Notes On The Development Of
The Augusta Water Works
1822 - 1901

By Thomas Heard Robertson

"...Water Works like cities are seldom
if ever finished."—William Phillips, C.E.

It was some eighty-seven years after the founding of Augusta in 1735 that any attempt was made to furnish the city with a flowing supply of water. Up until this time the source of water for the city's six thousand citizens was a series of shallow wells and pumps located at convenient places in town.

In June 1822, George M. Tower, a local civil engineer, petitioned the City Council "for the exclusive privilege of furnishing the citizens of Augusta with water to be brought from some spring in the neighborhood of the city." The city fathers showed their enthusiasm over the venture by immediately granting his petition. But Mr. Tower seems to have had second thoughts about his part of the bargain, because he gave up his right just six months later.

Not to be discouraged, the members of council then ordered surveys and engineering reports to be made. Two civil engineers, Joseph Eve and George M. Tower, submitted reports outlining the advantages of bringing pure water into the city. Each explained the benefits of health and fire protection that having an abundant supply of water would bring. Mr. Eve predicted that the "luxury of having the purest of water to drink will be duly appreciated by one class of inhabitants, particularly the female—and another will be deprived of the excuse for the free use they make of ardent spirits, which they often urge bad water compels them to."

The engineers also discussed the various methods of supplying and transmitting water. Each compared the two springs available for use, Indian Springs and Turknett Spring. They described the relative merits of using pipes made of copper, lead, clay, iron, and wood. They agreed that cast iron was the best reasonably priced material, but that wood was less costly and imparted no color or taste to the water.

As an alternative, Mr. Tower recommended that the city obtain water from the Savannah River by a steam or water driven pump. He proposed that the water be put into a sedimentation basin and through a filter before delivery to the city. It should be noted that at the time water treatment was still unpracticed in the United States.

The citizens were not easily convinced that sedimentation and filtration could render the waters of the muddy Savannah fit for use, so a spring source was decided upon. Turknett Spring was chosen because of its superior quality and its higher yield of seventy five gallons per minute—about eighteen gallons per capita per day. Wooden pipes made of bored pine logs, joined with cast iron couplings, were selected.

Although these grand plans were made, for reasons unknown the system was not constructed until several years later. In March, 1828, the city granted Thomas McGran a license to provide water from Turknett Spring for twenty five years. With the assistance of Hiram Knowlton, "a skilled and experienced mechanic", Mr. McGran constructed Augusta's first water works, the earliest piped system in Georgia, and one of the earliest in the United States.

The spring flow was collected by a stone gutter, passed through a strainer in the spring house, and conveyed into a brick reservoir. From this point, six inch diameter bored logs carried the water about twelve thousand feet to the city reservoir on Broad Street near present day Fifteenth Street.

In 1829, Thomas McGran transferred his right to furnish water to Samuel Hale, who was mayor of the city at the time. Mr. Hale improved the system and operated it until 1840 when he conveyed the works to the City Council of Augusta.

The installation of a second transmission main in 1852 was apparently the only improvement made until the need for more water was realized in 1857.

In that year, Mayor George B. Evans urged the city council to consider building a new water works to take water from the Augusta Canal, which had been built in 1848 to provide water power for industries in the city. He appointed a committee to employ an engineer to look into the matter. A voluminous engineering report was prepared in 1858 by A. W. Craven advising that water be taken from the river west of town near Rae's Creek.

However, no further action was taken until two years later when the subject was revived by Mayor Foster Blodgett, Jr. He reported to the council that "the expense thus incurred by the city does not seem as yet to have produced anything but delays", and proposed an ambitious scheme for increasing the water supply. The idea of taking water from the river was abandoned since the property owner at Rae's Creek was opposed to the construction of any works there, and since the council wished to avoid any litigation. Mayor Blodgett proposed that a "Canal Water Works" be built to supply water under pressure for watering the streets and washing the drains during dry weather, for bathing, and for extinguishing fires. The Turknett Spring Water Works was to be im-

WATER PIPE AND FITTINGS (1828)

(courtesy of Augusta Richmond County Museum)
proved and expanded to provide "a sufficiency of water for drinking and culinary purposes". These ambitious plans were carried out, providing Augusta with two separate water systems until the Turknett Springs Works was abandoned.

Mr. William Phillips, a local civil engineer, was employed to devise plans for the two systems. After visiting the springs and water works at Columbia, South Carolina, he recommended that the flow of Turknett Spring be increased by intercepting the subterranean water which was bypassing the spring underground. He proposed that a timber sheet pile wall be driven through the sands of the valley to the underlying clay, and that an earth dam be built on top to divert the entire flow to "the logs". The Committee on Water Works accepted the plan of Mr. Phillips and awarded the contract for construction of this work to R. Schley and Company. Work began in the middle of 1859 and was completed the following spring.

The committee also decided to lay a third transmission main from the spring to the city of some "other material than wooden logs". Earthenware pipe was selected over cast iron because of "the known rapidity with which the Spring Water acts upon iron". The first of the pipe, furnished by the Kaolin Manufacturing Company, was laid and construction was completed near the end of 1861. Apparently no improvements were made to the system within the city itself.

The Canal Water Works designed by Mr. Phillips was an important innovation in its day. He proposed that a water treatment plant with two parallel sets of basins be built adjacent to the first level of the Augusta Canal. Water was to be drawn from the canal through timber gates into a receiving and settling basin. After a retention period of several days, the water was to be passed through a gate house to a gravity filter basin, paved with brick; and from there conveyed via culverts to a clear water basin. Only the eastern half of the plant was built; and, as a consequence, the filter basin was not immediately effective as such. This facility was the first water treatment plant in Georgia. It was one of the earliest uses of filtration outside of Europe. Its settling basin was only the third in the United States. (The cities of Lynchburg, Virginia, and West Chester, Pennsylvania, had built settling reservoirs in 1829 and 1835, respectively.)

Mr. Phillips planned to convey water from the clear water basin to a water powered pumping station on the second level of the canal at Gardner's Flume several blocks away, through a pipeline of eighteen inch earthenware. The discharge from the pumps led through a sixteen inch cast iron main to a cast iron tank thirty seven seven feet in diameter, elevated ninety four feet above the ground on a brick base. The center of the tank was hollow and contained a stairway leading to a platform atop the reservoir. The sixteen miles of distribution mains were to be of cast iron with hemp and lead joints to traverse the streets of the city.

Bids were received by the Special Committee on Water Works in July, 1859, for furnishing pipe, valves, and hydrants. The committee awarded the contract for cast iron pipe to R. D. Wood & Company of Philadelphia and for "stop cocks" and hydrants to A. Sylvester & Company of Boston.

Mr. Phillips visited the water works at Richmond, Philadelphia, and Lowell to inspect the water wheels and pumps there, before writing the specifications for those at Augusta. After receiving bids, the committee awarded the contract for the water wheel and pumps to J. P. Morris and Company of Philadelphia.

On August 15, 1859, the committee opened bids for building the rest of the water works. The contract for the earthwork at the treatment plant and the pumping station was awarded to Mr. William V. Keenor; for the cast iron tank and stop cock covers, to Mr. William M. Hight; for foundations and brick work, to Rutherford and Greene; and for furnishing earthenware pipe, to The Porcelain Manufacturing Company. The responsibility for laying the mains was given to forces under the direction of Mr. Phillips's assistant, Mr. J. A. Robert. A Mr. Boardman was given the task of tapping the mains and constructing the service lines. He used a machine to tap the mains under pressure, which he made for the purpose himself, similar to one demonstrated by Mr. Sylvester of Boston. Construction was under way on all phases by October, 1859.

Construction was accomplished generally according to the plans, although a few changes were found necessary. Mr. Phillips probably delighted in changing the pump suction line from eighteen inch earthenware to twenty inch cast iron, after he found the clay pipe would not stand the required tests. At the outset of the project, he had had an argument with several leading citizens over the intended pipe specifications. He had publicly accused them of wishing to use earthenware pipes throughout the system, because they had financial interests in clay products manufacturing firms. Presumably he had allowed the pump suction conduit to be of clay as a compromise.

Late in the spring of 1860, a dispute arose between the city and the earthwork contractors over the price for disposing of waste soil. Shortly thereafter, the western range of basins was deleted from their contract, to be let to some other con-

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tractor. By August 1860, Mr. Phillips had become concerned over the fact that the work had not been let, and that the plant would not function properly unless the western range were constructed to allow for shutting down half of the plant for cleaning the filters.

When South Carolina troops fired on Fort Sumpter on April 12, 1861, the system was still not completed. Construction materials which had been obtained from the North were hard to procure; and skilled workmen became increasingly difficult to find. As a result the western range of basins was never built. Some four inch pipe for hydrant leads had to be cast locally, and many water services were not installed, because service pipe was no longer available.

By June 8, 1861, the entire system was considered as complete as possible. The works cost approximately $187,000, and was capable of delivering eight million gallons per day, “if such a mammoth supply should be needed”.

The Augusta Water Works remained virtually unchanged throughout the war and reconstruction eras. The Turknett Spring system was subsequently abandoned and a three million gallon per day steam pump was added to the Canal Water Works in the 1870’s. Its purpose was to carry the demand when high water in the river prevented the operation of the water wheel.

“Such a mammoth supply” did become needed within a few years. By 1895, the water consumption nearly equaled the capacity of the pumps. There was considerable talk among the city fathers about the need for expanding the water supply, but nothing was accomplished until the middle of 1897. At that time, Mayor W. B. Young appointed a Water Works Commission to oversee the planning and construction of a new water works. The commission engaged a consulting engineer from Atlanta, Mr. Nesbit Wingfield, to select sites and prepare plans for a new pumping station and reservoir.

In September 1897, Mr. Wingfield submitted an extensive report on his findings, which the commission adopted. He advised that a brick pumping station be constructed west of Augusta between the Canal and the Savannah River, upstream of any possible sewage contamination. The station was to contain two horizontal piston pumps, driven by two horizontal water wheels, each having the capability of delivering six million gallons per day from the canal through a twenty four inch pipeline to a reservoir several miles away. A fifty million gallon earth reservoir was to be constructed atop a hill in the Village of Summerville. Mr. Wingfield further recommended the construction of a six million gallon per day brick filter plant, which utilized alum as a coagulant. This instance was one of the earliest uses of coagulation for water treatment in Georgia. Following the filters was to be a one million gallon clear water basin from which water was to be delivered through a twenty four inch main to the sixteen inch supply pipe of the existing Canal Water Works.

The Commission received twenty five bids for construction on November 9, 1897. The three lowest bidders were requested to submit plans and specifications of the machinery they proposed to furnish. The Commission accepted the bid of C. H. Englee and Company and A. J. Twiggs, who proposed to furnish pumps and turbomachinery manufactured by R. D. Wood and Company. Construction began later that month and continued under the supervision of Mr. Wingfield.

The works was substantially completed in December, 1899, at a cost of about $320,000, but mechanical failures at the pumping station and problems with the filters delayed acceptance by the city until March 29, 1901.

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SODIUM BICARBONATE
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settleability had improved dramatically. Sludge Volume Indi
ces (SVI values) had decreased from 214 (pseudo-bulking)
to 76 (normal). These changes occurred in spite of decreasing
temperatures which theoretically retard settling rates.

In Wilbraham, Mass., an industrial waste extended aeration
plant was plagued with excessive sludge buildup. After 4½
months of the bicarb program, SVI values decreased from
140 to 85. At this plant, increased compaction was employed
to maintain higher MLSS concentrations within the system—
thus increasing sludge burnup and decreasing net buildup.

Just as the use of bicarb for buffering digesters was accompa
panied by increased energy production and improved sludge
compaction, the bonuses accompanying its application in
activated sludge systems appeared to be clear effluents, im
proved settling rates, and decreased sludge buildup.

Establish a Meaningful Control Test

To be useful, a control test should be easy to perform and
forewarn us of the problems we wish to avoid. pH determi
nations are not in this category because a low pH value only
informs us that trouble has already occurred. It provides no
warning or margin of safety.

The alkalinity test is among the simplest and most useful of
control measures in extended aeration plants. If alkalinity is
reduced below 20-25 mg/L. by nitrification or any other
reason, bicarb addition is indicated. In aerobic as in anaerobic
plants, if bicarb alkalinity is adequate, the pH will take care
of itself.

Summary

Since bicarbonate ion is nature’s own buffering agent, the
logical choice to prevent alkalinity depletion in biological
control plants is sodium bicarbonate or bicarb. Some of its
advantages are as follows:

- There is no danger of raising pH values to undesirably
  high levels. Bicarb is fail-safe.
- It is quite soluble and contains a non-precipitating, non
  scale-forming cation.
- It doesn’t react with carbon dioxide in digesters to pro
  duce a partial vacuum.
- It is safe to handle.
- It has no known adverse side effects.
- It appears to have several beneficial side effects. Its con
  centration was correlated with increased methane produc
  tion in digesters, and bicarb programs were accompanied
  by improved sludge compaction in both aerobic and
  anaerobic systems.

In summary, bicarb can provide needed buffering capacity
without ever disturbing the chemical and physical integrity
of delicately balanced biological systems.

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The water works of Mr. Wingfield and that of Mr. Phillips
remain the basis of the present system. The 1860 distribution
system is still in service after over one hundred fifteen years.
The Summerville reservoir and clear water basin remain in
service today. The brick filter plant building no longer houses
the filters, but has now been put to other uses.

Since 1901, there have been additions to the Augusta Water
Works too numerous to cover in this brief treatise. For ex
ample, Mr. Wingfield’s raw water pumping station was but the
first of five to be built on the same site. The fifth is presently
under construction, and the fourth filter plant is planned.
Perhaps, as William Phillips suggested, the water works will
never be finished.

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