Town of Stockton
Culinary Water System Improvements

Location
Stockton Town is located 6 miles south of Tooele City in Tooele County, Utah-18 North Johnson, Stockton Utah 84071. The current population estimate by the Town is 600 and has 262 culinary water connections.

Culinary Water System History

(Figure-1 Solder Creek Intake Structure-Flow Adjustment)

Soldier Creek (Figure-1) is the primary source of water to the Stockton Town culinary water system. The creek is diverted into a pipeline, which brings water to the sand filters. The diversion of the creek into the pipeline is at a sufficient elevation to carry the water to the sand filter at the proper pressure for the filters to operate correctly. The filters normally produce approximately 300 gpm of treated water, which then flows through a transmission line to the storage tanks. The well serves as an emergency backup water supply for the town.

Prior to the flood years of 1983-84, Stockton Town’s culinary water supply came from developed springs in Soldier Canyon. The floods damaged the springs and destroyed the pipeline from the springs. This sole source of culinary water was lost from the system. As a result, the Town installed a slow sand filter to treat creek water for use as culinary water. During flood periods when the creek carries a high silt load, the filters would become less effective, and could plug up requiring the town to haul water. Installation of a rapid sand filter upstream of the slow sand filter alleviated part of the problem, but the filters were required to backwash so frequently that the towns water supply was greatly reduced during flood or spring runoff periods.
In 2008, an emergency well was constructed to provide a backup source of water to the system. This well was test pumped at 1,100 gpm with very little draw down and very rapid recovery. The well is currently equipped to pump up to 650 gpm as needed, but the only source of electrical power to the pump is a propane powered generator.

**Solder Creek Intake Upgrade**
The original doors that lead into the Chlorine room and to the filtration facility were replaced due to deterioration.

(Figure-2 Solder Creek Intake Cover)
Treatment Plant Upgrades

(Figure 3 Stockton Slow Sand Filtration Plant)
Treatment Plant Door Replacement
The original doors that lead into the Chlorine room and to the filtration facility were replaced due to deterioration.
New Roof Membrane Cover

The Stockton Slow Sand Filtration Water Treatment Facility was in dire need of either a complete roof replacement or repair. The town reviewed the options of total replacement or concrete repair and a heavy membrane cover. The membrane cover with repair was chosen due to financial and scheduling reasons. The treatment facility would not be able to be in complete operation during a complete roof replacement, and the cost of a complete roof replacement was almost $200,000 dollars. The new concrete would need covering. The roof was repaired in all areas and then covered with a hi-density foam. This was then covered with a heavy membrane. The full roof repair took several weeks and the treatment process was in complete operation during the repairs.

(Figure-5 Concrete Roof Failure)
(Figure-8 Concrete Roof Failure)

(Figure-9 New Membrane Roof Covering)
(Figure-10 New Membrane Roof Covering and Steel Inserts to Seal Openings)
Slow Sand Filters; Feed Valve Upgrades

Figure 11 shows the feed valve configuration for adjusting the volume for water entering a filtration cell. The configuration was unsafe because an operator would have to reach out up to 24” over the cell and adjust the valve. We replaced the configuration to include less piping, new gate valves with extensions that an operator can adjust behind a safety rail (Figure-12).

(Figure-11 Feed Control Valve Un-Safe and Difficult to use)
Safety Railings

Figure 13 shows safety railing loose and unsafe. We had all railings re-mounted and secured. Please note the safety railing in Figure-12; repaired and secure.
Final Effluent Meter

Figure 14, shows the new replacement effluent electronic flow meter. We replaced the mechanical propeller flow meter for several reasons. First; the hardness in the water would build up and stop the propeller causing inaccurate meter readings. Second; we needed to replace the chlorine gas system to a liquid hypochlorite system and needed the pump to be flow controlled.

The meter was replaced, the accuracy and reliability was increased. The liquid chlorine system was installed, and the dosing pump is controlled by the electronic flow meter (Figure-15).
**T-Chlor System**

The Stockton disinfection system was installed with the Slow Sand Filtration Facility. Chlorine gas was used. Over time the system had multiple failures-leaks (Figures-16-17). Luckily no one was hurt. We have eliminated the use of Chlorine gas and use a metering pump to inject T-Chlor. The room was cleaned of all debris and painted. A new door was installed (Figure-18), Cl2 ventilation system was installed with a small room heater for the winter. The lighting, injection pump and ventilation fan is powered by a solar power generating system.

(Figure -16 Chlorine Gas Cylinder Feed Room)

(Figure-17 Chlorine Gas Injection Point)
(Figure-18 T-Chlor Room, New Door and Ventilation)
(Figure-19 T-Chlor Injection)
Solar Power System

The Stockton water treatment system was built using power from a small electrical generating turbine. The turbine generator used water flow from the systems intake that was at elevation. The turbine generating system was intermittent, so the facility was powerless most of the time. Inconsistent electrical power made it difficult for the treatment system to upgrade itself. We installed 2-highly efficient solar panels to charge 2-large batteries for power use. The system is used to power metering pumps, electronic flow meter, some lighting, small heaters and the Chlorine room ventilation.

(Figure-20 Solar Panels)
Hardness Treatment System (In Process)

The town of Stockton hired Sunrise Engineering to assist the town with the design of a chemical dosing system to control formation of Calcium Carbonate precipitate. Over the years calcium carbonate has bonded together and precipitated out in the sand filters causing a cement type material. The material blinds the filtering capacity of the treatment system and the facility experience’s a reduction of treated water. The process to remove the contaminated/cemented sand is very labor intensive. The sand must be broken up by hand sometimes using a pick ax. The broken up material must be removed from the filter cells by shovels and conveyor. This sand cannot be cleaned or reused as filtering material and must be replaced. This is very expensive and time consuming. A permit was issued to the town of Stockton from the state of Utah drinking water board. The permit allows Stockton to inject a chemical sequestering agent to prohibit the formation of the calcium carbonate precipitate. This will save the town a great deal of money, time, and treatment efficiency allowing the town a well maintained and safe operation of the filtration facility. The town has purchased all the equipment for the injection system, and expects to install the system within the next 30 days.
Pressure Filter Building Heater (In Process)
The town has purchased a new thermostatically controlled high efficacy propane heater to replace the current inefficient heater. The current heater is not controlled by a thermostat and wastes a great deal of propane heating the building to an inappropriate temperature. The new heater can be set to maintain a more efficient temperature. The town plans on installing the new heater within the next 30 days.

Sand Loading
The town has poured a concrete pad for sand preparation. The sand used for filtration is supplied in bulk. The sand is moved into the cell by wheelbarrows or slurry. The sand used to be staged on the ground and would need additional debris removal prior to use.
Storage Tank Upgrades

On July 16, 2014, a fire destroyed Stockton Town’s 500,000 gallon water storage tank (Figure-23 and 24). The level and flow were controlled in an underground pit (Figure-25). The tank was replaced in 2015 (Figure-27). The Railroad tank that burned was too low in altitude to properly serve the distribution system in accordance with requirements of the Drinking Water Rules as the system is currently configured. Therefore, the new tank was located at the site of the existing 250,000 gallon tank, which is at a higher elevation (Figure-26). The property was privately owned and the Town negotiated the properties purchase. The storage system is controlled in and above ground building (Figure-28). The control building has equipment to control; tank level-both tanks, sustain upper distribution pressure and flow control (Figure-29). The each tank level has an electronic read out and flow is also monitored (Figure-30).
Figure-25 Old Storage Tank Control Valve Pit with Flow Meter-Confined Space

(Figure-26 250,000 Gallon Storage Tank and Control Valve Building)
(Figure-27 New 500,000 Gallon Storage Tank)

(Figure-28 500,000/250,000 Gallon Control Building)
(Figure-29 500,000/250,000 Gallon Storage Tanks Controls; Valves, Flow Meter, PSV)

(Figure-30 Tank Level and Flow Readouts)
Distribution System Upgrades

The 8" transmission pipeline from the existing 250,000 gallon tank is too small to meet minimum fire flow regulations. Therefore, a 4,200 foot 12" transmission pipeline was installed from the tank site to the distribution system. The 12 inch pipeline is critical to providing adequate fire protection throughout the town. Prior to the installation of the 12" line the town experienced less than adequate fire flows. The existing 8 inch transmission line from the tank site remained in service as a parallel transmission and distribution line. The PRV controls pressure in the lower sections of town.

(Figure-31 Pressure Reducing Valve and By-Pass)

Summary

The town of Stockton repairs were made considering safety for the operations staff and the environment. It takes an entire community to make the improvements we have made. Our accomplishments were supported by all and understood necessary by the council and administration. We have a great partnership and teaming environment that continues to focus on the future, so that we pass along a well maintained infrastructure for future generations.