

WATER QUALITY IN PHILADELPHIA -- 1966

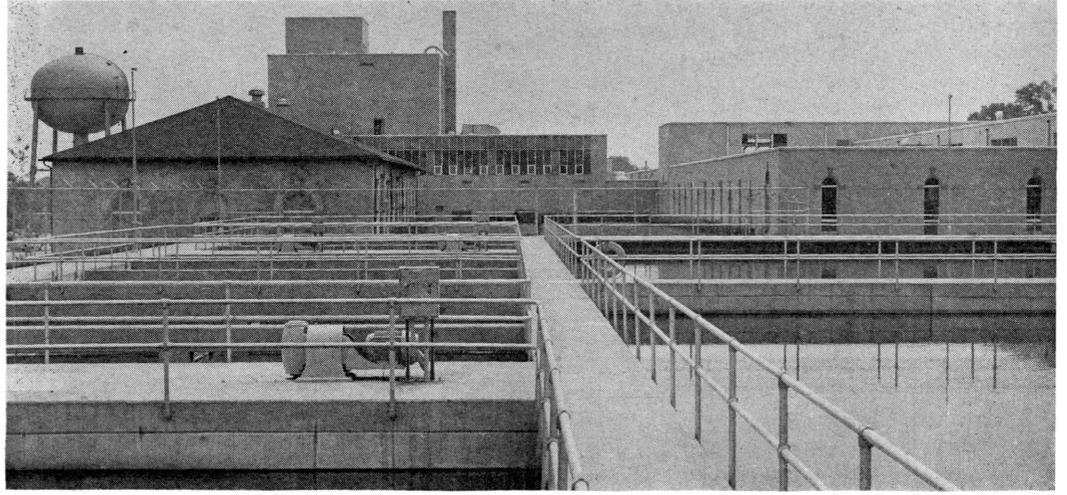
Analyses by Laboratories

of the

Philadelphia Water Department



HIGHEST NATIONAL AWARD of the American Water Works Association, this "Willing Water" statuette was won by the Philadelphia Water Department for the best all-around water utility effort in America to improve physical facilities, customer services, and public relations—June 5, 1967.



Philadelphia draws its water from the Delaware and Schuylkill Rivers in approximately equal quantities. These rivers are surface waters which are relatively consistent, but are subject to changes in quality according to rainfall and other conditions existing on their watersheds.

Although the land comprising the watersheds of the two rivers has a fairly high population density and many diversified industries are located on it, an effective pollution abatement program assures the city that this abundant supply of water will not contain impurities that will prevent it from being processed, in the Water Department's purification plants, into a safe and satisfactory water of excellent quality. The success of the program is due largely to the excellent liaison which exists between the communities and industries located on the watershed, the Pennsylvania Sanitary Water Board, and the Water Department of the City of Philadelphia.

Sanitary engineers from the State and City Governments make regular visits to industries and communities located on the watershed to prevent conditions from developing which might prove detrimental to the quality of the surface waters. The Philadelphia Water Department also routinely collects and makes analyses of water samples from locations selected as sensing points in

the rivers, and their tributaries, in order to detect changes or trends in the quality of the river waters.

TREATMENT

During the past few years modern water purification plants have replaced the old plants at Torresdale, Queen Lane and Belmont. The completion of these plants was a significant step in the Water Department's rehabilitation program. Since the Belmont plant was completed in 1965, the entire supply for the city is now purified in modern, efficient plants capable of producing water of excellent quality in sufficient quantity to meet the needs of our customers for many years in the future. Another part of the program has included the construction of modern automatic pumping stations.

To supply customers in all parts of the city with ample water to meet domestic and commercial uses and for adequate fire protection, many new large-sized express mains have been installed. In addition many of the old existing mains have been cleaned and lined with cement. Elevated storage tanks have been strategically placed in distribution to help maintain pressures during periods of heavy usage. Underground storage for filtered water is being significantly increased at the purification plants by conversion of obsolete slow-sand filters to water storage basins.

The treatment processes at the purification plants are under the control of plant chemists who work in shifts, in modern, well-equipped laboratories, to provide "round the clock" control of the treatment processes. Each laboratory is under the direction of a professionally trained sanitary chemist who is responsible for over-all supervision of the treatment processes of his particular plant.

To determine the quality of the water as it is received by the consumer, samples for sanitary analyses are collected several times each week from approximately sixty locations throughout the city. Along with the sanitary analyses the samples are checked for such characteristics as would be immediately apparent to the consumer, such as taste and odor, color, and turbidity. As a part of the sanitary analyses the bacteriological quality is also checked. In 1966, 10,173 samples were collected from the districts for this purpose. From these samples 50,865 bacteriological portions were tested. These produced a coliform count of only 2.8 percent of that allowed by the Drinking Water Standards of the United States Public Health Service for interstate carriers. A glance at Table VI will show that similar low coliform levels are held year after year.

HARDNESS

Hardness will be mentioned as of special interest because of industrial use and the use of modern soap compounds and washing facilities. This varies with the amount of rainfall and runoff, also the temperatures. It is not a seasonal change and therefore cannot be predicted—regardless of the time of the year, the drier the season the higher the hardness. The effects of the drought of the past five years are reflected in the higher hardness shown, above that for 1960 and 1961. The range of hardness of treated water from the Delaware River water varies from 3 to 7 grains per gallon, the long-term average being about 5 grains per gallon. The range on treated water from the Schuylkill varies from 5 to 15 grains per gallon, with the long-term average about 9 grains per gallon.



RADIOACTIVITY

Gross counts on water samples collected from both the Delaware and Schuylkill Rivers have been made since 1957. These show the radioactivity to be very slightly above the normal background such as is found in the atmosphere which surrounds us. The normal water treatment processes used by the Department remove more than one half of the radioactive isotopes found in the river waters. The water delivered to the consumers has always been well below the maximum allowable concentration of mixed fission products in drinking water as recommended by the National Bureau of Standards in their Handbook No. 52. This safe value (100 pc/L or pico-curies per liter) of permissible concentration has been demonstrated as not producing biological damage.

TEMPERATURES

Water temperatures at the plant effluents vary from 33°F to 85°F. At customers' services, due to the effect of ground temperatures, these are slightly higher in winter and lower in summer, ranging from about 35°F to 82°F.

Warming of pipes in the customers' basements, or in the walls of buildings during the colder weather, will cause release of air bubbles in water drawn from the taps, and is the cause of "white water" complaints.

PURIFIED WATERS

Table III shows physical and chemical characteristics of the water as it enters the distribution system after purification. The purification plant located at Torresdale is the only plant that treats water from the Delaware River. The effluent characteristics as listed in Table III under "Delaware Plant (Torresdale.))" are for that plant alone. The effluent characteristics listed as being from "Schuylkill Plants" are the averages of the two plants (Belmont and Queen Lane) located along its banks. Although these two plants draw their water from the Schuylkill, the plants' effluents are not identical. Table III-A lists the characteristics of the individual plant effluents.

Tables IV-A1, IV-A2, IV-B1, IV-B2, IV-C1 and IV-C2 list the analytical components of Belmont, Queen Lane and Torresdale Plant effluent waters on a monthly basis.

WATER DELIVERED TO YOUR AREA

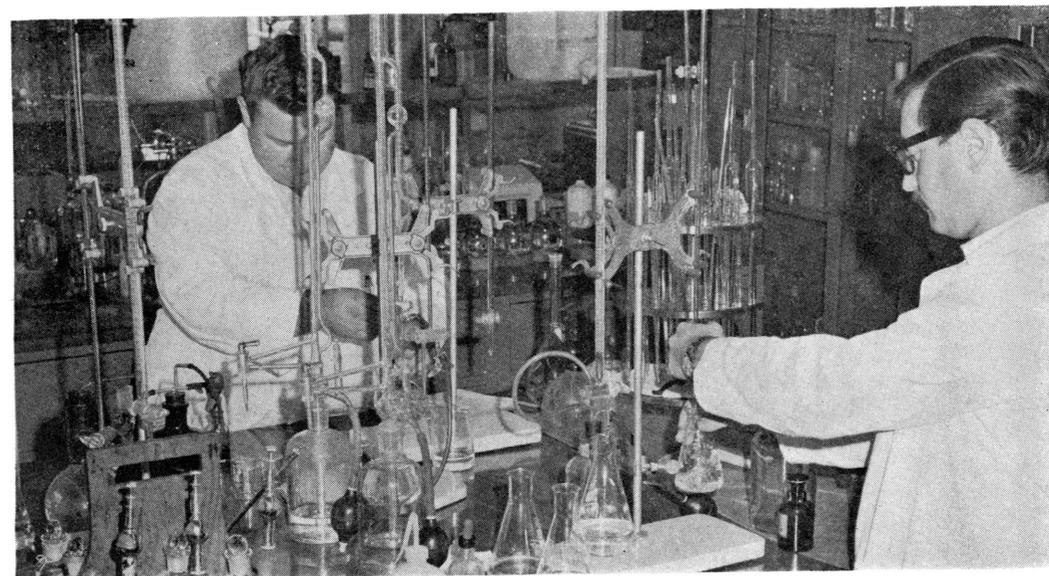
Delaware water is delivered generally to areas east of Broad Street, and Schuylkill

water west of Broad Street. Delaware water is pumped to West Oak Lane and at times to some sections of Chestnut Hill. It is also frequently supplied to many areas south of Erie Avenue.

Schuylkill water is sometimes pumped east of Broad Street, in the area generally bounded by Roosevelt Boulevard, Lehigh Avenue, Wyoming Avenue and Kensington Avenue. Express mains direct from Lardner's Point Pumping Station deliver Delaware water to the vicinity of East Park Reservoir, where it mixes with Schuylkill water before entering the central city area.

With changes in demands, and occasionally required changes in plant operation, it is, therefore, uncertain as to which of the river waters or what combination of the two will be received in much of the center city area south of Callowhill Street, and in many areas west of Broad Street, north of the city center to Erie Avenue. West Philadelphia receives purified Schuylkill water at all times except in emergency.

Note: If interested in specific information on "Treatment and Distribution," request leaflet by that title.



PHYSICAL AND CHEMICAL SUMMARIES FOR RAW WATER FROM SCHUYLKILL AND DELAWARE RIVERS IN 1966

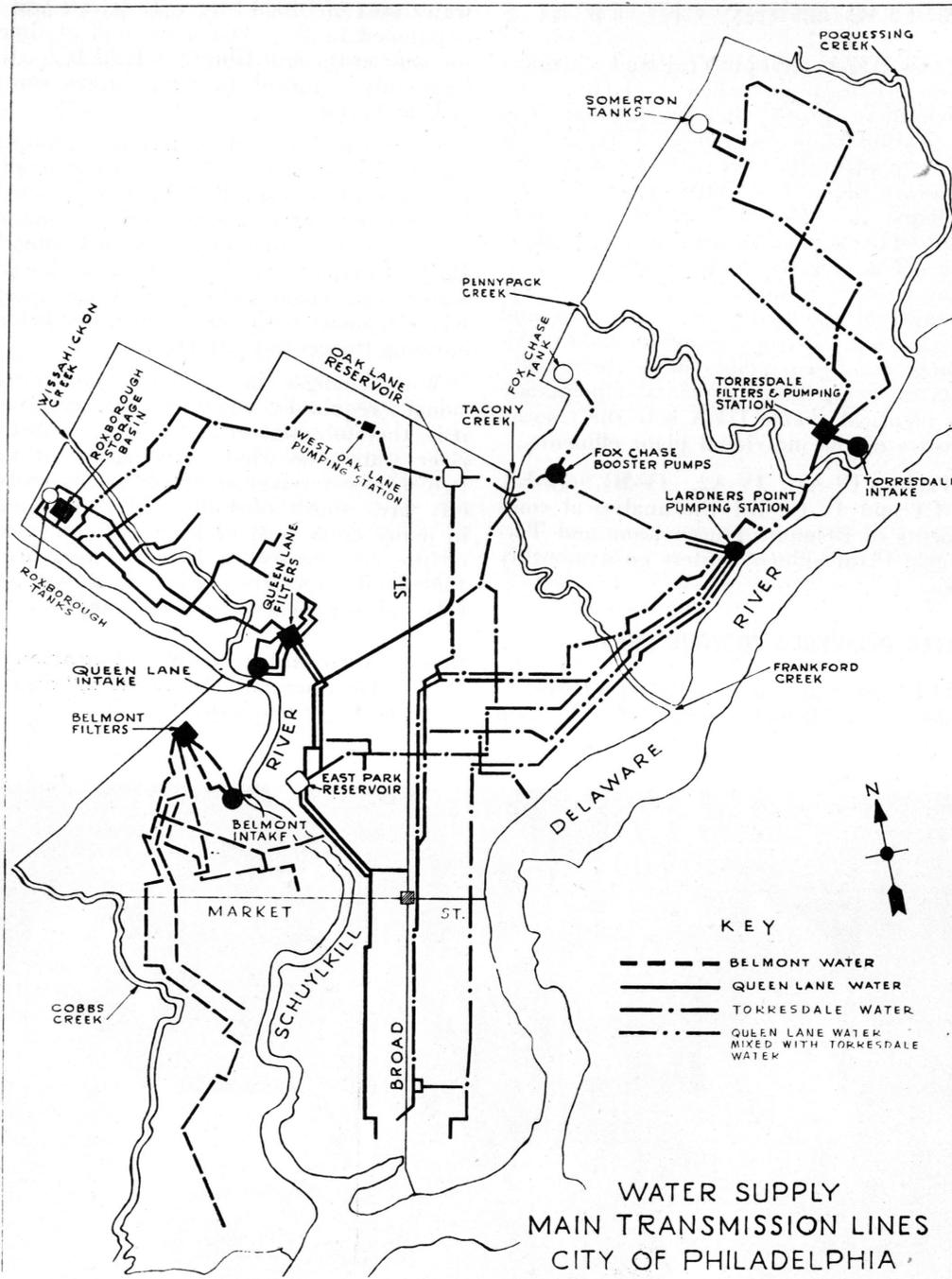


Table I

PHYSICAL & CHEMICAL CHARACTERISTICS	SCHUYLKILL AT BELMONT & QUEEN LANE				DELAWARE AT TORRESDALE			
	Yearly		Monthly	Avg.	Yearly		Monthly	Avg.
	Fr	Avg.	Max.	Min.	Fr	Avg.	Max.	Min.
Temperature † (°F)	**	60	84	38	**	58	80	36
Rainfall, Ppt. † (Inch)	X	40	8.70	0.41	X	40	8.70	0.41
Turbidity † (Units)	*	17	45	6	*	30	46	25
Residue, Total	†	335	464	216	†	175	222	147
Residue, Filtrable	†	313	440	201	—	—	—	—
Conductance, Sp. † (μmhos)	†	454	599	306	†	209	298	162
Color, Apparent † (Units)	+	30	63	15	—	—	—	—
Color, Filtered † (Units)	+	12	25	5	+	10	14	7
pH † (Units)	*	7.4	7.9	7.1	*	7.2	7.3	7.2
Alkalinity (CaCO ₃)	*	66	91	42	*	33	41	2.1
Carbon Dioxide (CO ₂)	+	46	8.0	2.4	+	3	7	2
Hardness, EDTA (CaCO ₃)	†	161	209	112	†	64	79	50
Potassium (K)	†	5.1	7.5	2.8	†	2.1	3.3	0.5
Sodium (Na)	†	32	42	18	†	10.2	17.0	3.5
Calcium (Ca)	†	39	50	28	†	14	18	10
Magnesium (Mg)	†	16	21	11	†	6	9	5
Iron, Total (Fe)	†	.32	.32	.15	†	1.14	1.78	0.46
Iron, Diss'd. (Fe)	†	.06	.12	.03	—	—	—	—
Manganese (Mn)	†	.27	.68	.10	†	0.14	0.18	0.08
Aluminum (Al)	†	.04	.08	.01	†	0.05	0.08	0.02
Copper (Cu)	††	.03	.18	.00	+	0.04	0.09	0.01
Arsenic (As)	†	.005	.012	.000	†	.002	.003	.000
Lead (Pb)	†	—	—	—	†	.031	.121	.000
Chloride (Cl)	†	35	51	16	†	12	18	8
Sulfate (SO ₄)	†	104	152	61	†	27	32	18
Silica (SiO ₂)	†	7.7	11.0	2.5	†	2.8	4.9	0.4
Chromium, Hexa. (Cr ⁺⁶)	†	.002	.006	.000	+	.008	.032	.001
Phosphates, Ortho (PO ₄)	+	.86	1.43	.45	+	0.34	0.45	0.27
Phosphates, Poly (PO ₄)	+	.10	.23	.03	+	0.05	0.17	0.00
Fluoride (F)	+	.38	.62	.24	**	0.24	0.30	0.19
Oxy. Demand, COD (O)	+	23	53	11	+	16.2	26.9	10.2
Oxy. Demand, BOD (O)	+	3.6	5.0	2.1	+	2.8	4.3	1.6
Oxy. Diss'd. (O)	+	8.1	11.6	4.3	+	8.1	12.1	5.0
Oxy. % Sat'n. † (N)	+	79	119	55	+	76	96	58
Ammonia, Free (N)	+	.44	1.15	.15	+	1.82	4.97	0.59
Nitrite (N)	+	.082	.160	.036	+	.058	.264	.015
Nitrate (N)	+	2.14	3.48	0.80	+	0.70	1.05	0.49
Cyanide (CN)	+	0.00	0.00	0.00	+	0.00	0.00	0.00
Phenols (C ₆ H ₅ OH)	+	.001	.005	.000	+	.005	.015	.001
Detergents (ABS)	†	0.11	0.17	0.05	†	0.11	0.15	0.05
Radioactivity † (pc/l)	†	5.2	7.3	3.9	†	4.9	7.8	3.7

NOTES: Results in mg/l except (†) ones which are in units as indicated. FR=frequency of analyses. Individual or grab samples: (*) eight per day, (**) one per day, (+) one or more per week, (††) one or more per month. COMPOSITE OF daily (6:00 A.M.) grab samples: (‡) one on weekly composite, (‡‡) one on semi-monthly or monthly composite. (X) Total precipitation at International Airport, Philadelphia, from U.S. Weather Bureau reports. Radioactivity equals gross beta activity in picocuries per liter.

**PHYSICAL AND CHEMICAL SUMMARIES FOR RAW WATER
FROM SCHUYLKILL RIVER AT BELMONT & QUEEN LANE IN 1966**

Table I-A

PHYSICAL & CHEMICAL CHARACTERISTICS	BELMONT INTAKE				QUEEN LANE INTAKE			
	Fr	Yearly Avg.	Monthly Max.	Avg. Min.	Fr	Yearly Avg.	Monthly Max.	Avg. Min.
	Temperature † (°F)	**	60	83	38	**	59	84	38
Rainfall, Ppt. † (Inch)	X	40	8.70	.41	X	40	8.70	0.41
Turbidity † (Units)	*	16	42	6	*	18	45	8
Residue, Total	†	328	451	216	†	341	464	241
Residue, Filtrable	†	305	407	201	†	320	440	222
Conductance, Sp. † (µmhos)	†	451	599	306	†	457	579	314
Color, Apparent † (Units)	+	33	63	17	+	26	41	15
Color, Filtered † (Units)	+	12	25	5	+	—	—	—
pH † (Units)	*	7.4	7.9	7.20	*	7.4	7.8	7.1
Alkalinity (CaCO ₃)	*	64	91	42	*	68	87	49
Carbon Dioxide (CO ₂)	+	5.3	8.0	2.4	+	3.9	6.0	2.4
Hardness, ED T A (CaCO ₃)	†	160	204	112	†	162	209	117
Potassium (K)	†	5.1	7.5	2.8	†	5.0	7.0	3.0
Sodium (Na)	†	30	42	19	†	33	38	18
Calcium (Ca)	†	38	48	28	†	39	50	29
Magnesium (Mg)	†	16	21	11	†	16	21	11
Iron, Total (Fe)	†	.33	.82	.15	†	.31	.53	.20
Iron, Diss'd. (Fe)	†	.06	.11	.03	†	.06	.12	.03
Manganese (Mn)	†	.33	.68	.13	†	.20	.43	.10
Aluminum (Al)	†	.04	.08	.01	†	.04	.07	.01
Copper (Cu)	††	.04	.18	.01	††	.02	.06	.00
Arsenic (As)	†	.005	.012	.000	†	.004	.011	.001
Lead (Pb)	†	—	—	—	†	—	—	—
Chloride (Cl)	†	34	51	16	†	35	47	19
Sulfate (SO ₄)	†	103	148	66	†	105	152	61
Silica (SiO ₂)	†	7.5	10.3	2.6	†	7.8	11.0	2.5
Chromium, Hexa. (Cr ⁺⁶)	†	.002	.005	.000	†	.002	.006	.000
Phosphates, Ortho (PO ₄)	+	.68	.86	.45	+	1.03	1.43	.76
Phosphates, Poly (PO ₄)	+	.10	.19	.05	+	.10	.23	.03
Fluoride (F)	+	.38	.58	.24	+	.37	.62	.24
Oxy. Demand, COD (O)	+	23.0	49.0	12.0	+	23.0	53.0	10.9
Oxy. Demand, BOD (O)	+	3.7	5.0	2.2	+	3.4	4.6	2.1
Oxy. Diss'd. (O)	+	8.0	10.6	5.4	+	8.1	11.6	4.3
Oxy. % Sat'n. † (N)	+	81	119	63	+	76	90	55
Ammonia, Free (N)	+	.48	1.15	.20	+	.39	1.10	.15
Nitrite (N)	+	.083	.128	.036	+	.081	.160	.041
Nitrate (N)	+	2.10	2.80	0.80	+	2.18	3.48	0.92
Cyanide (CN)	+	0.00	0.00	0.00	+	—	—	—
Phenols (C ₆ H ₅ OH)	+	.001	.003	.000	+	.001	.005	.000
Detergents (ABS)	†	.10	.14	.05	†	.11	.17	.08
Radioactivity † (pc/l)	†	5.0	7.3	2.9	†	5.3	6.8	3.9

For notes, see TABLE I

**COLIFORM ORGANISMS IN RAW WATER FROM
SCHUYLKILL AND DELAWARE RIVERS IN 1966**

Table II

1966 Monthly Average Phelps Index and Most Probable Number Per 100 Milliliters.

MONTH	SCHUYLKILL RIVER				DELAWARE RIVER	
	Belmont		Queen Lane		Torresdale	
	Index	M.P.N.	Index	M.P.N.	Index	M.P.N.
Jan.	5,100	13,000	93,000	223,000	30,000	72,000
Feb.	23,000	55,000	44,000	105,000	9,700	24,000
Mar.	20,000	50,000	61,000	147,000	11,000	26,000
Apr.	6,100	15,000	32,000	78,000	7,400	18,000
May	2,400	7,400	21,000	50,000	20,000	52,000
June	17,000	40,000	53,000	126,000	42,000	97,000
July	17,000	41,000	62,000	151,000	25,000	61,000
Aug.	72,000	178,000	162,000	388,000	35,000	87,000
Sept.	38,000	86,000	74,000	182,000	25,000	62,000
Oct.	9,000	23,000	34,000	78,000	23,000	56,000
Nov.	4,300	11,000	41,000	97,000	13,000	30,000
Dec.	13,000	31,000	65,000	154,000	4,900	12,000
Aver.	19,000	46,000	62,000	148,000	21,000	50,000
Max.	72,000	178,000	162,000	388,000	42,000	97,000
Min.	2,400	7,400	21,000	50,000	4,900	12,000

1957—1966 10-YEAR PERIOD AVERAGES						
1957	11,000	25,000	18,000	43,000	47,000	113,000
1958	9,600	23,000	22,000	53,000	27,000	62,000
1959	14,000	34,000	33,000	79,000	36,000	87,000
1960	16,000	37,000	12,000	28,000	32,000	75,000
1961	19,000	47,000	16,000	37,000	17,000	41,000
1962	19,000	45,000	30,000	72,000	23,000	54,000
1963	15,000	36,000	71,000	173,000	33,000	81,000
1964	21,000	50,000	84,000	200,000	45,000	110,000
1965	9,900	23,000	49,000	116,000	45,000	114,000
1966	19,000	46,000	62,000	148,000	21,000	50,000
Aver.	15,000	37,000	40,000	95,000	33,000	79,000
Max.	21,000	50,000	84,000	200,000	47,000	114,000
Min.	9,600	23,000	12,000	28,000	17,000	41,000

PHYSICAL AND CHEMICAL SUMMARIES FOR FINISHED WATER FROM THE WATER TREATMENT PLANTS IN 1966

Table III

PHYSICAL & CHEMICAL CHARACTERISTICS	SCHUYKILL PLANTS BELMONT & QUEEN LANE				DELAWARE PLANT TORRESDALE			
	Fr	Yearly	Monthly	Avg.	Fr	Yearly	Monthly	Avg.
		Avg.	Max.	Min.		Avg.	Max.	Min.
Turbidity † (Units)	*	.05	0.2	0.0	*	0.0	0.2	0.0
Residue, Total †	†	333	458	205	†	177	223	134
Conductance, Sp. † (µmhos)	†	494	648	335	†	293	413	166
Color, Apparent † (Units)	+	1	2	0	+	0	0	0
pH † (Units)	*	7.1	7.2	6.8	*	7.8	8.0	7.6
Alkalinity (CaCO ₃)	*	53	70	34	*	38	47	27
Carbon Dioxide (CO ₂)	+	6.8	9.0	4.7	+	2	8	1
Hardness, EDTA (CaCO ₃)	†	171	238	114	†	98	116	80
Potassium (K)	†	5.2	7.1	2.8	†	2.0	3.4	0.5
Sodium (Na)	†	33	49	20	†	10.6	17.9	3.9
Calcium (Ca)	†	43	61	29	†	28	35	19
Magnesium (Mg)	†	17	23	10	†	8	11	6
Iron, Total (Fe)	†	.03	.04	.01	†	0.00	0.03	0.00
Manganese (Mn)	†	.02	.03	.00	†	0.00	0.00	0.00
Aluminum (Al)	†	.03	.06	.00	†	0.08	0.19	0.03
Copper (Cu)	††	—	—	—	+	0.00	0.00	0.00
Chloride (Cl)	†	45	63	23	†	23	29	17
Sulfate (SO ₄)	†	121	178	77	†	42	57	28
Silica (SiO ₂)	†	7.6	10.1	2.9	†	3.0	4.3	0.8
Chromium, Hexa. (Cr ⁺⁶)	†	.005	.009	.002	+	0.000	0.000	0.000
Phosphates (Gravity System)	SEE TABLE III-A				+			
Ortho- (PO ₄)	+	.07	.09	.04	SAME AS HIGH SERVICE			
Poly- (PO ₄)	+	.17	.43	.08				
Phosphates (Hi-Serv. System)								
Ortho- (PO ₄)	+	.15	.33	.09	+	0.09	0.21	0.01
Poly- (PO ₄)	+	1.21	2.40	.71	+	0.58	0.80	0.03
Fluoride (F)	**	.91	1.09	.70	**	1.03	1.17	0.94
Chlorine Residual								
Total (Cl)	*	1.4	1.7	1.1	*	1.49	1.65	1.35
Free (Cl)	*	1.1	1.2	1.0	*	1.26	1.40	1.10
Oxy. Demand, COD (O)	+	10.3	36.0	4.5	+	4.3	5.5	2.4
Oxy. Dissolved (O)	+	9.2	12.7	5.9	+	8.7	12.4	5.7
Oxy. % Sat'n. † (N)	+	92	102	7.2	+	84	99	67
Ammonia, Free (N)	+	.04	.06	.02	+	0.01	0.03	0.00
Nitrite (N)	+	.001	.002	.001	+	0.000	0.000	0.000
Nitrate (N)	+	2.1	3.0	1.2	+	0.74	0.97	0.55
Detergents (ABS)	†	.09	.15	.04	†	0.12	0.20	0.07
Radioactivity † (pc/l)	†	4.8	5.9	2.9	†	3.3	4.9	2.2

For notes, see TABLE I

PHYSICAL AND CHEMICAL SUMMARIES FOR FINISHED WATER FROM THE WATER TREATMENT PLANTS ON THE SCHUYKILL IN 1966

Table III-A

PHYSICAL & CHEMICAL CHARACTERISTICS	BELMONT				QUEEN LANE			
	Fr	Yearly	Monthly	Avg.	Fr	Yearly	Monthly	Avg.
		Avg.	Max.	Min.		Avg.	Max.	Min.
Turbidity † (Units)	*	0.1	0.2	0.1	*	0.01	0.05	0.00
Residue, Total †	†	332	457	205	†	333	458	226
Conductance, Sp. † (µmhos)	†	489	648	337	†	498	635	335
Color, Apparent † (Units)	+	1	2	0	+	0	0	0
pH † (Units)	*	7.1	7.2	7.0	*	7.0	7.2	6.8
Alkalinity (CaCO ₃)	*	51	67	34	*	54	70	37
Carbon Dioxide (CO ₂)	+	6.8	9.0	4.7	+	6.75	7.95	5.1
Hardness, EDTA (CaCO ₃)	†	180	238	122	†	162	214	114
Potassium (K)	†	5.1	7.0	2.8	†	5.2	7.1	3.0
Sodium (Na)	†	30	40	20	†	38	49	27
Calcium (Ca)	†	46	61	34	†	40	51	29
Magnesium (Mg)	†	16	22	10	†	17.00	23.00	11.00
Iron Total (Fe)	†	.03	.04	.02	†	.02	.04	.01
Manganese (Mn)	†	.01	.03	.00	†	.01	.02	.00
Aluminum (Al)	†	.03	.06	.01	†	.02	.04	.00
Chloride (Cl)	†	43	63	23	†	47	62	27
Sulfate (SO ₄)	†	123	178	83	†	118	159	77
Silica (SiO ₂)	†	7.5	10.1	2.9	†	7.6	10.0	2.9
Chromium, Hexa. (Cr ⁺⁶)	†	.005	.009	.002	†	.004	.006	.003
Phosphates (Gravity System)								
Ortho- (PO ₄)	+	APPROX. SAME AS HIGH SERVICE			+	.07	.09	.04
Poly- (PO ₄)	+				+	.17	.43	.08
Phosphates (Hi-Serv. System)								
Ortho- (PO ₄)	+	.14	.19	.11	+	.15	.33	.09
Poly- (PO ₄)	+	1.21	1.46	.96	+	1.20	2.40	.71
Fluoride (F)	**	.97	1.09	.86	**	.85	1.09	.70
Chlorine Residual								
Total (Cl)	*	1.4	1.7	1.1	*	1.3	1.5	1.1
Free (Cl)	*	1.1	1.2	1.0	*	1.1	1.2	1.0
Oxy. Demand, COD (O)	+	10.0	31.3	4.5	+	10.6	36.0	5.7
Oxy. Dissolved (O)	+	9.1	12.7	5.9	+	9.2	12.4	7.2
Oxy. % Sat'n. † (N)	+	92	102	72	+	91	101	83
Ammonia, Free (N)	+	.04	.06	.02	+	.04	.06	.03
Nitrite (N)	+	.001	.002	.001	+	.001	.001	.001
Nitrate (N)	+	2.1	2.8	1.0	+	2.2	3.0	1.2
Detergents (ABS)	†	0.09	0.15	0.04	†	0.09	0.15	0.05
Radioactivity † (pc/l)	†	4.8	5.9	2.9	†	4.7	5.8	3.2

For notes, see TABLE I

**PHYSICAL AND CHEMICAL ANALYSES FOR FINISHED WATER
FROM THE BELMONT WATER TREATMENT PLANT IN 1966**

Table IV-A1

MONTH	FREQ.	Turbid-ity	Res-idue	Spec. Cond.	Color	pH	Alka-linity	Carbon Dioxide	Hard-ness
		(Units)	Total	(µmhos)	Appar-ent	(Units)	(CaCO ₃)	(CO ₂)	(CaCO ₃)
		*	‡	‡	+	*	*	+	‡
Jan.		0.1	279	444	1	7.1	43	6.0	152
Feb.		0.2	279	418	2	7.1	41	8.0	150
Mar.		0.2	205	337	2	7.1	34	5.0	120
April		0.1	261	422	0	7.2	45	4.7	154
May		0.1	218	347	2	7.1	40	5.5	134
June		0.1	346	479	1	7.0	53	7.7	178
July		0.2	395	576	2	7.0	66	6.6	204
Aug.		0.2	445	632	2	7.1	67	8.3	223
Sept.		0.1	457	648	1	7.1	59	6.8	238
Oct.		0.1	365	526	0	7.2	55	7.0	208
Nov.		0.2	396	558	0	7.1	65	9.0	216
Dec.		0.1	333	486	0	7.1	48	—	185
Avg.		0.1	332	489	1	7.1	51	6.8	180
Max. Mo.		0.2	457	648	2	7.2	67	9.0	238
Min. Mo.		0.1	205	337	0	7.0	34	4.7	122

MONTH	FREQ.	Potas-sium	So-dium	Cal-cium	Magne-sium	Iron, Total	Manga-nese	Alu-minum	Chlo-ride	Sul-fate	Sil-ica
		(K)	(Na)	(Ca)	(Mg)	(Fe)	(Mn)	(Al)	(Cl)	(SO ₄)	(SiO ₂)
		‡	‡	‡	‡	‡	‡	‡	‡	‡	‡
Jan.		4.3	30.0	39.6	13.3	.04	.03	.06	39	112	9.2
Feb.		4.4	33.8	41.0	13.0	—	.03	.06	44	90	10.1
Mar.		3.2	20.2	33.6	9.7	.04	.02	.03	24	83	9.0
April		3.3	20.0	37.8	14.4	.04	.02	.01	30	99	6.4
May		2.8	19.8	35.0	11.0	.03	.02	.01	23	83	7.3
June		3.8	26.8	45.4	15.6	.03	.00	.02	37	118	8.0
July		7.0	36.5	53.3	18.0	.03	.02	.02	60	139	2.9
Aug.		7.0	39.5	61.3	21.0	.04	.01	.03	63	168	3.4
Sept.		7.0	39.5	57.0	22.0	.03	.00	.02	59	178	5.8
Oct.		6.0	34.0	49.8	18.0	.04	.00	.03	47	140	10.0
Nov.		7.0	34.0	53.5	19.3	.02	.00	.03	48	140	8.8
Dec.		5.0	25.2	45.6	15.4	.02	.00	.04	45	131	9.3
Avg.		5.1	29.9	46.1	15.9	.03	.01	.03	43	123	7.5
Max. Mo.		7.0	39.5	61.3	22.0	.04	.03	.06	63	178	10.1
Min. Mo.		2.8	19.8	33.6	9.7	.02	.00	.01	23	83	2.9

For notes, see TABLE I

**PHYSICAL AND CHEMICAL ANALYSES FOR FINISHED WATER
FROM THE BELMONT WATER TREATMENT PLANT IN 1966**

Table IV-A2

MONTH	FREQ.	Chro-mium	PHOSPHATES		Fluo-ride	CHLORINE RESIDUAL		Chem. O.D.
		(Cr ⁺⁶)	Ortho (PO ₄)	Poly (PO ₄)	(F)	Total (Cl)	Free (Cl)	(C.O.D.)
		‡	+	+	**	*	*	+
Jan.		.003	.15	1.46	.86	1.1	1.0	31.3
Feb.		.002	.18	1.36	.89	1.2	1.1	23.2
Mar.		.002	.13	1.30	.92	1.2	1.1	4.8
April		.003	.12	1.23	1.02	1.3	1.1	6.2
May		.003	.14	1.03	.98	1.3	1.1	4.9
June		.005	.14	1.31	1.06	1.4	1.1	6.2
July		.008	.13	1.19	1.03	1.6	1.1	8.6
Aug.		.008	.14	1.27	1.09	1.7	1.1	9.0
Sept.		.009	.11	.96	1.02	1.7	1.2	6.7
Oct.		.005	.16	1.21	.95	1.4	1.1	7.4
Nov.		.006	.11	1.04	.90	1.4	1.1	7.2
Dec.		.004	.11	1.20	.91	1.4	1.1	4.5
Avg.		.005	.14	1.21	.97	1.4	1.1	10.0
Max. Mo.		.009	.19	1.46	1.09	1.7	1.2	31.3
Min. Mo.		.002	.11	.96	.86	1.1	1.0	4.5

MONTH	FREQ.	DISSOLVED OXYGEN		NH ₃ (N)	NITROGEN		Deter-gents (ABS)	β-Radio-Activity (pc/L)
		PPM (D.O.)	Sat'n. Per Cent		NO ₂ (N)	NO ₃ (N)		
		+	+	+	+	+	‡	‡
Jan.		12.0	94	.02	.001	2.28	0.15	5.2
Feb.		12.7	102	.03	.001	2.48	0.04	5.1
Mar.		11.2	100	.03	.001	2.33	0.06	3.5
April		9.8	95	.03	.001	2.36	0.05	2.9
May		9.2	98	.05	.001	1.98	0.08	3.1
June		7.6	91	.05	.001	1.82	0.07	3.8
July		8.1	101	.06	.002	1.03	0.08	5.9
Aug.		5.9	72	.04	.002	1.50	0.09	5.4
Sept.		6.5	76	.05	.002	1.38	0.12	5.6
Oct.		7.5	85	.04	.002	2.75	0.10	5.1
Nov.		8.3	89	.04	.001	2.64	0.13	5.1
Dec.		10.3	98	.04	.001	2.59	0.09	3.9
Avg.		9.1	92	.04	.001	2.06	0.09	4.8
Max. Mo.		12.7	102	.06	.002	2.75	0.15	5.9
Min. Mo.		5.9	72	.02	.001	1.03	0.04	2.9

For notes, see TABLE I

**PHYSICAL AND CHEMICAL ANALYSES FOR FINISHED WATER
FROM THE QUEEN LANE WATER TREATMENT PLANT IN 1966**

Table IV-B1

MONTH	Turbidity (Units)	Residue Total	Spec. Cond. (µmhos)	Color Apparent	pH (Units)	Alkalinity (CaCO ₃)	Carbon Dioxide (CO ₂)	Hardness (CaCO ₃)
FREQ.	*	‡	‡	+	*	*	+	‡
Jan.	0.00	287	468	0	6.9	43	7.6	143
Feb.	0.00	282	448	0	6.9	43	8.1	139
Mar.	0.00	228	363	0	6.9	35	5.8	119
April	0.00	266	426	0	6.9	44	6.4	140
May	0.00	226	335	0	7.2	43	5.9	114
June	0.00	334	488	0	7.0	58	4.6	162
July	0.02	413	568	0	7.0	69	7.6	186
Aug.	0.01	425	623	0	6.9	65	7.9	201
Sept.	0.04	458	635	0	6.8	60	8.1	214
Oct.	0.05	354	540	0	6.8	59	6.2	176
Nov.	0.01	389	572	0	7.0	69	8.1	190
Dec.	0.02	338	511	0	6.9	52	7.4	160
Avg.	0.01	333	498	0	6.9	53	7.0	162
Max. Mo.	0.05	458	635	0	7.2	69	8.1	214
Min. Mo.	0.00	226	335	0	6.8	35	4.6	114

MONTH	Potassium (K)	Sodium (Na)	Calcium (Ca)	Magnesium (Mg)	Iron, Total (Fe)	Manganese (Mn)	Aluminum (Al)	Chloride (Cl)	Sulfate (SO ₄)	Silica (SiO ₂)
FREQ.	‡	‡	‡	‡	‡	‡	‡	‡	‡	‡
Jan.	5	33	34	14	.03	.01	.04	47	110	9.2
Feb.	5	36	34	13	.04	.01	.03	51	89	9.4
Mar.	4	27	29	11	.03	.00	.01	28	77	9.1
April	3	29	35	14	.011	.02	.01	37	97	6.4
May	3	27	29	12	.02	.01	.00	27	82	8.0
June	4	34	41	19	.02	.00	.02	46	107	8.0
July	6	43	46	18	.02	.01	.02	57	133	2.9
Aug.	7	46	48	22	.02	.00	.01	57	159	3.8
Sept.	7	49	51	23	.02	.01	.01	62	150	5.7
Oct.	7	42	42	18	.03	.00	.02	50	144	10.0
Nov.	7	45	48	19	.01	.00	.03	49	148	9.0
Dec.	5	40	39	15	.03	.00	.04	54	122	9.2
Avg.	5	38	40	17	.02	.01	.02	47	118	7.6
Max. Mo.	7	49	51	23	.04	.02	.04	62	159	10.0
Min. Mo.	3	27	29	11	.01	.00	.00	27	77	2.9

For notes, see TABLE I

**PHYSICAL AND CHEMICAL ANALYSES FOR FINISHED WATER
FROM THE QUEEN LANE WATER TREATMENT PLANT IN 1966**

Table IV-B2

MONTH	Chromium (Cr ⁺⁶)	PHOSPHATES (PO ₄)				Fluoride (F)	CHLORINE RESID.		Chem. O.D. (C.O.D.)
		Gravity	Poly	High Service	Poly		Total (Cl)	Free (Cl)	
FREQ.	‡	+	+	+	+	**	*	*	+
Jan.	.003	.09	.10	.17	2.40	.70	1.2	1.1	36.0
Feb.	.004	.07	.09	.33	1.51	.72	1.2	1.1	21.0
Mar.	.003	.06	.09	.09	1.42	.72	1.2	1.1	5.8
April	.003	.06	.43	.12	1.30	.90	1.2	1.1	6.2
May	.003	.08	.32	.14	1.26	.88	1.2	1.0	5.7
June	.004	.04	.08	.14	1.13	.94	1.1	1.0	5.9
July	.004	.05	.08	.16	.71	.80	1.2	1.0	9.1
Aug.	.004	.08	.09	.16	1.16	1.09	1.3	1.0	9.4
Sept.	.006	.05	.09	.11	.89	1.02	1.4	1.1	7.7
Oct.	—	.09	.38	.13	.99	.82	1.2	1.1	6.8
Nov.	.004	.07	.10	.10	.75	.85	1.2	1.1	7.3
Dec.	.006	.07	.23	.10	.83	.78	1.5	1.2	6.6
Avg.	.004	.07	.17	.15	1.20	.85	1.2	1.1	10.6
Max. Mo.	.006	.09	.43	.33	2.40	1.09	1.5	1.2	36.0
Min. Mo.	.003	.04	.08	.09	.71	.70	1.1	1.0	5.7

MONTH	DISSOLVED OXYGEN		NH ₃ (N)	NITROGEN		Detergents (ABS)	β-Radio-Activity (pc/L)
	PPM (D.O.)	Sat'n. Per Cent		NO ₂ (N)	NO ₃ (N)		
FREQ.	+	+	+	+	+	‡	‡
Jan.	11.4	94	.03	.001	2.4	0.12	5.3
Feb.	12.4	97	.04	.001	2.1	0.09	5.2
Mar.	10.6	92	.03	.001	2.5	0.09	4.1
April	9.6	93	.03	.001	2.2	0.05	3.2
May	9.1	94	.06	.001	2.1	0.07	3.5
June	7.2	87	.05	.001	2.0	0.06	3.7
July	6.4	83	.05	.001	1.2	0.08	5.8
Aug.	6.9	88	.05	.001	1.4	0.10	5.7
Sept.	7.2	87	.05	.001	1.7	0.09	5.2
Oct.	8.2	88	.05	.001	2.7	0.13	5.3
Nov.	9.4	90	.04	.001	2.9	0.15	5.5
Dec.	11.6	101	.03	.001	3.0	0.10	4.3
Avg.	9.17	91	.04	.001	2.2	0.09	4.7
Max. Mo.	12.4	101	.06	.001	3.0	0.15	5.8
Min. Mo.	7.2	83	.03	.001	1.2	0.05	3.2

For notes, see TABLE I

**PHYSICAL AND CHEMICAL ANALYSES FOR FINISHED WATER
FROM THE TORRESDALE WATER TREATMENT PLANT IN 1966**

Table IV-C1

MONTH	Turbidity (Units)	Residue Total	Spec. Cond. (µmhos)	Color Apparent	pH (Units)	Alkalinity (CaCO ₃)	Carbon Dioxide (CO ₂)	Hardness (CaCO ₃)
FREQ.	*	‡	‡	+	*	*	+	‡
Jan.	0.1	155	258	0	7.8	31	8	91
Feb.	0.1	181	302	0	7.9	34	2	96
Mar.	0.0	136	222	0	8.0	27	2	80
April	0.0	134	223	0	8.0	31	3	80
May	0.0	148	245	0	7.6	33	1	90
June	0.0	166	166	0	7.7	37	2	90
July	0.0	212	354	0	8.0	43	2	104
Aug.	0.2	210	350	0	7.7	44	2	116
Sept.	0.1	223	413	0	7.8	47	2	109
Oct.	0.0	198	372	0	7.8	43	2	107
Nov.	0.0	189	315	0	7.9	44	1	110
Dec.	0.0	175	292	0	7.9	36	2	104
Avg.	0.0	177	293	0	7.8	38	2	98
Max. Mo.	0.2	223	413	0	8.0	47	8	116
Min. Mo.	0.0	134	166	0	7.6	27	1	80

MONTH	Potassium (K)	Sodium (Na)	Calcium (Ca)	Magnesium (Mg)	Iron, Total (Fe)	Manganese (Mn)	Aluminum (Al)	Chloride (Cl)	Sulfate (SO ₄)	Silica (SiO ₂)
FREQ.	‡	‡	‡‡	‡‡	‡	‡	‡	‡	‡	‡‡
Jan.	1.9	9.8	23	8	.00	0.00	.15	22	32	4.1
Feb.	1.2	7.3	27	7	.00	0.00	.19	29	46	4.3
Mar.	0.7	3.9	20	8	.03	0.00	.08	17	35	3.9
April	0.5	3.9	19	8	.00	0.00	.04	17	36	3.5
May	0.7	4.4	26	8	.00	0.00	.03	19	37	3.3
June	1.9	8.0	25	6	.01	0.00	.05	20	28	3.1
July	2.6	12.1	29	9	.00	0.00	.03	26	43	1.1
Aug.	3.1	15.0	35	9	.00	0.00	.03	29	57	0.8
Sept.	3.4	17.9	33	8	.00	0.00	.11	29	54	1.0
Oct.	3.3	14.3	31	11	.00	0.00	.09	25	42	3.1
Nov.	3.0	13.8	33	8	.00	0.00	.05	26	53	3.8
Dec.	2.1	16.5	32	9	.01	0.00	.08	21	45	4.0
Avg.	2.0	10.6	28	8	.00	0.00	.08	23	42	3.0
Max. Mo.	3.4	17.9	35	11	.03	0.00	.19	29	57	4.3
Min. Mo.	0.5	3.9	19	6	.00	0.00	.03	17	28	0.8

For notes, see TABLE I

**PHYSICAL AND CHEMICAL ANALYSES FOR FINISHED WATER
FROM THE TORRESDALE WATER TREATMENT PLANT IN 1966**

Table IV-C2

MONTH	Chromium (Cr ⁺⁶)	PHOSPHATES Ortho (PO ₄)	Poly (PO ₄)	Fluoride (F)	CHLORINE RESIDUAL Total (Cl)	Free (Cl)	Chem. O.D. (C.O.D.)
FREQ.	‡‡	+	+	**	*	*	+
Jan.	0.000	.09	.62	.88	1.50	1.30	5.4
Feb.	0.000	.09	.77	.92	1.56	1.27	4.8
Mar.	0.000	.07	.80	.82	1.60	1.40	3.6
April	0.000	.06	.76	.90	1.40	1.20	2.4
May	0.000	.21	.68	.86	1.42	2.21	5.5
June	0.000	.17	.77	.87	1.41	1.11	4.7
July	0.000	.15	.66	1.10	1.35	1.10	4.4
Aug.	0.000	.08	.56	1.13	1.50	1.30	3.2
Sept.	0.000	.07	.63	1.04	1.50	1.27	4.5
Oct.	0.000	.04	.14	.99	1.50	1.30	5.4
Nov.	0.000	.01	.03	.91	1.46	1.21	5.4
Dec.	0.000	.08	.52	.91	1.65	1.40	2.8
Avg.	0.000	.09	.58	.94	1.49	1.26	4.3
Max. Mo.	0.000	.21	.80	1.13	1.65	1.40	5.5
Min. Mo.	0.000	.01	.03	.82	1.35	1.10	2.4

MONTH	DISSOLVED OXYGEN PPM (D.O.)	Oxygen Sat'n. Per Cent	NITROGEN NH ₃ (N)	NO ₂ (N)	NO ₃ (N)	Detergents (ABS)	β-Radio- Activity (pc/L)
FREQ.	+	+	+	+	+	‡	‡
Jan.	12.2	98	.01	0.000	.66	.13	4.1
Feb.	12.4	96	.00	0.000	.68	.20	4.9
Mar.	11.5	99	.00	0.000	.66	.11	2.8
April	10.5	96	.00	0.000	.62	.10	2.2
May	8.9	89	.00	0.000	.63	.11	2.7
June	5.9	67	.00	0.000	.55	.08	2.8
July	6.5	81	.00	0.000	.75	.09	3.0
Aug.	5.9	73	.00	0.000	.67	.09	3.3
Sept.	5.7	67	.01	0.000	.93	.13	3.3
Oct.	6.6	71	.03	0.000	.97	.11	3.8
Nov.	7.9	77	.02	0.000	.96	.18	3.7
Dec.	10.8	91	.00	0.000	.85	.07	3.3
Avg.	8.7	84	.01	0.000	.74	.12	3.3
Max. Mo.	12.4	99	.03	0.000	.97	.20	4.9
Min. Mo.	5.7	67	.00	0.000	.55	.07	2.2

For notes, see TABLE I

COLIFORM ORGANISMS IN WATER TREATMENT PLANT EFFLUENTS AND IN THE DISTRIBUTION SYSTEM—1966

Table V

MONTH	*Number of Std. Samples	No. 10 ml. Portions Tested	10 ml. Portions Positive No.	%	Samples with 3 or more Portions Positive No.	%
EFFLUENTS—DELAWARE AND SCHUYKILL TREATMENT PLANTS						
Jan.	502	2510	0	.00	0	.00
Feb.	449	2245	0	.00	0	.00
Mar.	457	2285	0	.00	0	.00
April	446	2230	0	.00	0	.00
May	457	2285	3	.13	1	.22
June	453	2265	7	.31	0	.00
July	486	2430	7	.29	1	.21
Aug.	519	2595	5	.19	1	.19
Sept.	528	2640	5	.19	1	.19
Oct.	552	2760	0	.00	0	.00
Nov.	525	2625	0	.00	0	.00
Dec.	525	2625	1	.04	0	.00
TOTAL	5899	29495	28	.....	4	.....
Percent	.....	.....	.....	.09	.....	.07
Max. Mo.	552	2760	7	.31	1	.22
Min. Mo.	446	2230	0	.00	0	.00
DISTRIBUTION SYSTEM—DELAWARE AND SCHUYKILL						
Jan.	845	4225	0	.00	0	.00
Feb.	752	3760	3	.08	0	.00
Mar.	936	4680	3	.06	0	.00
April	827	4135	0	.00	0	.00
May	845	4225	2	.05	0	.00
June	881	4405	20	.45	3	.34
July	814	4070	63	1.55	13	1.60
Aug.	923	4615	17	.37	2	.22
Sept.	862	4310	24	.56	2	.23
Oct.	850	4250	6	.14	1	.12
Nov.	822	4110	3	.07	0	.00
Dec.	816	4080	3	.07	0	.00
TOTAL	10173	50865	144	.....	21	.....
Percent	.....	.....	.....	.28	.....	.21
Max. Mo.	936	4680	63	1.55	13	1.60
Min. Mo.	752	3760	0	.00	0	.00

NOTE:—*Each Standard Sample consists of five-10 ml. Standard Portions as defined by U.S. Public Health Service Drinking Water Standards for 1962.

COLIFORM ORGANISMS IN THE FINISHED WATERS OF THE DISTRIBUTION SYSTEM—1957-1966

Table VI

Per Cent of 10 Milliliter Standard Portions Having Positive Confirmed Tests

YEAR	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	MONTHLY	
														Max.	Min.
1957	0.46	0.12	0.00	0.00	0.13	0.29	0.23	0.61	0.88	0.22	0.15	0.07	0.27	0.88	0.00
1958	0.26	0.47	0.00	0.00	0.17	0.52	0.46	0.85	0.21	0.10	0.41	0.26	0.31	0.85	0.00
1959	0.41	0.12	0.00	0.00	0.00	1.10	0.33	0.58	0.68	0.17	0.12	0.63	0.35	1.10	0.00
1960	0.25	0.22	0.03	0.28	0.14	0.38	0.49	1.00	0.92	0.78	0.90	0.33	0.53	1.00	0.03
1961	0.05	0.00	0.00	0.07	0.35	0.49	0.47	0.37	0.59	0.61	0.40	0.10	0.30	0.61	0.00
1962	0.07	0.06	0.00	0.00	0.21	1.30	3.30	0.50	0.40	0.32	0.15	0.03	0.53	3.30	0.00
1963	0.02	0.03	0.02	0.12	0.26	0.16	0.79	0.66	0.46	0.35	0.30	0.06	0.27	0.79	0.02
1964	0.02	0.10	0.04	0.00	0.05	0.23	0.60	0.88	1.10	0.27	0.00	0.09	0.29	1.10	0.00
1965	0.00	0.00	0.02	0.00	0.12	0.23	1.54	1.63	0.36	0.02	0.03	0.00	0.35	1.63	0.00
1966	0.00	0.08	0.06	0.00	0.05	0.45	1.55	0.37	0.56	0.14	0.07	0.07	0.28	1.55	0.00

10 YEAR PERIOD—1957-1966 INCLUSIVE

Aver.	0.15	0.12	0.02	0.05	0.15	0.52	0.98	0.75	0.62	0.30	0.25	0.16	0.35	.....	.....
Max.	0.46	0.47	0.06	0.28	0.35	1.30	3.30	1.63	1.10	0.78	0.90	0.63	0.53	3.30	.....
Min.	0.00	0.00	0.00	0.00	0.00	0.16	0.23	0.30	0.20	0.02	0.00	0.00	0.27	.....	0.00

NOTE:—U.S. Public Health Service Drinking Water Standards (1962) require that when 10 ml. standard portions are examined, NOT MORE THAN 10% OF THESE PORTIONS in any month shall show the presence (positive confirmed tests) of coliform group.

COLIFORM ORGANISMS IN THE FINISHED WATERS OF THE DISTRIBUTION SYSTEM—1957-1966

Table VI-A

Per Cent of Samples Having Three or More 10 Milliliter Portions with Positive Confirmed Tests

YEAR													MONTHLY		
	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Max.	Min.
1957	0.33	0.00	0.00	0.00	0.00	0.16	0.16	0.48	0.53	0.15	0.00	0.00	0.14	0.53	0.00
1958	0.33	0.43	0.00	0.00	0.00	0.35	0.16	0.68	0.00	0.00	0.41	0.16	0.20	0.68	0.00
1959	0.34	0.00	0.00	0.00	0.00	0.86	0.16	0.34	0.51	0.00	0.00	0.50	0.23	0.86	0.00
1960	0.00	0.00	0.00	0.00	0.00	0.17	0.35	0.76	0.72	0.86	0.77	0.27	0.38	0.86	0.00
1961	0.00	0.00	0.00	0.00	0.23	0.35	0.50	0.32	0.49	0.35	0.50	0.00	0.23	0.50	0.00
1962	0.00	0.00	0.00	0.00	0.23	1.00	3.50	0.20	0.24	0.21	0.13	0.00	0.46	3.50	0.00
1963	0.00	0.00	0.00	0.12	0.21	0.00	0.44	0.49	0.26	0.21	0.28	0.00	0.17	0.49	0.00
1964	0.00	0.13	0.00	0.00	0.00	0.11	0.62	0.79	0.70	0.23	0.00	0.11	0.23	0.79	0.00
1965	0.00	0.00	0.00	0.00	0.12	0.11	1.14	0.99	0.36	0.00	0.00	0.00	0.23	1.14	0.00
1966	0.00	0.00	0.00	0.00	0.00	0.34	1.60	0.22	0.23	0.12	0.00	0.00	0.21	1.60	0.00

10 YEAR PERIOD—1957-1966 INCLUSIVE

Avg.	0.10	0.06	0.00	0.01	0.08	0.35	0.86	0.53	0.40	0.21	0.21	0.10	0.25	.....	.....
Max.	0.34	0.43	0.00	0.12	0.23	1.00	3.50	0.99	0.72	0.86	0.77	0.50	0.46	3.50	.....
Min.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	.....	0.00

NOTE:—U.S. Public Health Service Drinking Water Standards (1962) require that when 10 ml. standard portions are examined, not more than 5% of the standard samples in any month shall have three or more 10 ml. standard portions positive.

WATER TEMPERATURES TAKEN AT 6:00 A.M. AT WATER TREATMENT PLANTS

Table VII
Figures In Degrees Fahrenheit

MONTH	BELMONT—1966			QUEEN LANE—1966			TORRESDALE—1966			ANNUAL—1966			10-YR. VALUES 1957—1965		
	Daily			Daily			Daily			Avg.	Max.	Min.	Avg.	Max.	Min.
	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.
Jan.	40	48	34	38	46	32	39	45	35	39	48	32	37	40	35
Feb.	38	46	34	39	44	34	36	40	33	38	46	33	37	40	35
Mar.	50	58	43	47	56	40	43	48	37	47	58	37	43	47	39
April	56	65	51	54	62	47	49	56	43	53	65	43	54	57	51
May	65	75	54	62	72	52	58	66	54	62	75	52	66	70	62
June	77	84	71	76	86	70	70	73	60	74	86	60	75	77	71
July	83	86	80	84	88	78	80	82	73	82	88	73	81	82	77
Aug.	80	83	70	81	84	78	80	81	78	80	84	70	79	80	78
Sept.	72	81	63	72	83	60	75	81	69	73	83	60	74	79	71
Oct.	63	67	57	61	66	54	63	69	60	62	69	54	64	67	61
Nov.	56	62	49	54	60	48	56	60	52	55	62	48	54	57	51
Dec.	44	52	38	43	53	38	45	51	37	44	53	37	42	45	37
Annual	60	86	34	59	88	32	58	82	33	59	88	32	59	82	35

10 YEAR PERIOD AVERAGES (1957-1966)

MONTH	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	10 Year Avg.
Jan.	37	37	37	38	37	40	35	37	40	39	37
Feb.	35	35	38	39	37	40	35	38	37	38	37
Mar.	45	41	43	39	44	44	43	45	45	47	43
April	53	52	56	56	51	54	57	53	54	53	54
May	67	62	68	66	63	67	67	67	70	62	66
June	77	71	76	75	74	76	75	75	75	74	75
July	82	80	79	79	79	78	81	82	79	82	81
Aug.	78	80	80	79	80	80	79	79	79	80	79
Sept.	76	73	76	72	79	74	71	75	75	73	74
Oct.	62	61	67	62	67	66	66	65	64	62	64
Nov.	54	52	51	55	57	51	55	56	53	55	54
Dec.	42	37	41	40	44	41	40	45	45	44	42
Avg.	59	57	59	58	59	59	59	60	60	59	59

TOTAL PRECIPITATION AT PHILADELPHIA INTERNATIONAL AIRPORT †

Table VIII

Figures in Inches

MONTH	NORMAL (AVERAGE)			RECORD VALUES		TOTAL PRECIPITATION		
	1921— 1950	1931— 1960	1957— 1966	1941 — Max.	1966 Min.	1966	1965	1964
	Jan.	3.37	3.32	2.78	6.06	0.45	2.82	2.35	3.92
Feb.	3.02	2.80	3.07	4.64	1.37	4.30	2.18	2.83
Mar.	3.32	3.80	3.25	6.27	0.68	0.68	3.19	1.94
April	3.38	3.40	3.52	6.58	1.13	4.35	2.33	5.27
May	3.58	3.74	2.02	7.41	0.47	2.95	1.23	0.47
June	3.87	4.05	3.02	7.40	0.11	0.41	2.85	0.21
July	4.20	4.16	4.04	7.48	0.64	2.35	3.22	3.83
Aug.	4.58	4.63	3.60	*9.70	0.49	1.63	4.05	0.49
Sept.	3.46	3.46	4.15	8.78	0.88	8.70	3.02	2.42
Oct.	2.60	2.78	2.38	5.21	*0.09	5.12	2.02	1.73
Nov.	3.08	3.40	2.86	6.67	1.08	2.36	1.05	1.64
Dec.	2.67	2.94	3.04	5.48	0.25	4.33	1.85	5.13
Annual	41.13	42.48	37.74	*49.06	*29.34	40.00	29.34	29.88

MONTH	TOTAL PRECIPITATION								
	1963	1962	1961	1960	1959	1958	1957	1956	
Jan.	2.31	2.95	3.16	3.11	2.03	3.53	1.67	2.30	
Feb.	2.19	3.51	3.13	3.44	1.60	4.64	2.81	4.64	
Mar.	3.94	3.91	5.17	1.96	3.55	4.97	3.24	4.65	
April	1.13	3.69	4.82	2.92	2.25	4.19	4.22	2.68	
May	1.06	1.85	3.38	3.65	0.80	3.65	1.31	3.84	
June	2.88	7.40	2.95	0.71	5.28	5.13	2.41	3.86	
July	3.13	2.30	5.96	5.52	7.48	5.98	0.64	4.61	
Aug.	3.35	6.58	3.42	3.19	3.73	6.20	3.38	2.79	
Sept.	6.44	2.77	2.41	8.78	1.33	2.55	3.10	3.75	
Oct.	0.09	0.95	1.83	2.79	3.41	3.65	2.05	3.47	
Nov.	6.67	4.60	2.04	1.92	3.29	2.05	2.98	5.71	
Dec.	1.76	2.11	2.78	3.16	3.62	1.13	4.49	3.70	
Annual	34.95	42.62	41.05	41.15	38.37	47.87	32.20	46.00	

NOTE:—† WEATHER BUREAU DATA—U.S. Weather Bureau, International Airport, Philadelphia, Pa.
* Record values at International Airport:

Max.: Annual = 1948, Month = 1955
Min.: Annual = 1965, Month = 1963

COMPARATIVE HARDNESSES of FINISHED WATER 1957-66

	Year	Parts Per Million			Grains Per Gallons		
		Monthly Avg.			Monthly Avg.		
		Avg.	Max.	Min.	Avg.	Max.	Min.
Schuylkill Div.....	1957	163	234	106	9.5	13.7	6.2
Schuylkill Div.....	1958	137	190	92	8.0	11.1	5.4
Schuylkill Div.....	1959	143	200	92	8.4	11.7	5.4
Schuylkill Div.....	1960	131	164	99	7.7	9.6	5.8
Schuylkill Div.....	1961	153	266	97	9.0	15.6	5.7
Schuylkill Div.....	1962	148	251	89	8.7	14.7	5.2
Schuylkill Div.....	1963	160	230	99	9.4	13.5	5.8
Schuylkill Div.....	1964	164	278	108	9.6	16.3	6.3
Schuylkill Div.....	1965	180	230	125	10.5	13.5	7.3
Schuylkill Div.....	1966	171	238	114	10.0	13.9	6.7
Ten-year Values.....		155	278	89	9.1	16.3	5.2
Delaware Div.....	1957	69	86	54	4.0	5.0	3.2
Delaware Div.....	1958	61	77	42	3.6	4.5	2.5
Delaware Div.....	1959	68	74	49	4.0	4.3	2.9
Delaware Div.....	1960	84	95	63	4.9	5.6	3.7
Delaware Div.....	1961	90	102	64	5.3	6.0	3.7
Delaware Div.....	1962	93	107	69	5.4	6.3	4.0
Delaware Div.....	1963	99	108	87	5.8	6.3	5.1
Delaware Div.....	1964	97	114	74	5.7	6.7	4.3
Delaware Div.....	1965	99	120	74	5.8	7.0	4.3
Delaware Div.....	1966	98	116	80	5.7	6.8	4.7
Ten-year Values.....		86	120	42	5.0	7.0	2.5

NOTE:—One grain per gallon is equivalent to 17.1 parts per million (P.P.M.)

