Engineering Report

South and Center Chautauqua Lake Sewer District
Chautauqua County, NY

Wastewater Treatment Plant Equipment Replacement
March 2009

General

The South and Center Chautauqua Lake Sewer Districts (S&CCLSD) own and operate a 4.1 MGD Waste Water Treatment Plant (WWTP), first put on line in 1980, in the Village of Celoron, Chautauqua County, at the extreme eastern end of Chautauqua Lake. This plant is a secondary/tertiary activated sludge treatment plant that treats waste from the approximately 5000 connections, including significant industrial discharges, within the Districts. Effluent from the plant is discharged to Chautauqua Lake at the confluence of its outlet, the Chadakoin River.

Chautauqua Lake is a Class A water body, while the Chadakoin River is Class C. The treatment works has an exemplary performance history with 98% typical annual efficiency for organic load and solids removal, without polishing sand filters. Nitrification is essentially complete, both summer and winter. Although nutrient removal is not a permit condition, a NYSERDA project was implemented that reduces influent nitrogen by 60% to 80% prior to discharge and this project also lowered energy use at the treatment works.

This equipment replacement project is very labor intensive to manufacture and set in place precision heavy duty products. It has been expanded from a planned and budgeted $350,000 project in 2009 to a $2,216,650 project as a result of the American Recovery and Reinvestment Act (ARRA) of 2009. We believe this project should receive full consideration for ARRA funding since it will provide regional manufacturing and construction jobs quickly. Also, it will provide a public benefit to our residential and business customers by eliminating the burden to them, as ratepayers, to suffer a rate increase that would otherwise be necessary to accomplish the full project work.

Project Planning Area

This project entails the replacement of multiple pieces of equipment that service the operation of the plant. An aerial image of the plant is attached and indicates the specific processes that comprise the entire treatment operation. The work that is proposed as a part of this project is located completely within the confines of the treatment facility located at 51 Gifford Ave. in the Village of Celoron, Chautauqua County, NY. No NYSDEC or other permits are required for this work and it is a SEQR Type II action as documented in our files. Also, no SHPO, zoning or other clearances are needed since the project is merely replacing existing exposed equipment in kind.

Existing Facilities

The S&CCLSD wastewater treatment plant was constructed in the 1970s as the Districts were created to consolidate the sewage collection and treatment for three (3) Villages and four (4) Towns. In referring the aerial image of the facility, the flow scheme through the plant consists of an assembly of: 2 comminutors, 2 primary clarifiers, 4 aeration basins, 2 final clarifiers, 2 Archimedes screw lifts, 8 nitrification reactors, 3 tertiary clarifiers, 2 reaerators and disinfection prior to discharge to Chautauqua Lake. The treatment plant sludge is transported via a dedicated force main to the City of Jamestown, Board of Public Utilities (BPU), publically owned treatment works. The Jamestown WWTP is located at 2482 Quaint Rd. in the Town of Poland. There is a long term shared services, sludge acceptance, treatment and disposal agreement between S&CCLSD and the BPU. The 2008 operation and maintenance budget for the S&CCLSD treatment plant was $715,168. A staff of three licensed operators, and necessary support personnel, are responsible for the operation of the S&CCLSD treatment works. Maintenance is performed by S&CCLSD mechanics that also operate and maintain 12 major pump stations and the collection system.

Need for Project

The project is replacement of all major treatment process heavy-duty electro-mechanical equipment, drivers and associated components that have been in continuous service since 1980, when the plant became operational. The WWTP was funded by the EPA's construction grants program at a cost of more than $20,000,000. Motivated by the equipment's high replacement cost S&CCLSD mechanics applied diligent service schedules and thorough maintenance and, as thus, were able to extend the useful service life of the equipment through a strict preventative maintenance program. This equipment operates continuously 24/7/365 and maintenance expense has reached the point where it is prudent to replace all at this time to minimize the potential for a catastrophic failure that could affect the treatment capability of the plant and jeopardize the quality of the water in Chautauqua Lake.

Alternatives Considered

The work proposed as a part of this project is to replace:

- Seven Clarifier drive reducers
- Six aerator surface turbines
- Two Archimedes Screw Lifts
- Two Comminutors and,
- One Chlorine Mixer

Work that will be deferred until scheduled:

- Three Centrifugal Blowers (2014)
- Three RAS/WAS Pumps (2026)

- Three Plunger Sludge Pumps (2020)
- Two Dewatering Pumps (2012)
- Primary Scum Mixer (2015)
- Other Miscellaneous (2011-2020)

The proposed replacement of this very specific equipment does not lend itself to the consideration of a wide spectrum of alternatives. To accomplish the objectives of the project, the proposed equipment has to fit, continue to support mechanisms and function for the same process operation in exactly the same way as the existing devices. Consideration shall be made to in-kind replacement with modern, energy efficient products. It is not cost effective to change to different types of equipment since the mounting, concrete tankage changes and associated fittings would not make such changes cost effective. There have been several studies during the past 13 years and the S&CCLSD assessment of alternative equipment substitution is that changes are not cost effective. Also, quotes to rebuild the equipment proposed for replacement are 60% to 70% minimum of new, with no guarantee costs could be more due to wear and damage not known until disassembly.

In most instances the current production model of the piece of equipment proposed for replacement was selected. Any opportunity to take advantage of up to date features that may save energy costs or reduce maintenance requirements will be taken advantage of and selected. The estimated project budget, including contingencies and professional services is $2,216,650.

Conclusion

To maintain the reliability and high performance of the waste treatment process, it is necessary to replace critical components that must operate continuously and efficiently at this time. All of these mechanical components have exceeded their service life and are in jeopardy of fatigue failure because of their age and hours of operation. It is critical to replace the equipment with similar configuration products, but with current technology advances. This project shall enhance the system's reliability and reduce the overall cost of operation.

The S&CCLSD has file documentation from NYSDEC (3/19/09) that no permit is required. Also, the work has been classified as SEQR Type II (no further action required) on 3/13/09. Documentation of these facts is in the files of S&CCLSD. Archeological, wetlands and other permits do not apply. Consequently, this project, partly designed under contract with Sterns & Wheler, LLC dated 6/24/08, can be put out to bid relatively quickly.

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