

***DISCRIPTION AND HISTORICAL SKETCH OF THE FINEST PLANT OF ITS KIND ON THE OHIO RIVER – DURING THE 19<sup>TH</sup> CENTURY***

*(This narrative is taken from the Steubenville Water Department historical files. It is not known when it was written.)*

**Steubenville's First Water System**

As early as 1810 the town had grown to such an extent that the ordinary wells and springs had become insufficient to supply the public use. A company known as the Steubenville Water Company was formed under an act of Legislature dated January 10<sup>th</sup> of that year. This company was authorized to purchase land, lay pipes and do whatever else was necessary to afford a water supply.

The company first laid a line of wooden pipes from a spring between Market and Washington Streets, west of Seventh, and these becoming insufficient an additional line was laid from what has since been known as Spencer's tan yard. Fourth and Market Streets were principally supplied with these pipes and remains of them have been occasionally struck in making excavations in the first half of the 20<sup>th</sup> Century. They were made of logs with a hole through the center and were all bored by Jacob Brickard who lived on Water Street between Market and Adams Streets. These pipes led into a cistern on the Court House Square. In addition to this cistern there were also a number of public and private wells in use in the City. These wells and pipes supplied water for drinking and cooking purposes but river water was used for all other purposes. The business of water hauling was followed by quite a number of teamsters. The price of river water was 6 ¼ cents per barrel.

**The First City Water Works**

It had been claimed that the Steubenville Water Works were the first constructed in the State of Ohio, but there has been some dispute about the matter and it would seem that the Cincinnati and Zanesville works were built about the same time. In 1835, population of about 4,000, the citizens of Steubenville held a public meeting and authorized Council to borrow for the erection of a Water Works. Humphrey H. Leavitt was employed to negotiate a loan of \$35,000, and secured the money from Ed. Coleman of Philadelphia. The construction of the works was begun immediately at the foot of Adams Street and an attempt made to sink a well some distance from the riverbank but at a depth of 78 ft. quicksand was encountered. The project was abandoned and the works located on the riverbank. The reservoir was located half way up the hill at the head of Adams Street ¾ of a mile and 192 feet perpendicular height from the works. Its capacity was 360,000 gallons and it was supplied through an eight inch pipe by an engine of 40 HP, capable with other machinery of pumping 200,000 gallons in ten hours. Water was flowing through the pipes on January 26, 1837, and the cost of works as reported to Council was \$34,801.00.

## **The Old Water Works Enlarged**

The old pump was replaced by a larger one in 1849 and on January 15<sup>th</sup>, 1850 the citizens held a meeting and appointed a committee relative to the enlargement and improvement of the Water Works. In 1850 to 1853 the pipe system was extended at a cost of \$10,000. Reservoir No. 2 was constructed in 1854 adjoining reservoir No. 1 at a cost of \$2,903.93. It held 789,000 gallons, thus more than trebling the storage capacity. In 1864, the trustees began a series of improvements which were completed in 1867. The old building was increased to twice its original size, a pair of new and larger engines and pumps put in and a 15 inch main laid to the reservoir at a total cost of \$50,000. In 1886 reservoir No. 3 was constructed at a cost of \$11,255.86, immediately north of the other reservoirs. It is lined inside with solid masonry and has a capacity of 1,147,500 gallons. These three reservoirs are still in use and are known as the low pressure reservoirs. Combined they have a capacity of 2,296,500 gallons and since have had concrete covers placed over them. On September 14, 1895, the old water works which had been started December 19, 1836, were closed. Since that time the City has been supplied by the new works.

## **The Men Who Built the Works**

On March 1, 1893, the trustees, David McGowan, Robert E. Blinn, and Robert M. Brown recommended that a site for a new pumping station above the City should be procured. In accordance with their recommendation, the City Council at a special meeting on March 4<sup>th</sup>, 1893, purchased for \$6,000 the new pumping station site at Alikanna, consisting of 28 acres surface and 148 acres of underlying coal with shaft openings. March 28<sup>th</sup>, 1893, an ordinance was passed by Council providing for the appointment of three Commissioners to act with the trustees in procuring plans and estimates for a new water works system. D. J. Sinclair, who was then President of Council, appointed Charles F. Moodey, Francis Spearman and David McGowan, whose term as Water Works Trustee had expired and who had been succeeded by Charles J. Foreman. Mr. Spearman visited Boston, Chicago, Milwaukee and other cities in the country and inspected their water works in order to get new ideas. D. J. Sinclair, who was deeply interested in the building of the works and to whose tireless efforts were chiefly due their construction, was also appointed on the Advisory Commission when his term in Council expired and a few months later elected one of the Water Works Trustees. Messrs. Wilkinson and Davidson, engineers of Pittsburgh, drew the plans and managed the work. The pumping station, wells and tunnel were built by Floto Bros. and the reservoir by A. W. McDonald, who also laid the pipes.

## **Cost of the Water Works**

One remarkable fact connected with the construction of the water works plant was that the actual cost was \$7,924.04 less than the estimated cost made to City Council before work was started. The total actual cost of construction was as follows: Pumping Station, dry well and tunnel, wet well and river work, \$44,271.80; boilers and machinery \$37,934.51; reservoir, \$24,767.00; pipe lines, gates and hydrants, \$82,469.95; land

purchased and right of way, \$9,795.75; total, \$199,239.01. The total valuation of the water works plant at present including the old pumping station, old reservoirs, low-pressure pipes and hydrants is \$250,486.55.

## **FILTRATION PLANT**

### **General**

The Filtration Plant, located on Franklin Avenue (*Now University Blvd.*) opposite Woodlawn Road, was constructed in 1915, from plans and specifications furnished by the Norwood Engineering Company, Contractors, of Florence, MA. Complete plans were first prepared by Chester and Fleming, consulting engineers, of Pittsburgh, in 1913, but apparently on account of cost, based on bids received, all bids were rejected and The Norwood Engineering Company was authorized to prepare a new set of plans, revising the layout and design to reduce the cost, and the plant was constructed by them from these plans. The plant is on the same site as the storage reservoir and is fed by gravity from it.

The plant includes, in general, and in the order of the passage of the water through it, a main forebay; a baffle type, gravity mixing chamber; two plain coagulation underground basins; six mechanical, gravity filter units; and a clear well. It also contains a laboratory and office, a wash water tank, three chemical orifice tanks, flow meters, rate controllers, hydraulic valves, operating tables, two wash water pumps, an air compressor, two chlorinators, and other accessory equipment. The building is constructed of brick with sandstone trim and houses the filters, laboratory, and chemical feed and pump rooms. Pumping equipment, in addition to the was water pumps and reservoir drainage pump, includes three filtered water booster pumps, two of which serve the LaBelle View district and the third the West End residential districts.

The six million gallon per day filtration plant and its principal appurtenances was built in 1915, and has been operated since that date with very few changes, additions or improvements.

### **Improvements**

In March 1949, the City officials engaged the Floyd G. Brown & Associates, Consulting Engineers, to make a complete report of the water system. As a result of this engineering report, in 1955 the members of council under the administration of Samuel McCormick, negotiated Roberts & Shaefer Company, contractor, to enlarge and improve the purification plant.

The improvements consisted of the following:

1. Two flash mixers of the mechanical type;
2. Additional chemical feeders;

3. Three flocculators;
4. Three mechanically cleaned settling tanks with center feeds, effluent channel, multiple weirs, cross collectors, draw-off valves for removal of slurry sludge;
5. Constructed six new one-million gallon per day filters and extended filter gallery and building;
6. Rebuilt six existing filters using carborundum porous plates for filter bottoms;
7. The original filter equipment replaced with new rate controllers, hydraulic valves, filter tables and surface wash equipment;
8. Two influent meters;
9. Relocated the main sewer and some of water lines that interfered with construction;
10. Constructed new yard piping, including raw water and effluent lines, circulating lines, drains, force mains, sewers and chemical solution lines.

The over-all 1963, 1964, and 1965 improvement program consisted of the following:

1. Replaced electrical system at the water works raw water pumping station in its entirety, including new and modern electric service and new motors. The new electric system provides sufficient capacity to operate all motors simultaneously.
2. Provided a new gas fired hot water heating system at the Pump Station.
3. Provided dual line facilities to improve flexibility in operation, increase efficiency and eliminate “down – time” in case of pump failures.
4. Complete metering at the raw water pumping station and at the Filtration Plant.
5. New elevator at the Filtration Plant.
6. Isolated and provided new housing area for pre and post chlorinators; and rearranged the piping and appurtenances to improve general conditions at the Filtration Plant.

## **History of the Steubenville Water Department** **1965 to Present**

### **Finished Water Pump Station**

The new Finished Water Pump Station was constructed in 1969 – 1970. This provided three new pumps each for the LaBelle service district, and the West End service district. One pump for each district may be run at any time. This allows two spare pumps in case of pump failure. New telemetry was installed, it included; clearwell level, flow metering, and tank levels. The new LaBelle pumps are able to pump 1350 gallons per minute and the new West End pumps are able to pump 2650 gallons per minute.

The design and construction was done during the administration of Mayor Andrew W. Miller, Superintendent of Water and Wastewater Nick Mininni, and City Engineer Arthur B. Taylor. Consulting engineers were Alden E. Stilson & Associates, Limited. General Contractor was Bay Construction.

### **Other Improvements**

Improvements to the Filtration Plant have been ongoing since its improvement and enlargement in 1954. Some improvements are:

1. Three new Chlorinators installed along with the physical separation of the Chlorine and Chlorinators from the rest of the building.
2. New Backwash water reclaim pump and backwash equalization tank installed at rear of the plant.
3. Continuous Chlorine monitor, including pH and temperature, installed.
4. Continuous Turbidity monitors installed on all filters and combined filter effluent.
5. New Lime machine installed.
6. Rate of flow controllers, loss of head gauges, and rate of flow gauges rebuilt.
7. New flow metering on the LaBelle and West End pumping lines installed.

### **New Beginnings**

In January of 1988 a diesel storage tank containing over one million gallons of fuel ruptured near Pittsburgh, PA. The containment dikes near the tank could not contain the fuel, therefore fuel was leaked into the Monongahela River which flows into the Ohio River. The Steubenville Water Filtration plant was forced to treat the fuel contaminated river water because the raw water reservoir only holds one day worth of water. The raw water pumps could not be shut down to let the spill pass, otherwise, the City and parts of the County would be without water. The Water Works was therefore forced to treat the water. Unfortunately the Filtration Plant was not equipped to handle such a spill,

however, the water was treated and made safe to drink with great expense and great effort by the Water Department staff.

During March of 1996 the hillside containing the raw water pumping mains began to slip, this caused both 20-inch mains (one built in 1894, and the other in 1936) to break. Because of the continued movement of the hillside, parts of the mains had to be replaced with High Density Polyethylene piping. This type of pipe resists the movement of the earth. The City and part of Jefferson County were without water for approximately three days because of this problem.

Because of the recent almost catastrophic events, the City realized that the entire water system was getting antiquated and in need of updating.

In April of 1997, Council approved a preliminary study of the water system to be conducted by Dotson, Stilson and Associates (Now DLZ – Ohio, Inc.). This study determined many shortcomings in the Steubenville water system. The general consensus was that the system is very old and many parts of it needed replacement.

On February 3, 1998, DLZ Ohio was hired to prepare plans for a new Raw Water Pump Station to replace the Pump Station that was constructed in 1894. Construction was begun in May of 2001. When totally completed the new station will contain three twin volute pumps each capable of pumping 5.9 million gallons per day (MGD), with all three in operation the pumps will be able to pump 15.7 MGD. They will be capable of lifting the water over 390 vertical feet. A potassium permanganate (KMnO<sub>4</sub>) feed system will also be employed; feeding this chemical will discourage zebra mussels from attaching and clogging the raw water lines. A state of the art supervisory control and data acquisition (SCADA) system will be online to acquire data from many points in the pumping system.

The cost of the Raw Water Pumping Station and new Water mains is approximately \$7 million dollars.

Also in 1998 DLZ was hired to perform a Water/Wastewater Study to give specific recommendations and approximate costs, recommendations for water were:

- Replace or rebuild the current Filtration Plant (built in 1915).
- Replacement of the Raw Water Pump Station at Alikanna.
- Replacement of the Raw Water Transmission Mains from the Pump Station to the Raw Water Reservoir.
- Build a backup water line for the West End pressure district by laying new water line from Lincoln Ave to the current 16-inch water line near Goulds Road. This work should include a booster station at Tweed and Lincoln Avenues. (This project is referred as the Southeast improvements).
- Lay a new water line from Doral Drive to Efts Lane by way of Fernwood Rd. This work should encompass the new Crystal Pines subdivision. (This project is referred as the Southwest improvements)

- Lay a new 12-inch water line down the Lovers Lane connector to serve the newly annexed areas on County Road 43.
- Improve water lines in existing areas of the City that are inadequately served:
  1. Lay a new line to Lincoln Heights and connect the dead end water lines.
  2. Lay a new 6-inch water line at the end of Buena Vista Boulevard to replace the existing 1-¼ inch water main.
  3. Other as yet unidentified projects to be included by the City.
- Increase the amount of storage of finished water in the water system, this work should include:
  1. Replace the older 350,000-gallon elevated storage tank in the LaBelle area (located at Carnegie and Maryland Avenues) with a new 500,000-gallon elevated storage tank.
  2. Build an additional 500,000-gallon elevated storage tank for the LaBelle area. This tank being located on the Belleview golf course.
  3. Replace the current underground 1 million gallon low pressure reservoir with a smaller (300,000 gallon) standpipe type storage tank.
  4. Build two new additional one million gallon elevated storage tanks for the West End Water District, and removing the current 350,000-gallon elevated storage tank.

In the year 2000 DLZ – Ohio was hired to design a new water filtration plant, or rehabilitate the old one. DLZ partnered with Montgomery Watson Harza Inc. After much discussion between the consultants and city leaders, it was decided to construct a new water treatment plant using Superpulsator technology.

A small demonstration plant was brought in and data was collected from it for a period of six months. This enabled the designers to set parameters for the design of the full-scale plant.

The new plant will be built to the immediate north of the current raw water reservoir; tennis courts and a playground area for Belleview Park currently occupy this area. Parts of the old plant will be rehabilitated and used in the new system. The current underground settling tanks will be reconfigured and used as a clearwell and the current two million gallon clearwell will be refurbished and kept in service. The Finished Water Pump Station will have the electrical system replaced and current high service pumps rebuilt. The current building will no longer be used for the treatment of the water.

## **Status of current Water Department Projects**

(Contractors and sub-contractors in parenthesis)

- New twin 24-inch pumping mains from the Raw Water Pump Station to the reservoir are completed. (Ferri Construction)
- New Raw Water Pump Station is 95 percent complete. (Kokosing Construction, *Dickey Electric, Barefoot and Case, Ft. Steuben Maintenance, Flowserve, Aquarius Marine, Buckeye Power Sales, etc.*)
- New 500,000 gallon elevated storage tank on the Belleview Golf Course is in service. (Chicago Bridge and Iron)
- New 1,000,000 gallon elevated storage tank for the West End district is completed and in service. (Chicago Bridge and Iron)
- The old LaBelle elevated tank has been torn down. Construction on the new 500,000 gallon elevated storage tank has begun. (Chicago Bridge and Iron)
- Southwest connection between Doral Drive and Efts Lane is on hold due to
- Southeast improvement plans have been approved by OEPA. Will go to bid soon.
- New line to Lincoln Heights and Buena Vista extension are now in design.
- New 300,000 gallon Low Pressure reservoir is in service. (Mid-Atlantic Tank, *James White Construction*)
- Northwest water line for Lovers Lane connector is in design.