CITY OF PHILADELPHIA

WILLIAM J. MARRAZZO
COMMISSIONER

WATER DEPARTMENT
1180 MUNICIPAL SERVICES BUILDING
PHILADELPHIA, PA. 19107

April 23, 1984

50-352/353

Mr. Robert E. Martin
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Martin:

Enclosed is a copy of the brochure entitled "How Water in Philadelphia is Treated and Distributed". To summarize the information contained in the brochure, Philadelphia has three water treatment plants - Samuel S. Baxter, Queen Lane and Belmont. The Baxter Plant (Torresdale in the brochure, due to a name change in 1983) takes about one-half the City's requirement from the Delaware River, and the other plants take the remainder from the Schuylkill River.

The normal average daily production for all three plants combined is approximately 330 million gallons. Of course, peak days during the summer due to fire hydrant usage and during the winter due to broken water mains can reach about 470 mgd with instantaneous peaks reaching 700 mgd.

The three plants have a similar treatment scheme: natural sedimentation, disinfection, chemical treatment, coagulation, settling, filtration, ammoniation, and fluoridation. The filters are mostly conventional rapid sand filters, however, there are 15 dual media filters at Baxter. As filters need replacement, the more efficient dual media mode is utilized. Powdered activated carbon and chlorine dioxide can be added to the water for the treatment of offensive tastes and odors and algae control.

An aspect of operations not described in the enclosed brochure is sludge generation and disposal.

The Baxter Plant utilizes a raw water basin in which natural sedimentation settles out heavy particles in the river water. Backwash water from the filters is also discharged into this basin. In the past, about every six years the basin was dredged and the sludge pumped to a 19 acres sludge lagoon which is on the premises. Commencing in the summer, a contractor will remove the approximately 25 years of accumulated thickened sludge from the sludge lagoon. When this is

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completed (by the Spring of 1985) the raw water basin will be dredged on an annual basis using a purchased dredge and plant forces. The sludge will still be discharged to the renovated sludge lagoon.

The coagulant, ferric chloride, generates a sludge which consists of mostly ferric hydroxide, river silt, and river clay. Most of this sludge is settled in the sedimentation basins and is pumped to the sludge lagoon. The remainder is filtered out and is removed during the backwash. As previously stated, this backwash is discharged into the raw water basin.

The Belmont Plant similarly utilized a raw water basin which collects heavy particles through natural sedimentation. However, a division wall permits half of the raw water basin to be taken out of service at Belmont. Each half of the basin is cleaned every three years. The accumulated sediment is discharged to a sewer which transports the material to the City's Southwest Wastewater Treatment Plant.

This plant uses alum as a coagulant which generates an aluminum hydroxide sludge. The sludge from the sedimentation basins and the filter backwash are also discharged to the sewer and are likewise conveyed to the Southwest Wastewater Treatment Plant.

The Queen Lane Plant also has a raw water basin which collects sediment through natural sedimentation. Every ten years this basin is dredged and the solids deposited in a lagoon which is located on the plant grounds. Ferric chloride and alum are alternated at this plant and the resulting sludge from the sedimentation basins and the backwash water are discharged to a sewer which is serviced by the City's Southeast Water Pollution Control Plant. In turn, sludge removed at the Southeast Plant is sent through a force main for further treatment at the Southwest Plant.

In general, under normal operations, water from the Baxter Plant services the area of Philadelphia which is east of Broad St. Water from the Queen Lane Plant services the area west of Broad St. to the Schuylkill River. Water from the Belmont Plant services the area west of the Schuylkill River.

However, in an emergency, assuming the Baxter plant is fully on line (no significant equipment out for maintenance), no critical water mains are out of service, and an average daily flow, Baxter can via valve changes in the Distribution System, supply the City's entire needs with the exception of the Belmont High Service District. This area borders City Line Ave. and represents approximately 12 mgd.

Also, please find a data report of water analyses of the raw and finished water.

If you need any additional information, or clarification of the enclosed material, please do not hesitate to call.

Sincerely yours,

BRUCE S. APTOWICZ, MANAGER
Water Operations

BSA:mab
Enclosures

PHILADELPHIA WATER DEPARTMENT

BUREAU OF LABORATORY SERVICES

*** WATER QUALITY - PHYSICAL/CHEMICAL PARAMETERS ***

TORRESDALE INTAKE

PARAMETERS	F.Y. 1979	F.Y. 1980	F.Y. 1981	F.Y. 1982	4 YEAR AVERAGE
ALKALINITY	37	40	41	35	38
CARBON DIOXIDE	4	3	5	4	4
CHLORIDE	14	14	20	18	16
COLOR, APPARENT	----	----	----	----	----
COLOR, FILTERED	13	14	7	5	10
CONDUCTIVITY	183	180	216	189	192
CYANIDE	.011	.006	.004	----	.007
DISSOLVED OXYGEN	8.9	9.3	8.1	8.3	8.6
HARDNESS	70	68	74	59	68
NITROGEN, AMMONIA	0.25	0.10	0.31	0.37	0.26
NITROGEN, NITRATE	1.19	1.18	1.20	1.42	1.25
NITROGEN, NITRITE	0.081	0.046	0.079	0.041	0.062
pH	7.3	7.4	7.3	7.3	7.3
PHENOLS	0.001	0.001	0.001	0.000	0.001
PHOSPHATE, PERSULFATE	----	0.160	0.146	0.171	0.159
PHOSPHATE, ACID HYDROLYZED	----	----	0.096	0.060	0.078
PHOSPHATE, ORTHO	----	0.064	0.071	0.055	0.063
RADIOACTIVITY, GROSS ALPHA	----	----	----	----	----
RADIOACTIVITY, GROSS BETA	----	----	----	----	----
RESIDUE, TOTAL	148	142	152	139	145
RESIDUE, FILTRABLE	113	111	126	106	114
SILICA	14.5	7.6	1.6	4.5	7.0
SULFATE	18	20	27	23	22
SURFACTANTS	----	----	----	----	----
TEMPERATURE °C	13	13	17	19	16
TURBIDITY	14.3	7.8	4.8	8.7	8.9

Fiscal Year Averages are for the period ending on June 30.

PHILADELPHIA WATER DEPARTMENT

BUREAU OF LABORATORY SERVICES

*** WATER QUALITY - METALS ***

TORRESDALE INTAKE

PARAMETERS	F.Y. 1979	F.Y. 1980	F.Y. 1981	F.Y. 1982	4 YEAR AVERAGE
ALUMINUM, TOTAL	0.42	0.40	0.42	0.28	0.38
ALUMINUM, FILTERED	0.06	0.10	0.08	0.05	0.07
ARSENIC	0.002	0.002	0.002	0.003	0.002
BARIUM	0	0.05	0.03	0.04	0.03
CADMIUM	0.000	0.000	0.001	0.000	0.000
CALCIUM	19	21	21	17	20
CHROMIUM, TOTAL	0.005	0.007	0.008	0.004	0.006
COPPER	0.005	0.007	0.007	0.012	0.008
IRON, TOTAL	0.57	0.84	0.78	0.88	0.76
IRON, FILTERED	0.04	0.08	0.03	0.05	0.05
LEAD	0.006	0.007	0.009	0.012	0.008
MAGNESIUM	6	6	7	6	6
MANGANESE, TOTAL	0.08	0.08	0.09	0.10	0.09
MANGANESE, FILTERED	0.02	0.04	0.03	0.02	0.03
MERCURY	0.0004	0.0002	0.0000	0.0001	0.0002
NICKEL	0.000	0.004	----	0.010	0.005
POTASSIUM	2.4	2.2	2.6	2.2	2.4
SELENIUM	0.000	0.000	0.000	0.000	0.000
SILVER	0.000	0.000	0.000	0.000	0.000
SODIUM	10.4	9.6	14.0	11.5	11.4
ZINC	0.03	0.04	0.07	0.06	0.05

Fiscal Year Averages are for the period ending June 30.

PHILADELPHIA WATER DEPARTMENT

BUREAU OF LABORATORY SERVICES

*** WATER QUALITY - PHYSICAL/CHEMICAL PARAMETERS ***

TORRESDALE PLANT EFFLUENT

PARAMETERS	F.Y. 1979	F.Y. 1980	F.Y. 1981	F.Y. 1982	4 YEAR AVERAGE
ALKALINITY	43	43	45	39	42
CARBON DIOXIDE	2	1	0	0	1
CHLORIDE	34	35	37	35	35
CONDUCTIVITY	264	262	292	260	270
CYANIDE	0.003	0.003	0.001	----	0.002
DISSOLVED OXYGEN	9.8	10.1	9.0	8.6	9.4
HARDNESS	108	107	107	87	102
NITROGEN, NITRATE	1.30	1.21	1.24	1.46	1.30
NITROGEN, NITRITE	0.009	0.004	0.002	0.001	0.004
pH	8.1	8.1	8.3	8.0	8.1
PHENOLS	0.000	0.000	0.002	0.000	0.001
RADIOACTIVITY, GROSS ALPHA	----	0.2	0.3	0.3	0.3
RADIOACTIVITY, GROSS BETA	3.8	3.7	4.4	1.2	3.3
RESIDUE, TOTAL	198	193	195	177	191
SILICA	14.6	2.4	2.0	3.5	5.6
SULFATE	18	10	30	23	20
SURFACTANTS	----	----	----	----	----
TEMPERATURE ^{o}C	14	15	17	15	15
TURBIDITY	0.31	0.20	0.30	0.23	0.26

Fiscal Year Averages are for the period ending June 30.

PHILADELPHIA WATER DEPARTMENT

BUREAU OF LABORATORY SERVICES

*** WATER QUALITY - METALS ***

TORRESDALE PLANT EFFLUENT

PARAMETERS	F.Y. 1979	F.Y. 1980	F.Y. 1981	F.Y. 1982	4 YEAR AVERAGE
ALUMINUM, TOTAL	0.22	0.16	0.17	0.15	0.18
ALUMINUM, FILTERED	----	----	----	----	----
ARSENIC	0.001	0.002	0.001	0.002	0.002
BARIUM	0.00	0.04	0.03	0.03	0.02
CADMIUM	0.000	0.000	0.002	0.000	0.001
CALCIUM	33	34	24	28	30
CHROMIUM, TOTAL	0.003	0.007	0.008	0.003	0.005
COPPER	0.005	0.009	0.010	0.009	0.008
IRON, TOTAL	0.03	0.03	0.02	0.05	0.02
IRON, FILTERED	----	----	----	----	----
LEAD	0.002	0.002	0.002	0.001	0.002
MAGNESIUM	7	6	10	6	10
MANGANESE, TOTAL	0.00	0.01	0.04	0.01	0.02
MERCURY	0.0003	0.0002	0.0000	0.0000	0.0001
NICKEL	0.000	0.003	----	0.020	0.008
POTASSIUM	2.3	2.1	3.1	2.2	2.4
SELENIUM	0.000	0.000	0.000	0.000	0.000
SILVER	0.001	0.000	0.000	0.000	0.000
SODIUM	10.5	9.9	14.1	13.2	11.9
ZINC	0.01	0.02	0.01	0.01	0.01

Fiscal Year Averages are for the period ending June 30.

PHILADELPHIA WATER DEPARTMENT

BUREAU OF LABORATORY SERVICES

*** WATER QUALITY - PHYSICAL/CHEMICAL PARAMETERS ***

QUEEN LANE INTAKE

PARAMETERS	F.Y. 1979	F.Y. 1980	F.Y. 1981	F.Y. 1982	4 YEAR AVERAGE
ALKALINITY	61	64	80	67	68
CARBON DIOXIDE	3	4	7	4	4
CHLORIDE	30	31	41	40	36
COLOR, APPARENT	31	21	11	26	22
COLOR, FILTERED	8	6	5	4	6
CONDUCTIVITY	356	390	465	418	407
CYANIDE	0.006	0.005	0.000	----	0.004
DISSOLVED OXYGEN	9.9	10.4	9.0	10.0	9.8
HARDNESS	131	128	166	125	138
NITROGEN, AMMONIA	0.50	0.40	0.69	0.32	0.48
NITROGEN, NITRATE	2.52	2.73	2.86	2.94	2.76
NITROGEN, NITRITE	0.065	0.068	0.051	0.053	0.059
pH	7.7	7.7	7.6	7.5	7.5
PHENOLS	0.003	0.003	0.003	0.000	0.002
PHOSPHATE, PERSULFATE	0.420	----	----	0.493	0.456
PHOSPHATE, ACID HYDROLYZED	----	0.380	0.487	0.517	0.461
PHOSPHATE, ORTHO	0.380	0.351	0.457	0.409	0.399
RADIOACTIVITY, GROSS ALPHA	1.5	1.1	1.0	1.1	1.2
RADIOACTIVITY, GROSS BETA	5.8	6.4	10.2	3.8	6.5
RESIDUE, TOTAL	272	259	346	285	290
RESIDUE, FILTRABLE	243	238	296	252	257
SILICA	8.3	10.4	7.9	6.7	8.1
SULFATE	62	50	73	47	58
SURFACTANTS	0.04	0.05	0.06	----	0.05
TEMPERATURE °C	14	14	15	18	15
TURBIDITY	17.2	13.2	9.6	10.4	12.6

Fiscal Year Averages are for the period ending on June 30.

PHILADELPHIA WATER DEPARTMENT

BUREAU OF LABORATORY SERVICES

*** WATER QUALITY - METALS ***

QUEEN LANE INTAKE

PARAMETERS	F.Y. 1979	F.Y. 1980	F.Y. 1981	F.Y. 1982	4 YEAR AVERAGE
ALUMINUM, TOTAL	0.26	0.34	0.59	0.51	0.43
ALUMINUM, FILTERED	0.10	----	0.16	0.09	0.12
ARSENIC	0.005	0.003	0.003	0.006	0.007
BARIUM	0.043	0.050	0.040	0.070	0.050
CADMIUM	0.000	0.000	0.000	0.000	0.000
CALCIUM	33	37	45	34	37
CHROMIUM, TOTAL	0.006	0.003	0.002	0.011	0.006
COPPER	0.007	0.009	0.005	0.037	0.017
IRON, TOTAL	0.82	0.58	0.41	0.83	0.66
IRON, FILTERED	0.08	----	0.06	0.03	0.06
LEAD	0.007	0.005	0.009	0.013	0.008
MAGNESIUM	11	11	15	14	13
MANGANESE, TOTAL	0.18	0.18	0.16	0.19	0.18
MANGANESE, FILTERED	0.10	----	0.07	0.05	0.07
MERCURY	0.0009	0.0003	0.0000	0.0001	0.0003
NICKEL	0.00	0.005	----	0.02	0.008
POTASSIUM	3.9	3.5	4.6	4.0	4.0
SELENIUM	0.000	0.000	0.000	0.000	0.000
SILVER	0.000	0.000	0.000	0.000	0.000
SODIUM	22.2	20.7	34.1	23.3	25.1
ZINC	0.09	0.06	0.07	0.09	0.08

Fiscal Year Averages are for the period ending June 30.

PHILADELPHIA WATER DEPARTMENT

BUREAU OF LABORATORY SERVICES

*** WATER QUALITY - PHYSICAL/CHEMICAL PARAMETERS ***

QUEEN LANE PLANT EFFLUENT

PARAMETERS	F.Y. 1979	F.Y. 1980	F.Y. 1981	F.Y. 1982	4 YEAR AVERAGE
ALKALINITY	53	56	62	55	56
CARBON DIOXIDE	12	11	19	18	15
CHLORIDE	51	47	59	60	54
CONDUCTIVITY	431	437	535	479	470
CYANIDE	0.008	0.004	0.008	----	0.007
DISSOLVED OXYGEN	----	----	----	----	----
HARDNESS	148	140	174	140	150
NITROGEN, NITRATE	2.71	2.86	2.72	3.02	2.83
NITROGEN, NITRITE	0.001	0.001	0.002	0.001	0.001
pH	7.0	7.1	7.0	7.0	7.0
PHENOLS	0.003	0.002	0.001	0.000	0.002
RADIOACTIVITY, GROSS ALPHA	0.2	1.3	0.5	0.4	0.6
RADIOACTIVITY, GROSS BETA	2.8	4.5	5.8	2.1	3.8
RESIDUE, TOTAL	295	277	366	309	312
SILICA	8.9	10.3	7.2	6.7	8.3
SULFATE	62	52	77	56	62
SURFACTANTS	0.03	0.04	0.25	----	0.11
TEMPERATURE °C	----	----	15	5	10
TURBIDITY	0.24	0.30	0.30	0.25	0.27

Fiscal Year Averages are for the period ending June 30.

PHILADELPHIA WATER DEPARTMENT

BUREAU OF LABORATORY SERVICES

*** WATER QUALITY - METALS ***

QUEEN LANE PLANT EFFLUENT

PARAMETERS	F.Y. 1979	F.Y. 1980	F.Y. 1981	F.Y. 1982	4 YEAR AVERAGE
ALUMINUM, TOTAL	0.10	0.10	0.12	0.05	0.09
ALUMINUM, FILTERED	----	----	----	----	----
ARSENIC	0.002	0.001	0.002	0.002	0.002
BARIUM	0.038	0.040	0.030	0.050	0.040
CADMIUM	0.000	0.000	0.000	0.000	0.000
CALCIUM	39	19	48	38	36
CHROMIUM, TOTAL	0.003	0.000	0.002	0.005	0.002
COPPER	0.040	0.003	0.009	0.010	0.020
IRON, TOTAL	0.040	0.010	0.020	0.090	0.020
IRON, FILTERED	----	----	----	----	----
LEAD	0.001	0.000	0.001	0.011	0.004
MAGNESIUM	12	6	15	9	10
MANGANESE, TOTAL	0.03	0.08	0.03	0.02	0.04
MERCURY	0.0003	0.0000	0.0001	0.0000	0.0001
NICKEL	0.000	0.000	----	0.00	0.00
POTASSIUM	3.9	2.6	4.7	2.9	3.5
SELENIUM	0.000	0.000	0.000	0.000	0.000
SILVER	0.000	0.000	0.000	0.000	0.000
SODIUM	23.9	12.7	33.9	13.5	21.0
ZINC	0.54	0.00	0.35	0.15	0.22

Fiscal Year Averages are for the period ending June 30.

PHILADELPHIA WATER DEPARTMENT

BUREAU OF LABORATORY SERVICES

*** WATER QUALITY - PHYSICAL/CHEMICAL PARAMETERS ***

BELMONT INTAKE

PARAMETERS	F.Y. 1979	F.Y. 1980	F.Y. 1981	F.Y. 1982	4 YEAR AVERAGE
ALKALINITY	58	62	76	63	65
CARBON DIOXIDE	3	4	5	4	4
CHLORIDE	27	27	37	38	32
COLOR, APPARENT	33	18	13	26	22
COLOR, FILTERED	8	6	5	4	6
CONDUCTIVITY	345	369	449	407	392
CYANIDE	0.008	0.003	0.002	----	0.004
DISSOLVED OXYGEN	9.8	10.3	9.5	10.3	10.0
HARDNESS	131	124	167	114	134
NITROGEN, AMMONIA	0.47	0.37	0.54	0.34	0.43
NITROGEN, NITRATE	2.38	2.57	2.60	2.63	2.54
NITROGEN, NITRITE	0.068	0.058	0.042	0.045	0.053
pH	7.7	7.6	7.6	7.5	7.6
PHENOLS	0.003	0.002	0.002	0.000	0.002
PHOSPHATE, PERSULFATE	0.270	----	----	0.280	0.275
PHOSPHATE, ACID HYDROLYZED	----	0.228	0.377	0.401	0.335
PHOSPHATE, ORTHO	0.240	0.202	0.348	0.260	0.262
RADIOACTIVITY, GROSS ALPHA	0.5	0.7	0.6	----	0.6
RADIOACTIVITY, GROSS BETA	2.9	5.0	8.7	----	5.5
RESIDUE, TOTAL	260	248	364	272	286
RESIDUE, FILTRABLE	227	231	314	242	254
SILICA	8.3	10.5	6.4	6.5	7.9
SULFATE	62	51	74	48	59
SURFACTANTS	0.02	0.04	0.06	----	0.04
TEMPERATURE ^{o}C	14	14	16	15	15
TURBIDITY	27	9.6	9.2	8.9	13.7

Fiscal Year Averages are for the period ending on June 30.

PHILADELPHIA WATER DEPARTMENT

BUREAU OF LABORATORY SERVICES

*** WATER QUALITY - PHYSICAL/CHEMICAL PARAMETERS ***

BELMONT PLANT EFFLUENT

PARAMETERS	F.Y. 1979	F.Y. 1980	F.Y. 1981	F.Y. 1982	4 YEAR AVERAGE
ALKALINITY	51	49	60	51	40
CARBON DIOXIDE	8	11	17	17	13
CHLORIDE	37	32	46	46	40
CONDUCTIVITY	401	393	506	437	434
CYANIDE	0.008	0.003	0.000	----	0.004
DISSOLVED OXYGEN	13.6	10.4	8.8	----	10.9
HARDNESS	224	129	172	137	165
NITROGEN, NITRATE	2.54	2.51	2.57	2.53	2.54
NITROGEN, NITRITE	0.001	0.001	0.001	0.001	0.001
pH	7.4	7.1	7.0	7.0	7.1
PHENOLS	0.002	0.001	0.002	0.000	0.001
RADIOACTIVITY, GROSS ALPHA	0.3	0.3	0.4	0.3	0.3
RADIOACTIVITY, GROSS BETA	2.3	3.7	6.1	2.1	3.5
RESIDUE, TOTAL	268	246	363	280	289
SILICA	8.3	9.5	6.5	6.4	7.7
SULFATE	67	61	91	58	57
SURFACTANTS	0.03	0.03	0.04	----	0.03
TEMPERATURE °C	17	16	25	----	19
TURBIDITY	0.34	0.29	0.31	0.30	0.41

Fiscal Year Averages are for the period ending on June 30.

PHILADELPHIA WATER DEPARTMENT

BUREAU OF LABORATORY SERVICES

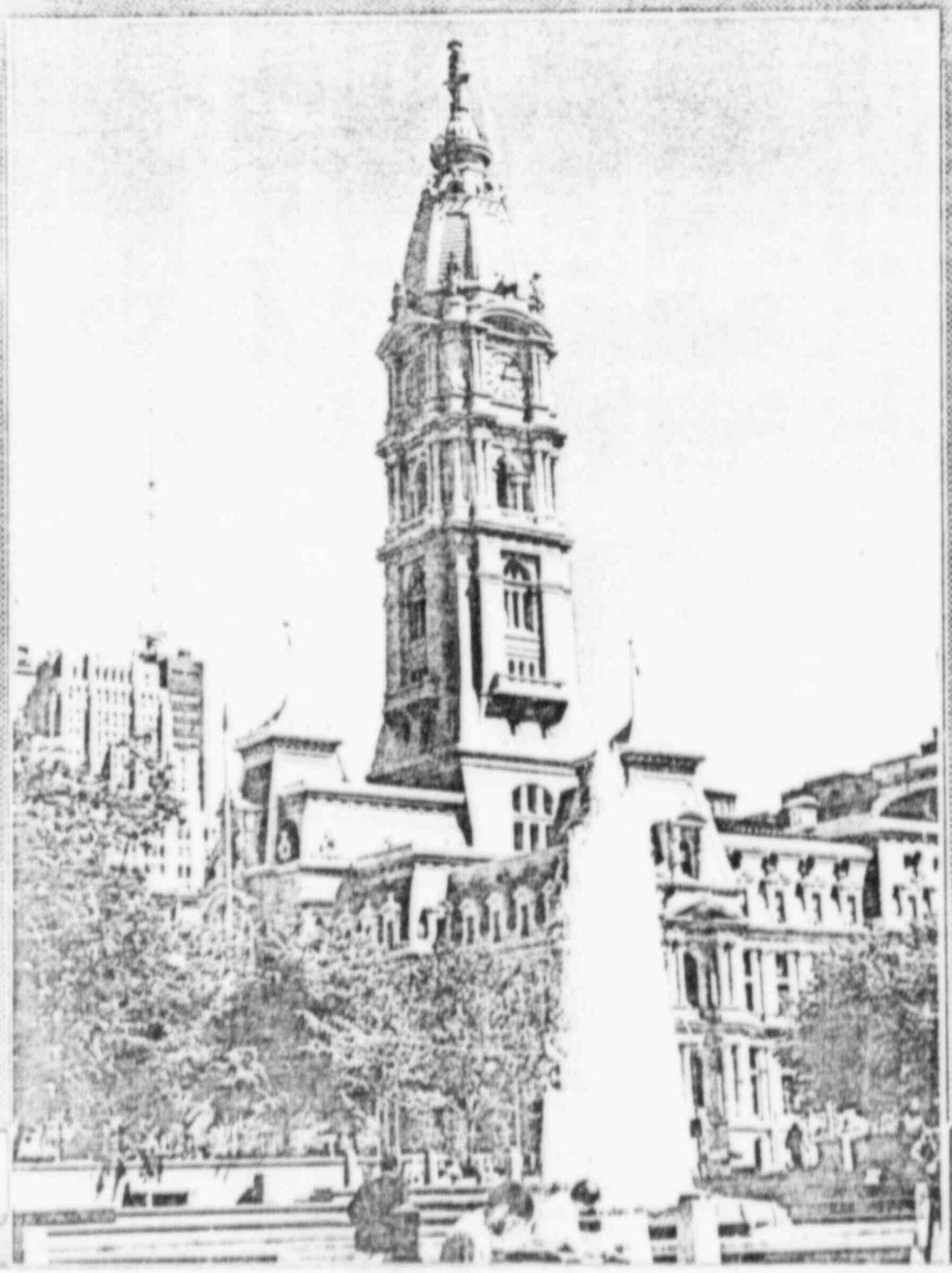
*** WATER QUALITY - METALS ***

BELMONT PLANT EFFLUENT

PARAMETERS	F.Y. 1979	F.Y. 1980	F.Y. 1981	F.Y. 1982	4 YEAR AVERAGE
ALUMINUM, TOTAL	0.25	0.13	0.18	0.11	0.16
ALUMINUM, FILTERED	----	----	----	----	----
ARSENIC	0.002	0.002	0.002	0.005	0.003
BARIUM	0.041	0.05	0.03	0.03	0.04
CADMIUM	0.000	0.000	0.000	0.000	0.000
CALCIUM	58	38	49	34	44
CHROMIUM, TOTAL	0.004	0.001	0.002	0.003	0.002
COPPER	0.027	0.021	0.016	0.030	0.020
IRON, TOTAL	0.20	----	0.01	0.02	0.08
IRON, FILTERED	----	----	----	----	----
LEAD	0.002	0.001	0.001	0.002	0.001
MAGNESIUM	12	10	16	12	12
MANGANESE, TOTAL	0.02	0.00	0.02	0.01	0.01
MERCURY	0.0002	0.0002	0.0001	0.0001	0.0002
NICKEL	0.000	0.005	----	0.010	0.004
POTASSIUM	3.3	2.9	4.6	3.9	3.6
SELENIUM	0.000	0.000	0.000	0.000	0.000
SILVER	0.000	0.000	0.000	0.000	0.000
SODIUM	20.2	16.7	33.8	25.0	23.9
ZINC	0.49	0.60	0.25	0.12	0.36

Fisca' Year Averages are for the period ending June 30.

How Water in PHILADELPHIA is Treated and Distributed



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FACTS AND CHARTS

Abundant Water From Local Streams...

SOURCES AND DISTRIBUTION

Where does Philadelphia get its water?

The city pumps one-half of its water from the Delaware River, just above the outlet of Pennypack Creek. The other half is pumped from the Schuylkill River at two different locations: the Belmont Pumping Station on the west side, just below Columbia Avenue Bridge, and the Queen Lane Pumping Station on the east side, just below City Line Bridge. The Belmont Station pumps from the pool formed by the Fairmount Dam, while the Queen Lane Station draws water from the head of the same pool.

All sources are located within the city and, with minor exceptions, all service is within the city limits.

After treatment and filtration, the major part of the effluent (or output) of the Belmont and Queen Lane Plants is delivered through the distribution system by gravity. This is possible because these plants have filtered water basins with water level elevations of 239 and 216 feet respectively.

The other effluents from Belmont and Queen Lane—and all the effluent from the Torresdale Plant—are pumped by stations located at, or near the plants, and some effluents are repumped at six booster stations. Pumping helps to maintain the gradients required for satisfactory pressures and good service at all points in the distribution system.

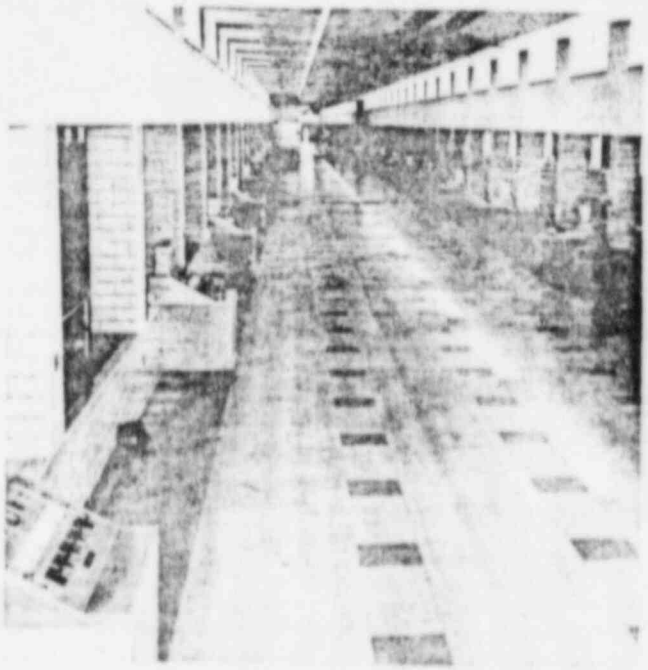
Normally about one-third of plant output is delivered by gravity and two-thirds is pumped. Of the latter, about 15% is repumped at the booster stations.

Because of differences in elevation among city neighborhoods (a difference of 450 feet, for example, between homes in Roxborough and those in South Philadelphia), the city is divided into ten pressure districts. The fact that Philadelphia takes its water from three different river sources also makes some of these districts necessary.

AREAS WHERE DELIVERED

Delaware water is delivered generally to those areas of the city east of Broad Street, while Schuylkill water reaches consumers west of Broad Street. There are some exceptions, however, to this pattern of distribution.

Thus Delaware water flows west of Broad Street to some neighborhoods south of Erie Avenue. It is also delivered to West Oak Lane and Chestnut Hill, and it may mix with Schuylkill water in the vicinity of East Park Reservoir before the latter water enters central city. Schuylkill water may also cross the Broad Street boundary: it serves the area bounded by Lehigh, Wyoming, and Kensington Avenue, and Roosevelt Boulevard.



Electronic consoles line the filter gallery at the Queen Lane Water Plant. Consoles regulate the flow of water through rapid-sand filter beds located behind the columns.

Because of changes in consumer demands, and the need for occasional changes in plant operations, it is uncertain which of the river waters, or what combination of them, will be received in some areas along the north-south mid-axis of the city represented by Broad Street. West Philadelphia, however, receives only Schuylkill water.

The preceding is of particular interest to those who may be affected by changes in the mineral content of the water, since the Schuylkill water contains in solution about twice the amount present in Delaware water. In the 10-year period 1971-1980, the annual hardness of water delivered to distribution from the Torresdale Plant on the Delaware averaged 96 parts per million; annual hardness of water from the plants on the Schuylkill averaged 145 parts per million.

The total population served is 1.69 million. To these customers the Water Department distributes an average of 345 million gallons daily.

In addition, the department delivers 11 million gallons of water daily to the Bucks County Water and Sewer Authority for distribution in lower Bucks County.

The distribution system contains 3,200 miles of pipes of various sizes, from three inches to seven feet nine inches in diameter. About 142 miles of this pipe are three feet or wider in diameter. There are 78,000 valves and over 25,000 fire hydrants.

Besides the regular distribution system, there is a high pressure fire system covering center city and that part of north central Philadelphia lying east of Broad Street and south of Lehigh Avenue. This is composed of 63 miles of mains, 1,900 valves, and 1,050 hydrants, together with two pumping stations that deliver water at pressures up to 300 lbs. per sq. in. One station is located at Delaware Avenue and Race Street; the other at 7th Street and Lehigh Avenue.

MODE OF TREATMENT

Philadelphia's three water treatment plants are modern. The Torresdale Plant was completed in 1959; the Belmont Plant in 1965; and the principal facilities of the Queen Lane Plant in stages — 1954, 1960, 1971. The plants are of the rapid-sand filter type, with automatic and semi-automatic controls. It is planned to bring all the plant treatment processes under computer control within the next few years.

Daily output of the water treatment plants, in millions of gallons daily, averaged as follows in fiscal 1980:

Belmont	**63.8**
Queen Lane	**98.0**
Torresdale	**214.6**

Although there is some variation at the plants, the treatment process comprises of natural sedimentation, pre-chlorination, chemical treatment, flocculation, sedimentation, filtration, and post chemical treatment.

Natual sedimentation takes place in a large raw-water reservoir, where some suspended matter settles out as the water moves slowly through.

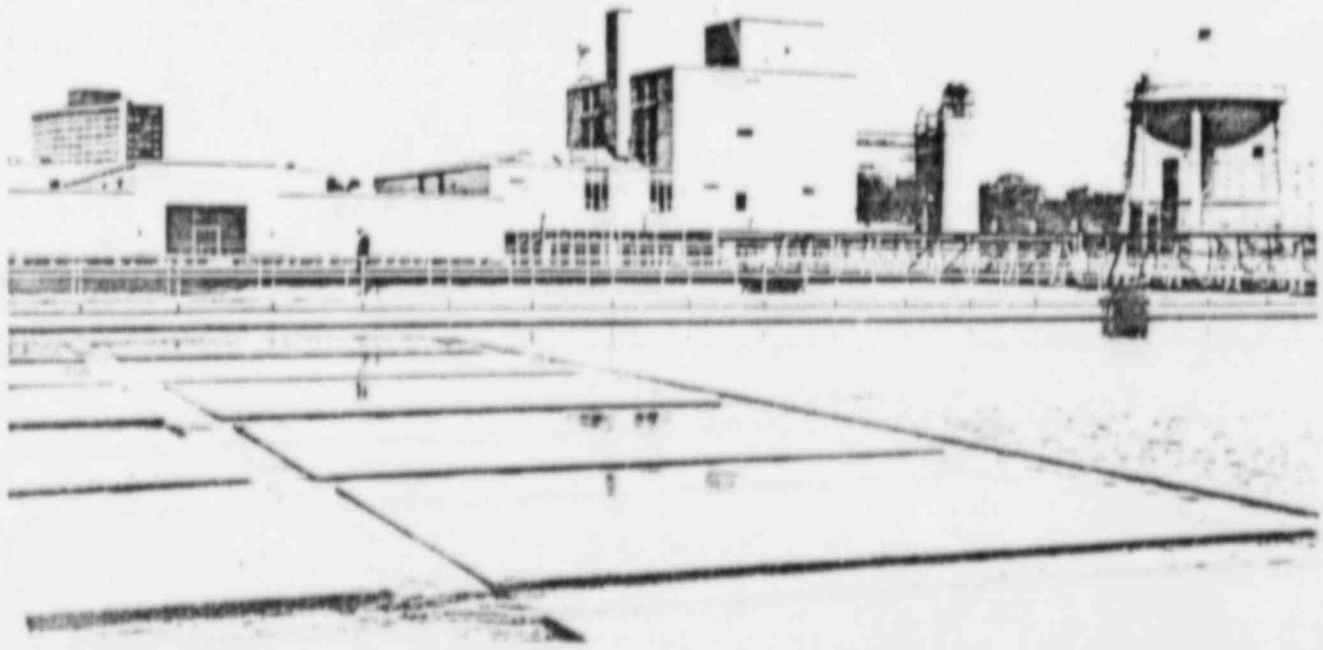
The second step in treatment is chlorination. The chlorine is added to the water to destroy taste and odor-producing materials which are chiefly organic matter. This may include the wastes of industries as well as those of natural origin.

The third step is injection of other chemicals into the raw water as it passes under a chemical or pre-treatment building. At this point, alum or ferric chloride may be added to promote the later formation of "floc," and chemicals such as carbon or sodium chlorite may be used to control taste and odor.

The fourth step is for the chemical-laden water to pass through small basins, where the chemicals and water are mixed for more than a half-hour by giant revolving paddles. The mixing causes the formation of "floc," tiny red or brown granules. The flox will enmesh suspended impurities in the water.

When necessary, lime is added to the water to neutralize acidity and create optimum conditions for the formation of floc.

Enmeshment of suspended particles by the floc takes place in large sedimentation basins to which the water next flows. In these basins the water remains quiescent for two to four hours, and the floc settles to the bottom, taking with it more than 90% of the suspended impurities. This prepares the water for filtration.



Water sparkles as it flows off the sedimentation basins at the Belmont Water Plant to enter the filter building (left background). The basins settle out 90% of the impurities in the water.

.....Treated In Modern Plants

.....One Of America's Purest Waters

The water is then filtered through beds of sand and gravel, which remove all particles that remain after the settling period.

As the final step in treatment, the chlorine content of the water is adjusted to ensure safety, and ammonia may be added to counteract chlorinous tastes and odors. At various steps in the treatment process, additional chemicals may be used, or the usual chemicals replaced by others. This is governed by the changes in the condition of the raw water supply.

To help prevent tooth decay in children, flouride is is also added to the water.

Because treatment steps differ slightly at the plants, the successive steps are summarized below:

BELMONT: (1) Settling by natural sedemintation for 22 hours, (2) pre-chlorination, (3) application of chemicals—alum with lime for pH adjustment, (4) rapid mixing of chemicals with water, (5) slow mixing of chemicals to form "floc," (6) settling, (7) chlorination, (8) rapid sand filtration, (9) post treatment, including chlorination, zinc phosphate, fluoridation, and ammonia.

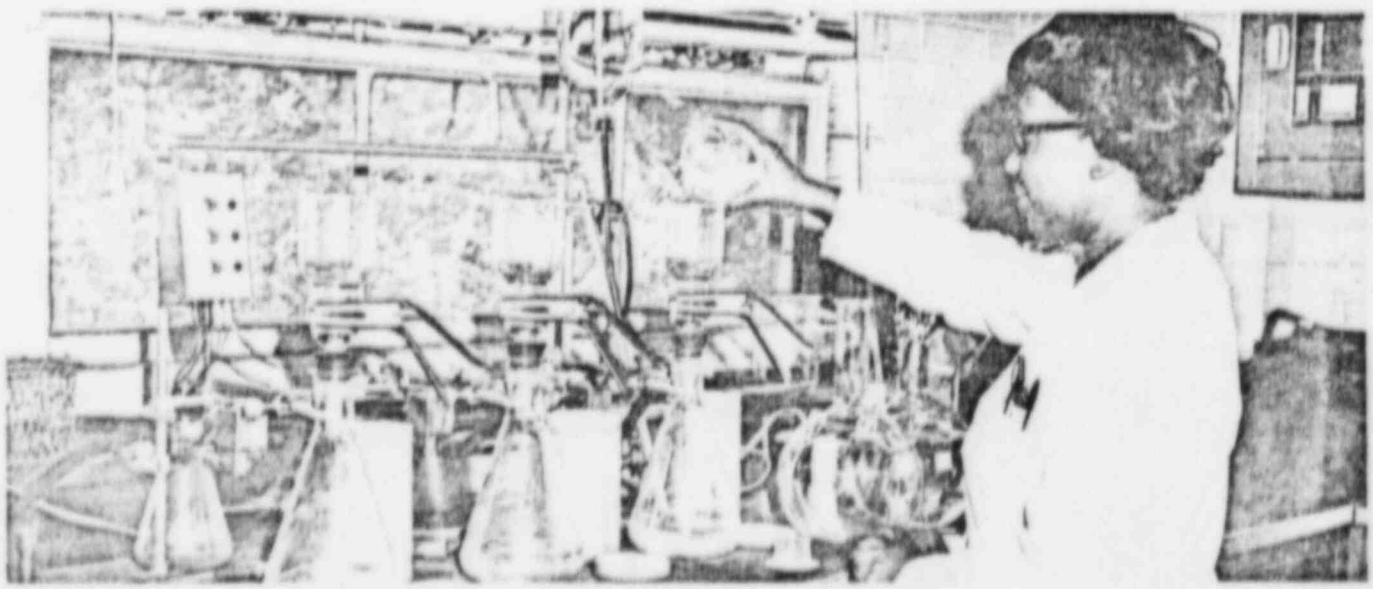
QUEEN LANE: (1) Settling for 20 hours, (2) pre-chlorination and fluoridation, (3) application of chemicals — ferric chloride, with lime for pH adjustment, and carbon,(4) rapid mixing of chemicals with water, (5) slow mixing of chemicals with water to form "floc," (6) settling, (7) chlorination, (8) rapid sand filtration, (9) post treatment, including zinc phosphate and ammonia.

TORRESDALE: (1) Settling by natural sedimentation, (2) chlorination,(3) application of chemicals — ferric chloride with lime for pH adjustment, chlorine, dioxide, and carbon, (4) rapid mixing of chemicals with water, (5) slow mixing of chemicals with water to form "floc," (6) settling, (7) chlorination to free chlorine residual, (8) rapid sand filtration, (9) post treatment, including chlorination, fluoridation and ammonia.

Water withdrawn from the East Park and Oak Lane Reservoirs is rechlorinated before entering the distribution system. East Park water is treated with chlorine dioxide through the spring, summer and autumn to control algae.

QUALITY CONTROL: The Water Department guards the quality of its water from the river to the home faucet. Along the rivers, raw water samples are collected by boat. In the plants, laboratory personnel check the water at every treatment stage, and this is followed by regular sampling of 85 points in the distribution system. Laboratories make 170,000 wet chemical tests on water each year, and the equivalent of hundreds of thousands of other tests by electronic testing devices.

The city's drinking water, in its finished form, meets or surpasses all of the quality standards of the U. S. Environmental Protection Agency under the Safe Drinking Water Act.



Modern laboratories ensure pure, safe, and palatable drinking water. They make 170,000 "wet chemical" tests and hundreds of thousands of instrumental tests on water samples yearly.

1801: Steam Pumps Supplied Water

Philadelphia's water system began with a bold experiment.

At a time when steam power was finding its first uses in America, the City Fathers opened two steam pumping stations in January, 1801. These water works represented the first large scale application of steam pumping to water service in this country.

The new system was the brain child of Benjamin Henry Latrobe, an immigrant British engineer, who later designed the Capitol in Washington.

One of Latrobe's stations was located just north of Chestnut Street near the Schuylkill River. The water flowed into a pit under the station, and a steam engine raised it about 40 feet into a brick conduit, which ran down Chestnut Street to Broad Street and then turned north to Centre (now Penn) Square.

The other station, situated in the middle of Centre Square where City Hall now stands, received the water and raised it by steam power to two wooden tanks that were 40 feet above the ground. These tanks, which held 17,660 gallons, were the city's only reservoir.

Latrobe's stations operated until 1815. The Centre Square buildings were taken down in 1[illegible].

OLD FAIRMOUNT WATER WORKS

By 1812 the City Fathers had grow[illegible] sted with the expense of keeping the wooden [illegible]mps running at Centre Square. Water service to[illegible] was frequently interrupted by insufficient storag[illegible]

As a result, the City built new water works at "Fair Mount," which went into service on September 7, 1815. Water was raised to an earthen reservoir on the hill now occupied by the Museum of Art, from which it flowed by gravity to city houses.

At first, two steam engines were used to lift the water. Unfortunately, the boiler of one of the high pressure engines burst in 1818, and the City Fathers turned to much cheaper water-wheel power.

A dam was thrown across the Schuylkill River to form a fresh water pool, and new paddle wheels and pumps were built just below the pool level. River water was conducted into a forebay on the back and east side of the mill buildings, and it was then led through flumes to turn the wheels.

The new water-driven works — the first of its type built for public water service in any large American city — went into operation July 1, 1822.

From the beginning of the Fairmount Station and through much of its subsequent evolution, Frederick Graff, eminent engineer, was the guiding spirit. His son, Frederick, Jr., carried on his work after his death in 1847.

As the city grew, additional paddle wheels were installed at Fairmount, and additional basins were created on the neighboring hill. By 1842, there were eight paddle wheels supplying water to four basins

The Centre Square Works was one of two steam-powered pumping stations opened by Philadelphia in 1801 to supply water.

through double-acting force pumps which had been designed by Frederick Graff.

The first water turbine (a French invention by Fourneyron) was installed at Fairmount in 1851, and by 1871 all of the paddle wheels had been replaced by turbines. Fairmount Dam was rebuilt in 1842-43.

The Fairmount Station continued to supply portions of the city until March, 1911, when new filtration plants took over all water service.

19TH CENTURY PIPING

When the Centre Square Station went into service in 1801, Water flowed from it through wooden logs to reach center city homes. These logs were bored through the center, and joined end to end by iron bands and caulking.

The wooden mains, however, leaked badly and constantly, and by 1832, the city discontinued laying them. Up to that time it had laid 241,604 feet.

Cast iron mains gradually replaced the old logs. The first 400 feet of cast iron pipe was imported from England in 1817, and by 1852 the city proper had 440,403 feet of cast iron mains in service. By the 1850's wooden mains were no longer in use, although many of them were not actually removed from the ground.

Philadelphia's water system today has 3,200 miles of mains, most of them cast iron but with an increasing proportion of ductile iron and steel pipe. A few old mains laid in the 1830's and 1840's are still in service.

From Water Wheels And Wooden Mains

EARLY 20TH CENTURY FILTRATION

The chief method of purifying water in 19th century Philadelphia was to provide for quiet periods in the reservoirs. This allowed suspended materials to settle to the bottom.

As the century wore on, however, the water from the Delaware and Schuylkill Rivers became increasingly polluted. Tastes and odors appeared, and the typhoid fever rate rose in the city.

Between 1858 and 1899, seven special studies were made of water sources and treatment. As a result of the 1899 report, the City Council authorized the construction of filtration plants.

Five new filtration plants — the biggest and finest "slow sand" plants in the world — went into service between 1902 and 1911. The new plants included extensive acreages of sand beds, where the river water was filtered. This filtration was preceded by cleansing in pre-filters of the coke or sponge type, and/or, later by settling in raw water basins.

Filtration of Philadelphia's water caused a marked drop in typhoid deaths. These quickly fell from an annual average of 60 per 100,000 residents to only one-fourth that number. With the introduction of chlorine treatment in 1913, typhoid was rapidly wiped out.

THE REBIRTH OF THE 1950'S

As the years went by, the lack of public funds handicapped the city's water system. Its proud slow sand plants gradually deteriorated. Though a few rapid sand filters were introduced at the Queen Lane and Belmont Plants in the 1920's and other modifications were made, the plants were unable to keep up with growing water demands. This was also true of the old steam pumping stations.

The city's drinking water had become safe, but tastes and odors persisted. To correct this, activated carbon, ozone, chlorine dioxide, and other treatment chemicals were adopted in the late 1940's and early 1950's. There was an immediate improvement in water quality.

With the creation of a self-supporting Water Department in 1952, the long needed funds became available. The department began a $217 million construction program (1952-1976).

To provide better water and meet rising demand, the department built a network of modern treatment plants, pumping stations, covered reservoirs, and hundreds of miles of new mains.

Notable were the treatment plants. Equipped with semi-automatic controls, the new Torresdale Plant was the largest "push-button" rapid-sand plant in America when it was opened in 1959. Similar plants were completed in the 1960's at Queen Lane and Belmont.

During the 1950's, the last steam pumps were removed from pumping stations, and new electric pumps were installed.

LOAD CONTROL CENTER

Keeping watch over the distribution of water to Philadelphians is a modern system of electronic controls. The multi-million dollar system, known as the Load Control Center, was one of the first in this country when it was inaugurated in 1960.

The high speed intelligence system constantly, monitors water pressure, rates of flow, levels, etc. in water mains, reservoirs, and pumping stations throughout the City. Data is picked up by electronic sensing devices at 120 points in the water distribution grid and is relayed by a ring of seven microwave towers to the control center. Complex equipment then deciphers the incoming signals, translating them automatically into meaningful information on typewritten sheets and digital displays.

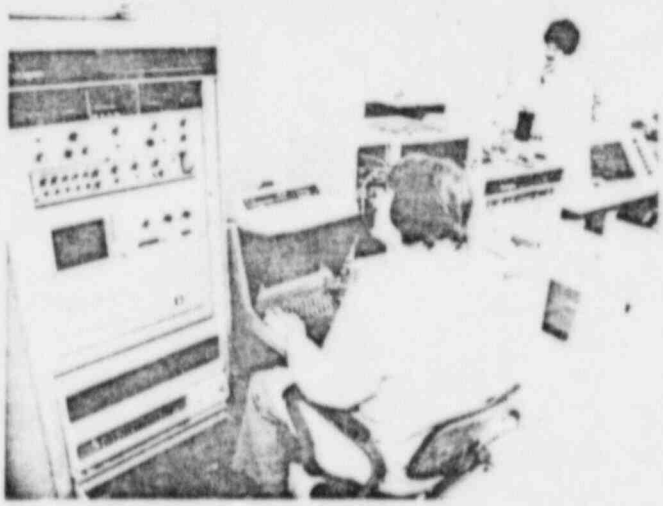
There are no operating personnel in any of the 16 pumping stations. By simply pushing a button, the operator at the control center can start or stop pumps, and open and close valves in the remotely located stations.

PROTECTING WATER QUALITY

In 1976, Philadelphia became the first American city to build a pilot plant to determine the best methods for removing trace organics, and tastes and odors from water. Located in the Torresdale plant, the pilot facility used both regular treatment and non-conventional treatment such as carbon filters, ozone, polyelectrolytes, and macroreticular resins. A Trace Organics Laboratory was also built at Torresdale to monitor the results of the tests.

To protect drinking water from taste and odor causing algae, the department began to cover its open reservoirs. In 1975-76, it placed floating covers on the north and south basins of the Oak Lane Reseroirs, and in 1981, the department's contractor began installing 4 million square feet of synthetic rubber to line and cover the north basins of the East Park Reservoirs. When completed, this will be one of the largest municipal lining/cover sites in the world.

The operator at the console of the Load Control Center can control 16 remote pumping stations and monitor water pressure, rates of flow, and levels of reservoirs throughout the city.



Samples of treated water, periodically analyzed for trace organics on an automated gas chromatograph/mass spectrometer system, are found to meet all federal standards.

WATER SYSTEM CAPACITIES — 1982

PLANT TREATMENT CAPACITIES

(in millions of gallons daily)

	RATED	PEAK RATE
BELMONT PLANT	**78**	**108**
QUEEN LANE PLANT	**120**	**150**
TORRESDALE PLANT	**282**	**423**

PLANT RETENTION CAPACITIES

(in millions of gallons)

		TOTAL
BELMONT PLANT:	Two 36-MG pre-sedimentation basins	72
	Four sedimentation basins	14.2
	Three filtered water basins	38.2
	Filtered water clear well	1.8
QUEEN LANE PLANT:	Pre-sedimentation basin	177
	Four 3-MG upper settling basins	12
	Four 3-MG lower settling basins	12
	Four filtered water basins	90
TORRESDALE PLANT:	Pre-sedimentation basin	176
	Four 10-MG sedimentation basins	40
	Five filtered water basins	193

OTHER RETENTION CAPACITIES

(in millions of gallons)

		TOTAL
UPPER ROXBOROUGH:	Filtered water basins	25.6
LOWER ROXBOROUGH:	Filtered water basins	3
OPEN RESERVOIRS:	East Park (filtered water)	677
	Oak Lane (filtered water)	70
STANDPIPES:	Two 5-MG Somerton tanks	10
	Two 5.5-MG Roxborough tanks	11
	Fox Chase tank	1.5

PUMPING STATION CAPACITIES

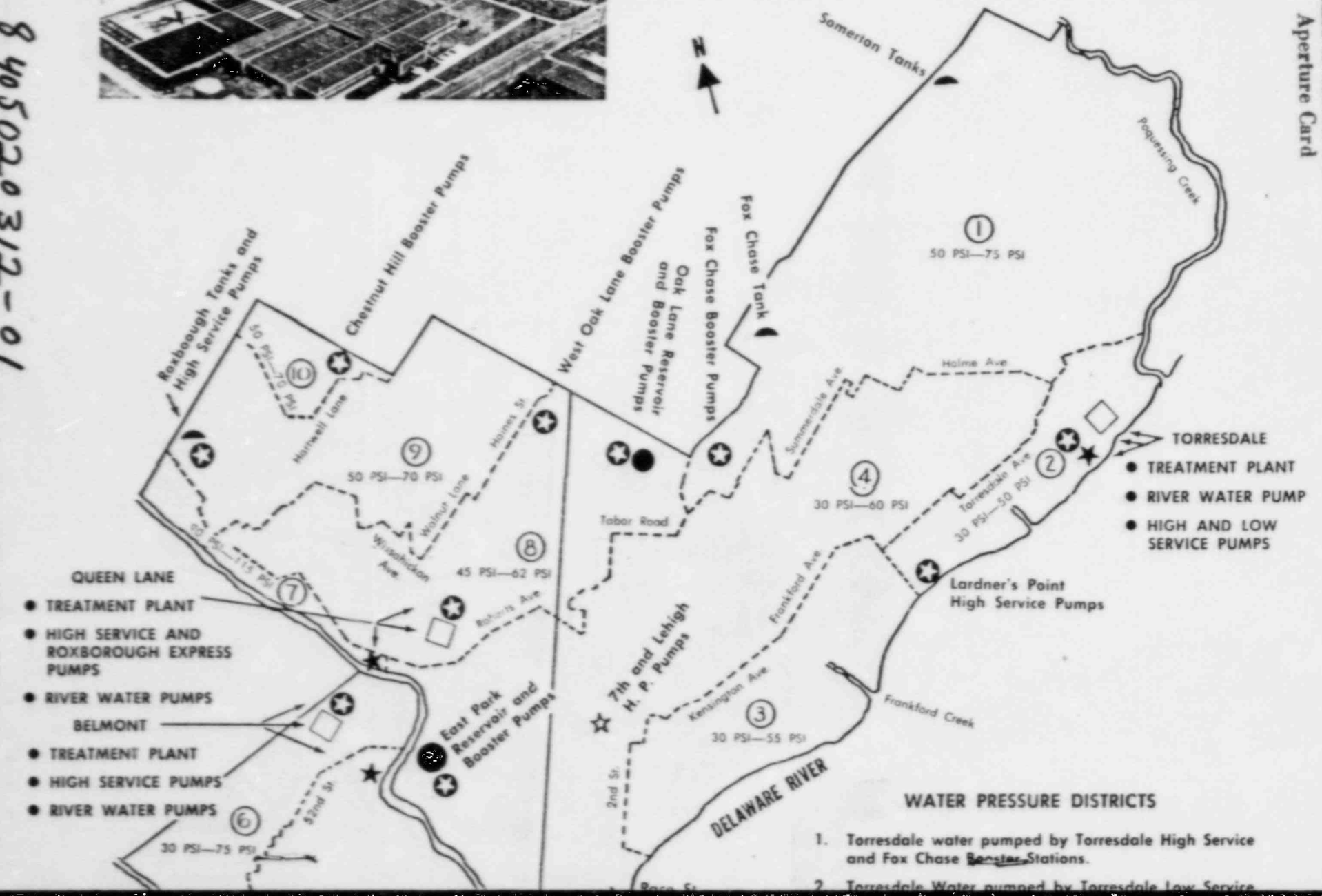
(in millions of gallons daily)

		TOTAL
RAW WATER:	Belmont Station (Schuylkill)	140
	Queen Lane Station (Schuylkill)	200
	Torresdale Station (Delaware)	480
FILTERED WATER:	1. Treated Schuylkill Water	
	Belmont High Service Station	42
	Chestnut Hill Booster Station	8.5
	East Park Booster Station	75
	Queen Lane High Service Station	77.5
	Roxborough High Service Station	45
	2. Treated Delaware Water	
	Fox Chase Booster Station	25.3
	Lardner's Point Station	240
	Oak Lane High Service Station	50
	Torresdale High and Low Service Station (200 MGD low, 80 MGD high)	263
	West Oak Lane Booster Station	27.5
HIGH PRESSURE:	Fairhill Station	21.6
	Race Street Station	21.6

(Each high pressure station can pump 15,000 gallons per minute)

***NOTE:** At each stage, the combined capacities of the water system facilities (whether treatment plants, reservoirs, or pumping stations) are much greater than average daily demand by consumers. This enables the Water Department to meet emergencies, to supply peak needs at certain hours or seasons, and to continue operation when some facilities have to be taken out of service.*

....To An Automated Water System



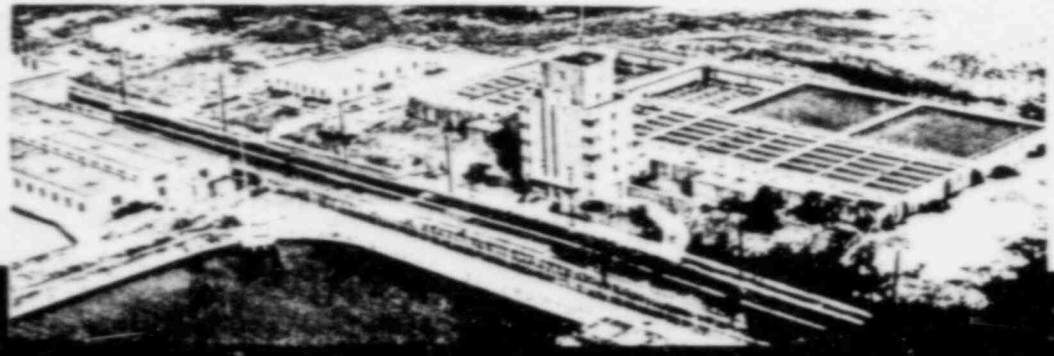
KEY

- Treatment Plants
- River Water Pumping Stations
- Filtered Water Pumping Stations
- High Pressure Pumping Stations (for fire protection only)
- Tanks for Filtered Water
- Open Reservoirs for Filtered Water

Note: There are also underground basins for filtered water at each treatment plant and in Upper Roxborough.

3. Torresdale water pumped by Torresdale Low Service Station. Pump capacity—60 PSI.
4. Torresdale water pumped by Lardner's Point High Service Station. Queen Lane water distributed by gravity from Queen Lane Plant and East Park Reservoir.
5. Belmont water distributed by gravity from Belmont Plant.
6. Belmont water pumped by Belmont High Service Station.
7. Queen Lane water supplied by gravity from Lower Roxborough Filtered Water Basin.
8. Queen Lane water pumped by Queen Lane High Service Station; also distributed by gravity from Upper Roxborough Filtered Water Basin. Torresdale water pumped by Oak Lane Booster Station.
9. Queen Lane water pumped by Roxborough High Service Station. Torresdale water pumped by West Oak Lane Station.
10. Either Torresdale or Queen Lane water pumped by Chestnut Hill Booster Station from April through November. At other times, the district is supplied directly by the Roxborough and West Oak Lane Stations.

Note on Water Pressures: The normal range of water pressures, as received by customers, is shown on the map for each district. Thus 50 PSI—75 PSI (for District 1) denotes a pressure range of 50 to 75 pounds per square inch.



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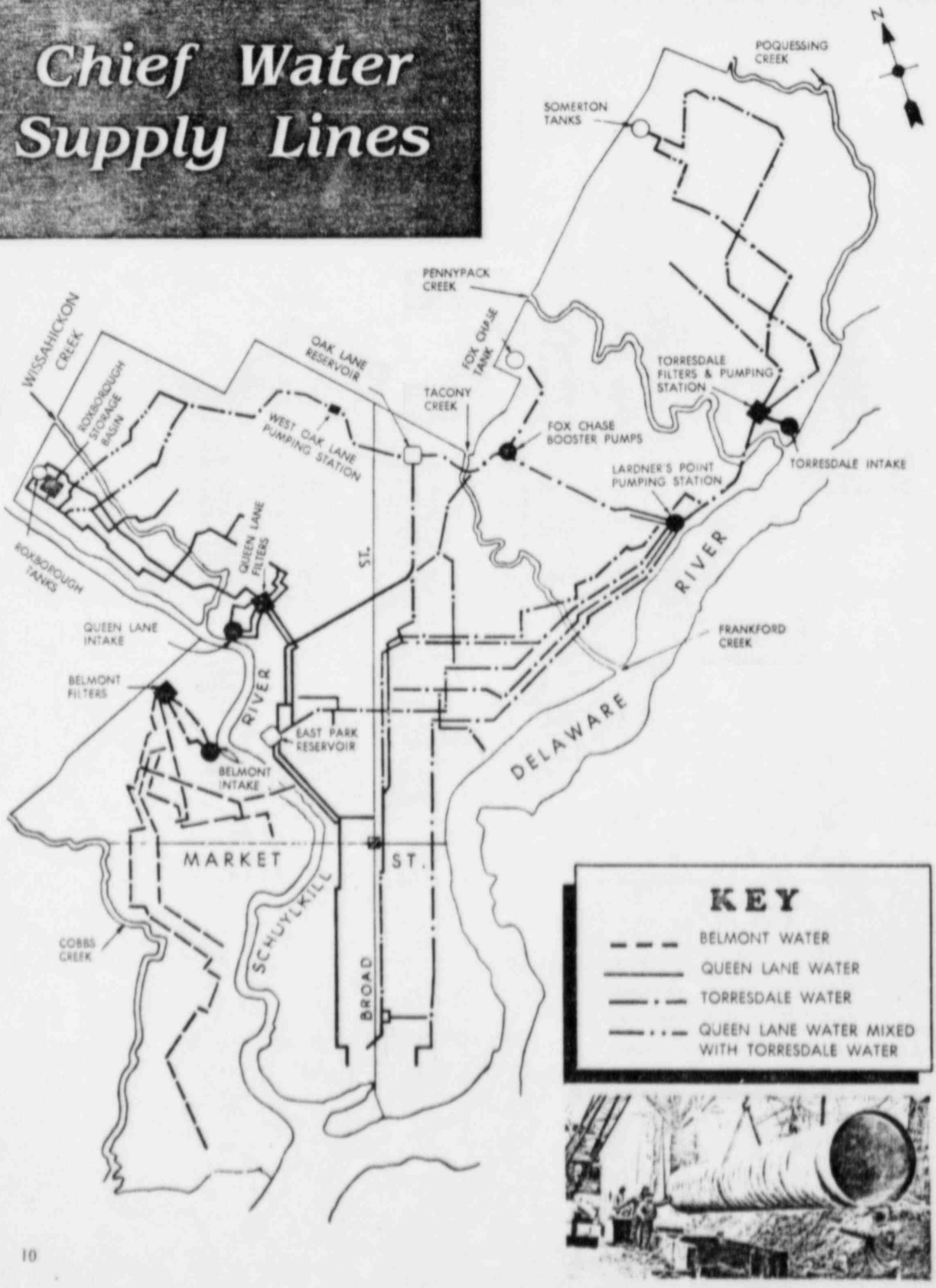
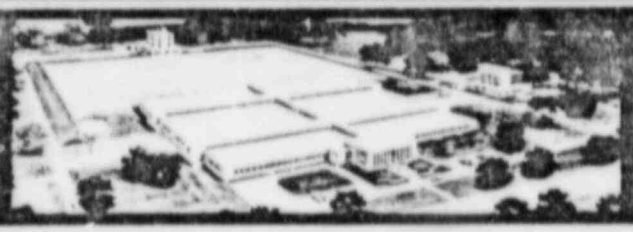
Philadelphia Water Facilities & Water Pressure Districts

Chief Water Supply Lines



Torresdale Water Treatment Plant



Delaware River

SEDIMENTATION BASIN
176 M.G. Cap.

TORRESDALE LOW LIFT PUMPING STATION
360 M.G.D. Cap.

A

EIGHT RAPID MIXERS
30 Seconds

20 SLOW MIXERS FOR FLOCCULATION
45 Minutes

FOUR SEDIMENTATION BASINS
40 M.G. Total Cap.
2½ Hours

B

94 RAPID SAND FILTER BEDS
282 M.G.D. Rated Cap.

C

FIVE FILTERED WATER BASINS
193 M.G. Total Cap.

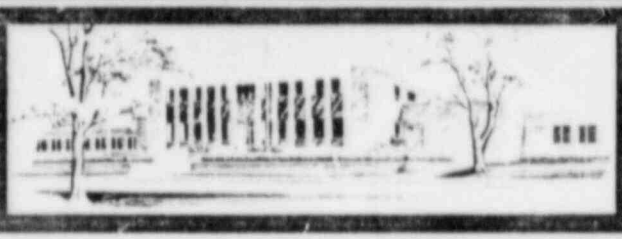
TORRESDALE FILTERED WATER PUMPING STATION
High Service 63 M.G.D. Cap.
Low Service 200 M.G.D.

LARDNER'S POINT HIGH SERVICE PUMPING STATION
240 M.G.D. Cap.

CHEMICALS APPLIED

A—Ferric chloride, lime, carbon, chlorine, chlorine dioxide
B—Chlorine or chlorine dioxide
C—Fluoride, chlorine, chlorine dioxide, ammonia

Distribution From Torresdale



TORRESDALE FILTERED WATER PUMPING STATION

High Service 80 M.G.D. Cap.

Low Service 200 M.G.D.

DISTRIBUTION

High service pumps supply Pressure District 1 with average of 21 M.G.D. annually. Also supply 11 M.G.D. to Bucks County

DISTRIBUTION

Low service pumps supply Pressure Districts 2, 3, and 4 with average of 35 to 40 M.G.D. annually.

LARDNER'S POINT HIGH SERVICE PUMPING STATION

240 M.G.D. Cap.

DISTRIBUTION

Supplies Pressure Districts 2, 3, and 4, and Fox Chase and Oak Lane Stations, with combined average of 145 M.G.D. annually.

FOX CHASE BOOSTER PUMPING STATION

25.3 M.G.D. Cap.

DISTRIBUTION

Supplies Pressure District 1 with average of 11 M.G.D. annually.

OAK LANE RESERVOIR

North Basin (A) South Basin

70 M.G. Total Cap.

OAK LANE BOOSTER PUMPING STATION

50 M.G.D. Cap.

DISTRIBUTION

Supplies Pressure District 8 and West Oak Lane Station with Combined average of 17 to 19 M.G.D. annually. Pressure District 8 is also supplied by Queen Lane H.S. Pumps and Upper Roxborough gravity.

Pressure Districts

WEST OAK LANE BOOSTER PUMPING STATION

27.5 M.G.D. Cap.

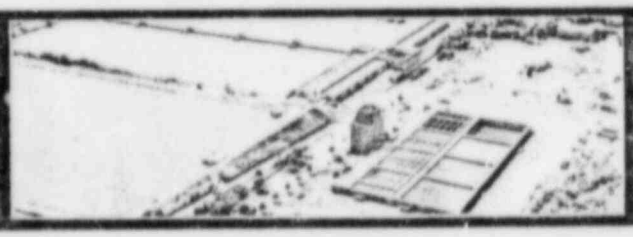
DISTRIBUTION

Supplies Pressure District 9, 10, with 8 to 9 M.G.D. annually.

CHEMICALS APPLIED

A— Sodium hypochlorite, ammonia

Queen Lane Water Treatment Plant



Schuylkill River

QUEEN LANE RAW WATER PUMPING STATION
200 M.G.D. Cap.

SEDIMENTATION BASIN
177 M.G. Cap.

A

FOUR RAPID MIXERS
30 Seconds

24 SLOW MIXERS FOR FLOCCULATION
45 Minutes

FOUR UPPER AND FOUR LOWER SEDIMENTATION BASINS
24 M.G. Total Cap.
3¼ Hours

B

40 RAPID SAND FILTER BEDS
120 M.G.D. Rated Cap.

C

THREE FILTERED WATER BASINS
South Basin — North Basins
90 M.G. Total Cap.

EAST PARK RESERVOIR
677 M.G. Cap.

QUEEN LANE HIGH SERVICE PUMPING STATION
77.5 M.G.D. Cap.

DISTRIBUTION
Supply Pressure District 4 with 60 to 65 M.G.D. annually.

DISTRIBUTION
Supplies Pressure District 8 with average of 10 M.G.D. annually. Pressure District 8 is also supplied by Oak Lane Booster Pumps and Upper Roxborough gravity.

DISTRIBUTION
Supplies Upper Roxborough Filtered Water Basins with average of 22 to 23 M.G.D. annually.

CHEMICALS APPLIED

A—Chlorine, lime, carbon, ferric chloride, fluoride

B—Chlorine, ammonia

C—Zinc phosphate

Distribution From Roxborough

QUEEN LANE HIGH SERVICE PUMPING STATION
77.5 M.G.D. Cap.

CHEMICALS APPLIED
A —Chlorine

ROXBOROUGH HIGH SERVICE PUMPING STATION
45 M.G.D. Cap.

UPPER ROXBOROUGH FILTERED WATER BASINS
25.6 M.G. Total Cap.

LOWER ROXBOROUGH FILTERED WATER BASIN
3 M.G. Cap.

DISTRIBUTION
To Pressure District 8 (also supplied by Queen Lane H.S. and Oak Lane Booster Pumps).

DISTRIBUTION
To Pressure District 7.

COMBINED DISTRIBUTION
Averages 15 M.G.D. annually.

TORRESDALE WATER

OAK LANE BOOSTER PUMPING STATION
50 M.G.D. Cap.

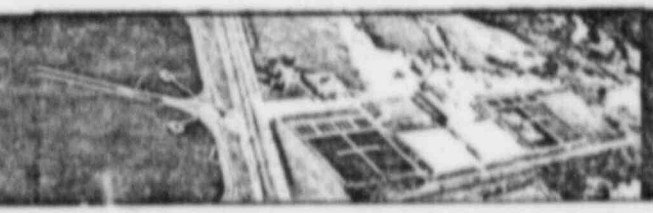
WEST OAK LANE BOOSTER PUMPING STATION
27.5 M.G.D. Cap.

DISTRIBUTION
Supply average of 20 M.G.D. annually to Pressure Districts 9 and 10. About 8 to 9 M.G.D. of this is from West Oak Lane, and the rest from Roxborough Pumps.

CHESTNUT HILL BOOSTER PUMPING STATION
8.5 M.G.D. Cap.

DISTRIBUTION
To Pressure District 10. No water has been distributed from the Chestnut Hill Station for several years. Station is used for stand-by.

Belmont Water Treatment Plant



Schuylkill River

BELMONT RAW WATER PUMPING STATION
140 M.G.D. Cap.

TWO SEDIMENTATION BASINS
72 M.G. Total Cap.

A

SIX RAPID MIXERS
30 Seconds

FOUR SLOW MIXERS FOR FLOCCULATION
42 Minutes

FOUR SEDIMENTATION BASINS
14.2 M.G. Cap.
4 to 4.7 Hours

B

26 RAPID SAND FILTER BEDS
78 M.G.D. Rated Cap.

C

WEIR CHAMBER

B

BELMONT HIGH SERVICE PUMPING STATION
42 M.G.D. Cap.

CLEAR WELL
1.8 M.G. Cap.

B

THREE FILTERED WATER BASINS
38.2 M.G. Cap.

DISTRIBUTION
Supplies average of 13 to 14 M.G.D. to Pressure District 6 annually.

CHEMICALS APPLIED

A—Alum, lime, carbon, chlorine, chlorine dioxide

B—Chlorine

C—Zinc phosphate, lime, fluoride, ammonia, chlorine, chlorine dioxide

DISTRIBUTION
Supplies average of 50 M.G.D. to Pressure District 5 annually.

Water is the lifeline of the Delaware Valley–

Don't Waste It!

City of Philadelphia

WILLIAM J. GREEN Mayor

WILLIAM J. MARRAZZO Water Commissioner