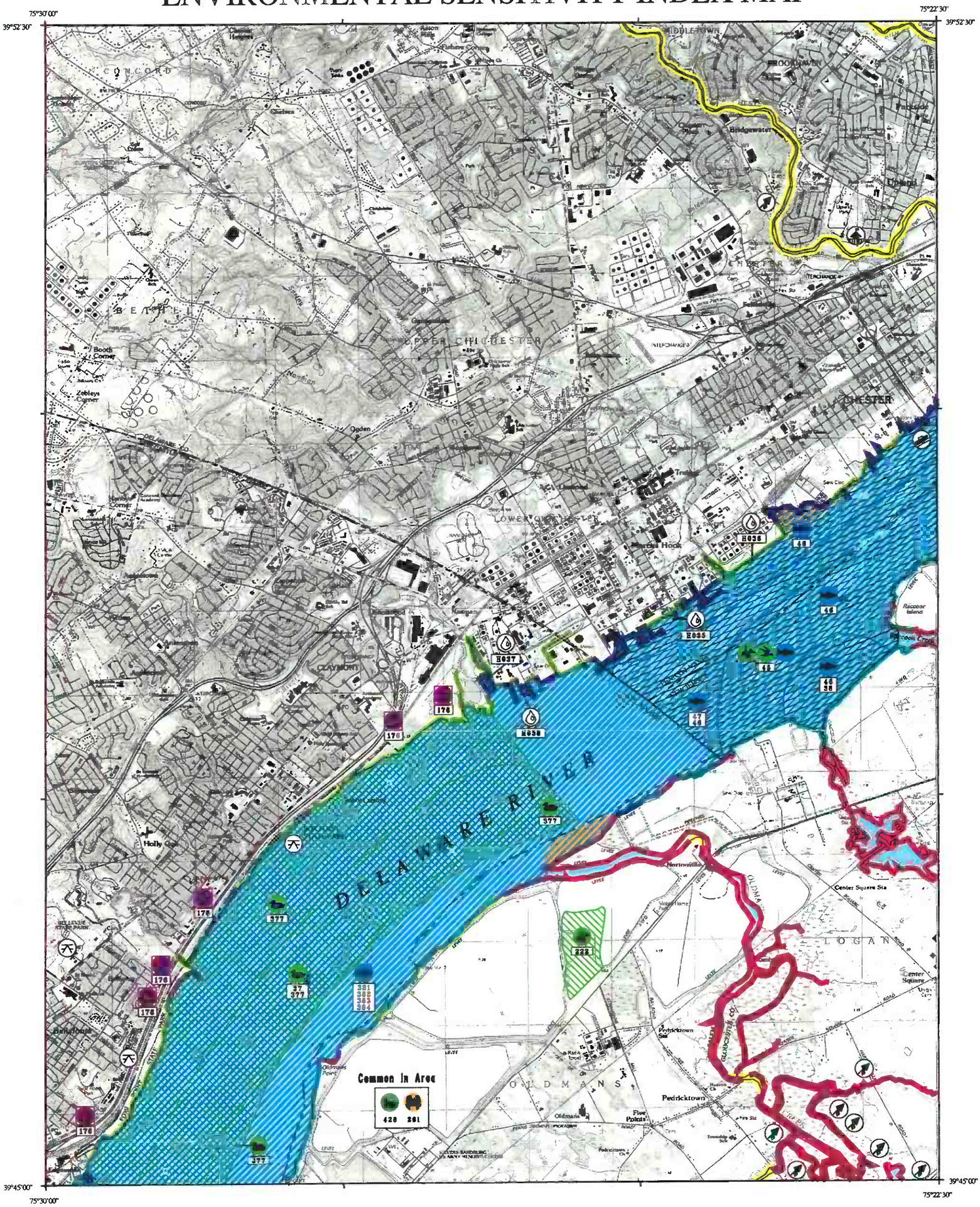
* Threatened and endangered species are designated by underlining; the state for which they are either threatened or endangered is indicated in parenthesis.

SPECIES LIST*

Common Name	Species Name
SHELLFISH (continued)	
GASTROPOD	
Channeled whelk	*Busycon canaliculatum*
Knobbed whelk	*Busycon carica*
LOBSTER	
Northern lobster	*Homarus americanus*
HABITATS	
SUBMERSED AQUATIC VEGETATION	
Eelgrass	*Zostera marina*
Minute duckweed (NJ)	*Lemna perpusilla*
TERRESTRIAL VEGETATION	
American cupscale (NJ)	*Sacciolepis striata*
Awl-leaved rush (NJ)	*Juncus coriaceus*
Barton's St. John's-wort (NJ)	*Hypericum adpressum*
Beach amaranth (NJ)	*Amaranthus pumilus*
Black-based quillwort (NJ)	*Isoetes melanopoda*
Black-fruited spikerush (NJ)	*Eleocharis melanocarpa*
Bog asphodel (NJ)	*Narthecium americanum*
Boykin's lobelia (NJ)	*Lobelia boykinii*
Britton's spikerush (NJ)	*Eleocharis brittonii*
Bur-marigold (NJ)	*Bidens bidentoides*
Clustered beaked rush (NJ)	*Rhynchospora glomerata*
Coast flatsedge (NJ)	*Cyperus polystachyos*
Cut-leaved water-milfoil (NJ)	*Myriophyllum pinnatum*
Cypress-swamp sedge (NJ)	*Carex joorii*
Featherfoil (NJ)	*Hottonia inflata*
Floating pennywort (NJ)	*Hydrocotyle ranunculoides*
Fog fruit (NJ)	*Phyla lanceolata*
Glade spurge (NJ)	*Euphorbia purpurea*
Grass-like beaked rush (NJ)	*Rhynchospora globularis*
Knieskern's beaked rush (NJ)	*Rhynchospora knieskernii*
Koehn's tooth-cup (NJ)	*Ammannia latifolia*
Lace-lip ladies'-tresses (NJ)	*Spiranthes laciniata*
Larger buttonweed (NJ)	*Diodia virginiana*
Lesser bladderwort (NJ)	*Utricularia minor*
Long's bulrush (NJ)	*Scirpus longii*
Mudweed (NJ)	*Limosella subulata*
New Jersey rush (NJ)	*Juncus caesariensis*
Pine Barren boneset (NJ)	*Eupatorium resinosum*
Pumpkin Ash (NJ)	*Fraxinus profunda*
Puttyroot (NJ)	*Aplectrum hyemale*
Rare-flowering beaked rush (NJ)	*Rhynchospora rariflora*
Red goosefoot (NJ)	*Chenopodium rubrum*
Robin-run-away (NJ)	*Dalibarda repens*
Rough cottongrass (NJ)	*Eriophorum tenellum*
Rough flatsedge (NJ)	*Cyperus retrofractus*
Salt marsh bulrush (NJ)	*Scirpus robustus*
Sea-beach milkwort (NJ)	*Glaux maritima*
Sea-side evening primrose (NJ)	*Oenothera humifusa*
Seaside alder	*Alnus maritima*
Seaside crowfoot (NJ)	*Ranunculus cymbalaria*
Short-fruited rush (NJ)	*Juncus brachycarpus*
Slender water-milfoil (NJ)	*Myriophyllum tenellum*
Small yellow pond lily (NJ)	*Nuphar microphyllum*
Small-headed beaked rush (NJ)	*Rhynchospora microcephala*
Snowy orchid (NJ)	*Platanthera nivea*
Stinking fleabane (NJ)	*Pluchea foetida*
Stout smartweed (NJ)	*Polygonum densiflorum*
Swamp-pink (NJ)	*Helonias bullata*
Thread-leaved beaked rush (NJ)	*Rhynchospora filifolia*
Twisted spikerush (NJ)	*Eleocharis tortilis*
Virginia joint-vetch (NJ)	*Aeschynomene virginica*
Virginia thistle (NJ)	*Cirsium virginianum*
Walter's St. John's-wort (NJ)	*Triadenum walteri*
Water oak (NJ)	*Quercus nigra*
Whorled nut rush (NJ)	*Scleria verticillata*
Wrinkled jointgrass (NJ)	*Coelorachis rugosa*

* Threatened and endangered species are designated by underlining; the state for which they are either threatened or endangered is indicated in parenthesis.

ENVIRONMENTAL SENSITIVITY INDEX MAP



BIOLOGICAL RESOURCES:

BIRD:

RAR#	Species	ST	S/F	T/E	Concen	J	F	M	A	M	J	J	A	S	O	N	D	Nesting	Laying	Hatching	Fledging
37	Mallard				600	X	X										X	-	-	-	-
45	Double-crested cormorant				HIGH	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-
	Great cormorant				LOW	X	X	X	X						X	X	X	-	-	-	-
	Gulls				HIGH			X	X	X	X	X	X					-	-	-	-
222	Pied-billed grebe					X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-
377	Black duck				200-2000	X	X	X	X	X	X	X	X	X	X	X	X	APR-APR	APR-APR	MAY-JUN	-
	Canada goose				200-300	X	X	X					X	X	X	X	X	MAR-AUG	MAR-JUL	APR-AUG	APR-AUG
	Ruddy duck				0-500	X	X						X	X	X	X	X	-	-	-	-
428	Black duck				6850	X	X										X	-	-	-	-
	Bufflehead				100	X	X	X	X	X			X	X	X	X	X	-	-	-	-
	Canada goose				9000	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-
	Canvasback				100	X	X	X	X	X			X	X	X	X	X	-	-	-	-
	Gadwall				50	X	X	X	X	X							X	-	-	-	-
	Green-winged teal				2800	X	X	X						X	X	X	X	-	-	-	-
	Mallard				3300	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-
	Merganser				200	X	X	X	X	X					X	X	X	-	-	-	-
	Mute swan				120	X	X	X	X	X	X	X	X	X	X	X	X	MAR-OCT	APR-MAY	MAY-JUN	SEP-OCT
	Northern pintail				3000	X	X	X	X					X	X	X	X	-	-	-	-
	Ring-necked duck				100	X	X	X	X	X				X	X	X	X	-	-	-	-
	Ruddy duck				7000	X	X	X	X	X				X	X	X	X	-	-	-	-
	Scaup				750	X	X	X								X	X	-	-	-	-
	Snow goose				15000	X	X	X						X	X	X	X	-	-	-	-
	Whistling swan (tundra swan)				400	X	X	X	X							X	X	-	-	-	-

FISH:

RAR#	Species	ST	S/F	T/E	Concen	J	F	M	A	M	J	J	A	S	O	N	D	Spawning	Outmig.	Larvae/Juv
38	Striped bass				HIGH			X	X	X	X	X	X	X	X			APR-MAY	-	MAY-OCT
45	Alewife				HIGH			X	X	X	X	X	X	X	X	X		APR-JUN	-	APR-NOV
	American shad				MED		X	X	X	X	X	X	X	X	X			-	SEP-NOV	JUN-NOV
	Atlantic menhaden				HIGH		X	X	X	X	X	X	X	X				-	-	MAR-OCT
	Blueback herring				HIGH			X	X	X								APR-JUN	-	-
	Spot				HIGH		X	X	X	X	X	X	X	X	X	X		-	-	MAR-JUN
	Striped bass				MED			X	X	X	X	X	X	X	X			-	OCT-OCT	-
	White perch				MED				X	X	X	X	X	X	X	X		MAY-MAY	-	-
46	Atlantic croaker				HIGH					X	X	X	X	X	X	X		-	-	SEP-DEC
	Bay anchovy				HIGH	X	X	X	X	X	X	X	X	X	X	X	X	MAY-SEP	-	MAY-JAN
	Bluefish				MED			X	X	X	X	X	X	X	X			-	-	JUL-SEP
	Seatrout (weakfish)				LOW		X	X	X	X	X	X	X	X	X			APR-AUG	-	APR-SEP
	Summer flounder				LOW			X	X	X	X	X	X	X	X			-	-	APR-NOV
	Yellow perch				LOW	X	X	X	X	X	X	X	X	X	X	X	X	FEB-MAR	-	FEB-MAR
47	Atlantic sturgeon				LOW	X	X	X	X	X	X	X	X	X	X	X	X	APR-JUL	-	APR-AUG
381	American shad				MED		X	X	X	X	X	X	X	X	X			APR-MAY	-	MAY-NOV
	Atlantic croaker				MED	X		X	X	X	X	X	X	X	X	X		-	-	MAY-JAN
	Atlantic menhaden				MED			X	X	X	X	X	X	X	X			-	-	MAY-OCT
	Atlantic sturgeon				LOW	X	X	X	X	X					X	X		-	-	-
	Bay anchovy				HIGH	X	X	X	X	X	X	X	X	X	X	X	X	MAY-SEP	-	MAY-JAN
	Black drum				LOW			X	X	X	X	X	X	X	X			-	-	JUN-NOV
	Black seabass				MED			X	X	X	X	X	X	X	X			-	-	APR-OCT
	Bluefish				MED				X	X	X	X	X	X	X			-	-	MAY-OCT
	Seatrout (weakfish)				HIGH			X	X	X	X	X	X	X	X			-	-	-
	Spot				MED				X	X	X	X	X	X	X	X		-	-	MAY-NOV
	Striped bass				MED	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-
	Summer flounder				MED			X	X	X	X	X	X	X	X	X		-	-	APR-NOV
382	Atlantic sturgeon				LOW				X	X	X	X	X					-	SEP-OCT	JUN-OCT
	Channel catfish				MED	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-
383	White perch				MED	X	X	X	X	X	X	X	X	X	X	X	X	-	OCT-NOV	JUN-NOV
384	Striped bass				MED			X	X	X								APR-JUN	-	-

HABITAT:

RAR#	Species	ST	S/F	T/E	Concen	J	F	M	A	M	J	J	A	S	O	N	D
176	Bur-marigold	NJ	S	E	MED	X	X	X	X	X	X	X	X	X	X	X	X

SHELLFISH:

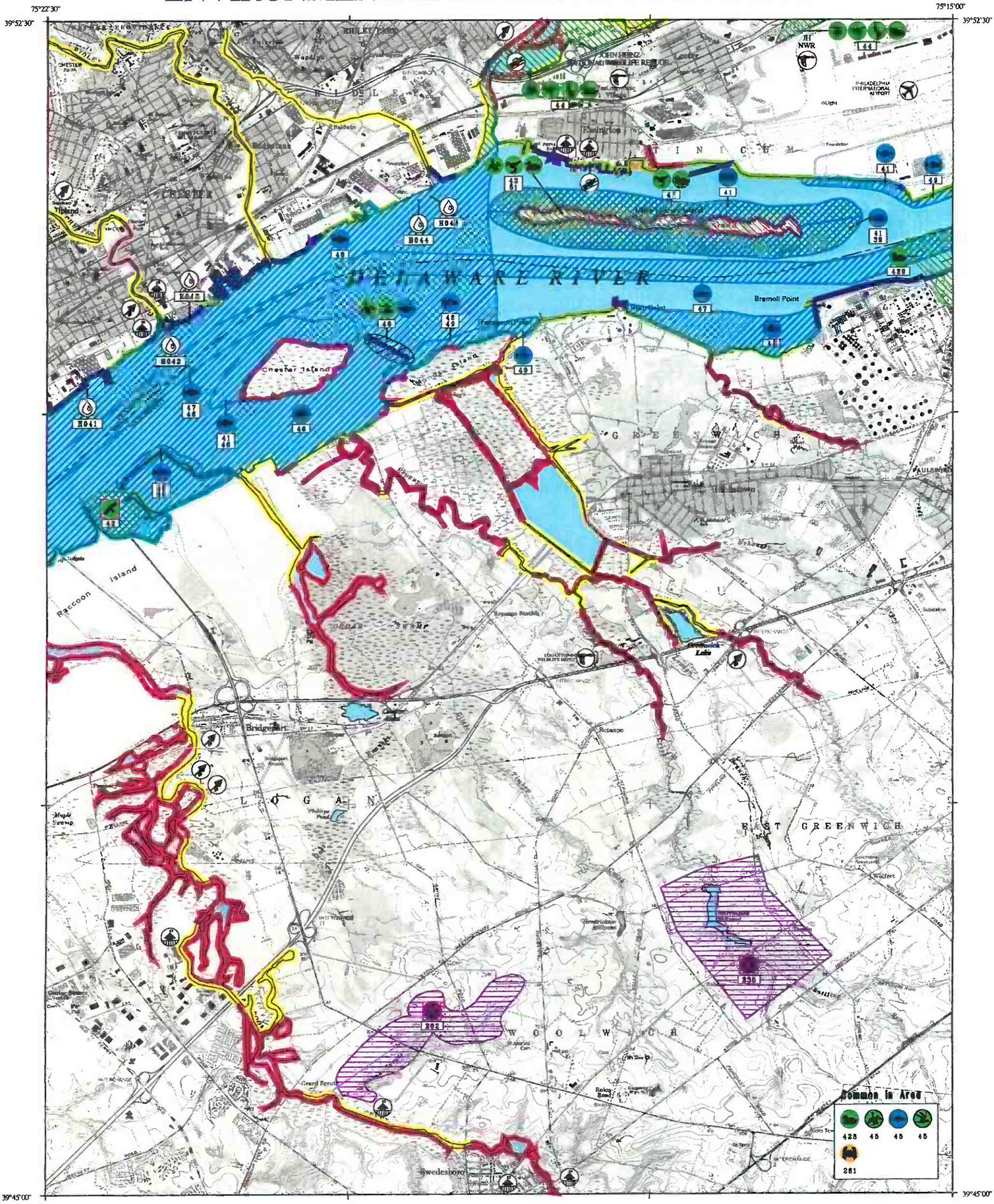
RAR#	Species	ST	S/F	T/E	Concen	J	F	M	A	M	J	J	A	S	O	N	D	Spawning	Larvae/Juv	Mating
261	Blue crab								X	X	X	X	X	X	X	X		JUL-AUG	SEP-OCT	-

HUMAN USE RESOURCES:

WATER_INTAKE:

RAR#	Name	Owner	Contact	Phone
H035	WATER INTAKE	RWS (STANDBY INTAKE)		
H036	WATER INTAKE	B. P. OIL INC.		215-499-7000
H037	INDUSTRIAL WATER SUPPLY	CITISTEEL USA, INC.	RAY AJALLI; MGR. ENERGY AND ENVIRONMENT	302-792-5400
H038	INDUSTRIAL WATER SUPPLY	GENERAL CHEMICAL CORPORATION	JOSEPH HARDMAN; MGR. REGIONAL AFFAIRS	302-792-8741

ENVIRONMENTAL SENSITIVITY INDEX MAP



Prepared for:

HAZARDOUS MATERIALS RESPONSE
and ASSESSMENT DIVISION
National Oceanic and Atmospheric Administration
Seattle, Washington
and
The States of DELAWARE,
NEW JERSEY, and PENNSYLVANIA

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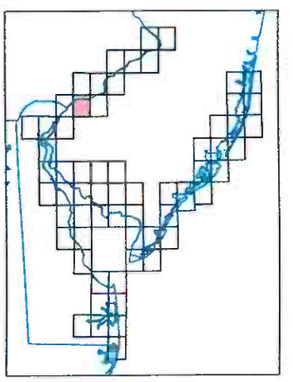
1 .5 0 1 KILOMETER

1 .5 0 1 MILE

Not For Navigation
Published: August 1996



BRIDGEPORT, N.J. -PA. (1994) 21

DELAWARE, NEW JERSEY, and PENNSYLVANIA ESIMAP 21

BIOLOGICAL RESOURCES:

BIRD:

RAR#	Species	ST	S/F	T/E	Concen	J	F	M	A	M	J	J	A	S	O	N	D	Nesting	Laying	Hatching	Fledging
40	Double-crested cormorant				HIGH	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-
	Great cormorant				LOW	X	X	X	X						X	X	X	-	-	-	-
	Gulls				HIGH			X	X	X	X	X	X					-	-	-	-
42	Peregrine falcon	NJ	S/F	E/E	LOW	X	X	X	X	X	X	X	X	X	X	X	X	MAR-AUG	MAR-APR	APR-MAY	JUN-AUG
43	Black duck				HIGH	X	X	X	X	X					X	X	X	-	-	-	-
	Canada goose				HIGH	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-
	Common merganser				HIGH	X	X	X	X						X	X	X	-	-	-	-
	Greater yellowlegs				LOW				X	X		X	X	X	X			-	-	-	-
	Hooded merganser				MED	X	X	X	X						X	X	X	-	-	-	-
	Least sandpiper				LOW					X		X	X	X				-	-	-	-
	Lesser yellowlegs				LOW				X	X		X	X	X	X			-	-	-	-
	Mallard				HIGH	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-
	Northern pintail				HIGH	X	X	X	X					X	X	X	X	-	-	-	-
	Northern shoveler				MED	X	X	X	X					X	X	X	X	-	-	-	-
	Semipalmated sandpiper				LOW					X		X	X	X				-	-	-	-
	Solitary sandpiper				LOW				X	X		X	X	X	X			-	-	-	-
	Spotted sandpiper				LOW				X	X	X	X	X	X	X			-	-	-	-
	Wood duck				HIGH			X	X	X	X	X	X	X	X	X		-	-	-	-
44	Black duck				HIGH	X	X	X	X	X					X	X	X	-	-	-	-
	Black tern				LOW					X		X	X					-	-	-	-
	Black-crowned night heron				HIGH			X	X	X	X	X	X	X	X			-	-	-	-
	Canada goose				HIGH	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-
	Common merganser				HIGH	X	X	X	X						X	X	X	-	-	-	-
	Common moorhen				HIGH				X	X	X	X	X	X	X			-	-	-	-
	Forster's tern				MED				X	X		X	X	X	X			-	-	-	-
	Great blue heron				HIGH	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-
	Great egret				HIGH			X	X	X	X	X	X	X	X	X		-	-	-	-
	Greater yellowlegs				HIGH				X	X		X	X	X	X			-	-	-	-
	Green-backed heron				HIGH				X	X	X	X	X	X	X			-	-	-	-
	Hooded merganser				MED	X	X	X	X						X	X	X	-	-	-	-
	King rail				LOW				X	X	X	X	X	X	X	X		-	-	-	-
	Least bittern				LOW				X	X	X	X	X	X	X	X		MAY-AUG	MAY-JUN	JUN-JUL	JUL-AUG
	Least sandpiper				HIGH					X		X	X	X				-	-	-	-
	Lesser yellowlegs				HIGH				X	X		X	X	X	X			-	-	-	-
	Little blue heron				LOW				X	X	X	X	X	X	X	X		-	-	-	-
	Mallard				HIGH	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-
	Northern pintail				HIGH	X	X	X	X					X	X	X	X	-	-	-	-
	Northern shoveler				MED	X	X	X	X					X	X	X	X	-	-	-	-
	Semipalmated sandpiper				HIGH					X		X	X	X				-	-	-	-
	Snowy egret				LOW				X	X	X	X	X	X	X			-	-	-	-
	Solitary sandpiper				MED				X	X		X	X	X	X			-	-	-	-
	Sora rail				MED				X	X	X	X	X	X	X			-	-	-	-
	Spotted sandpiper				HIGH				X	X	X	X	X	X	X			-	-	-	-
	Virginia rail				MED				X	X	X	X	X	X	X			-	-	-	-
	Wood duck				HIGH			X	X	X	X	X	X	X	X	X		-	-	-	-
45	Double-crested cormorant				HIGH	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-
	Great cormorant				LOW	X	X	X	X						X	X	X	-	-	-	-
	Gulls				HIGH			X	X	X	X	X	X					-	-	-	-
51	Double-crested cormorant				MED				X	X	X	X	X	X	X	X		-	-	-	-
	Great cormorant				LOW	X	X	X	X						X	X	X	-	-	-	-
428	Black duck				6850	X	X										X	-	-	-	-
	Bufflehead				100	X	X	X	X	X				X	X	X	X	-	-	-	-
	Canada goose				9000	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-
	Canvasback				100	X	X	X	X					X	X	X	X	-	-	-	-
	Gadwall				50	X	X	X	X	X							X	-	-	-	-
	Green-winged teal				2800	X	X	X							X	X	X	-	-	-	-
	Mallard				3300	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-
	Merganser				200	X	X	X	X						X	X	X	-	-	-	-
	Mute swan				120	X	X	X	X	X	X	X	X	X	X	X	X	MAR-OCT	APR-MAY	MAY-JUN	SEP-OCT
	Northern pintail				3000	X	X	X	X					X	X	X	X	-	-	-	-
	Ring-necked duck				100	X	X	X	X	X				X	X	X	X	-	-	-	-
	Ruddy duck				7000	X	X	X	X	X				X	X	X	X	-	-	-	-
	Scaup				750	X	X	X								X	X	-	-	-	-
	Snow goose				15000	X	X	X						X	X	X	X	-	-	-	-
	Whistling swan (tundra swan)				400	X	X	X	X							X	X	-	-	-	-
429	Black duck				1500	X	X										X	-	-	-	-
	Bufflehead				100	X	X	X	X	X				X	X	X	X	-	-	-	-
	Canada goose				7600	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-
	Canvasback				200	X	X	X	X					X	X	X	X	-	-	-	-
	Gadwall				10	X	X	X	X	X							X	-	-	-	-
	Goldeneye				100	X	X	X								X	X	-	-	-	-
	Green-winged teal				1700	X	X	X							X	X	X	-	-	-	-
	Mallard				1600	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-
	Merganser				300	X	X	X	X						X	X	X	-	-	-	-
	Northern pintail				1600	X	X	X	X					X	X	X	X	-	-	-	-
	Oldsquaw				100	X	X	X	X						X	X	X	-	-	-	-
	Ring-necked duck				200	X	X	X	X	X				X	X	X	X	-	-	-	-
	Ruddy duck				7300	X	X	X	X	X				X	X	X	X	-	-	-	-
	Scaup				6700	X	X	X								X	X	-	-	-	-
	Whistling swan (tundra swan)				200	X	X	X	X							X	X	-	-	-	-

FISH:

RAR#	Species	ST	S/F	T/E	Concen	J	F	M	A	M	J	J	A	S	O	N	D	Spawning	Outmig.	Larvae/Juv
39	Striped bass				MED				X	X								APR-MAY	-	-
40	Alewife				HIGH					X	X	X	X	X	X	X	X	APR-JUN	-	APR-NOV
	American shad				MED			X	X	X	X	X	X	X	X	X		-	SEP-NOV	JUN-NOV
	Atlantic menhaden				HIGH			X	X	X	X	X	X	X	X			-	-	MAR-OCT
	Blueback herring				HIGH				X	X	X							APR-JUN	-	-
	Spot				HIGH			X	X	X	X	X	X	X	X	X	X	-	-	MAR-JUN
	Striped bass				HIGH				X	X	X	X	X	X	X	X		-	OCT-OCT	-
	White perch				MED					X	X	X	X	X	X	X		MAY-MAY	-	-
41	Striped bass				HIGH					X	X	X	X	X	X			-	-	MAY-OCT
45	Alewife				HIGH				X	X	X	X	X	X	X	X		APR-JUN	-	APR-NOV
	American shad				MED			X	X	X	X	X	X	X	X	X		-	SEP-NOV	JUN-NOV
	Atlantic menhaden				HIGH			X	X	X	X	X	X	X	X			-	-	MAR-OCT
	Blueback herring				HIGH				X	X	X							APR-JUN	-	-
	Spot				HIGH			X	X	X	X	X	X	X	X	X	X	-	-	MAR-JUN
	Striped bass				MED				X	X	X	X	X	X	X	X		-	OCT-OCT	-
	White perch				MED					X	X	X	X	X	X	X		MAY-MAY	-	-
46	Atlantic croaker				HIGH						X	X	X	X	X	X	X	-	-	SEP-DEC
	Bay anchovy				HIGH	X	X	X	X	X	X	X	X	X	X	X	X	MAY-SEP	-	MAY-JAN
	Bluefish				MED				X	X	X	X	X	X	X	X		-	-	JUL-SEP
	Seatrout (weakfish)				LOW			X	X	X	X	X	X	X	X	X		APR-AUG	-	APR-SEP
	Summer flounder				LOW				X	X	X	X	X	X	X	X		-	-	APR-NOV
	Yellow perch				LOW	X	X	X	X	X	X	X	X	X	X	X	X	FEB-MAR	-	FEB-MAR
47	Atlantic sturgeon				LOW	X	X	X	X	X	X	X	X	X	X	X	X	APR-JUL	-	APR-AUG
48	Blueback herring				HIGH				X	X	X							APR-JUN	-	-
	Striped bass				HIGH				X	X								APR-MAY	-	-
49	Striped bass				HIGH				X	X								APR-MAY	-	-
50	Striped bass				LOW				X	X								APR-MAY	-	-

HABITAT:

RAR#	Species	ST	S/F	T/E	Concen	J	F	M	A	M	J	J	A	S	O	N	D
202	Robin-run-away	NJ	S		E	X	X	X	X	X	X	X	X	X	X	X	X
235	Twisted spikerush	NJ	S		E	X	X	X	X	X	X	X	X	X	X	X	X

SHELLFISH:

RAR#	Species	ST	S/F	T/E	Concen	J	F	M	A	M	J	J	A	S	O	N	D	Spawning	Larvae/Juv	Mating
261	Blue crab									X	X	X	X	X	X	X		JUL-AUG	SEP-OCT	-

HUMAN USE RESOURCES:

WATER_INTAKE:

RAR#	Name	Owner	Contact	Phone
H041	WATER INTAKE	DEGUSSA CORP. - NORTH AM. SILICA		
H042	WATER INTAKE	SCOTT PAPER COMPANY		215-522-5000
H043	WATER INTAKE	SCOTT PAPER COMPANY		215-522-5000
H044	WATER INTAKE	PHILADELPHIA ELECTRIC COMPANY		215-595-8100
H045	WATER INTAKE	PHILADELPHIA ELECTRIC COMPANY		215-595-8100

APPENDIX H

DETAILED COST ESTIMATE DATA

ROY F. WESTON, INC.
WEST CHESTER, PENNSYLVANIA

PROJECT:DELCORA CSO ALTERNATIVES
W.O. NO. :05623-009-001-0003-00
LOCATION:CHESTER, DELAWARE COUNTY, PENNSYLVANIA
ESTIMATE:CONCEPTUAL/PRELIMINARY
ESTIMATOR:NGA
DATE: 18-Jul-97 03:57 PM

FILENAME: DCORACSO.WK1

ESTIMATE ACCURACY: +30% TO -15%

ITEM	DESCRIPTION	UNIT QUANTITY	UNIT	MATERIAL UNIT COST	MATERIAL TOTAL MATERIAL	LABOR UNIT COST	LABOR TOTAL LABOR	EQUIPMENT UNIT COST	EQUIPMENT TOTAL EQUIPMENT	SUBCONTRACTS TOTAL SUBCONTRACTS	TOTAL
	COMBINED SEWER OVERFLOW (CSO) ALTERNATIVES P R O J E C T S U M M A R Y										
I	FIRST COST SUBTOTAL (FROM SHEET SUMMARY, SHEET NO. 3)				858,700.47		1,097,430		1,052,500	1,277,874	4,286,504.86
II	LABOR PRODUCTIVITY ADJUSTMENT FACTOR: LEVEL "D" PERSONNEL PROTECTION, DIFFERENTIAL						0				0.00
	SUBTOTAL				858,700.47		1,097,430		1,052,500	1,277,874	4,286,504.86
III	OTHER PROJECT DIRECT AND INDIRECT COSTS: PROJECT CONSTRUCTION FACILITIES - MOBILIZATION AND DEMOBILIZATION - CONSTRUCTION EQUIPMENT - SMALL TOOLS AND CONSUMABLE ITEMS - PERSONNEL PROTECTION EQUIPMENT (PPE) - PERMITS AND FEES - STATE SALES AND USE TAX @ 6%										342,900.00 47,200.00 128,600.00 86,400.00 0.00 64,300.00 119,856.03
	SUBTOTAL										5,075,800.00
IV	ESCALATION: (INFLATION/DEFLATION FACTOR) ENR CONSTRUCTION COST INDEX (CCI) = ENR BUILDING COST INDEX (BCI) =	1.0000 0.0000									0.00 0.00
	SUBTOTAL										5,075,800.00
V	PROJECT/CONSTRUCTION CONTRACT COSTS: GENERAL AND ADMINISTRATIVE OVERHEAD COSTS - CONTRACTOR MARKUP AND PROFIT -										239,900.00 534,900.00
	SUBTOTAL										5,850,600.00
VI	CONTINGENCY @ >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	20.00%									1,170,100.00
VII	T O T A L (ROUNDED)										7,020,700.00

NOTE:
SEE SHEET NO. 4 FOR INDIVIDUAL COST COMPONENT BREAKDOWN

ROY F. WESTON, INC.
WEST CHESTER, PENNSYLVANIA

PROJECT:DELCORA CSO ALTERNATIVES
W. O. NO.:05623-009-001-0003-00

FILENAME: DCORACSO.WK1

ITEM	DESCRIPTION COST INDEX AND LABOR DATA		UNIT	MATERIAL UNIT COST	MATERIAL TOTAL MATERIAL	LABOR UNIT COST	LABOR TOTAL LABOR	EQUIPMENT UNIT COST	EQUIPMENT TOTAL EQUIPMENT	SUBCONTRACTS TOTAL SUBCONTRACTS	TOTAL
1.	ENGINEERING NEWS RECORD COST INDEX DATA:										
	DATE OF REFERENCED INDEX - July 1997										
	CONSTRUCTION COST INDEX (CCI) =	5862.91									
	BUILDING COST INDEX (BCI) =	3391.86									
	DATE OF CURRENT INDEX -										
	CONSTRUCTION COST INDEX (CCI) =	5862.91									
	BUILDING COST INDEX (BCI) =	3391.86									
	ESCALATION FACTORS -										
	CONSTRUCTION COST INDEX (CCI) =	1.0000									
	BUILDING COST INDEX (BCI) =	1.0000									
2.	LABOR:										
	CRAFT CLASSIFICATION: GENERAL CONSTRUCTION										
	LOCAL NO. (N/A) [DAVIS-BACON WAGES]										
	CONTRACT EXPIRATION DATE: 5/31/98										
	BASE WAGE	1.0	HR				17.01				
	ESTIMATED WAGE INCREASE: (% OF BASE WAGE)	5.0%									
	WAGE ADJUSTMENT, BASE (IF APPLICABLE)	1.0	HR				0.85				
	HEALTH AND WELFARE, PENSION	1.0	LS				0.00				
	OTHER FRINGES	1.0	LS				9.69				
	SUBTOTAL						27.55				
	PAYROLL TAXES AND INSURANCE:										
	FICA, FUTA, SUTA, AND WORKMANS COMPENSATION, COMPUTE @ PERCENTAGE OF ADJUSTED BASE WAGE	23.5%					4.20				
	TOTAL JOURNEYMAN HOURLY BASE WAGE						31.75				
	TOTAL APPROXIMATE PROJECT MANHOURS	34567.2	HRS								
2A.	LABOR MODIFICATION FACTOR:										
	LEVEL OF PERSONNEL PROTECTION REQUIRED FOR THE EXECUTION OF THIS PROJECT:										
	LEVEL D	1.0		PROTECTIVE CLOTHING & EQUIPMENT							
	LEVEL D+										
	LEVEL C										
	LEVEL B										
	MODIFICATION FACTORS -										
	LEVEL D, MODIFICATION FACTOR	1.000		0.00	PER HOUR						
	LEVEL D+, MODIFICATION FACTOR	1.110		6.02	PER HOUR						
	LEVEL C, MODIFICATION FACTOR	1.310		9.80	PER HOUR						
	LEVEL B, MODIFICATION FACTOR	1.330		8.70	PER HOUR						
3.	MARKUP AND CONTINGENCY FACTORS:										
	GENERAL AND ADMINISTRATIVE OVERHEAD COSTS -				0.020		0.050		0.005	0.050	0.125
	CONTRACTOR MARKUP AND PROFIT -				0.050		0.400		0.020	0.025	
	PROJECT CONTINGENCY				0.075		0.075		0.025	0.025	0.200
	TOTAL SHEET NO. 2										

ROY F. WESTON, INC.
WEST CHESTER, PENNSYLVANIA

PROJECT:DELCORA CSO ALTERNATIVES
W. O. NO.:05623-009-001-0003-00

FILENAME: DCORACSO.WK1

ITEM	DESCRIPTION	UNIT QUANTITY	UNIT	MATERIAL UNIT COST	MATERIAL TOTAL MATERIAL	LABOR UNIT COST	LABOR TOTAL LABOR	EQUIPMENT UNIT COST	EQUIPMENT TOTAL EQUIPMENT	SUBCONTRACTS TOTAL SUBCONTRACTS	TOTAL
	D I V I S I O N S U M M A R Y										
	DIVISION 2 - SITE WORK				538,536.96		779,751.43		970,000.00	1,240,874	3,529,162.69
	DIVISION 3 - CONCRETE				248,981.30		239,004.86		0.00	20,000.00	507,986.16
	DIVISION 4 - MASONRY										
	DIVISION 5 - METALS				29,382.21		36,512.83		0.00	0.00	65,895.04
	DIVISION 6 - CARPENTRY										
	DIVISION 7 - MOISTURE PROTECTION										
	DIVISION 8 - DOORS, WINDOWS AND GLAZING										
	DIVISION 9 - FINISHES										
	DIVISION 10 - SPECIALTIES										
	DIVISION 11 - EQUIPMENT				6,800.00		10,159.27		55,000.00	0.00	71,959.27
	DIVISION 12 - FURNISHINGS										
	DIVISION 13 - SPECIAL CONSTRUCTION										
	DIVISION 14 - CONVEYING SYSTEMS										
	DIVISION 15 - MECHANICAL				13,500.00		9,143.34		0.00	10,000.00	32,643.34
	DIVISION 16 - ELECTRICAL				21,500.00		22,858.36		27,500.00	7,000.00	78,858.36
	TOTAL SHEET NO. 3				858,700		1,097,430		1,052,500	1,277,874	4,286,504.86

ROY F. WESTON, INC.
WEST CHESTER, PENNSYLVANIA

FILENAME: DCORACSO.WK1

PROJECT:DELCORA CSO ALTERNATIVES
W. O. NO.:05623-009-001-0003-00

ITEM	DESCRIPTION	UNIT QUANTITY	UNIT	MATERIAL UNIT COST	MATERIAL TOTAL MATERIAL	LABOR UNIT COST	LABOR TOTAL LABOR	EQUIPMENT UNIT COST	EQUIPMENT TOTAL EQUIPMENT	SUBCONTRACTS TOTAL SUBCONTRACTS	TOTAL
	ALTERNATIVE SUMMARY										
A.	RIDLEY CREEK OUTFALL INTERCEPTOR										1,247,800.00
B.	6A INTERCONNECT										19,300.00
C.	4A AND 4B INTERCONNECT										20,600.00
D.	23A INTERCONNECT										110,300.00
E.	STORM DRAIN INLETS (PER EACH) [1,140 REQUIRED]										10,100.00
F.	REGULATORS										1,651,000.00
G.	FLOATABLES CONTAINMENT										1,740,300.00
H.	WASTEWATER TREATMENT PLANT (WWTP) MODIFICATIONS										
I.	BYPASS FROM EXISTING PRIMARY SETTLING TANK(S)										427,400.00
II.	GRIT TANK EXPANSION										874,500.00
III.	CHLORINE CONTACT TANK EXPANSION										919,500.00
	TOTAL SHEET NO. 4				0.00		0.00		0.00	0.00	7,020,800.00

ROY F. WESTON, INC.
WEST CHESTER, PENNSYLVANIA

FILENAME: DCORACSO.WK1

PROJECT:DELCORA CSO ALTERNATIVES
W. O. NO.:05623-009-001-0003-00

ITEM	DESCRIPTION	UNIT QUANTITY	UNIT	MATERIAL UNIT COST	MATERIAL TOTAL MATERIAL	LABOR UNIT COST	LABOR TOTAL LABOR	EQUIPMENT UNIT COST	EQUIPMENT TOTAL EQUIPMENT	SUBCONTRACTS TOTAL SUBCONTRACTS	TOTAL
	S H E E T S U M M A R Y										
	TOTAL FROM SHEET NO. 6				5,086.11		145,653.41		0.00	4,250.00	154,989.52
	TOTAL FROM SHEET NO. 7				343,173.85		236,447.86		0.00	27,222.22	606,843.93
	TOTAL FROM SHEET NO. 8				5,930.53		4,779.19		0.00	1,102.87	11,812.59
	TOTAL FROM SHEET NO. 9				6,236.53		5,251.17		0.00	1,102.87	12,590.57
	TOTAL FROM SHEET NO. 10				9,829.39		38,634.31		0.00	18,864.44	67,328.14
	TOTAL FROM SHEET NO. 11				1,704.88		3,420.01		0.00	1,019.39	6,144.28
	TOTAL FROM SHEET NO. 12				0.00		0.00		0.00	1,008,000	1,008,000.00
	TOTAL FROM SHEET NO. 13				11,711.80		77,528.52		970,000.00	3,304.17	1,062,544.49
	TOTAL FROM SHEET NO. 14				146,909.70		107,433.10		0.00	6,583.33	260,926.13
	TOTAL FROM SHEET NO. 15				3,929.17		84,723.89		0.00	78,800.00	167,453.05
	TOTAL FROM SHEET NO. 16				107,683.68		106,343.61		0.00	10,000.00	224,027.29
	TOTAL FROM SHEET NO. 17				26,500.00		28,445.95		77,500.00	10,000.00	142,445.95
	TOTAL FROM SHEET NO. 18				4,025.00		75,879.98		0.00	90,625.00	170,529.98
	TOTAL FROM SHEET NO. 19				170,679.83		169,174.08		0.00	10,000.00	349,853.91
	TOTAL FROM SHEET NO. 20				15,300.00		13,715.01		5,000.00	7,000.00	41,015.01
	TOTAL SHEET NO. 5				858,700		1,097,430		1,052,500	1,277,874	4,286,504.86

ROY F. WESTON, INC.
WEST CHESTER, PENNSYLVANIA

FILENAME: DCORACSO.WK1

PROJECT:DELCORA CSO ALTERNATIVES
W. O. NO.:05623-009-001-0003-00

ITEM	DESCRIPTION	UNIT QUANTITY	UNIT	MATERIAL UNIT COST	MATERIAL TOTAL MATERIAL	LABOR UNIT COST	LABOR TOTAL LABOR	EQUIPMENT UNIT COST	EQUIPMENT TOTAL EQUIPMENT	SUBCONTRACTS TOTAL SUBCONTRACTS	TOTAL
A.	RIDLEY CREEK OUTFALL INTERCEPTOR DIVISION 2 - SITE WORK										
1.	SITE SURVEY AND LAYOUT: SURVEY AND ROUTE LAYOUT OFFSETS AND VERTICAL/ELEVATION CONTROLS	1.0	LS	500.00	500.00	2285.84	2,285.84		0.00	0.00	2,785.84
2.	EROSION AND SEDIMENTATION CONTROLS: PROVIDE AND INSTALL SILT FENCING, STAKED HAYBALES, DIVERSION SWALES, BERMS, TURBIDITY CURTAINS, AND OTHER MEASURES AS NECESSARY FOR E&S CONTROLS.	1.0	LS	3375.00	3,375.00	2539.82	2,539.82		0.00	0.00	5,914.82
	MAINTENANCE DURING CONSTRUCTION -	1.0	LS	100.00	100.00	761.95	761.95		0.00	0.00	861.95
3.	SAW CUTTING OF EXISTING PAVEMENT:	1000.0	LF	0.00	0.00	0.00	0.00		0.00	4,250.00	4,250.00
4.	BREAKOUT, REMOVE, LOAD, AND DISPOSE OF PAVEMENT TO AN APPROVED DISPOSAL AREA: 6" PAVEMENT THICKNESS	888.9	SY	1.25	1,111.11	11.11	9,877.07		0.00	0.00	10,988.18
5.	TRENCH EXCAVATION: MACHINE AND HAND										
	42" RCP	722.2	CY	0.00	0.00	12.06	8,712.98		0.00	0.00	8,712.98
	FROM: 9TH STREET, NEW MH-1; >PIPE LENGTH=	250.0	LF								
	TO: NEW MH-2; >DEPTH, AVERAGE=	12.0	VLF								
	42" RCP	737.3	CY	0.00	0.00	12.06	8,894.51		0.00	0.00	8,894.51
	FROM: NEW MH-2; >PIPE LENGTH=	250.0	LF								
	TO: NEW MH-3; >DEPTH, AVERAGE=	12.3	VLF								
	66" RCP	787.0	CY	0.00	0.00	12.06	9,494.92		0.00	0.00	9,494.92
	FROM: NEW MH-3; >PIPE LENGTH=	200.0	LF								
	TO: NEW MH-4; >DEPTH, AVERAGE=	12.5	VLF								
	66" RCP	999.5	CY	0.00	0.00	12.06	12,058.55		0.00	0.00	12,058.55
	FROM: NEW MH-4; >PIPE LENGTH=	250.0	LF								
	TO: NEW MH-5; >DEPTH, AVERAGE=	12.7	VLF								
	66" RCP (TRAIN BRIDGE)	1019.2	CY	0.00	0.00	24.13	24,591.84		0.00	0.00	24,591.84
	FROM: NEW MH-5; >PIPE LENGTH=	250.0	LF								
	TO: NEW MH-6; >DEPTH, AVERAGE=	13.0	VLF								
	66" RCP (TRAIN BRIDGE)	1246.7	CY	0.00	0.00	24.13	30,079.90		0.00	0.00	30,079.90
	FROM: NEW MH-6; >PIPE LENGTH=	300.0	LF								
	TO: NEW MH-7; >DEPTH, AVERAGE=	13.2	VLF								
	66" RCP	1487.5	CY	0.00	0.00	12.06	17,945.40		0.00	0.00	17,945.40
	FROM: NEW MH-7; >PIPE LENGTH=	350.0	LF								
	TO: NEW MH-8; >DEPTH, AVERAGE=	13.5	VLF								
	66" RCP	1526.1	CY	0.00	0.00	12.06	18,410.65		0.00	0.00	18,410.65
	FROM: NEW MH-8; >PIPE LENGTH=	350.0	LF								
	TO: NEW MH-9; >DEPTH, AVERAGE=	13.9	VLF								
	TOTAL SHEET NO. 6				5,086.11		145,653.41		0.00	4,250.00	154,989.52

ROY F. WESTON, INC.
WEST CHESTER, PENNSYLVANIA

PROJECT:DELCORA CSO ALTERNATIVES
W. O. NO.:05623-009-001-0003-00

FILENAME: DCORACSO.WK1

ITEM	DESCRIPTION	UNIT QUANTITY	UNIT	MATERIAL UNIT COST	MATERIAL TOTAL MATERIAL	LABOR UNIT COST	LABOR TOTAL LABOR	EQUIPMENT UNIT COST	EQUIPMENT TOTAL EQUIPMENT	SUBCONTRACTS TOTAL SUBCONTRACTS	TOTAL
A.	RIDLEY CREEK OUTFALL INTERCEPTOR DIVISION 2 - SITE WORK										
5.	TRENCH EXCAVATION: MACHINE AND HAND										
	66" RCP	1564.6	CY	0.00	0.00	12.06	18,875.90		0.00	0.00	18,875.90
	FROM: NEW MH-9; >PIPE LENGTH=	350.0	LF								
	TO: NEW MH-10; >DEPTH, AVERAGE=	14.2	VLF								
	66" RCP	687.1	CY	0.00	0.00	24.13	16,578.13		0.00	0.00	16,578.13
	FROM: NEW MH-10; >PIPE LENGTH=	150.0	LF								
	TO: NEW OUTFALL; >DEPTH, AVERAGE=	14.6	VLF								
6.	PIPE BEDDING: SELECT GRANULAR MATERIAL 6" THICK AND FINE GRADING	425	CY	19.35	8,223.75	6.35	2,698.56		0.00	0.00	10,922.31
7.	TRENCH BACKFILL WITH EXCAVATED MATERIAL, COMPACTED TO 95% MAXIMUM DENSITY	11854.9	CY	0.00	0.00	5.40	63,982.46		0.00	0.00	63,982.46
8.	RESTORATION:										
	PAVEMENT RESTORATION TO MATCH EXISTING	888.9	SY	1.50	1,333.33	9.84	8,748.26		0.00	22,222.22	32,303.82
	GRASSY/NON-PAVED AREAS	1133.3	SY	0.50	566.67	5.08	5,756.92		0.00	0.00	6,323.59
9.	PIPE: REINFORCED CONCRETE PIPE, CLASS 3 WITH GASKETS										
	42"	500.0	LF	46.50	23,250.00	24.70	12,349.86		0.00	0.00	35,599.86
	66"	2200.0	LF	122.00	268,400.00	38.07	83,744.13		0.00	0.00	352,144.13
10.	MANHOLES: PRECAST CONCRETE, 72" ID COMPLETE WITH TRANSITION, FRAME AND COVER										
	72"ID X 8.0 VLF	10.0	EA	2349.00	23,490.00	1124.79	11,247.90		0.00	0.00	34,737.90
	ADDITIONAL FOR DEPTHS >8.0 VLF	51.7	VLF	153.00	7,910.10	142.86	7,386.11		0.00	0.00	15,296.21
12.	OUTFALL STRUCTURE:										
	NON-SPECIFIC REQUIREMENTS, ALLOWANCE	1.0	LS	10000.00	10,000.00	5079.63	5,079.63		0.00	5,000.00	20,079.63
	TOTAL SHEET NO. 7				343,173.85		236,447.86		0.00	27,222.22	606,843.93

ROY F. WESTON, INC.
WEST CHESTER, PENNSYLVANIA

FILENAME: DCORACSO.WK1

PROJECT:DELCORA CSO ALTERNATIVES
W. O. NO.:05623-009-001-0003-00

ITEM	DESCRIPTION	UNIT QUANTITY	UNIT	MATERIAL UNIT COST	MATERIAL TOTAL MATERIAL	LABOR UNIT COST	LABOR TOTAL LABOR	EQUIPMENT UNIT COST	EQUIPMENT TOTAL EQUIPMENT	SUBCONTRACTS TOTAL SUBCONTRACTS	TOTAL
B.	SUBAREA 6A INTERCONNECT DIVISION 2 - SITE WORK										
1.	SAW CUTTING OF EXISTING PAVEMENT:	48.0	LF	0.00	0.00	0.00	0.00		0.00	204.00	204.00
2.	BREAKOUT, REMOVE, LOAD, AND DISPOSE OF PAVEMENT TO AN APPROVED DISPOSAL AREA: 6" PAVEMENT THICKNESS	16.0	SY	1.25	20.00	11.11	177.79		0.00	0.00	197.79
3.	EXCAVATION: MACHINE AND HAND '72" MANHOLE	85.3	CY	0.00	0.00	12.06	1,029.47		0.00	0.00	1,029.47
6.	BEDDING: SELECT GRANULAR MATERIAL 6" THICK AND FINE GRADING	2.7	CY	19.35	51.60	6.35	16.93		0.00	0.00	68.53
7.	BACKFILL WITH EXCAVATED MATERIAL, COMPACTED TO 95% MAXIMUM DENSITY	65.4	CY	0.00	0.00	5.40	352.85		0.00	0.00	352.85
8.	LOAD AND HAUL EXCESS SPOIL: TO APPROVED BORROW	20.0	CY	1.50	29.93	9.84	196.39		0.00	498.87	725.20
9.	RESTORATION: PAVEMENT RESTORATION TO MATCH EXISTING	16.0	SY	1.50	24.00	9.84	157.47		0.00	400.00	581.47
10.	MANHOLES: PRECAST CONCRETE, 72" ID COMPLETE WITH TRANSITION, FRAME AND COVER										
	72"ID X 8.0 VLF	1.0	EA	2349.00	2,349.00	1124.79	1,124.79		0.00	0.00	3,473.79
	ADDITIONAL FOR DEPTHS >8.0 VLF	6.0	VLF	153.00	918.00	142.86	857.19		0.00	0.00	1,775.19
11.	PIPE CONNECTIONS TO NEW MANHOLE:										
	54"	2.0	EA	648.00	1,296.00	172.36	344.72		0.00	0.00	1,640.72
	36"	1.0	EA	432.00	432.00	140.61	140.61		0.00	0.00	572.61
12.	PLUG EXISTING PIPE: 54"	1.0	EA	810.00	810.00	380.97	380.97		0.00	0.00	1,190.97
	TOTAL SHEET NO. 8				5,930.53		4,779.19		0.00	1,102.87	11,812.59

ROY F. WESTON, INC.
WEST CHESTER, PENNSYLVANIA

PROJECT:DELCORA CSO ALTERNATIVES
W. O. NO.:05623-009-001-0003-00

FILENAME: DCORACSO.WK1

ITEM	DESCRIPTION	UNIT QUANTITY	UNIT	MATERIAL UNIT COST	MATERIAL TOTAL MATERIAL	LABOR UNIT COST	LABOR TOTAL LABOR	EQUIPMENT UNIT COST	EQUIPMENT TOTAL EQUIPMENT	SUBCONTRACTS TOTAL SUBCONTRACTS	TOTAL
C.	SUBAREA 4A AND 4B INTERCONNECT DIVISION 2 - SITE WORK										
1.	SAW CUTTING OF EXISTING PAVEMENT:	48.0	LF	0.00	0.00	0.00	0.00		0.00	204.00	204.00
2.	BREAKOUT, REMOVE, LOAD, AND DISPOSE OF PAVEMENT TO AN APPROVED DISPOSAL AREA: 6" PAVEMENT THICKNESS	16.0	SY	1.25	20.00	11.11	177.79		0.00	0.00	197.79
3.	EXCAVATION: MACHINE AND HAND '72" MANHOLE	96.0	CY	0.00	0.00	12.06	1,158.16		0.00	0.00	1,158.16
6.	BEDDING: SELECT GRANULAR MATERIAL 6" THICK AND FINE GRADING	2.7	CY	19.35	51.60	6.35	16.93		0.00	0.00	68.53
7.	BACKFILL WITH EXCAVATED MATERIAL, COMPACTED TO 95% MAXIMUM DENSITY	76.0	CY	0.00	0.00	5.40	410.42		0.00	0.00	410.42
8.	LOAD AND HAUL EXCESS SPOIL: TO APPROVED BORROW	20.0	CY	1.50	29.93	9.84	196.39		0.00	498.87	725.20
9.	RESTORATION: PAVEMENT RESTORATION TO MATCH EXISTING	16.0	SY	1.50	24.00	9.84	157.47		0.00	400.00	581.47
10.	MANHOLES: PRECAST CONCRETE, 72" ID COMPLETE WITH TRANSITION, FRAME AND COVER										
	72"ID X 8.0 VLF	1.0	EA	2349.00	2,349.00	1124.79	1,124.79		0.00	0.00	3,473.79
	ADDITIONAL FOR DEPTHS >8.0 VLF	8.0	VLF	153.00	1,224.00	142.86	1,142.92		0.00	0.00	2,366.92
11.	PIPE CONNECTIONS TO NEW MANHOLE:										
	54"	2.0	EA	648.00	1,296.00	172.36	344.72		0.00	0.00	1,640.72
	36"	1.0	EA	432.00	432.00	140.61	140.61		0.00	0.00	572.61
12.	PLUG EXISTING PIPE: 54"	1.0	EA	810.00	810.00	380.97	380.97		0.00	0.00	1,190.97
	TOTAL SHEET NO. 9				6,236.53		5,251.17		0.00	1,102.87	12,590.57

ROY F. WESTON, INC.
WEST CHESTER, PENNSYLVANIA

FILENAME: DCORACSO.WK1

PROJECT:DELCORA CSO ALTERNATIVES
W. O. NO.:05623-009-001-0003-00

ITEM	DESCRIPTION	UNIT QUANTITY	UNIT	MATERIAL UNIT COST	MATERIAL TOTAL MATERIAL	LABOR UNIT COST	LABOR TOTAL LABOR	EQUIPMENT UNIT COST	EQUIPMENT TOTAL EQUIPMENT	SUBCONTRACTS TOTAL SUBCONTRACTS	TOTAL
D.	SUBAREA 23A INTERCONNECT DIVISION 2 - SITE WORK										
1.	SITE SURVEY AND LAYOUT: SURVEY AND ROUTE LAYOUT OFFSETS AND VERTICAL/ELEVATION CONTROLS	1.0	LS	500.00	500.00	1523.89	1,523.89		0.00	0.00	2,023.89
2.	EROSION AND SEDIMENTATION CONTROLS: PROVIDE AND INSTALL SILT FENCING, STAKED HAYBALES, DIVERSION SWALES, BERMS, TURBIDITY CURTAINS, AND OTHER MEASURES AS NECESSARY FOR E&S CONTROLS.	1.0	LS	650.00	650.00	1269.91	1,269.91		0.00	0.00	1,919.91
	MAINTENANCE DURING CONSTRUCTION -	1.0	LS	100.00	100.00	761.95	761.95		0.00	0.00	861.95
3.	SAW CUTTING OF EXISTING PAVEMENT:	1040.0	LF	0.00	0.00	0.00	0.00		0.00	4,420.00	4,420.00
4.	BREAKOUT, REMOVE, LOAD, AND DISPOSE OF PAVEMENT TO AN APPROVED DISPOSAL AREA: 6" PAVEMENT THICKNESS	577.8	SY	1.25	722.22	11.11	6,420.09		0.00	0.00	7,142.32
5.	TRENCH EXCAVATION: MACHINE AND HAND 18" RCP	1014.0	CY	0.00	0.00	12.06	12,233.03		0.00	0.00	12,233.03
	FROM: 23-N22 (MH); >PIPE LENGTH=	520.0	LF								
	TO: 12-B01-A (MH); >DEPTH, AVERAGE=	11.7	VLF								
6.	PIPE BEDDING: SELECT GRANULAR MATERIAL 6" THICK AND FINE GRADING	43.3	CY	19.35	838.50	6.35	275.15		0.00	0.00	1,113.65
7.	TRENCH BACKFILL WITH EXCAVATED MATERIAL, COMPACTED TO 95% MAXIMUM DENSITY	1115.4	CY	0.00	0.00	5.40	6,019.94		0.00	0.00	6,019.94
8.	RESTORATION: PAVEMENT RESTORATION TO MATCH EXISTING	577.8	SY	1.50	866.67	9.84	5,686.37		0.00	14,444.44	20,997.48
9.	PIPE: REINFORCED CONCRETE PIPE, CLASS 3 WITH GASKETS 18"	520.0	LF	11.00	5,720.00	8.13	4,226.26		0.00	0.00	9,946.26
11.	PIPE CONNECTIONS TO NEW MANHOLE: 18"	2.0	EA	216.00	432.00	108.86	217.73		0.00	0.00	649.73
	TOTAL SHEET NO. 10				9,829.39		38,634.31		0.00	18,864.44	67,328.14

ROY F. WESTON, INC.
WEST CHESTER, PENNSYLVANIA

FILENAME: DCORACSO.WK1

PROJECT:DELCORA CSO ALTERNATIVES
W. O. NO.:05623-009-001-0003-00

ITEM	DESCRIPTION	UNIT QUANTITY	UNIT	MATERIAL UNIT COST	MATERIAL TOTAL MATERIAL	LABOR UNIT COST	LABOR TOTAL LABOR	EQUIPMENT UNIT COST	EQUIPMENT TOTAL EQUIPMENT	SUBCONTRACTS TOTAL SUBCONTRACTS	TOTAL
E.	STORM DRAIN INLETS: Existing Condition: System is currently served by open curb face type inlets. Thus allowing unacceptable amounts of trash to enter the system and over time the inlets are in need of replacement. Recommendations: Demolish and remove existing open curb face stormwater inlets. Replace with precast concrete storm inlet boxes with bicycle type grates, ADA access curb cuts and new sidewalks (See Attached Sketch) NOTE: ONE(1) AS SHOWN; ONE THOUSAND ONE HUNDRED FORTY(1,140) REQUIRED. DIVISION 2 - SITE WORK										
1.	SAW CUTTING OF EXISTING PAVEMENT:	66.0	LF	0.00	0.00	0.00	0.00		0.00	280.50	280.50
2.	DEMOLITION AND REMOVALS:										
	REMOVE EXISTING CURB	22.0	LF	0.00	0.00	14.43	317.48		0.00	0.00	317.48
	REMOVE EXISTING INLET	1.0	EA	0.00	0.00	317.48	317.48		0.00	0.00	317.48
	REMOVE EXISTING SIDEWALK	266.0	SF	0.00	0.00	1.67	444.47		0.00	0.00	444.47
3.	PROVIDE AND INSTALL NEW:										
a	CATCH BASIN/INLET: PRECAST CONCRETE, INTERIOR DIMENSION - 4.0' X 2.0' X +/-4.0' FROM GRATE ELEVATION TO DRAIN INVERT + 1.0' FROM DRAIN PIPE INVERT TO BOTTOM OF BASIN; COMPLETE WITH BICYCLE GRATE.	1.0	EA	650.00	650.00	761.95	761.95		0.00	0.00	1,411.95
b	PIPE CONNECTIONS TO NEW INLET BASIN:										
	18"	2.0	EA	216.00	432.00	108.86	217.73		0.00	0.00	649.73
c	NEW ADA CURB CUT REPLACEMENT	22.0	LF	4.91	108.02	23.09	507.96		0.00	0.00	615.98
d	SIDEWALKS	266.0	SF	1.38	367.08	2.15	571.46		0.00	0.00	938.54
4.	RESTORATION:										
	PAVEMENT RESTORATION TO MATCH EXISTING	29.6	SY	5.00	147.78	9.52	281.50		0.00	738.89	1,168.16
	NOTE: ONE(1) AS SHOWN; ONE THOUSAND ONE HUNDRED FORTY(1,140) REQUIRED.										
	TOTAL SHEET NO. 11				1,704.88		3,420.01		0.00	1,019.39	6,144.28

ROY F. WESTON, INC.
WEST CHESTER, PENNSYLVANIA

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W. O. NO.:05623-009-001-0003-00

FILENAME: DCORACSO.WK1

ITEM	DESCRIPTION	UNIT QUANTITY	UNIT	MATERIAL UNIT COST	MATERIAL TOTAL MATERIAL	LABOR UNIT COST	LABOR TOTAL LABOR	EQUIPMENT UNIT COST	EQUIPMENT TOTAL EQUIPMENT	SUBCONTRACTS TOTAL SUBCONTRACTS	TOTAL
F.	REGULATORS										
	DIVISION 2 - SITE WORK										
1.	STORMWATER FLOW REGULATORS:										
	ALL WORK PER QUOTATION										
	PULL AND REPLACE	24.0	EA	0.00	0.00	0.00	0.00		0.00	1,008,000	1,008,000.00
	PULL ONLY	1.0	EA	0.00	0.00	0.00	0.00		0.00	0.00	0.00
	TOTAL SHEET NO. 12				0.00		0.00		0.00	1,008,000	1,008,000.00

ROY F. WESTON, INC.
WEST CHESTER, PENNSYLVANIA

PROJECT:DELCORA CSO ALTERNATIVES
W. O. NO.:05623-009-001-0003-00

FILENAME: DCORACSO.WK1

ITEM	DESCRIPTION	UNIT QUANTITY	UNIT	MATERIAL UNIT COST	MATERIAL TOTAL MATERIAL	LABOR UNIT COST	LABOR TOTAL LABOR	EQUIPMENT UNIT COST	EQUIPMENT TOTAL EQUIPMENT	SUBCONTRACTS TOTAL SUBCONTRACTS	TOTAL
G.	FLOATABLES CONTAINMENT DIVISION 2 - SITE WORK										
1.	SITE SURVEY AND LAYOUT: SURVEY AND ROUTE LAYOUT OFFSETS AND VERTICAL/ELEVATION CONTROLS	1.0	LS	500.00	500.00	2285.84	2,285.84		0.00	0.00	2,785.84
2.	EROSION AND SEDIMENTATION CONTROLS: PROVIDE AND INSTALL SILT FENCING, STAKED HAYBALES, DIVERSION SWALES, BERMS, TURBIDITY CURTAINS, AND OTHER MEASURES AS NECESSARY FOR E&S CONTROLS.	1.0	LS	2025.00	2,025.00	1523.89	1,523.89		0.00	0.00	3,548.89
	MAINTENANCE DURING CONSTRUCTION -	1.0	LS	100.00	100.00	761.95	761.95		0.00	0.00	861.95
3.	SAW CUTTING OF EXISTING PAVEMENT:	150.0	LF	0.00	0.00	0.00	0.00		0.00	637.50	637.50
4.	BREAKOUT, REMOVE, LOAD, AND DISPOSE OF PAVEMENT TO AN APPROVED DISPOSAL AREA: 6" PAVEMENT THICKNESS	100.0	SY	1.25	125.00	11.11	1,111.17		0.00	0.00	1,236.17
5.	TRENCH EXCAVATION: MACHINE AND HAND INLINE TYPE TRASHTRAP SYSTEMS	231.1	CY	0.00	0.00	12.06	2,788.16		0.00	0.00	2,788.16
	FROM: INFLUENT/INLET; >PIPE LENGTH=	120.0	LF								
	TO: EFFLUENT/DISCHARGE; >DEPTH, AVERAGE=	8.0	VLF								
	ENDWALL TYPE TRASHTRAP SYSTEMS	184.9	CY	0.00	0.00	12.06	2,230.52		0.00	0.00	2,230.52
	FROM: INFLUENT/INLET; >PIPE LENGTH=	96.0	LF								
	TO: EFFLUENT/DISCHARGE; >DEPTH, AVERAGE=	8.0	VLF								
6.	PIPE BEDDING: SELECT GRANULAR MATERIAL 6" THICK AND FINE GRADING	28.0	CY	19.35	541.80	6.35	177.79		0.00	0.00	719.59
7.	TRENCH BACKFILL WITH EXCAVATED MATERIAL, COMPACTED TO 95% MAXIMUM DENSITY	457.6	CY	0.00	0.00	5.40	2,469.72		0.00	0.00	2,469.72
8.	RESTORATION: PAVEMENT RESTORATION TO MATCH EXISTING	106.7	SY	1.50	160.00	9.84	1,049.79		0.00	2,666.67	3,876.46
	GRASSY/NON-PAVED AREAS	64.0	SY	2.50	160.00	10.16	650.19		0.00	0.00	810.19
9.	INLINE NETTING TRASHTRAP SYSEM: PROPRIETARY TRASHTRAP AND RECOVERY SYSTEM, PRECAST CONCRETE CONSTRUCTION WITH INTERNAL NETTING/TRASH COLLECTION AND RETENTION SYSTEM. COMPLETE WITH REPLACABLE FILTER BAGS.										
	FLOATABLE TYPE	3.0	EA	1200.00	3,600.00	8127.42	24,382.25	100000.00	300,000.00	0.00	327,982.25
	ENDWALL TYPE	4.0	EA	500.00	2,000.00	5079.63	20,318.54	80000.00	320,000.00	0.00	342,318.54
	INLINE TYPE	5.0	EA	500.00	2,500.00	3555.74	17,778.72	70000.00	350,000.00	0.00	370,278.72
	TOTAL SHEET NO. 13				11,711.80		77,528.52		970,000.00	3,304.17	1,062,544.49

ROY F. WESTON, INC.
WEST CHESTER, PENNSYLVANIA

FILENAME: DCORACSO.WK1

PROJECT:DELCORA CSO ALTERNATIVES
W. O. NO.:05623-009-001-0003-00

ITEM	DESCRIPTION	UNIT QUANTITY	UNIT	MATERIAL UNIT COST	MATERIAL TOTAL MATERIAL	LABOR UNIT COST	LABOR TOTAL LABOR	EQUIPMENT UNIT COST	EQUIPMENT TOTAL EQUIPMENT	SUBCONTRACTS TOTAL SUBCONTRACTS	TOTAL
II.	WASTEWATER TREATMENT PLANT (WWTP) MODIFICATIONS DIVISION 2 - SITE WORK										
I.	BYPASS FROM EXISTING PRIMARY SETTLING TANK(S) EFFLUENT TO POST-AERATION TANKS T-19 AND T-20, REGULATING FLOW TO 36.4 MGD (25,300 GPM)										
1.	TRENCH EXCAVATION: MACHINE AND HAND 60" RCP FROM: SETTLING TANKS; >PIPE LENGTH= TO: POST-AERATION TANKS; >DEPTH, AVERA	3407.4 1000.0 11.5	CY LF VLF	0.00	0.00	12.06	41,107.41		0.00	0.00	41,107.41
2.	PIPE BEDDING: SELECT GRANULAR MATERIAL 6" THICK AND FINE GRADING	148.1	CY	19.35	2,866.67	6.35	940.67		0.00	0.00	3,807.34
3.	TRENCH BACKFILL WITH EXCAVATED MATERIAL, COMPACTED TO 95% MAXIMUM DENSITY	3748.1	CY	0.00	0.00	5.40	20,229.18		0.00	0.00	20,229.18
4.	RESTORATION: RESTORATION TO MATCH EXISTING	888.9	SY	1.50	1,333.33	4.76	4,233.03		0.00	5,333.33	10,899.70
5.	PIPE: REINFORCED CONCRETE PIPE, CLASS 3 WITH GASKETS 60"	1000.0	LF	97.13	97,125.00	35.30	35,303.46		0.00	0.00	132,428.46
6.	PIPE TIEIN TO EXISTING 72" SETTLING TANK EFFLUENT: 60"	1.0	EA	1500.00	1,500.00	1523.89	1,523.89		0.00	1,250.00	4,273.89
7.	PIPE FITTINGS: REINFORCED CONCRETE, CLASS 3 72" X 72" X 60" TAPPING SPLIT TEES 60" 90LR ELLS	2.0 2.0	EA EA	11220.00 4370.85	22,440.00 8,741.70	1015.93 396.85	2,031.85 793.69		0.00 0.00	0.00 0.00	24,471.85 9,535.39
8.	BUTTERFLY VALVE: LUG TYPE WITH MANUAL OPERATOR 60"	1.0	EA	12903.00	12,903.00	1269.91	1,269.91		0.00	0.00	14,172.91
	TOTAL SHEET NO. 14				146,909.70		107,433.10		0.00	6,583.33	260,926.13

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ITEM	DESCRIPTION	UNIT QUANTITY	UNIT	MATERIAL UNIT COST	MATERIAL TOTAL MATERIAL	LABOR UNIT COST	LABOR TOTAL LABOR	EQUIPMENT UNIT COST	EQUIPMENT TOTAL EQUIPMENT	SUBCONTRACTS TOTAL SUBCONTRACTS	TOTAL
H.	WASTEWATER TREATMENT PLANT (WWTP) MODIFICATIONS										
II.	GRIT TANK EXPANSION - CONSTRUCTION OF ONE(1) GRIT TANK IN ADDITION TO THE EXISTING GRIT TANKS. COMMON WALL CONSTRUCTION WITH EXISTING, PILING REQUIRED FOR FOUNDATIONS. COMPLETE WITH GRIT REMOVAL EQUIPMERT AND ALL ANCILLARIES.										
	DIVISION 2 - SITE WORK										
1.	EXCAVATION: MACHINE AND HAND EXISTING PLANT WORK	5055.6	CY	0.00	0.00	6.32	31,939.97		0.00	0.00	31,939.97
2.	HAUL EXCAVATED SPOIL TO ONSIT BORROW: LOAD, HAUL AND PLACE	5561.1	CY	0.00	0.00	4.19	23,304.94		0.00	0.00	23,304.94
3.	PILING: PRECAST, PRESTRESSED CONCRETE PILES, 50.0' LONG WITH 3" WALLS										
	16" DIAMETER (64 EA)	3200.0	VLF	0.00	0.00	0.00	0.00		0.00	68,800.00	68,800.00
	MOBILIZATION AND DEMOBILIZATION	1.0	LS	0.00	0.00	0.00	0.00		0.00	10,000.00	10,000.00
	PIPE CUT-OFFS	64.0	EA	25.00	1,600.00	190.49	12,191.12		0.00	0.00	13,791.12
4.	FOUNDATION BEDDING: SELECT GRANULAR MATERIAL 6" T AND FINE GRADING	120.4	CY	19.35	2,329.17	6.35	764.30		0.00	0.00	3,093.46
5.	BACKFILL WITH EXCAVATED MATERIAL, COMPACTED TO 95% MAXIMUM DENSITY	3061.6	CY	0.00	0.00	5.40	16,523.56		0.00	0.00	16,523.56
	TOTAL SHEET NO. 15				3,929.17		84,723.89		0.00	78,800.00	167,453.05

ROY F. WESTON, INC.
WEST CHESTER, PENNSYLVANIA

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W. O. NO.:05623-009-001-0003-00

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ITEM	DESCRIPTION	UNIT QUANTITY	UNIT	MATERIAL UNIT COST	MATERIAL TOTAL MATERIAL	LABOR UNIT COST	LABOR TOTAL LABOR	EQUIPMENT UNIT COST	EQUIPMENT TOTAL EQUIPMENT	SUBCONTRACTS TOTAL SUBCONTRACTS	TOTAL
II.	WASTEWATER TREATMENT PLANT (WWTP) MODIFICATIONS										
II.	GRIT TANK EXPANSION -										
	DIVISION 3 - CONCRETE										
1.	CONCRETE: 3,500 PSI, CAST IN PLACE, WITH REINFORCING STEEL, LIGHT BENDING										
	BASE SLAB	373.3	CY								
	WALLS, LONG AXIS	94.5	CY								
	WALLS, SHORT AXIS	31.0	CY								
	WALLS - INTERIOR, LONG AXIS	32.0	CY								
	WALLS - INTERIOR, SHORT AXIS	8.0	CY								
	WALKWAY	8.7	CY								
	OTHER:		CY								
			CY								
	MISCELLANEOUS CONCRETE	54.8	CY								
	TOTAL CONCRETE	602.3	CY	158.75	95,609.61	152.39	91,778.63		0.00	10,000.00	197,388.24
	DIVISION 5 - METALS										
1.	MISCELLANEOUS METALS AND EMBEDMENTS: AS REQUIRED	1.0	LS	6022.65	6,022.65	9560.27	9,560.27		0.00	0.00	15,582.93
2.	HANDRAILS: 1 1/2" DIAMETER, PER OSHA REQUIREMENTS	247.0	LF	8.33	2,057.51	9.21	2,274.09		0.00	0.00	4,331.60
3.	BAR GRATING	366.0	SF	10.91	3,993.90	7.46	2,730.62		0.00	0.00	6,724.52
	TOTAL SHEET NO. 16				107,683.68		106,343.61		0.00	10,000.00	224,027.29

ROY F. WESTON, INC.
WEST CHESTER, PENNSYLVANIA

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ITEM	DESCRIPTION	UNIT QUANTITY	UNIT	MATERIAL UNIT COST	MATERIAL TOTAL MATERIAL	LABOR UNIT COST	LABOR TOTAL LABOR	EQUIPMENT UNIT COST	EQUIPMENT TOTAL EQUIPMENT	SUBCONTRACTS TOTAL SUBCONTRACTS	TOTAL
II.	WASTEWATER TREATMENT PLANT (WWTP) MODIFICATIONS										
II.	GRIT TANK EXPANSION -										
	DIVISION 11 - EQUIPMENT										
1.	ALLOWANCE FOR GRIT REMOVAL EQUIPMENT, SAME TYPE AS EXISTING FOR SPARE PARTS INVENTORY AND COMPATIBILITY	1.0	LS	5000.00	5,000.00	8127.42	8,127.42	55000.00	55,000.00	0.00	68,127.42
	DIVISION 15 - MECHANICAL										
1.	ALLOWNACE FOR MECHANICAL PIPING AND OTHER MECHANICAL REQUIREMENTS	1.0	LS	10000.00	10,000.00	5079.63	5,079.63		0.00	5,000.00	20,079.63
	DIVISION 16 - ELECTRICAL										
1.	ALLOWNACE FOR ELECTRICAL REQUIREMENTS, POWER DISTRIBUTION, LIGHTING, MOTOR CONTROL CENTER, MOTOR DISCONNECTS, GROUNDING AND MISCELLANEOUS WORK.	1.0	LS	11500.00	11,500.00	15238.90	15,238.90	22500.00	22,500.00	5,000.00	54,238.90
	TOTAL SHEET NO. 17				26,500.00		28,445.95		77,500.00	10,000.00	142,445.95

ROY F. WESTON, INC.
WEST CHESTER, PENNSYLVANIA

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PROJECT: DELCORA CSO ALTERNATIVES
W. O. NO.: 05623-009-001-0003-00

ITEM	DESCRIPTION	UNIT QUANTITY	UNIT	MATERIAL UNIT COST	MATERIAL TOTAL MATERIAL	LABOR UNIT COST	LABOR TOTAL LABOR	EQUIPMENT UNIT COST	EQUIPMENT TOTAL EQUIPMENT	SUBCONTRACTS TOTAL SUBCONTRACTS	TOTAL
II.	WASTEWATER TREATMENT PLANT (WWTP) MODIFICATIONS										
III.	CHLORINE CONTACT TANK EXPANSION										
	DIVISION 3 - CONCRETE										
1.	CONCRETE: 3,500 PSI, CAST IN PLACE, WITH REINFORCING STEEL, LIGHT BENDING										
	BASE SLAB	534.1	CY								
	WALLS, LONG AXIS	117.3	CY								
	WALLS, SHORT AXIS	74.0	CY								
	WALLS - INTERIOR, LONG AXIS	125.3	CY								
	WALLS - INTERIOR, SHORT AXIS	16.7	CY								
	WALKWAY	10.9	CY								
	OTHER:		CY								
			CY								
	MISCELLANEOUS CONCRETE	87.8	CY								
	TOTAL CONCRETE	966.1	CY	158.75	153,371.68	152.39	147,226.23		0.00	10,000.00	310,597.91
	DIVISION 5 - METALS										
1.	MISCELLANEOUS METALS AND EMBEDMENTS: AS REQUIRED	1.0	LS	9661.21	9,661.21	15336.07	15,336.07		0.00	0.00	24,997.27
2.	HANDRAILS: 1 1/2" DIAMETER, PER OSHA REQUIREMENTS	394.0	LF	8.33	3,282.02	9.21	3,627.49		0.00	0.00	6,909.51
3.	BAR GRATING	400.0	SF	10.91	4,364.92	7.46	2,984.29		0.00	0.00	7,349.21
	TOTAL SHEET NO. 19				170,679.83		169,174.08		0.00	10,000.00	349,853.91

ROY F. WESTON, INC.
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ITEM	DESCRIPTION	UNIT QUANTITY	UNIT	MATERIAL UNIT COST	MATERIAL TOTAL MATERIAL	LABOR UNIT COST	LABOR TOTAL LABOR	EQUIPMENT UNIT COST	EQUIPMENT TOTAL EQUIPMENT	SUBCONTRACTS TOTAL SUBCONTRACTS	TOTAL
H.	WASTEWATER TREATMENT PLANT (WWTP) MODIFICATIONS										
III.	CHLORINE CONTACT TANK EXPANSION										
	DIVISION 11 - EQUIPMENT										
1.	ALLOWANCE FOR CHLORINE INJECTION AT NEW CONTACT TANK. ASSUMED THAT EXISTING CHLORINE FEED SYSTEM IS ADEQUATE FOR NEW CONTACT TANK.	1.0	LS	1800.00	1,800.00	2031.85	2,031.85		0.00	0.00	3,831.85
	DIVISION 15 - MECHANICAL										
1.	ALLOWNACE FOR MECHANICAL PIPING AND OTHER MECHANICAL REQUIREMENTS	1.0	LS	3500.00	3,500.00	4063.71	4,063.71		0.00	5,000.00	12,563.71
	OIVISION 16 - ELECTRICAL										
1.	ALLOWNACE FOR ELECTRICAL REQUIREMENTS, POWER DISTRIBUTION, LIGHTING, CHLORINE ANALYZER WITH CONTROLLER, GROUNDING AND MISCELLANEOUS WORK.	1.0	LS	10000.00	10,000.00	7619.45	7,619.45	5000.00	5,000.00	2,000.00	24,619.45
	TOTAL SHEET NO. 20				15,300.00		13,715.01		5,000.00	7,000.00	41,015.01

ROY F. WESTON, INC.
WEST CHESTER, PENNSYLVANIA

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ITEM	DESCRIPTION	UNIT QUANTITY	UNIT	MATERIAL UNIT COST	MATERIAL TOTAL MATERIAL	LABOR UNIT COST	LABOR TOTAL LABOR	EQUIPMENT UNIT COST	EQUIPMENT TOTAL EQUIPMENT	SUBCONTRACTS TOTAL SUBCONTRACTS	TOTAL
H.	WASTEWATER TREATMENT PLANT (WWTP) MODIFICATIONS										
III.	CHLORINE CONTACT TANK EXPANSION - CONSTRUCTION OF ONE(1) CONTACT TANK IN ADDITION TO THE EXISTING CONTACT TANKS. COMMON WALL CONSTRUCTION WITH EXISTING, PILING REQUIRED FOR FOUNDATIONS.										
	DIVISION 2 - SITE WORK										
1.	EXCAVATION: MACHINE AND HAND EXISTING PLANT WORK	4666.7	CY	0.00	0.00	6.32	29,483.05		0.00	0.00	29,483.05
2.	HAUL EXCAVATED SPOIL TO ONSIT BORROW: LOAD, HAUL AND PLACE	5133.3	CY	0.00	0.00	4.19	21,512.25		0.00	0.00	21,512.25
3.	PILING: PRECAST, PRESTRESSED CONCRETE PILES, 50.0' LONG WITH 3" WALLS										
	16" DIAMETER (75 EA)	3750.0	VLF	0.00	0.00	0.00	0.00		0.00	80,625.00	80,625.00
	MOBILIZATION AND DEMOBILIZATION	1.0	LS	0.00	0.00	0.00	0.00		0.00	10,000.00	10,000.00
	PIPE CUT-OFFS	75.0	EA	25.00	1,875.00	190.49	14,286.47		0.00	0.00	16,161.47
4.	FOUNDATION BEDDING: SELECT GRANULAR MATERIAL 6" THICK AND FINE GRADING	111.1	CY	19.35	2,150.00	6.35	705.50		0.00	0.00	2,855.50
5.	BACKFILL WITH EXCAVATED MATERIAL, COMPACTED TO 95% MAXIMUM DENSITY	1833.0	CY	0.00	0.00	5.40	9,892.71		0.00	0.00	9,892.71
	TOTAL SHEET NO. 18				4,025.00		75,879.98		0.00	90,625.00	170,529.98

EXHIBIT B TO THE AQUA-DELCORA ASSET PURCHASE AGREEMENT

ESCROW AGREEMENT

THIS ESCROW AGREEMENT (the "Agreement") is entered into on December ___, 2019 by **Aqua Pennsylvania Wastewater, Inc.** ("Buyer"), the **Delaware County Regional Water Quality Control Authority** (transacting as "DELCORA") ("Seller") and **Univest Bank and Trust Co.**, as escrow agent (the "Escrow Agent").

BACKGROUND:

Buyer and Seller have entered into a certain Asset Purchase Agreement dated September 17, 2019 (the "Asset Purchase Agreement"). Upon Closing of the transaction contemplated by the Asset Purchase Agreement, Buyer is required to deposit the amount of $5,000,000 of the Purchase Price into escrow (the "Escrow Fund") in order to secure Seller's obligations related to Curing title objections that are not Cured as of Closing. Buyer and Seller are entering into this Agreement to establish the terms of the funding, management and distribution of the Escrow Fund as required by the Asset Purchase Agreement. Pursuant to the Asset Purchase Agreement, after the Closing Date and notwithstanding any other provision of the Asset Purchase Agreement, the Escrow Fund is Buyer's sole recourse with respect to providing for Seller's post-Closing obligations pursuant to Article VI of the Asset Purchase Agreement. This Agreement is referred to in the Asset Purchase Agreement as the "Escrow Agreement."

Capitalized terms used in this Agreement but not defined herein have the meanings ascribed to them in the Asset Purchase Agreement.

NOW THEREFORE, in consideration of the premises and of the mutual covenants contained herein and in the Asset Purchase Agreement, the parties hereto agree as follows:

1. Acceptance by Escrow Agent. The Escrow Agent accepts the appointment as escrow agent pursuant to this Agreement and shall act on the terms and conditions set forth in this Agreement. Escrow Agent shall be paid from the Escrow Fund in accordance with the provisions of Exhibit I.

2. Investment of Escrow Fund. Upon receipt by the Escrow Agent of the Escrow Fund at Closing, the Escrow Agent shall, subject to the terms hereof, retain the Escrow Fund and is empowered and directed to invest the Escrow Fund in a Univest Bank and Trust Co. interest bearing account, as described more fully in Exhibit II. The Escrow Agent shall not be obligated to earn any particular yield or rate of return on the Escrow Fund. All interest and other earnings on the Escrow Funds shall be retained by the Escrow Agent until disbursed in accordance with the terms hereof. The Escrow Agent shall have no liability for any investment losses.

3. Rights and Responsibilities of Escrow Agent. The acceptance by the Escrow Agent of its duties hereunder is subject to the following terms and conditions, which shall govern and control with respect to the Escrow Agent's rights, duties, liabilities and immunities:

   a. The Escrow Agent shall act hereunder as a depository only, and it shall not be responsible or liable in any manner whatsoever for the sufficiency, correctness, genuineness or validity of any document furnished to the Escrow Agent or any asset deposited with it.

b. The Escrow Agent shall have no duties except those specifically set forth in this Agreement.

c. The Escrow Agent shall have the right any time it deems appropriate to seek an adjudication in a court of competent jurisdiction as to the respective rights of the parties hereto and shall not be held liable by any party hereto for the delay or the consequences of any delay occasioned by such resort to court.

d. The Escrow Agent: (i) shall not be responsible for any of the agreements referred to or described herein, or for determining or compelling compliance therewith, and shall not otherwise be bound thereby; (ii) shall be obligated only for the performance of such duties as are expressly and specifically set forth in this Agreement on its part to be performed, each of which is ministerial (and shall not be construed to be fiduciary) in nature, and no implied duties or obligations of any kind shall be read into this Agreement against or on the part of the Escrow Agent; (iii) shall not be obligated to take any legal or other action hereunder which might in its judgment involve or cause it to incur any expense or liability unless it shall have been furnished with acceptable indemnification; (iv) may rely on and shall be protected in acting or refraining from acting upon any written notice, instruction (including, without limitation, wire transfer instructions, whether incorporated herein or provided in a separate written instruction), instrument, statement, certificate, request or other document furnished to it hereunder and believed by it to be genuine and to have been signed or presented by the proper person, and shall have no responsibility or duty to make inquiry as to or to determine the genuineness, accuracy or validity thereof (or any signature appearing thereon), or of the authority of the person signing or presenting the same, and (v) may consult counsel satisfactory to it, including in-house counsel, and the opinion or advice of such counsel in any instance shall be full and complete authorization and protection in respect of any action taken, suffered or omitted by it hereunder in good faith and in accordance with the opinion or advice of such counsel. In the event of any conflict between the terms and provision of this Agreement, those of the Asset Purchase Agreement, any schedule or exhibit attached to the Agreement, or any other Agreement among the parties, the terms and conditions of this Agreement shall control.

e. The Escrow Agent shall not be liable to anyone for any action taken or omitted to be taken by it hereunder except in the case of the Escrow Agent's gross negligence or willful misconduct as determined by a court of competent jurisdiction as being the primary cause of any loss to either the Seller or Buyer. The Escrow Agent may execute any of its powers and perform any of its duties hereunder directly or through affiliates or agents. The Escrow Agent may consult with accountants and other skilled persons to be selected and retained by it. The Escrow Agent shall not be liable for any action taken, suffered or omitted to be taken by it in accordance with, or in reliance upon, the advice or opinion of any such accountants or other skilled persons. In the event that the Escrow Agent shall receive instructions, claims or demands from any party hereto which, in its opinion, conflict with any of the provisions of this Agreement, it shall be entitled to refrain from taking any action and its sole obligation shall be to keep safely all property held in escrow until it shall be given a direction in writing by the parties which eliminates such conflict or by a final and non-appealable court order. In no event shall

the Escrow Agent be liable for indirect, punitive, special or consequential damage or loss (including but not limited to lost profits) whatsoever, even if the Escrow Agent has been informed of the likelihood of such loss or damage and regardless of the form of action.

f. The Escrow Agent is hereby authorized, in making or disposing of any investment permitted by this Agreement, to deal with itself (in its individual capacity) or with any one or more of its affiliates, whether it or such affiliate is acting as a subagent of the Escrow Agent or for any third person or dealing as principal for its own account.

g. Notwithstanding any term appearing in this Agreement to the contrary, in no instance shall the Escrow Agent be required or obligated to distribute any portion of the Escrow Fund (or take other action that may be called for hereunder to be taken by the Escrow Agent) sooner than two (2) business days after (i) it has received the applicable documents required under this Agreement in an acceptable form; or (ii) passage of the applicable time period (or both, as applicable under the terms of this Agreement), as the case may be.

h. Unless and except to the extent otherwise expressly set forth herein, all deposits and payments hereunder, or pursuant to the terms hereof shall be in U.S. dollars.

i. The Escrow Agent shall have the right at any time to resign for any reason and be discharged of its duties as Escrow Agent hereunder by giving written notice of its resignation to the parties hereto at least 30 business days prior to the date specified for such resignation to take effect. All obligations of the Escrow Agent in this Agreement shall cease and terminate on the effective date of its resignation, provided that, prior to the effective date of resignation:

(i) if a successor escrow agent shall have been appointed and written notice thereof shall have been given to the resigning Escrow Agent by Buyer, Seller and the successor escrow agent, then the resigning Escrow Agent shall deliver the Escrow Fund to the successor escrow agent; or

(ii) if a successor escrow agent shall not have been appointed by Buyer and Seller, for any reason whatsoever, the resigning Escrow Agent shall deliver the Escrow Fund to a court of competent jurisdiction and give written notice of the same to the Buyer and Seller.

The resigning Escrow Agent shall be reimbursed from the Escrow Fund for any expenses incurred in connection with its resignation and transfer of the Escrow Fund pursuant to and in accordance with the provisions of this Section.

j. The Seller and Buyer each covenants and agrees, jointly and severally, to indemnify the Escrow Agent (and its directors, officers and employees) and hold it (and such directors, officers and employees) harmless from and against any loss, liability, damage, cost and expense of any nature (including, without limitation, the fees and expenses of outside counsel and experts and their staffs and all expense of document location, duplication and shipment) incurred by the Escrow Agent arising out of or in connection with this Agreement or with the administration of its duties hereunder,

including, but not limited to, reasonable attorneys' fees and other costs and expenses of defending or preparing to defend against any claim of liability unless and except to the extent such loss, liability, damage, cost and expense shall be finally adjudicated by a court of competent jurisdiction to have been primarily caused by the Escrow Agent's gross negligence or willful misconduct. The foregoing indemnification and agreement to hold harmless shall survive the resignation of the Escrow Agent or the termination of this Agreement.

k. Each of the Seller and Buyer agrees, jointly and severally, (i) to assume any and all obligations imposed now or hereafter by any applicable tax law with respect to any payment or distribution of the Escrow Fund or performance of other activities under this Agreement, (ii) to instruct the Escrow Agent in writing with respect to the Escrow Agent's responsibility for withholding and other taxes, assessments or other governmental charges, and to instruct the Escrow Agent with respect to any certifications and governmental reporting that may be required under any laws or regulations that may be applicable in connection with its acting as Escrow Agent under this Agreement, and (iii) to indemnify and hold the Escrow Agent harmless from any liability or obligation on account of taxes, assessments, additions for late payment, interest, penalties, expenses and other governmental charges that may be assessed or asserted against the Escrow Agent in connection with, on account of or relating to the Escrow Fund, the management established hereby, any payment or distribution of or from the Escrow Fund pursuant to the terms hereof or other activities performed under the terms of this Agreement, including without limitation any liability for the withholding or deduction of (or the failure to withhold or deduct) the same, and any liability for failure to obtain proper certifications or to report properly to governmental authorities in connection with this Agreement, including costs and expenses (including reasonable attorneys' fees and expenses), interest and penalties. The foregoing indemnification and agreement to hold harmless shall survive the resignation of the Escrow Agent or the termination of this Agreement.

4. Statements. During the term of this Agreement, the Escrow Agent shall provide Seller and Buyer with monthly statements containing the beginning balance in the escrow account as well as all principal and income transactions for the statement period. The Escrow Agent shall be forever released and discharged from all liability with respect to the accuracy of such statements, except with respect to any such act or transaction as to which Seller or Buyer shall, within 90 days after the furnishing of the statement, file written objections with the Escrow Agent.

5. Preparation of List of Open Title Objections & Missing Easements. At or before Closing, a written list containing: (1) all Title Objection Items which have not been Cured as of Closing; (2) all items from Buyer's Easement Objection Notice which have not been Cured as of Closing ("Easement Objection Items"); and (3) all Missing Easements as of Closing, shall be appended to this Agreement as Schedule A.

6. Obligations of Seller Secured. Subject to Sections 7 through 9 below, the Escrow Agent shall retain the Escrow Fund for a period of five (5) years following Closing Date (the

"Term") to fund Buyer's assumption of the responsibilities under Article VI of the Asset Purchase Agreement.

7. Distribution Procedures. Except as specifically provided in this Agreement, no distribution from the Escrow Fund shall be made except as follows:

a. upon written notice executed jointly (or in counterparts) by Seller and Buyer (a "Joint Instruction"); or

b. as may be necessary to comply with any final and unappealable judgment, decree or order of a court of competent jurisdiction.

8. Periodic Distributions to Buyer. During the Term, Buyer and Seller shall, on a quarterly basis, issue a Joint Instruction to the Escrow Agent to make a distribution to Buyer for Buyer's unreimbursed Covered Expenses. For purposes of this Section 8, the following terms shall have the following meanings:

"***Conveyance Instrument***" means a written instrument signed by all parties required to effectuate its terms, in form and substance acceptable to Buyer in its reasonable discretion and in form acceptable for recording in the Delaware County Recorder of Deeds, which memorializes Buyer's property interest required to maintain the Acquired Asset in the location in which it is situated.

"***Covered Expenses***" means any and all expenses paid or payable by Buyer to third-parties in securing a Conveyance Instrument, including, without limitation, consideration paid to any counterparty to such Conveyance Instrument to acquire the interest granted therein, payments to engineers, attorneys and other vendors reasonably required to secure such Conveyance Instrument, and all costs of litigation, condemnation and any fees related to the foregoing.

9. Final Distribution. Within ten (10) days following the earlier to occur of: (1) the Escrow Agent's receipt of written notice from one of the parties advising the Escrow Agent that the Term has expired; and (2) the parties' Joint Instruction to terminate the Escrow Fund because all of Seller's obligations under Article VI of the Asset Purchase Agreement secured by this Agreement have been discharged, the Escrow Agent shall release the balance of the Escrow Fund to Seller or as the Seller may otherwise direct in writing.

10. Disbursement Instructions. In the event of any doubt or uncertainty by Escrow Agent as to the propriety of making periodic or final disbursements of the Escrow Fund, the Escrow Agent may retain the Escrow Fund, without penalty or liability, until the parties provide joint written instructions for the disbursement of the Escrow Fund or until a final adjudication is made as to its proper disposition. In this regard, Escrow Agent shall be entitled to rely absolutely on the advice of its counsel.

11. Tax Reporting. The Seller and Buyer hereby represent to the Escrow Agent that (a) there is no sale or transfer of a "United States Real Property Interest" as defined under Section 897(c) of the Internal Revenue Code, as the same may be amended from time to time (the "IRC") in the underlying transaction giving rise to this Agreement, and (b) such underlying transaction does not constitute an installment sale requiring tax reporting or withholding of

imputed interest or original issue discount to the Internal Revenue Service ("IRS") or other taxing authority. The Seller and Buyer each agree that, for tax reporting purposes, all interest or other income earned from the investment of the Escrow Fund shall be reported by the Escrow Agent as allocated to the Seller, and reported, as and to the extent required by law, by the Escrow Agent to the IRS, or any other taxing authority on IRS Form 1099 or 1042S (or other appropriate form) as income earned from the Escrow Fund by the Seller whether or not said income has been distributed during such year.

12. Certification of Taxpayer Identification Number. Each of the Seller and Buyer agree to provide the Escrow Agent with a certified tax identification number by signing and returning a Form W-9 to the Escrow Agent upon the execution and delivery of this Agreement. Each of the Seller and Buyer understand that, in the event their tax identification numbers are not certified to the Escrow Agent, the IRC, may require withholding of a portion of any interest or other income earned on the investment of the Escrow Fund.

13. Amendment; Waiver. The parties may amend this Agreement only by the parties' written agreement that identifies itself as an amendment to this Agreement. Any waiver of, or consent to depart from, the requirements of any provision of this Agreement will be effective only if it is in writing and signed by the parties giving it, and only in the specific instance and for the specific purpose for which it has been given. No failure on the part of any party to exercise, and no delay in exercising, any right under this Agreement will operate as a waiver of such right. No single or partial exercise of any such right shall preclude any other or further exercise of such right or the exercise of any other right.

14. Discharge. The Escrow Agent may be discharged from its duties as Escrow Agent under this Agreement upon thirty (30) days written notice from Buyer and Seller jointly and upon payment of any and all fees and indemnity amounts due to Escrow Agent. In such event, the Escrow Agent shall be entitled to rely on instructions from Buyer and Seller jointly as to the disposition and delivery of the Escrow Fund.

15. Execution. This Agreement may be executed in any number of counterparts which, taken together, is one and the same agreement. This Agreement becomes effective when it has been executed by each party and delivered to all parties, provided, however, that this Agreement shall be effective as between Buyer and Seller when it has been executed by Buyer and Seller and delivered to each of Buyer and Seller. To evidence the fact that it has executed this Agreement, a party may send a copy of its executed counterpart to the other parties by facsimile transmission. Such party is deemed to have executed and delivered this Agreement on the date it sent such facsimile transmission. In such event, such party shall forthwith deliver to the other parties an original counterpart of this Agreement executed by such party.

16. Severability. If any term, provision, covenant or restriction contained in this Agreement is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remainder of the terms, provisions, covenants and restrictions contained in this Agreement shall remain in full force and effect and in no way be affected, impaired or invalidated.

17. Entire Agreement. This Agreement is the entire agreement among the parties pertaining to the subject matter hereof and supersedes all prior agreements, negotiations,

discussions and understandings, written or oral, among the parties. There are no representations, warranties, conditions or other agreements, whether direct or collateral, or express or implied, that form part of or affect this Agreement, or that induced any party to enter into this Agreement or on which reliance is placed by any party, except as specifically set forth in this Agreement. The parties acknowledge and agree that (i) each has substantial business experience and is fully acquainted with the provisions of this Agreement, (ii) the provisions and language of this Agreement have been fully negotiated and (iii) no provision of this Agreement shall be construed in favor of any party or against any party by reason of such provision of this Agreement having been drafted on behalf of one party rather than the other parties.

18. Governing Law; Jurisdiction. The laws of the Commonwealth of Pennsylvania (without giving effect to its conflicts of law principles) govern all matters arising and relating to this Agreement, including torts. The parties irrevocably agree and consent to the jurisdiction of the United States District Court for the Eastern District of Pennsylvania and the Court of Common Pleas of Delaware County, Pennsylvania, for the adjudication of any matters arising under or in connection with this Agreement. Any action initiated in court shall be filed and litigated (including all discovery proceedings) exclusively in the United States District Court for the Eastern District of Pennsylvania and the Court of Common Pleas of Delaware County, Pennsylvania, and each party irrevocably submits to the exclusive jurisdiction of such courts in any such suit, action or proceeding. Service of process, summons, notice or other document by mail to such party's address set forth herein shall be effective service of process for any suit, action or other proceeding brought in any such court. EACH PARTY ACKNOWLEDGES AND AGREES THAT ANY CONTROVERSY WHICH MAY ARISE UNDER THIS AGREEMENT OR THE OTHER TRANSACTION DOCUMENTS IS LIKELY TO INVOLVE COMPLICATED AND DIFFICULT ISSUES AND, THEREFORE, EACH SUCH PARTY IRREVOCABLY AND UNCONDITIONALLY WAIVES ANY RIGHT IT MAY HAVE TO A TRIAL BY JURY IN RESPECT OF ANY LEGAL ACTION ARISING OUT OF OR RELATING TO THIS AGREEMENT, THE OTHER TRANSACTION DOCUMENTS OR THE TRANSACTIONS CONTEMPLATED HEREBY OR THEREBY. EACH PARTY TO THIS AGREEMENT CERTIFIES AND ACKNOWLEDGES THAT (A) NO REPRESENTATIVE OF ANY OTHER PARTY HAS REPRESENTED, EXPRESSLY OR OTHERWISE, THAT SUCH OTHER PARTY WOULD NOT SEEK TO ENFORCE THE FOREGOING WAIVER IN THE EVENT OF A LEGAL ACTION, (B) SUCH PARTY HAS CONSIDERED THE IMPLICATIONS OF THIS WAIVER, (C) SUCH PARTY MAKES THIS WAIVER VOLUNTARILY, AND (D) SUCH PARTY HAS BEEN INDUCED TO ENTER INTO THIS AGREEMENT BY, AMONG OTHER THINGS, THE MUTUAL WAIVERS AND CERTIFICATIONS IN THIS SECTION.

19. Parties in Interest; Third Party Beneficiaries. Except as hereinafter provided, this Agreement is not intended to and shall not be construed to create upon any Person other than the parties any rights or remedies hereunder.

20. Successors and Assigns. No party to this Agreement may assign any right or delegate any performance under this Agreement without the prior written consent of the other parties. A purported assignment or purported delegation without prior written consent is void.

21. Specific Performance. Irreparable damage would occur if any provision of this Agreement were not performed in accordance with the terms of this Agreement. Any party may seek specific performance of the terms of this Agreement, in addition to any other remedy to which they are entitled at law or in equity if such party has performed in accordance with the terms of this Agreement.

22. Headings. The headings in this Agreement are for convenience of reference only and shall neither be considered as part of this Agreement, nor limit or otherwise affect the meaning hereof.

23. Notices. All notices, requests, demands and other communications required or permitted under this Agreement shall be in writing and shall be deemed to have been duly given, made and received only when delivered (personally, by courier service such as Federal Express, or by other messenger) to the address set forth below:

in the case of the Seller:

DELCORA
100 East Fifth Street
Chester, PA 19013
Attention: Executive Director

with a copy to:

DELCORA
100 East Fifth Street
Chester, PA 19013
Attention: Solicitor

in the case of the Buyer:

Aqua Pennsylvania, Inc.
762 W. Lancaster Avenue
Bryn Mawr, PA 19010
Attention: President

with a copy to:

Aqua Pennsylvania, Inc.
762 W. Lancaster Avenue
Bryn Mawr, PA 19010
Attention: General Counsel

in the case of Escrow Agent:

Univest Bank and Trust Co.
16 Harbor Place
PO Box 197
Souderton, PA 18964
Attention: Jenna S. Kinzie, VP – Deposit Operations & Support Manager

with a copy to:

Univest Bank and Trust Co.
14 North Main Street
PO Box 64197
Souderton, PA 18964
Attention: Megan Duryea Santana, General Counsel

Any party may alter the address to which communications or copies are to be sent by giving notice of such change of address in conformity with the provisions of this paragraph for the giving of notice.

Signature page follows.

IN WITNESS WHEREOF, the parties hereto have duly executed this Agreement as of the date first above written.

THE DELAWARE COUNTY REGIONAL WATER QUALITY CONTROL AUTHORITY

By: _____

Printed: ROBERT J WILLETT
Its: Executive Director

ATTEST:

By: _____
Name:
Its:

AQUA PENNSYLVANIA WASTEWATER, INC.

By: _____

Printed: MARC A. LUCCA
Its: President

ATTEST:

By: _____
Name:
Its:

ESCROW AGENT:

UNIVEST BANK AND TRUST CO., as Escrow Agent

By: _____

Printed: _____

Title: _____

IN WITNESS WHEREOF, the parties hereto have duly executed this Agreement as of the date first above written.

THE DELAWARE COUNTY REGIONAL WATER QUALITY CONTROL AUTHORITY

By: _____

Printed: _____
Its: Executive Director

ATTEST:

By: _____
Name:
Its:

AQUA PENNSYLVANIA WASTEWATER, INC.

By: _____

Printed: _____
Its: President

ATTEST:

By: _____
Name:
Its:

ESCROW AGENT:

UNIVEST BANK AND TRUST CO., as Escrow Agent

By: Megan Santana

Printed: Megan Santana

Title: SEVP, CLO and GC

SCHEDULE A*

I. Title Objection Items

II. Easement Objection Items

III. Missing Easements

*to be populated on or before Closing as Buyer proceeds through title review / abstracting process.

EXHIBIT I

Fee Schedule

Account Acceptance Fee . . . . . . **WAIVED**
Encompassing review, negotiation and execution of governing documentation, opening of the account, and completion of all due diligence documentation. Payable upon closing.

Annual Administration Fee . . . . . **WAIVED**
The Administration Fee covers our usual and customary ministerial duties, including record keeping, distributions, document compliance and such other duties and responsibilities expressly set forth in the governing documents for each transaction. Payable upon closing and annually in advance thereafter, without pro-ration for partial years.

Extraordinary Services and Out-of Pocket Expenses
Any additional services beyond our standard services as specified above, and all reasonable out-of-pocket expenses including attorney's or accountant's fees and expenses will be considered extraordinary services for which related costs, transaction charges, and additional fees will be billed at the Escrow Agent's then standard rate. Disbursements, receipts, investments or tax reporting exceeding 25 items per year may be treated as extraordinary services thereby incurring additional charges. The Escrow Agent may impose, charge, pass-through and modify fees and/or charges for any account established and services provided by the Escrow Agent, including but not limited to, transaction, maintenance, balance-deficiency, and service fees and other charges, including those levied by any governmental authority.

Disclosure & Assumptions

- Please note that the fees quoted are based on a review of the transaction documents provided and an internal due diligence review. Escrow Agent reserves the right to revise, modify, change and supplement the fees quoted herein if the assumptions underlying the activity in the account, level of balances, market volatility or conditions or other factors change from those used to set our fees.
- The Escrow Fund shall be continuously invested in a Univest Bank and Trust Co. interest bearing account.
- Payment of the invoice is due upon receipt.

EXHIBIT II

Terms of Escrow Account

The Escrow Fund shall be continuously invested in a Univest Bank and Trust Co. interest bearing account.

EXHIBIT C TO THE AQUA-DELCORA ASSET PURCHASE AGREEMENT

BILL OF SALE

THIS BILL OF SALE is made as of this __ day of _____, 2020, by and between The Delaware County Regional Water Quality Control Authority (the "Seller") and Aqua Pennsylvania Wastewater, Inc. (the "Buyer").

B A C K G R O U N D:

A. Seller and Buyer entered into that certain Asset Purchase Agreement dated September 17, 2019, as amended on February 24, 2020, (the "Agreement"), pursuant to which Seller has agreed, among other things, to sell, transfer, convey, assign and deliver to Buyer and Buyer has agreed to purchase from Seller the Acquired Assets, including, without limitation, all of its personal property and fixed assets including equipment, machinery, vehicles, and auxiliary equipment as more thoroughly described on Exhibit "A" attached hereto and incorporated herein by reference ("Personal Property").

B. Seller desires hereunder to transfer and assign to Buyer the Personal Property pursuant to the Agreement and Buyer desires to accept the sale, transfer, conveyance, assignment and delivery thereof.

C. All capitalized terms not defined herein shall have the meaning ascribed to such term in the Agreement.

NOW, THEREFORE, in consideration of the mutual covenants contained in the Agreement and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, and intending to be legally bound hereby, the parties hereto agree as follows:

1. Transfer and Assignment. Seller hereby sells, transfers, assigns, delivers and conveys to Buyer, its successors and assigns, all of Seller's right, title and interest in, to and under the Personal Property.

2. Acceptance of Transfer and Assignment. Buyer hereby accepts the transfer, conveyance, assignment and delivery of the Personal Property.

3. Absolute Transfer. It is the intention of Seller to transfer absolute title of the Personal Property to Buyer.

4. Counterparts. This Bill of Sale may be executed in any number of counterparts, each of which shall be deemed to be an original, and all of which shall together constitute one and the same instrument. This Bill of Sale shall be binding when one or more counterparts hereof, individually or taken together, shall bear the signatures of all of the parties reflected on this Bill of Sale as the signatories.

5. Governing Law. This Bill of Sale shall be governed by and construed in accordance with the laws of the Commonwealth of Pennsylvania without giving effect to the conflicts of laws principles thereof.

6. Binding Effect. This Bill of Sale shall be binding upon and inure to the benefit of Seller and Buyer and their respective successors and assigns.

[Remainder of Page Intentionally Blank; Signature Page Immediately Follows]

IN WITNESS WHEREOF, the undersigned have caused this Bill of Sale to be duly executed on the day and year first above written.

SELLER:

DELAWARE COUNTY WATER QUALITY CONTROL AUTHORITY

By: _____
Name: _____
Title: _____

BUYER:

AQUA PENNSYLVANIA WASTEWATER, INC.

By: _____
Name: _____
Title: _____

EXHIBIT A

Personal Property

EXHIBIT D TO THE AQUA-DELCORA ASSET PURCHASE AGREEMENT

ASSIGNMENT AND ASSUMPTION AGREEMENT

THIS ASSIGNMENT AND ASSUMPTION AGREEMENT (this "Assignment") is entered into effective as of this __ day of _____, 2020, by and between The Delaware County Regional Water Quality Control Authority (the "Assignor") and Aqua Pennsylvania Wastewater, Inc. (the "Assignee").

A. Assignor, as seller, and Assignee, as purchaser, are parties to that certain Asset Purchase Agreement dated September 17, 2019, as amended on February 24, 2020, (the "Purchase Agreement"), pursuant to which Assignor has agreed, among other things, to sell, transfer, convey, assign and deliver to Assignee and Assignee has agreed to purchase from Assignor the Acquired Assets.

B. The Purchase Agreement contemplates that at Closing, Assignor will assign to Assignee and Assignee will accept and assume, all of Assignor's right, title and interest in and to any and all Assigned Contracts and Authorizations and Permits (the "Assigned Business Deliverables") necessary for the operation of the Acquired Assets.

C. Unless herein otherwise defined, all terms defined in the Purchase Agreement shall have the meanings ascribed to them in the Purchase Agreement when used in this Assignment.

NOW, THEREFORE, in consideration of mutual promises contained herein and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, and intending to be legally bound, the parties hereto agree as follows:

1. Assignment of Assigned Business Deliverables. To the extent assignable, Assignor hereby assigns, transfers, sets over, conveys and delivers to Assignee, and Assignee hereby accepts, all of Assignor's right, title and interest in and to all Assigned Business Deliverables, together with all rights and privileges of any nature thereunder accruing to Assignor on or after the date hereof.

2. Indemnification by Assignor. Assignor hereby agrees to indemnify, defend and hold harmless Assignee and the Buyer Indemnified Persons from and against any and all claims for Losses in accordance with Section 8.02 of the Purchase Agreement.

3. Indemnification by Assignee. Assignee hereby agrees to indemnify, defend and hold harmless Assignor and the Seller Indemnified Persons from and against any and all claims for Losses in accordance with Section 8.03 of the Purchase Agreement.

4. Counterparts. This Assignment may be executed in any number of identical counterparts, each of which may be executed by any one or more of the parties hereto, all of which shall together constitute one and the same instrument, and shall be binding and effective when each party hereto has executed and delivered to the other party at least one counterpart. Counterparts delivered via email (.pdf) or facsimile shall be deemed to be originals for all purposes.

5. Successors and Assigns. The terms and provisions of this Assignment shall be binding upon and inure to the benefit of the respective parties hereto, and their respective successors and assigns.

6. Governing Law. This Assignment shall be governed by, and construed and enforced in accordance with, the laws of the Commonwealth of Pennsylvania (without giving effect to Pennsylvania's principles of conflicts of law) and the applicable laws of the United States of America.

7. Further Assurances. Assignor acknowledges and agrees that it shall use commercially reasonable efforts to assist Assignee with notice to the other contract parties under the Assigned Contracts with respect to the execution and effect of this Assignment. Without limiting the foregoing, Assignor acknowledges and agrees that it shall use commercially reasonable efforts as requested to by Assignee to effectuate the assignment of any additional contracts, permits, authorizations, licenses and warranties not covered hereunder.

8. Absolute Assignment. It is the intention of Seller to transfer absolute title of the Assigned Business Deliverables to Buyer, its successors and assigns, free of any redemption by Seller or its successors and assigns.

[REMAINDER OF PAGE INTENTIONALLY BLANK;
SIGNATURE PAGE IMMEDIATELY FOLLOWS]

IN WITNESS WHEREOF, the parties hereto have caused this Assignment to be duly executed as of the day and year first written above.

ASSIGNOR:

DELAWARE COUNTY WATER QUALITY CONTROL AUTHORITY

By: _____
Name: _____
Title: _____

ASSIGNEE:

AQUA PENNSYLVANIA WASTEWATER, INC.

By: _____
Name: _____
Title: _____

MAY 1, 1973 AGREEMENT BETWEEN BOROUGH OF RUTLEDGE, CENTRAL DELAWARE COUNTY AUTHORITY AND DELCORA

CENTRAL DELAWARE COUNTY AUTHORITY

212 B Unity Terrace
Rutledge, Pennsylvania 19070
Telephone (610) 544-9944
Fax (484) 472-8643

Boroughs
RIDLEY PARK
SWARTHMORE
PROSPECT PARK
RUTLEDGE
MORTON

Townships
RIDLEY
SPRINGFIELD
NETHER PROVIDENCE
MARPLE
NEWTOWN
UPPER PROVIDENCE
EDGMONT

March 19, 2020

Via E-Mail teresa@tntlawfirm.com

Teresa L, Thomas, Legal Assistant
Thomas, Niesen & Thomas, LLC
212 Locust Street, Suite 302
Harrisburg, PA 17101

RE: Right to Know Request dated 02/27/2020
Agency Initial Response Date: 03/03/2020
Agency Final Response Date: 03/19/2020

Dear Ms. Thomas:

This notice is provided to you pursuant to Section 902 of the Pennsylvania Right to Know Law. CDCA is in receipt of the Right to Know request from February 27, 2020 in which you request a copy of the "Agreement dated May 1, 1973, between Central Delaware County Authority, the Borough of Rutledge and the Delaware County Regional Water Quality Control".

Your request for a copy of the agreement has been granted. The copy is attached to this email.

If you have any questions or concerns, please feel free to contact me.

Very truly yours,

James R, Kern, P.E.
Right-To-Know Officer
Authority Secretary

Enclosure: Rutledge-CDCA-DELCORA.pdf

Cc: J. Adam Matlawski, Esq.

5/1/73

4(i)

A G R E E M E N T

THIS AGREEMENT is made as of the first day of May of 1973 between RUTLEDGE a BOROUGH of the Commonwealth of Pennsylvania ("Municipality"), Central Delaware County Authority ("CDCA"), a Pennsylvania municipality authority, and Delaware County Regional Water Quality Control Authority ("DELCORA"), also a Pennsylvania municipality authority.

RECITALS

A. CDCA was organized by various Townships and Boroughs in Delaware County, and certain other municipalities have subsequently become members of it. Municipality is now a member.

B. Pursuant to various agreements between CDCA and its members, including especially an Agreement dated October 22, 1951 as previously amended and supplemented (the "Existing Members' Agreement"), CDCA has constructed and now operates for its members a system of interceptor sewers and pumping stations (collectively the "Existing Conveyance System") and a sewage treatment plant (the "Existing Plant").

C. By orders of the State Department of Environmental Resources dated May 5, 1972 various municipal authorities and industries in Delaware County, including CDCA, have been ordered to negotiate with DELCORA for the future treatment of sewage in regional facilities, specifically in the case of CDCA, Darby Creek Joint Authority and Muckinipates Authority (collectively, the "Eastern Authorities") at the Southwest Treatment Plant of the City of Philadelphia. Pursuant to said orders and various engineering

studies and regulatory approvals DELCORA has entered into separate but similar Service Agreements with each of the Eastern Authorities, including one dated as of April 1, 1973 between DELCORA and CDCA (the "Service Agreement") a copy of which has been delivered to Municipality.

D. DELCORA is also about to enter into an agreement with the City of Philadelphia (the "Philadelphia Agreement") for treatment by said City of sewage from the Eastern Delaware County Service Area of DELCORA (as defined in the Service Agreement), which includes the area served by the Eastern Authorities. Said Agreement will be approved by CDCA prior to its execution by DELCORA.

E. The Service Agreement between DELCORA and CDCA continues for a term of forty-nine years, with subsequent renewal rights, but the corporate existence of CDCA terminates prior thereto.

F. DELCORA intends to issue shortly its sewer revenue bonds to finance construction of the initial part of the new conveyance system required to transport sewage to the City of Philadelphia, and the term of said bond issue will exceed the present remaining life of CDCA. Although said bond issue will be indirectly secured in part by the County of Delaware, in order to obtain the best possible rate of interest on said bonds for the benefit of all parties being served by the facilities so financed, it has been determined to enter this Agreement and similar agreements with other members of CDCA and the members of the other Eastern Authorities.

G. It is not intended by this Agreement to alter the present ownership of the Existing Conveyance System or the Existing Plant (except for a small tract to be conveyed for a pumping station) or the operation of the Existing Conveyance System.

H. The abovementioned orders and the Service Agreement require that operation of the Existing Plant be terminated as soon as sufficient capacity becomes available in the regional facilities pursuant to the Philadelphia Agreement.

NOW, THEREFORE, the parties hereto, intending to be legally bound, hereby agree as follows:

1. Municipality hereby approves execution of the Service Agreement by CDCA, and recognizes DELCORA as the sole treatment agency for sewage emanating from the portion of Municipality's area served by the Existing Conveyance System.

2. DELCORA agrees to accept all sewage delivered to it from Municipality through the Existing Conveyance System and transport it to the City of Philadelphia for treatment, all pursuant to the Service Agreement and the Philadelphia Agreement.

3. Municipality agrees to pay to CDCA at least quarterly for prompt repayment to DELCORA, upon receipt of bills from CDCA, Municipality's proportionate share of the amounts payable by CDCA under the Service Agreement, said proportion to be based upon the same formula as that specified in Article III of the Existing Members' Agreement. For purposes of said Agreement, the aforementioned payments will be deemed to be payments toward the cost of operation of the Existing Plant, but until termination of operation thereof will be in addition to the payments for said Plant, under the Existing Members' Agreement.

4. Pending the negotiation and execution of subsequent agreements concerning the Existing Conveyance System and related matters, Municipality hereby approves an extension of the terms of the Existing Members' Agreement and of the corporate existence of CDCA to December 31, 2013, and will promptly enact an Ordinance authorizing

an appropriate amendment of CDCA's Articles of Incorporation to carry out such extension of corporate existence. Upon the execution of such subsequent agreements in form satisfactory to Municipality, then the terms of existence of CDCA and of the Existing Members' Agreement may be terminated.

5. Amounts payable by Municipality hereunder will be payable solely from the current revenues of the Municipality derived from the imposition of sewer rents and charges and other revenues from operation of the existing sewage collection system of Municipality, as it may be enlarged from time to time. Municipality agrees to continue operating said system and impose and collect rents and charges for the use thereof which together with all other revenues from operation of said system will be sufficient to provide in each year 110% of the cost of operating said system, providing for any debt service and making the payments due under this Agreement and any other agreements relating to sewage service. To the extent that sewer revenues of Municipality are insufficient in any year to comply with the foregoing requirement, Municipality will promptly increase its sewer rentals and charges by an amount sufficient to provide in the immediately following year for the deficiency and future compliance with such requirement.

6. Municipality hereby consents to the transfer by CDCA to DELCORA, for a nominal consideration of land for a pumping station adjacent to the Existing Plant not exceeding two acres plus necessary easements.

7. Except as provided in the prior sections hereof this Agreement shall not modify or affect any of the existing obligations between Municipality and CDCA, which will continue to own and operate all of its existing properties, except as specified above.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement by their duly authorized officers as of the date set forth above.

[SEAL]

Attest:

Irene Landsbaugh

RUTLEDGE BOROUGH
(Municipality Name)

By: Edward D. McLaughlin

[SEAL]

Attest:

Dorothy L. Sobocki
Secretary

CENTRAL DELAWARE COUNTY AUTHORITY

By: R. J. McNulty
Chairman

[SEAL]

Attest:

Robert K. Shivaar

DELAWARE COUNTY REGIONAL WATER QUALITY CONTROL AUTHORITY

By: John J O'Malley

SEPTEMBER 18, 2017 AGREEMENT BETWEEN DELCORA AND TINICUM TOWNSHIP

AGREEMENT FOR
CONTRACT MANAGEMENT
OF FACILITIES

THIS AGREEMENT, made and entered into this 18th day of September, 2017, by and between the DELAWARE COUNTY REGIONAL WATER QUALITY CONTROL AUTHORITY, a municipal authority in the Commonwealth of Pennsylvania, with offices at 100 East Fifth Street, Chester, Pennsylvania 19013 (hereinafter referred to as "MANAGER") and TINICUM TOWNSHIP, a first class township in the Commonwealth of Pennsylvania, with offices at 629 N. Governor Printz Boulevard, Essington, Pennsylvania 19029 (hereinafter referred to as "OWNER").

RECITALS:

a. OWNER is the owner of the facilities described in Exhibit A.

b. OWNER desires to engage MANAGER to provide contract management services for the Facilities as more fully described herein and in accordance with the terms and conditions of this Agreement.

c. MANAGER desires to provide such services to OWNER in accordance with the terms and conditions of this Agreement.

d. OWNER and MANAGER have full legal capacity and authority to enter into this Agreement.

NOW THEREFORE, in recognition of the above recitals, in exchange for the mutual consideration set forth herein, and intending to be legally bound, the parties agree as follows:

ARTICLE #1 - DEFINITIONS:

For purposes of this Agreement, the following terms shall have the meaning set forth below:

1.1 "Facilities" means those described in Exhibit A.

1.2 "Services" mean the contract management services set forth in Article 2 hereof.

ARTICLE #2 - SCOPE OF SERVICES:

In consideration of OWNER's timely payment of the compensation set forth herein, MANAGER will provide OWNER with the contract management services set forth in Exhibit A, attached hereto and made a part hereof, in accordance with the terms and conditions set forth herein. MANAGER's provision of contract management services as required by the terms of this Contract shall be performed in accordance with all applicable codes, laws, rules, regulations and ordinances of the Environmental Protection Agency and the Pennsylvania Department of Environmental Protection and the terms and conditions of the National Pollutant Discharge Elimination System permit for the Facilities.

ARTICLE #3 - OWNER'S RESPONSIBILITIES:

The OWNER shall provide MANAGER with the items and assistance set forth in Exhibit B, attached hereto and made a part hereof.

ARTICLE #4 - TERM OF AGREEMENT:

4.1 This Agreement shall become binding when signed by the authorized representatives of both parties hereto. MANAGER shall commence providing the Services on June 1, 2017. This Agreement shall remain in effect unless extended or terminated as provided herein.

4.2 This Agreement shall be automatically renewed for subsequent one (1) year terms, unless one of the parties gives written notice to the other at least sixty (60) days prior to the termination date contained herein.

4.3 Either party may terminate this Agreement by providing written notice to the other party at least ninety (90) days in advance.

ARTICLE #5 - COMPENSATION AND PAYMENT:

5.1 In consideration of services to be provided by MANAGER as set forth herein, OWNER shall pay MANAGER the compensation set forth in Exhibit C, attached hereto and made a part hereof, in accordance with the payment provisions set forth in Exhibit C.

5.2 MANAGER will invoice OWNER for the Services in accordance with the payment provisions of Exhibit C. Invoices shall be paid by OWNER within 30 days of the invoice date. No payment to MANAGER shall be withheld by OWNER for any reason while MANAGER is providing the Services.

5.3 Interest at the rate of one half (0.5%) percent per month shall accrue and be paid by OWNER on any amounts not paid in accordance with the payment provisions of this Agreement. MANAGER's right to interest on any unpaid amounts shall be in addition to any other rights MANAGER has under this Agreement or at law.

ARTICLE #6 - OWNERSHIP OF FACILITIES:

6.1 Notwithstanding anything contained in this Agreement, OWNER shall be and remain the owner of the Facilities and any capital additions made thereto and paid for directly by OWNER.

ARTICLE #7 - INDEMNIFICATION AND INSURANCE:

7.1 MANAGER agrees to indemnify, defend and hold OWNER and its elected and appointed officials, contractors, employees, directors and agents harmless from and against liability damages, costs, expenses, and attorneys' fees from personal injury, including death, or property damage to the extent caused by the negligence, recklessness and/or intentional act(s) and/or omission(s) or other fault of MANAGER, its employees, subcontractors and/or agents in connection with the performance of the services hereunder. OWNER agrees to indemnify, defend and hold MANAGER and its officers, employees, subcontractors, directors, and agents harmless from and against liability damages, costs, expenses, and attorneys' fees from personal injury, including death, or property damage to the extent caused by the negligence, recklessness and/or intentional act(s) and/or omission(s) or other fault of OWNER, its officials,

contractors, employees and/or agents. In the event that both MANAGER and OWNER are finally determined to have jointly caused any liability for claims or damages as aforesaid, such liability and damages shall be apportioned between the parties in accordance with their pro-rata percentage of fault.

7.2 MANAGER warrants that it will exert the degree of care and skill in the performance of the Services ordinarily exercised, under similar circumstances, by similar professionals at the time such Services are rendered. THIS WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES, WHETHER EXPRESSED OR IMPLIED, BY OPERATION OF LAW OR OTHERWISE, INCLUDING ANY WARRANTY OF FITNESS FOR PARTICULAR PURPOSE, IF APPLICABLE.

7.3 OWNER will obtain and maintain adequate property insurance, naming the MANAGER as an additional insured, on the Facilities and any other insurance coverage required under any financing agreement or regulatory requirements with respect to the Facilities and operation thereof. OWNER will provide MANAGER with a certificate of insurance evidencing such coverage upon MANAGER's request.

7.4 MANAGER shall maintain the following types and amounts of insurance during the term of this Agreement. The OWNER shall be named as an additional insured in the applicable liability insurance policies for claims arising out of MANAGER's negligence:

Type of Coverage	Minimum Limits
Worker's Compensation	Statutory
General Liability	$2,000,000
Excess General Liability	$5,000,000
Automobile Liability	$500,000
Excess Automobile Liability	$5,000,000

Pollution Control and Liability	$1,000,000

MANAGER will provide OWNER with a certificate of insurance evidencing the required coverage upon OWNER's request.

7.5 The insurance obligations of both parties shall become effective upon execution of this Agreement.

7.6 Notwithstanding anything in this agreement to the contrary, MANAGER shall have no responsibility and OWNER shall indemnify MANAGER against any claims arising from the release of Hazardous Substances or pursuant to or under the Environmental Laws from or related to the operation of the Facilities, except to the extent that any such claim relates to Hazardous Substances introduced to the Facilities or violation of Environmental Laws as a result of the negligent or intentional acts or omissions of MANAGER or those under MANAGER'S direction in operation of the Facilities under this Agreement. OWNER represents and warrants that the Facilities and the operation thereof are now and at all times through the commencement date of this Agreement shall remain in compliance with the Resource Conservation and Recovery Act, the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended, the Superfund Amendments and Reauthorization Act of 1986, the Federal Water Pollution Control Act and all other federal, state and local laws relating to pollution or protection of the environment, including, without limitation, laws relating to emissions, discharges, releases or threatened releases of industrial, toxic or hazardous substances or wastes or other pollutants, contaminants, petroleum products or chemicals (collectively, "**Hazardous Substances**") into the environment (including without limitation, ambient air, surface water, ground water, land surface or subsurface strata) or otherwise relating to the manufacture, processing, distribution, use, treatment, storage, disposal, transport or handling of Hazardous Substances (the "**Environmental Laws**"). OWNER covenants and agrees at its sole cost and expense, to protect, defend, indemnify, release and hold MANAGER harmless from and against any and all losses, claims, damages, suits, penalties, administrative orders imposed

upon or incurred by or asserted against MANAGER and directly or indirectly arising out of or in any way relating to any one or more of the following (except to the extent that same relate to Hazardous Substances introduced to the Facilities as a result of the negligent or intentional acts or omissions of MANAGER or those under MANAGER'S direction in operation of the Facilities under this Agreement): (a) the past, present or future presence, release or threatened release of any Hazardous Substances in, on, above, or under the Facilities; (b) any past, present or threatened noncompliance or violations of any Environmental Laws (or permits issued pursuant to any Environmental Law) in connection with the Facilities or operations thereof or thereon; (c) any legal or administrative processes or proceedings or judicial proceedings in any way connected with any matter addressed in this Agreement; (d) any personal injury, wrongful death, or property or other damage arising under any statutory or common law or tort law theory concerning Hazardous Substances; and (e) any misrepresentation or inaccuracy in any representation or warranty or material breach or failure to perform any covenants or other obligations pursuant to this Agreement. The term "Release" with respect to any Hazardous Substance includes but is not limited to any release, deposit, discharge, emission, leaking, leaching, spillage, seeping, migrating, ejecting, pumping, pouring, emptying, escaping, dumping, disposing or other movement of Hazardous Substances.

ARTICLE #8 - TERMINATION:

8.1 The failure of either party to comply with the terms of this Agreement shall constitute a default. Upon default by one party, the other party may send a Notice of Termination, in accordance with Article 17. Such notice shall clearly specify the nature of the default and provide the defaulting party with ninety (90) days to cure the default. If the default is capable of being cured within ninety days but is not cured within ninety days, this Agreement shall terminate at midnight of the ninetieth day following receipt of the Notice. In the case of a default that cannot be cured within ninety days, this Agreement shall continue for a reasonable period of time beyond the ninetieth day if the defaulting party has commenced and is diligently pursuing a cure. Evidence of such cure shall be provided from the party determined to be in default to the satisfaction of the other

party.

8.2 In the event of termination of this Agreement under the above paragraph, OWNER shall pay MANAGER for the Services provided and invoiced by MANAGER up to the effective date of termination.

ARTICLE #9 - SERVICE DELAYS:

Neither OWNER nor MANAGER shall be liable for any loss or damage, failure or delay in rendering any Service or performing any obligation required under this Agreement resulting from a strike, work stoppage, or slowdown on the part of OWNER's employees and from any cause beyond the reasonable control of OWNER or MANAGER including, but not limited to: acts of God; acts or omissions of civil or military authority; acts or omissions of contractors or suppliers; fires; floods; epidemics; quarantine restrictions; severe weather; strikes; embargoes; wars; political strife; riots; delays in transportation; or fuel, power, materials, or labor shortages.

ARTICLE #10 - REPRESENTATIVES:

Each party hereto will designate a person to serve as that party's Authorized Representative. All requests for changes to this Agreement shall be transmitted between the Authorized Representatives of the parties. The initially-designated Authorized Representatives for the parties shall be:

For OWNER:

Tinicum Township
629 N. Governor Printz Boulevard
Essington, PA 19029

Attn: Township Manager

For MANAGER:

Delaware County Regional Water Quality Control Authority
100 E. 5th Street
Chester, PA 19013

Attn: Executive Director

Either party may change its Authorized Representative at any time by written notice to the other party.

ARTICLE #11 - INDEPENDENT CONTRACTOR:

The parties agree and acknowledge that MANAGER is and shall act as an independent contractor in performing under this Agreement, not as an Employee of OWNER. MANAGER shall not be an agent of OWNER, and nothing in this Agreement shall be construed as creating a partnership, joint venture or similar relationship of any kind between OWNER and MANAGER. MANAGER shall be responsible for payment, including any withholding, of any and all taxes payable by MANAGER and, as applicable, any person employed by MANAGER, with respect to monies paid to MANAGER by OWNER in consideration for service performed hereunder.

ARTICLE #12 - RECORDS:

MANAGER shall maintain a record of the tasks performed for the Facilities in accordance with the Services described herein. These records shall be provided to the OWNER monthly. OWNER shall be the custodian of these records. MANAGER shall make these records available for inspection at all reasonable times during normal daylight office hours and upon twenty four (24) hours advanced notice to MANAGER.

ARTICLE #13 - CHANGES:

13.1 This Agreement may only be modified by way of a written document executed by both parties.

13.2 In the event that any changes in the scope of operations of the Facilities shall occur, including but not limited to a change in applicable governmental regulations, permit requirements, reporting requirements, changes in influent or effluent volume or characteristics, or changes to conditions affecting the Facilities or the Services that impact on the cost or liability of providing the Services hereunder, MANAGER will make a written request to OWNER for a

modification to the Compensation due MANAGER or to other provisions of this Agreement. Such notice shall specify the change required, the reasons therefore, and the effective date thereof. OWNER shall review such request within sixty days after receipt thereof and either approve or disapprove such request by written notice to MANAGER within such sixty-day period. Such additional compensation shall be retroactive.

13.3 Any change properly justified and requested by MANAGER which is necessary to meet the terms and conditions of this agreement including, but not limited to, permit requirements, and submitted in accordance with the terms and conditions of this agreement that may be disapproved by OWNER within such sixty-day period, may, at the discretion of MANAGER, result in the termination of this agreement by MANAGER in accordance with the termination provisions of this agreement.

ARTICLE #14 - WAIVER:

The failure of either party to enforce, at any time, the provisions of this Agreement shall not constitute a waiver of such provisions in any way or the right of OWNER or MANAGER at any time to avail themselves of such remedies as either may have for any breach or breaches of such provisions.

ARTICLE #15 - ASSIGNMENT:

Neither party shall assign its rights, interests, or obligations under this Agreement without the expressed written consent of the other party. Any assignment made without such written consent shall be void; however, such consent shall not be unreasonably withheld.

ARTICLE #16 - APPLICABLE LAW/VENUE:

This Agreement shall be subject to and construed in accordance with the laws of the Commonwealth of Pennsylvania. MANAGER and OWNER agree to comply with all applicable laws and regulations related to the Facilities and the operations thereof. The parties consent to the exclusive jurisdiction of the Court of Common Pleas of Delaware County, Pennsylvania for the resolution of any dispute arising hereunder or in any way related hereto, and suit to resolve any

such dispute may only be initiated in that Court.

ARTICLE #17 - NOTICES:

17.1 Any written notices required to be given hereunder shall be delivered by hand, or sent by overnight courier or registered U.S. mail, return receipt requested, and addressed to the receiving party as follows:

To OWNER:

Tinicum Township
629 N. Governor Printz Boulevard
Essington, PA 19029

Attn: Township Manager

To MANAGER:

Delaware County Regional Water Quality Control Authority
100 E. 5th Street
Chester, PA 19013

Attn: Executive Director

17.2 All notices shall be deemed made when actually delivered to the receiving party. Acceptance by the receiving party of any such notice shall constitute a waiver of any and all defects of delivery of said notice.

ARTICLE #18 - ENTIRE AGREEMENT:

This Agreement shall constitute the entire and integrated understanding between the parties and supersedes all prior and contemporaneous negotiations, representations and agreements, whether written or oral, with respect to the subject matter herein.

IN WITNESS WHEREOF, the parties hereto have signed this Agreement as of the date set forth above.

TINICUM TOWNSHIP

By: _____
Witness

Elaine M. Bradley
(Print Name)

By: _____
Authorized Officer

Thomas Giancristoforo
(Print Name)

DELAWARE COUNTY REGIONAL WATER QUALITY CONTROL AUTHORITY

By: _____
Witness
Christopher Lenton

By: _____
Executive Director
Robert J. Willert

EXHIBIT A - SCOPE OF SERVICES

MANAGER will provide the following basic services:

1.1 MANAGER shall provide the services of qualified personnel, including at least two DEP certified operators as required by Act 11 and the DEP Operator Certification Program, who shall be responsible for the direct supervision and management of all operation and maintenance activities associated with the Facilities. These duties and responsibilities shall include:

a. Provision of, and posting of, the appropriate number of valid operator certifications as required by PADEP;

b. Ensure proper staffing of an adequate number of on-call personnel, for 24 hours per day emergency response;

c. Ensure proper staffing and contract services for the uninterrupted operation and maintenance of the facilities in accordance with all regulatory requirements and industry guidelines;

d. Attend OWNER's meetings when requested;

e. Prepare and submit to OWNER each month, a monthly client report for the previous month including a fully completed DMR for effluent with cover letter, daily flow data, analytical results, daily O&M log, and an operations summary;

f. Meet with regulatory officials, on behalf of the OWNER, during normal business hours;

g. Meet with OWNER's representatives during normal business hours;

h. Prepare and submit all required regulatory agencies' monthly reports;

i. Perform routine inspections of the Facilities to make process and/or equipment adjustments for proper operations and maintenance. This inspection includes but is not limited to, pump stations, chemical feed units, instrumentation, and pumps;

j. MANAGER shall advise the OWNER of capital improvements which are needed or required for the operation and maintenance of the Facilities in accordance with permit requirements and industry guidelines;

In accordance with the above, MANAGER agrees to provide contract management services for the following, defined as the FACILITIES:

Tinicum Township Wastewater Treatment Plant, Pump Stations, and Collection System

EXHIBIT B - OWNER'S RESPONSIBILITIES

1. OWNER warrants that it has and shall maintain all permits, easements, license, and equipment warranties for the mutual benefit of both parties and necessary for the proper operation of the Facilities.

2. OWNER shall purchase and insure that standard fire insurance policies are maintained including extended coverage to the full insurable value of the Facilities as mutually agreed between the parties and shall name OPERATOR as an additional insured according to its insurable interest under these policies during the term of this Agreement.

3. OWNER shall pay for all capital improvements (capital improvements are defined herein as those purchases or improvement(s) and equipment or structures which may be depreciated, which extends service life and which represents a non-routine type of purchase).

4. Should Facilities hydraulic, organic, and/or inorganic loadings exceed treatment plant design parameters and treatment or should the influent to the treatment plant contain contaminants which violate the OWNER Ordinances, and/or Federal, State, and Local Municipal Ordinances, MANAGER will continue to perform duties as identified in the scope of services but does not accept responsibility for associated effluent characteristics or damages associated therewith. MANAGER shall advise the OWNER of the abnormal situation and recommend an action plan.

5. In the event that labor stoppages by employee groups or any other person(s) not employed by MANAGER cause a disruption with MANAGER employees working at the facilities, the OWNER, with MANAGER assistance,

shall seek appropriate legal injunctions or court orders. During such a designated period, MANAGER shall operate the Facilities on a best efforts basis until labor relations are normalized. MANAGER shall not be liable for any fines or penalties associated with its responsibilities under this Agreement resulting from such labor stoppage or disruption until labor stoppages are restored.

6. OWNER hereby authorizes MANAGER to purchase emergency capital expense items which are identified and defined for the purpose of this Agreement as those items which are necessary for the safety of workers or the protection of public health and safety. MANAGER shall provide notice to OWNER of such emergency at the time of such event necessitating such purchase or as soon as practicable thereafter. OWNER will reimburse MANAGER for such emergency purchases.

7. OWNER shall provide for all utilities (phone, electricity, gas, etc.) as needed for the operation of the Facilities.

8. OWNER shall be responsible for the costs of routine supplies, chemicals, sludge hauling, generator maintenance, and meter calibration.

9. OWNER shall pay for all labor and materials necessary for the proper operation and maintenance of the Facilities in accordance with all regulatory requirements and industry standards.

EXHIBIT C - COMPENSATION

1. MONTHLY OPERATING FEE

a) The OWNER shall pay MANAGER an hourly fee of $65 for all hours billed for the direct supervisions and management of the operation and maintenance of the Facilities as defined in this Agreement, with adjustments and additions as contained herein, based on a starting date of June 1, 2017.

b) This fee shall be payable within 30 days of the invoice date. For any portion of a full operating month, the fee shall be apportioned appropriately. Any additional compensation which has been agreed to in writing by the parties to this Agreement, shall be added to the monthly contract fee in effect at the time such adjustment was deemed necessary.

2. ADJUSTMENTS TO MONTHLY OPERATING FEE

a) Starting on June 1, 2018 and continuing until the contract expires, the hourly fee shall be increased by 3% annually.

3. ADMINISTRATIVE FEE

a) MANAGER shall be entitled to an additional fee of ten percent (10%) of the cost of any services, equipment, or material procured

by MANAGER on behalf of OWNER.

Eckell Sparks

Eckell, Sparks, Levy, Auerbach, Monte,
Sloane, Matthews & Auslander, P.C.

Direct Extension: 246
E-Mail: sauslander@eckellsparks.com
File Number: 20080-0480

Orig: Mike DiSantis

October 11, 2017

J. Adam Matlawski, Esquire
McNichol, Byrne & Matlawski, P.C.
1223 N. Providence Road
Media, PA 19063

Re: Tinicum Township – DELCORA

Dear Adam:

Please be advised that the Tinicum Township Board of Commissioners at their regularly scheduled Public Meeting on September 18, 2017, approved the Agreement for Contract Management of Facility with the Delaware County Regional Water Quality Control Authority. I am pleased to provide you with three (3) copies of the Agreement for Contract Management of Facility signed by Tinicum Township. I would appreciate you having the authorized Representative of DELCORA sign where appropriate, returning a fully executed copy to me.

Thank you for your cooperation and assistance in bringing this matter to a satisfactory conclusion. Should you have any questions, please do not hesitate to contact me.

Very truly yours,

Eckell, Sparks, Levy, Auerbach, Monte,
Sloane, Matthews & Auslander, P.C.

By: _____
SAM S. AUSLANDER

SSA/kao
Enclosures

cc: David D. Schreiber, Township Manager (w/o encl.) (Via E-Mail)
Tinicum Township Board of Commissioners (w/o encl.) (Via E-Mail)
Elaine M. Brolley, Township Secretary (w/o encl.) (Via E-Mail)

VERIFICATION

I, William C. Packer, Vice President - Controller of Aqua Pennsylvania, Inc., hereby state that the facts set forth in the foregoing letter of Counsel of Aqua Pennsylvania Wastewater, Inc., dated May 6, 2020, addressing information requests of the Bureau of Technical Utility Services in the matter at PaPUC Docket No. A-2019-3015173, are true and correct to the best of my knowledge, information and belief and that I expect to be able to prove the same at a hearing held in this matter. I understand that the statements herein are made subject to the penalties of 18 Pa. C.S. § 4904 (relating to unsworn falsification to authorities).

William C. Packer

William C. Packer
Vice President – Controller
Aqua Pennsylvania, Inc.

Dated: May 6, 2020

CERTIFICATE OF SERVICE

I hereby certify that I have this 6th day of May, 2020, served a true and correct copy of the foregoing Letter and Additional Information, upon the persons and in the manner set forth below:

VIA ELECTRONIC MAIL

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Water/Wastewater Section
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Pennsylvania Public Utility Commission
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Thomas T. Niesen
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