COMPARISON OF NPDES PERMIT VIOLATIONS AND AMBIENT WATER QUALITY USING AVAILABLE DATABASES

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I. INTRODUCTION

Water quality management requires data from a variety of sources, including ambient water quality and permitted facilities discharge values. Ambient water quality is affected by both point and nonpoint sources, to a greater or lesser degree depending on the specific nature of the area being considered. Permits have been written for most direct dischargers in the United States. The purpose of a permit limitation is to control the impact on the receiving waters. Violations of the permit levels result in some form of enforcement action by the state which has the National Pollutant Discharge Elimination System (NPDES) permit authority for the particular discharger.

In the Potomac basin, all the states, with the exception of the District of Columbia, have been delegated the authority for issuing and enforcing the NPDES permits. If a permit is constantly violated, the water quality likely will be degraded. This, of course, depends on the flow of the receiving stream and the type of violation. The purpose of this report is to examine selected stream reaches and see whether permit violations are correlated with a degradation in ambient water quality. Certainly, other factors impact water quality, but a permit violation may be a key to potential degradation and subsequent action. A quick response to the problem, rather than waiting for the result to be seen in a water standard violation could be the result. The use of currently available databases for ambient quality and permit limits and violations provides a water quality manager information in a very short period of time. Rapid access to the data is extremely important. Detecting and acting upon permit violations is a role of the manager today, as is analysis of ambient quality. The techniques developed here do not add additional work, but integrate what is available. The permit activities may not be performed by the same people as the ambient water quality work, therefore, interaction between different offices may be required. Such interaction, if it does not presently occur, will improve water quality management.

This report will cover the following three topic areas:

A. Permits. Dischargers who may impact the water quality monitoring station are obtained from the U.S. Environmental Protection Agency (EPA) software WQAB package, described in the ICPRB publication Monthly Monitoring Data and Integrated Databases as Management Tools (Brooks, 1986). By requesting a stream reach, the WQAB software produces a listing of dischargers. The output from the Permit Compliance System (PCS) includes the permit limits and percentage of exceedance of those levels. The actual dates of permit violation for each parameter are also presented. In this report, only exceedances are presented.

B. Ambient Water Quality. In examples with numeric violations of the permit requirements, the water quality data of related parameters are listed with histograms, statistical summaries and standard normal residual analyses. Areas include South River, Virginia; Antietam Creek, Pennsylvania; Conococheague Creek, Pennsylvania; and Opequon Creek, West Virginia. Statistical analysis of outliers for water quality (WQ) is performed by a statistical package from the Pennsylvania State University -- MINITAB. This procedure was described in detail in the 1CPRB report Using Monthly Monitoring Data as A Management Tool (Brooks and Sheer, 1985). Standard normal residual was used and is the value derived from the equation:

S.N.R. = (x - mean)/standard deviation

C. Discussion of adequacies and deficiencies of existing databases, as requested by U.S. EPA. Problems exist with PCS which lessen the usefulness of the system. The older data which is archived is not capable of being retrieved by use of the Limitation and Violation (LV) file. A variety of bugs remains in the use of the system for retrieval of violations. The STORET data for Maryland and District of Columbia are not complete. Without a historical record of permit violations, it is quite difficult to assess valid relationships. By comparison, the Virginia database has Discharge Monitoring Reports (DMR) back through 1977. States vary greatly in their use of PCS and STORET.

This report was preceded by two other publications in a series of ICPRB technical reports on the use of available databases and statistical methods for water quality management (Brooks and Sheer, 1985; Brooks, 1986).

II. METHODOLOGY

The methodology used in this report requires access to STORET, the EPA water quality database system, PCS, the permit compliance system, and a statistical software package, MINITAB, available for personal computers.

The procedure requires 5 steps:

1. Use of the WQAB software under STORET to obtain the dischargers on a selected stream reach.

2. Use of the Permit Compliance System to obtain permit information and instances of violations. This accesses the LV software, which produces reports of both limitations and violations.

3. With the parameters which have exceeded their permit limit, STORET is used again to obtain the ambient water quality data

for the parameters of interest. Water quality parameters retrieved, generally, are the same parameters as in the NPDES permit. For example, pH values in STORET are retrieved when a pH limit in PCS is violated. The STORET and PCS codes are the same (e.g.: pH is 00400). Some permit violations which may affect ambient water quality required that additional relationships be analyzed. BOD and COD (PCS) were retrieved for impacts upon ambient dissolved oxygen (STORET). For ambient ammonia, nitrite and nitrate, ammonia violations from PCS were examined.

4. Using the techniques developed in the 1985 report, the statistical outliers of water quality values are calculated from the standard normal residual analysis. A statistical outlier, for purposes of this report, will be any value whose Standard Normal Residual (S.N.R.) is greater than 1.8.

5. Compare the permit violations with the outliers.

6. If there are any correlations, follow through on a more in-depth investigation of the discharger and ambient water quality.

For Antietam Creek, in Pennsylvania, the example will include all the water quality data of parameters which were potentially impacted by permit violations. This comprehensive data presentation will be for illustrative purposes of how the integration of the two major databases would operate. Water quality outliers will be shown with two asterisks (**). On Antietam Creek, permit violations will be designated with 3 v's (vvv) for the two closest months of water quality data. For the other streams, only flagged outliers in water quality will be shown. All permit violations will be listed. Those outliers, with corresponding permit violations, will be designated with 3 v's (vvv), also. For those non-outlier periods, the listing of permit violations will highlight chronic problems even though water quality is not showing up as being impacted. Parameters which demonstrated five or more months of continuous violation are set apart from the listing.

Water Quality data from STORET were analyzed using standard normal residual analysis. Standard normal residual is a fast and easy method to obtain statistical outliers. Using MINITAB, the following data are produced: histograms, tables of descriptive statistics and Standard Normal Residual.

The relationship between permit data and ambient water quality is based on determining the exceedance of the permit levels and examining the water quality outliers. For purposes of this report, a relationship exists when a WQ outlier appears within the same month as the violation of a permit. In the tables shown, a relationship occurs when the value is flagged by

both WQ outliers (**) and permit violations (vvv) in the Antietam Creek example; and when the "vvv" flag is shown for the other streams, where only outliers are reported.

Using MINITAB FOR NPDES WQ Analysis:

1. Clean up STORET WQ files (remove headers, check for errors)
2. Read 'x' into c1 - c6 (this reads the water quality data)
3, print c1 - c6
4. hist c6 (creates a histogram of the data)
5. desc c6 (produces summary statistics)
6. write down mean and standard deviation
7. subtract mean from c6, put in c7
8. divide c7 by standard deviation, put in c8
9. print c1 - c8

III. RESULTS

WQAB TABLES

The WQAB interactively produces information on a requested stream reach. A request upstream from a designated point produces dischargers for both the main stem and tributary streams. Listed below is a brief description of the data supplied by the WQAB.

Stream reaches of 11 digits are based upon the USGS hydrologic unit code (HUC) of eight digits. The three additional numbers define a stream reach in the subbasin. For example, Antietam Creek is 02070004002.

A pipe is a NPDES permitted discharge; a gage is a flow monitoring station; and a drink is a water supply intake.

The NPDES number is the permit designator for a given facility. Flow of a facility is given in thousand gallons per day (TGD). Following flow, are the letters C, P and B. These designate the purpose of the water used, i.e.: C is cooling, P is process and B is both. The SIC is the Standard Industrial Code which describes the type of facility which is permitted.

A. Antietam Creek, in Pennsylvania

ANTIETAM CREEK DISCHARGERS from WQAB

```
  0.00  02070004002/000.00  TYPE R  LEV 2  LENGTH  11.00  NAME ANTIETA                                  2 DISCHARGES

0.00 GAGE WEG02070004002       ?                    STCO    -1 DA -1 ?   MF(CFS)    306 LF(CFS)     69
   0.00 PIPE  1 NPDES# MD0020231 BOONSBORO MUNICIPAL UTILITOFF  FLOW(TGD)     160.00 -P SIC  4952   -1   -1
   0.00 PIPE  2 NPDES# MD0020231 BOONSBORO MUNICIPAL UTILITOFF  FLOW(TGD)     400.00 -P SIC  4952   -1   -1

  11.00  02070004003/000.00  TYPE S  LEV 3  LENGTH  10.00  NAME BEAVER CR
                              4 DISCHARGES
  11.00 GAGE WEG02070004003       ?                    STCO    -1 DA  -1 ?   MF(CFS)     35 LF(CFS)      8
  11.00 DRINK MD0210010 HAGERSTOWN           POP   70000 ?  10300 TGD TYPE P2     SMITHBURG TRTMT PLT  SOURCE ?
  11.00 DRINK MD0210010 HAGERSTOWN           POP   70000 Y     10 TGD TYPE P2I1   SMITHBURG RESERVOIR  SOURCE S
  11.00 PIPE  1 NPDES# MD0002917 DOUBLEDAY & CO SMITHSBURG ON   FLOW(TGD)      50.00 -C SIC  2731   -1   -1
  11.00 PIPE  2 NPDES# MD0002917 DOUBLEDAY & CO SMITHSBURG ON   FLOW(TGD)       2.80 -P SIC  2752   -1   -1
  11.00 PIPE  1 NPDES# MD0050954 MT. AETNA COMMUNITY ASSOC.OFF  FLOW(TGD)       5.00 -P SIC  4941   -1   -1
  11.00 PIPE  1 NPDES# MD0051365 WASHINGTON-CTY SAN DIST-GEOFF  FLOW(TGD)     100.00 -P SIC  4952   -1   -1

  11.00  02070004004/000.00  TYPE R  LEV 2  LENGTH  11.60  NAME ANTIETAM CR
                              13 DISCHARGES
  11.00 GAGE WEG02070004004       ?                    STCO    -1 DA  -1 ?   MF(CFS)    224 LF(CFS)     54
  11.00 PIPE  1 NPDES# MD0020362 FUNKSTOWN MAYOR & COUNCIL ON   FLOW(TGD)      70.00 -P SIC  4952   -1   -1
  16.38 PIPE  2 NPDES# MD0020362 FUNKSTOWN MAYOR & COUNCIL ON   FLOW(TGD)     150.00 -P SIC  4952   -1   -1
  18.61 PIPE  1 NPDES# MD0054402 SUBDISTRICT NO 4 SHARPSBUROFF  FLOW(TGD)       5.00 -P SIC  4952   -1   -1
  18.84 PIPE  1 NPDES# MD0056596 METAL FINISHING INC.      ON   FLOW(TGD)       9.00 -P SIC  3471   -1   -1
  19.04 PIPE  1 NPDES# MD0056405 REED INDUSTRIES INC.      ON   FLOW(TGD)       2.50 -B SIC  2819   -1   -1
  19.28 PIPE  1 NPDES# MD0050181 OAK RIDGE METAL CRAFT INC OFF  FLOW(TGD)       7.50 -P SIC  3471   -1   -1
  19.28 PIPE  1 NPDES# MD0051071 MARINE & ELECTRONICS MFG,IOFF  FLOW(TGD)       2.50 -P SIC  3441   -1   -1
  19.40 PIPE  1 NPDES# MD0003433 MACK TRUCKS INC-ENG TRANS OFF  FLOW(TGD)      20.00 -P SIC  3537   -1   -1
  19.40 PIPE  1 NPDES# MD0053775 CARBORUNDUM CO.-PANGBORN DOFF  FLOW(TGD)      30.00 -B SIC  3569   -1   -1
  20.19 PIPE  1 NPDES# MD0002151 MARQUETTE CEMENT MFG CO   ON   FLOW(TGD)      50.00 -C SIC  3241   -1   -1
  20.19 PIPE  2 NPDES# MD0002151 MARQUETTE CEMENT MFG CO   ON   FLOW(TGD)      50.00 -C SIC  3241   -1   -1
  20.19 PIPE  3 NPDES# MD0002151 MARQUETTE CEMENT MFG CO   ON   FLOW(TGD)      50.00 -C SIC  3241   -1   -1
  20.19 PIPE  4 NPDES# MD0002151 MARQUETTE CEMENT MFG CO   ON   FLOW(TGD)      50.00 -C SIC  3241   -1   -1

  22.60  02070004008/000.00  TYPE S  LEV 3  LENGTH  12.70  NAME MARSH RUN
                              5 DISCHARGES
  22.60 GAGE WEG02070004008       ?                    STCO    -1 DA  -1 ?   MF(CFS)     45 LF(CFS)     11
  22.60 PIPE  1 NPDES# MD0000973 FAIRCHILD REPUBLIC DIVISIOON   FLOW(TGD)
  22.60 PIPE  2 NPDES# MD0054500 JEFFERSON CHEESE MANUFACTUOFF  FLOW(TGD)       0.50 -C SIC  2022   -1   -1
  22.60 PIPE  1 NPDES# MD0054861 ARNOLD GRAPHIC INDUSTRIES OFF  FLOW(TGD)       5.00 -B SIC  2751   -1   -1
  22.60 PIPE  1 NPDES# PA0080012 GROVE MFG CO QUINCY FAC DIOFF  FLOW(TGD)     300.00 -P SIC  3559 3471   -1
  27.37 PIPE  1 NPDES# PA0080225 WASHINGTON TOWNSHIP MUNICIOFF  FLOW(TGD)      -1.00 -P SIC  4952   -1   -1
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 22.60  02070004005/000.00  TYPE R  LEV 2  LENGTH   8.90  NAME ANTIETAM CR
                              2 DISCHARGES
 22.60 GAGE WEG02070004005       ?                    STCO    -1 DA  -1 ?   MF(CFS)     139 LF(CFS)     34
 22.60 DRINK MD0210010 HAGERSTOWN           POP   70000 N      0 TGD TYPE P2I1S1 EDGEMONT RESERVOIR   SOURCE ?
 22.60 DRINK MD0002457 ST JAMES SCHOOL      POP     350 ?     -1 TGD TYPE P1     TREATMENT PLANT     SOURCE ?
 22.60 DRINK MD0002457 ST JAMES SCHOOL      POP     350 ?     -1 TGD TYPE P1I1   UNNAMED SOURCE      SOURCE S
 22.60 PIPE  1 NPDES# MD0021776 HAGERSTOWN STP,CITY OF    ON   FLOW(TGD)    6500.00 -P SIC  4952   -1   -1
 22.60 PIPE  1 NPDES# PA0030066 GREEN RIDGE UTILITY CO-C GOFF  FLOW(TGD)       4.30 -P SIC  4952   -1   -1

 31.50  02070004007/000.00  TYPE S  LEV 3  LENGTH  14.50  NAME ANTIETAM CR, W BR
                              1 DISCHARGE

DATE 870130    TIME 113132  R=02070004002 U LEVEL=+3 MILES=50


 31.50 GAGE WEG02070004007       ?                    STCO    -1 DA  -1 ?   MF(CFS)      51 LF(CFS)     12
 31.50 DRINK ?          WASHINGTON TWP MUN A POP    2500 ?    150 TGD TYPE P1     TREATMENT PLANT     SOURCE ?
 31.50 DRINK ?          WASHINGTON TWP MUN A POP    2500 ?      0 TGD TYPE P1I1   HOOVER SPRING       SOURCE S
 31.50 DRINK PA7280040 MONT ALTO BORO WATER POP    1480 ?     -1 TGD TYPE P1     TREATMENT PLANT     SOURCE ?
 31.50 DRINK PA7280040 MONT ALTO BORO WATER POP    1480 ?     -1 TGD TYPE P1I1    BLACK ANDY RUN     SOURCE S
 31.50 DRINK ?          SOUTH MOUNTAIN RESTO POP   1400 ?     -1 TGD TYPE P1     TREATMENT PLANT     SOURCE ?
 31.50 DRINK ?          SOUTH MOUNTAIN RESTO POP   1400 ?     -1 TGD TYPE P1I1    CARBAUGH RUN DA    SOURCE S
 31.50 PIPE  1 NPDES# PA0038130 MONT ALTO SEWAGE TREATMENTON   FLOW(TGD)     130.00 -P SIC  4952   -1   -1

 31.50  02070004006/000.00  TYPE S  LEV 2  LENGTH  16.20  NAME ANTIETAM CR, E BR
                              1 DISCHARGE
 31.50 GAGE WEG02070004006       ?                    STCO    -1 DA  -1 ?   MF(CFS)      57 LF(CFS)     14
 31.50 DRINK PA7280032 WAYNESBORO BOROUGH A POP   14800 ?   2100 TGD TYPE P1     TREATMENT PLANT     SOURCE ?
 31.50 DRINK PA7280032 WAYNESBORO BOROUGH A POP   14800 Y      2 TGD TYPE P1I1   E.BR. ANTIETEM      SOURCE S
 31.50 PIPE  1 NPDES# PA0020621 WAYNESBORO BOROUGH        ON   FLOW(TGD)    1300.00 -P SIC  4952   -1   -1
```

Violations from PCS

1. Washington Township

		(STORET/PCS Code Number)
04/30/85	BOD - 5	(00310)
04/30/86	BOD - 5	(00310)
01/31/85	pH	(00400)
06/30/85	pH	(00400)
04/30/85	solids	(00530)
10/31/85	ammon.	(00610)
04/40/85	ammon.	(00610)
11/20/85	ammon.	(00610)
12/31/85	ammon.	(00610)
01/31/86	ammon.	(00610)
02/28/86	ammon.	(00610)
03/31/86	ammon.	(00610)
04/30/86	ammon.	(00610)
04/30/85	colif.	(74055)
10/31/85	colif.	(74055)

2. Waynesboro Borough STP

08/31/86	BOD - 5	(00310)
05/31/86	pH	(00400)

BOD-5

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0	10	**********
2	42	**********
4	10	**********
6	3	***
8	0	
10	1	*
12	0	
14	0	
16	0	
18	0	
20	0	
22	1	*

	BOD	
N	67	(the number of observations)
MEAN	2.53	
MEDIAN	1.70	
TMEAN	2.14	
STDEV	2.93	
SEMEAN	0.36	
MAX	22.00	
MIN	0.20	
Q3	2.90	
Q1	1.30	

ROW	Yr.	Mo.	Day	Time	dep	(x) BOD	mean	(x-mean)	S.N.R.	
1	81	1	20	1125	0	10.0	2.53	7.47	2.54949	**
2	81	3	3	1330	0	3.0	2.53	0.47	0.16041	
3	81	3	31	1240	0	4.0	2.53	1.47	0.50171	
4	81	4	27	1245	0	1.4	2.53	-1.13	-0.38567	
5	81	5	7	1200	0	1.6	2.53	-0.93	-0.31741	
6	81	6	30	1000	0	1.2	2.53	-1.33	-0.45392	
7	81	7	20	1345	0	6.2	2.53	3.67	1.25256	
8	81	8	13	1145	0	1.5	2.53	-1.03	-0.35154	
9	81	9	21	1000	0	1.8	2.53	-0.73	-0.24915	
10	81	10	26	1330	0	6.0	2.53	3.47	1.18430	
11	81	12	14	1400	0	2.8	2.53	0.27	0.09215	
12	82	1	21	1330	0	1.7	2.53	-0.83	-0.28328	
13	82	2	25	1135	0	1.3	2.53	-1.23	-0.41980	
14	82	3	15	1330	0	2.8	2.53	0.27	0.09215	
15	82	4	20	1500	0	1.4	2.53	-1.13	-0.38567	
16	82	5	12	1100	0	1.8	2.53	-0.73	-0.24915	
17	82	6	9	1030	0	1.4	2.53	-1.13	-0.38567	
18	82	7	27	1400	0	2.1	2.53	-0.43	-0.14676	
19	82	8	24	1115	0	1.4	2.53	-1.13	-0.38567	
20	82	9	16	1030	0	4.4	2.53	1.87	0.63823	
21	82	10	18	1400	0	22.0	2.53	19.47	6.64505	**
22	82	11	9	1045	0	2.9	2.53	0.37	0.12628	
23	82	12	6	945	0	2.2	2.53	-0.33	-0.11263	
24	83	1	4	1200	0	3.8	2.53	1.27	0.43345	
25	83	2	16	1225	0	3.0	2.53	0.47	0.16041	
26	83	3	23	1400	0	1.4	2.53	-1.13	-0.38567	
27	83	4	14	1400	0	0.3	2.53	-2.23	-0.76109	
28	83	5	12	1153	0	1.2	2.53	-1.33	-0.45392	
29	83	6	21	1030	0	1.7	2.53	-0.83	-0.28328	
30	83	7	13	1230	0	2.3	2.53	-0.23	-0.07850	
31	83	8	29	1120	0	6.0	2.53	3.47	1.18430	
32	83	9	13	1330	0	0.8	2.53	-1.73	-0.59044	
33	83	10	18	1130	0	1.1	2.53	-1.43	-0.48805	
34	83	11	17	1130	0	0.9	2.53	-1.63	-0.55631	
35	83	12	20	1030	0	0.3	2.53	-2.23	-0.76109	
36	84	1	31	1000	0	2.6	2.53	0.07	0.02389	
37	84	2	13	930	0	1.2	2.53	-1.33	-0.45392	
38	84	3	19	950	0	1.0	2.53	-1.53	-0.52218	
39	84	4	26	1235	0	0.2	2.53	-2.33	-0.79522	

40	84	5	21	1210	0	0.4	2.53	-2.13	-0.72696	
41	84	6	14	1030	0	1.4	2.53	-1.13	-0.38567	
42	84	7	26	1315	0	1.6	2.53	-0.93	-0.31741	
43	84	9	12	1230	0	0.7	2.53	-1.83	-0.62457	
44	84	10	31	1050	0	0.2	2.53	-2.33	-0.79522	
45	84	11	14	1000	0	0.8	2.53	-1.73	-0.59044	
46	84	12	26	1000	0	1.4	2.53	-1.13	-0.38567	
47	85	1	28	1030	0	1.4	2.53	-1.13	-0.38567	
48	85	2	27	1030	0	0.6	2.53	-1.93	-0.65870	
49	85	3	21	1015	0	2.2	2.53	-0.33	-0.11263	
50	85	4	8	1130	0	1.4	2.53	-1.13	-0.38567	vvv
51	85	5	20	1300	0	4.2	2.53	1.67	0.56997	vvv
52	85	6	19	1100	0	1.6	2.53	-0.93	-0.31741	
53	85	7	15	1100	0	1.6	2.53	-0.93	-0.31741	
54	85	8	6	1130	0	2.4	2.53	-0.13	-0.04437	
55	85	9	19	1230	0	3.2	2.53	0.67	0.22867	
56	85	10	8	1155	0	2.4	2.53	-0.13	-0.04437	
57	85	11	13	1230	0	1.2	2.53	-1.33	-0.45392	
58	85	12	17	1100	0	2.4	2.53	-0.13	-0.04437	
59	86	3	11	1100	0	1.6	2.53	-0.93	-0.31741	
60	86	4	3	1100	0	1.6	2.53	-0.93	-0.31741	vvv
61	86	5	12	1200	0	2.4	2.53	-0.13	-0.04437	vvv
62	86	6	4	1030	0	2.9	2.53	0.37	0.12628	vvv
63	86	7	15	1200	0	2.4	2.53	-0.13	-0.04437	vvv
64	86	8	21	1000	0	4.1	2.53	1.57	0.53584	vvv
65	86	9	17	1430	0	3.2	2.53	0.67	0.22867	vvv
66	86	10	16	1327	0	2.4	2.53	-0.13	-0.04437	
67	86	11	4	1130	0	4.8	2.53	2.27	0.77474	

pH

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
7.0	0	
7.2	1	*
7.4	3	***
7.6	8	********
7.8	8	********
8.0	5	*****
8.2	8	********
8.4	1	*

N	34
MEAN	7.803
MEDIAN	7.725
TMEAN	7.808
STDEV	0.320
SEMEAN	0.055
MAX	8.400
MIN	7.100
Q3	8.113
Q1	7.600

ROW	Yr.	Mo.	Da.	Time	Dep.	(x) pH	(x-mean)	S.N.R.	
1	81	1	20	1125	0	7.70	-0.103000	-0.32188	
2	81	3	3	1330	0	8.20	0.397000	1.24062	
3	81	5	7	1200	0	8.20	0.397000	1.24062	
4	81	6	30	1000	0	7.85	0.047000	0.14687	
5	81	8	13	1145	0	7.65	-0.153000	-0.47812	
6	81	11	18	1145	0	8.25	0.447000	1.39688	
7	82	2	25	1135	0	8.10	0.297000	0.92813	
8	82	8	24	1115	0	8.05	0.247000	0.77188	
9	82	11	9	1045	0	7.90	0.097000	0.30313	
10	83	2	16	1225	0	7.55	-0.253000	-0.79062	
11	83	5	12	1153	0	8.20	0.397000	1.24062	
12	83	8	29	1120	0	7.60	-0.203000	-0.63438	
13	83	11	17	1130	0	7.60	-0.203000	-0.63438	
14	84	5	21	1210	0	8.25	0.447000	1.39688	
15	84	8	30	1100	0	7.80	-0.003000	-0.00937	
16	84	10	31	1050	0	7.70	-0.103000	-0.32188	
17	85	3	21	1015	0	8.20	0.397000	1.24062	
18	85	4	8	1130	0	7.50	-0.303000	-0.94687	
19	85	5	20	1300	0	7.10	-0.703000	-2.19688	** vvv
20	85	6	19	1100	0	7.70	-0.103000	-0.32188	vvv
21	85	8	6	1130	0	7.75	-0.053000	-0.16562	
22	85	10	8	1155	0	7.50	-0.303000	-0.94687	
23	85	11	13	1230	0	7.70	-0.103000	-0.32188	
24	85	12	17	1100	0	7.40	-0.403000	-1.25937	
25	86	1	16	1430	0	7.90	0.097000	0.30313	
26	86	2	10	1200	0	7.30	-0.503000	-1.57187	
27	86	3	11	1100	0	8.00	0.197000	0.61563	
28	86	4	3	1100	0	8.15	0.347000	1.08437	vvv
29	86	5	12	1200	0	8.40	0.597000	1.86562	** vvv
30	86	7	15	1200	0	7.90	0.097000	0.30313	
31	86	8	21	1000	0	7.60	-0.203000	-0.63438	
32	86	9	17	1430	0	7.70	-0.103000	-0.32188	
33	86	10	16	1327	0	7.30	-0.503000	-1.57187	
34	86	11	4	1130	0	7.60	-0.203000	-0.63438	

Ammonia

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.0	6	******
0.5	23	**********
1.0	16	**********
1.5	6	******
2.0	11	**********
2.5	4	****
3.0	1	*
3.5	2	**
4.0	2	**

Statistical Summary

N	71
MEAN	1.213
MEDIAN	0.870
TMEAN	1.125
STDEV	0.951
SEMEAN	0.113
MAX	3.990
MIN	0.010
Q3	1.760
Q1	0.520

ROW	Yr.	Mo.	Da.	Time	Dep.	(x) Amm.	(x-mean)	S.N.R.	
1	81	1	20	1125	0	3.99	2.777	2.92008	**
2	81	3	3	1330	0	0.75	-0.463	-0.48686	
3	81	3	31	1240	0	0.82	-0.393	-0.41325	
4	81	4	27	1245	0	0.52	-0.693	-0.72871	
5	81	5	7	1200	0	1.01	-0.203	-0.21346	
6	81	6	30	1000	0	0.65	-0.563	-0.59201	
7	81	7	20	1345	0	1.01	-0.203	-0.21346	
8	81	8	13	1145	0	1.76	0.547	0.57518	
9	81	9	21	1000	0	2.09	0.877	0.92219	
10	81	10	26	1330	0	0.87	-0.343	-0.36067	
11	81	11	18	1145	0	0.07	-1.143	-1.20189	
12	81	12	14	1400	0	3.41	2.197	2.31020	**
13	82	1	21	1330	0	2.42	1.207	1.26919	
14	82	2	25	1135	0	0.46	-0.753	-0.79180	
15	82	3	15	1330	0	0.49	-0.723	-0.76025	
16	82	4	20	1500	0	0.68	-0.533	-0.56046	
17	82	5	12	1100	0	0.94	-0.273	-0.28707	
18	82	6	9	1030	0	0.65	-0.563	-0.59201	
19	82	7	27	1400	0	0.84	-0.373	-0.39222	
20	82	8	24	1115	0	2.52	1.307	1.37434	
21	82	9	16	1030	0	2.86	1.647	1.73186	
22	82	10	18	1400	0	3.52	2.307	2.42587	**
23	82	11	9	1045	0	3.99	2.777	2.92008	**
24	82	12	6	945	0	2.09	0.877	0.92219	
25	83	1	4	1200	0	2.20	0.987	1.03785	
26	83	2	16	1225	0	1.54	0.327	0.34385	
27	83	3	23	1400	0	0.20	-1.013	-1.06519	
28	83	4	14	1400	0	0.19	-1.023	-1.07571	
29	83	5	12	1153	0	0.01	-1.203	-1.26498	
30	83	6	21	1030	0	0.18	-1.033	-1.08623	
31	83	7	13	1230	0	0.28	-0.933	-0.98107	
32	83	8	29	1120	0	0.76	-0.453	-0.47634	
33	83	9	13	1330	0	0.63	-0.583	-0.61304	
34	83	10	18	1130	0	1.98	0.767	0.80652	
35	83	11	17	1130	0	0.94	-0.273	-0.28707	
36	83	12	20	1030	0	0.35	-0.863	-0.90747	

37	84	1	31	1000	0	0.56	-0.653	-0.68665	
38	84	2	13	930	0	0.45	-0.763	-0.80231	
39	84	3	19	950	0	0.38	-0.833	-0.87592	
40	84	4	26	1235	0	0.31	-0.903	-0.94953	
41	84	5	21	1210	0	0.73	-0.483	-0.50789	
42	84	6	14	1030	0	0.50	-0.713	-0.74974	
43	84	7	26	1315	0	0.80	-0.413	-0.43428	
44	84	8	30	1100	0	0.04	-1.173	-1.23344	
45	84	9	12	1230	0	0.49	-0.723	-0.76025	
46	84	10	31	1050	0	0.97	-0.243	-0.25552	
47	84	11	14	1000	0	1.98	0.767	0.80652	
48	84	12	26	1000	0	0.63	-0.583	-0.61304	
49	85	1	28	1030	0	1.26	0.047	0.04942	
50	85	2	27	1030	0	0.46	-0.753	-0.79180	
51	85	3	21	1015	0	0.85	-0.363	-0.38170	
52	85	4	8	1130	0	0.43	-0.783	-0.82334	vvv
53	85	5	20	1300	0	0.65	-0.563	-0.59201	vvv
54	85	6	19	1100	0	0.93	-0.283	-0.29758	
55	85	7	15	1100	0	1.65	0.437	0.45952	
56	85	8	6	1130	0	1.76	0.547	0.57518	
57	85	9	19	1230	0	2.09	0.877	0.92219	
58	85	10	8	1155	0	2.09	0.877	0.92219	vvv
59	85	11	13	1230	0	0.98	-0.233	-0.24501	vvv
60	85	12	17	1100	0	0.53	-0.683	-0.71819	vvv
61	86	1	16	1430	0	1.43	0.217	0.22818	vvv
62	86	2	10	1200	0	1.54	0.327	0.34385	vvv
63	86	3	11	1100	0	0.52	-0.693	-0.72871	vvv
64	86	4	3	1100	0	0.94	-0.273	-0.28707	vvv
65	86	5	12	1200	0	1.76	0.547	0.57518	vvv
66	86	6	4	1030	0	1.65	0.437	0.45952	
67	86	7	15	1200	0	1.10	-0.113	-0.11882	
68	86	8	21	1000	0	0.59	-0.623	-0.65510	
69	86	9	17	1430	0	2.53	1.317	1.38486	
70	86	10	16	1327	0	2.20	0.987	1.03785	
71	86	11	4	1130	0	2.64	1.427	1.50053	

Fecal Coliform

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0	26	**************************
2000	19	******************
4000	3	***
6000	8	********
8000	0	
10000	0	
12000	0	
14000	0	
16000	0	
18000	0	
20000	2	**

N	58
MEAN	2327
MEDIAN	1150
TMEAN	1706
STDEV	3768
SEMEAN	495
MAX	20000
MIN	25
Q3	2575
Q1	320

ROW	Yr.	Mo	Day	Time	Dep.	(x) coli.	(x-mean)	S.N.R.	
1	81	3	3	1330	0	1100	-1227	-0.32564	
2	81	3	31	1240	0	5000	2673	0.70939	
3	81	4	27	1245	0	280	-2047	-0.54326	
4	81	5	7	1200	0	500	-1827	-0.48487	
5	81	6	30	1000	0	5000	2673	0.70939	
6	81	7	20	1345	0	1500	-827	-0.21948	
7	81	8	13	1145	0	5000	2673	0.70939	
8	81	9	21	1000	0	800	-1527	-0.40525	
9	81	10	26	1330	0	6000	3673	0.97479	
10	81	11	18	1145	0	320	-2007	-0.53264	
11	81	12	14	1400	0	120	-2207	-0.58572	
12	82	1	21	1330	0	25	-2302	-0.61093	
13	82	2	25	1135	0	100	-2227	-0.59103	
14	82	3	15	1330	0	380	-1947	-0.51672	
15	82	4	20	1500	0	200	-2127	-0.56449	
16	82	5	12	1100	0	1900	-427	-0.11332	
17	82	6	9	1030	0	1000	-1327	-0.35218	
18	82	7	27	1400	0	2100	-227	-0.06024	
19	82	8	24	1115	0	1400	-927	-0.24602	
20	82	9	16	1030	0	4000	1673	0.44400	
21	82	10	18	1400	0	1400	-927	-0.24602	
22	83	1	4	1200	0	1300	-1027	-0.27256	
23	83	2	16	1225	0	180	-2147	-0.56980	
24	83	3	23	1400	0	100	-2227	-0.59103	
25	83	4	14	1400	0	1500	-827	-0.21948	
26	83	5	12	1153	0	650	-1677	-0.44506	
27	83	6	21	1030	0	20000	17673	4.69029	**
28	83	7	13	1230	0	1500	-827	-0.21948	
29	83	8	29	1120	0	20000	17673	4.69029	**
30	83	9	13	1330	0	5000	2673	0.70939	
31	83	10	18	1130	0	2400	73	0.01937	
32	83	11	17	1130	0	580	-1747	-0.46364	
33	83	12	20	1030	0	420	-1907	-0.50610	
34	84	1	31	1000	0	320	-2007	-0.53264	
35	84	2	13	930	0	120	-2207	-0.58572	
36	84	3	19	950	0	350	-1977	-0.52468	
37	84	4	26	1235	0	5000	2673	0.70939	
38	84	5	21	1210	0	950	-1377	-0.36545	

39	84	6	14	1030	0	5000	2673	0.70939	
40	84	7	26	1315	0	2300	-27	-0.00717	
41	84	8	23	930	0	1200	-1127	-0.29910	
42	84	8	30	1100	0	2800	473	0.12553	
43	84	9	12	1230	0	2500	173	0.04591	
44	84	10	31	1050	0	2100	-227	-0.06024	
45	84	11	14	1000	0	900	-1427	-0.37872	
46	84	12	26	1000	0	1000	-1327	-0.35218	
47	85	1	28	1030	0	200	-2127	-0.56449	
48	85	2	27	1030	0	220	-2107	-0.55918	
49	85	3	21	1015	0	180	-2147	-0.56980	vvv
50	85	4	8	1130	0	260	-2067	-0.54857	vvv
51	85	6	19	1100	0	5100	2773	0.73593	
52	85	7	15	1100	0	4300	1973	0.52362	
53	85	8	6	1130	0	1700	-627	-0.16640	
54	85	9	19	1230	0	3000	673	0.17861	
55	85	10	8	1155	0	2200	-127	-0.03370	vvv
56	85	11	13	1230	0	820	-1507	-0.39995	vvv
57	85	12	17	1100	0	360	-1967	-0.52203	
58	86	1	16	1430	0	320	-2007	-0.53264	

B. Conococheague Creek, Pennsylvania

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CONOCOCHEAGUE CREEK DISCHARGERS from WQAB

  0.00  02070004011/000.00  TYPE R  LEV 2  LENGTH  28.40  NAME CONOCOCHEAGUE CR
                            3 DISCHARGES
  0.00 GAGE WEG02070004011       ?                    STCO    -1 DA -1 ?   MF(CFS)    661 LF(CFS)     50
  0.00 PIPE  1 NPDES# MD0051527 VICTOR CUSHWA & SONS INC  ON   FLOW(TGD)       0.50 -B SIC  3251   -1   -1
  0.00 PIPE  1 NPDES# MD0053431 W.D.BYRON & SONS,INC.SUB GON   FLOW(TGD)     386.00 -P SIC  3111   -1   -1
  0.00 PIPE  1 NPDES# MD0054968 DAZER METAL WORKS CO, THE OFF  FLOW(TGD)       3.00 -B SIC  3442 3471   -1

 28.40  02070004015/000.00  TYPE S  LEV 3  LENGTH  40.70  NAME CONOCOCHEAGUE CR, W BR
                            5 DISCHARGES
 28.40 GAGE WEG02070004015       ?                    STCO    -1 DA  -1 ?   MF(CFS)    323 LF(CFS)     15
 28.40 DRINK ?          MERCERSBURG BORO MUN POP    2700 ?      0 TGD TYPE P1     TREATMENT PLANT       SOURCE ?
 28.40 DRINK ?          MERCERSBURG BORO MUN POP    2700 ?      0 TGD TYPE P1I1   BUCKS RUN             SOURCE S
 28.40 PIPE  1 NPDES# PA0009521 LOEWENGART AND CO         OFF  FLOW(TGD)      32.00 -P SIC  3111   -1   -1
 28.40 PIPE  2 NPDES# PA0009521 LOEWENGART AND CO         OFF  FLOW(TGD)      40.00 -P SIC  3111   -1   -1
 28.40 PIPE  3 NPDES# PA0009521 LOEWENGART AND CO         OFF  FLOW(TGD)      44.00 -P SIC  3111   -1   -1
 28.40 PIPE  1 NPDES# PA0022179 MERCERSBURG BOROUGH COUNCIOFF  FLOW(TGD)     220.00 -P SIC  4952   -1   -1
 28.40 PIPE  1 NPDES# PA0080501 SCHOOL BD OF DIR OF TUSAROOFF  FLOW(TGD)      12.00 -P SIC  4952   -1   -1

 28.40  02070004012/000.00  TYPE R  LEV 2  LENGTH  11.30  NAME CONOCOCHEAGUE CR
                            3 DISCHARGES
 28.40 GAGE WEG02070004012       ?                    STCO    -1 DA  -1 ?   MF(CFS)    162 LF(CFS)     27
 28.40 PIPE  1 NPDES# PA0010669 ACME MARKETS ABBATTOIR    OFF  FLOW(TGD)      28.00 -P SIC  2011   -1   -1
 28.40 PIPE  1 NPDES# PA0020834 GREENCASTLE BORO          OFF  FLOW(TGD)     400.00 -P SIC  4952   -1   -1
 28.40 PIPE  1 NPDES# PA0046001 GREENCASTLE PRODUCTS CO   ON   FLOW(TGD)      -1.00 -P SIC  2048   -1   -1
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39.70  02070004014/000.00  TYPE S  LEV 3  LENGTH  20.80  NAME BACK CR

                              3 DISCHARGES
39.70 GAGE WEG02070004014       ?                    STCO    -1 DA  -1 ?   MF(CFS)     38 LF(CFS)      9
39.70 DRINK PA7280043 BEAR VALLEY JOINT AU POP    3000 ?   5000 TGD TYPE P1     TREATMENT PLANT      SOURCE ?
39.70 DRINK PA7280043 BEAR VALLEY JOINT AU POP    3000 ?      5 TGD TYPE P1I1    BROAD RUN            SOURCE S
39.70 PIPE  1 NPDES# PA0029351 CARL R. FLOHR              OFF  FLOW(TGD)      29.00 -P SIC  4952   -1   -1
39.70 PIPE  1 NPDES# PA0035173 BEAR VALLEY FRANKLIN COUNTON    FLOW(TGD)       2.00 -P SIC  4941   -1   -1
39.70 PIPE  1 NPDES# PA0080161 CASHTOWN WASTE WATER TREATON    FLOW(TGD)      75.00 -P SIC  4952   -1   -1

39.70  02070004013/000.00  TYPE S  LEV 2  LENGTH  37.70  NAME CONOCOCHEAGUE CR
                             10 DISCHARGES
39.70 GAGE WEG02070004013       ?                    STCO    -1 DA  -1 ?   MF(CFS)     70 LF(CFS)     14
39.70 DRINK PA7280005 CHAMBERSBURG BORO WA POP    16700 ?   3400 TGD TYPE P1     TREATMENT PLANT      SOURCE ?
39.70 DRINK PA7280005 CHAMBERSBURG BORO WA POP    16700 Y      3 TGD TYPE P1I1    CONOCOCHEAGUE C      SOURCE S
39.70 DRINK ?         CALEDONIA WATER COMP POP      480 ?     -1 TGD TYPE P1     TREATMENT PLANT      SOURCE ?
39.70 DRINK ?         CALEDONIA WATER COMP POP      480 ?     -1 TGD TYPE P1I1    STUMP RUN           SOURCE S
39.70 DRINK ?         POND BANK IMPROV ASS POP       80 ?     40 TGD TYPE P1     TREATMENT PLANT      SOURCE ?
39.70 DRINK ?         POND BANK IMPROV ASS POP       80 ?      0 TGD TYPE P1I1    KETTLE SPRING R     SOURCE S
39.70 DRINK PA7280038 GUILFORD WATER AUTH  POP    8500 ?    710 TGD TYPE P1     TREATMENT PLANT      SOURCE ?
39.70 DRINK PA7280038 GUILFORD WATER AUTH  POP    8500 N      1 TGD TYPE P1I1    COLD SPRING RUN      SOURCE S
39.70 PIPE  1 NPDES# PA0009181 HEINZ USA-CHAMBERSBURG     OFF  FLOW(TGD)      10.00 -P SIC  2032   -1   -1
39.70 PIPE  2 NPDES# PA0009181 HEINZ USA-CHAMBERSBURG     OFF  FLOW(TGD)     470.00 -P SIC  2032   -1   -1
39.70 PIPE  3 NPDES# PA0009181 HEINZ USA-CHAMBERSBURG     OFF  FLOW(TGD)     203.00 -P SIC  2032   -1   -1
39.70 PIPE  4 NPDES# PA0009181 HEINZ USA-CHAMBERSBURG     OFF  FLOW(TGD)     137.00 -P SIC  2032   -1   -1
39.70 PIPE  5 NPDES# PA0009181 HEINZ USA-CHAMBERSBURG     OFF  FLOW(TGD)      10.00 -P SIC  2032   -1   -1
39.70 PIPE  6 NPDES# PA0009181 HEINZ USA-CHAMBERSBURG     OFF  FLOW(TGD)       5.00 -P SIC  2032   -1   -1
39.70 PIPE  1 NPDES# PA0009687 KRAFT INC.,                OFF  FLOW(TGD)     649.00 -P SIC  2023   -1   -1
39.70 PIPE  1 NPDES# PA0026051 CHAMBERSBURG BOROUGH MAYORON    FLOW(TGD)    2500.00 -P SIC  4952   -1   -1

DATE 870130    TIME 112701  R=02070004011 U LEVEL=+3 MILES=50
39.70 PIPE  1 NPDES# PA0080101 BAUMGARDNER OIL COMPANY, IOFF   FLOW(TGD)      -1.00 -P SIC  2910   -1   -1
39.70 PIPE  1 NPDES# PA0080519 ANTRIM TOWNSHIP MUNICIPAL ON    FLOW(TGD)     700.00 -P SIC  4952   -1   -1
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Violations

1. Chambersburg Borough

11/30/82	BOD - 5	(00310)
12/31/82	BOD	(00310)
02/28/83	BOD	(00310)
03/31/83	BOD	(00310)
01/31/84	BOD	(00310)
02/29/84	BOD	(00310)
03/31/84	BOD	(00310)
04/30/84	BOD	(00310)
05/31/84	BOD	(00310)
01/31/84	ammon.	(00610)
02/29/84	ammon.	(00610)
03/31/84	ammon.	(00610)
04/30/86	BOD	(00310)
02/28/85	ammon.	(00610)
02/28/86	ammon.	(00610)
03/31/86	ammon.	(00610)
04/30/86	ammon.	(00610)

2. Letterkenny Army Depot

05/31/84	chromium	(01034)
07/31/86	copper	(01042)

3. Loewengart & Co.

10/31/84	do	(00300)
06/30/85	do	(00300)
08/31/86	pH	(00400)
07/31/84	ammon.	(00610)
08/31/84	ammon.	(00610)
09/30/84	ammon.	(00610)
10/31/84	ammon.	(00610)
06/30/85	ammon.	(00610)
07/31/85	ammon.	(00610)
08/31/85	ammon.	(00610)
09/30/85	ammon.	(00610)
06/30/86	ammon.	(00610)
07/31/84	phenol	(34694)
08/31/84	phenol	(34694)
09/30/84	phenol	(34694)
10/31/84	phenol	(34694)
06/30/85	phenol	(34694)
08/31/85	phenol	(34694)
10/31/85	phenol	(34694)

08/31/85	flow	(50050)
09/30/85	flow	(50050)
10/31/85	flow	(50050)
08/31/85	flow	(50050)

DISSOLVED OXYGEN

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
7	2	**
8	3	***
9	6	******
10	7	*******
11	11	**********
12	9	*********
13	11	**********
14	4	****
15	5	*****
16	3	***

N	61
MEAN	11.68
MEDIAN	11.70
TMEAN	11.66
STDEV	2.21
SEMEAN	0.28
MAX	16.20
MIN	7.30
Q3	13.35
Q1	9.85

ROW	Yr.	Mo.	Da.	Time	Dep.	(x) D.O.	(x-mean)	S.N.R.	
20	82	11	9	1210	0	15.8	4.12	1.86425	vvv
36	84	6	14	1300	0	7.3	-4.38	-1.98190	vvv
53	86	1	16	1300	0	16.2	4.52	2.04525	
56	86	4	3	1400	0	16.2	4.52	2.04525	vvv
58	86	8	21	1200	0	7.4	-4.28	-1.93665	

AMMONIA

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.0	22	**********
0.1	43	**********
0.2	3	***
0.3	1	*
0.4	1	*
0.5	0	
0.6	0	
0.7	0	
0.8	0	
0.9	1	*

N	71
MEAN	0.084
MEDIAN	0.050
TMEAN	0.066
STDEV	0.115
SEMEAN	0.014
MAX	0.880
MIN	0.010
Q3	0.100
Q1	0.030

ROW	Yr.	Mo.	Da.	Time	Dep.	(x) Amm.	(x-mean)	S.N.R.	
11	81	11	18	1045	0	0.88	0.796	6.92174	
44	84	8	30	1020	0	0.42	0.336	2.92174	vvv

CHROMIUM

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0	2	**
10	1	*
20	1	*
30	0	
40	0	
50	0	
60	0	
70	1	*

N	5
MEAN	21.6
MEDIAN	10.0
TMEAN	21.6
STDEV	27.8
SEMEAN	12.4
MAX	70.0
MIN	4.0
Q3	45.0
Q1	4.0

ROW	Yr.	Mo.	Da.	Time	Dep.	(x) Cr	(x-mean)	S.N.R.
3	84	9	12	1100	0	70	48.4	1.74101

NO2

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
0.00	3	***
0.01	6	******
0.02	22	**********
0.03	21	**********
0.04	10	**********
0.05	3	***
0.06	4	****
0.07	1	*
0.08	0	
0.09	1	*

N	71
MEAN	0.0292
MEDIAN	0.0280
TMEAN	0.0280
STDEV	0.0165
SEMEAN	0.0020
MAX	0.0920
MIN	0.0020
Q3	0.0360
Q1	0.0180

ROW	Yr.	Mo.	Da.	Time	Dep.	(x) NO2	(x-mean)	S.N.R.	
8	81	8	13	1100	0	0.064	0.0348	2.10909	
30	83	6	21	1330	0	0.074	0.0448	2.71515	
53	85	5	20	1430	0	0.064	0.0348	2.10909	vvv
54	85	6	19	1300	0	0.092	0.0628	3.80606	vvv

NO3

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
1.0	2	**
1.5	1	*
2.0	2	**
2.5	3	***
3.0	7	*******
3.5	19	**********
4.0	6	******
4.5	15	**********
5.0	8	********
5.5	3	***
6.0	3	***
6.5	2	**

N	71
MEAN	3.93
MEDIAN	3.87
TMEAN	3.94
STDEV	1.12
SEMEAN	0.13
MAX	6.56
MIN	0.78
Q3	4.60
Q1	3.28

ROW	Yr.	Mo.	Da.	Time	Dep.	(x) NO3	(x-mean)	S.N.R.	
4	81	4	27	1130	0	1.74	-2.19	-1.95536	
18	82	6	9	1330	0	0.78	-3.15	-2.81250	
21	82	9	16	1330	0	6.56	2.63	2.34821	
31	83	7	13	1400	0	6.37	2.44	2.17857	
42	84	6	14	1300	0	1.24	-2.69	-2.40179	vvv

pH

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
7.5	7	*******
8.0	19	*******************
8.5	9	*********
9.0	1	*
9.5	0	
10.0	0	
10.5	0	
11.0	1	*

N	37
MEAN	8.118
MEDIAN	8.000
TMEAN	8.038
STDEV	0.605
SEMEAN	0.099
MAX	11.100
MIN	7.500
Q3	8.300
Q1	7.800

ROW	Yr.	Mo.	Da.	Time	Dep.	(x) pH	(x-mean)	S.N.R.
18	84	9	12	1100	0	11.10	2.982	4.92893

C. Opequon Creek, West Virginia and Virginia

OPEQUON CREEK DISCHARGERS from WQAB

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22.80  02070004031/000.00  TYPE S  LEV 2  LENGTH  48.20  NAME OPEQUON CR
                          24 DISCHARGES
22.80 GAGE WEG02070004031       ?                    STCO    -1 DA   -1 ?   MF(CFS)    276 LF(CFS)     33
22.80 DRINK WV3300218 OPEQUON PSD          POP    2422 ?     -1 TGD TYPE P1     TREATMENT PLANT      SOURCE ?
22.80 DRINK WV3300218 OPEQUON PSD          POP    2422 ?     -1 TGD TYPE P1I1    QUARRY-SPRING       SOURCE S
22.80 DRINK WV3300202 BERKELEY COUNTY PSD  POP    9000 ?     -1 TGD TYPE P1     TREATMENT PLANT      SOURCE ?
22.80 DRINK WV3300202 BERKELEY COUNTY PSD  POP    9000 N     -1 TGD TYPE P1I1    LEFEVRE SPRINGS     SOURCE S
22.80 PIPE  1 NPDES# VA0002356 HEINZ USA-WINCHESTER      OFF  FLOW(TGD)      -1.00 -P SIC  2099   -1   -1
22.80 PIPE  1 NPDES# VA0002534 O'SULLIVAN CORP WINCHESTEROFF  FLOW(TGD)    5350.00 -P SIC  3069   -1   -1
22.80 PIPE  2 NPDES# VA0002534 O'SULLIVAN CORP WINCHESTEROFF  FLOW(TGD)     500.00 -P SIC  3069   -1   -1
22.80 PIPE  3 NPDES# VA0002534 O'SULLIVAN CORP WINCHESTEROFF  FLOW(TGD)     845.00 -P SIC  3069   -1   -1
22.80 PIPE  4 NPDES# VA0002534 O'SULLIVAN CORP WINCHESTEROFF  FLOW(TGD)    2650.00 -P SIC  3069   -1   -1
22.80 PIPE  5 NPDES# VA0002534 O'SULLIVAN CORP WINCHESTEROFF  FLOW(TGD)    1340.00 -P SIC  3069   -1   -1
22.80 PIPE  1 NPDES# VA0025135 WINCHESTER CITY DEPT OF UTOFF  FLOW(TGD)    4740.00 -P SIC  4952   -1   -1
22.80 PIPE  1 NPDES# VA0027600 L & J ENTERPRISES, INC., WOFF  FLOW(TGD)       7.50 -P SIC  7542   -1   -1
22.80 PIPE  1 NPDES# VA0029033 T.I.M.E.-D.C. INC.        OFF  FLOW(TGD)       5.00 -P SIC  7539   -1   -1
22.80 PIPE  1 NPDES# VA0029866 VIRGINIA LAKESDIE SEWER & OFF  FLOW(TGD)     120.00 -P SIC  4952   -1   -1
22.80 PIPE  2 NPDES# VA0031780 ABRAMS CRK WSWTR T.P.FREDEOFF  FLOW(TGD)     500.00 -P SIC  4952   -1   -1
22.80 PIPE  1 NPDES# WV0005479 NATL FRUIT PROD CO INC    OFF  FLOW(TGD)     250.00 -C SIC  2033   -1   -1
22.80 PIPE  2 NPDES# WV0005509 E I DUPONT EXPLOSIVES MARTON   FLOW(TGD)     136.00 -P SIC  2892   -1   -1
22.80 PIPE  4 NPDES# WV0005509 E I DUPONT EXPLOSIVES MARTON   FLOW(TGD)     136.00 -P SIC  2892   -1   -1
22.80 PIPE  1 NPDES# WV0005533 3M COMPANY-MIDDLEWAY PLANTOFF  FLOW(TGD)     750.00 -P SIC  2752 3479   -1
22.80 PIPE  2 NPDES# WV0005533 3M COMPANY-MIDDLEWAY PLANTOFF  FLOW(TGD)     125.00 -P SIC  2752 3479   -1
22.80 PIPE  3 NPDES# WV0005533 3M COMPANY-MIDDLEWAY PLANTOFF  FLOW(TGD)      50.00 -P SIC  2752 3479   -1
22.80 PIPE  1 NPDES# WV0005550 MARTIN MARIETTA CO        OFF  FLOW(TGD)    1500.00 -P SIC  3241   -1   -1
22.80 PIPE  1 NPDES# WV0020061 U.S. VETERANS ADMINISTRATION   FLOW(TGD)     210.00 -P SIC  4952   -1   -1
22.80 PIPE  1 NPDES# WV0023167 MARTINSBURG CITY MUN SEWAGOFF  FLOW(TGD)    2900.00 -P SIC  4952   -1   -1
22.80 PIPE  1 NPDES# WV0034916 PAUL G.GREGORY SR         OFF  FLOW(TGD)       1.00 -P SIC  4952   -1   -1
22.80 PIPE  1 NPDES# WV0045357 CAMELOT SUBDIVISION       OFF  FLOW(TGD)      12.00 -P SIC  4952   -1   -1
22.80 PIPE  1 NPDES# YCRCLA182 LEETOWN PESTICIDE PILE    OFF  FLOW(TGD)      -1.00 -? SIC  8999   -1   -1
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Violations

1. Martinsburg STP, WVA

12/31/84	BOD	(00310)
02/28/85	BOD	(00310)
04/30/85	BOD	(00310)
02/28/85	solids	(00530)
04/30/85	solids	(00530)
05/31/85	KJEL N	(00625)
12/31/84	flow	(50050)
02/28/85	flow	(50050)
04/30/85	flow	(50050)
05/31/85	flow	(50050)
06/30/85	flow	(50050)
02/28/85	fec. coli.	(74055)

2. 3M Middleway Printing, WVA

01/31/85	BOD	(00310)
02/28/85	BOD	(00310)
03/31/85	BOD	(00310)
04/30/85	BOD	(00310)
01/31/85	COD	(00340)
02/28/85	COD	(00340)
03/31/85	COD	(00340)
04/30/85	COD	(00340)
06/30/85	COD	(00340)
02/28/85	pH	(00400)
06/30/85	TSS	(00530)
12/31/84	N, Amm.	(00610)
01/31/85	Nitrate	(00620)
02/28/85	Nitrate	(00620)
03/31/85	Nitrate	(00620)
04/30/85	Nitrate	(00620)
06/30/85	Nitrate	(00620)
01/31/85	Cyanide	(00720)
03/31/85	Cyanide	(00720)
06/30/85	Cyanide	(00720)
01/31/85	Chloride	(00940)
03/31/85	Chloride	(00940)
04/30/85	Chloride	(00940)
06/30/85	Chloride	(00940)
12/31/84	Fluoride	(00951)
01/31/85	Fluoride	(00951)
02/28/85	Fluoride	(00951)
03/31/85	Fluoride	(00951)
06/30/85	Fluoride	(00951)
01/31/85	Aluminum	(01105)
02/28/85	Aluminum	(01105)
06/30/85	Aluminum	(01105)
03/31/85	fec. coli.	(74055)
05/31/85	TSS	(00530)

01/31/85	Chloride	(00940)
02/28/85	Chloride	(00940)
03/31/85	Chloride	(00940)
04/30/85	Chloride	(00940)
05/31/85	Chloride	(00940)
06/30/85	Chloride	(00940)
05/31/85	Aluminum	(01105)

The West Virginia data available on STORET for Opequon Creek are not current. The latest values for this non-CORE station are only through 1983. For CORE stations, West Virginia has entered much more recent data.

D. South River, Virginia

SOUTH RIVER DISCHARGERS from WQAB

21.80 02070005027/000.00 TYPE R LEV 4 LENGTH 24.80 NAME SOUTH R

12 DISCHARGES

21.80	GAGE	WEG02070005027		?		STCO	-1	DA	-1	?	MF(CFS)	231	LF(CFS)	42
21.80	PIPE	1	NPDES#	VA0001767	REYNOLDS METALS CO	GROTTOON	FLOW(TGD)				2870.00	-P SIC	3079	-1 -1
21.80	PIPE	1	NPDES#	VA0001856	THIOKOL FIBERS DIV	ON	FLOW(TGD)				883.00	-P SIC	2297	-1 -1
21.80	PIPE	1	NPDES#	VA0001899	CROMPTON-SHENANDOAH-WAYNESON		FLOW(TGD)				1270.00	-P SIC	2261	-1 -1
21.80	PIPE	1	NPDES#	VA0002160	DUPONT WAYNESBORO	ON	FLOW(TGD)				5300.00	-P SIC	2821	2823 2824
21.80	PIPE	2	NPDES#	VA0002160	DUPONT WAYNESBORO	ON	FLOW(TGD)				50.00	-C SIC	2821	2823 -1
21.80	PIPE	3	NPDES#	VA0002160	DUPONT WAYNESBORO	ON	FLOW(TGD)				3300.00	-C SIC	2823	-1 -1
21.80	PIPE	4	NPDES#	VA0002160	DUPONT WAYNESBORO	ON	FLOW(TGD)				6000.00	-C SIC	2821	2823 2824
21.80	PIPE	1	NPDES#	VA0002402	GENERAL ELECTRIC WAYNESBORON		FLOW(TGD)				300.00	-C SIC	3662	-1 -1
21.80	PIPE	1	NPDES#	VA0025151	WAYNESBORO DEPT OF UTILITION		FLOW(TGD)				2740.00	-P SIC	4952	-1 -1
21.80	PIPE	1	NPDES#	VA0027901	HARRISTON SERVICE CORPORATON		FLOW(TGD)				41.00	-P SIC	4952	-1 -1
21.80	PIPE	1	NPDES#	VA0054771	GREENVILLE CAR WASH	OFF	FLOW(TGD)				-1.00	-P SIC	7542	-1 -1
21.80	PIPE	1	NPDES#	VA0065374	GROTTOES TOWN OF	ON	FLOW(TGD)				200.00	-P SIC	4952	-1 -1