

2017 Fort Collins Drinking Water Quality Policy Annual Report



The Fort Collins Water Treatment Facility

In October 1993, Fort Collins City Council Resolution 93-144 adopted the Drinking Water Quality Policy (Attachment A) to ensure the continuous delivery of high-quality drinking water to Fort Collins Utilities' (Utilities) customers. This 24th annual report is a requirement of the Drinking Water Quality Policy and summarizes the actions taken in support of policy goals during 2017.

GOAL 1

The City will provide water services that meet or exceed customer expectations for quality, quantity and reliability.

Reliability, Capacity and Redundancy

Utilities owns an 87-million gallons/day capacity water treatment facility that operates 24 hours a day, seven days a week to ensure that a continuous supply of high-quality drinking water is delivered to our customers. Staff is available at all times to respond to customer complaints and concerns regarding drinking water quality and reliability of service.

In 2017, the plant produced 8.2 billion gallons of drinking water. Peak day production was 45.0 million gallons/day, or 52 percent of plant capacity. At this rate, available treated water storage would meet 18 hours of peak demand, exceeding the benchmark of storage capacity for 12 hours of peak demand.

The treatment plant has multiple systems and processes in place to provide high reliability with low risk of failure. For example, Utilities has two water sources, three raw water pipelines, multiple chemical storage tanks, delivery systems, treatment trains, filters and storage reservoirs.

Utilities also has a robust asset management and preventative maintenance program that helps ensure the provision of safe drinking water to the community and that standards are met for community firefighting and emergency needs.

To increase reliability of electrical power to the Water Treatment Facility, the Water Production Division submitted a budget offer in 2016 to switch power suppliers for the Water Treatment Facility from Xcel to Fort Collins Utilities Light and Power.

Throughout initial negotiations with Xcel, it became evident that the way to implement this change was to ask City Council to annex the Water Treatment Facility property into City limits. A flagpole annexation was approved on Feb. 20, 2018, and the Water Treatment Facility is working with Light and Power to connect the facility to the grid by the end of 2018. In addition to increasing system reliability, this change will also create a more collaborative environment for use of on-site renewable electricity generation.

Regulatory Changes

The anticipated revised lead/copper rule did not get drafted or finalized in 2017. Currently, the Environmental Protection Agency (EPA) is working on the rule with a proposal date of February 2019.

Monitoring for the Long Term 2 Enhanced Surface Water Treatment Rule was completed in 2017. As a result, Utilities is no longer required to monitor the two source waters for cryptosporidium, E. coli and turbidity. Additional monitoring for this rule is only required if Utilities uses a new water source.

The operator in responsible charge for treatment operations was changed from the plant operations manager to the plant operations director. The operator in responsible charge for the distribution system was changed to the newly appointed water field operations manager.

Per the Colorado Primary Drinking Water regulation, the number of monthly total coliform samples is based on the population supplied by Utilities. Since the population continues to grow, efforts to identify additional sampling locations were started in 2017. This will help ensure Utilities is ready to collect additional samples when the current population threshold is crossed.

Water Quality Complaints

In 2017, the City received 60 drinking water quality complaints, equating to a rate of 0.48 per 1,000 customers. This was a decrease of one complaint from 2016 and remains well under benchmark goals. Staff responded to 44 of the complaints at the site to talk with customers and collect water samples. Based on the 2017 *Benchmarking*

Manual from the American Water Works Association, 23 other participating utilities had a median number of technical water complaints of 5.4 per 1,000 customer accounts. The “best” quartile rate observed by other participating utilities was 1.1 per 1,000; at 0.48 per 1,000, the City was “better than the best.”

Figure 1
Complaints by Quarter 2017

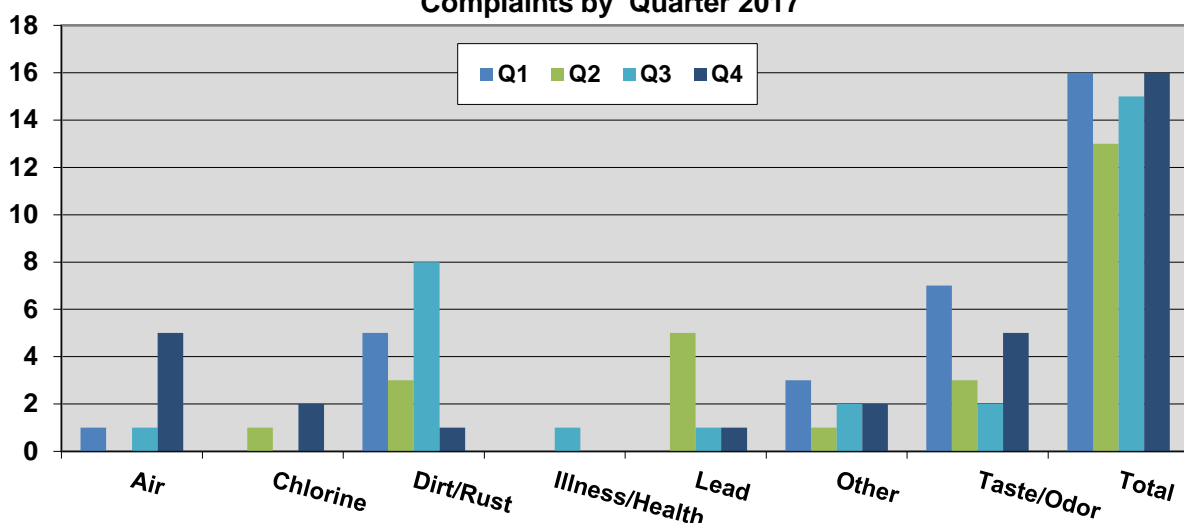


Figure 2

GOAL 2

The City will protect and maintain high water quality in the development of all codes, policies, plans and specifications related to the acquisition, production and delivery of water services to its customers.

Partnership for Safe Water (PSW)

The Water Treatment Facility maintained its President's Award status for 2017. The President's Award is the first tier of Phase IV of the PSW, which is the final phase. The Award is bestowed upon top-tier water plants that have demonstrated commitment to providing superior quality water to their customers, beyond the requirements of the EPA regulations. While the Director's Award, which was obtained by the Water Treatment Facility for the previous 16 years, requires higher performance of the overall filtered water quality, the President's Award requires the performance of each individual filter to be evaluated. Only 36 treatment facilities throughout the nation have achieved this level of recognition. Staff will evaluate the Facility's readiness to proceed to the Excellence in Water Treatment Award in 2018, which is the second tier of Phase IV of the partnership and the highest level recognized. Due to other priorities, staff was unable to devote sufficient time to this evaluation to proceed in 2017.

The PSW is an alliance of six drinking water organizations including the EPA. This voluntary program strives to enhance water quality through continuous optimization of treatment processes. Operators, managers and administrators are provided self-assessment and optimization tools to improve performance above and beyond current and proposed regulatory levels.



The PSW was originally designed with a focus on the treatment of drinking water but has expanded to inspire and recognize excellence in distribution systems. The distribution system was awarded the Partnership's Director's Award for distribution excellence in 2015 and has maintained that status in 2016 and 2017. The award was conferred after a comprehensive, independent review of our citywide water quality by a national panel. The review was based in part on water samples collected throughout the distribution system by the City's Water Quality Lab.

Environmental Management System

The Water Treatment Facility has established a formal Environmental Management System (EMS) that is certified to conform to the ISO 14001:2015 standard.

The ISO standard was updated in 2015 and the EMS core team spent much of 2016 and



**ENVIRONMENTAL
MANAGEMENT SYSTEM**

2017 updating our system and processes to comply with the new standard. We successfully passed an upgrade audit in December.

A key aspect of the EMS is reduction in energy use and greenhouse gas footprint. In support of this, the facility has participated in the Colorado Industrial Energy Challenge, sponsored by the Colorado Governor's Energy Office and the U.S. Department of Energy. The Facility achieved a 3.7 percent decrease in overall electrical energy use from 2016. Purchased electrical power increased by 2.5 percent, due to a 7.8 percent decrease in power produced by the solar field. Even with the increase, purchased energy use levels still equate to a 22.3 percent reduction in greenhouse gas footprint from 2005 levels, exceeding the City's Climate Action Plan goal of 20 percent reduction by 2020.

Plant staff continue to pursue energy efficiency improvements to reduce the greenhouse gas footprint and control operating costs associated with energy in the face of rising treated water demands.

Environmental Leadership Program

The Environmental Leadership Program (ELP) is a statewide environmental recognition and reward program administered by Colorado Department of Public Health and Environment's (CDPHE) Sustainability Program.

The ELP offers benefits and incentives to members that voluntarily go beyond compliance with state and federal regulations and who are committed to continual environmental improvement.



As the result of process improvements and the ISO 14001:2015 certification of the EMS, the facility has received and maintained recognition as an ELP **Gold Leader**.

Corrective Actions from Turbidity Violation

In January, the Water Treatment Facility received a treatment technique violation from the CDPHE for a single maximum turbidity event that occurred Dec. 14, 2017. The filters that clean the water were never affected and remained significantly below the 1.0 turbidity units requirement.

Utilities routinely monitors the water delivered to customers within its service territory for turbidity (cloudiness). Turbidity values tell us whether we are effectively filtering the water supply.

Water sampling performed Dec. 14, 2017, showed turbidity levels in the combined filter effluent (CFE) of 2.5 turbidity units for a period of 18 minutes between 8:41-8:59 a.m. This is above the standard of 1.0 turbidity units.

The high turbidity was caused by a malfunction of the lime feed system that is used to control the chemical characteristics of the water and provide corrosion control in home plumbing pipes. Lime is a safe, approved additive to the water. Due to the malfunction, too much lime was fed into the water, causing a spike in turbidity.

Plant staff failed to notify the State drinking water program (CDPHE) of the high level of turbidity in a timely manner. The turbidity event itself would have been a tier II treatment technique violation, but the failure to notify within the required timeframe elevated the violation to tier I.

The lime dose was immediately lowered to normal levels and the turbidity dropped below 1.0 turbidity units after 18 minutes.

Public notice was published in both English and Spanish on Jan. 9, 2018, as required by CDPHE. An after-action review was conducted internally and reviewed by a consulting engineer. Sixteen corrective actions were initiated because of this review to ensure a similar incident cannot recur in the future. Fifteen of the 16 corrective actions have been completed. The remaining corrective action requires physical modification of a plant process during a planned plant shutdown scheduled for Dec. 12.

GOAL 3

The City's water supply, treatment, storage, delivery and laboratory facilities will be planned, designed, constructed, maintained, staffed and operated to assure safe, reliable and cost-effective service to the residents of Fort Collins and all those served by the City's water utility.

Source Water Protection

The City of Fort Collins' drinking water supply comes from two sources: the upper Cache la Poudre River (Poudre River) and Horsetooth Reservoir. Beginning as rain and snow in the mountains, Poudre River water originates on the eastern slope of the Continental Divide, northwest of Fort Collins. Horsetooth water is delivered from the Colorado River Basin on the western slope via the Colorado-Big Thompson Water Project.

In 2016, Utilities, with assistance from the Colorado Rural Water Association, CDPHE and a local steering committee completed a Source Water Protection Plan (SWPP) for the Poudre River and Horsetooth Reservoir. This document guides the City's water quality monitoring and water supply protection priorities and directly supports the City's Drinking Water Quality Policy:

"The City will protect raw water sources from contamination or any other activities that would diminish the quality of water provided to customers, or that would result in increased treatment costs."

The SWPP (fcgov.com/source-water-monitoring) identifies potential sources of contamination to water supplies; ranks those sources according to risk to the City's drinking water infrastructure and source water quality; and identifies best management practices to mitigate those risks. Abandoned and active mines and forest health/wildfires were identified as the highest priority threats.

An abandoned mine inventory and assessment was completed in September 2016 to determine whether heavy metals from mine sites are a risk to our infrastructure and source water quality in the Poudre River. The study concluded that there is no known mine drainage to the Poudre River or its tributaries, which was consistent with metals data from routine Poudre River monitoring from 2008-2016. Fort Collins' water supplies are currently considered at low risk of contamination from historical mining activity.

Since 2013, Utilities has worked collaboratively with the Coalition for the Poudre River Watershed (CPRW) and other stakeholders to improve the health and resiliency of the Poudre River. The City provided an initial 2-year funding for establishing the organization and retains a fixed seat on CPRW's Board of Directors alongside other partner utilities and stakeholders.

In 2016, CPRW worked with community stakeholders to complete the Poudre River Watershed Resiliency Plan (poudrewatershed.org); the plan is used by Utilities to prioritize watershed protection projects in the watershed.

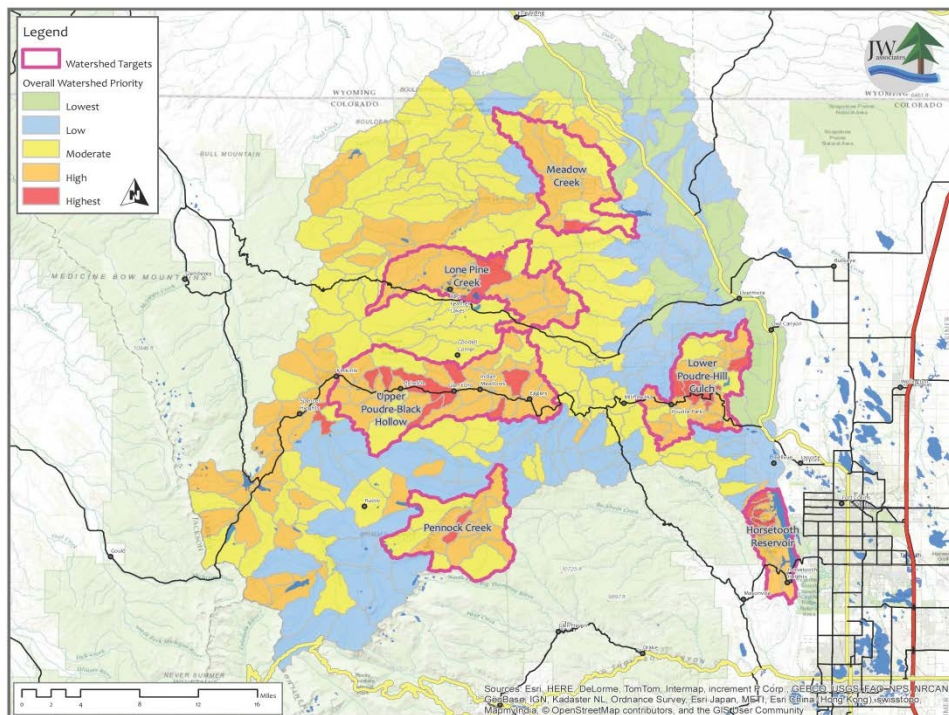


Figure 2. Map showing the forest health and wildfire risk reduction priority watersheds that were identified as part of the *Upper Poudre Watershed Recovery and Resiliency Plan*.



Fuels reduction efforts within the Elkhorn Creek drainage

Utilities continues to allocate funding for collaborative wildfire restoration and mitigation projects to protect our source watersheds. To date, restoration efforts have largely focused on projects within the High Park Fire burn area to control soil erosion. In addition, several forest thinning projects have been successfully completed outside of the burn area to reduce fuel loads and mitigate the future risk of large, high-severity wildfires that could impact our source water.

The 2017 Elkhorn Creek Forest Health Initiative is a great example of a collaborative project that successfully reduced fuels in a priority area of the Poudre River. The project was completed using funding, labor and equipment from more than a dozen partners, including Utilities. Wildfire risk was significantly reduced with treatments that included hand thinning, piling and burning; mechanical treatment; and prescribed fire. The successes of this project provide a project implementation template that will be used at a larger scale on several projects in 2018.

Source Water Quality Monitoring

Utilities collaborates with other local drinking water providers and water stakeholders to monitor water quality trends in the [Poudre River](#), [Big Thompson River](#) and [Horsetooth Reservoir](#). Monitoring includes more than 25 different chemicals, physical and microbiological contaminants at 35 locations throughout our source watersheds. As in previous years, 2017 water quality data indicated that the City's source watersheds continue to provide high-quality water.

Upper Cache la Poudre River

Since 2008, the Utilities' Watershed Program has lead the collaborative upper Cache la Poudre Water Quality Monitoring Program. Partner utilities include the City of Greeley and Soldier Canyon Water Authority. This monitoring program assists partners in meeting current and future drinking water treatment goals by reporting seasonal, short term and long-term trends in source water quality. Seasonal, annual and 5-year water quality reports are available on the Watershed Program website: fcgov.com/upper-poudre-monitoring.

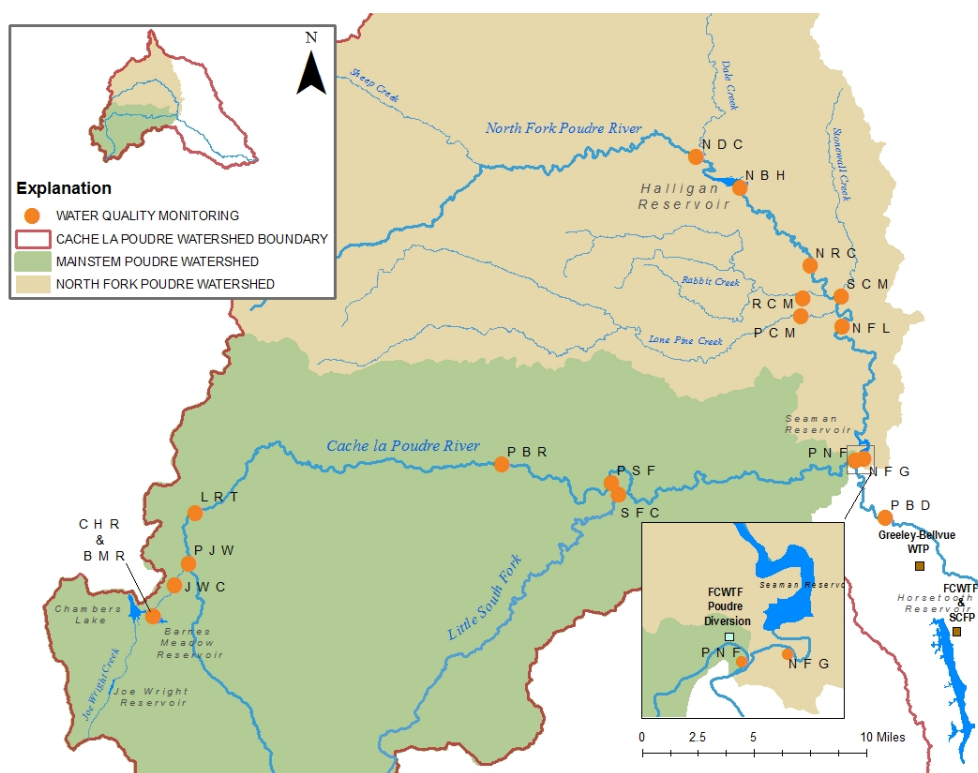


Figure 3. Map showing the locations of Upper Cache la Poudre River Monitoring Program study sites within the Poudre River Watershed.

Horsetooth Reservoir

Utilities has actively monitored the water quality in Horsetooth Reservoir since the mid-1980s. In 2015, Utilities entered into a cost-share agreement with Northern Water for the monitoring of Horsetooth Reservoir water quality to conserve resources. Northern provides up-to-date information about water quality conditions, periodically analyzes data and writes trend reports. In exchange for these services, the Fort Collins Water Quality Lab provides chlorophyll-a analysis for up to 200 samples collected from sites within Northern Water's monitoring network as an in-kind contribution to the program. Northern Water's water quality network includes streams, canals, lakes and reservoirs throughout the Colorado Big-Thompson and Windy Gap projects. Water quality data and Northern Water's most recent Horsetooth water quality report are available at: northernwater.org/WaterQuality/MonitoringPrograms.aspx

Big Thompson River Watershed

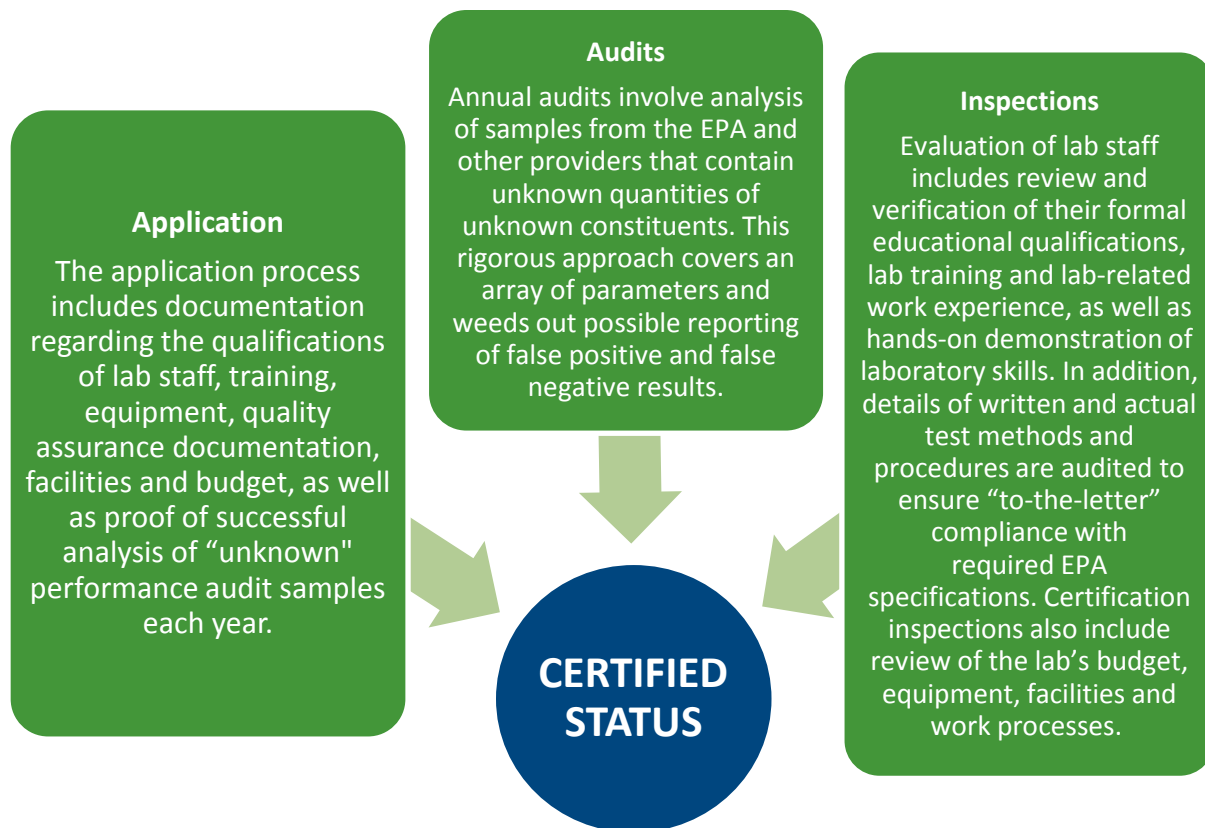
Utilities is a major funder and member of the board of directors for the Big Thompson Watershed Forum (BTWF), along with the City of Greeley, City of Loveland, Northern Water, Weld County and Soldier Canyon Water Authority. The BTWF manages a routine water quality monitoring program, through a contract with the U.S. Geological Survey, on the Big Thompson River, a major component of the Colorado-Big Thompson (C-BT) system, which delivers water to Horsetooth Reservoir. Northern Water also monitors additional C-BT Project canals and reservoirs upstream of Horsetooth. This collaborative approach to monitoring large watersheds reduces sampling costs and provides a significant shared knowledge base between partners. For more information, visit: btwatershed.org.

Certified Laboratory

The City is required to comply with state and federal drinking water standards. These standards mandate that a *certified* laboratory perform all regulatory compliance testing. The City's Water Quality Lab staff provides state-certified regulatory compliance testing and reporting for Utilities as well as 10 other regional water agencies.

The Water Quality Lab first achieved certification in bacteriology testing in 1978. Since that time, the lab has gained certified status for a large array of water quality tests. Certified status is achieved through a multistep process:

Figure 4 – Certified Status Achievement Process



The Water Quality Services Division initiated work with a consultant to complete a master plan in 2017. This includes a condition assessment of the Water Quality Lab and will result in a five-year plan for maintaining the lab's capability to provide necessary services. The process will consider such options as renovation of the current building, building a new facility, or combining with the Pollution Control Lab into one facility and is expected to be completed in 2018.

Asset Management

Utilities continued risk-forecasting efforts within its water production and distribution asset base throughout 2017. The asset management risk forecast is a process to evaluate the condition of the equipment, piping and facilities, the types of risks associated with the system, and determinations as to timeline for replacement.

Some 2017 highlights:

- Staff continued to add asset information to the IBM Maximo Enterprise Asset Management System for the Water Treatment Facility and the distribution system.
- Continued using data from the IBM Maximo Enterprise Asset Management System to analyze and benchmark maintenance metrics. We continue to exceed our benchmark goal of four planned maintenance events for every one corrective maintenance event.



Inspecting a filter underdrain

- Inspected, replaced media, and recoated walls in filters 18-23. These were the final filters scheduled for this work, so filters 9-23 have now all been coated and had new media placed. The media in filters 1-8 will be replaced in 2019-2020. The walls of filters 1-8 were coated several years ago and the coating is still in good condition.
- Completed multiple asset replacement projects that had been identified in the Master Plan, including high-priority upgrades to the electrical systems, ensuring the continued reliability of the plant.

- Installed or enhanced drainage systems on the Water Treatment Facility clearwell and main on-site finished water storage tanks. This will facilitate draining these assets for inspections, cleaning and maintenance in the future. As a result, the frequency of inspection of the plant clearwell will be significantly increased.
- Performed required maintenance, adjustments and inspections on the impressed-current cathodic protection system, which protects metal piping on the plant site from corrosion.
- Relocated and repurposed a large carbon dioxide tank from the pre-treatment side of the Water Treatment Facility, where it had been unused for several years, to the finishing side of the plant, where it provided increased capacity for corrosion control adjustment.



Placement of larger CO₂ tank

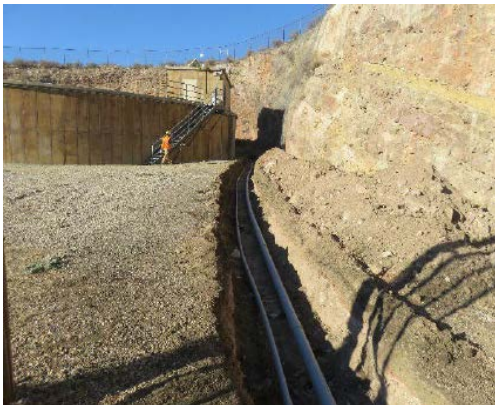
- Began work to update the Cathodic Protection Program Master Plan for the protection of water transmission lines throughout the City from corrosion.

- Inspected and assessed the condition of the 24-inch Poudre raw water pipeline.



Inspection crews enter the Horsetooth Pipeline

- Cooperated with multiple agencies to inspect the Horsetooth raw water pipeline.
- Performed necessary minor repairs to finished water storage tanks.



Inspecting repairs at the Goathill Tank

- Began work on the Water Distribution and Wastewater Collection Master Plan, which will identify capital improvements necessary to maintain levels of service in these systems.

- Performed 347 backflow surveys and inspections.
- Took 388 cathodic protection test station readings.
- Replaced 9,606 linear feet (LF), or 1.82 miles, of water mains out of 542 total miles of pipe in the system. This equates to an annual replacement rate of ~0.34 percent. The 2017 replacement rate was 24 percent higher than the 2016 replacement rate. Plans are being developed to increase this rate to 1 percent replacement per year by 2020.



Water main replacement at Pine Street

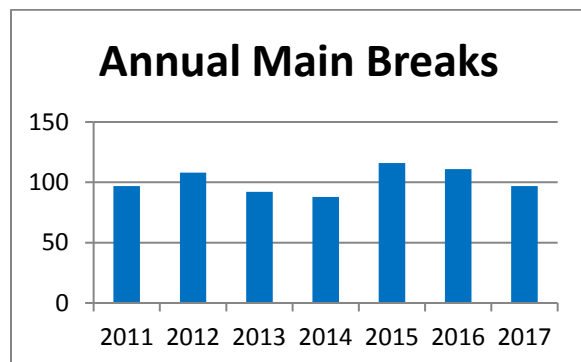
- Installed 40 new valves and 10 fire hydrants during our annual water distribution system replacement program.
- Tested 3,624 water meters, replaced 1,488 meters, and installed 346 new meters.
- 148 miles of water distribution pipes were checked for leaks.

Distribution Maintenance System

The water distribution crews are responsible for the operation and maintenance of 542 miles of water mains, 763 locator stations, 492 cathodic protection test stations, 12,928 valves, 3,780 fire hydrants and 38,749 water service lines in the City's water distribution system.

Some of the main responsibilities of the group are to manage, implement, and set annual goals for defined maintenance programs. In 2017 the group was responsible for responding to 813 customer complaints during regular hours and 275 after hours. They also repaired 125 valves, 63 fire hydrants, 32 service lines and 17 service leaks. Additionally, 97 water main breaks were repaired – 64 electrolysis, 23 beam breaks and 6 longitudinal breaks. Also, four miscellaneous repairs were made to the water mains.

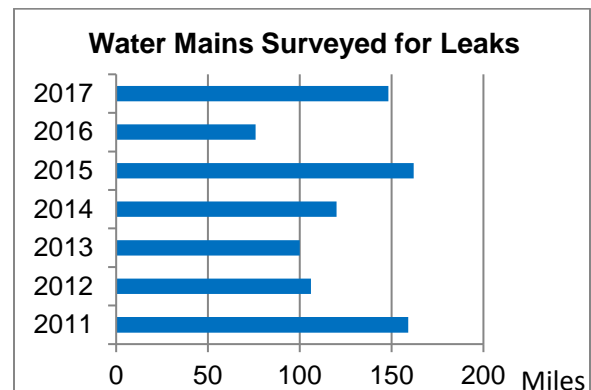
Figure 4



Maintenance performed by the crews in 2016 includes maintenance checks on 2,422 valves, 74 air valves and 636 fire hydrants. The crews also flushed the water mains on the east side of the water distribution system from College Avenue to Northern Lights Drive and operated 923 fire hydrants during that program. Leak detection operations were performed on 148 miles of water main along with 347 backflow surveys and inspections and took 388 cathodic protection test station readings.

Additional distribution maintenance information is available in the asset management section on the previous two pages.

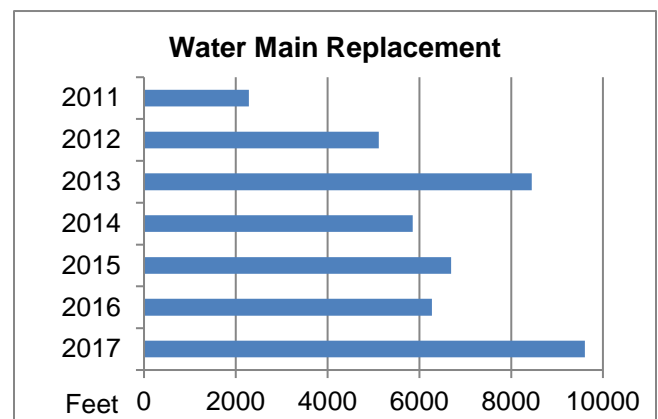
Figure 5



Following is a list of replacement projects:

1. The Marriot – JFK Parkway to Stanford Road - **1,097 LF**
2. Tanglewood Drive – Creekwood Drive to Eastwood Drive - **819 LF**
3. Howes Street – Magnolia Street to Mulberry Street – **534 LF**
4. Stover Street – Swallow Road to Boltz Drive – **1,598 LF**
5. Sombrero Lane – Adobe Drive to Sagebrush Drive – **1,598 LF**

Figure 6



Pleasant Valley Pre-Sedimentation Basin

In 2013, a pre-sedimentation basin was put in service ahead of the Pleasant Valley pipeline as a water quality buffer between the pipeline and the canal carrying water to the pipeline from North Poudre Irrigation Company's Munroe Diversion off the Poudre River. A sediment removal study continued in 2017 comparing multiple water quality parameters between the influent and effluent of the basin to further verify the efficiency of the basin and its value in protecting water quality for our customers. Data demonstrated a 54 percent reduction of total suspended solids (TSS) in the effluent of the basin as compared to the influent.



The Pleasant Valley Pre-Sedimentation Basin

State Certified Operators

The treatment facility operators are certified by the Colorado Water and Wastewater Facility Operators Certification Board as certified water professionals. As of 2017, the Division Manager (operator in responsible charge, or ORC), Plant Superintendent, and all Plant Operators had earned the highest level of classification, 'A', which also carries the profession credential, "Certified Water Professional." Operation of the Water Treatment Facility requires supervision by a certified Operator A.

Operation of our pump stations and storage reservoirs requires supervision by a certified Operator 3. The Division Manager (ORC) holds a level 4 distribution system Operator Certification, and the Plant Superintendent holds a level 3 certification. Several Plant Operators and other staff are also certified distribution system operators, varying from level 1 to level 4.

Additionally, several non-operations personnel hold operator certifications. Other plant personnel are encouraged to pursue certification as plant operators, as well as other professional certifications that increase their skills. Two maintenance staff hold level D certifications. One staff member holds Professional Operator (PO) certification through the Certification Council for Environmental Professionals. Other certifications held by plant staff include:

- Professional Engineer
- Certified Control Systems Technician
- Certified Water Quality Analyst
- Hazardous Materials Technician
- Occupational Health and Safety Technician
- Journeyman Electrician
- DOT Certification
- ASE Mechanic Certification

The Water Field Operations Manager (ORC) holds a level 4 Water System Operator certification. All crew chiefs are certified to at least level 2, many to level 4, and most crew members hold certification varying from level 1 to level 4.

This report was compiled by the Water Production Division with contributions from:

- Water Quality Services Division
- Environmental Regulatory Affairs Division
- Water Field Operations Service Unit