

WATER QUALITY OF THE  
POTOMAC RIVER AT CHAIN BRIDGE  
AT WASHINGTON, D.C.,  
HYDROLOGIC DATA REPORT  
1978 WATER YEAR

Stephen F. Blanchard

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JAMES G. WATT, Secretary

## GEOLOGICAL SURVEY

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## Inch-Pound-Second and Metric Conversions

Multiply	by <u>Length</u>	To obtain
inches (in)	2.54 0.0254	centimeters (cm) meters (m)
feet (ft)	0.3048 30.48	meters (m) centimeters (cm)
miles (mi)	1.6093	kilometers (km)
nautical miles (nt mi)	1.8530	kilometers (km)
 <u>Volume</u>		
U.S. gallons (gal)	3.785	liters (l)
cubic feet (ft <sup>3</sup> )	0.02832	cubic meters (m <sup>3</sup> )
 <u>Flow</u>		
cubic feet/second (ft <sup>3</sup> /sec)	0.02832	cubic meters/second (m <sup>3</sup> /sec)
 <u>Temperature</u>		
degrees Fahrenheit (F°)	(F° - 32) x .555	degrees Celcius (C°)
degrees Celcius (C°)	(C° x 1.8) + 32	degrees Fahrenheit (F°)

## Nitrogen and phosphorus species conversions

To convert mg/l of:	To mg/l of:	Multiply by
NH <sub>4</sub>	N	0.7765
NO <sub>3</sub>	N	0.2258
NO <sub>2</sub>	N	0.3045
N	NH <sub>4</sub>	1.289
N	NO <sub>3</sub>	4.429
N	NO <sub>2</sub>	3.284
PO <sub>4</sub>	P	0.3872
P	PO <sub>4</sub>	2.583

Water Quality of the Potomac River at Chain Bridge  
at Washington, D.C., Hydrologic Data Report,  
1978 Water Year

Abstract

This report contains water quality data measured at the Potomac River at Chain Bridge at Washington, D.C. for the 1978 water year. Samples were generally collected twice a week and more frequently during periods of high flow. The samples were analyzed for nitrogen, phosphorus, silica, and suspended sediment.

## INTRODUCTION

### Purpose and Scope

This report presents data from samples collected at Chain Bridge at Washington, D.C. for the 1978 water year. The samples were analyzed for nitrogen, phosphorus, silica, and suspended sediment.

### Study Background

The sampling program at Chain Bridge for the 1978 water year is part of an interdisciplinary study of the tidal Potomac River and Estuary (fig. 1) conducted by the U.S. Geological Survey. The overall goal of this study is to understand the major aspects of hydrodynamic, chemical, and biological processes and their interaction in a tidal river-estuarine system. The data collection program covered the period from August 1977 to September 1981, and sampling stations extended from Chain Bridge at Washington, D.C. to Chesapeake Bay (fig. 1).

### MEASURING STATION AND SAMPLE COLLECTION

The measuring station, Potomac River at Chain Bridge at Washington, D.C., is located (fig. 2) 1.9 kilometers downstream from the Little Falls Dam. The cross section is a narrow canyon 49 m (meters) wide with many rock outcrops. The constricted cross section and rock outcrops cause the water to remain turbulent and insures thorough mixing. During flooding, samplers cannot be submerged more than 3 m because water velocities are about 4.5 meters per second. Therefore, samples were collected as a mid-channel surface grab sample using a weighted 1-liter polyethylene bottle or from the intake line of the water-quality monitor. The intake of the water-quality monitor was located 0.7 m below the low water stage and about 2.5 m from the right bank.

Samples were generally collected twice a week. The sampling frequency was increased during periods of high flow.

### METHODS

Filtration of samples. - All samples analyzed for dissolved constituents were collected after 500 ml of sample were passed through a 142 mm diameter, 0.45  $\mu$ m Millipore<sup>1</sup>/type HA filter. The sample was passed through the filter using a peristaltic pump.

Sample analyses. - Concentrations of nitrogen, phosphorus, and silica were determined at the Atlanta Central Water Quality Laboratory of the U.S. Geological Survey, by methods described by Skougstad and others (1979) and

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<sup>1</sup>/The use of brand names in this report is for identification purposes and does not constitute endorsement by the U.S. Geological Survey.

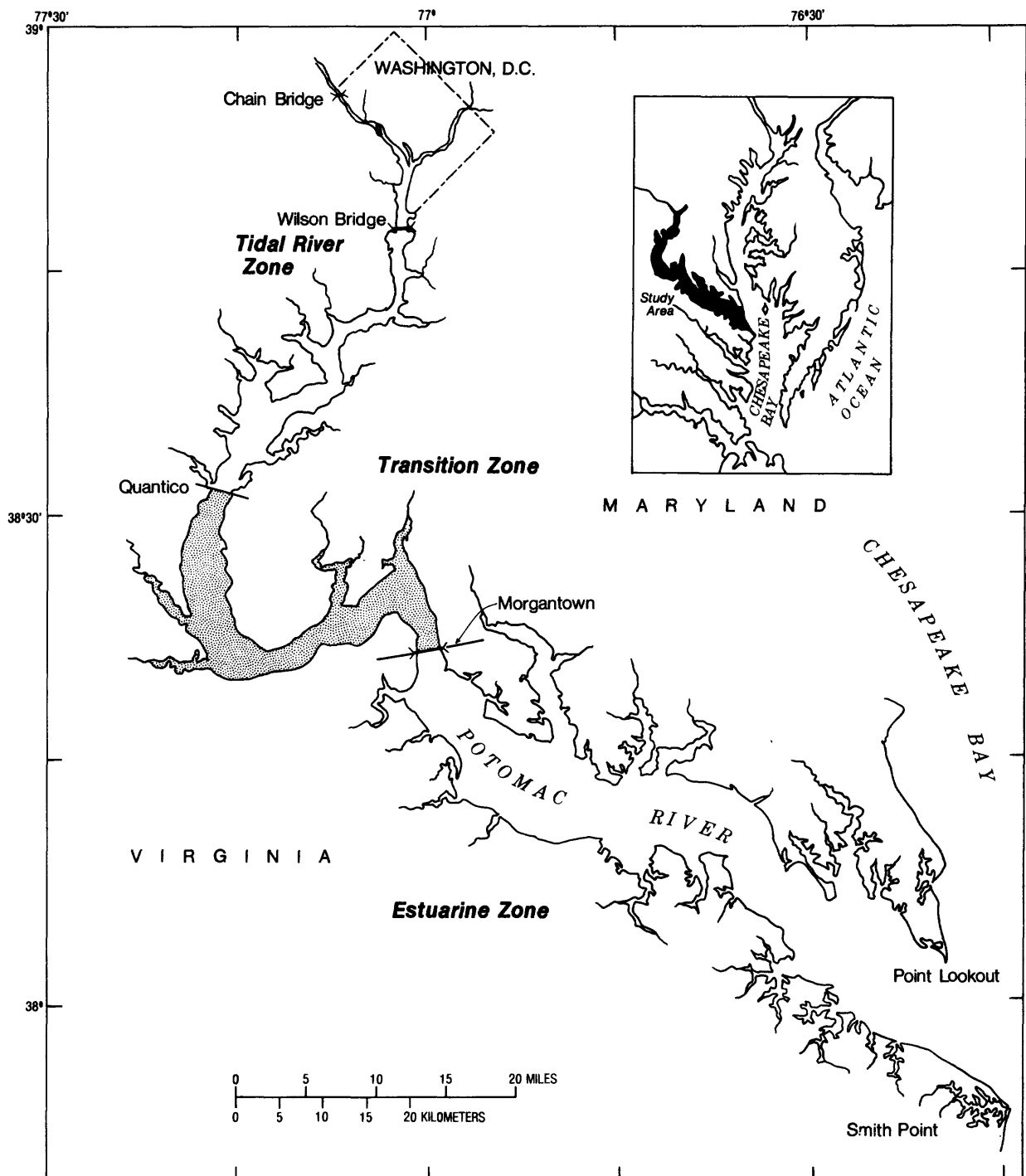


Figure 1.--Tidal Potomac River and Estuary

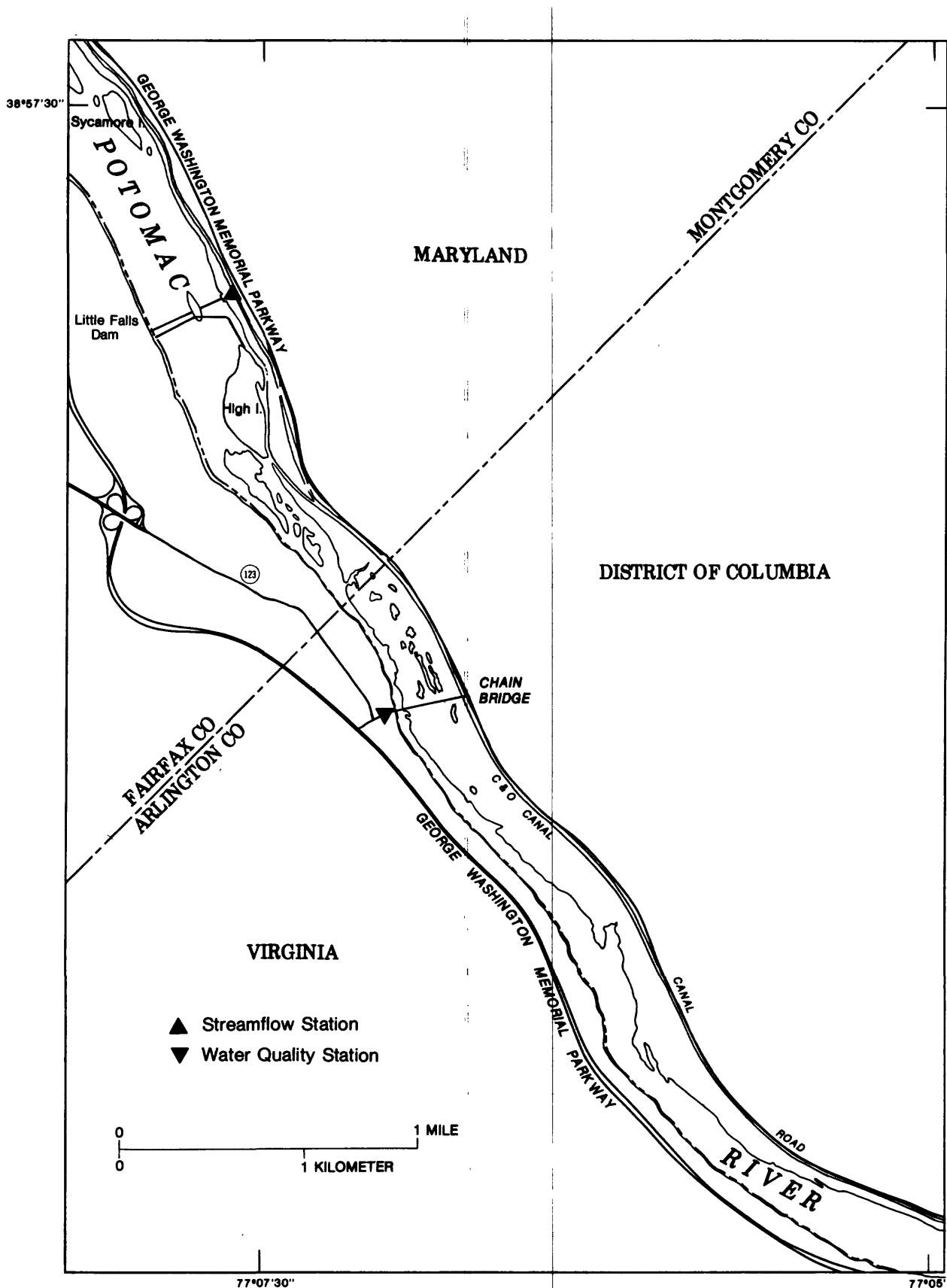


Figure 2.--The Potomac River at Chain Bridge at Washington, D.C.



The American Public Health Association and others (1975). Suspended sediment concentrations were determined at the Harrisburg, Pennsylvania Sediment Laboratory of the U.S. Geological Survey by methods described by Guy (1962).

A summary of sample preservation procedures is presented in table 1. The samples shipped to the Atlanta Central Laboratory generally arrived there within 48 hours from the time of sample collection.

Table 1.- Methods of sample preservation

<u>Constituent</u>	<u>Container type</u>	<u>Preservation</u>
Nitrogen species Phosphorus species Dissolved silica	plastic bottle	Chilled to 4°C and kept dark
Suspended sediment	glass bottle	none

## RESULTS

Concentrations of dissolved silica as  $\text{SiO}_2$ , dissolved nitrate plus nitrite as N, dissolved ammonia plus organic nitrogen as N, total ammonia plus organic nitrogen as N, total phosphorus as P, dissolved phosphorus as P, and suspended sediment are present in table 2 in order by date and time.

## AIDS FOR USING THE DATA

Time.- From October 23, 1977, at 0200 hours through April 23, 1978, at 0200 hours, the times are Eastern Standard Time. For all other periods during the 1978 water year, times are Eastern Daylight Savings Time.

Sample location.- All samples will appear in table 2 with a corresponding cross-section location, the distance from left bank looking downstream. This distance locates the specific sampling site along the cross-section line at which the water-quality sample was taken. A sample from the water-quality monitor intake line has a distance from left bank of 1350 feet and a mid-channel surface sample has a distance from left bank of 1240 feet.

Missing data.- Missing data in table 2 will appear as a dashed line.

Parameter codes.- Each column heading in table 2 has a number that is the parameter code used in the U.S. Geological Survey National Water Data Storage and Retrieval System (WATSTORE) to reference parameters related to water quality (Hutchison, 1975).

01646580

Table 2

- POTOMAC R AT CHAIN BRIDGE, AT WASH, DC

## WATER QUALITY DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978

DATE	TIME	SAMPLE LOC- ATION, CROSS SECTION (FT FM L BANK) (00009)	SILICA, DIS- SOLVED (MG/L) AS SiO2 (00955)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L) AS N (00631)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L) AS N (00625)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L) AS N (00623)	PHOS- PHORUS, TOTAL (MG/L) AS P (00665)	PHOS- PHORUS, DIS- SOLVED (MG/L) AS P (00666)	SEDI- MENT, SUS- PENDED (MG/L) (80154)
DEC, 1977									
19...	1155	1240	10	1.4	1.40	.57	.510	.090	404
21...	1217	1240	--	1.6	.70	.37	.130	.050	68
23...	1127	1240	7.6	1.4	.55	.31	.100	.050	40
28...	1133	1240	7.9	1.3	.30	.38	.050	.040	9
30...	1242	1240	7.3	1.7	.17	.20	.040	.030	6
JAN, 1978									
04...	1117	1240	6.6	1.8	.23	.16	.050	.030	5
05...	1131	1240	6.4	1.8	.15	--	.050	.040	4
06...	1316	1240	6.3	1.8	.20	.25	.050	.040	2
09...	1445	1240	6.0	1.8	.89	.52	.170	.120	185
11...	1129	1240	5.4	1.6	.76	.50	.160	.060	108
16...	1152	1240	7.0	1.7	.34	.30	.070	.050	18
18...	1350	1240	7.0	1.6	.43	.34	.070	.040	36
25...	1350	1240	6.2	1.8	.25	.18	.040	.030	24
27...	1208	1240	4.1	1.2	1.70	.48	.470	.050	469
30...	1421	1240	6.1	1.3	.57	.29	.140	.040	94
FEB									
01...	1152	1240	6.6	1.5	.33	.27	.060	.030	29
03...	1433	1240	7.4	1.7	.22	.30	.050	.030	13
08...	1108	1240	7.8	2.1	.22	.27	.030	.030	--
10...	1147	1240	7.5	2.1	.30	.33	.040	.030	--
13...	1120	1240	7.5	2.2	.25	.09	.050	.040	12
15...	1136	1240	7.1	2.1	.21	.09	.040	.040	8
17...	1216	1240	6.8	2.0	.23	.17	.040	.040	7
22...	1331	1240	5.9	2.1	.17	.29	.050	.030	13
24...	1205	1240	5.0	2.0	.44	.24	.040	.030	4
27...	1135	1240	4.7	2.0	.56	.41	.060	.040	13
MAR									
01...	1205	1240	3.9	1.9	.29	.32	.050	.040	8
03...	1435	1240	3.1	1.7	.21	.47	.050	.040	5
05...	1103	1240	2.5	1.5	.77	.31	.030	.030	5
10...	1107	1240	2.0	1.5	.28	.28	.020	.020	8
13...	1029	1240	3.3	1.5	1.50	1.0	.160	.090	61
15...	1031	1240	4.2	1.4	1.70	.58	.370	.070	361
17...	1243	1240	5.3	1.2	2.20	.53	.370	.030	565
20...	1026	1240	6.7	1.5	.69	.29	.080	.030	81
22...	1037	1240	6.6	1.4	.53	.27	.090	.030	96
24...	1017	1240	6.3	1.3	.36	.21	.070	.020	81
27...	1344	1240	6.5	1.4	.87	.38	.210	.040	236
28...	1404	1240	5.8	1.2	1.20	.41	.200	.040	302
29...	1116	1240	6.1	1.2	.94	.33	.190	.040	277
31...	1109	1240	7.1	1.2	.61	.21	.080	.050	83

Table 2  
01646580 - POTOMAC R AT CHAIN BRIDGE, AT WASH, DC -- Cont.  
WATER QUALITY DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978

DATE	TIME	SAMPLE LOC- ATION, CROSS SECTION (FT. FM L BANK) (00009)	SILICA, DIS- SOLVED (MG/L) AS SiO2 (00955)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L) AS N (00631)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L) AS N (00625)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L) AS N (00623)	PHOS- PHORUS, TOTAL (MG/L) AS P (00665)	PHOS- PHORUS, DIS- SOLVED (MG/L) AS P (00666)	SEDI- MENT, SUS- PENDED (MG/L) (80154)
APR									
03...	1121	1240	6.9	1.4	.30	.37	.060	.020	39
05...	1218	1240	6.5	1.4	.22	.22	.050	.020	26
07...	1051	1240	6.1	1.4	.32	.24	.030	.030	26
10...	1341	1240	4.9	1.3	.31	.28	.030	.020	16
12...	1045	1240	4.5	1.2	.34	.20	.030	.010	13
14...	1054	1240	2.3	1.0	.61	.15	.030	.000	13
17...	1028	1240	1.1	.80	.47	.41	.020	.010	6
21...	1418	1240	1.5	.96	.33	.27	.040	.010	6
24...	1427	1240	.7	.96	.21	.22	.030	.010	8
26...	1032	1240	1.6	.93	.27	.22	.030	.010	4
28...	0659	1240	1.5	.95	.31	.15	.030	.000	5
MAY									
01...	1140	1240	1.0	1.1	.47	.38	.030	.010	8
02...	0944	1240	1.3	.93	.34	.31	.040	.010	7
02...	1028	1240	1.2	.93	---	.20	---	.020	4
02...	1131	1240	1.3	.93	.35	.26	.030	.010	7
02...	1237	1240	1.1	.92	---	.57	---	.010	5
02...	1332	1240	1.3	.90	.32	.22	.030	.010	---
02...	1338	1240	1.3	.90	.32	.22	.030	.010	5
02...	1433	1240	1.2	.90	---	.25	---	.010	7
02...	1524	1240	1.3	.89	.33	.28	.030	.010	6
02...	1528	1240	1.3	.89	.33	.28	.030	.010	---
02...	1633	1240	1.2	.88	---	.40	---	.010	7
02...	1724	1240	1.2	.87	.30	.27	.030	.010	7
03...	1404	1240	.9	.74	.53	.28	.030	.000	5
05...	1423	1240	.9	.65	.30	.23	.030	.010	8
10...	1016	1240	2.0	.75	.32	.22	.040	.010	16
12...	1045	1240	---	.88	.39	.26	.070	.020	18
15...	1130	1240	5.4	1.1	1.50	.32	.630	.040	415
16...	1027	1240	---	---	---	---	---	---	10
17...	1050	1240	7.0	.93	.80	.28	.180	.030	169
19...	0904	1200	---	---	---	---	---	---	8
19...	1020	1240	7.3	.89	.59	.25	.120	.020	94
22...	1211	1240	---	1.0	.36	.24	.080	.030	38
24...	1136	1240	7.4	1.1	.39	.20	.060	.020	34
26...	1127	1240	7.0	1.2	.31	.18	.060	.030	23
31...	1032	1240	2.1	.47	.66	.19	.040	.010	17
JUN									
02...	1319	1240	1.5	.51	.52	.26	.040	.010	17
02...	1343	1350	1.5	.51	.55	.27	.040	.020	18
05...	1210	1350	1.6	.56	.54	.31	.040	.010	15

Table 2  
01646580 -- POTOMAC R AT CHAIN BRIDGE, AT WASH, DC -- Cont.  
WATER QUALITY DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978

DATE	TIME	SAMPLE LOC- ATION, CROSS SECTION (FT-FM L BANK) (00009)	SILICA, DIS- SOLVED (MG/L) AS SiO2 (00955)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L) AS N (00631)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L) AS N (00625)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L) AS N (00623)	PHOS- PHORUS, TOTAL (MG/L) AS P (00665)	PHOS- PHORUS, DIS- SOLVED (MG/L) AS P (00666)	SEDI- MENT, SUS- PENDED (MG/L) (80154)
JUN	05...	1227	1240	1.6	.55	.45	.26	.020	15
	07...	1247	1350	1.7	.58	.46	.25	.010	14
	07...	1302	1240	1.7	.58	.48	.21	.010	13
	09...	0850	1350	2.3	.69	.54	.34	.010	21
	09...	0904	1240	2.3	.70	.55	.50	.010	16
	12...	0940	1350	2.6	.68	.51	.29	.020	18
	12...	1023	1240	2.5	.68	.50	.29	.010	10
	12...	1024	1240	2.6	.68	.50	.27	.010	--
	12...	1025	1240	2.5	.25	.48	.33	.010	--
	14...	0925	1240	2.3	.74	.63	.36	.010	12
	16...	1016	1240	2.1	.66	.68	.31	.010	10
	16...	1027	1240	2.1	.67	--	.25	.000	--
	16...	1031	1240	2.1	.65	--	.32	.010	--
	16...	1034	1240	2.1	.65	--	.29	.000	--
	16...	1037	1240	2.0	--	--	--	--	--
	19...	0904	1240	2.1	.68	.40	.20	.010	8
	23...	0912	1240	2.9	1.0	.82	.47	.020	37
	26...	0942	1350	2.9	.46	.83	.41	.010	24
	26...	1003	1240	--	.45	.69	.38	.010	13
	27...	1008	1350	3.0	.45	.47	.47	.010	18
	27...	1026	1240	2.9	.38	.68	.28	.020	13
	30...	1336	1240	4.2	.85	.58	.35	.010	14
	30...	1343	1350	4.2	.86	.47	.43	.010	16
JUL	03...	1426	1350	4.8	.75	.66	.36	.030	34
	03...	1430	1350	4.8	.75	.71	.31	.030	39
	05...	1020	1350	7.0	2.5	1.30	1.0	.090	241
	05...	1037	1240	7.0	2.5	1.60	.66	.090	222
	07...	1023	1350	--	--	--	--	--	406
	07...	1035	1240	6.1	1.1	1.20	.52	.010	387
	10...	1346	1240	6.7	1.3	.28	.26	.030	34
	12...	1413	1240	6.4	1.2	.53	.24	.030	35
	14...	0917	1240	6.4	1.1	.48	.24	.020	24
	17...	1146	1240	4.2	.71	.53	.31	.020	16
	19...	0942	1240	3.9	.71	--	.40	.020	16
	24...	1441	1240	3.6	--	.38	--	--	10
	26...	1047	1240	3.5	.41	.42	.28	.020	18
	28...	1146	1350	2.2	.39	.47	.23	.010	16
	28...	1211	1240	2.0	.38	.54	.25	.010	16
	31...	0945	1350	.7	.17	.75	.32	.010	109

Table 2  
01646580 - POTOMAC R AT CHAIN BRIDGE, AT WASH, DC -- Cont.  
WATER QUALITY DATA- WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978

DATE	TIME	SAMPLE LOC- ATION, CROSS SECTION (FT FM L BANK) (00009)	SILICA, DTS- SOLVED (MG/L) AS STODT (00955)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L) AS N) (00631)	NITRO- GEN+AM- MONIA + ORGANIC TOTAL (MG/L) AS N) (00625)	NITRO- GEN+AM- MONIA + ORGANIC DIS- (MG/L) AS N) (00623)	PHOS- PHORUS, TOTAL (MG/L) AS P) (00665)	PHOS- PHORUS, DIS- SOLVED (MG/L) AS P) (00666)	SEDI- MENT, SUS- PENDE (MG/L) (80154)
JUL									
31...	0959	1240	.46	.17	.61	.37	.050	.010	20
AUG									
02...	1147	1240	2.2	.63	.52	.31	.060	.020	40
04...	1312	1350	3.6	.81	.84	.29	.060	.030	31
06...	1329	1240	3.6	.81	.84	.38	.080	.030	32
07...	1204	1350	5.1	.80	.48	.56	.080	.040	56
07...	1221	1240	5.1	.80	.50	.32	.090	.040	46
10...	0924	1350	6.7	.65	1.00	.44	.260	.030	243
10...	0939	1240	6.7	.65	1.00	.60	.230	.040	241
11...	0953	1350	6.8	.80	.95	.41	.050	.050	256
11...	1009	1240	6.8	.80	1.00	.74	.050	.050	168
14...	1201	1350	7.4	1.0	.96	.64	.160	.060	312
14...	1215	1240	7.4	1.1	2.00	.39	.160	.070	112
16...	1023	1240	7.2	1.1	.81	.41	.150	.070	95
18...	0900	1240	7.1	1.0	.62	.48	.160	.090	63
22...	1029	1240	6.8	.95	.40	.30	.060	.070	25
23...	1120	1240	6.3	.76	.67	.20	.070	.060	17
25...	0852	1240	5.5	.54	.52	.38	.070	.020	16
29...	1000	1240	3.7	.22	.52	.46	.050	.010	16
30...	0907	1240	2.1	.16	.55	.31	.060	.020	18
SEP									
01...	0914	1240	2.2	.47	.59	.35	.050	.010	26
06...	0901	1240	2.6	.88	.61	.30	.040	.040	22
08...	0943	1240	.7	.18	.63	.52	.060	.010	23
11...	0922	1240	3.1	.41	.59	.30	.070	.010	23
13...	1036	1240	3.5	.42	.52	.55	.070	.020	21
15...	0904	1240	2.8	.36	.71	.41	.070	.010	23
18...	0936	1240	3.2	.56	.42	.42	.060	.010	22
20...	1017	1240	2.6	.37	.59	.17	.060	.000	24
22...	1325	1240	3.7	.55	.61	.33	.070	.010	21
25...	1111	1240	3.3	.66	.75	.24	.060	.010	20
27...	1059	1240	2.6	.53	.70	.20	.060	.020	19
29...	1156	1240	2.5	.55	.48	.32	.050	.010	20

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