

Coatesville Wastewater Operations

Infiltration & Inflow Study

**Prepared by
Pennsylvania American Water Company
Engineering Department**

March 2010

Coatesville Wastewater Operations I&I Study

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Coatesville Wastewater Inflow & Infiltration (I&I) Study

I. Background

In Paragraph 8.j., of the Joint Petition for Settlement of Pennsylvania American Water Company's (PAWC or the Company) 2008 Coatesville Wastewater Rate Case at Docket No. R-2008-2032689, the Company agreed "to prepare a study that will provide an empirical basis for the manner in which the cost of inflow and infiltration (I&I) is allocated to customer classes for ratemaking cost of service purposes." In addition, the Company agreed that (1) it would meet with the other Joint Petitioners within 60 days of the entry of the Commission's final Order approving the Settlement to discuss its plan for conducting the study and provide the Joint Petitioners the opportunity to offer comments on the plan; and (2) provide the results of its study to the Joint Petitioners not less than 30 days before filing its next general base rate case for the Coatesville Wastewater Operations.

PAWC met with the Joint Petitioners on May 19, 2009 at the Company's Mechanicsburg office to review the approach of the study and solicit suggestions and other input from the meeting participants. A list of the meeting participants is set forth in Appendix A. Appendix B is a copy of a letter dated May 21, 2009 from counsel for Township of Valley, West Brandywine Township Municipal Authority, Township of West Brandywine, Township of Sadsbury, Caln Township Municipal Authority and Township of Caln (the Municipal Sewer Group) setting forth those parties' comments..

During the first quarter of 2010, the Company finalized its I&I study and prepared this report on the results of that study, which incorporates information through the end of calendar year 2009. Consistent with the Joint Petition for Settlement, this report is being furnished to the Joint Petitioners not less than 30 days before the Company's anticipated filing of a general base rate case for its Coatesville Wastewater operations.

II. System Description

In 2009, PAWC treated an average of 3.439 million gallons per day (MGD) of wastewater from approximately 6,030 customers directly served by PAWC and four bulk municipal customers in the Coatesville service area. The Coatesville Wastewater Treatment Plant provides sewage treatment service for homes and businesses in 10 municipalities in Chester County, Pennsylvania. A map of the Coatesville Wastewater service territory is provided in Appendix C. As of December 31, 2009, PAWC's Coatesville Wastewater operations furnished service to 5,682 residential, 325 commercial, two industrial (Quebecor and Mittal Steel), 21 municipal, and four bulk resale customers. Detailed customer and usage information is provided in Appendices D and E, respectively.

In 2009, the Municipal Sewer Group was responsible for 32 percent of the average daily flow treated by PAWC's Coatesville Wastewater Treatment Plant. Appendix F shows calendar year 2009 bulk municipal flow values and contract flow limits for the members of the Municipal Sewer Group. (The contract flow limits are different for periods before and after the expansion of the Coatesville Wastewater Treatment Plant.) Appendix G shows calendar year 2009 flow values associated with all 10 municipalities and the VA Hospital.

PAWC's Coatesville Wastewater Treatment Plant is located in the Borough of South Coatesville and discharges to the West Branch Brandywine Creek. The plant is currently operating under NPDES Permit Number PA0026859 A2. This permit provides for a current effluent discharge rate of 3.85 MGD with conditional provisions for phased increases to 4.6 MGD and 7 MGD. These capacity increases are applicable upon

commensurate Act 537 planning approval. The Act 537 plan collected growth data from all municipalities documenting the need for 7.0 MGD capacity to satisfy their projected sewerage flow needs. Projected flows contained in the recent approved Act 537 Plan are provided in Appendix H.

PAWC is completing a major expansion and rehabilitation of the wastewater treatment plant in the spring of 2010. This upgrade and expansion will replace aging equipment, increase the average daily treatment capacity to 7.0 MGD, and enable the plant to meet more stringent effluent standards. Peak capacity will be increased from approximately 8.0 MGD to 21.0 MGD to handle wet weather flows. The upgraded plant consists of construction of a new headworks structure and influent pump station, new biological treatment process including anaerobic and aerobic treatment units, three new secondary clarifiers, a return activated sludge (RAS) pumping station, tertiary filtration units, expansion of an existing disinfection system, and upgrades and modifications to the sludge handling facilities.

PAWC's collection and conveyance facilities consist of approximately 79 miles of sewer mains, 1,562 manholes, and 16 pump stations located in the City of Coatesville and the Townships of East Fallowfield, Parkesburg, West Sadsbury, and West Caln. The members of the Municipal Sewer Group own and operate their own collection and conveyance systems and are bulk customers of PAWC.

PAWC's sewer mains range in age from a few months to over 75 years and range in size from 1-1/2" force mains to 42" gravity mains. Most of the older pipe is vitrified clay or reinforced concrete while new mains consist of SDR 26 or 35 PVC pipe or equivalent. Older manholes are of brick and mortar construction and newer manholes are

pre-cast concrete. Overall, the newer collection system components, generally less than 10 years in age, are considered by PAWC to be in excellent condition. Appendix I contains a detailed breakdown by pipe size and footage of the collection and conveyance system owned by PAWC.

With the exception of the 16 PAWC owned lift stations and 8 lift stations owned by the bulk customer municipalities, flows to the wastewater treatment plant are conveyed through gravity conveyance mains and siphons. The major sections of the PAWC-owned gravity sewer mains are the east end trunk line (EETL), west end trunk line (WETL), and main interceptor.

The EETL runs through the City of Coatesville to the east of the wastewater treatment plant, and currently receives flows from these sections of the City of Coatesville in addition to flows from West Brandywine and Caln Townships Valley Township's Rock Run pump station, and the east end of East Fallowfield Township.

The WETL runs to the west of the wastewater treatment plant, and currently receives flows from West Sadsbury, Parkesburg, Highland, Sadsbury and West Caln Townships, Valley Township's Westwood and Hayti basins, the west side of the City of Coatesville, and portions of East Fallowfield Township.

The main interceptor receives flows from both the EETL and the WETL and carries all system flows to the headworks of the wastewater treatment plant. Monthly flows over the past four years, together with precipitation recorded at the wastewater treatment plant, are provided in Appendices J and K, respectively.

III. Definitions

Average Dry-Weather Flow (ADWF) – The average of the daily flows sustained during dry-weather periods with limited infiltration.

Annual Average Daily Flow (AADF) – The total wastewater flow received at the wastewater facility during any one calendar year divided by 365 (the number of days in that period).

Infiltration – Water other than sanitary flow that enters a sewer system (including sewer service connections) from a variety of existing points which include, but are not limited to, defective pipes, pipe joints, connections, or manholes.

Infiltration/Inflow (I&I) – The quantity of water from both infiltration and inflow without distinguishing the source.

Inflow – Water other than sanitary flow that enters a sewer system (including sewer service connections) from sources which include, but are not limited to, roof leaders, cellar and foundation drains, yard drains, area drains, drains from springs and swampy areas, manhole covers, cross connections between storm sewers and sanitary sewers, catch basins and cooling water discharges.

Maximum Daily Flow – The largest volume of wastewater flow to be received during a continuous 24-hour period.

Peak Hourly Flow (PHF) – The largest volume of wastewater flow to be received during a 1 hour period.

Sanitary Flow – Sanitary flow is defined as the component of wastewater which includes domestic, commercial, institutional, and industrial sewage and specifically excludes infiltration/inflow.

IV. Methodology

1. Select study periods for average and peak flow conditions.
2. Quantify customer wastewater demands of bulk municipal and direct customers for study periods.
3. Determine base level Infiltration and distribute between bulk municipal and direct customers for collection and conveyance systems during a selected average dry weather flow period.
4. Determine I&I levels between bulk municipal and direct customers for average and peak flow conditions of selected study periods.

V. Results

1. Study periods for Average and Peak Flow Conditions

Calendar year 2009 average and peak flows are the most representative of current flow conditions. Complete system metering captured unrestricted flows thru the collection and conveyance system. The highest recorded peak flow of 10.747 MGD occurred on 12/26/09, and was caused by a combination of rainfall and snow melt. Additionally, the lowest dry weather flow of 2.849 MGD was recorded during the month of March 2009 following nearly two months of limited precipitation. The previous low flow of 2.877 MGD had occurred from 9/17/07 to 10/15/07. For calendar year 2009, as reported in the Company's Chapter 94 report filed with PaDEP, the average annual daily flow (AADF) and peak hourly flow (PHF) were 3,439,040 gallons per day (gpd) and 10.747 MGD, respectively. The resulting peaking factor of PHF to AADF was 3.13.

The second study period selected was calendar year 2017. The regional Act 537 Plan projected future sewerage flow needs over a 10 year period to calendar year 2017. The Act 537 Plan information was used to determine sizing requirements for the wastewater treatment plant expansion. The projected 2017 AADF and PHF were 7,472,417 gpd and 22 MGD, respectively.

2. Customer wastewater demands for bulk municipalities (Clan Township, Sadsbury Township, Valley Township and West Brandywine Township) and direct customers for study periods.

For the calendar year 2009 study period, wastewater demand for direct residential, commercial, and municipal customers was based on a factor of 88% of their corresponding water usage. This factor was derived from a recent study conducted at Branford Village in East Fallowfield Township (Appendix L). For the two industrial accounts, metered sewage flows at Quebecor and 100% of metered water usage at Mittal were utilized. The remaining demands, for the VA Hospital and the Municipal Sewer Group, were metered wastewater flows as reported in the Company's Chapter 94 report filed with PaDEP.

For the calendar year 2017 study period, wastewater demands for direct residential, commercial, and municipal customers were estimated based on a similar conversion of water usage to wastewater demand for 2007 as described in the previous paragraph and adding the incremental 10 year wastewater flow amount identified in the regional Act 537 Plan. Mittal and Quebecor wastewater demands remained unchanged. The projected demands for the VA Hospital and

the four bulk municipalities were estimated flows derived from municipal Act 537 Plans.

Estimated wastewater demand for direct customers in 2009 was 1,100,987 gpd. This level is projected to increase to 2,888,879 gpd by 2017, based on Act 537 planning. Similarly, wastewater demands for the bulk municipal customers in 2009 were 1,106,778 gpd and projected to increase to 3,239,834 gpd by 2017, based on Act 537 planning. Recorded peak hourly wastewater flows for the bulk municipal customers in 2009 (Appendix F) was 3,336,057 gpd and projected to increase to 8,357,688 gpd by 2017. Peaking factors used for estimating 2017 peak flows were similar to actual peaking factors experienced in 2009, with the exception of Caln Township. The peaking factor used to estimate peak flows in 2017 for Caln Township was adjusted to reflect expected flow conditions at the Municipal Drive Pump Station.

3. Base level Infiltration determination and distribution between bulk and direct customers during selected dry weather flow period. (Appendices N, O, and P)

The lowest dry weather flow of 2.849 MGD during March 2009 was utilized to determine a base level infiltration condition, primarily influenced by groundwater, for the common conveyance system (EETL, WETL, and main interceptor mains). Infiltration factors, in gallon per day/in-mile, for the common conveyance system were assigned based on the condition of the pipe and the estimated depth of groundwater above the top of pipe. Infiltration factors ranged from 250 gpd/in-mile for newly installed sections of the EETL to 1500 gpd/in-mile for older sections of both the EETL and WETL. In total, the base level infiltration amount associated with the common conveyance system was estimated to be approximately 64,000 gpd during the dry weather period. During the same period and utilizing the same methodology, the resulting I&I associated with the entire collection system was estimated to be approximately 741,000 gpd.

Lower infiltration factors were assigned where the influence of household laterals was deemed to be limited. Footages for the collection system excluded force mains.

4. Determination of I&I for average (AADF) and peak (PHF) flow conditions during study periods. (Appendices Q and R)

During AADF and PHF conditions, I&I levels will increase over levels experienced during dry weather flow conditions. Given the relatively good condition of the conveyance system (trunk line and interceptor

mains and manholes) and the limited influence of household sewer laterals on the conveyance system, I&I factors were significantly greater for the gravity collection system during AADF and PHF conditions. The resultant estimated I&I flow values are shown on the chart on the following page.

**ESTIMATED I&I FLOW VALUES
IN GALLON PER DAY (gpd)**

Study Period	Bulk	Direct	Common Conveyance	TOTAL	gpd/in-mile	NOTES
Dry Weather (March 2009)	45,200	695,794	63,935	804,929	1380	Base level Infiltration
AADF	70,682	1,088,057	72,536	1,231,275	2110	Average I&I level for current year
PHF	377,161	5,805,952	126,843	6,309,956	10815	Estimated I&I level during peak flow event – 12/26/09
10 Year Act 537 AADF	77,570	1,194,098	72,536	1,344,204	2304	Average I&I level for future 10 year average daily per Act 537 Plan
PHF	648,238	9,978,852	126,843	10,753,933	18,433	Estimated I&I level for future 10 year peak flow

NOTES: I&I flows incorporate both common conveyance and PAWC collection systems

APPENDIX A

List of Attendees

**May 19, 2009 Meeting to Discuss initial approach for
Coatesville Wastewater Operations I&I Study**

<u>Name</u>	<u>Company</u>	<u>Phone</u>
Jerry DeBalko	PAWOC	610-670-7799 x10
Dawn Kaufman	PAWOC	717-531-3303
Terry Fought	Consultant OCA	717-520-4235
Scott Rubin	Consultant OCA	570-387-1893
Sharon F. Webb	OSDA	717-783-2525
Gres Prowant	CALN Twp	610-384-0600
Ronald A. Ramos Jr.	WEST BRANDYWINE	610-390-8200
James W. MacCombs	WEST BRANDYWINE TWP SADDY CREEK TOWNSHIP EAST FALLENFURROWS TWP	610-356-9550
Ken Myers	High Swartz	610-275-0700
Howard Solganick	Energy Technics Services	215 378 2280
John Cox	PAWC	717 531 3258
PAUL HERBERT	GANNETT FLEMING	717-763-7212 x228
Seth Mendelsohn	PITWC	(717)531-3362

APPENDIX B

**Correspondence dated 5/21/09
from
High Swartz, LLP
regarding
Coatesville Wastewater Operations I&I Study**

HIGH SWARTZ

Attorneys At Law LLP

40 EAST AIRY STREET, P. O. BOX 671, NORRISTOWN, PENNSYLVANIA 19404
(610) 275-0700, FAX (610) 275-5290, main@highswartz.com, www.highswartz.com

ESTABLISHED 1914

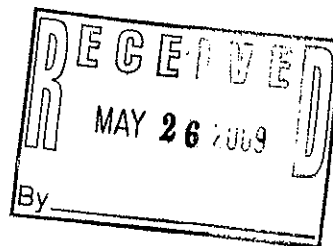
Gilbert P. High, Jr.
Paul Baker Bartle
Thomas D. Rees
Mary Cushing Doherty
J. Kenneth Cronney
Eric B. Smith
Joel D. Rosen
Richard C. Sokorai
James B. Shrimp
Melissa M. Boyd
Ronald W. Fenstermacher, Jr.
Alan W. Flenner
Monica Mathews Reynolds
Stephanie E. Murphy
Mark R. Fischer, Jr.
Joo Y. Park
Jacqueline J. Shafer
Keri A. Schantz

OF COUNSEL
Marlyn F. Smith
Lois A. Nafziger
George M. Aman, III
John P. Gregg
Kenneth R. Myers
Dina Schlossberg
William F. Kerr, Jr.

Kenneth R. Myers
DIRECT EMAIL
@highswartz.com

May 21, 2009

Seth Mendelsohn, Esquire
Pennsylvania American Water Company
800 West Hersheypark Drive
Hershey, PA 17033



Re: Inflow and Infiltration Study

Dear Mr. Mendelsohn:

Thank you for the presentation of your I&I study plans on May 19, 2009 at Mechanicsburg. The presentation was very informative.

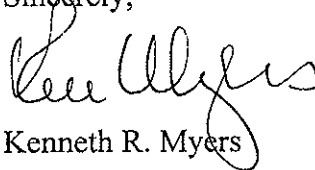
We mentioned a few ways in which the study could be strengthened, for better results in the context of a future rate proceeding. We repeat those suggestions here for your convenience:

1. Our main concern is that the methodology not be based solely or primarily on subjective judgment. We urge you to gather actual field data or interpret data you have in hand (for example in your I&I studies to date) to provide a factual basis for the method of division of I&I between collection and transmission and interceptor lines.
2. We urge you to consider the younger age of the interceptor and transmission system compared to the collection lines, and the extensive replacement of mains and I&I work you have done on the transmission lines, as factors which should further reduce the I&I component of the transmission and interceptor system. In the same vein, we also urge that consideration be given to differences in pipe length and number of joints per mile, as well as the large number of connections to the collection system compared to the relatively small number of connections into the transmission system.
3. Finally, we suggest that inflow (as contrasted with infiltration) should not be a problem of the transmission and interceptor lines. There should be few or no cross-connections with roof drains or other sources of stormwater in the transmission or interceptor lines.

HIGH SWARTZ LLP
Seth Mendelsohn, Esquire
May 21, 2009
Page 2

We look forward to receiving your study when it is prepared. If you have any questions regarding the suggestions above please contact me or Howard Solganick.

Sincerely,

A handwritten signature in cursive script, appearing to read "Ken Myers".

Kenneth R. Myers

KRM/lcj




cc: David Kaufman ✓
Jerry DeBalko
Anthony DeCusatis, Esquire
Thomas Gadsden, Esquire
Shaun A. Sparks, Esquire
Lauren M. Lepkoski, Esquire
Kenneth L. Mickens, Esquire

APPENDIX C

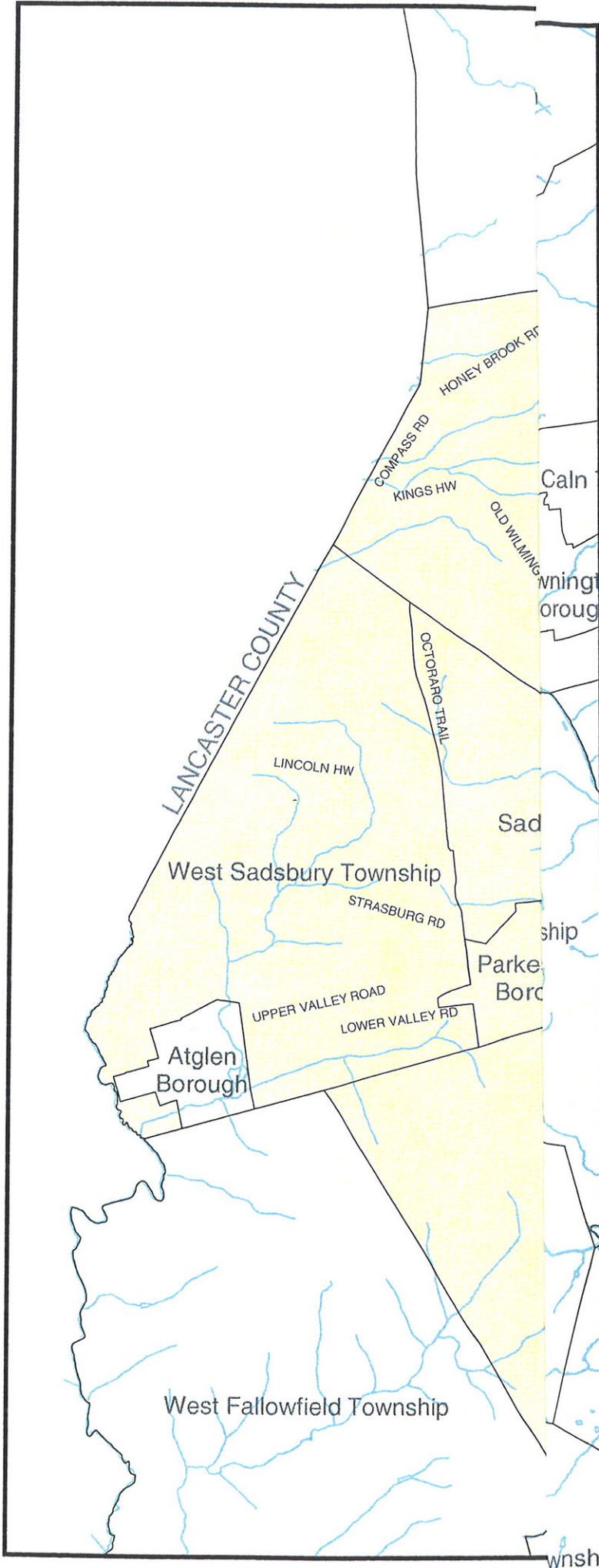
Service Area Map

Tributary Municipalities of PAWC WWTP Act 537 Plan

Legend

-  Water
-  Municipal Boundary
-  Tributary Municipalities

5,000 0 5,000
Feet



URS

1200 Philadelphia Pike
Wilmington, DE 19809
Tel: 302.791.0700
Fax: 302.791.0708

Map II-1

Tributary Municipalities

APPENDIX D

Number of Customers by Rate Classification

**Coatesville Wastewater Operations
Number of Customers at Years End**

WASTEWATER CUSTOMERS

Coatesville Wastewater	Rate Schedule	<u>2009</u>	<u>2008</u>	<u>2007</u>
Residential Usage Monthly	X01M	5624	5533	
Residential Usage Monthly	X01MS	2	2	
Residential Usage Monthly	XVRM		13	
Residential Flat	X1MF1	41	40	
	X1MF2	13	12	
	X1M3	2	2	
TOTAL RESIDENTIAL		5682	5602	5530
Commercial Usage Monthly	X02M	324	334	
Commercial Flat Quarterly	X2MF2	1	1	
TOTAL COMMERCIAL		325	335	337
Industrial Usage Monthly	X03M	1	1	
Industrial Usage Quarterly	X03ML	1	1	
TOTAL INDUSTRIAL		2	2	2
Municipal Usage Monthly	X04M	20	16	
Municipal Usage Bulk	X04MB	1	1	
TOTAL MUNICIPAL		21	17	19
Resale Monthly	X05MB	4	4	
TOTAL RESALE		4	4	4
TOTAL		6034	5960	5892

APPENDIX E

Annual Customer Water Usage by Rate Classification

**Coatesville Wastewater Operations
Annual Water Usage for Calendar Year in Gallons x 100**

	2009	2008	2007
WASTEWATER CUSTOMER			
Residential Usage Monthly & Residential Usage Monthly	2,845,394	2,882,252	2,856,139
Residential Usage Monthly	4,941	397	
	944 EDUs	920 EDUs	896 EDUs
	161 EDUs	164 EDUs	148 EDUs
	36 EDUs	16 EDUs	5 EDUs
Commercial Usage Monthly	701,222	669,178	649,928
Commercial Flat Quarterly	12 EDUs	14 EDUs	28 EDUs
Industrial Usage Monthly	80,090	87,870	99,230
Industrial Usage Quarterly	406,191	1,129,689	861,970
			Quebecor Mittal Steel
Municipal Usage Monthly	49,094	60,319	60,550
Municipal Usage Bulk	316,420	497,920	827,939
			VA Medical Center
Resale Monthly	3,953,020	3,641,261	3,370,980
			West Brandywine Twp, Sadsbury Twp, Calh Twp, ValleyTwp

NOTES:

- 1) EDU counts are a 12-month summation
- 2) Because usage amounts are based on billing cycles, annual resale usage will differ from reported Chapter 94 calendar year values

APPENDIX F

**Bulk Municipal Flows
Flows in Gallons Per Day**

**Bulk Municipal Flows
Flows in Gallons Per Day**

	Valley Twp	West Brandywine Twp	Caln Twp	Sadsbury Twp
2009 Chapter 94				
AA DF	638,709	146,477	190,451	131,141
PDF	1,574,749	207,556	588,854	249,517
PHF	1,951,373	377,750	630,833	376,101
Contract Flows Pre-Plant Expansion				
ADF Peak Flow	1,140,000	345,000	570,000	410,750
			740,800 (daily)	1,026,720
Contract Flows Post-Plant Expansion				
ADF Peak Flow	1,540,000 4,620,000*	533,100 1,332,750 (daily) 1,865,850 (hourly)	800,000 1,046,000 (daily)	410,750 1,026,720

CODE: AADF – Average Annual Daily Flow
 ADF – Average Daily Flow
 PDF – Peak Daily Flow
 PHF – Peak Hourly Flow
 *30 Minute duration

APPENDIX G

Municipal Flows 2009

PAWC MUNICIPAL FLOWS 2009

Line #		Current ADF GPD	Current MDF GPD	Current MDF Peaking Factor	Current PHF GPD	Current PHF Peaking Factor
2	Total Metered Plant Flow	3,439,040	7,956,300	2.31	10,747,000	3.13
3	GPD					
4	Highland Township					
5	Borough Line Rd.	675	1,013	1.50	1,688	2.60
6						
7	GPD	675	1,013	1.50	1,688	2.60
8	Cain Township					
9	Pump Station	149,333	461,801	3.09	494,734	3.31
10	Carver Court	15,268	47,178	3.09	50,537	3.31
11	Megargee Heights	22,732	70,243	3.09	75,244	3.31
12	Brandywine Fab & Keehn	3,117	9,631	3.09	10,317	3.31
13						
14	GPD	190,451	588,854	3.09	630,833	3.31
15	Valley Township					
16	Rock Run Pump Station	199,754	471,381	2.36	626,025	3.14
17	Valley Road	214,717	580,986	2.71	783,038	3.65
18	Charles Street	235,907	545,878	2.31	576,754	2.44
19	Country Club (line 27)	(3,271)	(6,542)	2.00	(9,813)	3.00
20	Strasburg Hunt (line 35)	(8,477)	(16,954)	2.00	(25,431)	3.00
21						
22	GPD	638,709	1,574,749	2.47	1,951,379	3.06
23	Parkesburg Borough					
24	Pump Station	396,012	1,078,821	2.72	1,628,609	4.11
25	Quebecor (line 48)	(24,407)	(90,018)	3.69	(109,832)	4.50
26	West Sadsbury Commons (line 49)	(20,306)	(30,494)	1.50	(38,530)	1.90
27	Borough Line Rd.	(675)	(1,350)	2.00	(2,025)	3.00
28						
29	GPD	350,622	956,959	2.73	1,478,223	4.22
30	West Cain Township					
31	Coatesville Country Club	3,271	6,542	2.00	9,813	3.00
32	Sandy Hill	20,402	53,568	2.63	78,526	3.85
33						
34	GPD	23,673	60,110	2.54	88,339	3.73
35	East Fallowfield Township					
36	Strasburg Hunt	8,477	16,954	2.00	25,431	3.00
37	Brinton Station	14,191	30,773	2.17	49,560	3.49
38	Branford Village PS #1 - Main	61,545	121,714	1.96	201,240	3.27
39	Branford Village PS #2	16,028	26,292	1.64	54,370	3.39
40	Hilltop Mobile Home Park	7,453	14,906	2.00	22,360	3.00
41	Stone Creek	45,896	66,021	1.44	139,130	3.03
42	Providence Hill	13,487	21,461	1.59	38,815	2.88
43	Northwoods	1,519	4,276	2.81	12,312	8.10
44	Derry Ln.	1,102	6,781	6.15	12,214	11.08
45						
46	GPD	169,700	309,178	1.82	555,431	3.27
47	West Sadsbury Township					
48	Quebecor	24,407	90,018	3.69	109,833	4.50
49	West Sadsbury Commons	20,306	30,494	1.50	38,530	1.90
50						
51	GPD	44,713	120,512	2.70	148,363	3.32
52	West Brandywine Township					
53	Pump Station	146,477	207,556	1.42	377,750	2.68
54						
55	GPD	146,477	207,556	1.42	377,750	2.68
56	Sadsbury Township					
57	Pump Station	148,838	297,671	2.00	446,507	3.00
58	Sadsbury Crossing	2,707	5,414	2.00	8,120	3.00
59	Sandy Hill	(20,402)	(53,568)	2.63	(78,526)	3.85
60						
61	GPD	131,141	249,517	1.90	376,101	2.87
62	Veterans Hospital					
63	11th & Diamond	234,140	324,360	1.39	520,417	2.22
64	West Brandywine PS (line 53)	(146,477)	(207,556)	1.42	(377,750)	2.58
65	Total					
66	GPD	87,663	116,804	1.33	142,667	1.63
67	Bulk Delivery					
68	Rock Run to Parkesburg	-	-			
69	Octoraro to Parkesburg	-	-			
70	Haulers to Parkesburg	-	-			
71	Rock Run to Plant	-	-			
72	Octoraro to Plant	-	-			
73	Haulers to Plant	4,633				
74						
75	GPD	4,633	0		0	
76	City of Coatesville					
77	Total Metered Plant Flow	3,439,040	7,966,300	2.31	10,747,000	3.12
78	Total Contributing	1,748,189	4,185,251	2.39	6,750,767	3.29
79						
80	GPD	1,690,851	3,771,049	2.23	4,998,233	2.95

Footnotes (Line #)
Red indicates estimated Peaking Factors

APPENDIX H

**Calendar Year 2007 and Projected 10 Year Flow
(2017) per Act 537 Plan**

**TABLE IV-1
EXISTING AND PROJECTED FLOWS FOR PAWC TREATMENT FACILITY
(Average Daily Flows in Gallons per Day)**

Tributary Municipality or Source	Existing Flows per 2007 Ch. 94 Report	0-5 Year		5-10 Year		10 Year Total Flows	Additional Flows Beyond 10 Years		Total Flows Beyond 10 Years	Contract Flows
		Additional Flows	Total Flows	Additional Flows	Total Flows		Additional Flows Beyond 10 Years	Total Flows Beyond 10 Years		
Cain ⁽¹⁾	173,330	346,475	519,805	92,464	612,269	187,731	800,000	800,000	800,000	800,000
Coatesville ⁽¹⁾	1,943,879	245,950	2,189,829	81,584	2,271,413	165,641	2,437,054	N/A	2,437,054	N/A
East Fallowfield ⁽²⁾	103,657	153,000	256,657	12,450	269,107	173,650	442,757	N/A	442,757	N/A
Highland ⁽²⁾	225	48,150	48,375	0	48,375	0	48,375	N/A	48,375	N/A
Parkesburg ⁽¹⁾	350,071	174,488	524,559	130,363	654,921	260,726	915,647	N/A	915,647	N/A
Sadsbury ⁽²⁾	150,469	304,631	455,100	65,075	520,175	65,075	585,250	410,750	585,250	410,750
Valley ⁽¹⁾⁽³⁾	622,552	547,550	1,170,102	72,788	1,242,890	198,000	1,440,890	1,540,000	1,440,890	1,540,000
West Brandywine ⁽²⁾	139,974	548,261	688,235	176,265	864,500	0	864,500	533,100	864,500	533,100
West Cain ⁽²⁾	20,861	218,039	238,900	269,325	508,225	112,500	620,725	N/A	620,725	N/A
West Sadsbury ⁽¹⁾	48,749	196,875	245,624	134,775	380,399	109,800	487,804	N/A	487,804	N/A
Veterans Hospital	96,078	0	96,078	0	96,078	0	96,078	N/A	96,078	N/A
Bulk Haulers	4,064	0	4,064	0	4,064	0	4,064	N/A	4,064	N/A
TOTALS	3,653,909	2,783,419	6,437,328	1,035,089	7,472,417	1,273,122	8,743,144		8,743,144	

(1) Future flows derived from completed individual municipality Act 537 planning
 (2) Future flows derived from preliminary individual municipality Act 537 planning
 (3) Existing Flows per Valley Township Act 537 Plan
 See Chapter IV narrative for detailed explanation of flow calculations

APPENDIX I

Collection System Statistics

Cotatesville Wastewater System - Collection and Conveyance System Statistics (as of 12/31/09)						
PIPE DIAMETER	FOOTAGE	EETL	WETL	MAIN INTERCEPT	COLLECTION SYSTEM	
GRAVITY MAINS						
6"	3,672	0	0		3,672	
8"	280,110				280,110	
10"	9,089				8,434	
12"	3,376	1,089			2,287	
15"	15,668	1,144	13,141		1,383	
16"	138	138	0		0	
18"	9,155	1,225	5,283		2,647	
20"	210	0	210		0	
24"	4,909	2,347	0		2,562	
30"	2,408		1,932		476	
36"	998				0	
42"	1,284				0	
SUBTOTAL		6,598	20,555	2,282	301,571	
FORCE MAINS						
1-1/2"	2,157	0	0	0	2,157	
2"	4,756	0	0	0	4,756	
4"	28,023	0	0	0	28,023	
6"	14,299	0	0	0	14,299	
8"	26,764	0	0	0	26,764	
10"	9,827	0	9,827	0	0	
SUBTOTAL	85,826	0	9,827	0	75,999	
TOTAL	151,643	6,598	30,382	2,282	407,116	
Miles						

Code: EETL - East End Trunk Line
WETL - West End Trunk Line

APPENDIX J

**Coatesville Wastewater Treatment Plant
Monthly Flows
(2006 thru 2009)**

COATESVILLE WASTEWATER TREATMENT PLANT FLOWS

<u>MONTH</u>	<u>Flow Amounts (MGD)</u>				
	<u>YEAR</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>
January		3.939	3.795	3.369	3.299
February		3.901	3.517	3.921	3.166
March		3.472	4.154	3.936	2.849
April		3.411	4.657	3.516	3.283
May		3.189	3.966	3.601	3.521
June		3.891	3.692	3.388	3.890
July		3.811	3.568	3.362	3.457
August		3.353	3.468	3.197	3.608
September		3.403	3.015	3.284	3.215
October		3.292	3.191	3.059	3.492
November		3.593	3.199	3.317	3.341
December		<u>3.379</u>	<u>3.572</u>	<u>3.746</u>	<u>4.147</u>
Average Annual (AADF)		3.553	3.654	3.475	3.439
Peak Day (PDF)		7.4	8.2	6.55	7.956
Peak Hourly (PHF)		8.5	9.2	8.7	10.747
Peak Hour Ratio		2.39	2.52	2.5	3.13

NOTE: Prior year (2003-5) Peak Hour Ratios ranged between 2.18 – 2.42

APPENDIX K

Recorded Rainfall Totals

**COATESVILLE WASTEWATER TREATMENT PLANT
Monthly Rainfall Totals**

<u>MONTH</u>	<u>MONTHLY FLOW AVERAGE (MGD)</u>				
	<u>YEAR</u>	2006	2007	2008	2009
January		10.53	4.84	1.97	2.36
February		2.06	1.17	4.52	0.43
March		1.25	3.86	3.36	1.17
April		4.01	7.98	3.54	4.61
May		1.52	2.42	4.56	6.45
June		15.01	4.22	3.37	6.19
July		4.73	6.52	5.13	2.42
August		1.68	5.72	2.96	10.34
September		6.92	0.05	5.01	4.6
October		3.8	8.13	2.89	7.32
November		4.46	3.33	2.63	3.25
December		1.42	5.43	5.28	5.33

APPENDIX L

Branford Village Study

Coatesville Wastewater
 Analysis from low flow period to determine the percent of waer consumption goes to sewer system

Monitoring Period - February & March 2009

Location - Branford Village Main Pump Station

Sewer Flow Measurements for March - April 3,472,675 Reference Chapter 94 Municipal Flow Data

Water Consumption for all connections in Branford service area 3,936,600 Reference billing information below

88.22%

Program: PRTBUDZ
 Distribution Zone Code: 246524
 Division: *ALL
 District: *ALL
 Area Code: *ALL
 Region: *ALL
 Route: *ALL
 Bill Date: 03/06/2009 to 04/07/2009

Distributor	Distribution Zone Name	Engl	Route	Type	Stop	Premise Number	Service Address	Div	Dist	Area	Region	Type	Current Read Date	Prev Read Date	U/M	Billed Usage
246524	Parkeburg - Strasburg Hunt	650105	1	5	240686793	38 Branford Way	2406	650	2506	SCTV	A	20090303	20090202	100MC	0	
246524	Parkeburg - Strasburg Hunt	650105	1	5	240686793	38 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	10	
246524	Parkeburg - Strasburg Hunt	650105	1	20	240686794	37 Branford Way	2406	650	2506	SCTV	A	20090303	20090202	100MC	30	
246524	Parkeburg - Strasburg Hunt	650105	1	20	240686794	37 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	30	
246524	Parkeburg - Strasburg Hunt	650105	1	35	240686795	36 Branford Way	2406	650	2506	SCTV	A	20090303	20090202	100MC	30	
246524	Parkeburg - Strasburg Hunt	650105	1	35	240686795	36 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	30	
246524	Parkeburg - Strasburg Hunt	650105	1	50	240686796	35 Branford Way	2406	650	2506	SCTV	D	20090303	20090202	100MC	20	
246524	Parkeburg - Strasburg Hunt	650105	1	50	240686796	35 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	20	
246524	Parkeburg - Strasburg Hunt	650105	1	65	240686797	34 Branford Way	2406	650	2506	SCTV	A	20090303	20090202	100MC	10	
246524	Parkeburg - Strasburg Hunt	650105	1	65	240686797	34 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	50	
246524	Parkeburg - Strasburg Hunt	650105	1	80	240686798	33 Branford Way	2406	650	2506	SCTV	A	20090303	20090202	100MC	10	
246524	Parkeburg - Strasburg Hunt	650105	1	80	240686798	33 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	20	
246524	Parkeburg - Strasburg Hunt	650105	1	95	240686799	32 Branford Way	2406	650	2506	SCTV	A	20090303	20090202	100MC	20	
246524	Parkeburg - Strasburg Hunt	650105	1	95	240686799	32 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	40	
246524	Parkeburg - Strasburg Hunt	650105	1	110	240686800	31 Branford Way	2406	650	2506	SCTV	A	20090303	20090202	100MC	50	
246524	Parkeburg - Strasburg Hunt	650105	1	110	240686800	31 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	60	
246524	Parkeburg - Strasburg Hunt	650105	1	125	240686801	30 Branford Way	2406	650	2506	SCTV	D	20090303	20090202	100G	24	
246524	Parkeburg - Strasburg Hunt	650105	1	125	240686801	30 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100G	22	
246524	Parkeburg - Strasburg Hunt	650105	1	140	240692497	29 Branford Way	2406	650	2506	SCTV	D	20090303	20090202	100MC	10	
246524	Parkeburg - Strasburg Hunt	650105	1	140	240692497	29 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	10	
246524	Parkeburg - Strasburg Hunt	650105	1	155	240692498	28 Branford Way	2406	650	2506	SCTV	D	20090303	20090202	100MC	30	
246524	Parkeburg - Strasburg Hunt	650105	1	155	240692498	28 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	30	
246524	Parkeburg - Strasburg Hunt	650105	1	170	240692499	27 Branford Way	2406	650	2506	SCTV	D	20090303	20090202	100MC	50	
246524	Parkeburg - Strasburg Hunt	650105	1	170	240692499	27 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	20	
246524	Parkeburg - Strasburg Hunt	650105	1	185	240692500	26 Branford Way	2406	650	2506	SCTV	D	20090303	20090202	100MC	80	
246524	Parkeburg - Strasburg Hunt	650105	1	185	240692500	26 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	50	
246524	Parkeburg - Strasburg Hunt	650105	1	200	240692505	25 Branford Way	2406	650	2506	SCTV	D	20090303	20090202	100MC	30	
246524	Parkeburg - Strasburg Hunt	650105	1	200	240692505	25 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	30	
246524	Parkeburg - Strasburg Hunt	650105	1	215	240692506	24 Branford Way	2406	650	2506	SCTV	D	20090303	20090202	100MC	20	
246524	Parkeburg - Strasburg Hunt	650105	1	215	240692506	24 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	20	
246524	Parkeburg - Strasburg Hunt	650105	1	230	240692507	23 Branford Way	2406	650	2506	SCTV	D	20090303	20090202	100G	63	
246524	Parkeburg - Strasburg Hunt	650105	1	230	240692507	23 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100G	26	
246524	Parkeburg - Strasburg Hunt	650105	1	245	240692508	22 Branford Way	2406	650	2506	SCTV	D	20090303	20090202	100MC	0	
246524	Parkeburg - Strasburg Hunt	650105	1	245	240692508	22 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	10	
246524	Parkeburg - Strasburg Hunt	650105	1	260	240692509	21 Branford Way	2406	650	2506	SCTV	D	20090303	20090202	100MC	40	
246524	Parkeburg - Strasburg Hunt	650105	1	260	240692509	21 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	40	
246524	Parkeburg - Strasburg Hunt	650105	1	275	240691235	20 Branford Way	2406	650	2506	SCTV	D	20090303	20090202	100MC	50	
246524	Parkeburg - Strasburg Hunt	650105	1	275	240691235	20 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	40	
246524	Parkeburg - Strasburg Hunt	650105	1	290	240691236	19 Branford Way	2406	650	2506	SCTV	D	20090303	20090202	100MC	80	
246524	Parkeburg - Strasburg Hunt	650105	1	290	240691236	19 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	40	
246524	Parkeburg - Strasburg Hunt	650105	1	305	240691237	18 Branford Way	2406	650	2506	SCTV	D	20090303	20090202	100MC	20	
246524	Parkeburg - Strasburg Hunt	650105	1	305	240691237	18 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	10	
246524	Parkeburg - Strasburg Hunt	650105	1	320	240691238	17 Branford Way	2406	650	2506	SCTV	D	20090303	20090202	100MC	40	
246524	Parkeburg - Strasburg Hunt	650105	1	320	240691238	17 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	30	
246524	Parkeburg - Strasburg Hunt	650105	1	335	240691239	16 Branford Way	2406	650	2506	SCTV	D	20090303	20090202	100MC	20	
246524	Parkeburg - Strasburg Hunt	650105	1	335	240691239	16 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	30	
246524	Parkeburg - Strasburg Hunt	650105	1	350	240687579	15 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	30	
246524	Parkeburg - Strasburg Hunt	650105	1	350	240687579	15 Branford Way	2406	650	2506	SCTV	M	20090303	20090202	100MC	30	
246524	Parkeburg - Strasburg Hunt	650105	1	365	240687580	14 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	60	
246524	Parkeburg - Strasburg Hunt	650105	1	365	240687580	14 Branford Way	2406	650	2506	SCTV	M	20090303	20090202	100MC	50	
246524	Parkeburg - Strasburg Hunt	650105	1	380	240686802	13 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	30	
246524	Parkeburg - Strasburg Hunt	650105	1	380	240686802	13 Branford Way	2406	650	2506	SCTV	M	20090303	20090202	100MC	20	
246524	Parkeburg - Strasburg Hunt	650105	1	395	240686803	12 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	30	
246524	Parkeburg - Strasburg Hunt	650105	1	395	240686803	12 Branford Way	2406	650	2506	SCTV	S	20090303	20090202	100MC	100	
246524	Parkeburg - Strasburg Hunt	650105	1	410	240686804	11 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	30	
246524	Parkeburg - Strasburg Hunt	650105	1	410	240686804	11 Branford Way	2406	650	2506	SCTV	M	20090303	20090202	100MC	30	
246524	Parkeburg - Strasburg Hunt	650105	1	425	240686805	10 Branford Way	2406	650	2506	SCTV	D	20090303	20090202	100MC	20	
246524	Parkeburg - Strasburg Hunt	650105	1	425	240686805	10 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	30	
246524	Parkeburg - Strasburg Hunt	650105	1	440	240686806	9 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	30	
246524	Parkeburg - Strasburg Hunt	650105	1	440	240686806	9 Branford Way	2406	650	2506	SCTV	M	20090303	20090202	100MC	30	
246524	Parkeburg - Strasburg Hunt	650105	1	455	240686807	8 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	10	
246524	Parkeburg - Strasburg Hunt	650105	1	455	240686807	8 Branford Way	2406	650	2506	SCTV	M	20090303	20090202	100MC	30	
246524	Parkeburg - Strasburg Hunt	650105	1	470	240686808	7 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	60	
246524	Parkeburg - Strasburg Hunt	650105	1	470	240686808	7 Branford Way	2406	650	2506	SCTV	M	20090303	20090202	100MC	40	
246524	Parkeburg - Strasburg Hunt	650105	1	480	240693228	6 Branford Way	2406	650	2506	SCTV	D	20090303	20090202	100MC	20	
246524	Parkeburg - Strasburg Hunt	650105	1	480	240693228	6 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	20	
246524	Parkeburg - Strasburg Hunt	650105	1	495	240693229	5 Branford Way	2406	650	2506	SCTV	D	20090303	20090202	100MC	40	
246524	Parkeburg - Strasburg Hunt	650105	1	495	240693229	5 Branford Way	2406	650	2506	SCTV	E	20090402	20090303	100MC	50	

246524	Parkeburg - Strasburg Hunt	650105	1	4685	240692947	101 Crossing Blvd	2406	650	2449	EFLW	E	20090402	20090303	100MC	30
246524	Parkeburg - Strasburg Hunt	650105	2	1610	240674061	91 Arden Ln	2406	650	2449	EFLW	A	20090304	20090202	100MC	20
246524	Parkeburg - Strasburg Hunt	650105	2	1610	240674061	91 Arden Ln	2406	650	2449	EFLW	E	20090402	20090304	100MC	20
246524	Parkeburg - Strasburg Hunt	650105	2	3300	240684432	103 Osprey Way	2406	650	2449	EFLW	A	20090303	20090202	100MC	10
246524	Parkeburg - Strasburg Hunt	650105	2	3300	240684432	103 Osprey Way	2406	650	2449	EFLW	E	20090402	20090303	100MC	10
246524	Parkeburg - Strasburg Hunt	650105	2	4520	240684426	127 Magpie Ln	2406	650	2449	EFLW	A	20090303	20090202	100MC	40
246524	Parkeburg - Strasburg Hunt	650105	2	4520	240684426	127 Magpie Ln	2406	650	2449	EFLW	E	20090402	20090303	100MC	70
246524	Parkeburg - Strasburg Hunt	650105	2	4835	240616381	450 Doe Run Rd	2406	650	2449	EFLW	D	20090303	20090202	100MC	60
246524	Parkeburg - Strasburg Hunt	650105	2	4835	240616381	450 Doe Run Rd	2406	650	2449	EFLW	E	20090402	20090303	100MC	10
246524	Parkeburg - Strasburg Hunt	650105	4	4845	240683177	475 Doe Run Rd	2406	650	2449	EFLW	D	20090303	20090202	100MC	20
246524	Parkeburg - Strasburg Hunt	650105	4	4845	240683177	475 Doe Run Rd	2406	650	2449	EFLW	E	20090402	20090303	100MC	20
246524	Parkeburg - Strasburg Hunt	650119	1	5	240688880	116 Nassau Ln	2406	650	2449	EFLW	D	20090303	20090202	100MC	30
246524	Parkeburg - Strasburg Hunt	650119	1	5	240688880	116 Nassau Ln	2406	650	2449	EFLW	E	20090402	20090303	100MC	30
246524	Parkeburg - Strasburg Hunt	650129	2	1520	240616382	427 Doe Run Rd	2406	650	2453	EFLW	S	20090227		100G	0
246524	Parkeburg - Strasburg Hunt	650129	2	1520	240616382	427 Doe Run Rd	2406	650	2453	EFLW	S	20090227	20090223	100MC	320
246524	Parkeburg - Strasburg Hunt	650129	2	1520	240616382	427 Doe Run Rd	2406	650	2453	EFLW	S	20090325	20090227	100G	2709

3936600

APPENDIX M

**Wastewater Customer Demands
for
Selected Study Periods
and
Dry Weather Flow Periods**

Wastewater Customer Demands Flows in Gallons Per Day (GPD)

<u>Customer Classification</u>	<u>Year 2009</u>	<u>Dry Weather Flow March 2009</u>	<u>Dry Weather Flow 9/17-10/5/07</u>	<u>2007</u>
	<u>DIRECT</u>			
Residential (R)	788,687	752,709	803,910	782,504
Commercial (C)	192,709	228,025	193,527	178,062
Municipal (M)	13,450	10,732	14,337	16,589
Subtotal – Water Demand	994,846	991,466	1,011,774	977,155
Wastewater – 88% water (R+C+M)	875,464	872,490	890,361	859,896
Industrial				
• Mittal	111,285	173,232	235,074	236,156
• Quebecor	21,942	19,032	27,063	27,186
VA Hospital	87,663	48,645	96,078	96,078
Bulk Hauler	4,633	4,023	4,064	4,064
Total Direct	1,100,987	1,117,42	1,252,640	1,223,380
Bulk				
Caln Township	190,451	139,967	173,330	173,330
Valley Township	638,709	524,978	622,552	622,552
West Brandywine Township	146,477	143,092	139,974	139,974
Sadsbury Township	131,141	118,612	150,469	150,469
Total Bulk	1,106,778	926,649	1,086,325	1,086,325
Wastewater Customer Demand	2,207,765	2,044,071	2,338,965	2,309,705
Average Dry Weather Flow (ADWF)		2,849,000	2,877,000	
Annual Average Daily Flow (AADF)	3,439,040			3,653,909

Notes:

- 1) Wastewater demands for direct residential, commercial, and municipal customers based upon 88% of metered water use
- 2) Quebecor wastewater demand based on sewer meter. Mittel wastewater demand based on 100% of metered water use.
- 3) Wastewater demand for bulk customers based on metered wastewater flows, as indicated in Chapter 94 report for calendar year.
- 4) Average Annual Daily Flow (AADF) based on Chapter 94 report.

APPENDIX N

**Infiltration Estimate
of
Coatesville Wastewater Gravity System
for
Dry Weather Period
March 2009**

Coatesville Wastewater Gravity System

Infiltration Estimate

Dry Weather Period

Appendix N

	<u>Length, Feet</u>	<u>In-Mile</u>	<u>Base Level Infiltration Factor (gpd/in-mile)</u>	<u>Base Level Infiltration (gpd)</u>
CONVEYANCE SYSTEM				
West End Trunk Line (WETL)				
P3 0103 - P3 0116	1800	6.14	1,000	6,140
Parkesburg PS				
WE080 - WE032	13,141	37.33	500	18,665
WE032 - WE012	3,063	10.44	1,000	10,440
WE012 - WE001	2,562	13.21	300	3,963
Subtotal	20,566	67.12	584	39,208
East End Trunk Line (EETL)				
EE 033 - EE 019	2,865	7.25	1,500	10,875
EE 019 - EE 018	190	0.86	250	215
EE 018 - EE 015	972	3.32	1,500	4,980
EE 015 - EE 003	2,571	10.80	250	2,700
Subtotal	6,598	22.23	844	18,770
Main Interceptor	2,282	17.02	350	5,957
TOTAL CONVEYANCE	29,446	106.37	601	63,935
COLLECTION SYSTEM (Gravity)				
Direct Customer	285,584	447.96	1553	695,794
Bulk Municipalities	15,987	29.10	1553	45,200
TOTAL COLLECTION (Gravity)	301,571	477.06	1553	740,994
TOTAL (Gravity)	331,017	583.42	1380	804,929

NOTES: In-mile calculated by pipe diameter includes x miles of pipe length
Excludes collection system force mains

APPENDIX O

**Infiltration Estimate during Dry Weather Period
for
Portion of Collection System
Downstream of Bulk Municipal
Entry Connection to Conveyance System**

**Coatesville Wastewater Gravity System
Infiltration Estimate Common Collection System (Bulk Municipalities)
Dry Weather Period**

	<u>Length, Feet</u>	<u>In-Mile</u>	<u>Base Level Infiltration Factor (gpd/in-mile)</u>	<u>Base Level Infiltration (gpd)</u>
COLLECTION SYSTEM (Gravity)				
West End Trunk Line (WETL)				
C2 105 - WE 029	1,423	2.26	1553	3,510
Sadsbury Crossing - MH 800	7,994	16.32	1553	25,350
Subtotal	9,417	18.58		28,860
East End Trunk Line (EETL)				
EE 039 - EE 033	1,517	2.87	1553	4,458
Carver Court - EE 033	1,330	2.01	1553	3,122
C7 102 - EE 030	3,723	5.64	1553	8,760
Subtotal	6,570	10.52	1553	16,340
TOTAL COMMON COLLECTION (Bulk Municipalities)	15,987	29.10	1553	45,200

APPENDIX P

**Wastewater Flow Allocation
for
Dry Weather Period (March 2009)**

**Wastewater Flow Allocation
For
Dry Weather Period (March 2009)**

BULK

DIRECT

<p>Valley Township 524,978 gpd</p>	<p>PAWC Direct Customers 1,117,422 gpd</p>
<p>West Brandywine Township 143,092 gpd</p>	
<p>Cain Township 139,967 gpd</p>	
<p>Sadsbury Township 118,612 gpd</p>	
<p>I&I PAWC Collection 45,200 gpd</p>	
<p>I&I PAWC Collection 695,794 gpd</p>	
<p>Infiltration Common Conveyance 63,935 gpd</p>	

Dry Weather Flow (March 2009) = 2,849,000 gpd *J*

APPENDIX Q

**Wastewater Flow Allocation
for
Current Year 2009
Average and Peak Flows**

**Wastewater Flow Allocation
for
Current – Annual Average Flow (2009)
Values in gpd**

BULK

DIRECT

<p>Valley Township 638,709 gpd</p>	<p>PAWC Direct Customers 1,100,987 gpd</p>
<p>West Brandywine Township 146,477 gpd</p>	
<p>Caln Township 190,451 gpd</p>	
<p>Sadsbury Township 131,141 gpd</p>	
<p>I&I PAWC Collection 70,682 gpd</p>	
<p>I&I PAWC Collection 1,088,057 gpd</p>	
<p>I&I Common Conveyance 72,536 gpd</p>	

Calendar Year 2009 AADF = 3,439,040 gpd

**Coatesville Wastewater Gravity System
I&I Estimate
AADF 2009**

Appendix Q

	<u>Length, Feet</u>	<u>In-Mile</u>	<u>I&I Factor (gpd/in-mile)</u>	<u>I&I (gpd)</u>
CONVEYANCE SYSTEM				
West End Trunk Line (WETL)				
P3 0103 - P3 0116	1800	6.14	1,200	7,368
Parkesburg PS				
WE080 - WE032	13,141	37.33	500	18,665
WE032 - WE012	3,063	10.44	1,200	12,528
WE012 - WE001	2,562	13.21	300	3,963
Subtotal	20,566	67.12	634	42,524
East End Trunk Line (EETL)				
EE 033 - EE 019	2,865	7.25	2,000	14,500
EE 019 - EE 018	190	0.86	250	215
EE 018 - EE 015	972	3.32	2,000	6,640
EE 015 - EE 003	2,571	10.80	250	2,700
Subtotal	6,598	22.23	1,082	24,055
Main Interceptor	2,282	17.02	350	5,957
TOTAL CONVEYANCE	29,446	106.37	682	72,536
COLLECTION SYSTEM (Gravity)				
Direct Customer	285,584	447.96	2,429	1,088,057
Bulk Municipalities	15,987	29.10	2,429	70,682
TOTAL COLLECTION (Gravity)	301,571	477.06	2,429	1,158,739
TOTAL (Gravity)	331,017	583.42	2,110	1,231,275

NOTES: In-mile calculated by pipe diameter includes x miles of pipe length
Excludes collection system force mains

**Wastewater Flow Allocation
For
Peak Flow (2009)
Values in gpd**

BULK	DIRECT
Valley Township 1,951,373 gpd	PAWC Direct Customers 1,100,987 gpd
West Brandywine Township 377,750 gpd	
Caln Township 630,833 gpd	
Sadsbury Township 376,101 gpd	Peak Storm Event I&I 4,717,895 gpd
Peak Storm Event I&I 306,479 gpd	
I&I PAWC Collection 70,682 gpd	I&I PAWC Collection 1,088,057 gpd
I&I Common Conveyance 126,843 gpd	

Peak Hourly Flow – 10,747,000 gpd
Date – 12/26/09

**Coatesville Wastewater Gravity System
I&I Estimate
PHF 2009**

	<u>Length, Feet</u>	<u>In-Mile</u>	<u>I&I Factor (gpd/in-mile)</u>	<u>I&I (gpd)</u>
CONVEYANCE SYSTEM				
West End Trunk Line (WETL)				
P3 0103 - P3 0116	1800	6.14	2,000	12,280
Parksburg PS				
WE080 - WE032	13,141	37.33	750	27,998
WE032 - WE012	3,063	10.44	2,000	20,880
WE012 - WE001	2,562	13.21	300	3,963
Subtotal	20,566	67.12	970	65,121
East End Trunk Line (EETL)				
EE 033 - EE 019	2,865	7.25	5,000	36,250
EE 019 - EE 018	190	0.86	250	215
EE 018 - EE 015	972	3.32	5,000	16,600
EE 015 - EE 003	2,571	10.80	250	2,700
Subtotal	6,598	22.23	2,508	55,765
Main Interceptor	2,282	17.02	350	5,957
TOTAL CONVEYANCE	29,446	106.37	1,192	126,843
COLLECTION SYSTEM (Gravity)				
Direct Customer	285,584	447.96	12,961	5,805,952
Bulk Municipalities	15,987	29.10	12,961	377,161
TOTAL COLLECTION (Gravity)	301,571	477.06	12,961	6,183,113
TOTAL (Gravity)	331,017	583.43	10,815	6,309,956

NOTES: In-mile calculated by pipe diameter includes x miles of pipe length
Excludes collection system force mains

APPENDIX R

**Wastewater Flow Allocation
for
Projected 10 year flows (2017)
based on
Act 537 Planning**

**Wastewater Flow Allocation
For
Projected 10 Year – Annual Average Flow
Based on Act 537 Planning
Values in gpd**

BULK	DIRECT
Valley Township 1,242,890 gpd	PAWC Direct Customers 2,888,379 gpd
West Brandywine Township 864,500 gpd	
Caln Township 612,269 gpd	
Sadsbury Township 520,175 gpd	
I&I PAWC Collection 77,570 gpd	I&I PAWC Collection 1,194,098 gpd
I&I Common Conveyance 72,536 gpd	

Projected 10 Year AADF = 7,472,417 gpd (2017)

**Coatesville Wastewater Gravity System
I&I Estimate
AADF 2017**

	<u>Length, Feet</u>	<u>In-Mile</u>	<u>I&I Factor (gpd/in-mile)</u>	<u>I&I (gpd)</u>
CONVEYANCE SYSTEM				
West End Trunk Line (WETL)				
P3 0103 - P3 0116	1800	6.14	1,200	7,368
Parkesburg PS				
WE080 - WE032	13,141	37.33	500	18,665
WE032 - WE012	3,063	10.44	1,200	12,528
WE012 - WE001	2,562	13.21	300	3,963
Subtotal	20,566	67.12	634	42,524
East End Trunk Line (EETL)				
EE 033 - EE 019	2,865	7.25	2,000	14,500
EE 019 - EE 018	190	0.86	250	215
EE 018 - EE 015	972	3.32	2,000	6,640
EE 015 - EE 003	2,571	10.80	250	2,700
Subtotal	6,598	22.23	1,082	24,055
Main Interceptor	2,282	17.02	350	5,957
TOTAL CONVEYANCE	29,446	106.37	682	72,536
COLLECTION SYSTEM (Gravity)				
Direct Customer	285,584	447.96	2,666	1,194,098
Bulk Municipalities	15,987	29.10	2,666	77,570
TOTAL COLLECTION (Gravity)	301,571	477.06	2,666	1,271,668
TOTAL (Gravity)	331,017	583.42	2,304	1,344,204

NOTES: In-mile calculated by pipe diameter includes x miles of pipe length
Excludes collection system force mains

**Wastewater Flow Allocation
For
Projected 10 Year - Peak Flow
Based on Act 537 Planning
Values in gpd**

BULK	DIRECT
Valley Township 3,797,257 gpd	PAWC Direct Customers 2,888,379 gpd
West Brandywine Township 2,229,515 gpd	
Caln Township* 839,099 gpd	Peak Storm Event I&I 8,784,839 gpd
Sadsbury Township 1,491,817 gpd	
Peak Storm Event I&I 570,673 gpd	I&I PAWC Collection 1,194,098 gpd
I&I PAWC Collection 77,570 gpd	
I&I Common Conveyance 126,843 gpd	

Projected 10 Year Peak Hourly Flow – 22,000,000 (E) gpd
 *Allocation - Municipal Drive Pump Station – 590,840 gpd
 - Remainder – 248,259 gpd

**Coatesville Wastewater Gravity System
I&I Estimate
PHF 2017**

	<u>Length, Feet</u>	<u>In-Mile</u>	<u>I&I Factor (gpd/in-mile)</u>	<u>I&I (gpd)</u>
CONVEYANCE SYSTEM				
West End Trunk Line (WETL)				
P3 0103 - P3 0116	1800	6.14	2,000	12,280
Parkesburg PS				
WE080 - WE032	13,141	37.33	750	27,998
WE032 - WE012	3,063	10.44	2,000	20,880
WE012 - WE001	2,562	13.21	300	3,963
Subtotal	20,566	67.12	970	65,121
East End Trunk Line (EETL)				
EE 033 - EE 019	2,865	7.25	5,000	36,250
EE 019 - EE 018	190	0.86	250	215
EE 018 - EE 015	972	3.32	5,000	16,600
EE 015 - EE 003	2,571	10.80	250	2,700
Subtotal	6,598	22.23	2,508	55,765
Main Interceptor	2,282	17.02	350	5,957
TOTAL CONVEYANCE	29,446	106.37	1,192	126,843
COLLECTION SYSTEM (Gravity)				
Direct Customer	285,584	447.96	22,276	9,978,852
Bulk Municipalities	15,987	29.10	22,276	648,238
TOTAL COLLECTION (Gravity)	301,571	477.06	22,276	10,627,090
TOTAL (Gravity)	331,017	583.42	18,433	10,753,933

NOTES: In-mile calculated by pipe diameter includes x miles of pipe length
Excludes collection system force mains