

THE SEARCH FOR PURE WATER IN PITTSBURGH: THE URBAN RESPONSE TO WATER POLLUTION, 1893-1914

MARK J. TIERNO

AN important concern of the current environmental movement is the quality of water that we drink. Nowhere has this matter received more attention than in Pittsburgh, where citizens have expressed widespread apprehension over the healthfulness of the drinking water. The issue of clean water, however, has a long history in Pittsburgh, as in other cities, and this article will discuss the manner in which Pittsburgh coped with an earlier crisis over water quality.

The problem of supplying fresh water for the cities was faced by urban leaders early in the nation's history. In 1799 and 1800, Philadelphia, under the impetus caused by the yellow fever epidemic of that decade, constructed the Centre Square Water Works to bring untainted water into the city. Other cities soon followed. In the 1830s New York City constructed the Croton Aqueduct, and in the 1840s Boston developed a publicly owned waterworks with an aqueduct bringing water from outside the city. Most American cities of substantial size had taken some action on water supply by 1860.¹

Pittsburgh developed its first waterworks in 1827-1828. Subsequent growth of the city required expansion of the water supply system in 1850, in 1870, and again 1879. By 1880, the city had a population of nearly 110,000 and its waterworks supplied over 15,000,000 unfiltered gallons of water daily to residential and industrial consumers.²

To a large extent, improvements in urban waterworks were a response to a high death rate from epidemic disease and the need for adequate water supplies to fight fires in the largely wooden-structured nineteenth-century cities. By the late nineteenth century, some cities had begun to consider methods of further purification. In 1872, the city of Poughkeepsie, New York, began operating a slow-sand filter to purify its water, and in 1893, Lawrence, Massachusetts, put a simi-

Dr. Tierno is on the faculty in Teacher Education at the University of Pittsburgh.—Editor

1 Nelson Manfred Blake, *Water for the Cities: A History of the Urban Water Supply Problem in the United States* (Syracuse, N. Y., 1956), 265.

2 City of Pittsburgh, *Its Water Works and Typhoid Fever Statistics*, comp. by Erwin E. Lanpher and C. F. Drake (Pittsburgh, 1930), 25.

lar process in operation. The introduction of purified water in Lawrence resulted in a dramatic decrease in the number of typhoid fever deaths in that city and served as a demonstration of the relationship between water supply and public health.

During the late nineteenth century, a similar concern over the relationship between typhoid fever deaths and the quality of the water supply focused attention on this question in Pittsburgh. For most of the century, however, diseases other than typhoid had dominated the public attention. The Pittsburgh Board of Health, formed by the city councils in 1851 because of the fear of a cholera epidemic, centered most of its efforts on the elimination of cholera and smallpox. While typhoid actually claimed more victims than other epidemic diseases, its incidence was constant rather than episodic, causing attention to focus on the more conspicuous diseases. From 1878-1882, for instance, smallpox claimed 862 victims and typhoid fever 933; but while the typhoid victims were spread evenly over the years, 748 of the smallpox deaths were concentrated in the last two years of the period (see Table 1).

In the 1880s, however, smallpox deaths, responding to widespread vaccination campaigns, decreased spectacularly. The drop in smallpox deaths focused attention on the fact that Pittsburgh had the highest typhoid fever death rate of the nation's large cities. In 1887, the Board of Health sponsored two separate inquiries into the relationship between a severe typhoid outbreak on the South Side and the water supplied to that section of the city.

TABLE 1
DEATHS FROM CHOLERA, SMALLPOX, AND TYPHOID FEVER
IN PITTSBURGH³

	Cholera	Smallpox	Typhoid Fever
1873-77	0	409	519
1878-82	0	862	933
1883-87	0	31	881
1889-93	0	4	1228

Both studies associated the typhoid outbreak with an impure

³ City of Pittsburgh, *Annual Reports of the Board of Health, 1873-1887, passim*; City of Pittsburgh, *Annual Reports of the Bureau of Health, 1888-1893, passim*.

water supply.⁴ Pittsburgh drew its water from the Allegheny and Monongahela rivers. More than 350,000 inhabitants in over seventy-five upriver municipalities discharged their untreated sewage into the two rivers, contaminating the city's water sources.⁵ Despite the recommendations of the Board of Health inquiries, and proof that purification of contaminated drinking-water supplies drastically reduced the incidence of typhoid in other cities, the Pittsburgh councils took no action to improve the water supplies before 1896.⁶

TABLE 2
TYPHOID FEVER DEATH RATES BY DECADE FOR SOME
AMERICAN CITIES,⁷ IN DEATHS PER 100,000 POPULATION

	1881-1890	1891-1900
Philadelphia	686	441
Chicago	686	598
Milwaukee	335	230
Detroit	—	322
Cleveland	624	411
Buffalo	396	324
Boston	457	310
New York	279	190
Baltimore	452	386
Washington	757	762
Pittsburgh	1072	900
Cincinnati	659	433
New Orleans	213	378
St. Louis	365	333
San Francisco	468	298

Concerned with Pittsburgh's public health reputation, the Chamber of Commerce began to investigate the relationship between the city's drinking-water supply and the high incidence of epidemic disease. On February 20, 1893, chemist Samuel G. Stafford presented the results of his study of Pittsburgh's water supply to the Chamber of Commerce. Stafford found numerous impurities in the city's drinking

⁴ *Board Reports, 1880-1887*, 58-59.

⁵ Frank E. Wing, "Thirty-Five Years of Typhoid," *Charities and Commons* 21 (Feb. 6, 1909): 925.

⁶ Blake, *Water for the Cities*, 262.

⁷ American Water Works Association, *Water Works Practice: A Manual* (Baltimore, 1926), 14.

water.⁸ In response to Stafford's report, chamber Vice-President Reuben Miller suggested the chamber form a special committee "to act in conjunction with the city engineers, for investigation and report as to the best means of improving the water supplied to the citizens."⁹

A month later, members of the new Chamber of Commerce Committee on Water Supply attended a meeting of the Chemical Section of the Engineers' Society of Western Pennsylvania to hear the results of an analysis of the city's water supply by the society's secretary, James H. Harlow.¹⁰ The Engineers' Society, founded in 1880 to provide a common forum for local engineers, became interested in Pittsburgh's drinking-water problem in 1887.¹¹ Harlow's report added to the already existing evidence that associated Pittsburgh's high incidence of typhoid fever with the character of the city's drinking water.¹² Acting on a request by the chamber, the Chemical Section of the Engineers' Society selected a committee to work in cooperation with the Chamber of Commerce Committee on Water Supply.¹³

Members of the two cooperating committees, seeking additional expertise in the effort to improve the city's water supply, decided upon the formation of a joint commission. They invited the main body of the Engineers' Society, the Allegheny County Medical Society, and the Iron City Microscopical Society to appoint representatives to the new body.

The resulting twenty-nine-member Joint Commission on Water Supply included prominent Pittsburghers such as George W. Guthrie and W. Lucien Scaife. Scaife, a member of an elite Pittsburgh family, served as a board member of the Scaife Foundry and Machine Company, while Guthrie — a descendant of Pittsburgh's first mayor, Ebenezer Denny — was prominent as a lawyer and political reformer and as a member of an old and highly regarded Pittsburgh family. He

8 James Otis Handy, "Story of the Efforts Which Led to the Purification of the Water-Supply of Pittsburgh, And to the Elimination of Typhoid Fever from that Cause," *Proceedings of the Engineers' Society of Western Pennsylvania* 43 (Apr. 1927) : 181-82.

9 Chamber of Commerce of Pittsburgh, Minutes, Feb. 20, 1893.

10 Handy, "Purification," 181.

11 Engineers' Society of Western Pennsylvania, *Pittsburgh: Commemorating the Fiftieth Anniversary of the Engineers' Society of Western Pennsylvania* (Pittsburgh, 1930), x; Handy, "Purification," 179.

12 James H. Harlow, "The Water-Supply of Pittsburgh and Allegheny City," *Proceedings of the Engineers' Society of Western Pennsylvania* 9 (Apr. 1893) : 109-24.

13 Handy, "Purification," 181.

himself won the Pittsburgh mayoralty in 1906.¹⁴

The commission began a bacteriological study of Pittsburgh's water supply and a search for alternative means of supplying Pittsburgh with pure water shortly after the slow-sand filters at Lawrence, Massachusetts, began functioning. Commission members compared the results obtained by slow-sand filters at Lawrence and Poughkeepsie, New York, with several mechanical filtration methods. Other members investigated alternative sources such as drilled wells or distant rivers and lakes.¹⁵ The commission completed its research in October 1893, and published the results the following February.

The commission found Pittsburgh's water supply "pernicious" and identified it as the cause for the twenty-year epidemic of typhoid fever in Pittsburgh.¹⁶ To improve the public health they recommended the immediate construction of a slow-sand filtration plant.¹⁷ After the issuance of the report, several commission members decided to construct a demonstration filter to prove the effectiveness of slow-sand filtration.¹⁸

The demonstration filter was erected at the First Unitarian Church, on Craig Street near Fifth Avenue, and began operating on September 22, 1895. The experimental filter remained in operation for one year. The tests supported the commission's claim that slow-sand filtration represented the best means to provide the city with pure water.¹⁹

The activities and recommendations of the Joint Commission on Water Supply received sympathetic coverage from newspapers and professional journals.²⁰ The pressure from prominent citizens and respected organizations obliged the Pittsburgh Select and Common Councils to take action on the city's public water supply problem. On June 8, 1896, the councils passed an ordinance authorizing the mayor to establish a Pittsburgh Filtration Commission. The Filtration Commission — to include the mayor and the two council presidents as well as eight representative citizens — was responsible for an investigation

14 *Report of the Joint Commission of the Chamber of Commerce of Pittsburgh, Engineers' Society of Western Pennsylvania, Allegheny County Medical Society, and Iron City Microscopical Society* (Pittsburgh, 1894); Handy, "Purification," 181; *Pittsburgh Gazette-Times*, Apr. 9, 1906; *Pittsburgh Leader*, Feb. 25, 1906; *Pittsburgh Post*, Feb. 25, 1906.

15 *Report of the Joint Commission*, 1-12.

16 *Ibid.*, 1.

17 *Ibid.*, 13.

18 *Pittsburgh Medical Review* 9 (Dec. 1895): 370-71; *Engineering News* 34 (Dec. 12, 1895): 390-91.

19 *Engineering News* 34 (Dec. 12, 1895): 390-91.

20 *Ibid.*; *Pittsburgh Dispatch*, Dec. 29, 1895.

into the character of the unfiltered water supply and its relation to the city's public health, the possible benefits of sand filtration, and the advisability of seeking other sources of water for Pittsburgh.²¹

Most members of the Filtration Commission, like the joint commission, were prominent Pittsburghers. Two commission members, William J. Holland and Robert Pitcairn, serve as examples. Holland, a noted Presbyterian minister and successful biologist, was chancellor of the Western University of Pennsylvania (later the University of Pittsburgh).²² Pitcairn, a financier and railroad man, was an executive officer of the Pennsylvania Railroad and held major shares in four Pittsburgh-based manufacturing companies.²³

Realizing the gravity of their task, the Filtration Commission employed several leading sanitary engineering experts as consultants. Morris Knowles, a member of the Engineers' Society of Western Pennsylvania, took overall charge of all investigations and experiments. Sanitary expert William T. Sedgwick, of the Massachusetts Institute of Technology, one of the nation's most prominent public health authorities, was responsible for investigating the sources of typhoid fever in Pittsburgh. Allen Hazen, well known for his publications on public health and water filtration, became the commission's filtration consultant.²⁴

The Filtration Commission undertook several simultaneous investigations. Commission members visited European and American cities to study different filtration techniques. Locally, the commission engineers made bacteriological studies of the Allegheny River and constructed an experimental filtration plant seven miles above the city line near the Brilliant pumping station. This plant tested and compared the effectiveness of slow-sand and mechanical filtration systems upon Allegheny River water. Commission members also studied the feasibility of piping pure water from distant Indian Creek and of supplying Pittsburgh with water from deep-drilled wells.²⁵

The Filtration Commission presented its report to a joint session of Pittsburgh councils on February 6, 1899.²⁶ Completed nearly six

²¹ City of Pittsburgh, *Municipal Record: Proceedings of Select Council*, 29: 108.

²² *Carnegie Magazine* 6 (Jan. 1933): 244.

²³ William Bender Wilson, *Robert Pitcairn, 1836-1909* (Holmesburg, Pa., 1913).

²⁴ For example, see Allen Hazen, *Filtration of Public Water-Supplies* (New York, 1895); Wing, "Typhoid," 934.

²⁵ City of Pittsburgh, *Report of the Filtration Commission of the City of Pittsburgh, Pennsylvania* (Pittsburgh, 1899), *passim*.

²⁶ *Municipal Record: Select Council*, 31: 321-25.

years after publication of the report of the extra-governmental joint commission, the Filtration Commission's report blamed Pittsburgh's high incidence of typhoid fever on the character of the city's drinking water and recommended slow-sand filtration as the most economical means of dealing with this continually prevalent public health problem.²⁷ Pittsburgh councils, acting upon the recommendations of the commission, decided to seek public approval of a bond issue to fund the building of a slow-sand filtration facility. Pittsburghers approved the \$2,500,000 bond issue on September 19, 1899, and on March 29, 1900, Pittsburgh councils authorized the City Controller to issue filtration bonds.²⁸

The voting patterns on the water filtration bond issue shown in Table 3 indicate that twenty-two of the twenty-four downtown and East End wards voted in favor of the filtration bonds. The South Side wards, which were not included in the filtration plans,²⁹ split eight to six in favor of the bond issue. Overall, Pittsburghers voted nearly two to one for the issuance of water filtration bonds.³⁰

A comparison of the voting results shown in Table 3 and the typhoid fever death rates shown by ward in Table 4 indicates that, in general, a correlation exists between the two. In five of the seven downtown and East End wards with typhoid fever death rates over 140 per 100,000, voters cast over 70 percent of their ballots in favor of the bond issue. Among the twenty-one downtown and East End wards with typhoid fever death rates over 70 per 100,000, voters in twenty wards supported the bond issue with over 60 percent of their votes. Only two of the South Side wards had typhoid fever death rates over 70 per 100,000, eleven were under 50 per 100,000. Because of its lower incidence of typhoid fever, the South Side was not included in the filtration plans and the bond issue failed in six of the fourteen wards there. In general, those wards with high incidence rates strongly supported the filtration bonds, wards experiencing moderate typhoid deaths reported close voting, and wards with few typhoid deaths opposed the bond issue. Overall, twenty-nine of Pittsburgh's thirty-eight wards supported the water filtration bonds.

Although construction of the filtration plant seemed imminent in April 1900, a three-year political power struggle which began in the

27 *Report of the Filtration Commission*, 7.

28 *Pittsburgh Commercial Gazette*, Sept. 20, 1899; *Municipal Record: Select Council*, 32: 525.

29 Wing, "Typhoid," 927, 937.

30 *Ibid.*, 934.

spring of that year caused a series of delays. The Republican political machine, controlled by Christopher Lyman Magee and William Flinn, had held sway over Pittsburgh's government since the mid-1880s. By agreement with the head of the state Republican organization, Senator Matthew S. Quay, the state and Pittsburgh bosses had not interfered with each other's operations since 1887.³¹ Early in 1900 Flinn and Director of Public Works Edward M. Bigelow had a dispute over the awarding of public works contracts. Bigelow attempted to open

TABLE 3

VOTES BY WARD FOR THE WATER FILTRATION BOND PROPOSITION³²
SEPTEMBER 19, 1899

Ward No.	In Favor		Against		Ward No.	In Favor		Against	
	Vote	Percent	Vote	Percent		Vote	Percent	Vote	Percent
1	362	98.6	5	.4	20	634	64.1	356	35.9
2	193	95.6	9	4.4	21	732	69.8	317	30.2
3	107	95.6	18	4.4	22	160	60.4	105	39.6
4	145	94.8	8	5.2	23	355	65.3	189	34.7
5	259	88.4	34	11.6	24	171	53.1	145	45.9
6	652	89.4	77	10.6	25	123	38.3	201	61.7
7	283	86.0	46	14.0	26	258	58.2	185	41.8
8	294	79.9	74	20.1	27	141	25.5	391	73.5
9	119	70.4	50	29.6	28	191	62.6	114	37.4
10	67	63.8	38	36.2	29	122	60.7	79	39.3
11	418	61.8	258	38.2	30	77	68.1	36	31.9
12	402	91.3	33	8.7	31	116	35.3	213	64.7
13	609	84.2	141	15.8	32	280	49.4	287	50.6
14	925	83.3	186	16.7	33	40	91.2	4	8.8
15	198	72.9	71	27.1	34	120	87.6	17	12.4
16	267	67.3	130	32.7	35	148	34.7	278	65.3
17	656	82.9	135	17.1	36	99	46.7	113	53.3
18	210	47.6	321	52.4	37	86	43.6	111	56.4
19	582	69.9	250	30.1	38	59	38.8	93	61.2

the contracts to bids, while Flinn demanded the contracts be awarded to his company and to others he selected. Bigelow refused to renege

³¹ Leland D. Baldwin, *Pittsburgh: The Story of a City* (Pittsburgh, 1937), 354.

³² *Pittsburgh Post*, Sept. 20, 1899.

and the Flinn-controlled councils removed him from the public works directorship on June 11, 1900.³³

TABLE 4
TYPHOID FEVER DEATH RATES IN PITTSBURGH BY WARD³⁴

Annual Deaths per 100,000 Population	Ward Numbers
over 200	5, 9, 15
160-179	11, 17
140-159	12, 18
110-139	8, 13, 26
90-109	1, 2, 3, 7, 14, 16, 19, 21
70- 89	6, 10, 22, 23, 24
50- 69	20, 25, 28
30- 49	27, 29, 32, 37
13- 29	30, 31, 36, 38
12 or less	4, 33, 34, 35

In response to Flinn's action, Bigelow and his wealthy brother Thomas began organizing a Citizens party reform movement with the backing of the city's small Democratic party and Quay's powerful state organization.³⁵ At Quay's direction, the state legislature changed Pittsburgh's charter, eliminating the office of mayor and replacing it with that of recorder. The recorder had the power to appoint and dismiss department heads, a power formerly held by councils. The new charter did not provide for a recorder's election until February 1903. Prior to the election, the governor held the right to appoint the city's recorders.³⁶

Quay had Governor William A. Stone appoint prominent Pittsburgh lawyer and Citizens party member Adam M. Brown as the city's recorder. Brown reappointed Edward Bigelow as director of public works.³⁷ Bigelow renewed planning for construction of the slow-sand filtration plant on the Allegheny River at Aspinwall.³⁸

Magee and Flinn, meanwhile, prevailed upon the governor to remove the Quay-Bigelow recorder from office. In November 1901,

³³ Lincoln Steffens, *Shame of the Cities* (New York, 1904), 129; Wing, "Typhoid," 934.

³⁴ Wing, "Typhoid," 927.

³⁵ Baldwin, *Pittsburgh*, 354.

³⁶ Steffens, *Shame*, 129; Wing, "Typhoid," 935.

³⁷ Steffens, *Shame*, 129; Wing, "Typhoid," 935.

³⁸ Wing, "Typhoid," 935.

Stone replaced the original recorder with Joseph O. Brown, former Magee-Flinn director of public safety.³⁹ Bigelow again lost the position of public works director, and construction of the filtration plant was again delayed.⁴⁰

But before the year's end Magee died, leaving Flinn in sole charge of the Republican ring.⁴¹ In the recorder's election of February 1903, the Citizens party candidate, William B. Hays, campaigning against boss control, defeated Flinn's candidate, John C. Haymaker.⁴² Hays therefore reappointed Edward Bigelow as director of public works.⁴³ The reformers' victory ended the political struggle which had delayed construction of the filtration facility for three years.

Although the construction of the filtration plant was a casualty of the political battle, more than politics was involved. At issue were two opposing approaches to the problem of governing a large urban area. Control of Pittsburgh's government enabled the bosses to utilize patronage as a means to hold sway over the city's departments and to strengthen their machine. The reformers, however, maintained a broader, more cosmopolitan view of urban government and were attempting to bring the rationalism and efficiency of the business corporation to the city.⁴⁴

The political struggle, then, centered around the Republican machine's desire to maintain control of city spending and the reformers' attempts to break this control and to change the character of Pittsburgh's government. By replacing the weak mayor with a strong recorder and by moving jurisdiction over the department directorships from the councils to the recorder, the reformers endeavored to centralize more of the decision-making authority and to shift the city government's attention from ward-related matters to concerns of city-wide scope.

On July 31, 1903, the Pittsburgh councils, controlled by the Citizens party,⁴⁵ passed an ordinance requiring Director of Public Works Bigelow to enlarge existing filtration plans to include the South

39 Steffens, *Shame*, 119, 130.

40 Wing, "Typhoid," 935.

41 Baldwin, *Pittsburgh*, 354.

42 Allen Humphreys Kerr, "The Mayors and Recorders of Pittsburgh, 1816-1951: Their Lives and Somewhat of Their Times," unpublished manuscript (Pittsburgh, 1952), 237.

43 Wing, "Typhoid," 937.

44 Samuel P. Hays, "The Politics of Reform in Municipal Government in the Progressive Era," in Alexander B. Callow, ed., *American Urban History: An Interpretive Reader with Commentaries* (New York, 1969), 425-28.

45 Wing, "Typhoid," 937.

Side as well as other sections of the city. The councils further instructed Bigelow to reestimate the cost of filtration construction.⁴⁶ On September 14, 1903, Bigelow presented an estimate of \$7,152,000 for an expanded filtration plant.⁴⁷

Apparently surprised by Bigelow's high estimate of cost, councils authorized the Committee on Finance to employ three engineering experts — Colonel Alexander M. Miller, chief engineer at the Washington, D. C., filtration plant; John W. Hill, chief engineer at Philadelphia's filtration plant; and Rudolph Hering, prominent New York sanitary engineer — to verify the accuracy of Bigelow's engineering and cost estimates.⁴⁸ The three experts submitted final reports on February 27, 1904. By revising several technical specifications they reduced the cost by \$700,000.⁴⁹ City councils decided to seek an additional bond issue of \$5,000,000 to finance land purchases and construction of the filtration plant.⁵⁰

On July 12, 1904, Pittsburghers voted in favor of the second filtration bond issue.⁵¹ The voting patterns, shown in Table 5, indicate a heavier vote and a narrower margin of victory for the second bond issue than for the first. On the South Side, where the incidence of death from typhoid was comparatively low (see Table 4), eleven of the fourteen wards opposed the second bond proposition, while only six had rejected the first. The percentage of votes favoring the second bond issue also decreased in eighteen of the twenty-four typhoid-stricken downtown and East End wards. Apparently many Pittsburghers, concerned over the four-year delay in construction of a filtration facility, doubted the effectiveness of the city's government and refused to vote additional funds for the project.⁵²

During the one-year delay created by the engineering and cost revisions made for the filtration plant, prominent local groups again pressured Pittsburgh councils to expedite construction of a filtration facility. On November 30, 1903, the Pittsburgh Section of the American Chemical Society presented a resolution to Select Council urging the erection of a slow-sand filtration system as soon as possible.⁵³ On January 11, 1904, similar resolutions were offered by both the Civic

46 *Municipal Record: Select Council*, 36: 87-88.

47 City of Pittsburgh, *Municipal Record: Proceedings of Common Council*, 36: 154-57.

48 *Ibid.*, 162; Handy, "Purification," 188.

49 Wing, "Typhoid," 938.

50 *Municipal Record: Select Council*, 37: 24.

51 Handy, "Purification," 188; Wing, "Typhoid," 938.

52 *Pittsburgh Press*, July 13, 1904.

53 *Municipal Record: Select Council*, 36: 173.

Club of Allegheny County and the Permanent Civic Committee of the Women's Clubs of Allegheny County.⁵⁴

In apparent response to the resolutions presented by the three civic organizations, the Pittsburgh councils established a Bureau of Filtration in the Department of Public Works, on March 28, 1904, before voter approval of the second filtration bond issue.⁵⁵ Morris Knowles, formerly employed by the Filtration Commission, received the new filtration bureau's post of chief engineer of design and construction. Following passage of the bond issue, councils authorized the letting of filtration-plant construction contracts on December 7, 1904.⁵⁶

TABLE 5

VOTES BY WARDS FOR THE WATER FILTRATION BOND PROPOSITION⁵⁷
JULY 12, 1904

Ward No.	In Favor		Against		Ward No.	In Favor		Against	
	Vote	Percent	Vote	Percent		Vote	Percent	Vote	Percent
1	377	96.7	13	3.3	20	1176	67.4	569	32.6
2	391	95.1	20	4.9	21	1263	62.0	774	38.0
3	130	94.9	7	5.1	22	207	56.9	157	43.1
4	400	98.0	8	2.0	23	562	56.3	436	43.7
5	406	92.7	32	7.3	24	229	51.8	213	48.2
6	751	86.6	116	13.4	25	169	24.8	512	75.2
7	380	82.4	81	17.6	26	207	45.6	247	54.4
8	403	76.4	123	23.6	27	276	27.9	715	72.1
9	153	78.1	43	21.9	28	72	17.5	340	82.5
10	173	77.5	73	22.5	29	62	15.7	333	84.3
11	639	58.7	449	41.3	30	110	45.6	131	54.4
12	347	75.4	113	24.6	31	199	29.8	470	70.2
13	930	61.8	575	38.2	32	234	22.7	797	77.3
14	1188	69.1	532	30.9	33	54	81.8	12	18.2
15	203	57.6	150	42.4	34	69	73.4	25	26.6
16	438	38.8	691	61.2	35	228	38.3	367	61.7
17	510	59.4	501	40.6	36	168	42.1	231	57.9
18	387	49.1	401	50.9	37	182	37.5	303	62.5
19	1026	59.0	713	41.0	38	125	31.2	276	68.8

⁵⁴ *Ibid.*, 213.

⁵⁵ *Municipal Record: Common Council*, 36: 523.

⁵⁶ *Ibid.*

⁵⁷ *Pittsburgh Press*, July 13, 1904.

Bigelow awarded the filtration-plant construction contracts on March 14, 1905, and construction of the filtration plant began on April 6, 1905, on the northern bank of the Allegheny River opposite the Brilliant pumping station.⁵⁸ Work on the facility continued on schedule, and the first filtered water was delivered on December 18, 1907. The entire downtown and East End sections of the city received filtered water on October 3, 1908. The South Side began to receive filtered water on February 4, 1909. Pittsburgh annexed the North Side, formerly Allegheny City, on December 6, 1907, and that section of the city began to receive filtered water on March 29, 1914.⁵⁹

TABLE 6
TYPHOID DEATH RATES PER 100,000 INHABITANTS⁶⁰

Year	Pittsburgh		Pennsylvania	U.S. Registration Area	56 Large American Cities
	Resident	Total			
1900	120	144.6		35.9	28.37
1901	102	125.3		32.5	30.00
1902	109	133.8		34.4	32.89
1903	108	134.2		34.2	35.45
1904	122	142.1		31.7	30.97
1905	89	98.8		27.8	27.06
1906	110	130.3	56.5	31.4	29.18
1907	106.6	125.2	50.3	29.3	30.88
1908	42.6	48.7	34.3	24.4	22.19
1909	17.4	24.6	22.7	21.2	17.61
1910	21.7	27.8	24.6	23.5	19.38
1911	20.0	25.9	22.0	21.0	15.42
1912	8.1	12.8	16.6	16.5	12.45
1913	10.5	19.6	18.3	17.9	12.60
1914	8.4	15.4	13.2	15.5	10.26
1915	6.6	10.5	12.6	12.4	9.67
1916	5.5	8.6	13.9	13.3	7.59
1917	7.7	11.5	10.7	13.5	6.53
1918	6.2	10.0	10.9	12.6	6.15
1919	3.9	6.3	7.1	9.2	3.81
1920	2.7	5.2	5.7	7.8	3.48

⁵⁸ City of Pittsburgh, *Annual Report of the Department of Public Works, 1905*, 260-62, 293-346; Pittsburgh, *Water Works and Typhoid Fever Statistics*, 26.

⁵⁹ Pittsburgh, *Water Works and Typhoid Fever Statistics*, 26.

⁶⁰ *Annual Report of the Department of Public Works, 1905*, 260-62, 293-346; Pittsburgh, *Water Works and Typhoid Fever Statistics*, 26.

With the introduction of purified water, the typhoid fever death rate in Pittsburgh dramatically dropped. As shown in Table 6, the introduction of filtered water to Pittsburgh in 1908 and 1909, and to the North Side in 1914 lowered the incidence of typhoid fever over 900 percent by 1912. Pittsburgh's typhoid death rate was now at a normal level when compared to the averages for Pennsylvania and for other American cities.

By the beginning of the twentieth century, therefore, after displaying a consistently negligent attitude towards Pittsburgh's public health needs, the city government finally took action on the critical water supply question. Influential voluntary associations such as the Pittsburgh Chamber of Commerce and the Engineers' Society of Western Pennsylvania were primarily responsible for securing action. By combining their funds and influence, the Chamber of Commerce, the Engineers' Society, the Allegheny County Medical Society, and the Iron City Microscopical Society forced the Pittsburgh councils to establish a filtration commission. Although temporarily blocked by a political struggle between the Magee-Flinn machine and the reform Citizens party, a bond issue providing for the construction of a filtration plant was placed on the ballot in 1904 and approved by the voters.

Most instrumental in the leadership of the movement for pure water were the members of the business and financial elite who dominated the voluntary associations and who combined with professionals from the engineering, medical, and public-health professions. Similar coalitions were instrumental in spearheading movements to improve the urban quality of life in other cities throughout the country during this period. In Pittsburgh, efforts at this time to enact other environmental improvements in the areas of air pollution and housing were unsuccessful because they infringed upon significant private economic interests.⁶¹ Pure water, however, was a cause that both private and public interests could rally to, and by 1908, Pittsburgh, after years of delay, had resolved its great water crisis.

⁶¹ Roy Lubove, *Twentieth Century Pittsburgh: Government, Business and Environmental Change* (New York, 1969), 44, 46.