COPY

WATER-QUALITY ASSESSMENT, PLUM CREEK WASTEWATER FACILITY, NEAR SEDALIA, COLORADO

Prepared for
Plum Creek Wastewater Authority
5880 Country Club Drive
Castle Rock, CO 80104

Prepared by
TDS Consulting Inc.
595 West Meadow Road
Evergreen, CO 80439-9745

TDS Project No. 0008

June 19, 2000

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Mr. Tim Grotheer
Plum Creek Wastewater Authority
5880 Country Club Drive
Castle Rock, CO 80104

Subject: Transmittal of Report, Water-Quality Assessment, Plum Creek Wastewater Facilities, near Sedalia, Colorado
TDS Project No. 0008

Dear Mr. Grotheer:

As requested, the subject water-quality assessment report is hereby transmitted. I have appreciated working again with the PCWA and hope you find the results of this assessment helpful in your future water-quality deliberations in the Plum Creek watershed. Do not hesitate to give me a call if you have questions or need additional information regarding this assessment or its associated recommendations.

Sincerely,

Timothy D. Steele, Ph.D.
President, TDS Consulting Inc.

Enclosure: WQ Assessment Report

WATER-QUALITY ASSESSMENT, PLUM CREEK WASTEWATER FACILITY, NEAR SEDALIA, COLORADO

General Overview

On June 2, 2000, TDS Consulting Inc. (TDS) was contacted by Mr. Tim Grotheer, a technical representative of the Plum Creek Wastewater Authority (PCWA), and asked to compile and evaluate various data on streamflows, plant-effluent discharges, and associated water/wastewater-quality conditions. The results of this water-quality assessment are provided herein.

Data Sources and Content

The various data sources for this water-quality assessment were provided by the PCWA, Commodore ASI, and the U.S. Geological Survey's Water-Resources Division (USGS-WRD). Specific details of the available data are as follows:

Site	Name	Description/Source	Period of Record
4B	East Plum Creek above PCWA	Water Quality C-ASI	1991-94
		Water Quality PCWA	1/95-5/00
		Streamflows USGS-WRD	5/99-6/00
001A	PCWA Effluent Discharge	Water Quality PCWA	1/95-5/00
		Flows PCWA	1/96-6/00
4A	East Plum Creek below PCWA	Water Quality C-ASI	1991-94
		Water Quality PCWA	1/95-5/00
4	East Plum Creek at Sedalia	Water Quality C-ASI	1987, 90-92
		Water Quality PCWA	2,12/99-5/00
2B	Plum Creek near (below) Sedalia	Water Quality C-ASI	4-5/91 (3)
		Streamflows USGS-WRD	8/90-6/00

The focus of the water-quality assessment used data for all but the last monitoring site; this latter site was used only for general reference purposes. The monitoring sites are indicated on Figure 1.

Results and Discussion

Descriptions of the data analyses are given on a site-by-site basis. Afterwards, a general comparative description of this part of the Plum Creek watershed is provided.

East Plum Creek above PCWA Discharge (Site 4B)

Approximately 370 samples were collected at this monitoring site over the past 10 years. For nutrient-species concentrations, basic statistics (average, maximum, and minimum concentrations) as well as the number of analyses for several variables are given in Table 1. In general, the average ammonia-nitrogen (NH3-N) and nitrate-nitrogen (NO3-N) concentrations during the 1991-94 period were slightly higher than for the 1995-2000 period; however, these differences are judged not to be significant. Over the same period, no time trend was noted for total-phosphorus (T-P) concentrations. Period-of-record time-series plots for data at this monitoring site are given as follows:

Figure 2A – NH3-N concentrations,
Figure 2B – NO3-N concentrations, and
Figure 2C – T-P concentrations.

Although intermittent relatively high concentrations were noted in each case, no discernible time-trends were noted.

Streamflows have been reported by the U.S. Geological Survey, Water Resources Division, at this site since April 21, 1999 (Appendix A). Solute loads could be computed by interpolating between sample-survey analyses and combining these daily concentrations with daily streamflows (see Steele, 1973; 2000). Using NH3-N as an indicator variable, daily loads for the period from April 21, 1999 through May 31, 2000 are indicted in Appendix A. For this 13-month period, streamflows averaged 28.8 cubic feet per second (cfs); whereas, NH3-N loadings averaged 14.4 pounds per day (lbs/d).

It is noteworthy to compare streamflows and loadings of May 1999 with May 2000, the single month to date for which time-overlapping data are available. Flows and NH3-N loadings in May 1999 were relatively high (109 cfs and 88 lbs/d, respectively); whereas, those averages for May 2000 were much lower (19.6 cfs and 2.9 lbs/d, respectively). These differences point out the need for assessing flows and loadings over longer periods of time and to evaluate seasonally varying conditions in any water-quality assessment. Unfortunately, this assessment is constrained by the limited streamflow records at this site. However, it may possible to extend the streamflow record, using interstation correlations with a longer-term streamflow record on Plum Creek (see Recommendations below).

PCWA Effluent Discharge (Site 001A)

Data available this water-quality assessment at monitoring site 001A consisted of nutrient-species analyses (namely, NH3-N, NO3-N, and T-P) since January 1995 and effluent flows since January 1996. Ammonia was analyzed most frequently in this data set (486 values); whereas, NO3-N and T-P were analyzed less frequently (276 and 269 values, respectively). Over the same period, total suspended solids (TSS) and biochemical oxygen demand were analyzed (378 and 377 values, respectively). A record of relatively frequently measured pH values since July 1998 was included in the data set. Basic statistics for this data set are included in Table 1.

Period-of-record time-series plots were made for these six variables for characterizing PCWA effluent conditions. For NH3-N and NO3-N, intermittently higher concentrations have occurred historically (Figures 3A and 3B, respectively); however, recent (year 2000) concentrations for these two variables have been relatively lower compared to the historical period-of-record data. For T-P, no discernible time trend in the effluent concentrations was noted (Figure 3C). Relatively higher BOD concentrations occurred during 1999; however, concentrations were relatively low during the year 2000 as well as intermittently historically (May-November 1996 and June-September 1998) (Figure 3D). TSS concentrations have historically indicated intermittently high values (Figure 3E); however, concentrations have remained generally between 1 and 15 since 1998. The pH values indicate considerable variability over time (Figure 3F for the period from July 1998 through May 1999; variability was comparable for the June 1999-May 2000 period). However, the pH values have ranged for the most part between 6.8 and 7.3.

PCWA effluent flows have increased during the period of available record (since January 1996). Average flows increased from 1.2 cfs during the 1996 water year (9 months) to 2.6 cfs during the 2000 water year (8 months). With this flow record and using the same data-interpolation techniques used previously for Site 4B, daily NH3-N concentrations were used in conjunction with daily flows to compute loadings (Appendix B). Average NH3-N loadings over the period indicate no trend over time, as follows:

Water Year	Flow (cfs)	NH3-N Loading (lbs/d)
1996 (9 months)	1.24	13.0
1997	1.83	7.08
1998	2.20	5.01
1999	2.40	25.9
2000 (8 months)	2.61	9.64

The daily variability in flows and NH3-N loadings are indicated in Figures 4A through 4E. High NH3-N loadings during 1999 were associated with high WWTP flows and relatively high NH3-N concentrations (see Figures 4D-1 and 4D-2). For the 5-year period of record, average NH3-N loadings from the PCWA-WWTP facility have averaged 13.0 lbs/d. This average NH3-N loading is slightly lower than that computed for East Plum Creek (Site 4B, 14.4 lbs/d) just upstream from the PCWA discharge.

East Plum Creek below PCWA Discharge (Site 4A)

Approximately 370 samples were collected at this monitoring site over the past 10 years, which is consistent with the period of record for upstream Site 4B. For nutrient-species concentrations, basic statistics (average, maximum, and minimum concentrations) as well as the number of analyses for several variables are given in Table 1. In general, the average NH3-N), NO3-N, and T-P concentrations during the 1991-94 period were considerably higher than for the 1995-2000 period. Period-of-record time-series plots for data at this monitoring site are given as follows:

Figure 5A – NH3-N concentrations,
Figure 5B – NO3-N concentrations, and
Figure 5C – T-P concentrations.

4. Supplemental monitoring might be made at Site 2B (below the confluence of East Plum Creek and West Plum Creek), in order to characterize water-quality conditions and to use the available streamflow records at this location.

References

Advanced Sciences, Inc. (ASI), 1991a, Water-Quality Monitoring Program, Chatfield Basin and Reservoir, Denver Metropolitan Area, Historical Basic-Data Report, June 1982 – December 1989: Prepared for the Chatfield Basin Authority, April 25 (revised), 18 tables.

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Advanced Sciences, Inc. (ASI), 1993, Water-Quality Monitoring Program, Chatfield Basin and Reservoir, Denver Metropolitan Area, Basic-Data Report, January 1992 – December 1992: Prepared for the Chatfield Basin Authority, January 27 (Final), 7 figures, 21 tables, and Appendices A through C.

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Denver Regional Council of Governments (DRCOG), 1997, Chatfield Watershed and Reservoir – 1986-1995 Historical Data Analysis and Monitoring Program Review: Prepared for the Chatfield Watershed Authority with Assistance of Balloffet and Associates, Inc. (T.D. Steele), Keith W. Little Associates (K.W. Little) and DRCOG (R.N. Clayshulte), July, 75 p., 16 figures, and 18 tables).

Steele T.D., 1973, Simulation of Major Inorganic Chemical Concentrations and Loads in Streamflow: U.S. Geological Survey Computer Contribution, Washington, D.C., August, 153 p.; Available from U.S. Department of Commerce, National Technical Information Service, Springfield, VA 22161 as Report PB-222 556.

Steele, T.D., 2000, Estimation of Solute Loadings – A Hydrologist's Dream or Nightmare?: Presented at American Water Resources Association (AWRA) Colorado Section, 2000 Annual Symposium, Mount Vernon Country Club near Golden, CO, March 17, 16 p.

Table 1 -- Basic Statistics by Monitoring Site

Site 4B Statistical Summaries:						
1991-94	*NH3-N*	*NO3-N*	*NO2-N*	*T-P*	*Ortho-P*	*TKN*
Average	0.09	1.01	0.04	0.10	0.10	0.40
Maximum	0.43	13.30	0.60	0.64	0.43	0.70
Minimum	0.01	0.01	0.00	0.02	0.04	0.20
# Analyses	*90*	*90*	*90*	*89*	*47*	*3*
1/95-9/98	*NH3-N*	*NO3-N*	*NO2-N*	*T-P*	*Ortho-P*	*TKN*
Average	0.07	0.79	0.03	0.08		
Maximum	0.71	4.40	0.33	0.45		
Minimum	0.02	0.16	0.00	0.00		
# Analyses	*191*	*186*	*187*	*184*		
9/98-5/00	*NH3-N*	*NO3-N*	*NO2-N*	*T-P*	*Ortho-P*	*TKN*
Average	0.07	0.75	0.07	0.10		
Maximum	0.53	1.62	0.54	0.24		
Minimum	0.01	0.06	0.00	0.04		
# Analyses	*88*	*88*	*88*	*78*		
1991-2000	**NH3-N**	**NO3-N**	**NO2-N**	**T-P**	**Ortho-P**	**TKN**
Average	**0.07**	**0.83**	**0.04**	**0.09**	**0.10**	**0.40**
Maximum	0.71	13.30	0.60	0.64	0.43	0.70
Minimum	0.01	0.01	0.00	0.00	0.04	0.20
# Analyses	*369*	*364*	*365*	*351*	*47*	*3*

Site 001A Statistics:				
1/95-5/00	**NH3-N**	**NO3-N**	**NO2-N**	**T-P**
Average	**1.37**	**10.7**	**1.09**	**0.23**
Maximum	10.70	27.4	9.108	0.573
Miniumum	0.035	3.25	0.023	0.097
# Analyses	*486*	*276*	*277*	*269*

1/1/95-6/11/00	**Q, MGD**	**Q, cfs**	**1/95-4/00**	**BOD5**	**TSS**
Average	1.342	2.08	Average	6.7	6.8
Maximum	3.327	5.15	Maximum	26.8	24
Minimum	0.000	0.00	Miniumum	1	1
#values	*1624*	*1624*	# Analyses	*377*	*378*

Site 4A, Statistical Summaries:

1991-94	*NH3-N*	*NO3-N*	*NO2-N*	*T-P*	*Ortho-P*	*TKN*
Average	0.69	6.19	0.42	0.228	0.097	0.47
Maximum	5.2	26.9	2.88	2.88	0.411	0.8
Minimum	0.01	0.41	0	0.033	0.036	0.2
# Analyses	*92*	*93*	*92*	*92*	*48*	*3*

01/95-9/98	*NH3-N*	*NO3-N*	*NO2-N*	*T-P*	*Ortho-P*	*TKN*
Average	0.58	4.49	0.37	0.132		
Maximum	6.65	18.2	7	0.433		
Minimum	0.03	0.41	0.006	0.052		
# Analyses	*190*	*185*	*187*	*184*		

9/98-5/00	*NH3-N*	*NO3-N*	*NO2-N*	*T-P*	*Ortho-P*	*TKN*
Average	0.26	2.90	0.41	0.126		
Maximum	1.40	5.87	1.55	0.303		
Minimum	0.015	0.175	0.010	0.012		
# Analyses	*88*	*88*	*88*	*78*		

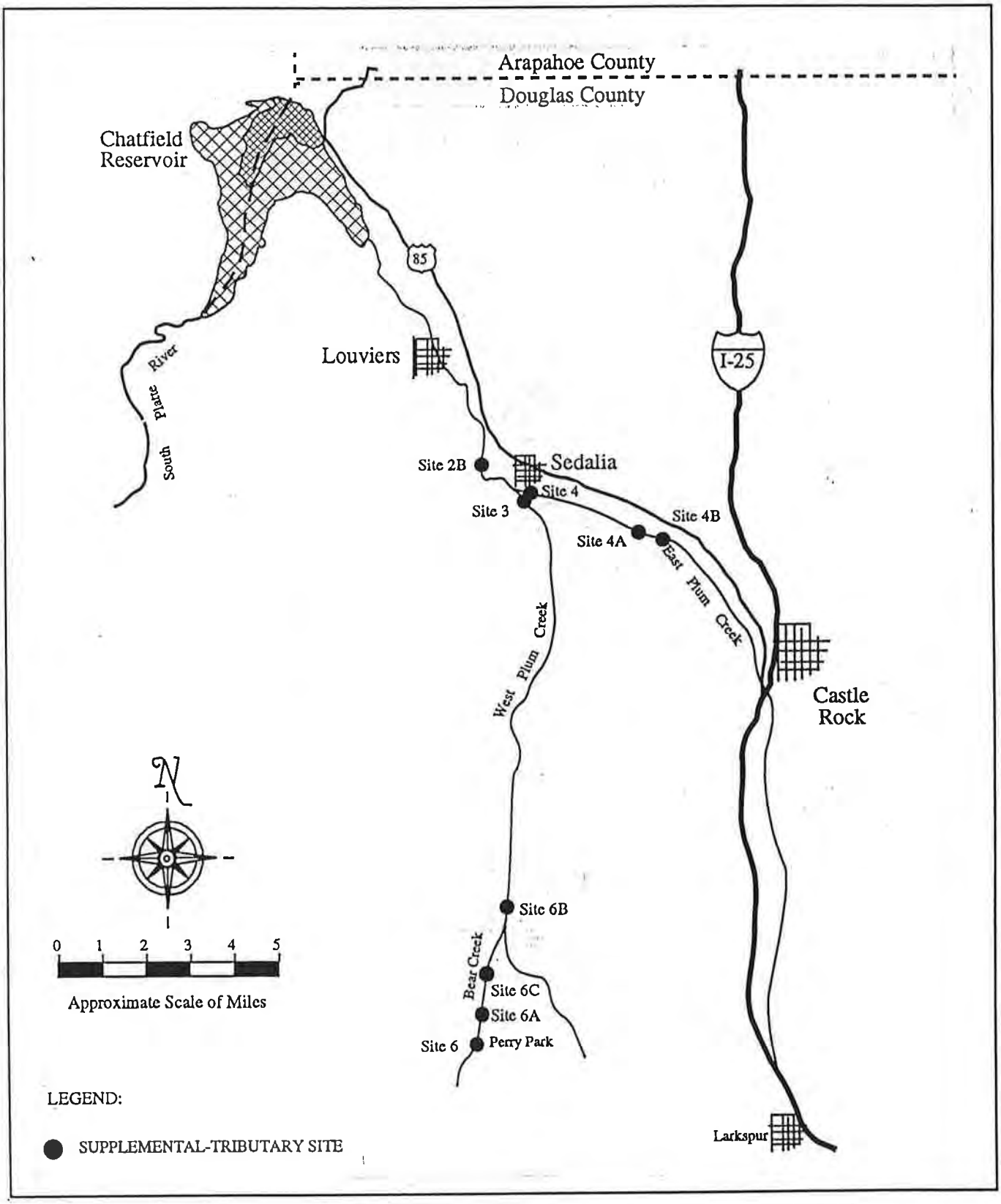
1991-2000	**NH3-N**	**NO3-N**	**NO2-N**	**T-P**	**Ortho-P**	**TKN**
Average	**0.53**	**4.54**	**0.39**	**0.156**	**0.097**	**0.47**
Maximum	6.65	26.9	7	2.88	0.411	0.8
Minimum	0.01	0.175	0	0.012	0.036	0.2
# Analyses	*370*	*366*	*367*	*354*	*48*	*3*

Site 4, Statistical Summaries:

1987-92	*NH3-N*	*NO3-N*	*T-P*	*Ortho-P*
Average	0.055	3.02	0.16	0.12
Maximum	0.28	7.25	0.39	0.30
Minimum	0.01	0.19	0.02	0.02
# Analyses	*35*	*36*	*35*	*35*

2,12/99-5/00	*NH3-N*	*NO3-N*
Average	0.100	2.66
Maximum	0.339	4.41
Miniumum	0.0212	0.771
# Analyses	*24*	*24*

1987-2000	**NH3-N**	**NO3-N**	**T-P**	**Ortho-P**
Average	**0.073**	**2.872717**	**0.16**	**0.12**
Maximum	0.339	7.25	0.39	0.30
Minimum	0.01	0.19	0.02	0.02
# Analyses	*59*	*60*	*35*	*35*



CHATFIELD BASIN AND RESERVOIR
WATER-QUALITY MONITORING PROGRAM

SUPPLEMENTAL-TRIBUTARY
MONITORING LOCATIONS

PROJECT NO. 8969.20
FIGURE 1

ADVANCED SCIENCES, INC.

STATUS: AUGUST 19, 1992

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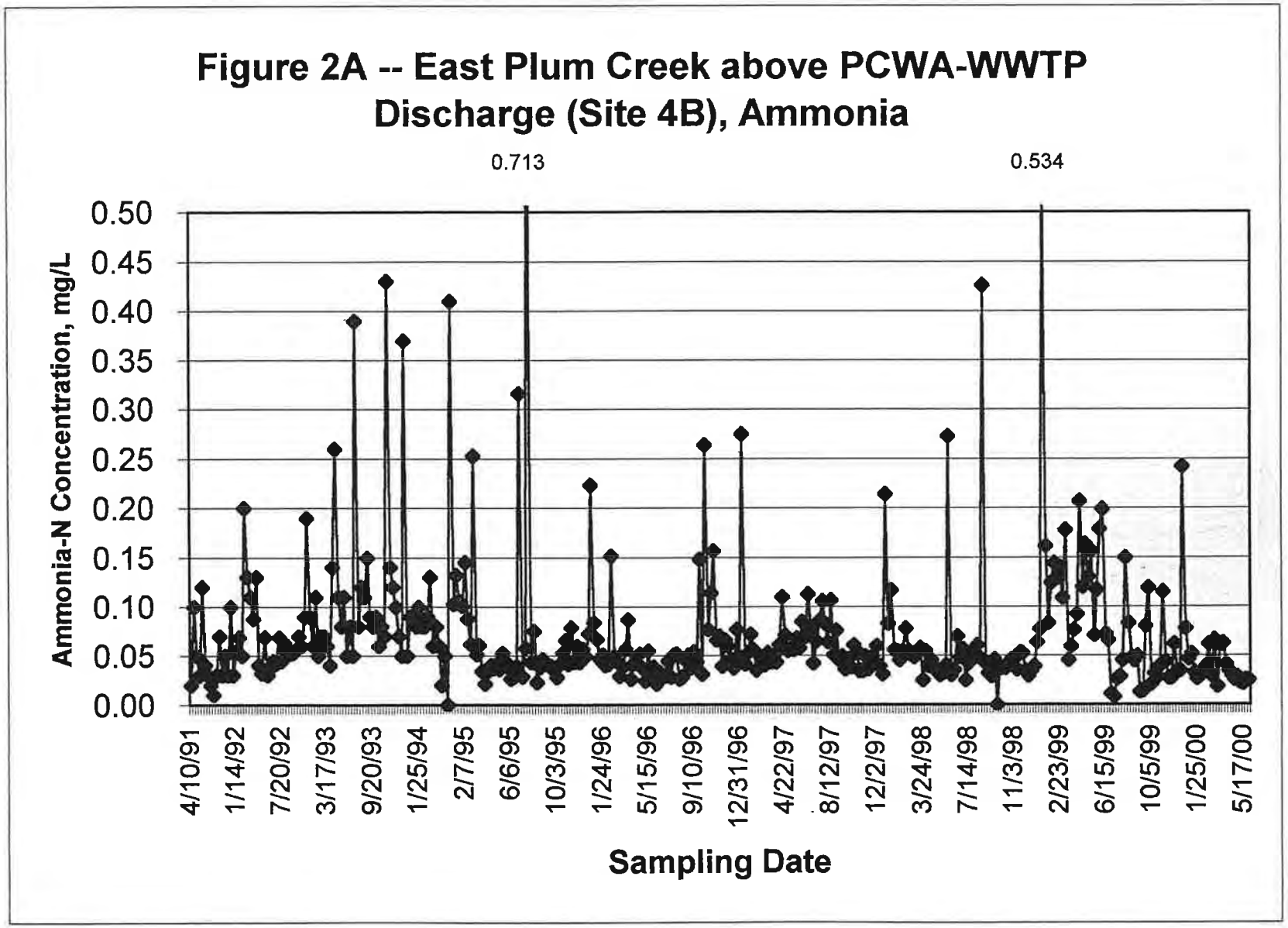


Figure 2A -- East Plum Creek above PCWA-WWTP Discharge (Site 4B), Ammonia
0.713
0.534
Ammonia-N Concentration, mg/L
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
4/10/91
1/14/92
7/20/92
3/17/93
9/20/93
1/25/94
2/7/95
6/6/95
10/3/95
1/24/96
5/15/96
9/10/96
12/31/96
4/22/97
8/12/97
12/2/97
3/24/98
7/14/98
11/3/98
2/23/99
6/15/99
10/5/99
1/25/00
5/17/00
Sampling Date

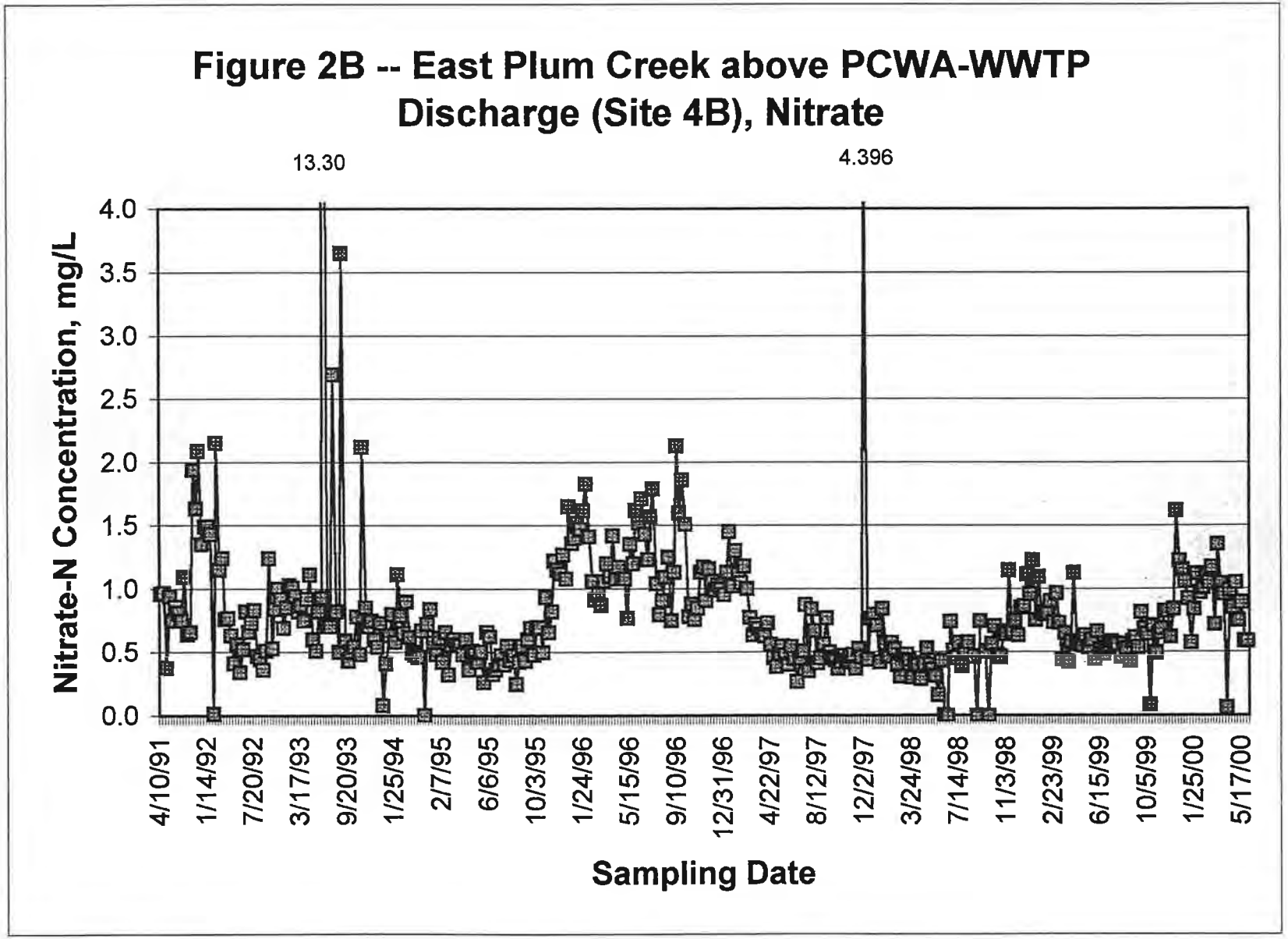


Figure 2B -- East Plum Creek above PCWA-WWTP Discharge (Site 4B), Nitrate
13.30
4.396
Nitrate-N Concentration, mg/L
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
4/10/91
1/14/92
7/20/92
3/17/93
9/20/93
1/25/94
2/7/95
6/6/95
10/3/95
1/24/96
5/15/96
9/10/96
12/31/96
4/22/97
8/12/97
12/2/97
3/24/98
7/14/98
11/3/98
2/23/99
6/15/99
10/5/99
1/25/00
5/17/00
Sampling Date

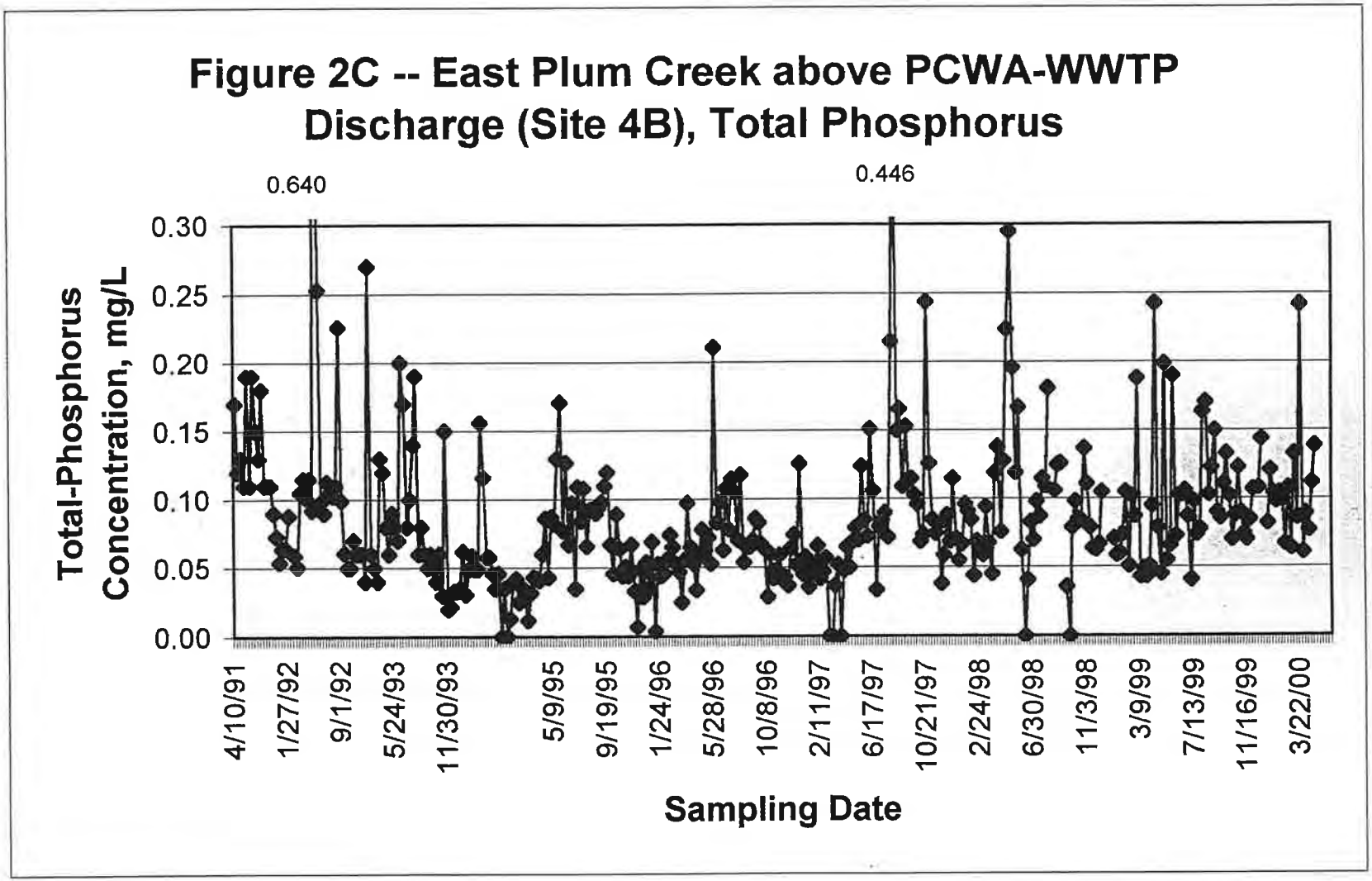


Figure 2C -- East Plum Creek above PCWA-WWTP Discharge (Site 4B), Total Phosphorus
0.640
0.446
Total-Phosphorus Concentration, mg/L
0.30
0.25
0.20
0.15
0.10
0.05
0.00
4/10/91
1/27/92
9/1/92
5/24/93
11/30/93
5/9/95
9/19/95
1/24/96
5/28/96
10/8/96
2/11/97
6/17/97
10/21/97
2/24/98
6/30/98
11/3/98
3/9/99
7/13/99
11/16/99
3/22/00
Sampling Date

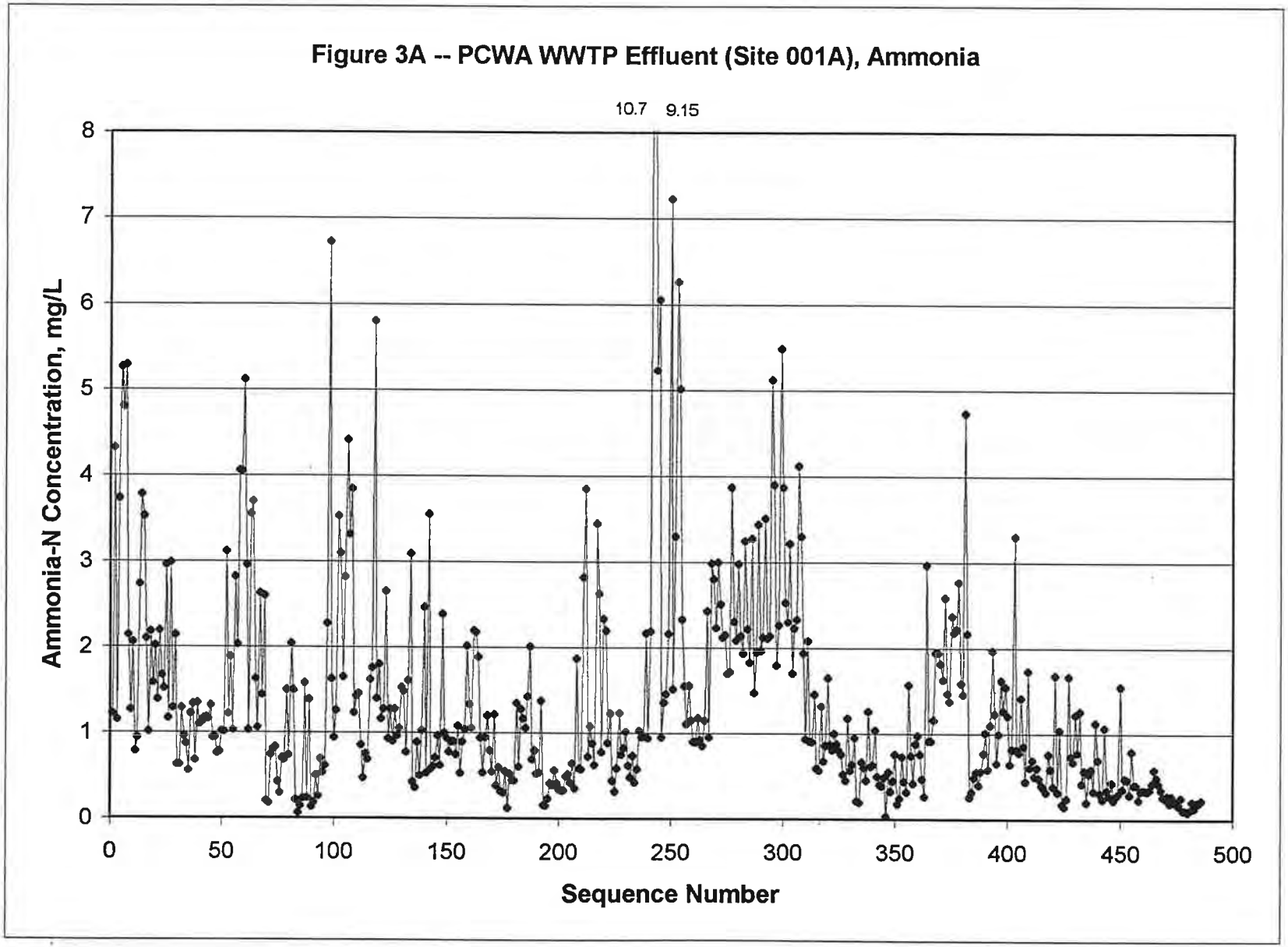


Figure 3A -- PCWA WWTP Effluent (Site 001A), Ammonia
10.7
9.15
Ammonia-N Concentration, mg/L
0
1
2
3
4
5
6
7
8
0
50
100
150
200
250
300
350
400
450
500
Sequence Number

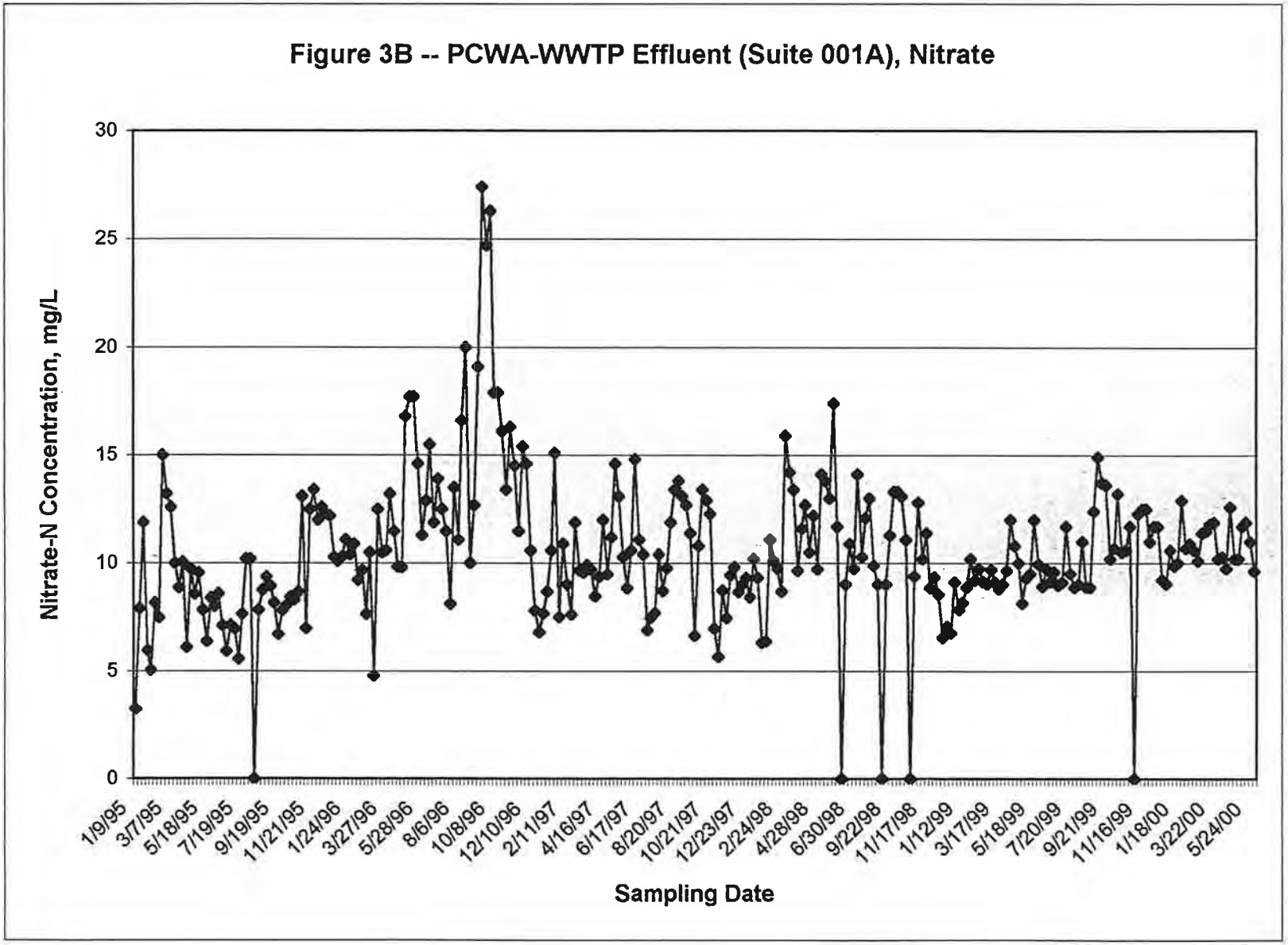
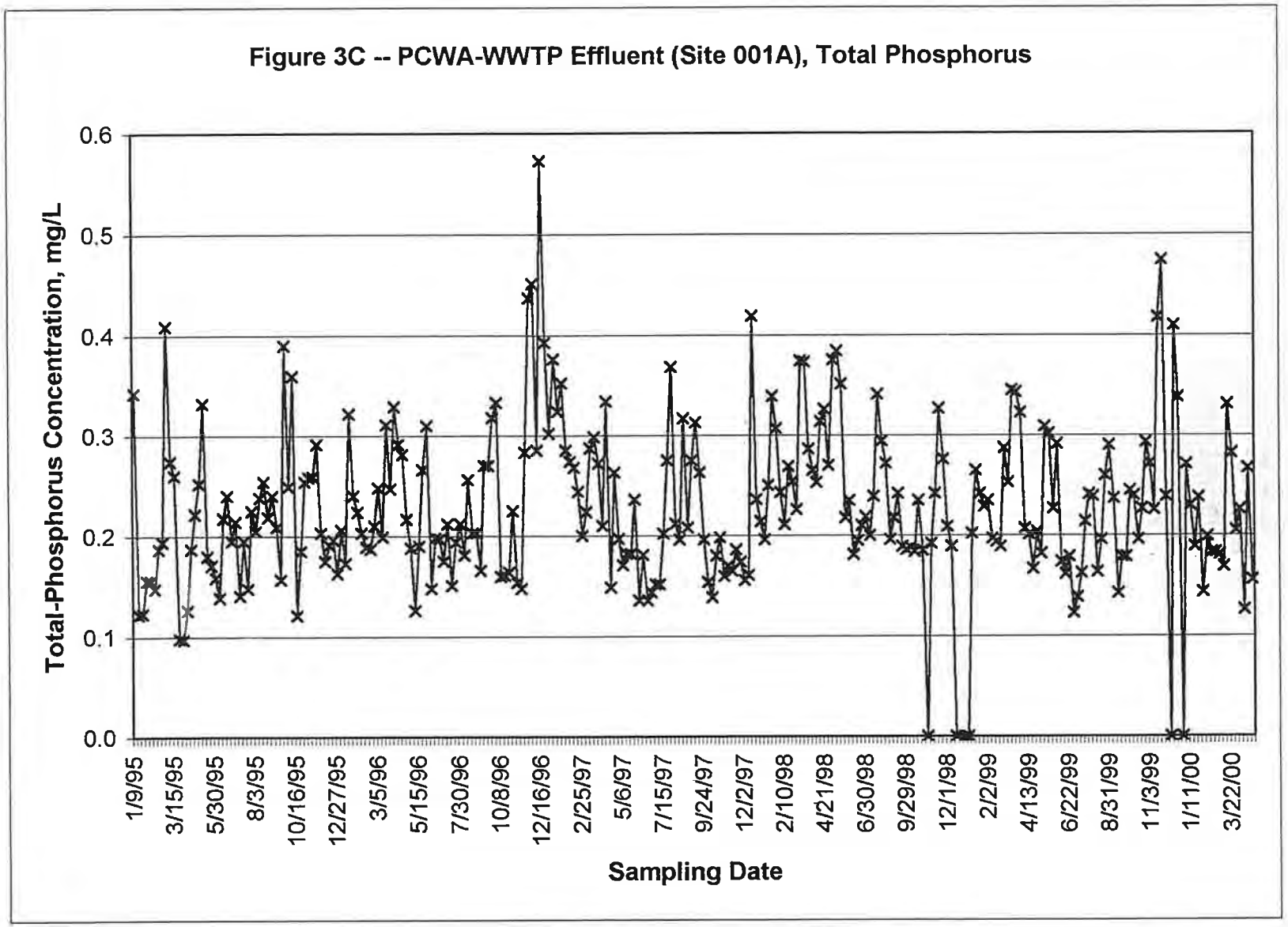


Figure 3B -- PCWA-WWTP Effluent (Suite 001A), Nitrate
Nitrate-N Concentration, mg/L
30
25
20
15
10
5
0
1/9/95
3/7/95
5/18/95
7/19/95
9/19/95
11/21/95
1/24/96
3/27/96
5/28/96
8/6/96
10/8/96
12/10/96
2/11/97
4/16/97
6/17/97
8/20/97
10/21/97
12/23/97
2/24/98
4/28/98
6/30/98
9/22/98
11/17/98
1/12/99
3/17/99
5/18/99
7/20/99
9/21/99
11/16/99
1/18/00
3/22/00
5/24/00
Sampling Date

Figure 3C -- PCWA-WWTP Effluent (Site 001A), Total Phosphorus



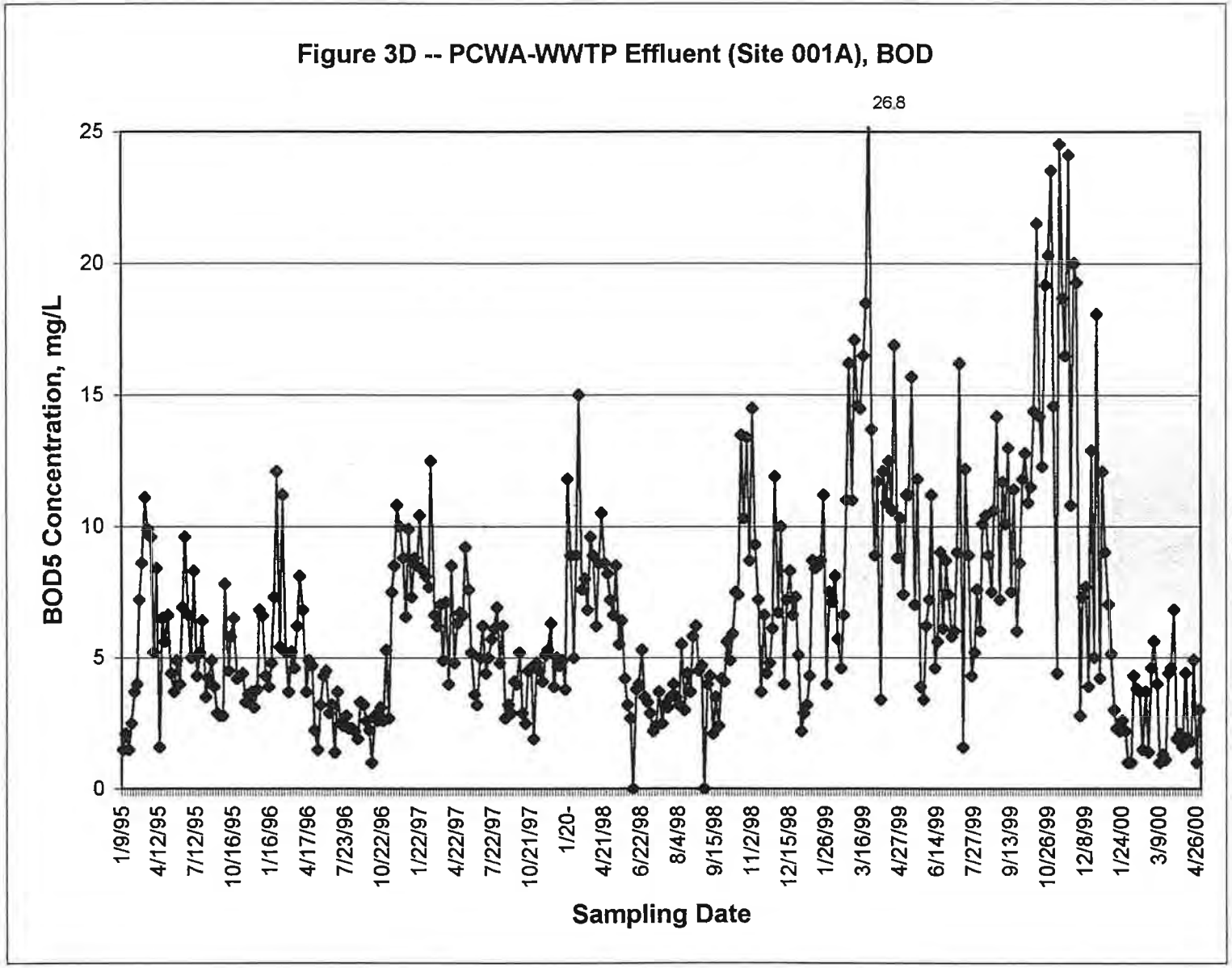


Figure 3D -- PCWA-WWTP Effluent (Site 001A), BOD
26.8
25
20
15
10
5
0
BOD5 Concentration, mg/L
1/9/95
4/12/95
7/12/95
10/16/95
1/16/96
4/17/96
7/23/96
10/22/96
1/22/97
4/22/97
7/22/97
10/21/97
1/20-
4/21/98
6/22/98
8/4/98
9/15/98
11/2/98
12/15/98
1/26/99
3/16/99
4/27/99
6/14/99
7/27/99
9/13/99
10/26/99
12/8/99
1/24/00
3/9/00
4/26/00
Sampling Date

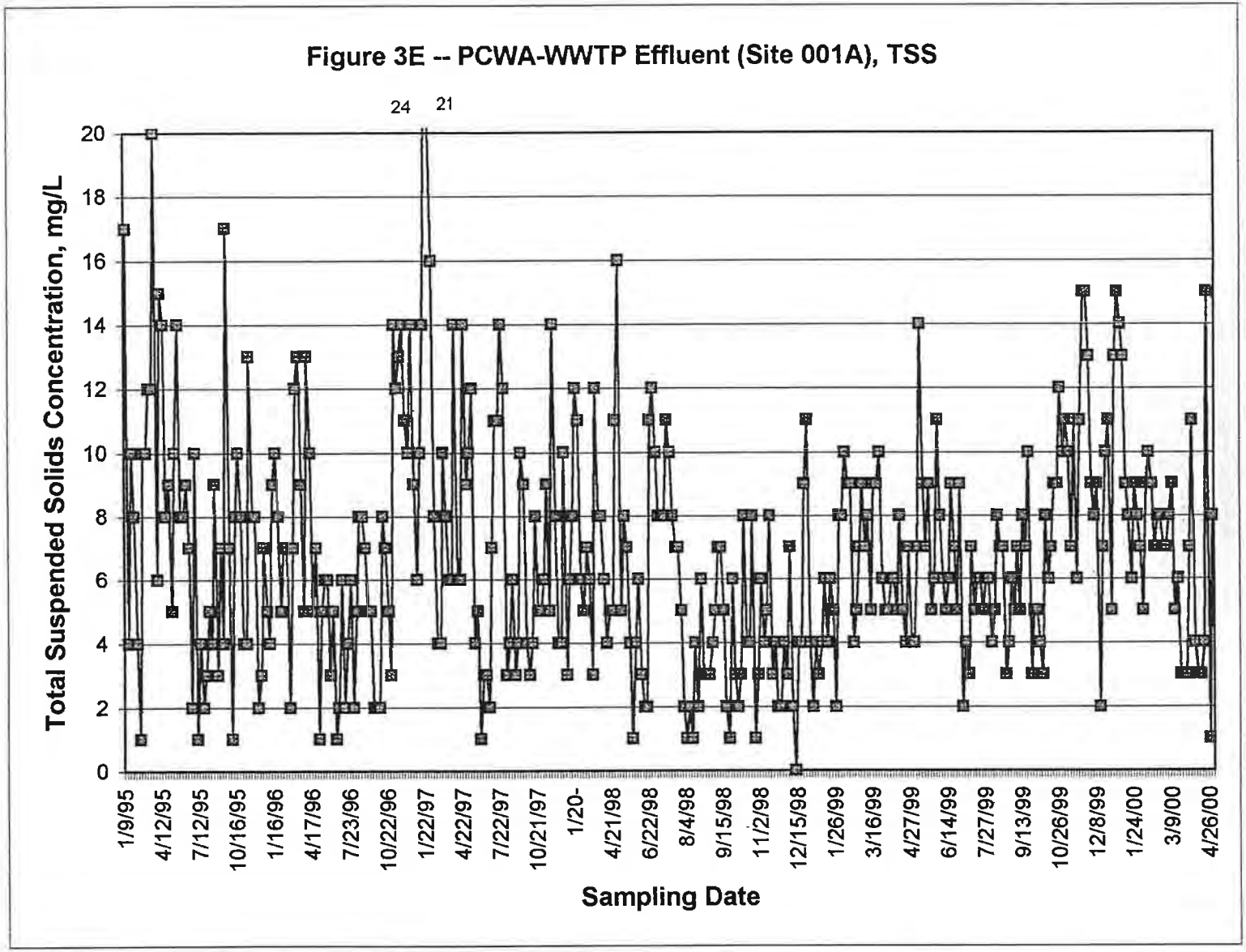


Figure 3E -- PCWA-WWTP Effluent (Site 001A), TSS
24
21
Total Suspended Solids Concentration, mg/L
0
2
4
6
8
10
12
14
16
18
20
1/9/95
4/12/95
7/12/95
10/16/95
1/16/96
4/17/96
7/23/96
10/22/96
1/22/97
4/22/97
7/22/97
10/21/97
1/20-
4/21/98
6/22/98
8/4/98
9/15/98
11/2/98
12/15/98
1/26/99
3/16/99
4/27/99
6/14/99
7/27/99
9/13/99
10/26/99
12/8/99
1/24/00
3/9/00
4/26/00
Sampling Date

Figure 3F -- PCWA-WWTP Effluent (Site 001A), pH (7/98-5/99)

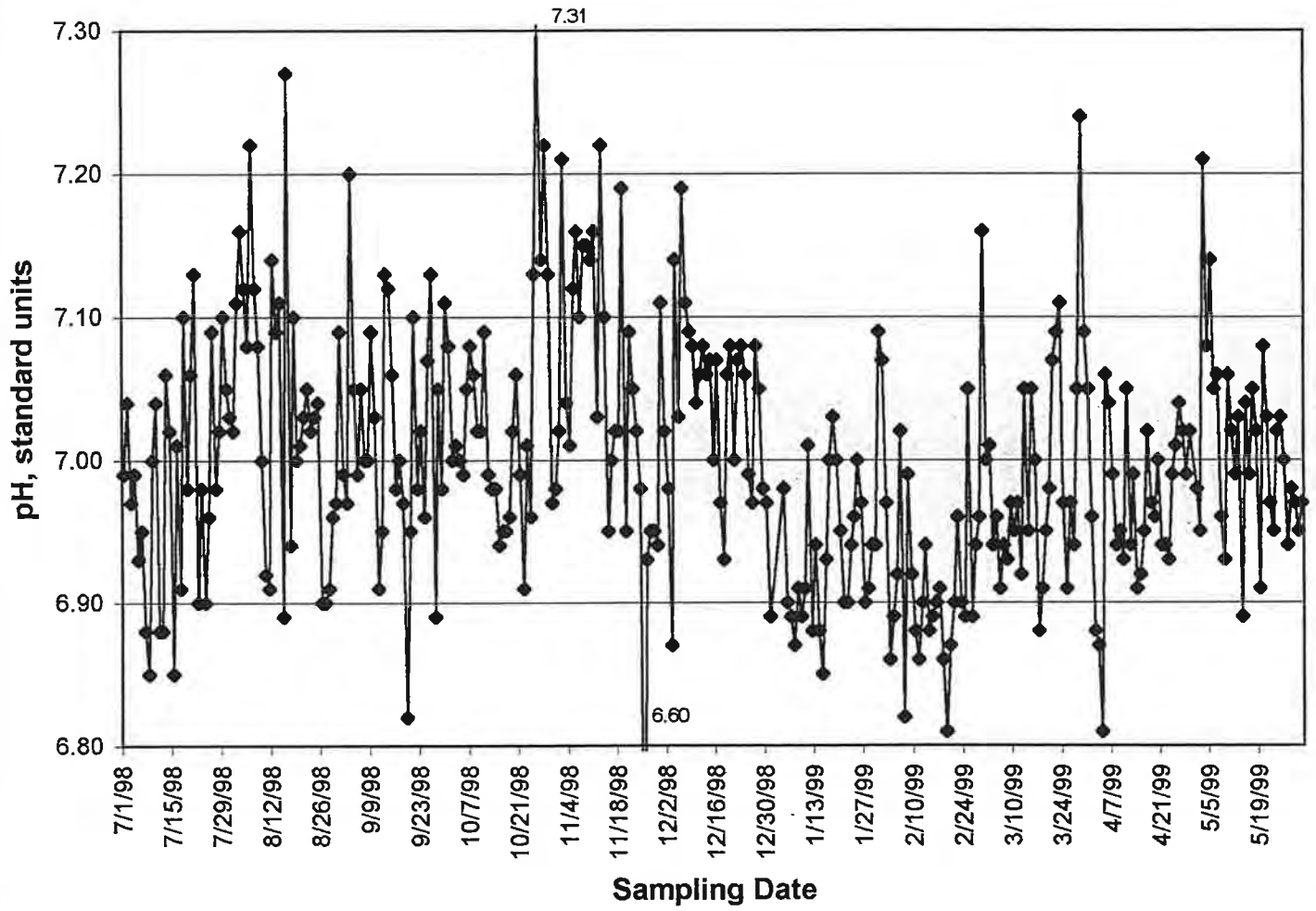


Figure 4A-1 -- PCWA-WWTP, NH3-N Concentrations vs. Streamflow (1/96-9/96)

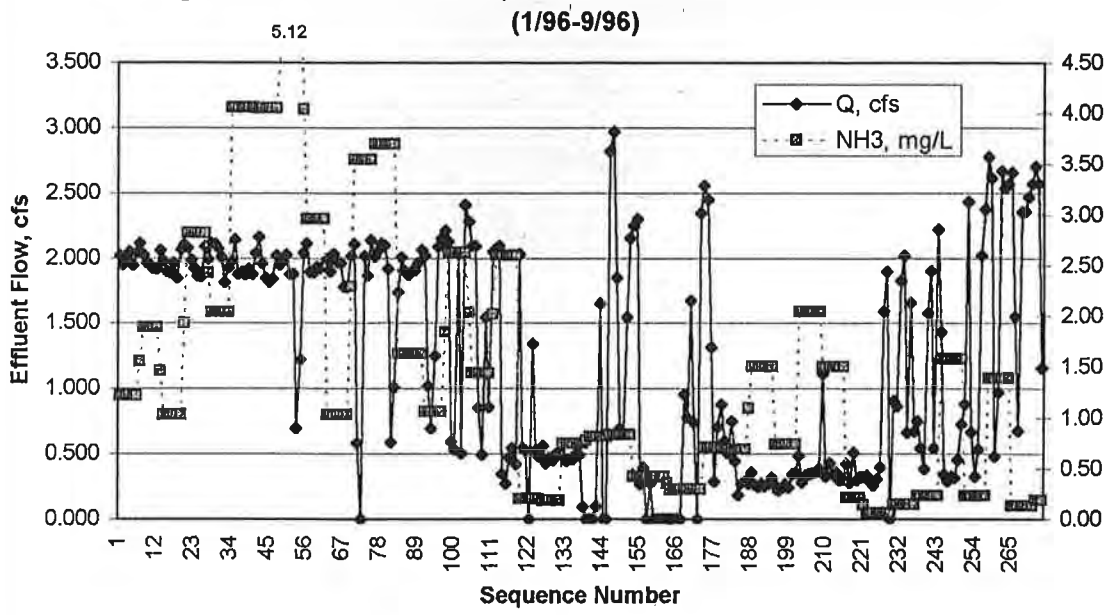


Figure 4A-2 -- PCWA-WWTP Ammonia Loadings (1/96-9/96)

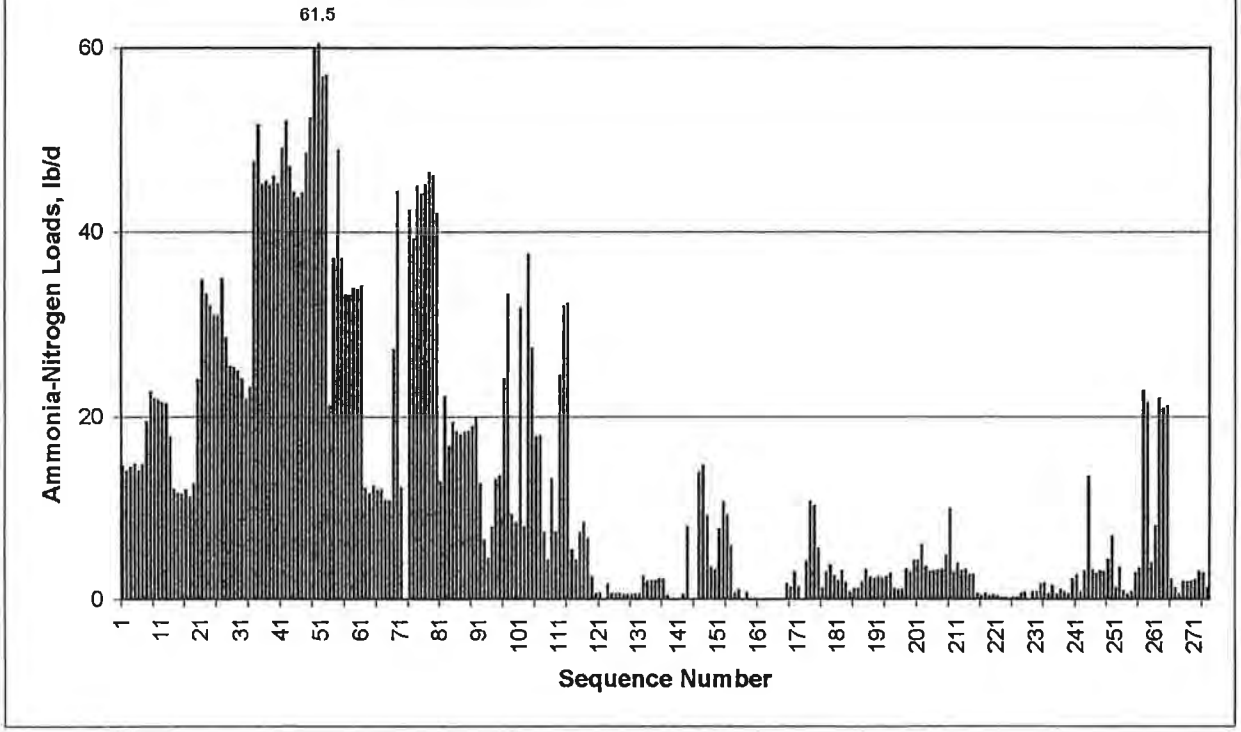


Figure 4B-1 -- PCWA-WWTP, NH3-N Concentrations vs. Streamflow (1997 WY)

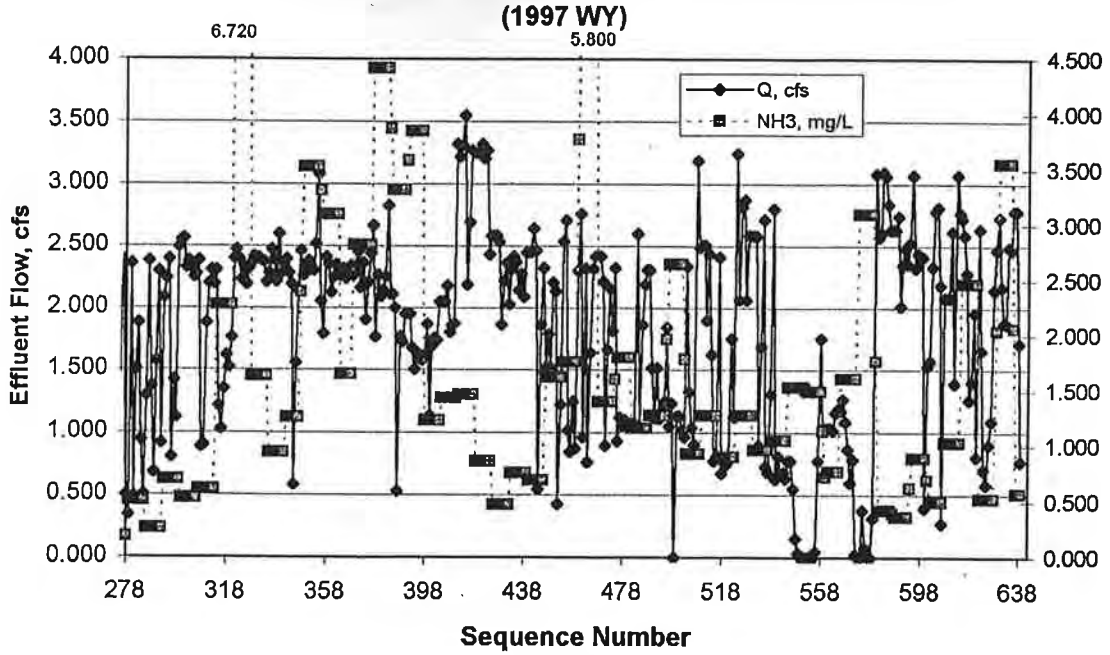


Figure 4B-2 -- PCWA-WWTP Ammonia Loadings (1997 WY)

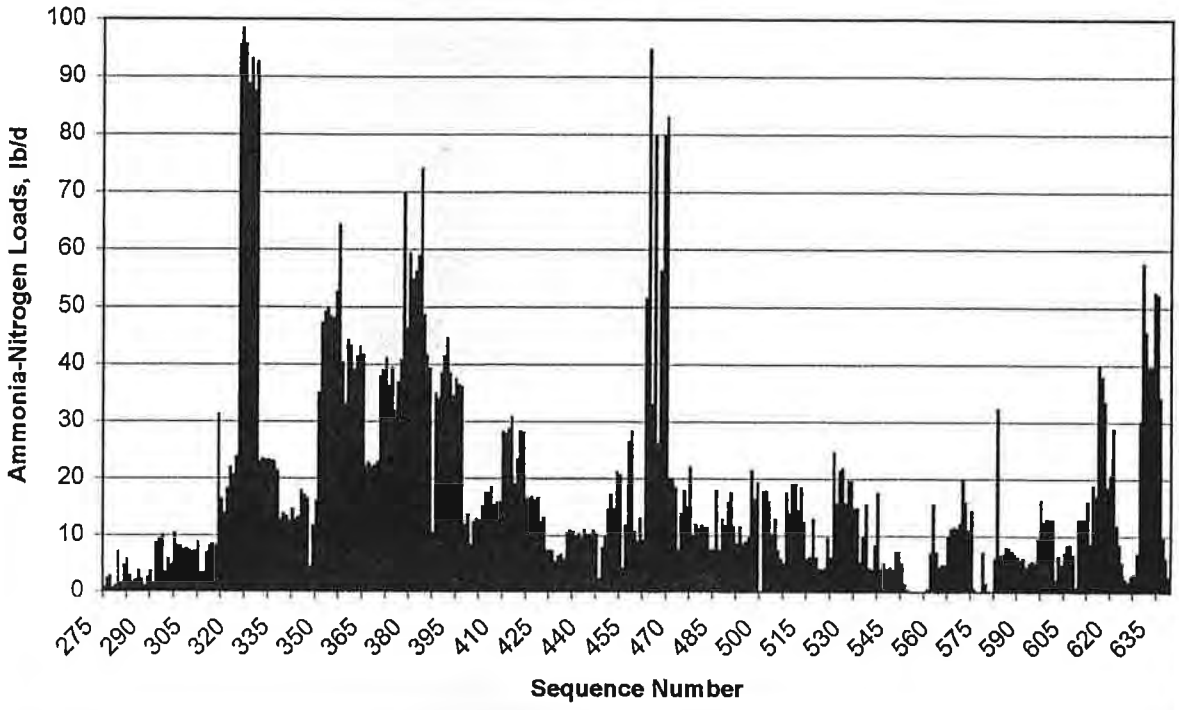


Figure 4C-1 -- PCWA-WWP, NH3-N Concentrations vs. Streamflow (1998 WY)

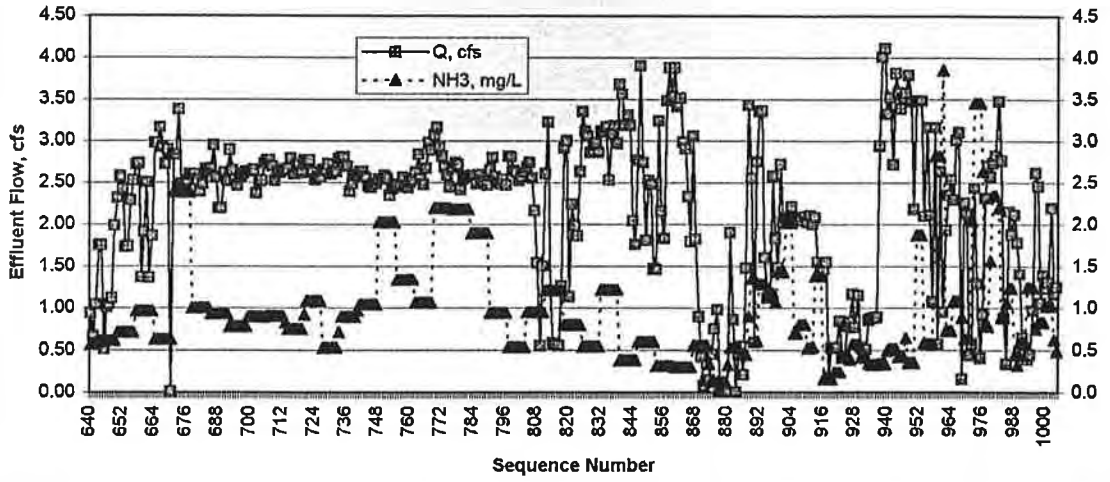
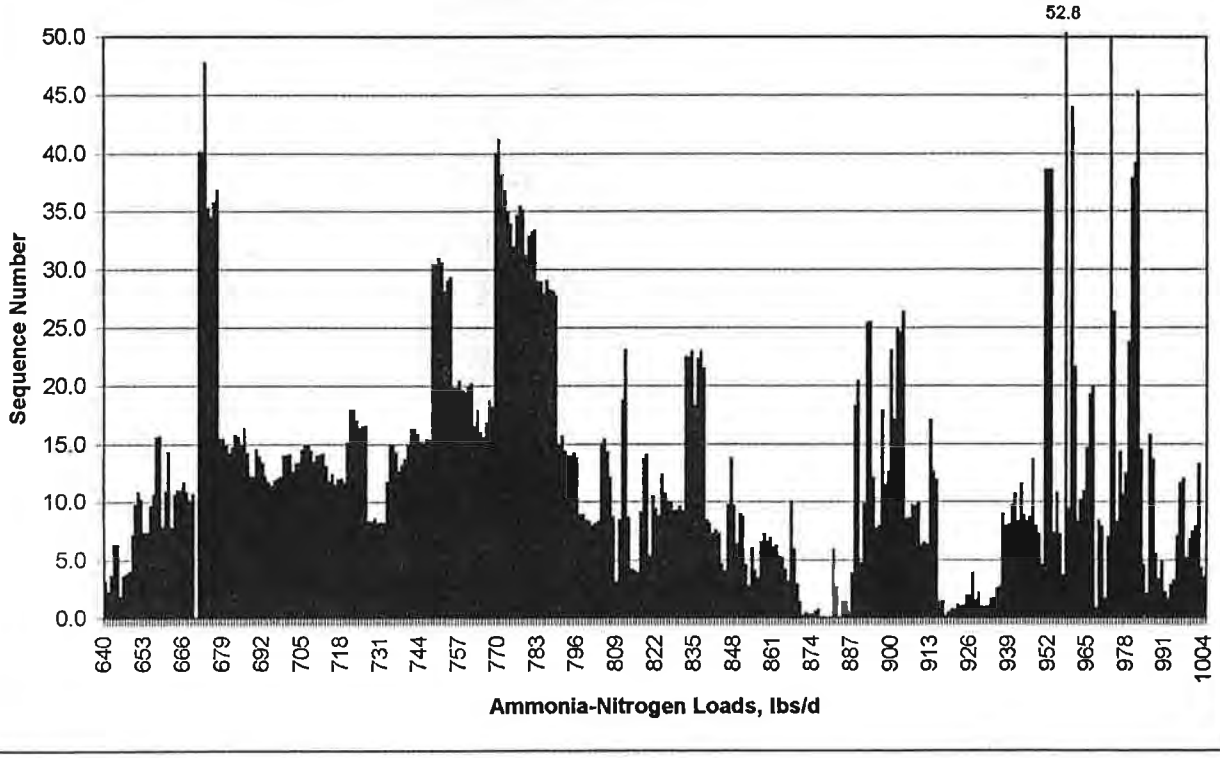


Figure 4C-2 -- PCWA-WWTP Ammonia Loadings (1998 WY)



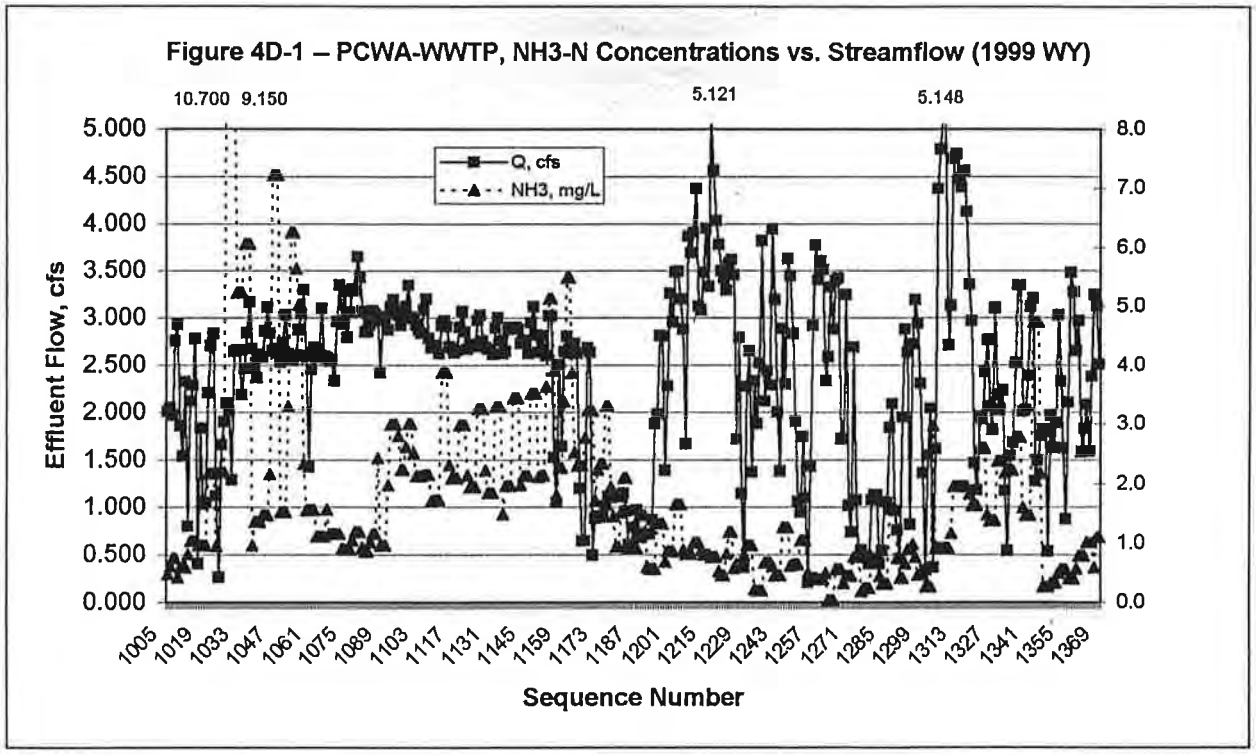


Figure 4D-1 – PCWA-WWTP, NH3-N Concentrations vs. Streamflow (1999 WY)
10.700
9.150
5.121
5.148
Q, cfs
NH3, mg/L
Effluent Flow, cfs
5.000
4.500
4.000
3.500
3.000
2.500
2.000
1.500
1.000
0.500
0.000
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1005
1019
1033
1047
1061
1075
1089
1103
1117
1131
1145
1159
1173
1187
1201
1215
1229
1243
1257
1271
1285
1299
1313
1327
1341
1355
1369
Sequence Number

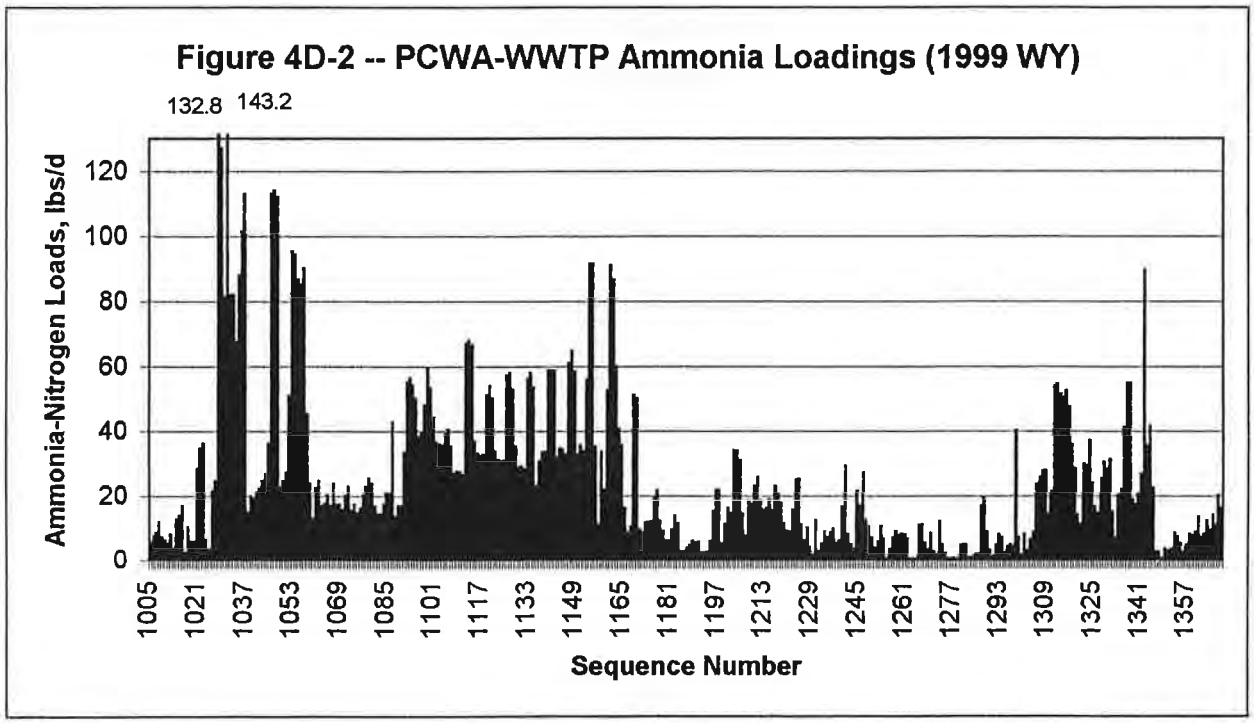


Figure 4D-2 -- PCWA-WWTP Ammonia Loadings (1999 WY)
132.8
143.2
Ammonia-Nitrogen Loads, lbs/d
120
100
80
60
40
20
0
1005
1021
1037
1053
1069
1085
1101
1117
1133
1149
1165
1181
1197
1213
1229
1245
1261
1277
1293
1309
1325
1341
1357
Sequence Number

Figure 4E-1 -- PCWA-WWTP, NH3-N Concentratons vs. Streamflow (10/99-5/00)

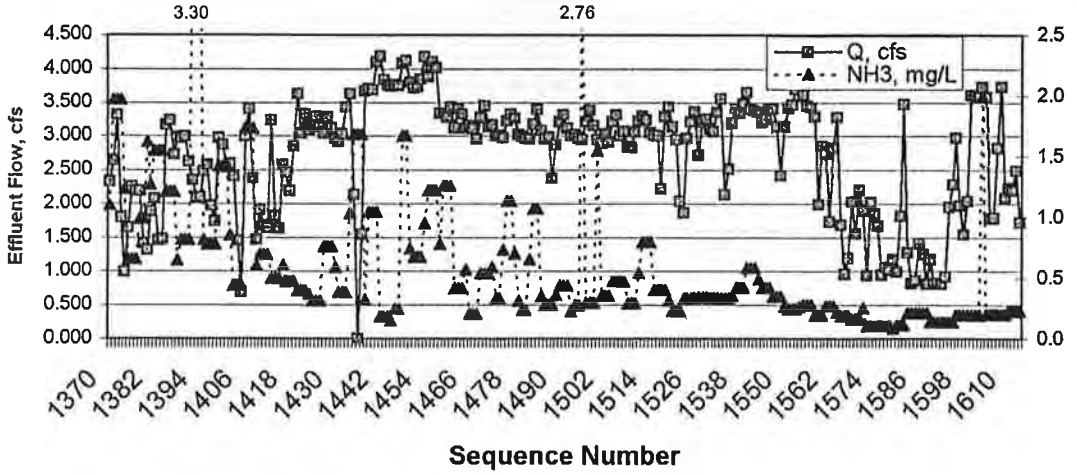
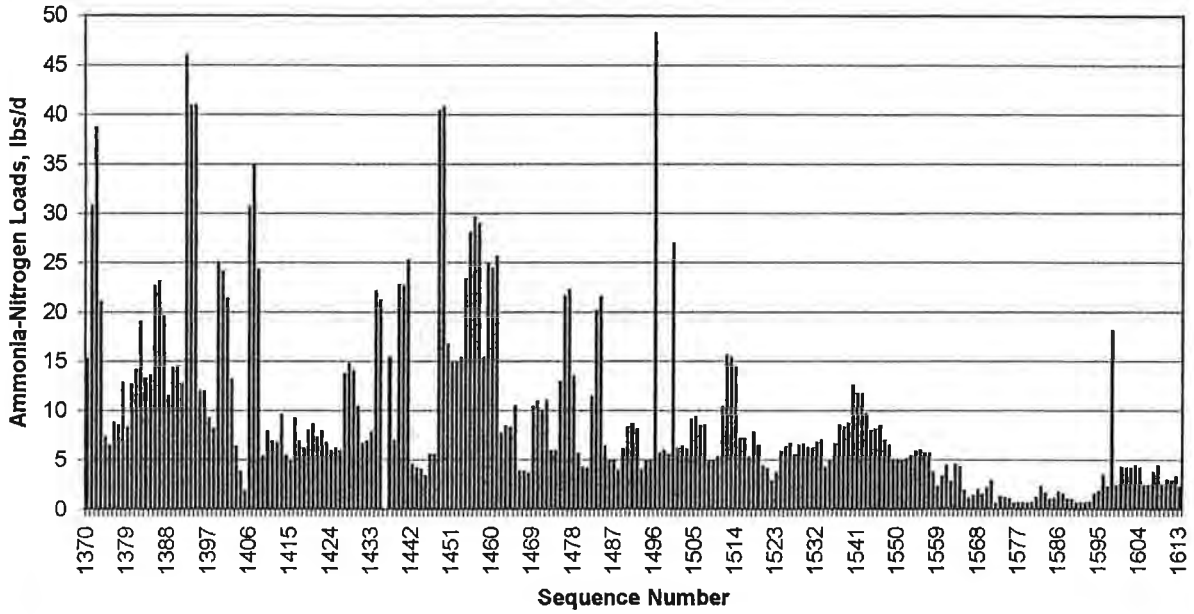


Figure 4E-2 -- PCWA-WWTP Ammonia Loadings (10/99-5/00)



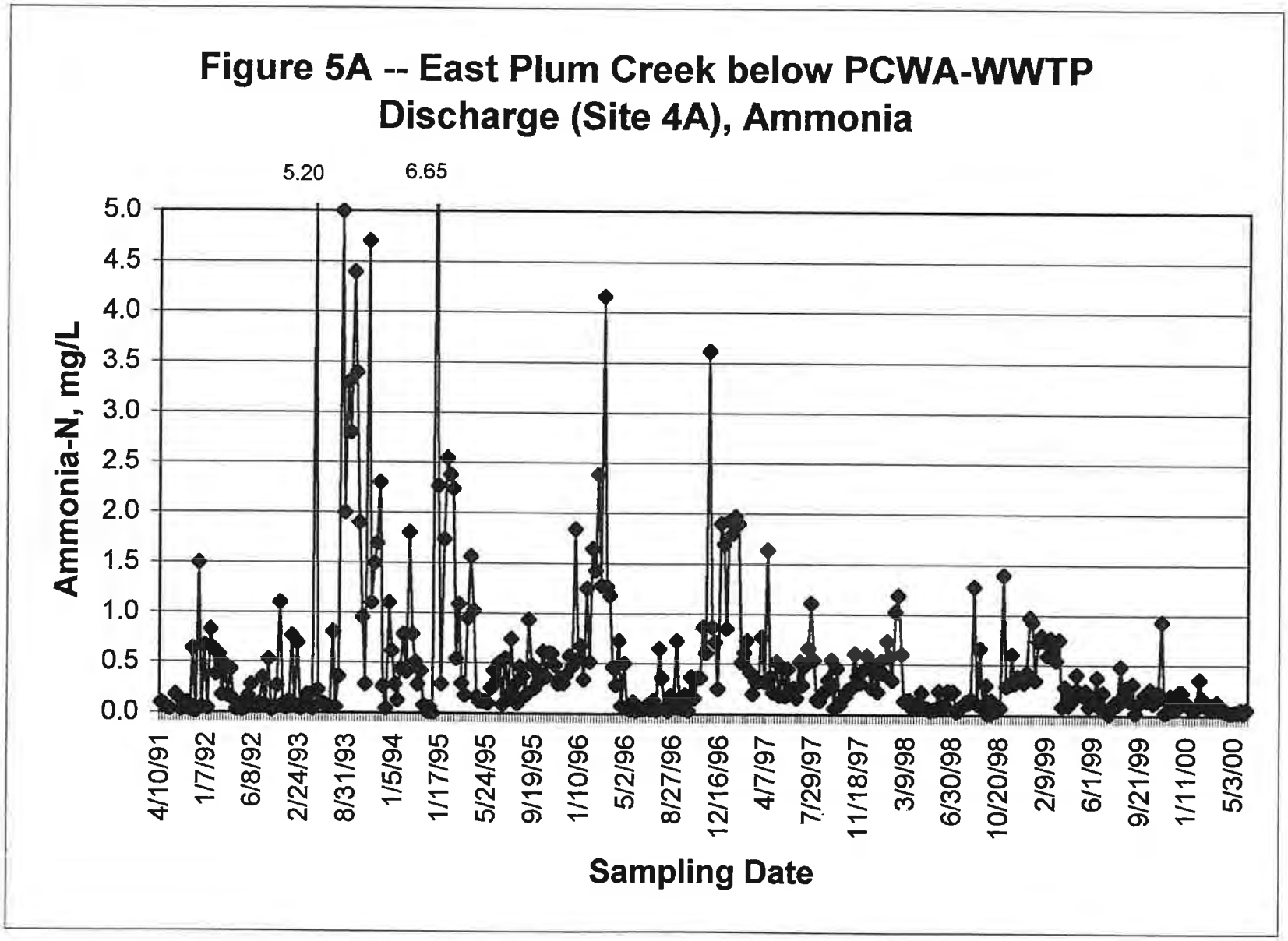


Figure 5A -- East Plum Creek below PCWA-WWTP Discharge (Site 4A), Ammonia
5.20
6.65
Ammonia-N, mg/L
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
4/10/91
1/7/92
6/8/92
2/24/93
8/31/93
1/5/94
1/17/95
5/24/95
9/19/95
1/10/96
5/2/96
8/27/96
12/16/96
4/7/97
7/29/97
11/18/97
3/9/98
6/30/98
10/20/98
2/9/99
6/1/99
9/21/99
1/11/00
5/3/00
Sampling Date

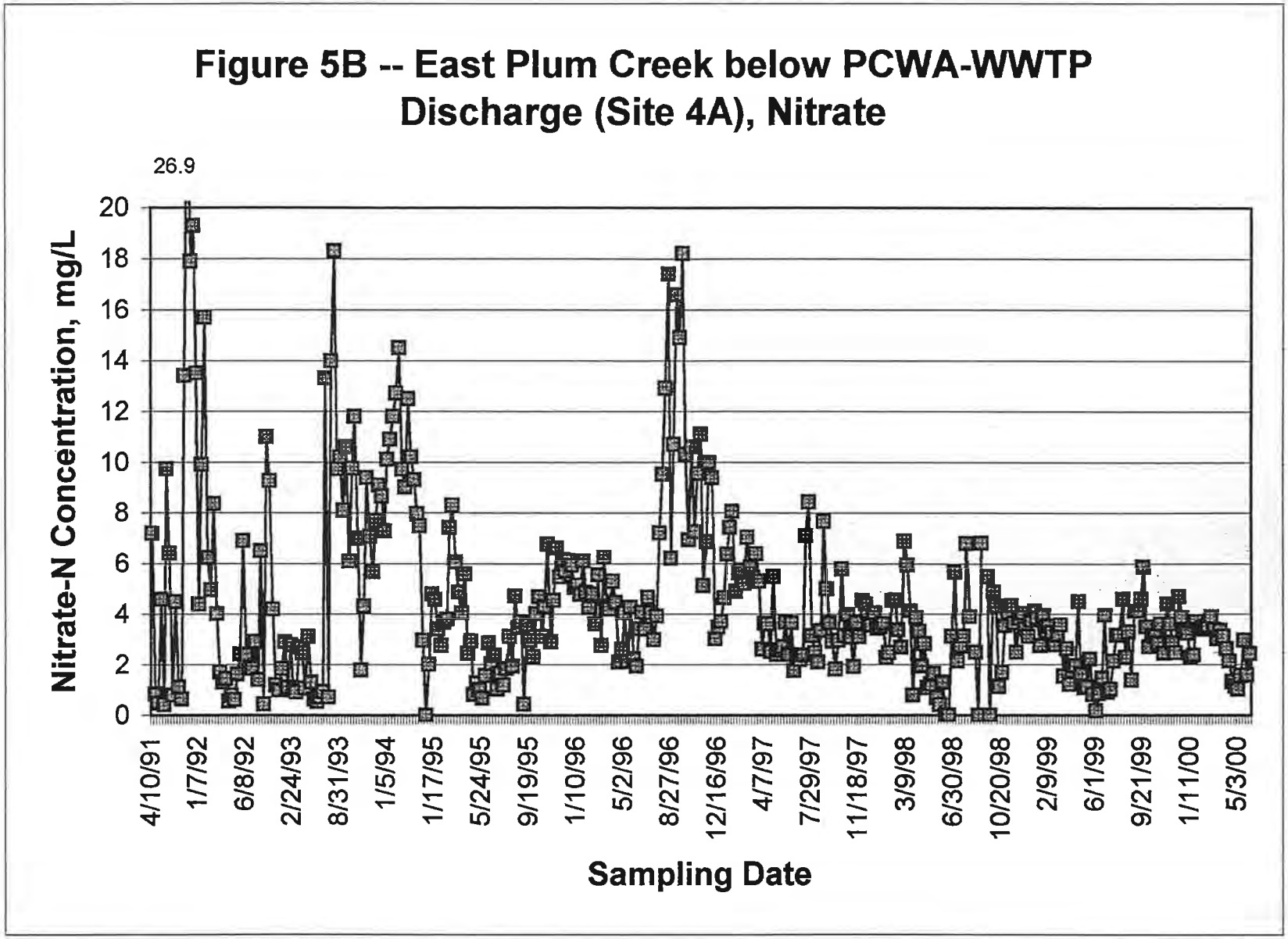


Figure 5B -- East Plum Creek below PCWA-WWTP Discharge (Site 4A), Nitrate
26.9
Nitrate-N Concentration, mg/L
20
18
16
14
12
10
8
6
4
2
0
4/10/91
1/7/92
6/8/92
2/24/93
8/31/93
1/5/94
1/17/95
5/24/95
9/19/95
1/10/96
5/2/96
8/27/96
12/16/96
4/7/97
7/29/97
11/18/97
3/9/98
6/30/98
10/20/98
2/9/99
6/1/99
9/21/99
1/11/00
5/3/00
Sampling Date

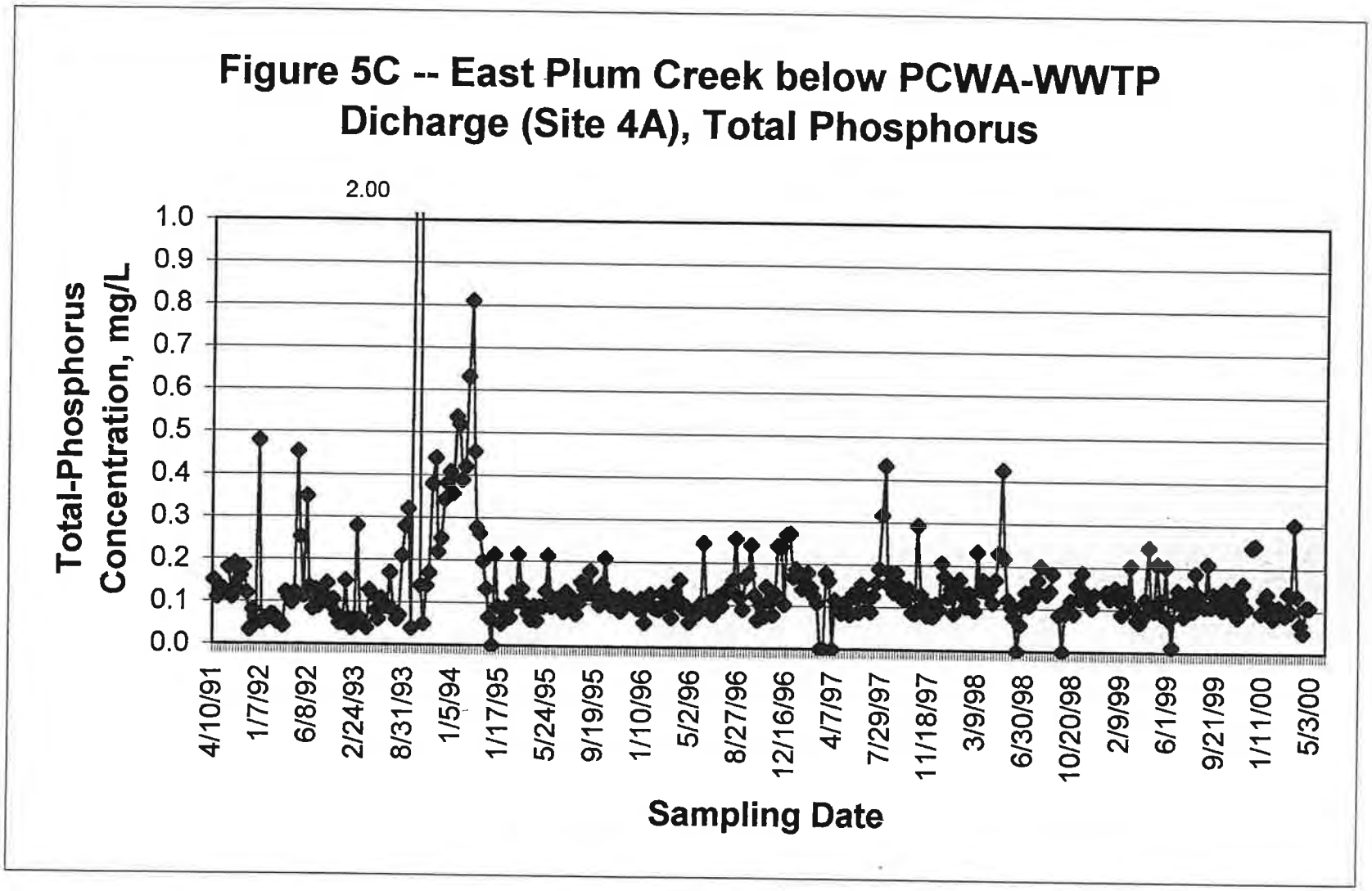


Figure 5C -- East Plum Creek below PCWA-WWTP Dicharge (Site 4A), Total Phosphorus
2.00
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Total-Phosphorus Concentration, mg/L
4/10/91
1/7/92
6/8/92
2/24/93
8/31/93
1/5/94
1/17/95
5/24/95
9/19/95
1/10/96
5/2/96
8/27/96
12/16/96
4/7/97
7/29/97
11/18/97
3/9/98
6/30/98
10/20/98
2/9/99
6/1/99
9/21/99
1/11/00
5/3/00
Sampling Date

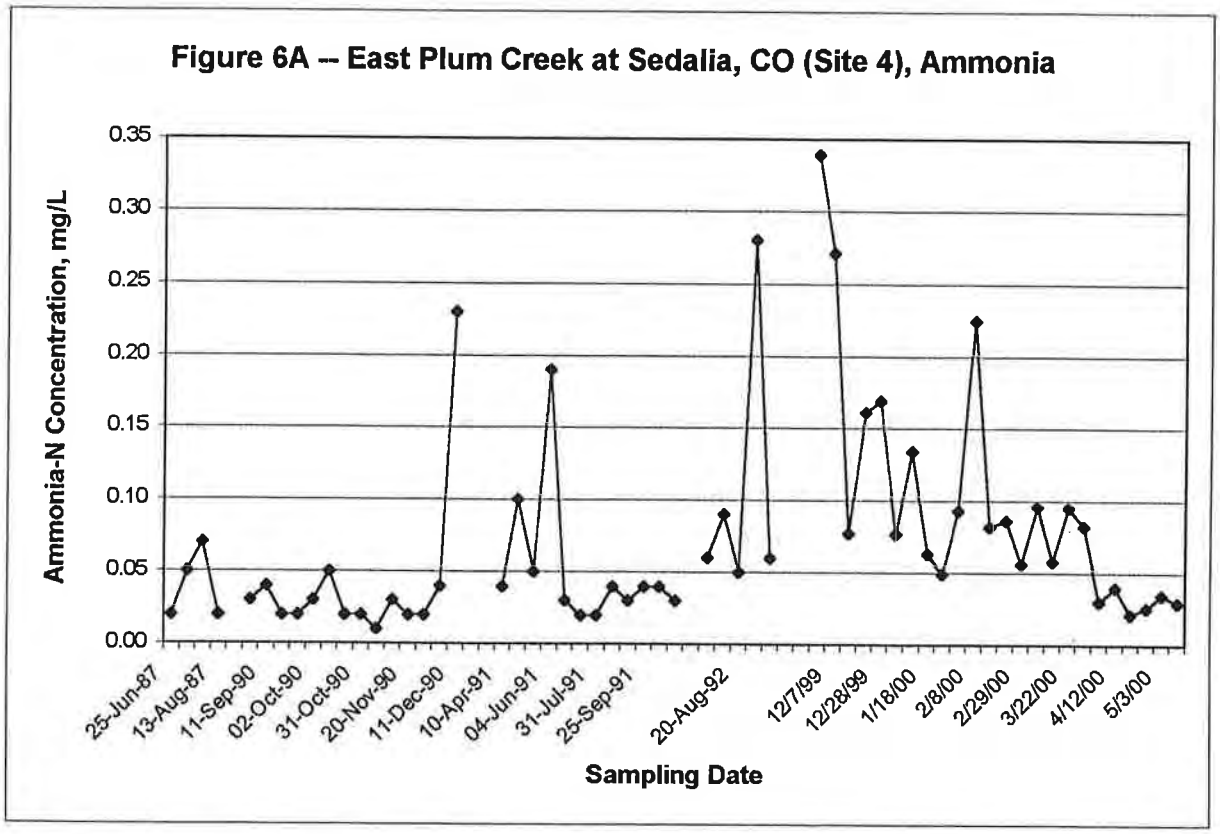


Figure 6A -- East Plum Creek at Sedalia, CO (Site 4), Ammonia
Ammonia-N Concentration, mg/L
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
25-Jun-87
13-Aug-87
11-Sep-90
02-Oct-90
31-Oct-90
20-Nov-90
11-Dec-90
10-Apr-91
04-Jun-91
31-Jul-91
25-Sep-91
20-Aug-92
12/7/99
12/28/99
1/18/00
2/8/00
2/29/00
3/22/00
4/12/00
5/3/00
Sampling Date

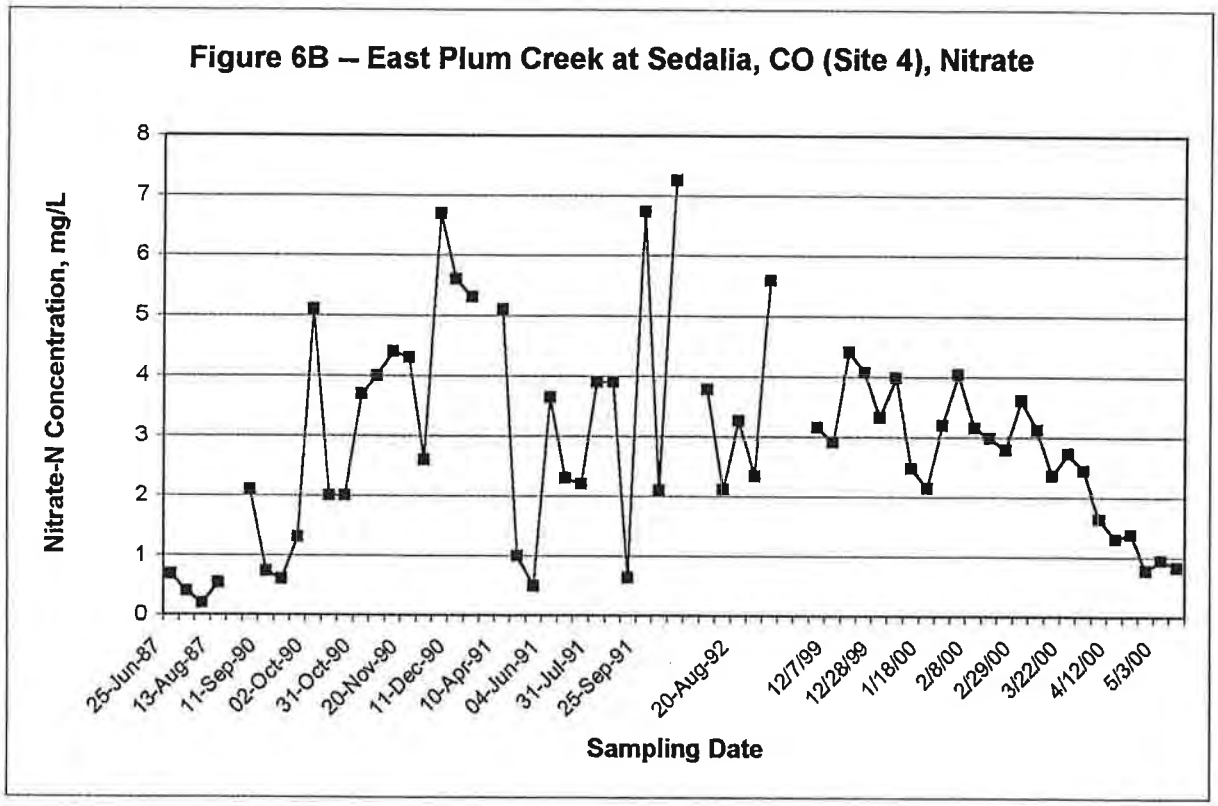


Figure 6B -- East Plum Creek at Sedalia, CO (Site 4), Nitrate
Nitrate-N Concentration, mg/L
8
7
6
5
4
3
2
1
0
25-Jun-87
13-Aug-87
11-Sep-90
02-Oct-90
31-Oct-90
20-Nov-90
11-Dec-90
10-Apr-91
04-Jun-91
31-Jul-91
25-Sep-91
20-Aug-92
12/7/99
12/28/99
1/18/00
2/8/00
2/29/00
3/22/00
4/12/00
5/3/00
Sampling Date

APPENDIX A

Daily Streamflows and Ammonia-N Loadings,
East Plum Creek upstream from PCWA-WWTP Facility
(Site 4B, USGS Gaging-Station 06708800)

Period of Record: 4/21/99-5/31/00

Plum Creek Watershed Ammonia-Nitrogen Loadings

MONITORING SITE 4B -- East Plum Creek upstream from PCWA WWTP effluent discharge

Notes: *Upstream East Plum Creek water-quality data (Site 4B); Source: PCWA (Jeff), 6/12/00.*
This is assumed analogous to USGS gaging station 06708800 (record from 4/21/00 to present).
Loadings estimated by interpolating NH3-N concentrations from intermittent sampling surveys.

1999 Water Year Flows

Daily Streamflows, in cubic feet per second

Day	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Sept	
1								394	95	34	50	12	
2								277	96	28	34	4.4	
3								184	90	25	26	7.5	
4								155	83	27	34	7.8	
5								132	80	17	38	13	
6								121	80	16	54	14	
7								113	68	17	43	13	
8								104	61	18	46	9.7	
9								102	60	27	46	7.2	
10								105	106	25	36	10	
11								103	78	26	39	13	
12								102	65	31	29	18	
13								94	76	19	26	29	
14								88	61	14	24	34	
15								85	67	13	28	25	
16								80	67	12	18	17	
17								82	69	13	16	21	
18								67	64	18	16	19	
19								58	58	32	17	31	
20								53	54	32	41	28	
21							14	49	48	23	33	26	
22							40	39	42	24	27	21	
23							35	37	35	18	22	11	
24							31	36	32	16	13	4.0	
25							36	109	39	17	15	2.1	
26							39	79	38	16	24	1.7	
27							32	80	29	7.2	20	2.1	
28							30	176	33	11	42	8.6	
29					--		126	98	31	15	20	15	
30					--		410	95	32	28	12	12	*5 months*
31		--			--		--	94	--	49	11	--	**Annual**
Avg	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**79.3**	**109**	**61.2**	**21.6**	**29.0**	**14.6**	**49.2**
Max	0	0	0	0	0	0	410	394	106	49	54	34	**410**
Min	0	0	0	0	0	0	14	36	29	7.2	11	1.7	**1.7**
ac-ft	*#DIV/0!*	*#DIV/0!*	*#DIV/0!*	*#DIV/0!*	*#DIV/0!*	*#DIV/0!*	*1573*	*6726*	*3644*	*1325*	*1785*	*867*	***15920***
#Days	0	0	0	0	0	0	10	31	30	31	31	30	**163**

Plum Creek Watershed Ammonia-Nitrogen Loadings

MONITORING SITE 4B -- East Plum Creek upstream from PCWA WWTP effluent discharge

Notes: *Upstream East Plum Creek water-quality data (Site 4B); Source: PCWA (Jeff), 6/12/00.*
This is assumed analogous to USGS gaging station 06708800 (record from 4/21/00 to present).
Loadings estimated by interpolating NH3-N concentrations from intermittent sampling surveys.

1999 Water Year Ammonia-Nitrogen Loadings

Daily Loadings, in pounds per day

Day	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Sept	
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	303.38	100.72	2.20	44.42	3.53	
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	213.29	101.78	1.81	30.21	1.30	
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	141.68	95.42	1.15	23.10	2.21	
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	119.35	88.00	1.25	30.21	1.46	
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	101.64	94.29	0.79	33.76	1.02	
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	93.17	94.29	0.74	47.98	1.10	
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	87.01	80.15	0.79	21.19	1.02	
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	96.71	71.90	0.83	22.67	0.76	
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	94.85	70.72	1.25	22.67	0.57	
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	97.64	124.94	3.95	17.74	0.79	
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	95.78	91.94	4.11	19.22	1.05	
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	94.85	27.87	4.90	14.29	1.50	
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	87.41	32.59	3.00	12.81	2.42	
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	81.83	26.16	2.21	6.75	2.84	
15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.69	28.73	2.06	7.88	2.09	
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.60	28.73	2.04	5.06	1.42	
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.83	29.59	2.21	4.50	1.75	
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.43	27.44	3.06	4.50	9.05	
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.19	22.57	8.55	4.78	14.76	
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.73	21.01	8.55	11.54	13.33	
21	0.00	0.00	0.00	0.00	0.00	0.00	9.95	33.96	18.68	6.14	8.76	12.38	
22	0.00	0.00	0.00	0.00	0.00	0.00	28.43	27.03	16.34	6.41	7.16	10.00	
23	0.00	0.00	0.00	0.00	0.00	0.00	24.88	25.64	13.62	4.81	5.84	5.24	
24	0.00	0.00	0.00	0.00	0.00	0.00	30.11	38.17	12.45	4.27	3.45	1.90	
25	0.00	0.00	0.00	0.00	0.00	0.00	34.97	115.56	15.18	4.54	3.98	1.48	
26	0.00	0.00	0.00	0.00	0.00	0.00	37.88	54.75	2.45	4.27	6.37	1.20	
27	0.00	0.00	0.00	0.00	0.00	0.00	31.08	55.44	1.87	1.92	5.31	1.48	
28	0.00	0.00	0.00	0.00	0.00	0.00	29.14	121.97	2.13	2.94	12.36	6.06	
29	0.00	0.00	0.00	0.00	--	0.00	122.39	103.90	2.00	4.01	5.89	10.57	
30	0.00	0.00	0.00	0.00	--	0.00	398.26	100.72	2.07	7.48	3.53	8.46	
31	0.00	--	0.00	0.00	--	0.00	--	99.66	--	43.53	3.24	--	**Annual**
Avg	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**24.90**	**88.22**	**44.86**	**4.70**	**14.55**	**4.09**	**31.4**
Max	0.00	0.00	0.00	0.00	0.00	0.00	398.3	303.4	124.94	43.53	47.98	14.76	**398**
Min	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.64	1.87	0.74	3.24	0.57	**0.57**
Cumul.	*0*	*0*	*0*	*0*	*0*	*0*	*747*	*2735*	*1346*	*146*	*451*	*123*	***4800***
#Days	31	30	31	31	28	31	30	31	30	31	31	30	153

Plum Creek Watershed Ammonia-Nitrogen Loadings

MONITORING SITE 4B -- East Plum Creek upstream from PCWA WWTP effluent discharge

Notes: *Upstream East Plum Creek water-quality data (Site 4B); Source: PCWA (Jeff), 6/12/00.*
This is assumed analogous to USGS gaging station 06708800 (record from 4/21/00 to present).
Loadings estimated by interpolating NH3-N concentrations from intermittent sampling surveys.

2000 Water Year Flows

Daily Streamflows, in cubic feet per second

Day	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Sept	
1	22	6.4	7.9	10	4.4	8.8	*45*	31	2.4				
2	17	5.1	6.4	1.2	7.9	10	*40*	25	2.9				
3	11	6.0	11	2.3	17	11	*37*	23	8.2				
4	11	13	6.7	5.5	18	9.8	34	22	1.8				
5	7.4	3.0	9.2	8.5	9.0	9.6	46	23					
6	11	7.2	15	5.8	9.3	10	73	24					
7	13	8.8	22	5.5	8.2	14	*60*	23					
8	5.9	4.5	21	2.9	12	22	*47*	32					
9	14	13	13	2.5	15	14	32	30					
10	8.8	11	22	1.1	10	9.9	30	23					
11	9.0	7.5	18	4.3	9.2	9.2	33	18					
12	3.5	7.7	10	12	10	9.0	35	24					
13	6.5	3.1	11	5.1	9.5	*10*	38	24					
14	3.4	8.4	5.4	8.4	11	*11*	38	23					
15	9.9	1.6	4.9	8.6	14	12	41	21					
16	15	4.8	3.8	6.9	9.9	*14*	39	18					
17	17	4.3	13	5.7	10	*16*	38	*25*					
18	10	3.9	7.9	15	12	*18*	32	33					
19	17	8.5	4.0	22	13	*20*	36	23					
20	20	12	3.9	18	13	*22*	29	23					
21	18	14	0.01	17	13	*24*	32	18					
22	17	18	0.26	6.9	11	*25*	31	14					
23	17	13	1	10	19	26	31	8.3					
24	13	9.4	1.8	5.9	12	42	25	5.6					
25	14	15	1.3	8.1	14	40	27	14					
26	10	11	1.6	4.0	6.8	41	24	16					
27	6.6	13	2.8	3.9	3.1	40	26	*13*					
28	6.5	14	6.4	10	6.9	35	26	11					
29	5.3	13	6.1	3.7	6.0	45	29	12					
30	4.4	10	0.69	5.3	--	51	50	4.9					*8-months*
31	6.7	--	2.2	4.0	--	50	--	2.4	--			--	**Annual**
Avg	**11.3**	**9.0**	**7.8**	**7.4**	**10.8**	**21.9**	**36.8**	**19.6**	**3.8**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**15.307**
Max	22	18	22	22	19	51	73	33	8.2	0	0	0	73
Min	3.4	1.6	0.01	1.1	3.1	8.8	24	2.4	1.8	0	0	0	0.01
ac-ft	*696*	*536*	*477*	*456*	*623*	*1347*	*2190*	*1204*	*30*	*#DIV/0!*	*#DIV/0!*	*#DIV/0!*	***7630***
#Days	31	30	31	31	29	31	30	31	4	0	0	0	**248**

Plum Creek Watershed Ammonia-Nitrogen Loadings

MONITORING SITE 4B -- East Plum Creek upstream from PCWA WWTP effluent discharge

Notes: *Upstream East Plum Creek water-quality data (Site 4B); Source: PCWA (Jeff), 6/12/00.*
This is assumed analogous to USGS gaging station 06708800 (record from 4/21/00 to present).
Loadings estimated by interpolating NH3-N concentrations from intermittent sampling surveys.

2000 Water Year Ammonia-Nitrogen Loadings

Daily Loadings, in pounds per day

Day	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Sept	
1	2.75	4.36	2.90	2.73	0.76	1.54	16.77	5.18	0.00	0.00	0.00	0.00	
2	2.12	3.47	2.35	0.33	1.36	1.75	12.32	4.18	0.00	0.00	0.00	0.00	
3	1.37	4.09	4.04	0.63	21.05	1.92	9.01	3.84	0.00	0.00	0.00	0.00	
4	1.37	8.85	1.33	1.50	3.10	1.71	8.28	3.67	0.00	0.00	0.00	0.00	
5	0.92	2.04	1.83	2.32	1.78	3.77	11.20	3.84	0.00	0.00	0.00	0.00	
6	1.37	1.87	2.99	1.58	1.84	3.93	17.77	4.01	0.00	0.00	0.00	0.00	
7	1.62	2.28	4.38	1.50	1.62	5.50	14.61	3.09	0.00	0.00	0.00	0.00	
8	0.74	1.17	4.18	0.89	2.37	8.64	11.44	4.30	0.00	0.00	0.00	0.00	
9	2.63	3.37	2.59	0.77	2.97	5.50	6.52	4.03	0.00	0.00	0.00	0.00	
10	1.65	2.85	4.38	0.34	1.98	3.89	6.11	3.09	0.00	0.00	0.00	0.00	
11	1.69	1.95	3.68	1.32	1.82	3.61	6.72	2.42	0.00	0.00	0.00	0.00	
12	0.66	2.00	2.04	3.69	2.33	1.00	7.13	3.23	0.00	0.00	0.00	0.00	
13	1.22	0.80	2.25	1.57	2.22	1.11	7.74	3.23	0.00	0.00	0.00	0.00	
14	0.64	2.18	1.10	2.58	2.57	1.22	7.74	3.09	0.00	0.00	0.00	0.00	
15	1.86	0.42	1.00	1.67	3.27	1.33	8.35	2.82	0.00	0.00	0.00	0.00	
16	2.50	1.01	0.78	1.34	2.31	1.55	7.42	2.68	0.00	0.00	0.00	0.00	
17	2.83	0.69	2.66	1.11	2.33	1.77	6.71	3.72	0.00	0.00	0.00	0.00	
18	1.66	0.62	11.32	2.91	2.80	1.99	5.65	4.91	0.00	0.00	0.00	0.00	
19	2.83	1.36	5.73	4.27	4.77	7.24	6.35	3.42	0.00	0.00	0.00	0.00	
20	3.33	1.92	5.59	3.50	4.77	7.96	5.12	3.42	0.00	0.00	0.00	0.00	
21	3.00	2.24	0.01	2.98	4.77	8.69	5.65	2.68	0.00	0.00	0.00	0.00	
22	2.83	2.88	0.37	1.08	4.03	9.05	5.47	2.08	0.00	0.00	0.00	0.00	
23	3.95	2.08	1.43	1.56	6.97	9.41	5.07	1.24	0.00	0.00	0.00	0.00	
24	3.02	1.50	2.58	0.92	4.40	15.20	3.76	0.84	0.00	0.00	0.00	0.00	
25	3.25	2.40	0.60	1.27	5.13	14.48	4.06	2.09	0.00	0.00	0.00	0.00	
26	2.32	1.76	0.74	0.63	1.84	15.06	3.61	2.38	0.00	0.00	0.00	0.00	
27	1.53	4.77	1.29	0.61	0.54	14.90	3.91	1.93	0.00	0.00	0.00	0.00	
28	1.51	5.14	2.96	1.56	1.21	13.04	3.91	1.64	0.00	0.00	0.00	0.00	
29	1.23	4.77	2.82	0.64	1.05	16.77	4.36	1.79	0.00	0.00	0.00	0.00	
30	3.00	3.67	0.32	0.91	–	19.00	8.35	0.73	0.00	0.00	0.00	0.00	*8 months*
31	4.56	–	1.02	0.69	–	18.63	–	0.36	–	0.00	0.00	–	**Annual**
Avg	**2.13**	**2.62**	**2.62**	**1.59**	**3.38**	**7.13**	**7.70**	**2.90**	**0.00**	**0.00**	**0.00**	**0.00**	**3.75**
Max	4.56	8.85	11.32	4.27	21.05	19.00	18	5	0	0.00	0.00	0.00	**21**
Min	0.64	0.42	0.01	0.33	0.54	1.00	3.61	0.36	0.00	0.00	0.00	0.00	**0.01**
Cumul.	*66*	*79*	*81*	*49*	*98*	*221*	*231*	*90*	*0*	*0*	*0*	*0*	***915***
#Days	31	30	31	31	29	31	30	31	30	31	31	30	244

APPENDIX B

Daily Effluent Flows and Ammonia-N Loadings,
Plum Creek Wastewater Treatment Facility
(Site 001A)

Period of Record: 1/1/96-5/31/00

Plum Creek Watershed Ammonia-Nitrogen Loadings

MONITORING SITE 001A -- Plum Creek Wastewater Authority Effluent Discharges

Notes: *PCWA-WWTP Effluent Discharges (Site 001A); Source: PCWA (Jeff), 6/12/00*

Loadings estimated by interpolating NH3-N concentrations from intermittent sampling surveys.

1996 Water Year Flows

Daily Effluent Flows, in cubic feet per second

Day	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Sept	
1				2.024	1.812	1.950	1.021	0.000	2.250	0.446	0.302	0.342	
2				1.950	1.926	1.997	0.698	1.338	2.302	0.184	0.305	0.296	
3				2.008	1.979	1.900	1.253	0.525	0.271	0.274	0.424	0.328	
4				2.053	2.144	2.032	2.093	0.480	0.396	0.288	0.280	0.320	
5				1.943	1.875	1.968	2.155	0.560	0.000	0.275	0.512	0.458	
6				2.041	1.891	1.965	2.214	0.427	0.279	0.359	0.300	0.727	
7				2.115	1.871	1.781	2.132	0.470	0.000	0.265	0.322	0.883	
8				2.027	1.914	1.775	0.596	0.452	0.000	0.249	0.322	2.434	
9				1.963	1.877	2.016	0.535	0.501	0.000	0.274	0.336	0.670	
10				1.951	2.044	2.112	2.039	0.503	0.000	0.257	0.288	0.330	
11				1.922	2.166	0.582	0.507	0.565	0.000	0.277	0.260	0.537	
12				1.914	1.960	0.000	2.409	0.447	0.000	0.317	0.311	2.022	
13				2.064	1.844	2.016	2.281	0.455	0.000	0.265	0.399	2.377	
14				1.960	1.818	1.868	2.095	0.455	0.000	0.223	1.591	2.779	
15				1.894	1.841	2.138	2.096	0.506	0.000	0.241	1.897	2.616	
16				1.883	2.022	2.013	0.853	0.489	0.959	0.268	0.000	0.480	
17				1.963	1.950	2.056	0.497	0.091	0.774	0.244	0.907	0.973	
18				1.844	1.973	2.118	1.547	0.000	1.673	0.343	0.863	2.672	
19				2.066	2.027	2.101	0.859	0.000	0.741	0.354	1.827	2.536	
20				2.106	1.874	1.919	2.052	0.000	0.000	0.486	2.018	2.573	
21				2.081	1.880	0.588	2.076	0.101	2.344	0.286	0.661	2.663	
22				1.988	0.698	1.012	2.096	1.648	2.559	0.336	1.652	1.553	
23				1.917	1.224	1.739	0.350	0.000	2.448	0.342	0.673	0.676	
24				1.858	2.041	2.007	0.275	0.000	1.317	0.353	0.749	2.355	
25				1.854	2.117	1.905	0.469	2.822	0.289	0.364	0.546	2.358	
26				2.090	1.897	1.869	0.543	2.972	0.707	0.390	0.387	2.469	
27				1.991	1.891	1.902	0.424	1.849	0.880	1.112	1.578	2.575	
28				2.123	1.934	1.905	2.035	0.690	0.600	0.328	1.902	2.703	
29				2.109	1.926	1.965	0.545	0.651	0.504	0.430	0.545	2.575	
30				2.076	--	2.066	0.523	1.547	0.750	0.342	2.219	1.159	*9-months*
31		--		2.007	--	2.022	--	2.154	--	0.359	1.436	--	**Annual**
Avg	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**1.994**	**1.876**	**1.783**	**1.309**	**0.732**	**0.735**	**0.340**	**0.833**	**1.581**	**1.238**
Max	0.000	0.000	0.000	2.123	2.166	2.138	2.409	2.972	2.559	1.112	2.219	2.779	**2.972**
Min	0.000	0.000	0.000	1.844	0.698	0.000	0.275	0.000	0.000	0.184	0.000	0.296	**0.000**
ac-ft	*#DIV/0!*	*#DIV/0!*	*#DIV/0!*	*123*	*108*	*110*	*78*	*45*	*44*	*21*	*51*	*94*	***673***
#Days	0	0	0	31	29	31	30	31	30	31	31	30	**274**

Plum Creek Watershed Ammonia-Nitrogen Loadings

MONITORING SITE 001A -- Plum Creek Wastewater Authority Effluent Discharges

Notes: *PCWA-WWTP Effluent Discharges (Site 001A); Source: PCWA (Jeff), 6/12/00*

Loadings estimated by interpolating NH3-N concentrations from intermittent sampling surveys.

1996 Water Year Ammonia-Nitrogen Loadings

Daily Loadings, in pounds per day

Day	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Sept	
1	0.00	0.00	0.00	14.62	21.78	34.18	6.41	0.00	9.17	1.82	2.68	3.20	
2	0.00	0.00	0.00	14.09	23.16	12.19	4.38	1.62	5.77	0.75	2.71	2.77	
3	0.00	0.00	0.00	14.51	47.59	11.59	7.87	0.63	0.68	1.12	0.53	3.07	
4	0.00	0.00	0.00	14.84	51.57	12.39	13.14	0.55	0.99	1.17	0.36	3.00	
5	0.00	0.00	0.00	14.04	45.09	12.01	13.53	0.60	0.00	1.78	0.65	4.29	
6	0.00	0.00	0.00	14.75	45.47	11.99	24.20	0.46	0.70	3.19	0.38	6.81	
7	0.00	0.00	0.00	19.42	44.98	10.86	33.21	0.51	0.00	2.35	0.41	1.23	
8	0.00	0.00	0.00	22.69	46.02	10.83	9.28	0.49	0.00	2.21	0.26	3.40	
9	0.00	0.00	0.00	21.98	45.13	27.34	8.34	0.54	0.00	2.43	0.13	0.94	
10	0.00	0.00	0.00	21.84	49.03	44.41	31.77	0.54	0.00	2.28	0.11	0.46	
11	0.00	0.00	0.00	21.51	51.96	12.23	7.91	2.49	0.00	2.46	0.10	0.75	
12	0.00	0.00	0.00	21.43	47.02	0.00	37.53	1.97	0.00	2.82	0.12	2.83	
13	0.00	0.00	0.00	17.85	44.24	42.39	27.49	2.00	0.00	1.16	0.15	3.32	
14	0.00	0.00	0.00	12.08	43.61	39.27	17.87	2.00	0.00	0.97	0.61	22.88	
15	0.00	0.00	0.00	11.55	44.17	44.96	17.88	2.23	0.00	1.06	0.73	21.54	
16	0.00	0.00	0.00	11.49	48.51	44.11	7.27	2.15	1.68	3.23	0.00	3.949	
17	0.00	0.00	0.00	11.98	52.37	45.06	4.24	0.40	1.35	2.95	0.78	8.012	
18	0.00	0.00	0.00	11.25	59.82	46.42	13.20	0.00	2.92	4.15	0.75	21.999	
19	0.00	0.00	0.00	12.60	61.47	46.05	7.32	0.00	1.29	4.28	1.58	20.878	
20	0.00	0.00	0.00	24.01	56.82	42.05	24.55	0.00	0.00	5.87	1.74	21.184	
21	0.00	0.00	0.00	34.76	57.01	12.88	31.98	0.48	4.10	3.46	0.57	2.13	
22	0.00	0.00	0.00	33.21	21.16	22.18	32.29	7.93	10.70	2.98	1.43	1.24	
23	0.00	0.00	0.00	32.02	37.11	16.79	5.38	0.00	10.24	3.04	0.58	0.54	
24	0.00	0.00	0.00	31.04	48.83	19.37	4.24	0.00	5.51	3.13	1.04	1.88	
25	0.00	0.00	0.00	30.96	37.11	18.39	7.22	13.94	1.21	3.23	0.76	1.885	
26	0.00	0.00	0.00	34.91	33.26	18.04	8.36	14.68	2.96	4.71	0.54	1.975	
27	0.00	0.00	0.00	28.60	33.15	18.36	6.53	9.13	3.68	9.88	2.19	2.059	
28	0.00	0.00	0.00	25.52	33.91	18.39	2.46	3.41	2.48	2.91	2.64	2.994	
29	0.00	0.00	0.00	25.36	33.77	18.97	0.66	3.22	2.06	3.82	0.75	2.852	
30	0.00	0.00	0.00	24.97	--	19.94	0.63	7.64	3.06	3.04	3.08	1.284	*9 months*
31	0.00	--	0.00	24.13	--	12.70	--	10.64	--	3.19	13.44	--	**Annual**
Avg	**0.00**	**0.00**	**0.00**	**21.10**	**43.63**	**24.08**	**13.90**	**2.91**	**2.35**	**2.95**	**1.35**	**5.84**	**13.0**
Max	0.00	0.00	0.00	34.91	61.47	46.42	38	15	11	9.88	13.44	22.88	**61**
Min	0.00	0.00	0.00	11.25	21.16	0.00	0.63	0.00	0.00	0.75	0.00	0.461	**0.00**
Cumul.	*0*	*0*	*0*	*654*	*1265*	*746*	*417*	*90*	*71*	*91*	*42*	*175*	***3552***
#Days	31	30	31	31	29	31	30	31	30	31	31	30	274

Plum Creek Watershed Ammonia-Nitrogen Loadings

MONITORING SITE 001A -- Plum Creek Wastewater Authority Effluent Discharges

Notes: *PCWA-WWTP Effluent Discharges (Site 001A); Source: PCWA (Jeff), 6/12/00*

Loadings estimated by interpolating NH3-N concentrations from intermittent sampling surveys.

1997 Water Year Flows

Daily Effluent Flows, in cubic feet per second

Day	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Sept	
1	0.633	2.278	2.472	2.279	1.623	2.589	0.845	2.192	0.671	0.153	0.314	2.081	
2	1.993	2.387	2.392	2.338	1.872	2.589	1.249	2.307	0.760	0.034	3.082	2.616	
3	2.429	0.887	2.214	2.270	1.136	2.533	0.866	2.307	0.738	0.000	2.570	1.391	
4	0.497	0.899	2.604	2.335	1.690	1.864	2.305	1.516	0.772	0.000	2.609	3.070	
5	0.340	1.881	2.281	2.454	1.758	2.222	2.759	1.116	1.755	0.000	3.096	2.768	
6	2.360	2.202	2.356	2.166	1.741	2.366	0.959	1.518	1.125	0.000	3.065	2.720	
7	0.489	2.308	2.395	2.363	2.052	2.032	2.321	1.111	3.243	0.000	2.839	2.589	
8	1.509	2.197	2.284	1.909	2.052	2.312	0.761	1.171	2.067	0.000	2.630	2.285	
9	1.881	2.310	2.194	2.209	2.052	2.418	1.640	1.247	2.816	0.045	2.630	1.261	
10	0.942	1.211	0.580	2.442	2.178	2.370	2.321	1.846	2.873	0.772	2.630	1.402	
11	0.504	1.026	1.560	2.666	1.807	2.146	2.415	1.047	2.069	1.751	2.742	1.960	
12	1.293	1.352	2.135	1.767	1.863	2.278	2.415	1.235	2.585	1.032	2.013	0.803	
13	2.378	1.621	2.462	2.265	1.878	2.090	2.415	0.000	2.582	1.032	2.352	2.636	
14	1.372	1.521	2.262	2.092	3.319	2.448	2.214	1.129	2.582	1.034	2.483	1.654	
15	0.681	1.762	2.353	2.146	3.220	2.448	0.894	1.129	2.582	1.032	2.356	0.699	
16	1.572	2.401	2.383	2.250	3.311	2.448	1.666	1.021	0.896	1.010	2.528	0.583	
17	2.298	2.472	2.307	2.827	3.552	2.644	2.161	0.964	1.685	1.159	3.068	0.900	
18	0.916	2.403	2.305	2.115	2.191	2.465	1.815	2.339	2.712	1.188	2.324	1.091	
19	2.086	2.230	2.517	2.112	2.695	0.543	2.322	1.324	0.724	1.173	2.438	2.151	
20	2.240	2.338	3.077	2.001	3.269	1.868	0.933	1.037	0.681	1.266	2.395	2.469	
21	2.398	2.196	2.056	0.529	3.249	2.325	1.119	0.905	1.306	1.083	2.414	2.729	
22	0.801	2.324	1.796	1.770	3.249	1.519	1.052	3.187	2.802	0.863	0.398	2.168	
23	1.423	2.367	2.412	1.725	3.249	1.790	1.099	2.488	0.625	0.596	1.532	1.875	
24	1.123	2.415	2.356	1.953	3.323	1.524	1.057	2.510	0.806	0.780	1.574	1.874	
25	2.496	2.398	2.127	1.953	3.203	2.206	1.068	2.510	0.654	0.026	2.332	2.489	
26	2.558	2.406	2.253	1.953	3.271	2.140	1.068	1.905	0.681	0.000	2.780	2.469	
27	2.567	2.386	2.349	1.683	2.434	0.429	1.068	2.438	0.634	0.000	2.811	2.780	
28	2.329	2.373	2.271	1.509	2.589	1.224	2.599	1.623	0.774	0.378	2.186	2.780	
29	2.381	2.211	2.261	1.642	--	2.539	1.051	0.774	0.774	0.077	0.271	1.714	
30	2.322	2.284	2.321	1.592	--	2.709	1.868	0.808	0.549	0.008	2.081	0.767	
31	2.250	--	2.240	1.578	--	1.017	--	2.409	--	0.000	2.081	--	**Annual**
Avg	**1.647**	**2.035**	**2.244**	**2.029**	**2.494**	**2.067**	**1.611**	**1.584**	**1.517**	**0.532**	**2.278**	**1.959**	**1.828**
Max	2.567	2.472	3.077	2.827	3.552	2.709	2.759	3.187	3.243	1.751	3.096	3.070	**3.552**
Min	0.340	0.887	0.580	0.529	1.136	0.429	0.761	0.000	0.549	0.000	0.271	0.583	**0.000**
ac-ft	*101*	*121*	*138*	*125*	*138*	*127*	*96*	*97*	*90*	*33*	*140*	*117*	***1324***
#Days	31	30	31	31	28	31	30	31	30	31	31	30	**365**

Plum Creek Watershed Ammonia-Nitrogen Loadings

MONITORING SITE 001A -- Plum Creek Wastewater Authority Effluent Discharges

Notes: *PCWA-WWTP Effluent Discharges (Site 001A); Source: PCWA (Jeff), 6/12/00*

Loadings estimated by interpolating NH3-N concentrations from intermittent sampling surveys.

1997 Water Year Ammonia-Nitrogen Loadings

Daily Loadings, in pounds per day

Day	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Sept	
1	1.04	8.93	14.83	25.71	20.70	7.85	20.69	7.85	0.00	18.84	65.71	2.48	
2	0.74	10.30	13.25	27.22	18.55	7.20	19.39	10.07	2.42	13.98	35.30	5.61	
3	1.16	12.27	14.05	46.91	18.05	7.01	27.45	24.53	2.89	13.21	8.84	14.10	
4	1.94	9.06	14.11	46.91	19.48	6.98	74.90	16.39	1.09	13.25	8.98	16.47	
5	5.26	8.86	15.25	45.04	21.66	7.11	107.05	13.85	7.89	13.82	9.51	15.70	
6	1.53	9.18	15.48	40.06	21.04	6.92	105.03	26.43	18.34	1.64	8.72	39.95	
7	3.03	9.45	20.70	41.58	22.35	7.89	98.23	29.42	19.30	4.57	5.47	41.33	
8	3.15	9.45	20.10	43.18	26.76	12.58	98.76	26.78	4.47	4.59	8.74	50.86	
9	3.36	35.10	18.83	43.34	24.78	11.86	102.00	29.41	20.84	4.64	8.10	40.38	
10	5.94	34.08	19.53	43.99	23.86	11.78	98.33	39.73	25.40	7.46	7.46	12.72	
11	6.96	32.37	19.56	68.94	22.74	11.32	106.89	55.18	25.45	3.65	4.50	4.91	
12	4.00	33.58	19.77	67.12	22.00	11.53	25.74	46.82	12.11	2.88	6.78	31.46	
13	3.76	35.96	37.80	64.32	20.74	11.79	26.26	45.70	8.45	3.34	4.53	5.86	
14	2.69	35.58	55.71	63.88	22.71	12.04	21.00	36.69	6.54	3.81	2.31	6.59	
15	2.70	36.08	58.39	65.21	23.72	11.26	25.57	28.05	14.72	5.33	6.78	5.53	
16	3.55	117.38	54.38	65.17	23.51	10.49	26.38	47.99	10.46	7.32	2.10	4.366	
17	3.91	101.92	56.39	66.55	20.89	8.90	24.62	19.31	8.51	10.92	13.90	2.004	
18	4.22	87.57	56.61	58.39	22.00	6.33	30.54	4.95	15.53	5.00	5.02	1.434	
19	11.31	87.39	54.70	50.90	22.24	2.26	33.75	2.34	11.52	4.75	10.17	1.212	
20	5.66	104.32	57.87	50.23	22.33	6.18	33.96	0.40	11.91	4.78	12.43	5.356	
21	7.89	100.07	54.35	46.16	22.34	10.72	35.28	0.73	12.83	15.60	13.42	20.29	
22	10.35	115.10	50.94	47.71	13.07	30.89	33.98	0.79	13.76	15.97	12.11	55.20	
23	5.63	25.59	48.24	48.13	12.60	11.55	21.81	2.48	12.94	16.19	12.37	51.84	
24	7.68	24.41	46.48	48.92	13.11	5.60	18.79	5.71	12.98	16.36	9.15	22.35	
25	12.30	23.80	47.02	52.83	12.74	5.43	29.51	7.44	12.80	53.92	0.46	29.395	
26	9.38	24.75	47.02	58.53	12.69	5.26	26.81	0.00	12.73	73.66	6.66	25.937	
27	9.97	25.14	48.69	55.96	12.52	12.14	18.85	0.29	12.99	75.45	6.26	16.063	
28	9.22	25.44	48.69	55.64	13.45	28.01	12.43	0.00	18.33	60.94	1.30	7.459	
29	8.58	25.44	26.60	56.98	--	31.27	17.35	0.00	19.08	64.69	1.69	3.961	
30	9.11	14.70	25.42	57.97	--	11.81	17.03	14.38	18.12	49.94	14.87	4.240	
31	0.02	--	25.72	59.80	--	23.35	--	4.58	--	69.97	7.86	--	**Annual**
Avg	**5.36**	**40.8**	**35.7**	**52.0**	**19.7**	**11.5**	**44.6**	**17.7**	**12.5**	**21.3**	**10.4**	**18.2**	**10.4**
Max	12.30	117.38	58.39	68.94	26.76	31.27	107	55	25	75.45	65.71	55.20	**117**
Min	0.02	8.86	13.25	25.71	12.52	2.26	12.43	0.00	0.00	1.64	0.46	1.212	**0.00**
Cumul.	*166*	*1223*	*1106*	*1613*	*553*	*355*	*1338*	*548*	*374*	*660*	*321*	*545*	***3788***
#Days	31	30	31	31	28	31	30	31	30	31	31	30	365

Plum Creek Watershed Ammonia-Nitrogen Loadings

MONITORING SITE 001A -- Plum Creek Wastewater Authority Effluent Discharges

Notes: *PCWA-WWTP Effluent Discharges (Site 001A); Source: PCWA (Jeff), 6/12/00*

Loadings estimated by interpolating NH3-N concentrations from intermittent sampling surveys.

1998 Water Year Flows

Daily Effluent Flows, in cubic feet per second

Day	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Sept	
1	0.939	2.833	2.658	2.630	2.841	2.800	1.985	1.468	0.000	2.079	3.579	0.407	
2	0.664	2.831	2.375	2.785	2.547	2.570	1.860	1.465	0.452	1.543	3.382	0.919	
3	1.044	3.373	2.517	2.808	2.477	2.503	2.633	3.235	0.540	1.457	3.518	2.312	
4	1.753	2.491	2.528	2.808	2.674	2.491	3.350	2.161	0.204	1.462	3.577	2.700	
5	1.753	2.437	2.734	2.697	2.974	2.539	3.116	1.827	1.475	1.546	3.788	2.573	
6	0.509	2.525	2.774	2.398	2.889	2.471	3.057	3.486	3.429	0.186	3.470	2.731	
7	1.009	2.599	2.774	2.489	3.068	2.816	2.859	3.880	2.545	0.518	2.180	2.825	
8	1.049	2.599	2.694	2.585	3.159	2.805	2.875	3.532	0.589	0.520	3.480	3.477	
9	1.119	2.599	2.524	2.595	2.926	2.646	2.969	3.879	2.749	0.526	3.480	2.760	
10	1.979	2.524	2.616	2.633	2.818	2.627	2.862	3.413	3.350	0.845	3.480	0.870	
11	2.318	2.397	2.621	2.633	2.684	2.525	3.111	3.515	3.357	0.413	2.098	0.336	
12	2.576	2.486	2.649	2.564	2.598	2.571	3.104	2.983	1.597	0.430	3.164	2.151	
13	2.425	2.663	2.664	2.457	2.449	2.629	3.167	2.912	1.114	0.781	2.112	1.877	
14	1.733	2.635	2.664	2.440	2.681	2.684	2.533	2.338	1.143	0.832	1.075	2.110	
15	1.739	2.672	2.793	2.491	2.743	2.739	3.084	1.787	2.576	1.165	3.161	1.773	
16	2.290	2.949	2.601	2.489	2.718	2.553	3.181	3.057	1.830	0.767	0.565	1.399	
17	2.522	2.561	2.697	2.542	2.415	2.165	2.969	1.821	1.488	1.145	2.632	0.642	
18	2.717	2.200	2.708	2.542	2.544	1.541	3.682	0.899	2.717	0.525	0.950	0.460	
19	2.735	2.196	2.616	2.589	2.571	0.551	3.562	0.424	2.016	0.498	1.925	0.388	
20	1.369	2.621	2.768	2.554	2.582	1.502	3.186	0.073	2.084	0.501	2.352	0.443	
21	1.908	2.514	2.768	2.347	2.584	2.609	3.310	0.133	2.062	0.849	2.541	0.962	
22	2.503	2.892	2.774	2.426	2.584	3.220	3.187	0.144	2.213	0.870	2.293	2.618	
23	1.362	2.650	2.627	2.448	2.491	1.204	2.045	0.450	2.081	0.882	3.005	2.459	
24	1.858	2.528	2.531	2.488	2.592	0.583	1.762	0.754	2.087	0.891	3.102	1.060	
25	2.975	2.465	2.561	2.488	2.519	0.566	2.768	0.981	2.058	2.937	0.155	1.394	
26	2.975	2.564	2.561	2.567	2.508	0.548	3.902	0.000	2.047	4.012	2.259	1.230	
27	3.164	2.604	2.652	2.454	2.476	1.266	2.743	0.039	2.089	4.109	2.121	1.312	
28	2.926	2.635	2.652	2.440	2.658	2.920	1.809	0.000	2.022	3.319	0.439	2.194	
29	2.722	2.635	2.722	2.499	--	3.000	2.525	0.000	2.106	3.523	0.572	1.165	
30	2.892	2.635	2.601	2.542	--	1.133	2.479	1.897	1.999	2.720	2.437	1.247	
31	0.006	--	2.632	2.623	--	2.240	--	0.857	--	3.811	1.289	--	**Annual**
Avg	**1.920**	**2.610**	**2.647**	**2.550**	**2.670**	**2.162**	**2.856**	**1.723**	**1.867**	**1.473**	**2.393**	**1.626**	**2.204**
Max	3.164	3.373	2.793	2.808	3.159	3.220	3.902	3.880	3.429	4.109	3.788	3.477	**4.109**
Min	0.006	2.196	2.375	2.347	2.415	0.548	1.762	0.000	0.000	0.186	0.155	0.336	**0.000**
ac-ft	*118*	*155*	*163*	*157*	*148*	*133*	*170*	*106*	*111*	*91*	*147*	*97*	***1596***
#Days	31	30	31	31	28	31	30	31	30	31	31	30	**365**

Plum Creek Watershed Ammonia-Nitrogen Loadings

MONITORING SITE 001A -- Plum Creek Wastewater Authority Effluent Discharges

Notes: PCWA-WWTP Effluent Discharges (Site 001A); Source: PCWA (Jeff), 6/12/00

Loadings estimated by interpolating NH3-N concentrations from intermittent sampling surveys.

1998 Water Year Ammonia-Nitrogen Loadings

Daily Loadings, in pounds per day

Day	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Sept	
1	3.19	40.10	14.09	8.23	17.84	15.66	9.34	4.57	0.00	17.00	8.86	8.32	
2	2.26	40.08	12.59	11.72	15.99	14.37	8.75	2.75	1.41	12.61	8.37	14.32	
3	3.66	47.75	13.34	14.85	15.55	14.00	12.38	6.07	1.43	11.91	8.71	10.64	
4	6.33	35.26	13.40	14.85	16.79	13.93	10.79	4.06	0.54	1.35	13.67	12.43	
5	6.33	34.50	14.49	14.26	18.67	14.20	10.04	3.43	3.88	1.43	7.94	23.75	
6	1.84	35.74	14.84	12.68	18.14	13.82	9.85	6.55	18.22	0.17	7.28	37.85	
7	3.64	36.80	14.84	13.17	39.98	8.89	9.21	7.29	20.35	0.46	4.57	39.16	
8	3.79	15.40	14.41	13.67	41.17	8.86	9.26	6.63	4.71	0.72	38.54	45.30	
9	4.04	15.40	13.50	14.85	38.13	8.35	9.57	6.92	9.82	0.73	38.54	14.47	
10	7.15	14.95	13.99	16.22	36.71	8.29	9.22	6.09	25.40	1.17	38.54	4.56	
11	9.76	14.20	14.02	16.22	34.98	7.97	22.48	6.27	25.45	1.01	7.31	2.10	
12	10.85	14.73	14.17	15.79	33.85	8.12	22.43	5.32	12.11	1.05	10.78	15.67	
13	10.21	15.77	13.03	15.13	31.92	8.30	22.89	5.19	7.72	1.90	7.19	13.67	
14	7.30	15.61	11.80	15.03	34.62	15.04	18.30	4.17	7.92	1.93	3.66	5.55	
15	7.32	14.83	12.37	15.34	35.42	15.34	22.28	3.19	17.85	3.91	52.80	3.37	
16	9.64	16.37	11.52	15.34	35.10	14.30	22.99	10.01	11.49	1.57	9.43	4.855	
17	10.62	14.21	11.95	30.41	31.19	12.13	21.46	5.96	12.61	2.22	43.96	2.229	
18	15.55	12.21	12.00	30.41	32.84	8.63	8.42	2.94	23.01	1.02	21.66	1.595	
19	15.65	12.18	11.59	30.97	33.20	3.09	8.14	1.39	17.08	0.96	8.29	2.852	
20	7.83	14.55	15.07	30.56	33.34	8.42	7.28	0.24	24.81	0.99	10.13	3.250	
21	10.92	13.95	17.87	28.08	28.93	18.70	7.57	0.44	24.55	1.68	10.94	7.07	
22	14.32	13.36	17.91	29.03	28.93	23.08	7.29	0.29	26.34	1.72	14.67	11.60	
23	7.79	12.24	16.96	29.29	27.89	8.63	4.68	0.33	8.55	2.58	19.22	12.03	
24	10.63	11.68	16.34	19.75	29.01	4.18	4.03	0.55	8.58	2.72	19.84	5.19	
25	11.01	11.39	16.53	19.75	28.20	4.06	9.77	0.72	9.70	8.96	0.80	6.820	
26	11.01	11.84	16.53	20.37	28.08	3.93	13.77	0.00	9.65	7.91	8.39	7.431	
27	11.71	12.03	8.29	19.48	27.71	9.07	9.68	0.03	9.85	8.11	7.88	7.927	
28	10.83	12.17	8.29	19.37	14.86	13.73	6.38	0.00	6.26	9.69	1.63	13.255	
29	10.07	13.97	8.51	19.83	--	14.11	8.91	0.00	6.52	10.75	6.91	4.299	
30	10.70	13.97	8.13	20.18	--	5.33	8.75	5.91	6.31	8.30	49.80	3.545	
31	0.02	--	8.23	16.47	--	10.54	--	2.67	--	11.62	26.34	--	**Annual**
Avg	**8.26**	**19.6**	**13.2**	**19.1**	**28.9**	**10.9**	**11.9**	**3.55**	**12.1**	**4.46**	**16.7**	**11.5**	**5.01**
Max	15.65	47.75	17.91	30.97	41.17	23.08	22.99	10.01	26.34	17.00	52.80	45.30	**53**
Min	0.02	11.39	8.13	8.23	14.86	3.09	4.03	0.00	0.00	0.17	0.80	1.595	**0.00**
Cumul.	*256*	*587*	*411*	*591*	*809*	*337*	*356*	*110*	*362*	*138*	*517*	*345*	***1828***
#Days	31	30	31	31	28	31	30	31	30	31	31	30	365

Plum Creek Watershed Ammonia-Nitrogen Loadings

MONITORING SITE 001A -- Plum Creek Wastewater Authority Effluent Discharges

Notes: *PCWA-WWTP Effluent Discharges (Site 001A); Source: PCWA (Jeff), 6/12/00*

Loadings estimated by interpolating NH3-N concentrations from intermittent sampling surveys.

1999 Water Year Flows

Daily Effluent Flows, in cubic feet per second

Day	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Sept	
1	2.008	2.838	2.595	2.993	2.759	1.526	0.788	5.121	3.447	0.487	5.147	2.021	
2	2.052	3.163	2.573	3.121	2.687	1.048	0.967	4.568	2.829	0.407	2.713	2.385	
3	1.965	2.669	2.542	3.349	2.668	2.507	0.723	4.031	1.904	1.076	3.127	3.113	
4	2.759	2.468	2.556	3.005	2.671	1.641	0.677	3.780	1.058	1.130	4.686	3.206	
5	2.927	2.364	2.329	2.988	2.615	2.640	0.710	3.501	0.948	1.135	4.733	1.276	
6	1.858	2.610	2.960	2.925	2.896	2.802	0.718	3.424	1.744	0.407	4.483	1.490	
7	1.535	2.579	3.348	2.872	3.001	2.669	0.716	3.295	1.097	0.544	4.384	1.751	
8	2.324	2.862	2.934	2.840	2.757	2.622	0.869	3.584	0.207	1.057	4.562	1.813	
9	0.801	3.108	3.277	3.083	2.623	2.728	1.875	3.619	1.427	1.052	4.126	1.788	
10	2.114	2.833	2.793	3.195	2.646	2.622	1.982	3.455	2.922	1.834	3.355	0.533	
11	2.284	2.646	3.053	2.783	2.882	1.196	2.810	1.712	3.773	2.084	2.969	1.965	
12	2.780	2.671	3.306	2.686	2.898	0.644	2.806	2.792	3.404	0.961	1.462	1.624	
13	0.407	2.624	3.286	2.708	2.898	0.645	1.386	1.145	3.606	0.757	1.181	1.880	
14	1.832	2.525	3.650	2.699	2.898	2.685	2.278	0.369	3.508	0.454	1.953	3.030	
15	1.032	2.739	3.427	2.621	2.882	2.638	3.260	2.267	2.329	1.944	1.924	2.326	
16	1.052	3.026	3.068	2.922	2.733	0.497	2.952	2.647	2.586	2.882	2.428	1.623	
17	2.205	2.615	2.850	2.967	2.766	0.883	3.489	1.367	3.330	2.639	2.762	0.871	
18	2.703	2.576	2.858	2.909	2.751	0.910	3.498	2.332	2.880	0.821	2.057	2.097	
19	2.830	2.547	2.927	2.699	2.620	0.892	3.195	1.875	3.399	2.723	1.813	3.484	
20	1.116	2.604	3.074	2.679	2.944	0.904	2.877	2.520	3.424	3.191	3.105	3.271	
21	0.265	2.875	3.043	2.632	3.118	1.014	1.664	3.820	1.721	2.944	2.182	2.648	
22	1.652	3.040	2.972	2.653	2.817	1.114	3.866	2.113	1.711	2.304	2.019	2.967	
23	1.894	3.291	2.421	2.900	2.633	1.098	3.692	2.439	3.245	1.364	2.231	1.581	
24	2.095	2.593	2.994	3.066	2.813	1.111	3.906	2.286	1.016	0.340	1.174	1.823	
25	2.005	1.423	3.014	2.855	2.679	1.127	4.367	3.944	0.739	1.547	0.541	2.083	
26	1.287	2.455	2.875	2.667	2.599	1.132	3.121	3.189	2.692	2.038	1.539	1.582	
27	2.643	2.680	3.115	2.721	3.020	1.107	3.084	2.002	1.074	0.368	1.679	2.376	
28	2.657	2.582	3.190	2.699	3.020	1.147	3.480	1.379	0.473	1.613	2.523	3.245	
29	2.655	2.669	3.067	2.703	--	0.958	3.951	2.884	0.546	4.372	3.350	3.120	
30	2.182	3.093	3.028	2.977	--	0.603	3.337	2.295	0.477	4.788	3.350	2.506	
31	2.457	--	2.920	3.026	--	0.604	--	3.635	--	5.148	2.005	--	**Annual**
Avg	**1.948**	**2.692**	**2.969**	**2.869**	**2.796**	**1.475**	**2.435**	**2.819**	**2.117**	**1.755**	**2.760**	**2.183**	**2.399**
Max	2.927	3.291	3.650	3.349	3.118	2.802	4.367	5.121	3.773	5.148	5.147	3.484	**5.148**
Min	0.265	1.423	2.329	2.621	2.599	0.497	0.677	0.369	0.207	0.340	0.541	0.533	**0.207**
ac-ft	*120*	*160*	*183*	*176*	*155*	*91*	*145*	*173*	*126*	*108*	*170*	*130*	***1737***
#Days	31	30	31	31	28	31	30	31	30	31	31	30	**365**

Plum Creek Watershed Ammonia-Nitrogen Loadings

MONITORING SITE 001A -- Plum Creek Wastewater Authority Effluent Discharges

Notes: PCWA-WWTP Effluent Discharges (Site 001A); Source: PCWA (Jeff), 6/12/00

Loadings estimated by interpolating NH3-N concentrations from intermittent sampling surveys.

1999 Water Year Ammonia-Nitrogen Loadings

Daily Loadings, in pounds per day

Day	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Sept	
1	5.71	101.85	17.06	39.53	53.10	35.24	4.19	23.17	12.53	0.70	27.87	17.48	
2	7.41	113.51	23.77	48.34	35.34	11.18	5.15	20.67	10.64	0.58	**14.69**	20.63	
3	8.61	15.08	17.32	59.51	29.08	33.70	6.26	18.24	7.16	4.69	21.54	26.92	
4	12.09	19.88	17.41	53.40	29.11	22.06	5.85	11.75	3.98	4.92	54.12	89.81	
5	7.39	19.04	15.86	44.43	28.50	52.85	6.14	9.39	5.84	4.94	54.66	35.75	
6	6.41	21.03	20.16	36.73	56.27	91.10	2.52	9.19	10.75	1.06	51.78	41.75	
7	5.29	22.30	22.81	36.06	58.29	86.79	**2.41**	15.93	6.76	1.03	50.63	22.51	
8	8.01	24.75	15.64	35.66	53.57	60.10	2.92	25.05	0.61	2.00	52.69	2.84	
9	3.83	26.88	17.35	39.26	22.99	40.89	6.30	25.29	3.46	1.99	**47.66**	2.80	
10	12.89	36.24	14.79	40.69	30.72	35.72	15.49	11.71	7.08	17.06	36.17	0.83	
11	13.93	113.14	16.16	35.45	33.45	16.29	21.97	6.46	9.14	19.38	28.66	3.74	
12	16.96	114.20	20.31	27.04	33.65	8.77	21.94	**10.53**	7.86	8.94	14.12	3.09	
13	2.30	112.22	22.97	27.59	59.05	10.54	5.60	4.32	8.33	3.34	11.40	3.57	
14	10.38	22.73	25.51	27.50	59.05	51.20	11.61	1.73	8.10	1.12	29.96	8.78	
15	5.85	24.66	23.95	26.70	58.72	50.31	16.62	12.77	6.77	**4.79**	29.51	7.59	
16	5.96	27.25	16.81	66.98	31.90	9.49	15.06	3.14	**0.54**	8.02	37.24	5.30	
17	28.34	51.11	14.45	68.01	34.73	8.95	34.10	5.43	0.69	7.35	24.04	2.84	
18	34.74	95.52	14.49	66.67	34.54	12.02	34.18	9.27	0.60	2.28	16.81	5.01	
19	36.37	94.43	17.39	36.93	32.90	12.31	31.22	7.45	11.09	4.27	14.82	8.32	
20	6.24	86.99	20.94	33.16	61.20	12.47	14.88	8.99	11.18	5.01	25.38	7.81	
21	3.43	85.48	20.73	32.58	64.82	19.82	7.97	10.27	5.62	4.62	30.63	8.78	
22	21.43	90.40	42.78	32.84	58.56	21.78	18.53	5.68	3.27	40.53	28.34	13.64	
23	24.57	45.42	13.68	51.20	32.91	12.61	17.69	6.56	8.55	7.38	31.32	7.27	
24	132.77	23.81	16.92	54.12	35.66	9.46	23.14	17.06	2.68	1.84	15.16	8.38	
25	127.08	13.07	17.03	50.39	33.96	6.24	25.87	29.44	1.95	8.37	**7.11**	12.46	
26	81.58	22.54	33.58	33.80	55.96	6.26	18.48	8.58	12.18	3.20	20.24	9.47	
27	143.22	24.60	55.16	31.26	91.75	9.92	16.00	5.38	4.86	6.47	22.08	14.21	
28	82.29	16.98	56.50	31.01	91.78	14.19	16.61	3.71	2.14	8.73	41.39	11.22	
29	82.25	17.55	54.31	31.06	--	11.86	18.86	21.52	0.59	23.67	54.96	20.33	
30	67.58	20.33	50.22	57.31	--	3.24	15.93	17.12	0.68	25.92	54.96	**16.33**	
31	88.19	--	38.56	58.25	--	3.22	--	27.12	--	27.87	18.89	--	**Annual**
Avg	**35.26**	**50.10**	**24.99**	**42.37**	**46.48**	**25.18**	**14.78**	**12.68**	**5.85**	**8.45**	**31.25**	**14.65**	**25.9**
Max	143.22	114.20	56.50	68.01	91.78	91.10	34.2	29.4	12.53	40.53	54.96	89.81	**143**
Min	2.30	13.07	13.68	26.70	22.99	3.22	2.41	1.73	0.54	0.58	7.11	0.83	**0.54**
Cumul.	*1093*	*1503*	*775*	*1313*	*1302*	*781*	*443*	*393*	*176*	*262*	*969*	*439*	***9449***
#Days	31	30	31	31	28	31	30	31	30	31	31	30	365

Plum Creek Watershed Ammonia-Nitrogen Loadings

MONITORING SITE 001A -- Plum Creek Wastewater Authority Effluent Discharges

Notes: *PCWA-WWTP Effluent Discharges (Site 001A); Source: PCWA (Jeff), 6/12/00*

Loadings estimated by interpolating NH3-N concentrations from intermittent sampling surveys.

2000 Water Year Flows

Daily Effluent Flows, in cubic feet per second

Day	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Sept	
1	2.330	2.538	2.914	3.116	3.002	2.041	3.691	1.281	1.726				
2	2.642	2.596	3.034	3.403	3.021	1.871	3.770	0.820	1.738				
3	3.315	2.411	3.429	3.330	2.970	2.966	3.605	0.866	2.869				
4	1.800	1.452	3.626	3.115	2.951	3.214	3.447	1.409	1.435				
5	0.996	0.696	2.133	3.156	3.212	3.360	3.421	1.255	1.626				
6	1.646	2.993	0.000	3.111	3.378	2.721	3.284	0.819	1.626				
7	2.256	3.399	1.547	2.958	3.155	3.206	1.986	1.179	1.446				
8	2.185	2.373	3.662	3.279	2.942	3.251	2.853	0.817	1.763				
9	2.188	1.472	3.707	3.448	2.894	3.108	2.738	0.822	1.810				
10	1.407	1.904	3.681	3.138	3.035	3.070	1.734	0.816	1.708				
11	1.315	1.675	4.103	3.160	2.904	3.351	2.819	0.920	1.674				
12	1.882	1.634	4.191	3.004	3.209	3.551	3.274	1.951					
13	2.076	3.235	3.841	3.017	3.320	2.133	1.684	2.285					
14	1.456	1.823	3.757	2.977	3.001	2.522	0.959	2.971					
15	1.482	1.628	3.739	3.224	3.069	3.195	1.190	1.967					
16	3.165	2.581	3.772	3.325	2.845	3.407	2.024	1.542					
17	3.229	2.459	3.754	3.256	2.830	3.333	1.550	2.035					
18	2.731	2.185	4.087	3.026	3.061	3.479	2.202	3.612					
19	2.988	2.851	4.125	2.993	3.222	3.646	1.898	3.597					
20	2.961	3.627	3.799	2.967	3.301	3.393	0.939	3.576					
21	2.989	3.040	3.713	2.953	3.241	3.371	2.015	3.732					
22	2.621	3.329	3.731	3.170	3.051	3.353	1.845	3.577					
23	2.353	3.099	3.843	3.395	3.009	3.216	1.667	1.786					
24	2.095	3.145	4.177	3.076	3.005	3.252	0.946	1.794					
25	2.097	3.287	3.885	2.952	2.218	3.397	1.061	2.819					
26	2.478	3.122	4.104	2.980	3.290	3.397	1.011	3.728					
27	2.577	3.045	4.015	2.380	3.429	3.134	1.172	2.084					
28	1.971	3.274	3.336	2.875	3.133	2.415	0.998	2.238					
29	1.748	3.113	3.331	3.208	2.949	3.139	1.816	2.201					
30	2.979	2.968	3.275	3.317	--	3.409	3.474	2.487					*8-months*
31	2.868	--	3.433	3.121	--	3.464	--	1.721	--			--	**Annual**
Avg	**2.285**	**2.565**	**3.476**	**3.111**	**3.057**	**3.109**	**2.169**	**2.023**	**1.766**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**2.607**
Max	3.315	3.627	4.191	3.448	3.429	3.646	3.770	3.732	2.869	0.000	0.000	0.000	4.191
Min	0.996	0.696	0.000	2.380	2.218	1.871	0.939	0.816	1.435	0.000	0.000	0.000	0.000
ac-ft	*140*	*153*	*214*	*191*	*176*	*191*	*129*	*124*	*39*	*#DIV/0!*	*#DIV/0!*	*#DIV/0!*	***1319***
#Days	31	30	31	31	29	31	30	31	11	0	0	0	**255**

Plum Creek Watershed Ammonia-Nitrogen Loadings

MONITORING SITE 001A -- Plum Creek Wastewater Authority Effluent Discharges

Notes: *PCWA-WWTP Effluent Discharges (Site 001A); Source: PCWA (Jeff), 6/12/00*

Loadings estimated by interpolating NH3-N concentrations from intermittent sampling surveys.

2000 Water Year Ammonia-Nitrogen Loadings

Daily Loadings, in pounds per day

Day	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Sept	
1	15.18	21.35	6.63	7.68	3.96	2.83	5.36	1.60	2.30	0.00	0.00	0.00	
2	30.83	13.13	6.90	8.39	4.94	3.67	5.86	1.03	2.32	0.00	0.00	0.00	
3	38.69	6.31	7.80	8.20	4.85	5.81	5.98	1.08	0.00	0.00	0.00	0.00	
4	21.00	3.80	22.16	10.46	48.23	6.30	5.72	1.76	0.00	0.00	0.00	0.00	
5	7.26	1.82	21.23	3.85	5.63	6.69	5.67	1.57	0.00	0.00	0.00	0.00	
6	6.41	30.67	0.00	3.80	5.92	5.50	3.77	1.02	0.00	0.00	0.00	0.00	
7	8.78	34.83	15.40	3.61	5.53	6.48	2.28	0.95	0.00	0.00	0.00	0.00	
8	8.50	24.32	6.96	10.41	27.01	6.57	3.28	0.66	0.00	0.00	0.00	0.00	
9	12.86	5.29	22.84	10.95	6.09	6.24	4.40	0.66	0.00	0.00	0.00	0.00	
10	8.27	7.81	22.67	9.96	6.38	6.16	2.78	0.66	0.00	0.00	0.00	0.00	
11	12.62	6.88	25.28	10.99	6.11	6.73	4.52	0.74	0.00	0.00	0.00	0.00	
12	14.16	6.71	4.52	5.91	9.05	6.98	4.29	1.57	0.00	0.00	0.00	0.00	
13	19.00	9.56	4.14	5.93	9.36	4.19	1.90	1.84	0.00	0.00	0.00	0.00	
14	13.32	5.39	4.05	12.89	8.46	4.96	1.08	3.47	0.00	0.00	0.00	0.00	
15	13.56	4.81	3.39	21.58	8.47	6.59	1.34	2.30	0.00	0.00	0.00	0.00	
16	22.68	9.22	5.52	22.26	4.89	8.50	1.95	18.17	0.00	0.00	0.00	0.00	
17	23.14	6.90	5.49	13.46	4.86	8.31	1.50	2.40	0.00	0.00	0.00	0.00	
18	19.57	6.13	40.42	5.56	5.26	8.68	2.13	4.26	0.00	0.00	0.00	0.00	
19	11.45	8.00	40.81	4.20	10.36	12.61	2.87	4.24	0.00	0.00	0.00	0.00	
20	14.35	8.64	16.65	4.17	15.56	11.74	0.58	4.21	0.00	0.00	0.00	0.00	
21	14.48	7.24	14.84	11.43	15.28	11.66	1.24	4.40	0.00	0.00	0.00	0.00	
22	12.70	7.93	14.92	20.09	14.39	9.67	1.14	4.22	0.00	0.00	0.00	0.00	
23	45.98	6.72	15.37	21.51	7.13	8.00	1.03	2.38	0.00	0.00	0.00	0.00	
24	40.95	5.92	23.44	6.29	7.10	8.09	0.58	2.39	0.00	0.00	0.00	0.00	
25	40.99	6.19	28.08	4.88	5.24	8.45	0.65	3.76	0.00	0.00	0.00	0.00	
26	11.96	5.88	29.66	4.92	7.77	7.02	0.62	4.39	0.00	0.00	0.00	0.00	
27	11.92	13.71	29.02	3.93	6.43	6.48	0.59	2.46	0.00	0.00	0.00	0.00	
28	9.12	14.74	15.35	6.10	4.34	4.99	0.65	2.98	0.00	0.00	0.00	0.00	
29	8.08	14.01	24.86	8.32	4.09	5.02	1.18	2.93	0.00	0.00	0.00	0.00	
30	25.06	10.35	24.44	8.60	–	4.95	2.26	3.31	0.00	0.00	0.00	0.00	*8 months*
31	24.12	–	25.62	8.10	–	5.03	–	2.29	–	0.00	0.00	–	**Annual**
Avg	**18.29**	**10.48**	**17.05**	**9.30**	**9.40**	**6.93**	**2.57**	**2.89**	**0.15**	**0.00**	**0.00**	**0.00**	**9.64**
Max	45.98	34.83	40.81	22.26	48.23	12.61	5.98	18.17	2.32	0.00	0.00	0.00	**48**
Min	6.41	1.82	0.00	3.61	3.98	2.83	0.58	0.66	0.00	0.00	0.00	0.00	**0.00**
Cumul.	*567*	*314*	*528*	*288*	*273*	*215*	*77*	*90*	*5*	*0*	*0*	*0*	***2353***
#Days	31	30	31	31	29	31	30	31	30	31	31	30	244