Rochester and Its Water Works

THE STORY OF ONE CITY'S QUEST FOR
A DOMESTIC SUPPLY OF PURE
AND WHOLESOME WATER

1834 - 1954

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Rochester Bureau of Municipal Research, Inc.

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When Rochester became a city in 1834 and for forty years thereafter its water supply was precarious to say the least. Water for domestic purposes was taken from public or private wells and from cisterns in which roof water was collected and stored. Writing in 1872, the chief engineer of the projected city water works referred to the "objectionable quality" of the water from the wells and to the "foul and stagnant" water from the cisterns. Water for fire protection was taken by the fire engines from small underground reservoirs scattered through the "lamp and watch" area of the city. These reservoirs were supplied in most cases by pipe lines from the Erie Canal. That they were far from satisfactory may be inferred from the following quotation from the annual report of the fire department committee to the common council in 1871: "It has been extremely fortunate that we have been unusually free from fires during the past year, as the great scarcity of water would have prevented any very effectual resistance in many sections of the city and especially so during the winter season." In spite of these conditions, every proposal for the acquisition of a water supply was warmly debated and bitterly opposed right down to January 23, 1876, when Hemlock water first flowed into Highland Reservoir. This same tendency to debate and to oppose has prevailed on each occasion when extensions of the supply have been under consideration.

First Water Company--1835

The first move to supply the city with "pure and wholesome" water came in 1835 when the state legislature passed "An act to incorporate the Rochester Water Works Company." This company was capitalized at $10,000, the small amount being eloquent of the failure to grasp the importance and the magnitude of the project. Five citizens--a banker, two attorneys, an exchange broker and a merchant miller--were named in the statute to receive subscriptions to the capital stock. No record of any proceedings under this law have been found and, in all probability, the charter expired under the provision of the Revised Statutes of the State that any corporation not organizing and commencing operations within one year of its incorporation forfeited its corporate powers.

Johnson Report--1838

The second step on the long road to a public water supply was taken in 1838. On January 16th of that year, the common council directed the mayor, Elisha Johnson, to study the matter and report his findings to the council at an early date. Water supply evidently was a hobby with the mayor and his report was filed with startling promptness on March 3rd, only seven weeks after it had been requested. The mayor suggested the river as the source of supply, his plan calling for clarifying basins on each side of the river from which the water would be lifted to distributing reservoirs to flow by

gravity through cast iron mains in the city streets. The mayor estimated the cost of the proposed works as $132,642.85 and recommended that the city borrow $150,000 and build the project in four steps, of which the clarifying basins and the distributing reservoir on the west side of the river, north of Clarissa Street, with a main "through Caledonia and Sophia (streets) to Buffalo street" would be the first. Water rates, Mr. Johnson thought, would average "five dollars per family of six," making a total revenue of $12,500 to meet an annual operating expense of $1,500 and the various capital charges. The Johnson report caused a minor wave of interest throughout the city, interest that soon evaporated to be followed by fourteen long, apathetic years.

Second Water Company--1852

The second Rochester Water Works Company was incorporated in 1852. This company, miserably directed and insufficiently financed, was destined to dominate the water situation in Rochester for twenty years. During these two decades, periods of masterly inactivity alternated with periods of bustling but ineffectual activity, while the people of the city and their elected representatives were torn between exaspiration and hope. Although the official record in the Proceedings of the Common Council and the unofficial record in the local newspapers are voluminous, one always turns from a reading of the sources with a feeling of bewilderment--

whatever was the motivation of the company over those twenty important but futile years!

The act incorporating the company was passed by the state legislature on April 16, 1852. It named eleven local men to serve as a board of directors pending an election on "the first Wednesday of May, 1853." The capital stock of the company was set at $200,000, but this might be increased to $500,000 by the company at any time and without further authorization. The usual "books of subscription" for the capital stock were authorized. Finally, in the eighth section of the charter, the purpose of the company was obliquely stated as "supplying the said city of Rochester with pure and wholesome water." Where the supply was to come from was not stated and subsequent events seem to indicate that no one then associated with the company had any clear opinion on the subject. The common council of the city was empowered to subscribe "an amount not exceeding one hundred and fifty thousand dollars" to the capital stock and was given the right to acquire the company at any time by the purchase of all other outstanding stock at a premium that varied from twenty per cent downward as the company became older.

Participation by the city as a stockholder in the company was not popular with the people and consequently the law was amended in 1853 to permit the city to borrow $200,000 and to advance that amount to the company as a loan. Apparently

the people were as loath to become creditors of the company as they had been to become part-owners, and the "lending provision" was repealed in 1856. In 1860 the matter of municipal participation was revived by the passage of a law giving the city council the right to sell city-owned stock of the Genesee Valley Railroad Company and to invest the proceeds, to the extent of $200,000 in stock of the Rochester Water Works Company. In case the aldermen were unwilling to proceed under this plan--and they definitely were unwilling--they were further authorized to submit to the people by referendum a proposition to borrow $200,000 on city bonds and to use the funds so derived for the purchase of water works stock. The referendum was never sanctioned by the council. In 1867 the company was permitted to increase its capital stock to $800,000 and the common council was hopefully authorized to subscribe for $150,000.

This last law was adopted by the legislature on March 26, 1867. The reaction was sharp and immediate. The people of the city wanted no part in the troubles of the Rochester Water Works Company. On July 7th Alderman Kelly, obeying the mandate of his constituents, offered the following resolution at a meeting of the common council:

> "Whereas, It has appeared during the recent exciting debate upon the water works question, that, while the citizens at large are in favor of the present contract as it is and wish the work

speedily performed, they are opposed to have any law remain unrepealed that gives to the Common Council any right or power to subscribe to stock in the Water Works;

"Therefore resolved, That our Representatives in Senate and Assembly are hereby instructed to secure the repeal of that portion of our charter that gives the Council any right to subscribe for stock in the Water Works Company."

The resolution was carried and, at the legislative session in 1868, a law was passed terminating all authority for city participation in the financing of the company.

Johnson Plan--1859

While the matter of city participation was being decided, Elisha Johnson, no longer a resident of the city, reentered the picture in 1859 through the medium of a long and rather incoherent letter to the mayor, S. W. D. Moore, in which the whole question was settled for all time to nobody's satisfaction. In his letter the ex-mayor recanted on his report of 1838 and advocated the construction of a storage basin in the valley of the Little Black Creek west of the city. The Johnson proposal was read to the council on July 5, 1859 and was courteously referred to a select committee to be appointed by the mayor. This, in reality, was the end of the Little Black Creek project, but the interest engendered by its proposal led Daniel Marsh, a civil engineer, to write to the council, outlining some work that he had already done on a plan for supplying the city with water and asking the

assistance of the city in its completion. The Marsh letter was referred to the select committee appointed to consider the Johnson proposals, that committee being expanded from three to six members in view of the possibility of action. The select committee, under the chairmanship of Alderman George Shelton, contented itself with requests for more time until Alderman Lewis Selye, storm center at many a council meeting, demanded action. This was on March 13, 1860. On March 20, 1860 the select committee reported that it had received bids for a survey of routes for a pipe line from Hemlock Lake to the city and for a report covering the whole question of water supply. The committee recommended that the proposal made by Mr. Marsh be accepted, although his bid of five hundred dollars was the highest of the three received. The council concurred and Mr. Marsh was employed.

Marsh Report--1860

The completion of the Marsh Report was announced to the council by the select committee on October 2, 1860. This, the first official report on Rochester's water problem by a qualified engineer, is worthy of more than passing attention. The report listed eleven "sources from which this city may be abundantly supplied with water": (1) Genesee River; (2) Lake Ontario; (3) Irondequoit Creek; (4) Black Creek; (5) Little Black Creek; (6) Caledonia Spring; (7) Mendon Ponds; (8) Honeoye Outlet at West Rush; (9) Honeoye Outlet at Smithtown; (10) Co-

nesus Lake; and (11) Hemlock Lake. Six of these sources were given scant consideration, the report discussing seriously only the Genesee River, Lake Ontario, Little Black Creek, the Honeoye Outlet at Smithtown and Hemlock Lake. As summarized in the report, the five plans were as follows:

> "By the first plan, it is proposed to elevate the water of Lake Ontario, by steam power, located at the lake shore. A supply pipe of wood to extend 1,000 feet into the lake, and a pumping main of cast iron, thirty inches in diameter, to extend thence to the distributing reservoir east of Mount Hope Cemetery.
>
> "By a modification of this plan, the water of the lake is to be conducted by a thirty-six inch main to a pump well at the lower falls and thence elevated and forced to the reservoir by a water pressure engine.
>
> "By the second plan, the water of the Genesee River is to be raised by water or steam power at the Rapids, to a storing and subsiding reservoir, south of Mount Hope ridge, and thence by the same power to the distributing reservoir.
>
> "By the third plan, the rainfall upon the sources of Little Black Creek is to be collected into a storing reservoir in the valley towards the mouth of that creek, and conducted thence by a twenty inch pipe to the pumping engine at the Rapids and from that point by either steam or water power to the distributing reservoir.
>
> "By the fourth plan, the water of the Honeoye Outlet is to be taken at Smithtown and conducted by a twenty inch pipe directly to the distributing resvoir. Auxiliary to this plan there is to be either a large storing reservoir on the route of the main pipe or the lake itself is to be made such reservoir.
>
> "By the fifth plan, the water of Hemlock Lake is to be conveyed by a sixteen inch pipe to the distributing reservoir."

Since the first three of these acceptable sources required pumping, Mr. Marsh showed a tendency to favor either the Honeoye Outlet or Hemlock Lake.

The construction costs of the works necessary with each source were estimated as follows:

Lake Ontario (Plan No. 1)	$1,030,000
Genesee River (Plan No. 2)	680,000
Little Black Creek (Plan No. 3)	810,000
Honeoye Outlet (Plan No. 4)	980,000
Hemlock Lake (Plan No. 5)	1,210,000

Estimates were based on a supply of 2,000,000 gallons per day and included a distribution system comprising fifty-four miles of cast iron pipe. The Marsh Report was judiciously written, confining itself generally to the engineering aspects of a water supply and omitting the usual propaganda. The author, near the end of the report, however, was impelled to say: "Originally the natural emporium of the beautiful and fertile valley of the Genesee River, the position, facilities and resources of Rochester have been gradually improved and developed by its canals, railroads, lake, harbor and the extensive hydraulic power in its midst, and should there now be added to these advantages an ample supply of pure water, and

ultimately an abundance of cheap fuel (from the Pennsylvania coal fields), both so important and essential to the development of steam power and many departments of mechanical enterprise, the industrial, manufacturing and commercial prosperity of our city would be advanced beyond the present anticipations of its people." Incidentally, both the report and its compiler were later adopted by the Rochester Water Works Company, the report being used as propaganda and Mr. Marsh being employed as chief engineer.

The Company Again--1860

The Marsh Report was reviewed by the select committee in a stilted report, in which the policy of the council "that the works be constructed by private enterprise alone, and the city pay the company an annual sum for use of the waters" was first laid down--a policy which was doggedly followed for twelve years. On October 16, 1860, the select committee was authorized to advertise for proposals to furnish the city with a supply of water at a fixed annual charge. About two months later the committee reported that it had received three proposals for furnishing the water in accordance with plans four and five of the Marsh Report. On the basis of the findings of the committee, the council decided to make a contract with the Rochester Water Works Company "for furnishing this city with water, within three years from January 1, 1860, from the outlet of Hemlock Lake . . . at a cost to the

city not to exceed $20,000 per year." In its report the committee wrote: "In the present state of the money market, and its prospective condition for some time to come, the Company will need all the encouragement the Common Council can reasonably afford, acting in behalf of the city, to enable them to induce capitalists to invest their money in the capital needed for the construction of the works." Unfortunately succeeding councils did not always have this implied warning in mind.

The first contract between the city and the Rochester Water Works Company was authorized on January 25, 1861. Under its terms, the company was to have "the whole work . . . entirely completed, all the pipes laid, and in full operation, by the first day of January, 1864." A war intervened and, on June 2, 1863, the contract was extended for two years to January 1, 1866. The matter of a further renewal of the contract was discussed by the council late in 1865. A committee of aldermen reported sharply that, as of January 9, 1866, the date of the report, the company had "not as yet expended one cent of money or laid one inch of pipe." The report also expressed the committee's opinion that "if the contract was not given to this company five years ago, Rochester, would be supplied to-day with water works." Fourteen years of inactivity and broken promises gave weight to the committee's report and the contract was allowed to lapse. Later in the year, the matter was reconsidered. A new contract was offered and

accepted. This contract, differing in no material respect from the contract of 1861, was effective until terminated by the bankruptcy of the company in 1872.

The flurry over the renewal of the contract in 1866, seems to have stirred the company to action. On September 18th, Daniel Marsh, as engineer for the company, wrote to Chairman Gorsline of the Council Committee on Water Works that "the whole of the iron pipe to complete the Rochester Water Works has been contracted for and is now being cast" and that "work at Hemlock Lake has been commenced in compliance with the contract." On July 2, 1867, the editor of the Daily Union and Advertiser noted that "yesterday a gang of hands began digging on Alexander street preparatory to putting down the water pipes, and to-day the number seems to be increased." This was probably the beginning of actual construction work by the company. For five years the work proceeded in a desultory manner with the contractor, Alexander Easton, and the common council continually sniping at each other, apparently with honors about even. In 1871 an engineer employed by the stockholders of the company estimated the actual value of the work--not the amount spent--as $222,738. The then-owners and Mr. T. B. Rand, who later acquired the property on the foreclosure of a mortgage, offered to sell the works to the city at prices that gradually dropped from $250,000 to $90,000. All offers were rejected by the city. Finally,

on August 18, 1882, the potential nuisance of the company's legal rights was erased by the acquisition of the property for $26,000, a material decrease from the first asking price. The charter of the company and its amending laws were repealed in 1907.

Public Water Supply Proposed

The last gun of the first war over Rochester's water supply had not yet been fired, when the first gun of the second war echoed through the city. Disparing of a water supply by contract, some influential citizens had secured the introduction of a bill in the legislature of 1871 naming a Board of Water Commissions and authorizing it "to ascertain the best and most expedient plan for procuring a supply of water." If the plan proposed by the commissions were accepted by the people of the city at a referendum election, the commission was authorized to borrow funds on the credit of the city and to construct the proposed works. This bill aroused the ire of the common council and, at the regular meeting of March 28, 1871, Alderman James H. Kelly, Republican from the ninth ward, said that the bill had been introduced "without the knowledge of any except the proposed commissioners and their immediate friends" and that it was "crude and ill digested in its provisions." A resolution protesting against the passage of the bill was unanimously adopted by the council. Copies of this resolution were sent to the senator and assemblymen from Monroe County and the bill did not become a law.

Third Company Planned

On December 12th the council appointed a committee of ten citizens "to investigate the present plan to supply the city with water, and especially to examine the Holly or any other system, which shall look to bringing the water from Lake Ontario." The committee reported at length on January 30, 1872, stating that "the cheapest, most expeditious, and most reliable supply can be procured . . . from the river within or near the city limits." Incidentally the report noted the foreclosure sale of the Rochester Water Works Company to Mr. T. B. Rand of New York; predicted a long drawn out legal battle, over the assets of the company; and advised against any continued dependence on the Hemlock Lake project. Two weeks later the ten citizen authors of the report were named in a proposed resolution as prospective organizers of a third Rochester Water Works Company. Action on the resolution was deferred until March 19th when it was quietly tabled. This was the last official attempt to secure a water supply by contract with a private company. A letter from Mr. Rand's attorney, suggesting the appointment of a committee to negotiate a new contract, was received on March 26th but was ignored after being read and published.

The second phase of Rochester's struggle for a water supply may be dated from April 27, 1872 when the state

legislature adopted "An Act to supply the City of Rochester with pure and wholesome water." This law directed the mayor to appoint a board of water commissioners consisting of five residents of the city holding office for five-year overlapping terms. The board in turn was directed "to consider all matters relative to supplying the city. . . with . . . pure and wholesome water . . . . " For its purposes, the board was authorized "to employ engineers . . . and such other persons as . . . may be necessary, to ascertain the . . . most expedient plan for procuring such supply of water." When its plans were completed, the board was to submit them, along with a report and estimates, to the mayor. If the plans were accepted by the mayor, the commissioners were further directed to "proceed with their plans" and were empowered "to borrow. . . upon the credit of said City of Rochester, an amount not exceeding the amount named in their estimates of cost of said works." The common council, otherwise ignored in the law, was curtly ordered to pay "all expenses incurred by said commissioners. . . up to the time of submitting their estimate to the mayor" and "to raise. . . by tax . . . the sum or sums of money which may be required to pay the interest on said bonds and to redeem them at maturity."

Jarvis and George Lord

This bill, reputedly drafted by Assemblyman George D. Lord representing the second assembly district (Rochester)

of Monroe County, was introduced by him in the assembly and was actively supported in the senate by Jarvis Lord of Pittsford, sole senator from Monroe County. The Lords were father and son--Jarvis being the father; were Democrats representing a city with a Republican administration; and were contractors. The combination brought unmerciful criticism on their heads, criticism that at times verged on abuse. George Lord, defeated for the assembly in 1873 by Henry L. Fish, one time Democratic mayor of the city, is commonly accepted as the contractor for the conduit from Hemlock Lake to the city. If this is true, he must have acted in the capacity of a sub-contractor as the contractor of record was James McDonald of Essex County. The charge that the Lords promoted the water works for their own pecuniary advantage, based on the foregoing rumor, is probably merely one of the many crosscurrents that were running in the middle '70s.

Mayor Wilder

The position of the mayor, A. Carter Wilder, a Republican, must certainly have been embarrassing during the twelve bitter months that followed his inauguration on April 1, 1872. In his introductory message to the common council, Mayor Wilder said "I should deem it a disaster . . . should another year pass without the construction of works necessary for our (water) supply." He then proceeded to announce his preference

for Hemlock Lake as the source of the supply and outlined in considerable detail the plans of Mr. Rand and his associates for the coming construction season. Concluding his comment on the situation, he said, "I cannot doubt that the abundant means, energy and experience of the new owners (of the Rochester Water Works Company), will combine with their interests, to give us, at the earliest date, a bountiful supply of water not inferior in purity to any on this continent." Either the mayor was being somewhat artful or else he had no personal knowledge of the "commission plan" which, even as he was writing his message, must have been nearly in its final form.

Thirty days later, under authority of the law adopted on April 27th, the mayor appointed Roswell Hart, Edward M. Smith, William H. Bowman, Charles C. Morse and Gilman H. Perkins commissioners, charged with the task of bringing a water supply to the City of Rochester. Mr. Hart and Mr. Bowman were lawyers, the former not practicing. Mr. Morse was a boot and shoe manufacturer, Mr. Perkins, a wholesale grocer, and Mr. Smith an insurance agent, later becoming postmaster. Of the five commissioners appointed by Mayor Wilder three, Messrs. Hart, Morse, and Perkins, signed the final report of the board on September 30, 1876. Mr. Smith had resigned early in 1873 and had been succeeded by Pliny M. Bromley, one of the proprietors of the Osburn House. Mr. Bromley died and was succeeded by Mr. John Bower in 1874, who was in turn succeeded by Mr. M. H.

Merriman in 1876. Mr. Bowman's term of office expired in 1875 and he was succeeded by Mr. J. C. Cochrane, also a lawyer. The final report of the board of water commissioners, therefore, was signed by Messrs. Hart, Merriman, Cochrane, Morse and Perkins.

In his second annual message to the common council, read at the meeting of April 7, 1873, the mayor said, "Recent legislation has considerably modified our charter and divested your honorable body of powers heretofore confided to your exercise. Much heated discussion and diversity of opinion have been developed among our citizens by these enactments, and their policy has been fiercely attacked and defended. With regard to the expediency or justice of these changes I cannot with propriety express an opinion here. The decision upon these matters must necessarily be left to another tribunal which has exclusive jurisdiction therein. The simple duty was imposed on me by those laws of selecting the appropriate instruments for carrying their policy into practical effect. In the performance of a trust thus made imperative, I endeavored to make choice of citizens of approved integrity and capacity, who would, in my judgment, best discharge the important duties created by the statutes in question. The exceeding delicacy of this unsought power, rendered its performance in the last degree embarrassing, from which I should have been glad to have been relieved. Having discharged it to the best of my

judgment, and with conscientious devotion to the public interests, my further connection with the matter ceased, and I have no other official duty in the premises, than to see that the powers thus delegated by the supreme legislative authority, are fairly and honestly exercised."

There is something rather convincing in these words coming from a very sick man--the mayor resigned on October 28, 1873 because of illness soon to be fatal--and, read in connection with his message of the year before, seem to absolve the city's chief executive from any part in the so-called plot that rocked the city for five years, but did result in the long-sought water supply.

The Common Council

While the position of the mayor in the matter of "the City of Rochester vs. Commissions" was somewhat hazy, the position of the common council was crystal clear. Individually and collectively the aldermen were as sore as the legendary goat over the turn affairs had taken. Only five of the twenty-eight council members were willing to accept the situation as satisfactory or as final. A letter from the owners of the Rochester Water Works Company seemingly revived for a short time the very dead issue of a privately-owned water supply. A special committee was selected by the council on May 28th to present to the council at an early meeting a "draft of the most

favorable contract that can be made with the parties." Two months later the committee submitted a contract involving the immediate filling with river water of such mains as had been laid in the city streets. This would have afforded some protection against fire and, what was probably more important in the eyes of the aldermen, would have been a serious legal obstacle in the path of the unwanted water commissioners. On August 6, 1872 the mayor and the city clerk were authorized to execute such a contract, but in the meanwhile an injunction had been secured by the water commissioners temporarily barring any such action.

While the aldermen were fretting over the situation, the board of water commissioners organized and employed J. Nelson Tubbs--delightful name for a water man--as chief engineer and General I. F. Quinby as consulting engineer. Surveys were started only to be stopped by an injunction. This injunction was modified in a few days to permit the surveys to proceed and on July 15, 1872 plans and estimates were presented to and approved by the mayor.

Election of 1872

Before the surveys and plans were completed, shadows of the coming legislative elections fell across the confused picture. The Republican city convention met on October 29th to nominate a candidate for member of assembly from the second

(or city) district. Before any nomination could be made by this convention one of the delegates was on his feet denouncing "the legislature of last winter which deprived the people of this district of all voice in the government of their own affairs." At the close of his philippic, the delegate proposed a resolution condemning "the obnoxious and nefarious laws," which resolution was adopted unanimously to the obligato of hearty cheers. The convention then adjourned without naming a candidate, an oversight that, in view of future events, may have been deliberate.

The following morning the Democrat and Chronicle formerly leaning toward the "commissions," said editorially, "the spirit, the fervor, the enthusiasm, and above all else the earnest determination, exhibited at the Republican convention last evening gives abundant evidence that any Republican can be elected to the assembly who will stand squarely upon the wise platform adopted by that convention." That same afternoon the Evening Express carried a card from Henry L. Fish denying certain implications that he had favored the "commissions" and pledging himself "to aid the good citizens of Rochester to wipe them all out of existence."

In the evening--things were moving rapidly--a "citizens' meeting" assembled in the city hall. This meeting urged city electors to put aside all political differences and to

"unite in a joint effort to procure the immediate and unconditional repeal of each and all of said acts," including, of course, the act establishing the board of water commissioners. These recommendations were embodied in a formal resolution which was adopted unanimously after which the meeting proceeded to nominations. At this point, quoting from the record, "great confusion arose from disorderly persons" and the meeting adjourned. The following morning the meeting reconvened and named Henry L. Fish as "the people's candidate." City Republicans did not share the optimism of the editor who believed that "any Republican can be elected" and accepted Mr. Fish as "the people's choice," nominating him as the candidate of the Republican Party. Their wisdom was proven by the election of November 5, 1872, Mr. Fish winning over the reviled Mr. Lord by the scant margin of 173 votes.

Court Actions

As the political aspects of the water supply situation were unfolding, the battle in the courts was moving to a dubious victory for the commission. Injunctions were dismissed and the matter taken into the Supreme Court. Here, it must be assumed--the record being lacking,--the commission was upheld and the case went to the Court of Appeals. Only a brief memorandum of this appeal is available. This memorandum shows that the appeal was argued on December 12, 1872 and was decided, once more in favor of the commission, on January 21,

1873. A list of cases pending on March 31, 1874, shows that the matter of the City of Rochester vs. Roswell Hart and others had reached the Supreme Court of the United States. Diligent search has revealed no official clue as to the fate of the case in the land's highest court, but at any rate, the board of water commissioners lived out its allotted span and bowed off the stage on October 3, 1876 with the water works completed.

The utter confusion and the bitterness of the period is clearly indicated by the choppy nature of the preceding paragraphs. Currents and crosscurrents were many and deep, and resulted in a surface pattern that defies interpretation at this late date. Logic was definitely abandoned by disputants on both sides of the issue and political lines were crossed and re-crossed for no reasons now apparent. For example, of the five aldermen who accepted the commission idea, two were Democrats and three were Republicans. When the matter was finally resolved after five and one-half years of open hostilities, the solution must have been--even as it is today--almost laughable to any Rochesterian of the time who had somehow managed to maintain his mental equilibrium.

Tubbs and Kuichling

While these personal, legal and political differences were being resolved, the board of water commissioners proceeded

with its appointed task. The first step, the selection of J. Nelson Tubbs as chief engineer, has been noted. Tubbs was something of a character. Born in Schoharie County in 1832, he was educated according to the rather easy standards of the time and at the early age of eighteen was teaching school. Four years later he entered state service as an engineering assistant on the enlargement of the old Erie Canal. Eighteen years of engineering work along the canal qualified him, in the opinion of the water commissioners, for the position of chief engineer on what must have been one of the prize design and construction jobs in the state at the time--the Rochester Water Works. It is significant to read in the final report of the board of water commissioners the following: "While thoroughly versed in the science of his profession he has never hesitated to set formulas and formulated methods at defiance, when his own genius has dictated a better way or larger result." Maybe this was a fair statement back there in "the elder days of art," but today it would cause a skeptical lifting of engineering eyebrows.

Whatever his shortcomings may have been, the new chief engineer possessed the energy and the assurance that were requisites for success in a badly divided community. His flair for showmanship, his willingness to take up verbal cudgels at any time and with anybody, and his rare ability to skirt all

embarrassing political salients were very important factors in the planning, construction and early operation of the water works. To his commissioners, Tubbs was a paragon as the following, culled from the aforementioned final report, will testify: "Genial in intercourse, patient under trials and disappointments, cool and undaunted in the presence of difficulties, clear in judgment, accurate in detail, rarely mistaken in his estimate of results, of strict integrity, firm in purpose and of remarkable executive ability, we are free to confess that the credit of the success of these magnificent water works is in largest measure due to him." That was in 1876. In 1890, Mr. Tubbs was requested to resign because the conduit from Hemlock Lake was not delivering as much water as someone thought it should.

The chief engineer and his employers, the water commissioners, were downright lucky in securing Emil Kuichling as an assistant engineer. Kuichling was born in Germany in 1848 and had been brought to Rochester that same year by his father, a doctor fleeing a death sentence for political activity. Young Kuichling had taken his arts degree in 1868 and his engineering degree in 1869, both from the University of Rochester. In 1872 he had received his civil engineering degree from the Polytechnic School at Carlsruhe in Germany. His employment as assistant engineer on the Rochester water

works was the beginning of a distinguished career in the engineering profession. Those who were privileged to know Mr. Kuichling, may see his shadow behind Mr. Tubbs in his defiance of "set formulas and formulated methods."

Although an injunction was pending, a gentlemen's agreement--already noted--permitted Tubbs and Kuichling to proceed with their surveys and their plans with only a slight delay. The plans and a report were presented to the mayor for his approval, as required by the much questioned statute, and were approved by him on July 15, 1872, as previously stated. These plans called for a double-barreled system--one, for fire protection, taking its supply from the river and the other, for domestic and industrial purposes, taking its supply from Hemlock Lake.

Once the general plans were approved by the mayor the preparation of working plans and specifications proceeded apace. The contract for furnishing and installing pumping equipment together with water turbines and steam engines for what came to be known as the Holly system was awarded to the Holly Manufacturing Company of Lockport on February 27, 1873. A short time later the contract for the pump and engine house was awarded to George H. Thompson and Company of Rochester. A lot and five water rights on Brown's Race were purchased for $23,500 and work on the pumping station was soon under way.

By January 1, 1874 the Holly Company had been paid $62,400 and the Thompson Company, $48,407.40, something over half the final cost of the combined contracts. The contract for the domestic or Hemlock system was awarded to James McDonald of Essex County on April 12, 1873. In spite of some delay in securing title to one of the reservoir sites, the report of the treasurer of the board for January 1, 1874 showed that Mr. McDonald had been paid $371,390.17 "for trenching and laying pipe for both Holly and Hemlock Lake systems and for construction of reservoirs."

The following year (1874) was busy but fairly quiet. The financial report at the end of the year showed that the commissioners had spent $1,788,085.21 during the year, nearly three times the amount ($625,083.16) spent in 1873. According to the chief engineer, construction work had "progressed with remarkable vigor." The pumping machinery had been subjected to a spectacular test in the best Tubbsian manner on February 18th. Even before that date the Holly system, as far as completed, was in service in an area that steadily expanded as mains were laid. Fires in this protected district were easily extinguished "by streams of great power from hydrants 1,600 to 1,700 feet distant." "On no occasion," once more quoting the chief engineer, "have the works failed to respond to every demand made upon them." It may very well have been that the unwonted spectacle of fires being cut down in the very flower

of their young vigor was conquering community animosities. At any rate, the arguments that had kept the city in a near uproar since 1872 were reduced to the whispering stage. The commissioners were probably looking forward to a local "era of good feeling." But then the blow fell.

A correspondent of the New York Times drifted into Rochester near the end of March, 1875 on a hunt for scandal. On the basis of his findings the Rochester Democrat and Chronicle let loose on Friday, April 2, 1875, with a verbal blast that must have rocked the city right down to its lowest Ordovician stratum. According to the article, the McDonald bid for the work was "unbalanced"--that is to say it contained ridiculously low bids on items which there was reason to believe would be eliminated and preposterously high bids on items which might be expected to be increased. It was--and still is--a game that some contractors delight in playing. The Democrat used the issue as ammunition in taking a pot shot at the chief engineer: "It is held that the engineer of the works is a man familiar from long service on the canals with unbalanced bids and that, with his intimate knowledge of the tricks of contractors, he should have so guarded his specifications as to have removed these objections." This was only a passing shot. The real objective was George D. Lord, author and advocate of the unpopular "water commission law." "It is

stated that the nominal holder of the contract (McDonald) is but a figure-head for George D. Lord, a noted canal contractor, . . . and it is feared that the city is at the mercy of George D. Lord, who exacts such prices as seem to him to be due his conspicuous ability as a manipulator of fat jobs and the ruler of contracting boards." From this generalization the paper proceeded to details, details that were repeated and elaborated in subsequent articles.

On Monday, April 5, the Democrat printed a letter from the commissioners--one of those gentle letters "that turneth away wrath." It began, "It is our desire to respond to the very proper and courteous appeal which you (the editor) have made to us." After intimating that the "correspondent of the New York Times" had been hasty in his inferences, the commissioners proceeded to explode some of the specific charges that had been made against them. For example, the Democrat had hinted, rather broadly, that the contractor had made a profit of $80,000 on oak timber--one of the unbalanced items. The commissioners showed that the total paid for oak timber was "just $22,230 and no more." This did make the $80,000 profit look rather absurd. Ultimately the clamor died away and the commissioners were left in uneasy peace to complete an important job.

On September 30, 1876 the board of water commissioners rendered a dignified final report to the common council. Water from Hemlock Lake had been admitted into the distribution system on January 23, 1876. "The time has arrived when, by provision of law, the term of our office expires. The work entrusted to our care is done. . . . Others might have done it better, more wisely, more cheaply, and with fewer mistakes. But we believe the judgment of the people is . . . it has been well done, and there are none who would now have it undone." The project had cost $3,287,220.82.

The friction between the water commission and the common council during the early construction period was highlighted by a running argument over who should pay the interest on the water bonds. The commission had, in 1873, directed the sale of bonds aggregating $698,000 out of its authorized three million dollar issue. Prior to January 1, 1875, the whole issue had been floated at par, the commission receiving $41,539.42 in addition to face value for accrued interest.

The council, probably with this accrued interest in mind, refused to pay the interest due on July 1, 1873. The amount was small--only $1,190--and was finally paid by the commission. The second interest payment on January 1, 1874 amounted to $24,441.40. Once more the aldermen were refractory and the commissioners, under protest, authorized payment from

funds under their control. When the next interest was due in the middle of 1874, with the full issue of $3,000,000 drawing interest at seven per cent, the commissioners balked. An agreement was evidently reached to the effect that any interest payments by the commission would be refunded, if necessary, by the council and once more the funds were advanced by the commission. This was repeated when the next installment of interest was due on January 1, 1875.

The matter was now serious. If the commission continued meeting interest charges from money borrowed to build the water plant, its funds would be depleted with the plant still under construction. On March 8, 1875, the city treasurer, acting as the treasurer of the water commission, wrote, "The coupons and interest on the water works bonds from date of issue have been paid by the water commissioners under an understanding with the finance committees of the different years, and the undersigned, that, provided the funds of said commissioners were not exhausted, they would consent to legislation authorizing the same to be charged to their construction account. The amount is about $200,000. It is evident that the commissioners will need this amount during the coming season."

With not the best of grace, the council finally added the interest due in 1875 to the $200,000 already paid

by the water commission and requested the state legislature to grant permission for the issuance of bonds aggregating $410,000. Permission was granted; the bonds were issued; and, when finally retired in May, 1935, had cost the taxpayers of the city in interest alone nearly a million and a quarter dollars.

Executive Board Takes Over

With this matter of bond interest settled and with the none-too-popular Board of Water Commissioners off the stage, the water works which were now under the supervision of the Executive Board, entered a short period of blissful quiet. The Executive Board had been organized on March 31, 1876 with six members, three elected by the voters and three appointed by the mayor. It was--or, at least, was reputed to be--bi-partisan. At its first meeting on May 1, 1876, Henry L. Fish, who will be remembered as the pugnacious friend of the common council and the common people in 1872, was elected permanent chairman.

In accepting the chairmanship, Mr. Fish, as a part of his "well chosen remarks," said: "By the change in the charter, the inherent rights of the people have been restored and we again have a republican form of government. These obnoxious commissions, one by one, are passing away. The Board of Public Works ceases to exist today . . . . We shall

soon assume the management of the water works . . . . In addition to other branches, we assume the management of the fire department . . . . In taking office we assume great responsibility and it behooves us to make our duties a study--to act ourselves by a unit and in harmony with the mayor, common council and other city officers, for the honor, credit and interest of the city."

In the course of his acceptance speech, the new chairman added this bit of sanctimonious eye-wash to the world's oversupply. "It should be borne in mind that the council render their arduous service to the public free and it should not be expected that they can devote even a moiety of their time; and as the law is obligatory upon us to spend our whole time and the city pay us, we may be able to aid somewhat to lighten their burdens."

And then, completely forgetful of the slanderous campaign against the Lords and the water commissioners, he continued, "It has become a chronic disease with some people to accuse officers indiscriminately of malfeasance in office. The allegations are too sweeping and have a tendency to deter good men of experience and integrity eminently qualified to fill stations from accepting, thereby rendering it more easy for corruptive men to climb into office."

Fearing, evidently, that he was a bit off-key, he added, "I am sorry to say that malfeasance in office from the center to the circumference of the Union is the rule and not the exception." This was followed by some more high-sounding phrases, designed to stir the people to the old, old job of "turning the rascals out." In reading this and other samples of mid-Victorian eloquence, one wonders if the people were guileless or if tongues were calloused from frequent contacts with the inside of doubting cheeks. At any rate, Henry L. Fish was the first chairman of the first Executive Board, a board which, after several changes in the number and method of selecting its members, ruled Rochester's streets, sewers, water mains and fire apparatus with an iron rod for a quarter of a century.

Honeoye Millers' Suits

As has been noted, the water works enjoyed a period of quiet progress after the water commissioners were brushed from the picture. The income from water rents rose from $2,655.73 in 1874 to $187,288.69 in 1889. Rochesterians were so proud and--dare we say it--boastful of their water supply that outsiders must have believed that the Hemlock conduit delivered only a delicious mixture of milk and honey.

Some millers along the Hemlock Outlet and Honeoye Creek, it was true, had disturbed this blissful interlude by

filing damage claims for water abstracted from their mill ponds by thirsty Rochester. The Executive Board had battled valiantly against these claims for five long years (1882-1886), but finally bowed to the court's decision to uphold the awards of an official commission and requested the common council to appropriate $97,000 to meet the awards.

The report of the Executive Board for the year ending March 31, 1887 offered the following epilogue: "The long and sharply contested litigation between the Honeoye millers and the City of Rochester has finally terminated by the payment by the City of the amounts awarded by the commission appointed by the Supreme Court for that purpose, and the City is now entitled to draw from Hemlock and Canadice Lakes an amount of water equal to nine million gallons per day for all future time."

First Water Famines

While the matter of the Honeoye millers was being resolved, the water works were quietly but inevitably headed for another controversy that was destined to shake the seats of the mighty. The winter of 1884-85 must have been a cold one and the following significant paragraph occurs in the report of the Executive Board for the year ending March 31, 1885: "In order to prevent freezing, owners and tenants are accustomed to open faucets and allow the water to run con-

tinuously. This practice must be at all hazards caused to cease or the limit of the capacity of our water works conduit will soon be reached. For the months of January and February of the present year not less than 100 gallons per day for 60,000 persons have been used and wasted from the Hemlock system alone. This is at least double the amount that necessity should require for all legitimate purposes."

The matter of water waste was referred to the chief engineer who proceeded, with his usual bustling efficiency, to "repress the reprehensible practice." According to his report to the board: "Inspectors were sent out to make house to house inspections. Several parties who continued to waste water were prosecuted and fined, and by energetic effort a great improvement in the pressure in the mains was soon accomplished." Tubbs was never a man to deprecate his own energy.

The chief engineer had several other ideas in regard to reducing the demand for water. One of these is worth resurrecting. "I also suggest that some of the present watering troughs be entirely removed and that others be removed from their present location and placed where they will best accommodate the public. There seems to be a notion prevalent that, if such a trough can be secured in front of a saloon, it will increase the business of the proprietor. This opin-

ion has resulted in a great number of applications and has been the cause of such applications being pressed with great persistence." This may have been a conservation measure as stated, but it has some of the earmarks of the repression of a business rival.

More Water Needed

About eighteen months after the Executive Board had announced that, with the settlement of the Millers' Suits, "water equal to nine million gallons per day for all future time" might be drawn from Hemlock and Canadice Lakes, the chief engineer reported, in effect, that nine million gallons per day was no longer adequate for the growing city. He suggested either metering all water services to reduce consumption or constructing a second conduit from the lakes to increase the supply by ten million gallons per day. As an engineer he leaned, of course, toward the plan for an additional conduit, after dealing a coup de grace to an alternate supply from Lake Ontario. The report--a good one, by the way, with many indications of Emil Kuichling's meticulous thought--touched off another round of discussion and argument.

A special committee of the common council was organized almost immediately to consider the questions raised by the report. On October 16, 1889, this committee suggested that the Chamber of Commerce appoint a committee of five to

work with the Council's committee. The Chamber complied with this suggestion and thus the so-called Joint Committee came into existence. On November 27th it was reported to the Council that the joint committee had agreed "to take steps for more water supply at once." On February 5, 1889, the committee was authorized to employ Alphonse Fteley and J. F. Fanning, consulting engineers, to study and to report on Rochester's need for additional water supply.

The consulting engineers reported to the joint committee in April, 1889 and their report was transmitted to the council on May 14th. They estimated that the city would have a population of 310,802 in 1910 and would require a daily water supply of 31,080,200 gallons. They recommended a supply from either Hemlock Lake or Conesus Lake and the immediate construction of a second conduit with a capacity of fifteen million gallons per day. The report and recommendation of Messrs. Fteley and Fanning were referred to Chief Engineer Tubbs for review.

The chief engineer concluded his review--which was rather critical of the "experts"--with a characteristic twist. "While by no means making the claim that my professional opinion is infallible, yet from long experience in hydraulic construction, covering a period of 35 years, and my perfect familiarity with the original construction and operation of

the present works, coupled with a thorough knowledge of the country at the sources of the proposed supply, obtained by 17 years management of the present works, I think it is not egotistical to assume that my judgment in this matter is entitled to careful consideration." On December 10, 1889, the joint committee reported in favor of the Fteley and Fanning plan and on July 18, 1890, Mr. Tubbs resigned, to be succeeded on September 6 by Emil Kuichling.

A few weeks before Mr. Tubbs resigned as chief engineer, the capacity of the conduit from Hemlock Lake to the city was measured. It was found that the main which had been carrying slightly over 9,000,000 gallons per day in January, 1876, was carrying only 6,730,000 gallons per day in June, 1890. It is most probable that the furor that arose over this loss in efficiency had something to do with the resignation of Mr. Tubbs and perhaps even more to do with the delay in the appointment of Mr. Kuichling. Some hint as to the backstage action during this period of bitter discussion is contained in the following editorial comment in the Post Express for August 9, 1890: "If Emil Kuichling ever comes to Rochester to accept the position of chief engineer of the water works it will be on conditions named by him; and one of the conditions will be that every architect, the Chamber of Commerce, and every crank in town shall not be his superior officer, and that his opinion on strictly engineering subjects shall go and not be modified to suit the ideas of every

newspaper correspondent". Perhaps the editor was taking a pot shot in the dark of the moon, but one thing is certain--during the incumbency of Mr. Kuichling, which extended until his retirement on December 31, 1899, carping critics were strangely silent.

Immediately following his appointment, the new chief engineer was directed to investigate and to report on the city's need for an additional water supply. On the basis of Mr. Kuichling's study, the city obtained the necessary legislative permission to take additional water from Hemlock Lake and to bond itself to the extent of $1,750,000 for that purpose. A contract for a 38-inch steel conduit from the lake to the city was awarded to the contracting firm of Whitmore, Rauber and Vicinus on January 20, 1893. On October 9, 1894, the conduit was completed and water famines were, for a time, things of the past.

The executive board that had controlled the operation and extensions of the water system since its original construction by the Board of Water Commissioners, passed into history on January 1, 1900 when Rochester, having attained the stature of a city of the second class, came automatically under the so-called "White Charter". This charter placed the control of the water works in the hands of the commissioner of public works appointed by the mayor.

The peace and quiet that had settled over the water works during the Kuichling regime continued with only minor

disturbances for another quarter of a century. During this period, a commission, appointed in 1895 to purchase property around Hemlock Lake, reported, under date of June 30, 1902, that it had acquired for the city 73,572 feet of the total lake frontage of 77,919 feet at a total cost of $336,634.94. Cobbs Hill Reservoir was completed in 1908. Ten years later the third conduit between Hemlock Lake and the city, started in April, 1914, was completed and put into service. While this conduit was under construction, steps were being taken to utilize the water from Canadice Lake. A concrete dam was built at the north end of this lake and a conduit constructed to bring water from behind this dam into Hemlock Lake. This work was completed on February 6, 1919.

Early in 1926, under the repeated warnings of John F. Skinner, Rochester's capable deputy city engineer, the city again gave reluctant consideration to the need for an increased water supply. Rainfall on the Hemlock watershed had been definitely below average for four consecutive years (1918 to 1921) and Mr. Skinner proved, by dint of reports amply supported by convincing diagrams, that one more dry year would have been disasterous, particularly if the dry spell had come during the period between October 1921 and March 1922 when Rochester's water crop for 1922 was being harvested. Mr. Skinner was supported by the commissioner of public works, Harold W. Baker, and on February 23, 1926, Allen Hazen of New York and Harrison P. Eddy of Boston, two outstanding municipal engineers, were employed to work with Edwin A. Fisher,

consulting engineer to the city, on the vexatious and unwelcome problem.

The engineers reported on March 7, 1927. The report dismissed the idea that the Hemlock-Canadice watershed could be trusted for an adequate water supply. With the storage then available in the two lakes, it was estimated that only twenty-six million gallons of water per day "could be safely counted on". Raising the water level in Hemlock Lake by increasing the height of the dam at its northerly end by four feet and changing the intake so as to draw three more feet of water from the lake, would, according to the report, increase the capacity of the lakes to thirty-one million gallons per day. "This increase of 5 mgd in delivering capacity is not great, but it comes at a time when even a small increase will be helpful", the engineers commented. After the further statement that "we regard the storage now being added as representing practically the economical development of Hemlock and Canadice Lakes", the report turned to consideration of other sources of supply.

Conesus Lake, Canandaigua Lake and the Genesee River were appraised and dismissed as unsatisfactory for one reason or another and attention was focused on Lake Ontario and Honeoye Lake. Lake Ontario was eliminated as a source of supply on the grounds that pumping costs would be too high, and the Honeoye supply was recommended. A dam sixty feet high and 800 feet long across the Honeoye Outlet south of West Bloomfield was proposed

to create a storage reservoir about fifteen miles long in the Honeoye valley. Raising the water level in this valley by thirty feet would have submerged the village of Richmond Mills and about half of the village of Honeoye. It was estimated that this reservoir, plus the thirty-one mgd from Hemlock and Canadice Lakes, would provide a supply of about 100 mgd which the engineers considered sufficient "to a future so distant" as to deserve only the most casual attention.

For some reason or other the Hazen-Eddy-Fisher plan to develop Honeoye Lake as an additional water supply for the city was never popular. For almost five years the only efforts to put it into effect were desultory conferences with state officials whose approvals were required. On February 23, 1932, however, the commissioner of public works, John A. Ellendt, sent to the city council a request that water rates be increased to provide funds for the construction of the Honeoye reservoir. The council called a public hearing on the commissioner's proposal. At this hearing, on March 15, a large majority of the people who packed the council chamber expressed uncompromising disapproval of the rate increase and incidentally of the whole Honeoye plan. The executive committee of the Business District Association, feeling that the need for an additional water supply had been obscured by opposition to any increase in water rates, requested the city manager, C. Arthur Poole, to "appoint a non-partisan committee for the purpose of investigating the matter from a business

standpoint". On April 16 the city manager, in a letter to H. H. Sullivan, president of the Business District Association, requested the Association to undertake the investigation it had proposed. The Association had talked itself into a job.

Mr. Sullivan immediately appointed a committee, consisting of Edmund M. Alling, Houston Barnard, Mark G. Goddard, Fred M. Strohm and Frederick J. Weider, to comply with his rebounding request. The committee reported on November 3, 1932. The report was most unfavorable to the Honeoye Plan--at least to its immediate consummation. "The major project at Honeoye . . . appears so unnecessary under present or near-future conditions, that it should not be undertaken for many years". This definite conclusion was supported by the statement that "Rochester's present financial position does not warrant the undertaking of any public work which is not absolutely necessary". And that--although the committee had studiously avoided any criticism of the plan itself--was the end of the Honeoye proposal.

About eighteen months later (April, 1934) the water level in Hemlock and Canadice Lakes was again causing concern. Mr. Baker, now city manager, appointed a committee of councilmen and city officials to meet this revived emergency. The committee reported on September 10, 1934. This report, even to a critical reader, maintained a benign neutrality between the Honeoye plan and the Ontario plan. Nevertheless it became associated in the minds of many Rochesterians with the Ontario--or Bogus Point--

plan and touched off a chain of political reactions that put the matter of additional water supply on the shelf for about fifteen years and brought the city to the very verge of disaster.

The committee report was filed with the city council on October 8, 1934 and was referred to the public works committee of which Julius Hoesterey, Democratic councilman-at-large, was chairman. Mr. Hoesterey, a member of the reporting committee, had already introduced a resolution directing the city manager "to cause to be prepared the necessary investigations, plans, specifications, surveys, applications and ordinances to secure at Lake Ontario near Bogus Point the construction of an intake, pumping and filter plant with necessary appurtenances and conduit lines to the City of Rochester". This rather quaintly worded resolution was also referred to the public works committee. The committee held a public hearing on the matter of an additional water supply on September 19 and on November 26 presented a report favoring the Bogus Point plan and advancing nine reasons for its acceptance. Following the reading of the committee report, Mr. Hoesterey's original resolution of September 10 was called up and adopted by a vote of six to three, Louis S. Foulkes, independent Republican, voting with the majority and Anthony C. Scinta, Democrat, voting with the minority.

Bogus Point, unfortunate name, immediately became a storm center. Protests, petitions, straw votes rained down on the council and the people of the city. The Republican minority

in the council demanded that the whole matter be submitted to referendum. Failing in this effort, the minority invoked the recall provisions of Rochester's "home rule" charter and began the circulation of recall petitions against the councilmen favoring the plan. Although these petitions were legally empty gestures--the recall provisions of the charter having been indirectly repealed in 1932--they were potent politically in that they definitely hurt the chances of the existing administration to succeed itself; killed the Bogus Point plan; convinced the people of the city that Ontario water at its very best was only a shade better than a slow poison; and committed the Republican Party to uncompromising opposition to the use of Lake Ontario as a source of water supply for the city. Once more the important matter of an additional water supply was swept under the rug.

In 1942 conditions were once more alarming and the city manager, Louis B. Cartwright, was authorized to investigate the possibility of a supply from driven wells to the south of the city. This proved to be a blind alley and early in the following year Robert E. Horton, consulting hydraulic engineer, was employed "in connection with making water studies". Mr. Horton filed a report on January 3, 1944. In the introduction to this report, Mr. Horton said that his concern was with "putting the present system in first-class condition and developing its resources to the fullest extent to meet both existing wartime demands and as far as practicable to provide for future water

requirements of the City". In other words, he had confined his studies to the Hemlock-Canadice supply.

The Horton report recommended the construction of a new Hemlock Dam well north of the present dam and at a higher level; the construction of a new Canadice Dam north of the present dam; and the diversion of the run-off from three areas outside the natural Hemlock watershed. These changes would have added about forty-two square miles to the Hemlock-Canadice catchment area, which, at Mr. Horton's estimate of 600,000 gallons per square mile per day, would have added about twenty-five million gallons per day to Rochester's available supply, bringing the total available supply to fifty-six million gallons per day. The State Health Department objected to some of the proposals of the Horton Plan and, although the city did proceed with some of the smaller proposals, the plan as a whole was held up pending a meeting of the minds between Mr. Horton and the engineers of the Health Department.

In the meanwhile the water level in Hemlock and Canadice Lakes was dropping at an alarming rate. By late summer, 1949, Canadice Lake was practically dry and storage in Hemlock Lake was down to less than two weeks' supply. This critical situation refocused attention on Lake Ontario as a more immediate source of supply. For a time things moved at top speed. Tentative approval of a plan taking water from the Kodak intake just east of Round Pond was obtained from state authorities. The proposed capital

budget for 1950-54, presented to the council by the city planning commission on January 24, 1950, recommended appropriations of $2,610,000 in 1950 and of $2,490,000 in 1951 for "facilities to amplify our water supply". The employment of a designing engineer with experience in the design of water plants was approved. On March 14, funds for the construction of the first part of the plant were made available. When construction, now close to completion, is finished the city will have an additional supply of thirty-six million gallons per day.[1] A like amount can be added to the daily supply by building an intake to a point about two miles off-shore, by increasing the pumping capacity of existing stations, and by duplicating existing filter equipment. This all means that Rochester's water supply has been increased from 31 mgd to 67 mgd and can be increased easily to over 100 mgd. With this supply from two independent sources and adequate for a population of over three-quarters of a million, it really seems that one of Rochester's century old headaches has been cured for ever and ever.

1 A full description of the Ontario Water Project was published in #153 of the Bureau's bi-monthly publication "Your City and County". A copy is appended to make the story of Rochester's water supply complete

Your CITY and COUNTY

ROCHESTER BUREAU OF MUNICIPAL RESEARCH

FOUNDED BY GEORGE EASTMAN IN 1915

NO. 153 JULY, 1954

ONTARIO WATER PLANT TO DISPEL ALL DANGER OF WATER SHORTAGE

Within the next few weeks, the City of Rochester's new Lake Ontario water plant will be placed in operation. This long awaited expansion of the city's water supply, like all good things, will be worth having waited for. Among its numerous merits, it will be capable of supplying almost as much water of high quality as is normally supplied by the city's present Hemlock-Canadice Lakes system. In addition, being attached to a practically inexhaustible source (Lake Ontario and the entire Great Lakes watershed), it lends itself to unlimited expansion. The fact that it is a completely separate system provides, in time of emergency, the protection of a dual water supply system for our city. The location of the new plant and its connections on the northwest side of the city, will also have the important effect of raising water pressures to a uniformly high level in all those areas which are farthest from the pressure now supplied by Cobbs Hill reservoir. Still another point worth noting is that the overall investment in the new plant and conduits is probably less than one-third of the amount which would have been necessary to expand the Hemlock-Canadice Lakes system, while at the same time the supply obtained will be two or three times as much.

Since the late 1920's when the possible inadequacy of the Hemlock-Canadice water supply first became apparent, Rochester's quest for additional water has been marked by a series of studies, plans, schemes, and temporary expedients to avoid the possibility of water shortages. In 1927, a report, submitted by consultants Hazen, Eddy and Fisher, recommended the utilization of Honeoye Lake as an additional upland source. Opponents of this plan proposed the use of Lake Ontario water, suggesting the construction of a pumping plant and treatment station on Bogus Point connected by a long conduit to Cobbs Hill reservoir. This second plan received favor from the City Council in 1934, and then became a political issue in the election of 1935. Still later, consideration was given to the possibilities of artesian wells in the pre-glacial Genesee river valley. Test wells, however, did not prove too promising.

In 1942, the city hired Robert Horton, a hydraulic engineer, to study the problem. His report recommended the artificial enlargement of the watershed and enlargement of the storage capacity of the two lakes by the construction of additional dams. This plan would have produced slightly less than twelve million gallons of water a day. It would have necessitated, as well, the construction of an additional twenty-eight mile conduit from Hemlock Lake to the city and probably the construction of treatment facilities for the entire upland supply.

During the period when all of these plans were being developed, considered and rejected, water consumption in the

area supplied by the city had risen from an average of thirty million gallons of water daily in 1927 to thirty-nine million gallons in 1949. Peak consumption during dry periods reached as high as fifty-one and one-half million gallons a day, making it necessary for the city to purchase water from both the Rochester Lake Ontario Water Company and the Eastman Kodak Company. These purchases reached over eight million gallons a day during the dry spell of 1949.

In spite of these purchases, the upland lakes were pulled to dangerously low levels, especially during the late months of 1949. This situation precipitated action by the city on several fronts. The use of water for air conditioning was restricted by ordinance. In 1950, a floating pump station and coffer dam was constructed on Hemlock Lake to enable the water level of the lake to be pumped twelve feet lower than was possible under the gravity flow system. Conduits between Hemlock Lake and Rush reservoir were cleaned and re-lined and a pumping station was built on Clinton Avenue below the level of the reservoirs. These steps raised the peak daily capacity of the supply lines from Hemlock to approximately forty-eight and one-half million gallons. Fortunately, since 1950, rainfall and water levels of the upland lakes have remained at comparatively high levels, making it possible to supply the city without further water purchases.

Authorization

In December 1949, the City Council authorized negotiations and land purchases for a pumping station and large conduit connecting the Kodak plant and the city mains. Finally, on July 11, 1950, the City Council took the necessary action authorizing the construction of a complete water pumping, treatment and filtration plant on Lake Ontario. This was to be located on Dewey Avenue near Beach Avenue, in the Town of Greece, adjacent to Kodak's water plant.

By constructing the new plant at this site the city was able to take advantage of an opportune expansion of Kodak's intake from Lake Ontario which had been constructed in 1947. Kodak had in that year installed a new intake line 8,000 feet into the lake to supplement and eventually to replace its existing intake. This intake, with a capacity of seventy-five million gallons a day, plus the one in existence gave Kodak a total intake capacity of 100 million gallons of water daily of which only about a third was scheduled for use in the near future.

Agreement with Kodak

An agreement was reached with Kodak and approved by the Water Power and Control Commission as well as by the New York State Department of Health, enabling the city to obtain untreated water from Kodak's new intake on a shared cost basis. This agreement is a fine example of industrial-governmental cooperation in which this Bureau was proud to be able to play a unique role--both in aiding in the development of the plans and assisting in the coordination of the cooperative efforts of the parties involved.

The agreement provides basically, that the city can pump up to thirty-six million gallons of water daily from the new intake at a monthly charge based upon the prorated costs of operation, maintenance, real estate taxes, and depreciation of the new intake facilities plus the cost of any additional power consumed by Kodak pumps because of the operation of this agreement. No charge has been made by Kodak for any interest on its investment or for the operation of any part of the system not used jointly. The city's share of the prorated costs is forty-eight percent, which is based on the relationship of the amount of water the city is allowed to take daily (36 mgd) to the total capacity of the new intake (75 mgd). Space was provided by Kodak in the intake building for the pumps, motors, and other necessary equipment of the city. Operation and normal maintenance of these pumps and motors will be provided by Kodak personnel.

The agreement, renewable at three year intervals, is scheduled to expire nine years from the time when the city's plant begins operation. After the first three-year period the contract may be cancelled by the city upon thirty days' notice or by Kodak after prior notifi-

cation of twenty-four months to allow the city sufficient time to construct its own intake facilities.

Based upon rates prevailing at the time the agreement was completed in 1951, it has been estimated that the city's share of the intake costs would range from approximately $1,300 to $1,550 per month depending upon the amount of water pumped by the city. Even at the higher rate of $1,550 per month, which is based on maximum city pumping, the expense to the city for use of the intake will be relatively very low. This amount would be insufficient to pay the interest costs on the necessary city investment in such an intake to say nothing of the costs for operation, maintenance, and taxation which are included in the monthly charge.

Construction

Basically, the city's new water system may be separated into four parts: (1) installation of the intake pumps, (2) construction of the main water plant including the building and water treatment and pumping facilities, (3) laying of a forty-eight inch conduit and laterals from Lake Ontario to present city mains near Mount Read Boulevard and Driving Park Avenue, and (4) construction of a booster pumping station on Mount Read Boulevard.

The total cost of the new system will be approximately five and one-half million dollars. Expenditures for the various elements are shown in the accompanying table. Some are necessarily estimates pending completion of the project.

ESTIMATED COST

Intake System	$ 86,313
Water Plant	3,109,700
Conduit	1,558,047
Booster Station	445,844
Property Acquisition	81,722
Engineering and Misc.	259,300
	$5,540,926

Intake System

At the intake station the city has installed two low lift pumps along with all the necessary hydraulic and electrical equipment. One of the pumps has a daily capacity of twelve million gallons, the other twenty-four million gallons. They are driven by electric motors with horsepower ratings of 250 and 300 respectively. A forty-two inch conduit delivers the untreated water to the adjacent city plant.

Water Plant

The structure housing the water treatment plant is 250 feet wide, 260 feet long, and forty-nine feet high from basement to roof. Located in this building are six huge precipitator tanks, chemical treatment equipment and space for chemical storage, twenty-four rapid-sand filter beds, two clear water storage wells, sets of high lift pumps and motors, countless valves, gauges and controls, and laboratories and offices.

As the raw intake water enters the plant it is chlorinated and then piped into a chemical mixing tank equipped with rotating wood paddles. Here, dry chemicals fed by pneumatic controls are mixed with the water. Provision has been made for adding such chemicals as alum, clay, lime, alkali, activated carbon and fluoride. The amount of each used depends on the correction necessary and on the nature of the water desired--alum and clay are for aiding the process of coagulation in the precipitation tanks, lime and alkali for softening the water and for pH correction, activated carbon for the removal of tastes and odors in the water, and fluoride for the prevention of tooth decay.

Precipitator Tanks. From the chemical mixing tank the water is directed into one of six concrete and steel precipitator tanks resembling huge bowls twenty-one feet high with a diameter sixty feet at the top and forty-two feet at the bottom. Each tank is capable of treating six million gallons of water daily with the water remaining in the tanks slightly more than one hour on its way through. Action of these tanks is to remove impurities from the water by precipitation, absorption, settling, and upward filtration through a suspended chemical sludge. A basic sketch of a precipitator tank is shown in the illustration appearing on the following page.

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Inside each concrete tank is a steel structure like an inverted funnel. Water enters through the narrow top of this funnel. As it flows downward it is agitated by revolving arms. The water flows underneath the bottom of the steel structure through a series of baffles into the outer basin and then upward through a deep layer of suspended sludge. As the space in the outer bowl widens the upward velocity of the water decreases to a point where the sludge, composed of coagulated chemicals and solids, remains uniformly suspended throughout the lower half of the tank. This blanket of sludge, through which the water must pass, acts as a filter entraining the smaller, lighter particles or organisms in the raw water.

PRECIPITATOR CROSS-SECTION

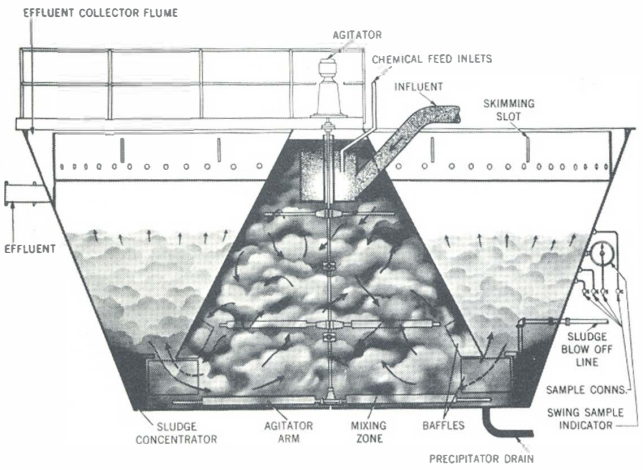

Illustration courtesy of the Permutit Co.

A photo-electric process automatically regulates the height and density of this sludge blanket. By the time the water passes up through the blanket of sludge and reaches the top of the bowl it has been properly treated, purified and clarified. The clear water is then drawn through the holes and channels at the top.

Filter Beds. After leaving the precipitator tanks, the water is directed into rapid-sand filter beds for a final cleansing and polishing. Here any filmy particles which may have escaped the precipitator tanks are removed by filtration through finely graded sand. The filter beds contain twenty-four inches of sand above a layer of porous carborundum plates one and one-quarter inches thick. Each bed is eighteen feet wide and thirty feet long. Altogether there are twelve pairs of filter beds, each pair operating on a separate set of valves, gauges and controls and having a capacity of three million gallons per day. Water leaving the filters is piped to clear water storage wells ready to be pumped to the consumer.

Approximately every thirty hours of operation each pair of filters is shut off and thoroughly cleaned. Clear water is flushed back up through the bed by a separate system of pumps and pipes. At the same time, six rotary surface washers in each bed send jets of water into the sand to loosen the filtered particles so they may be flushed away. With this periodic cleansing the filters operate at top efficiency almost indefinitely.

Pumps. Four high lift pumps operated by 600 horsepower motors at 2,300 volts push the water on its way. Each pump has a capacity of twelve million gallons daily and is designed to operate against a head of 230 feet. A forty-eight inch pre-stressed concrete conduit carries the water to a booster station on Mount Read Boulevard near Ridge Road where a similar pumping installation pushes the water on into the network of city mains. With an eye toward future expansion of the new system, the conduit has been designed for a capacity of sixty million gallons of water per day, which should be sufficient for almost any eventuality.