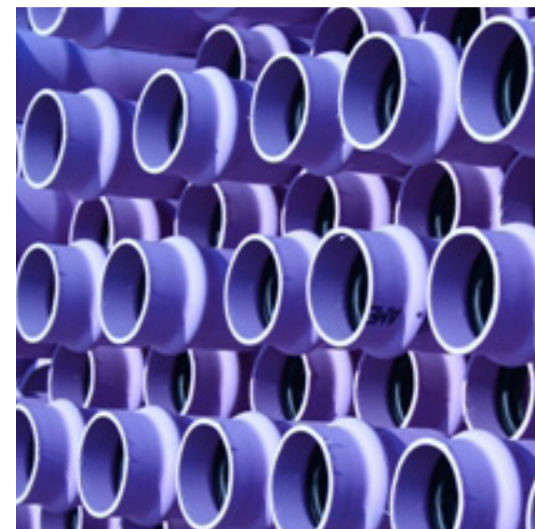




ANNUAL REPORT

To the Water Quality Control Commission and Colorado Legislature

2019



SUBMITTED BY
THE WATER QUALITY CONTROL DIVISION
OCTOBER 2019

FOREWORD

I am pleased to submit the Water Quality Control Division's Annual Report to the Water Quality Control Commission for the period of July 1, 2018 through June 30, 2019 (SFY2019). Pursuant to CRS Section 25-8-305, the division is to file with the commission, on an annual basis, a report on the effectiveness of its efforts under the state Water Quality Control Act. In particular, the division is to:

Include in such report such recommendations as it may have with respect to any regulatory or legislative changes that may be needed or desired. Such report shall include the then current information that has been obtained pursuant to Section 25-8-303 [monitoring] and information concerning the status of the division's implementation of the discharge permit program established in Part 5 of this article.

Further, in accordance with the requirements of Section 25-8-305 of the Colorado Water Quality Control Act, this report is also filed with the House Agriculture, Livestock and Natural Resources Committee and the Senate Agriculture, Natural Resources and Energy Committee.



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Colorado Department of Public Health and Environment
October 2019

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I. EXECUTIVE SUMMARY

The mission of the Water Quality Control Division is to protect and restore water quality for public health and the environment in Colorado. The vision of the division is to be a top performing organization that implements its programs in such a way that Colorado's drinking water and natural waters are of the highest attainable quality. The division will achieve its mission by pursuing the following clean water and drinking water program goals.

- Protect all designated uses by fully attaining water quality standards through improved implementation of the federal Clean Water Act, the Colorado Water Quality Control Act and its associated regulations.
- Restore impaired water quality to attainable standards through improved implementation of the federal Clean Water Act, the Colorado Water Quality Control Act and its associated regulations.
- Prevent waterborne disease and reduce chronic public health risks from drinking water through improved implementation of the federal Safe Drinking Water Act and Colorado's drinking water statutes and regulations.
- Deploy resources to achieve the greatest benefit for public health and the environment while pursuing a strategy of organizational improvement that includes increasing efficiency.

During the 2017 legislative session, the department was successful in funding the Clean Water Program through HB17-1285. This bill provided funding to maintain existing services and recognized that certain sectors were lacking resources for activities such as compliance oversight. The bill established the funding mix between general fund and cash funds that each sector (established in 2015) should receive in the future. The bill established fee increases that took effect July 1, 2018.

The division's Safe Drinking Water Program is recovering from a budget shortfall reported in 2018. Currently, the program receives 77 percent of its revenue from federal funds, 13 percent from the state's general fund, and 10 percent from cash funds paid by regulated public drinking water systems via an annual fee. General fund appropriations have remained relatively flat and cash fees have not been raised since 2007. During the same period, salaries and operating expenses have continued to increase. This inverse relationship between program revenue and expenses is not sustainable in the long term. Department leadership implemented significant staff reductions in 2017 so the program could remain solvent for the next two state fiscal years (SFY2017-18 and SFY2018-19). In 2018, the program received an influx of additional federal funding and has been able to restore most of the services reduced in 2017. However, hiring processes are slow, and with normal turnover still occurring, we are not yet caught up with actual staffing levels. The division continues to monitor federal funding, and it appears that federal funding will be decreased slightly for the next federal fiscal year. It is important to note that this situation unfolded during a time of substantial increased demand for services due to implementing the storage tank and cross-connection control rules that became effective in 2016 plus national issues with lead and toxic firefighting foam (scientifically referred to as PFAS) that also erupted in 2016.

II. LEGISLATIVE AND REGULATORY UPDATE

A. Budget status

For many years, there has been a significant gap in the demands placed on the division and the resources available to address those demands. Since 2006, the division has been required to submit an annual report to the state legislature's Joint Budget Committee. The report summarizes the division's current and

anticipated workload levels, including the impact of existing and proposed federal and state program requirements, as well as the associated funding and staffing needs based on those workload levels. In 2017, the legislature passed HB17-1285 which increased fees for the Clean Water Program. This fee increase was intended to stabilize funding for the program for a five-year period.

Federal funds provided to the division continue to be in jeopardy, but no funding reductions were implemented in federal fiscal year 2017-2018. If future federal funds are cut, the division will deploy resources to meet the most pressing water quality problems/needs based on the division's priorities. Water quality issues not deemed to be priorities will likely not be addressed.

The drinking water budget shortfall and 2017 staff and service level reductions were referenced above. The situation has improved for 2018 and 2019 based on increased federal funding, but future federal funding is uncertain. Further, the division needs to provide additional services related to PFAS and direct potable reuse to support the state's water plan.

B. Legislative changes

These bills passed by the General Assembly impacted the division in SFY2019 and will continue to influence division work.

- HB18-1069 - Toilet and urinal flushing in multifamily residential and nonresidential structures; HB18-1093 - Food crop irrigation; and SB18-038 - Industrial hemp cultivation. These three bills essentially codified Regulation 84 and added each identified activity as an allowable use of reclaimed domestic wastewater, along with requirements for each use. These bills give the Water Quality Control Commission a deadline of December 31, 2019 to adopt the new uses and requirements.
- SB18-019 - Amended the Colorado Water Resources and Power Development Authority statute to give the authority the ability to issue loans for all borrowers through the Water Pollution Control Revolving Fund for a longer term. The bill removed the original loan term of 20 years and authorizes loans up to 30 years under the Water Pollution Control Revolving Fund.
- HB19-1279 - The "Firefighting Foams and Personal Protective Equipment Control Act" was signed into law on June 3, 2019. The act includes a number of provisions with respect to limiting the use of toxic firefighting foams, scientifically known as PFAS. As of August 2, 2019, the legislation bans the use of Class B firefighting foams that contain PFAS for training or for testing systems that suppress fire. In addition, manufacturers or other persons who sell firefighting personal protective equipment are required to provide written notice to a purchaser at the time of sale that the equipment contains intentionally added PFAS. As of August 2, 2021, the legislation bans the sale of Class B firefighting foam that contains intentionally added PFAS. It also requires the division to develop and administer a survey to all fire departments, as defined in the legislation, to gather information for any use and inventory of Class B firefighting foams that contain PFAS. The division is required to report the results of the survey by January 1, 2020. The division is required to conduct the survey every three years and report to the legislature.

C. Regulatory changes

With reference to regulatory changes that are required or desired, the Water Quality Control Commission is fully aware of the ongoing efforts of the division to address a variety of issues through collaborative work group processes after consideration of the stakeholder community's many proposals. The current status of work groups formed under the auspices of the Colorado Water Quality Forum can be found at www.colowqforum.org, and division staff have substantially participated in these work groups through the current reporting period. A current list of new and ongoing work groups is provided in Appendix A.

The division provided staff support to the commission for these rulemaking hearings in SFY2019.

August 2018 rulemaking - October 2018 adoption

- Regulation 84 - Reclaimed Water Control Regulation (5 CCR 1002-84).

October 2018 rulemaking - November 2018 adoption

- Regulation 61 - Colorado Discharge Permit System Regulations (5 CCR 1002-61).

November 2018 rulemaking - November 2018 adoption

Response to OLLS Comments.

- Regulation 11 - Colorado Primary Drinking Water Regulations (5 CCR 1002-11).

November 2018 rulemaking - December 2018 adoption

- Regulation 82 - 401 Certification Regulations (5 CCR 1002-82).

December 2018 rulemaking - January 2019 adoption

Temporary modifications.

- Regulation 32 - Classifications and Numeric Standards for Arkansas River Basin (5 CCR 1002-32).
- Regulation 33 - Classifications and Numeric Standards for Upper Colorado River Basin and North Platte River (Planning Region 12) (5 CCR 1002-33).
- Regulation 34 - Classifications and Numeric Standards for San Juan River and Dolores River Basins (5 CCR 1002-34).
- Regulation 35 - Classifications and Numeric Standards for Gunnison and Lower Dolores River Basins (5 CCR 1002-35).
- Regulation 36 - Classifications and Numeric Standards for Rio Grande Basin (5 CCR 1002-36).
- Regulation 37 - Classifications and Numeric Standards for Lower Colorado River Basin (5 CCR 1002-37).
- Regulation 38 - Classifications and Numeric Standards for South Platte River Basin, Laramie River Basin, Republican River Basin, Smoky Hill River Basin (5 CCR 1002-38).

June 2019 rulemaking - August 2019 adoption

- Regulation 33 - Classifications and Numeric Standards for Upper Colorado River Basin and North Platte River (Planning Region 12) (5 CCR 1002-33).
- Regulation 37 - Classifications and Numeric Standards for Lower Colorado River Basin (5 CCR 1002-37).

D. New drinking water contaminant standards

Colorado Revised Statute (C.R.S.) Sections 25-1.5-202(3)-(4) establish the statutory process by which the Water Quality Control Commission can promulgate, based on the division's recommendation, "minimum general sanitary standards" for contaminants or substances that are unregulated by the Safe Drinking Water Act. Minimum general sanitary standards are essentially the state equivalent to federal maximum contaminant levels (or "MCLs") under the Safe Drinking Water Act. Pursuant to Section 25-1.5-202(3)(a), the first step in establishing minimum general sanitary standards for contaminants is that the division "shall annually establish and revise a priority list of contaminants or substances for which standards may be considered and shall submit the list to the commission for review and approval." This topic was discussed at the June 2011 Safe Drinking Water Program workshop with the commission. It was agreed that this requirement would be met by inclusion in the annual report.

For at least the past nineteen years, the division has not exercised its authority to develop and recommend new standards for any contaminants or substances independent of the process established in the Safe Drinking Water Act whereby the EPA develops and establishes national standards. For contaminants or substances that are not regulated by the Safe Drinking Water Act, promulgating new standards in accordance with Colorado's statutory requirements would be a resource-intensive process. Indeed, the department is concerned that it may not currently have the resources, both in number and type of personnel, to timely and sufficiently undertake all required activities for the promulgation of new minimum general sanitary standards for an emerging contaminant.

Despite this resource concern, the division has decided to submit a priority list of contaminants to the commission at this time. The division believes that establishing a priority list that includes certain PFAS chemicals is warranted to support the department's action plan to address PFAS. Establishing a priority contaminant list that includes PFAS does not set minimum general sanitary standards for PFAS, and it does not necessarily mean that the division will pursue setting standards for these compounds in the near future. However, because there are currently no federal drinking water standards for PFAS under the Safe Drinking Water Act, submitting a priority contaminant list that includes PFAS is a first step required by statute as mentioned above. Failing to establish a priority contaminant list that includes PFAS would unacceptably reduce the division's flexibility in moving forward to protect public health and address human exposure to PFAS in Colorado. While the EPA is in the process of evaluating numerous contaminants, including certain PFAS chemicals, for the development of federal drinking water standards, the division is unsure if or when this will result in any federal action. If the division decides to move forward in setting state minimum general sanitary standards for PFAS, there would be considerable outreach and a stakeholder process to gain needed input.

Priority list of contaminants or substances for which standards may be considered

1. Priority list of contaminants (Section 25-1.5-202(3)(a)). The division's list of priority contaminants submitted to the Water Quality Control Commission for review and approval consists of contaminants found in toxic firefighting foam and other commercial products (scientifically referred to as PFAS). While thousands of these man-made compounds have been produced in commerce and potentially released to the environment, the division's priority list of PFAS for which drinking water standards may be considered is limited to the compounds listed below. These compounds have been prioritized because of their confirmed presence in drinking water supplies and sources in Colorado as described in the ranking process considerations also provided below.
 - a. Perfluorooctanoic acid (PFOA) Chemical Abstract Service Number (CAS No.) 334-67-1.
 - b. Perfluorooctane sulfonate (PFOS) CAS No. 1763-23-1.
 - c. Perfluorohexane sulfonic acid (PFHxS) CAS No. 355-46-4.
 - d. Perfluorononanoic acid (PFNA) CAS No. 375-95-1.
2. Ranking process considerations (Section 25-1.5-202(3)(b)). The department's evaluation of the ranking process considerations listed in Section 25-1.5-203(b) are as follows.
 - a. Presence or threat of contamination (Section 25-1.5-203(3)(b)(I)).
 - i. *Widefield Aquifer*. This aquifer, which supplies drinking water for approximately 70,000 people in El Paso County, was the first known occurrence of PFAS in the state. The investigation into the extent of contamination included six public water systems and over 200 private domestic wells. The majority of the contamination is believed to be the result of the use of toxic firefighting foam at Peterson Air Force Base. Numerous public drinking water supply wells were shut down in the Widefield Aquifer in 2016.

- ii. *Sugarloaf area.* This area in Boulder County was the second location where PFAS were found in the state. The Sugarloaf area is a small and dispersed community of several hundred residents. Most residents rely on private domestic wells for their drinking water, and there are no public water systems that provide services in that area. The source of the PFAS contamination is believed to be from the local fire district that trained with firefighting foam decades ago.
 - iii. *South Adams County Water and Sanitation District.* The district relies on a nearby alluvial aquifer as one of its primary sources of drinking water. The district serves about 61,000 people in the Commerce City area. PFAS contamination below the EPA Health Advisory were discovered in the district's water in the summer of 2018, but some of their wells contained high levels and were shut down. There are other known contaminants in this aquifer, so the district has some drinking water treatment in place. This treatment can remove all PFAS compounds but was not specifically designed for this purpose. Investigation of potential sources of PFAS is ongoing, and in the meantime, the district continues to assess potential treatment improvements.
 - iv. *Boulder Mountain Fire Protection District.* In August 2019, the department was informed by the fire protection district that one of its fire stations and two nearby residences had been sampled, and PFAS were found at levels above the EPA Health Advisory. The department has begun working with multiple parties to initiate an investigation into potential sources and to identify impacted private domestic wells.
 - v. *U.S. Air Force Academy.* In August 2019, the department became aware of PFAS contamination in groundwater at the academy. The investigation into that site is just underway.
 - vi. *Possibility of other Colorado sites.* In general, the department believes it is possible that a number of other sites (e.g., Buckley Air Force Base) around the state are contaminated with PFAS as a result of previous firefighting, related training, or other activities.
- b. Identified contamination pathway (Section 25-1.5-203(3)(b)(II)).

In general, PFAS may be present in drinking water, food, indoor dust, consumer products, and workplaces. As seen at multiple Colorado locations, drinking water can be a source of exposure in communities where these chemicals have contaminated water supplies. Examples of sources that can contaminate surface and groundwater supplies follow.

- i. *Fire training/fire response sites.* Firefighting foams (that contain PFAS) released on the ground can run off into surface water or infiltrate groundwater. Accidental releases of these foams from storage tanks, railcars, and piping during delivery or transfer can also occur. Since foams that contain PFAS may be used to fight aviation-related fires, airports are a potential location for PFAS contamination.
- ii. *Industrial sites.* Industrial facilities may release PFAS to the environment during firefighting or training activities or via wastewater discharges or accidental releases such as leaks and spills.
- iii. *Landfills.* Landfill leachate and runoff are potential sources of PFAS contamination to water supplies as they can contain contaminated industrial waste, sewage sludge, waste from site mitigation, and PFAS-treated consumer goods (i.e., those containing hydrophobic, stain-resistant coatings).

- iv. *Wastewater treatment plants/biosolids.* Municipal and industrial wastewater treatment plants can provide pathways for PFAS to the environment such as point source discharges of effluent, leakage or releases from surface impoundments, and disposal of biosolids generated during the treatment process. PFAS may also be introduced to the environment through land application of biosolids, thereby potentially contaminating surface water through runoff or infiltration to groundwater.

Once a water source has been contaminated, human exposure to PFAS can occur through direct ingestion or by consuming organisms from contaminated waterbodies or through indirect ingestion of crops irrigated with contaminated groundwater.

- c. Analytical techniques (Section 25-1.5-203(3)(b)(III)).
 - i. *EPA Method 537 and 537.1.* Currently, the EPA does not have a specified method for analysis of drinking water. The agency has developed two methods appropriate for PFAS analysis in drinking water: EPA method 537 and the updated 537.1. EPA method 537.1 measures 18 different PFAS in drinking water (including PFOA, PFOS, and PFHxS) which is expanded from EPA method 537, published in 2009, which could determine only 14 of the hundreds of PFAS chemicals. EPA method 537 is intended for both government and private lab use and allows for accurate and consistent measurement of 18 PFAS in drinking water. EPA method 537 was used to support analysis of over 22,000 drinking water samples during UCMR3. However, this method is not suitable for analysis of some short chain PFAS.
 - ii. *Method 537 “modified” (usually isotope dilution).* The 537 modified method is one of the most common commercial methods for PFAS analysis and is considered to be the best method by many chemists. The 537 modified method is not an EPA-approved method, and labs can use their own proprietary methods, allowing for variation from lab to lab. This method can be used for both drinking water and non-drinking water samples (surface water, groundwater, wastewater) and can quantify up to 24 PFAS compounds.
 - iii. *EPA SW-846 validated method 8327.* This EPA-validated method, published in June 2019, is designed to measure a group of 24 PFAS compounds in groundwater, surface water, and wastewater samples using liquid chromatography/tandem mass spectrometry.
- d. Information availability regarding health effects and treatment (Section 25-1.5-203(3)(b)(IV)).
 - i. *Health effects.* In an extensive literature review by Wang et al. (2017)¹, over 10,000 peer-reviewed articles were discovered related to PFOS, PFOA, PFHxS, and PFNA alone. Furthermore, the Agency for Toxic Substances and Disease Registry, a federal public health agency, released their 852-page toxicological profile² on perfluoroalkyls for public comment in June 2018 with a considerable review of animal, epidemiological, and computer-based modeling studies for fourteen PFAS including PFOS, PFOA, PFHxS, and PFNA. A total of 616 human and animal toxicity studies (including null findings) were referenced in the toxicological profile (PFOA:

¹ Wang Z, DeWitt JC, et al. (2017). A Never-Ending Story of Per- and Polyfluoroalkyl Substances (PFASs)? *Environ Sci Tech.* 51(5): 2508-2518. doi: 10.1021/acs.est.6b04806

² Agency for Toxic Substances and Disease Registry. (2018). Toxicological profile for Perfluoroalkyls. (Draft for Public Comment). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

271 studies, PFOS: 218 studies, and other PFAS, including PFHxS and PFNA: 127 studies). In November 2018, the Agency for Toxic Substances and Disease Registry concluded there was sufficient evidence to derive minimum risk levels and screening values (adult and child environmental media evaluation guide [EMEG] values³) for PFOS, PFOA, PFHxS, and PFNA using guidelines published in the Public Health Assessment Guidance Manual and the U.S. Environmental Protection Agency's Exposure Factors Handbook.

- ii. *Treatment.* Treating drinking water to remove PFAS is challenging especially because the concentrations of concern are orders of magnitude lower than traditional contaminants of concern in drinking water. For example, the limit for nitrate is 10 milligrams per liter (mg/L) as nitrogen. The health advisory for PFOA/PFOS combined is 70 nanograms per liter. Nanograms are about 1 million times less concentrated than milligrams. Therefore, not only is effective treatment hard to achieve, analytical results are difficult to interpret because of the long delays in getting results and the potential for uncertainty in measurements. Colorado School of Mines has reported that in the nanograms per liter range, numbers can only be assumed to be accurate plus or minus 20%. Therefore, most treatment seeks to remove the contaminants below detectable levels to ensure there are no detectable PFAS contaminants of concern present. There are three primary technologies that target PFAS reduction or removal that are commonly used in the United States: reverse osmosis, anion exchange, and granular activated carbon. In addition to the technology, consideration should be given to treatment water systems with multiple wells that would likely need to construct piping to bring the raw water together in one location for treatment. This can be complicated and expensive and significantly change the water system's operations.
 1. Reverse osmosis (RO): While filtration with reverse osmosis technology will reliably remove all detectable PFAS, there are several key issues which make its use in Colorado quite problematic.
 - a. Waste disposal - RO generates liquid waste that is a highly concentrated salt solution. This liquid cannot be easily discarded. Typically, entities cannot discharge it to the environment, send it to the wastewater plant via the sewer, or haul it to a landfill. Therefore, utilities may be faced with very high costs to develop a deep well in order to inject the waste into the subsurface or to evaporate the waste in drying beds.
 - b. Corrosion and removal of all ions - RO typically makes water very aggressive - causing corrosion and lead/copper dissolution issues. This is mostly due to the RO filters stripping out all ions (sulfate, carbonate, chlorides, etc.) that provide stabilizing properties. Therefore, the water must be re-stabilized after RO treatment with more chemical treatment or blending.
 - c. Cost - procurement and operation of RO can be expensive and requires high levels of maintenance expense and operator

³ Agency for Toxic Substances and Disease Registry. (2018). ATSDR's Minimum Risk Levels (MRLs) and Environmental Media Evaluation Guides (EMEGs) for PFAS. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. https://www.atsdr.cdc.gov/pfas/mrl_pfes.html

expertise. Typically, the filters themselves need to be replaced every 10 to 15 years and are also expensive.

2. Anion exchange: Anion exchange technology is water filtration through a specially designed media (looks like plastic beads) that targets and removes PFAS. Its strengths are that it seems to remove short and long chain PFAS very effectively for long periods. After breakthrough is detected, the media are then incinerated, thus destroying the PFAS. The technology is currently in use at two water utilities in Colorado with known PFAS contamination: Widefield Water and Sanitation District and Stratmoor Hills Water District. Installation is also planned at the Security Water and Sanitation District and the City of Fountain. Anion exchange has proven to be the most economical and effective treatment of PFAS to date for the impacted area south of Colorado Springs. This is primarily due to the extraordinarily long run times achieved before filter change out is needed. Also, the long run times mean the cost of media replacement will be less for the utility.
3. Granular activated carbon (GAC): The City of Fountain and South Adams County Water and Sanitation District have both been using GAC to treat for PFAS contamination. GAC is effective at lowering the PFOA/PFOS concentrations below the health advisory levels set by the EPA but is typically less effective for shorter chain (containing five carbon atoms per molecule or less) PFAS as they tend to pass through the carbon filter. The carbon filter looks much like the anion exchange vessel but adsorbs the contaminant on the surface of the carbon. The specific type of carbon used determines the efficiency of the process and is different based on the carbon vendor. More frequent media change outs compared with anion exchange make this technology typically more expensive for PFAS treatment.

e. Magnitude of Health Risks (Section 25-1.5-203(3)(b)(V)).

Concentrations at which health effects (based on animal, epidemiological, and computer-based modeling studies) have been observed span orders of magnitude (ATSDR toxicological profile). Toxic effects associated with PFAS exposure include, but are not limited to, the following: immune, hepatic, and endocrine system effects; changes in cholesterol levels; fertility issues; cognitive and behavioral changes; growth effects; and increased risk for cancer. Developmental effects (PFOA: altered activity and skeletal alterations in offspring, PFOS: delayed eye opening and decreased pup weight, PFNA: decreased body weight and developmental delays) and endocrine effects (PFHxS: thyroid follicular cell damage) were selected as the critical effects applied in the development of minimum risk levels. Based on available data, the U.S. Environmental Protection Agency established a non-regulatory lifetime health advisory concentration of 70 ng/L for PFOS and PFOA⁴ (individually or combined) in November 2016 (Table 1). This advisory does not include exposure to other PFAS family members and was based on lactating women who often drink more water than other people and can transfer PFAS to their nursing infants through breast milk. This health

⁴ U.S. Environmental Protection Agency. (2016). Lifetime Health Advisories and Health Effects Support Documents for Perfluorooctanoic Acid and Perfluorooctane Sulfonate. Federal Register 81 (101) <https://www.govinfo.gov/content/pkg/FR-2016-05-25/pdf/2016-12361.pdf>

advisory was calculated in 2016 based on information available at that time to protect the most sensitive populations against adverse health effects, and therefore, exposure to these same levels will not result in adverse health effects (including cancer and non-cancer) to the general population over a lifetime (or any shorter period) of exposure to these chemicals. This advisory may change as more data are being added all the time. The Agency for Toxic Substances and Disease Registry drafted toxicity values, termed minimal risk levels by that agency, for four PFAS (PFOA, PFOS, PFHxS and PFNA) and derived drinking water screening levels, termed environmental media evaluation guides (EMEGs), for adults and children. The adult screening values for PFOS and PFOA (52 and 78 ng/L, respectively) have levels that are similar to the U.S. Environmental Protection Agency’s health advisories but do not account for concurrent exposures to multiple PFAS. EMEG values were also established for PFHxS and PFNA (517 and 78 ng/L, respectively). The application of the Agency for Toxic Substances and Disease Registry’s minimum risk levels as screening values accounts for differences in child versus adult exposures. The child EMEG levels are less than half the concentrations established for adults. According to the Agency for Toxic Substances and Disease Registry, if EMEG values are exceeded in drinking water, further investigation is recommended. Concentrations below these EMEG values indicate health effects should not occur in people.

In 2018, Colorado adopted a site-specific groundwater quality standard for PFOS and PFOA equal to the health advisory value of 70 ng/L in response to PFAS contamination in the Widefield Aquifer region of El Paso County, Colorado. Groundwater sampling in that area showed maximum levels of PFOS, PFOA, PFHxS, PFNA, PFBS, and PFHpA of 1600, 200, 970, 150, 260, and 200 ng/L, respectively. Studies of health effects in that exposed population are still underway. However, Barton et al. (August 2019)⁵ found that PFHxS blood concentrations were 12 times as high as the U.S. national average and PFOS and PFOA blood concentrations were both twice as high as the national average.

Table 1 - Brief review of comparison or screening values from federal and state agencies

<u>Value</u>	<u>PFOS (ng/L)</u>	<u>PFOA (ng/L)</u>	<u>PFHxS (ng/L)</u>	<u>PFNA (ng/L)</u>
Health Advisory ¹	70	70	--	--
EMEG (adult)	52	78	517	78
EMEG (child)	14	21	140	21
New Hampshire MCL	15	12	18	11
New Jersey MCL	13	14	--	13

EMEG = environmental media evaluation guide

MCL = maximum concentration level

'--' = no value available

⁵ Barton KE, Starling AP, et al. (2019). Sociodemographic and behavioral determinants of serum concentrations of per- and polyfluoroalkyl substances in a community highly exposed to aqueous film-forming foam contaminants in drinking water. *Int J Hyg & Env Health*. In press, online. doi: 10.1016/j.ijheh.2019.07.012

Groundwater PFAS contamination was detected in several more locations in Colorado including Adams County⁶, multiple military⁷ installations, and Boulder County⁸. Associated total costs (investigations, clean up, etc.) exceeded \$6.8 million as of October 2017 for military⁹ sites alone (at known or suspected contaminated military sites in Colorado).

f. National primary drinking water regulation (Section 25-1.5-203(3)(b)(VI)).

The EPA indicated in its February 2019 PFAS action plan (<https://www.epa.gov/pfas/epas-pfas-action-plan>) that it would make a regulatory determination for PFOS and PFOA in 2019. The agency has since signaled that this would be a positive determination, meaning that they would move forward to set national primary drinking water standards for those compounds. Once that determination is made, the EPA is then supposed to draft the standards within 24 months and finalize them 18 months after that. However, the EPA's process often takes considerably longer than that. Typically, states have two years to adopt national standards. Following adoption, there is usually an initial monitoring period of one or more years and a final compliance date at the end of initial monitoring.

g. Environmental fate and transport (Section 25-1.5-203(3)(b)(VII)).

Generally, PFAS chemicals do not break down in the environment and can be toxic to people and wildlife at very low levels. In regards to drinking water, PFAS chemicals are highly soluble in aquatic environments and, due to their chemical and biological stability, are difficult to degrade via biodegradation, photolysis, or hydrolysis. In other words, they are extremely stable and persistent in the environment, migrate easily, and can bioaccumulate in organisms (i.e., concentrate in the food chain). The risk to groundwater and surface water supplies in Colorado is further enhanced by the fact that they are not readily removed or destroyed by conventional wastewater treatment processes. If humans (or animals) ingest PFAS from contaminated water sources, these chemicals are subsequently absorbed and can accumulate in the body for long periods of time.

h. Populations and drinking water supplies at risk (Section 25-1.5-203(3)(b)(VIII)).

- i. *Populations.* PFAS can cause toxicity to anyone of any age. Several populations are considered more susceptible and may experience different or enhanced reactions when exposed to PFAS compared to when those in the general population are exposed based on animal and human studies. These populations include developing fetuses (in utero and at birth), children, adolescents, adults with preexisting conditions (for example, hypercholesterolemia, hypertension, and compromised liver function or immune system), and pregnant women, especially if they have pre-eclampsia/hypertension. Factors that may increase susceptibility (for example, genetic makeup, age, health and nutritional status, and exposure to

⁶ Perfluorinated compounds detected in water within the Quebec/I-270 Corridor. (2018).

https://www.sacwsd.org/DocumentCenter/View/1233/PFCs_AdamsCty_PressRelease_071218_FINAL

⁷ Lloyd B. (2019). Air Force finds elevated chemical levels in groundwater, plans to test wells south of USAF Academy. KOAA News Southern Colorado. <https://www.koaa.com/news/covering-colorado/air-force-academy-inspection-finds-elevated-levels-of-chemicals-from-firefighting-foam>

⁸ State of Colorado House Bill 19-1279 (2019).

https://leg.colorado.gov/sites/default/files/documents/2019A/bills/2019a_1279_rev.pdf

⁹ Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics. (2017). Aqueous Film Forming Foam Report to Congress. 18-C-0270. <https://www.denix.osd.mil/derp/home/documents/aqueous-film-forming-foam-report-to-congress/>

other toxic substances [for example, cigarette smoke]) may reduce detoxification, excretion, or organ function¹⁰.

ii. *Drinking water supplies.* Elevated levels of PFOA and PFOS, believed to be due to the use of toxic firefighting foam at Peterson Air Force Base, were initially identified in three large public water systems in El Paso County. Since the initial detection of PFAS in the Widefield Aquifer in El Paso County, PFAS have been detected in water supplies in additional areas in the state as discussed above. Any public water system with drinking water sources located in proximity to toxic firefighting foam use is at risk of PFAS contamination. Drinking water supplies located in proximity to the following PFAS source areas may also be susceptible to PFAS contamination.

- Firefighting training facilities.
- Fire stations.
- Refineries.
- Military bases.
- Airports.
- Biosolid land application.
- Railyards.
- Chemical facilities.
- Textile/carpet manufacturers.
- Residential septic systems.
- Wastewater treatment plants.
- Electroplating facilities.
- Landfills.
- Oil and gas operations.

In order to obtain a better and more complete understanding of drinking water supplies at risk in the state, additional testing needs to be conducted at public drinking water systems, private potable wells potentially impacted by PFAS, and/or sites with known use of PFAS-containing materials.

i. Level of effort to develop standard (Section 25-1.5-203(3)(b)(IX)).

It will take a considerable effort to develop enforceable PFAS drinking water standards. The actual rulemaking effort involves setting sampling requirements, specifying the compliance determination method, and defining numerous other details including public notice requirements in the event of violations. The effort goes well beyond examining health effects and setting a number. Additionally, treatment feasibility and cost considerations will need to be developed and health risks and benefits identified.

To move forward with setting an enforceable standard, a multi-disciplinary team will need to develop it, combined with a robust stakeholder process to ensure transparency and provide an opportunity for public input. In other states, these efforts have generated considerable interest, which means that considerable resource investment is needed. The types of resources involved in this effort would need to include:

¹⁰ Agency for Toxic Substances and Disease Registry. (2018). Toxicological profile for Perfluoroalkyls. (Draft for Public Comment). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

- i. *Toxicologists* to evaluate health studies, understand health risks and issues with vulnerable populations, and develop health-based values for drinking water.
- ii. *Engineering staff* to assess the effectiveness of various treatment technologies and the feasibility of deploying these technologies at public drinking water systems in Colorado including small systems.
- iii. *Compliance specialists* to develop all the specific rule requirements and to write regulations that will be legally defensible and enforceable.
- iv. *Laboratory specialists* to assist with sampling requirements, specification of test methods, and definition of lab certification requirements.
- v. *Legal representation* from the Attorney General's office as is needed for all rulemaking efforts.
- vi. *Administrative resources* to manage logistics.
- vii. *Communication resources* to manage the stakeholder process and web materials needed.

Overall, this effort would likely involve numerous staff over many months prior to the actual rulemaking. If the commission adopted a rule, then the division would also need adequate resources to implement and enforce the rule plus provide compliance and technical assistance.

E. Regulation 85 - Nutrients management control

Regulation 85 (Nutrients Management Control Regulation) became effective September 30, 2012. This control regulation establishes numerical effluent limitations for many domestic wastewater treatment plants and industrial wastewater dischargers that are likely to have significant levels of nutrients in their discharges. It describes requirements for other point source dischargers and voluntary steps for nonpoint sources to address nutrients. The control regulation also establishes monitoring requirements for point source dischargers and a program aimed at monitoring surface waters for nutrients and related parameters. This effort is geared toward better characterizing nutrient sources and current nutrient conditions to help inform future regulatory decisions regarding nutrient management.

Leading up to the October 2017 rulemaking hearing for Regulation 85, the division developed Policy 8 - 10-Year Water Quality Roadmap and Nutrient Management Plan. The division is currently leading a Water Quality Forum work group to implement this plan.

The monitoring requirements in Section 85.6 specify that nutrient data be submitted to the division by April 15 every year. To date, we have received data from over 350 facilities in 2014, 2015, 2016, 2017 and 2018. We are currently working on reviewing and uploading the 2018 data to the national STORET database. Since 2014, the division has added total phosphorus and total nitrogen to this routine panel assessed at all monitoring sites in an effort to supplement the existing body of data on nutrient levels in Colorado. In addition, facilities with design capacities greater than one million gallons per day have been collecting both in-stream and effluent data. All of this data can be used to establish a baseline of nutrient concentrations in the state.

In Colorado, six industrial facilities operating under standard industrial code (SIC) 20 (for the manufacturing of food and kindred products) are subject to Regulation 85. One facility (MillerCoors) has Regulation 85 limits implemented in its permit. Two SIC 20 facilities are in a low-priority watershed. The three remaining SIC 20 facilities are in the South Platte Basin and will be prioritized for renewal in 2021 and 2022 with other South Platte renewal permits, according to the basin schedule and as reflected in the tentative Permits Section Workplan. There are two other industrial dischargers (not SIC 20) with nutrients in the discharge

that have Regulation 85 limits implemented. Sixty-three domestic wastewater treatment works (DWWTW) discharge with a flow that exceeds 2 MGD. Of these 63 permits, 12 are located in low-priority watersheds, and implementation of Regulation 85 effluent limits are delayed until 2027 in accordance with 85.5(1)(a)(ii)(A). Implementation of Regulation 85 limits are delayed under 85.5(1)(a)(ii)(C) for an additional five facilities because they were already subject to nutrient controls under Regulations 71-74. In total, 46 DWWTW are subject to Regulation 85. Of the 46 DWWTW currently subject to the Regulation 85 effluent limits, the division has implemented applicable requirements in 29 permits. Of those 29, four met the dilution exception under Regulation 85.5(3)(b)(i), so numeric effluent limit requirements in 85.5(1)(a)(iii) do not apply. There are 17 remaining domestic facilities that will receive Reg. 85 limits upon renewal, according to the basin schedule.

The nonpoint source program continued to expand its proactive partnership with the agricultural community during this reporting period to promote Regulation 85 voluntary nutrient controls, information and education campaigns about nutrients, and monitoring of nutrients to better understand the sources and effectiveness of nutrient controls. The nonpoint source program did this in partnership with Colorado State University (CSU), Colorado Department of Agriculture and a number of local partners as summarized below.

CSU agriculture outreach committee

The division contracted with the CSU Extension to create an educational outreach program for agricultural nutrient Best Management Practice (BMP) implementation. CSU developed several videos featuring interviews with agricultural producers and scientists in the state and a fact sheet entitled “Reducing Nutrients in Water: What’s in it for Colorado Ag Producers?” as a quick reference for stakeholders about nonpoint sources of nutrients and Regulation 85 as it relates to agricultural nutrients entering surface waterways. One video highlights the current voluntary aspects of the nonpoint source reduction strategy in Regulation 85, and a second video, which includes mostly producers, features farm-applied BMPs that control nutrients to promote clean and safe drinking water. In addition, CSU created BMP-specific videos to demonstrate the use of conservation practices. These efforts are intended to help expand implementation of BMPs.

All of this information is available on an outreach website at <https://coagnutrients.colostate.edu/colorado-regulation-85/>. There has been increased use of this website and viewing of the videos.

Regulation 85 outreach project

In partnership with the Colorado Department of Agriculture, the division funded a contractor to provide Regulation 85 awareness through presentations and conversations with agricultural stakeholders around the state. Typically, presentations include discussion of Regulations 85 and 31 in regards to nutrient standards and upcoming decisions on possible regulation of nutrients for the agriculture sector. Outreach efforts will continue through an agreement between the nonpoint source (NPS) program and the Colorado Department of Agriculture in order to enhance awareness through presentations to various agricultural groups.

CLEAN Center at CSU

The division continued work with the CLEAN Center to assess and model nutrient data collected across the state as part of a larger modeling effort. The center developed the CLEAN Nutrient Dashboard, a publicly available internet-based system where nutrient loadings from various sources are estimated (www.erams.com). These sources can include wastewater treatment facilities, agriculture, stormwater and background. In addition, this model will be used to quantify nutrient reductions from implemented BMPs since the model incorporates edge of field monitoring. The CLEAN Center also provided outreach through webinars, presentations and stakeholder meetings. Furthermore, the center is developing a 303(d) assessment tool to

automate water quality assessments and a prioritization/planning tool for the NPS program to identify watersheds for prioritization.

South Platte Agriculture Nutrients Committee (SPAN)

This committee was established as part of a previously finalized “Outreach for Agricultural Nutrients and Regulation 85” project. The committee continues to meet to promote both ongoing discussions about water quality issues and implementation of BMPs to control nutrients entering waters of the state.

Agricultural implementation projects

The nonpoint source program worked with its partners to implement BMPs for reducing nonpoint sources of nutrients. The program collaborated with the Colorado Department of Agriculture and several local partners to implement BMPs in an effort to reduce nutrient loads to receiving waters. In an initial project, local collaborators collected water quality data from 16 monitoring locations over 2,000 acres to support the evaluation of effectiveness of implemented BMPs. This information will not only be important for this specific project but will also help communicate opportunities for success to others interested in partnering to reduce nonpoint sources of nutrients and other parameters. Under this contract, the contractor has been scheduled to install three sprinkler systems to achieve better nutrient and selenium control in a smaller watershed. Since the project started, six more sprinklers have been installed by locals, which will greatly help nutrient and selenium management in the watershed. Since this initial contract, the division has added two nutrient and selenium reduction projects in the Lower Arkansas and one nutrient and selenium reduction project in the Lower South Platte.

The nonpoint source program continued to collaborate with the Natural Resources Conservation Service (NRCS) to promote implementation of effective BMPs for reducing nonpoint sources of nutrients. The program continued its focused work to monitor the effectiveness of nutrient BMPs implemented in the Grape Creek watershed which is an NRCS National Water Quality Initiative (NWQI) watershed. The division also worked with NRCS to promote BMP implementation in the Fruitgrowers Watershed, the second NWQI watershed in the state. In addition, the program continued discussions with NRCS about executing a memorandum of understanding which would allow the nonpoint source program to obtain nutrient BMP data directly from NRCS while still protecting the producers' privacy.

Nonpoint source program communications

The nonpoint source program communicated the role of Regulation 85 to the program’s stakeholders through its website (npscolorado.com), the program’s day-to-day interactions with its partners and active participation in working groups, watershed conferences and other nonpoint source organized events. The nonpoint source program also developed a 10-year plan for implementing the nonpoint source provisions of Regulation 85. The plan is included in the Colorado Nutrient Management Plan and 10-Year Water Quality Roadmap at www.colorado.gov/cdphe/WQ-10-Year-Roadmap.

F. Water reuse

Consistent with Colorado’s Water Plan, the division has been involved with a variety of activities related to graywater and reclaimed water regulations. The following is a summary of these efforts.

Regulation 86 - Graywater Control Regulation

The Water Quality Control Commission adopted Regulation 86 (Graywater Control Regulation) on May 11, 2015, with a follow-up write-in, comment only hearing for improved organization and readability on November 9, 2015. Since the regulation became effective, the City and County of Denver, Pitkin County, and Town of Castle Rock have adopted local ordinances and developed local graywater control programs. Additional entities have inquired about the ordinance process and shown a strong interest but have not

acted at this time. While overall interest is growing, no local graywater control program has issued any permits. On May 7, 2018, the Water Quality Control Commission held an informational hearing to obtain feedback regarding a proposed rulemaking scope to update the Graywater Control Regulation (Regulation 86). The Water Quality Control Commission agreed to a hearing scope that includes considering research opportunities and new uses, such as green roofs, remote fire suppression and toilet tank sinks. The division initiated a stakeholder process for Regulation 86 with a meeting on August 7, 2018. During this meeting, stakeholders requested that the division consider irrigation of edible crops and establish water quality targets in lieu of prescriptive treatment requirements. At this point, the division needed to place the stakeholder process on hold due to resource limitations. The division intends to reinstate the stakeholder work as soon as possible but has not reengaged stakeholder meetings at this time.

Regulation 84 - Reclaimed Water Control Regulation

In 2018, water reuse stakeholders worked with state legislators to pass bills which directed the commission to add the irrigation of food crops and hemp as approved uses of reclaimed water and to develop rules in Regulation 84 for these new uses to protect public health and the environment. The division worked with stakeholders through a series of meetings from October 2018 through May 2019 to develop proposed rules for irrigation of food crops and hemp with reclaimed water. In June 2019, the division submitted a formal proposal to the commission to modify Regulation 84 for the addition of food crop and hemp irrigation with reclaimed water. Significant proposed elements included the adoption of treatment requirements that were set forth in the previous rulemaking for toilet and urinal flushing applicable to non-commercially processed food crops, new definitions necessary to develop the new uses, best management practices (“BMPs”) and updates to the User Plan to Comply requirements for the new uses.

The division has also continued to work with Denver Water on implementation of the toilet-flushing and localized system regulations with regards to Denver Water’s new facility. The division is also engaged in Aurora’s stakeholder process to add hydraulic fracking to the Regulation 84 uses.

Direct Potable Reuse

The division remains engaged with Water Reuse Colorado regarding the possibility of developing a regulatory framework (policy, regulations and guidance) to support direct potable reuse. Obtaining resources to develop and implement such a framework remains an obstacle, but the efforts to date have been very helpful and would leave Colorado in a place to begin developing a framework in 2020 if resources become available. In 2019, the division participated with Water Reuse Colorado in a project to further define the regulatory framework.

III. MONITORING ACTIVITIES

The division’s surface water monitoring activities for SFY2019 were grouped into six general types: (A) routine sampling, (B) special studies, (C) lake and reservoir monitoring, (D) aquatic life and habitat studies, (E) nonpoint source monitoring, (F) and augmented monitoring funds.

A. Routine sampling

The division uses a rotating basin approach for primary stream monitoring. The entire state is sampled on a five-year cycle that matches the commission’s schedule for triennial reviews of basin standards and classifications. For the purposes of conducting triennial reviews, the state has been divided into four major river basins. Each of the four major river basins is sampled intensively once every five years. This allows the division to concentrate its limited resources on the one basin scheduled for triennial review that year and to provide data for the review and for other data objectives such as impairment determination and source

control investment targeting and evaluation. Sampling is more evenly allocated among the long-term trend sites in the four basins, where special studies are conducted and where specific data gaps may be filled. In every fifth year of the cycle, Regulation 31 (Basic Standards and Methodologies for Surface Water) is reviewed by the commission, and there is no need to intensively sample one of the major basins.

The number of sites and the number of times a specific site is sampled each year is controlled by the division's monitoring budget for laboratory analyses, which in SFY2019 was \$457,851. The samples collected are analyzed by the department's Laboratory Services Division. Depending upon the amount of data sought for a particular site and its accessibility, sites are visited on a regular schedule, such as monthly or bimonthly, or when weather and road conditions allow access. In SFY2019, there was no specific river basin targeted as there is not a basin rulemaking hearing in June 2021. Sampling efforts will target sites across the state.

Routine water chemistry samples were collected from a network of 246 sampling sites located across the state. Of the 246 total sites, 29 sites are classified as trend sites - in other words, sites to be maintained annually and independent of the sites selected for the focus basin in a particular fiscal year. The trend sites are distributed as follows: seven within the South Platte River Basin, ten within the Colorado River Basin, six within the Arkansas/Rio Grande River basins, and six within the San Juan/Gunnison River basins. Of the total number of sites, 35.5 percent were within the Platte River basin, 30 percent within the Colorado River Basin, 21 percent within the Arkansas/Rio Grande River basins and 13.5 percent within the San Juan/Gunnison River basins. This sampling resulted in the collection of 913 sample sets. Samples were analyzed for a suite of constituents including metals, inorganics and nutrients. Field parameters such as dissolved oxygen, pH, specific conductance, turbidity and temperature were also collected.

B. Special studies

Special studies monitoring includes synoptic sampling events for a variety of projects including legacy mining investigations, total maximum daily load determinations, fish tissue sampling and other water quality investigations. Below are the results of these activities.

Legacy mining

The division continues to support monitoring efforts in the Upper Animas River. The division sampled at a trend monitoring station on the upper Animas River near Silverton below Mineral Creek. This site is sampled every other month during the same 12-month period. However, it is anticipated that the division's involvement in long-term monitoring activities will diminish as an EPA contractor will take over the quarterly monitoring of water quality, sediment, fish, benthic macroinvertebrates and physical habitat that began in September 2018.

In addition to the monitoring efforts described above, the division secured additional grant funding in SFY2019 from the EPA through the Water Infrastructure Improvements for the Nation (WIIN) Act. This funding will be used to estimate the natural annual variability of Upper Animas River benthic macroinvertebrate populations by analyzing sequential years of data at sites across a gradient of metal exposures and to continue funding for a communication liaison position stationed in the Town of Silverton. This liaison serves as a point of contact between EPA personnel attending to the Bonita Peaks Mining District Superfund area and downstream users/stakeholders.

In SFY2019, the division continued to lead the Mine Impacted Stream Task Force. The task force is made up of staff from the division, the Department of Natural Resources/Division of Reclamation, Mining and Safety and the department's Hazardous Materials and Waste Management Division. The goals of this task force are to determine the extent and magnitude of water quality impacts due to abandoned mines and to derive water quality improvements from abandoned mine pollution control projects.

In SFY2019, the task force continued to utilize data collected from the Colorado Abandoned Mines Water Quality Study. This study collected water quality data and field observations from 145 abandoned mine sites in 2016. This information was made publicly available through an interactive web-based map and summary report. Data collected in this effort were assessed through the Colorado Mixed Ownership group, which includes the division, the Department of Natural Resources/Division of Reclamation, Mining and Safety, the EPA, the U.S. Forest Service, the U.S. Fish and Wildlife Service and many other organizations. Based on the assessment, the mixed ownership group identified an initial set of more than 20 abandoned mines to include in a more comprehensive follow-up study which began in June 2018. Work continued through SFY2019 to prioritize follow-up characterization efforts.

The division will continue to coordinate with the Department of Natural Resources/Division of Reclamation, Mining and Safety to identify potential source control projects that will improve water quality in the Animas River Basin and also pursue appropriate funding sources. The division will also coordinate with local public health agencies, the department's Hazardous Materials and Waste Management Division, and EPA Region VIII staff regarding long-term water management activities that will address problems exemplified at the Gold King Mine.

Fish tissue

Seven reservoir and river sites across the state were sampled for fish tissue from July 1, 2017 through June 30, 2018. No new fish consumption advisories were issued. As of July 1, 2019, there were 25 advisories for lakes and reservoirs in Colorado. The division maintains a strong working relationship with the Colorado Division of Parks and Wildlife aquatic biologists by providing rationales behind sampling sites priorities, supporting biologists' efforts in the field, and modifying sampling priorities based on feedback from the biologists.

Selenium - Standards development

In 2016, the United States Environmental Protection Agency (EPA) released its final aquatic life ambient water quality criterion for selenium. The selenium criteria had been in flux for almost 20 years due to the need to diverge from traditional water-based criteria and develop fish tissue-based criteria, which is a unique approach. Selenium is complicated because toxicity does not occur due to direct exposure to water. Rather, selenium accumulates in the food web and enters aquatic life through the diet. Female fish with selenium-laden diets then transfer the selenium into their eggs, which can cause deformities or death in the developing eggs and larvae.

The EPA's 2016 recommended selenium criterion considers selenium concentrations in four elements: fish egg/ovary, fish whole-body or muscle, a chronic surface water element (with separate values for lentic and lotic waters), and an intermittent surface water element to consider short-term exposures. The surface water elements were developed through food web modeling using data collected from sites throughout the country.

To better understand selenium uptake and movement throughout the various aquatic food webs in Colorado, division staff have been sampling streams statewide in 2018 and 2019. Data collection has included water, sediment, and benthic macroinvertebrates, which are all components of the food web. The samples are being analyzed for selenite and selenate in water, selenium in sediment, and selenium in benthic macroinvertebrates. These data will allow the division to evaluate selenium behavior in Colorado and support updates to Colorado's selenium table value standards. The division expects to bring to the commission a proposal to update the selenium standards by 2027.

Nutrients - Standards development

In 2012, the commission adopted interim numeric nutrient criteria for the protection of the Aquatic Life Use in rivers and streams. These values were based on a stressor response relationship derived from the response

of the macroinvertebrate community to nutrient concentrations. The EPA took no action on the total phosphorus and total nitrogen interim values for rivers and streams adopted by the commission.

In order to develop a multi-assemblage approach to nutrient criteria as recommended by the EPA, the division is working towards using algal community endpoints such as diversity, abundance, and biomass to refine nutrient criteria for streams. This approach would include developing a relationship between nitrogen and phosphorus concentrations and the response of the algal community to the endpoints.

In 2017, the division contracted with TetraTech to summarize the division's existing algal data for streams (algal ID, chlorophyll a, ash-free dry mass) to evaluate suitability for developing refined nutrient criteria and identify potential data gaps. Drawing on the results of the report during the SFY19 and SFY20 field seasons, the division has been targeting eutrophic streams, streams in biotypes 2 (mountains) and 3 (plains), and targeting "stressed" sites in all use classes and reference sites in cold 2 and warm use classes. The division's current sampling efforts will bolster the existing data set and fill gaps identified in the report.

These data will allow the division to better understand algal community characteristics and responses to nutrients, develop algal indices that are responsive to nutrients, and identify protective use-based thresholds. The division plans to propose revised standards for phosphorus and nitrogen for rivers and streams in 2027.

Restoration planning and TMDL development

The Nonpoint Source and Watershed Analysis and Implementation Support work groups, in collaboration with the Environmental Data Unit, conducted selenium monitoring in the Lower Arkansas during this reporting period. The purpose of this special study - to be complete by September 30, 2020 - is to establish a detailed baseline of water quality and sediment data in order to inform model development and refine projections of reasonable progress in reducing selenium in the Lower Arkansas system from the John Martin Reservoir to state line. This monitoring strategy is identified in Colorado's Monitoring and Assessment (2016 - 2026) Strategy and will support the TMDL "alternative approach plan" for the Lower Arkansas River Basin.

Total Maximum Daily Load (TMDL) development to evaluate *E. coli* impairments in the urban corridor was prioritized by the Watershed Analysis and Implementation Support (WAIS) Work Group. While the WAIS work group routinely collects data in support of TMDL development, because *E. coli* data are highly variable, assessment methods require data to be collected at a high frequency which results in the need to develop TMDLs based on fine spatial- and temporal-scale data. These data needs could not be met with WAIS staff resources and the analytical budget allocated for TMDL development. The WAIS work group, therefore, secured funding from the Colorado Water Resources and Power Development Authority and partnered with Colorado State University to conduct several seasons of *E. coli* and stream discharge monitoring at a frequency and spatial resolution to support development of TMDLs for segments of the Cache la Poudre River, Sand Creek and Clear Creek. The monitoring continued during this reporting period.

C. Lake and reservoir monitoring

The division continued its lake and reservoir sampling in SFY2019. The division focused sampling efforts on the San Juan and Gunnison River basins to provide data for the upcoming triennial review and for lakes on the monitoring and evaluation list ahead of the 2020 hearing for the 303(d) List of Impaired Waters. Six lakes from the San Juan and Gunnison basins were sampled three times each during the growing season. Eight lakes from the Arkansas and Rio Grande basins were also monitored as a screening for monitoring for future basin hearings. Lastly, 10 lakes located in the Front Range were sampled for nutrient criteria development. At each lake, depth profiles of dissolved oxygen, pH, conductivity and temperature were collected at one-meter intervals. Water quality samples were taken from near the surface and near the

bottom. Samples were analyzed for a suite of chemical parameters including nutrients, metals and inorganics. In addition, the surface sample was analyzed for chlorophyll a content as a measure of trophic status and for the phytoplankton population to determine algal species composition. This year, the division started collecting cyanotoxin data from across the state to start understanding the frequency and distribution of the problem in Colorado.

D. Aquatic life and habitat studies

The division collected macroinvertebrate and habitat samples at multiple locations in the state. At each of the habitat sites, water quality samples were taken and analyzed for a specific suite of chemical constituents. These data plus habitat scores, periphyton samples and occasional substrate measurements will be used in the assessment of the aquatic life use and 303(d) or monitoring and evaluation (M&E) listing decisions.

The aquatic life studies included the following activities.

- Targeted sampling of 303(d) listed stream segment (COLCLY22a) as well as sampling of M&E listed stream segments (COUCBL17, COUCUC03, COUCYA13b, and COSPCL02c).
- Investigating Aquatic Life Use Policy Statement 10-1 high quality water declines in MMI scores. Collecting periphyton samples at existing reference sites where that algal assemblage was not previously collected.
- Investigating and visiting candidate reference sites in the Colorado River Basin.
- Characterizing the chemical relationship between benthic macroinvertebrates and nutrients at select Front Range sites.
- Sampling the Dolores River to address data gaps in that sub-basin.
- Gathering sediment data to investigate a potential new sediment region characterized by high elevation and flat terrain, such as North Park, to support continuing improvement of Sediment Guidance 98-1.

The division also collected water quality and macroinvertebrate data from sites near Parkdale, Colorado to support an ongoing temperature logger deployment. In addition, the division worked collaboratively with the Fourmile Watershed Coalition, U.S. Forest Service, Colorado Parks and Wildlife, and Mountain Studies Institute (Durango, CO) in order to collect macroinvertebrate samples at monitoring stations of particular importance to these agencies or watershed groups.

E. Nonpoint source monitoring

The division's nonpoint source (NPS) program is required to report to the EPA results from projects funded through its Clean Water Act Section 319 grant in order to assess the effectiveness of on-the-ground activities to improve water quality. For implementation projects, these results are measured through monitoring, and the program assists project sponsors with monitoring through its Success Story Initiative. The program is also encouraged as part of its Section 319 grant to collaborate with the Natural Resource Conservation Service (NRCS) on the National Water Quality Initiative (NWQI) for priority watersheds in Colorado. The program's role in the NWQI is to monitor the effectiveness of conservation practices that the NRCS helps farmers and ranchers implement to improve water quality in high-priority streams and rivers in the state.

Nonpoint Source Program - Success Story Initiative

The NPS Success Story Initiative provides project sponsors with technical assistance for sampling and analysis plan development, pre- and post-contract water quality monitoring and data analysis, and access to sampling protocols that have been adopted by the division's Environmental Data Unit. Nonpoint source staff implement the program in partnership with the Environmental Data Unit for the collection of nonpoint

source monitoring data. One of the primary focuses for this monitoring collaboration with project sponsors is to highlight projects resulting in restoration of waterbodies that demonstrate reductions of nonpoint source pollution that are then reported to the EPA as nationally-recognized NPS success stories.

During this reporting period, the NPS program highlighted Mineral Creek in the Upper Animas Basin as its success story. Mineral Creek was added to the state's impaired waters list in 1998 for metals and pH. This locally led restoration effort in the heavily mineralized Silverton Caldera of southwest Colorado included over 20 years of characterization, assessment, monitoring, planning and implementation of best management practices targeting runoff from historic mining sites. The collaborative efforts of numerous stakeholders resulted in reclamation of mine waste sites and water quality restoration projects in the Mineral Creek watershed to help remove pollutants. After assessment of water chemistry data, zinc concentrations have generally decreased and copper is being proposed for removal as a source of pollution for Mineral Creek.

The following discussion highlights additional NPS Success Story Initiative program accomplishments during this reporting period.

Kerber Creek and Willow Creek restoration projects

The nonpoint source program continued sample collection to evaluate long-term effectiveness of best management practices (BMPs) to address mine wastes/tailings in the Kerber and Willow Creek watersheds. Sampling for these two creeks was conducted during the reporting period for post-implementation monitoring.

Lower Arkansas River selenium and nutrient reduction project

Nonpoint source funds were used to support the implementation of BMPs to address selenium and nutrient runoff to the Lower Arkansas River. In collaboration with local partners, the nonpoint source program conducted pre-project monitoring to establish a baseline to quantify irrigation BMP efficiency through BMP performance monitoring to assess effectiveness for reducing selenium and nutrient loading.

National Water Quality Initiative

The NPS program continued its partnership with the EPA and NRCS to control nonpoint source pollution from the agricultural sector through collaborative efforts with local producers. Data are gathered in collaboration with NRCS and local producers to evaluate effectiveness of conservation practices implemented in the watershed to reduce nonpoint sources of nutrients. During this reporting period, the NPS program, in collaboration with local producers and NRCS, gathered data in the Grape Creek/DeWeese Reservoir watershed which is one of the NWQI watersheds. The NPS program also continued its assessment of data collected from 2014 – 2018 to evaluate impacts that conservation practices are having on water quality in the Grape Creek watershed. Initial data assessments indicate improved water quality from implementation of conservation practices, and the NPS program plans to continue data collection to better document and understand the effect of these practices.

F. Augmented monitoring funds

In order to upgrade state monitoring efforts and implementation of the monitoring and assessment strategies for states, Colorado applies for Clean Water Act Section 106 monitoring initiative grant money every year. Colorado received \$156,180 of these monitoring initiative funds to facilitate the implementation of the EPA's 10 Elements document by conducting a statewide probabilistic survey of water quality as part of a national project. Additional monitoring projects were completed in SFY2019. The division has designated these funds for additional monitoring of rivers and lakes, sediment sampling, and periphyton/phytoplankton sampling for standards development and 303(d) determinations.

In SFY2019, four studies evaluated the water quality changes in receiving streams as a result of the

implementation of Water Pollution Control Revolving Fund assisted infrastructure projects. These studies included continued work and characterization of improvements to the Town of Cedaredge Wastewater Treatment Facility, Town of Wray Wastewater Treatment Facility, Town of Nucla Wastewater Treatment Facility and City of Durango Wastewater Treatment Facility.

Additionally, in SFY2019, one study evaluated water quality impacts and quantified pollution contributions from abandoned hardrock mines. This study occurred in the East Mancos drainage near Durango. The data collection phase of this study was conducted during SFY2019. The assessment and reporting phase will take place in SFY2020. This project is being conducted with several partners including the Division of Reclamation, Mining and Safety and the Mountain Studies Institute.

IV. PERMITS PROGRAM

A. Permitting

As of September 30, 2018, approximately 7,851 permits were in effect. About 381 were individual permits, and the remainder were certifications under 15 general permits.

Industrial and domestic discharges to surface water (process water)

Traditional sources were the first to be permitted following promulgation of the Clean Water Act in 1972 and are referred to as process water. This includes discharges from domestic sewage systems, contaminated groundwater, and a variety of industrial sources such as manufacturing, food processing, natural resource extraction, transportation, electric services, and construction.

As of September 30, 2018, approximately 1,382 permits authorizing these types of discharges were in effect. About 381 were individual permits while about 1,000 were authorizations under 15 general permits. Some of the industrial permits also include stormwater protections.

Municipal separate storm sewer systems (MS4)

Operators of MS4s in urban areas are required to obtain permit coverage for discharges from their MS4s to waters of the state. Operators of MS4s include Colorado cities and counties (referred to as “standard” MS4s) as well as other governmental organizations such as the Department of Transportation, special districts, and school districts (referred to as “non-standard” MS4s). The permits require the implementation of control measures to prevent or reduce the discharge of pollutants to waters of the state.

Discharges from five of the largest MS4s in the state are authorized under individual permits. As of June 30, 2019, discharges from approximately 59 MS4s operated by cities and counties (standard MS4s) were authorized under two general permits, and discharges from approximately 61 MS4s operated by other governmental organizations (non-standard MS4s) were authorized under a third general permit. The division is currently in the process of renewing the non-standard MS4 as well as an individual MS4 permit.

Industrial stormwater

Operators of industrial and mining facilities in certain categories are required to obtain permit coverage for discharges of stormwater from their facilities or else certify that their industrial activities are not exposed to precipitation. Some of these permits (like for mines) are combined with their individual process water permits; others are under general permits, like the industrial stormwater permit. As of September 30, 2018, discharges from approximately 892 facilities are authorized under these general permits. Another 386 facilities have certified that their industrial activities are not exposed to precipitation.

Construction stormwater

Site operators engaged in clearing, grading and excavating activities that disturb one acre or more, including smaller sites as part of a larger common plan of development, must obtain permit coverage for their stormwater discharge. The division authorizes all construction stormwater discharges in the state under one general permit.

As of September 30, 2018, the division had about 4,755 construction stormwater permit certifications. The number of authorizations under this general permit varies significantly year to year and seasonally, but this number has shown an upward trend over the last several years that correlates with an increasing trend in the number of active construction projects. The division renewed the general permit in November 2018 and the new permit became effective on April 1, 2019. The division processes all applications under the new permit through the Colorado Environmental Online Services (CEOS) platform.

Pesticides

A 2009 federal appeals court decision resulted in a requirement for entities applying pesticides in or near waterways to obtain discharge permit coverage by an October 31, 2011, court-ordered deadline. The current Colorado pesticides general permit was renewed in 2014 for a five-year term; a draft renewal was put out to public notice in September 2019. The pesticides general permit is a self-implementing permit and if pesticide use remains under a certain threshold, reporting is not required. This makes it impossible to know exactly how many dischargers have coverage. However, the division collected reports from approximately 45 dischargers in 2019, and discussions with dischargers indicate that many have reduced pesticide use in order to stay below the reporting threshold.

Groundwater

The division issues permits authorizing discharges to groundwater from domestic sewage systems with a design capacity greater than 2,000 gallons per day. Discharges from smaller systems are subject to county authority. This is a state only permit program. The division estimates that there are approximately 200 facilities that should be permitted; however, many of these facilities do not have current permits. Division staff in the enforcement, engineering, field services, and permitting sections have developed a new process to identify these facilities and ensure that owners of these facilities obtain the appropriate permits.

This process is resource intensive because many facilities without appropriate permit coverage need to upgrade their level of treatment. To assist these operators, the division works with them to upgrade their systems prior to issuing new permits or includes compliance schedules in permits that outline the steps facilities need to take to comply with effluent limits. The division has made significant progress in permitting these discharges from 2017-2019, renewing two old general permits and renewing large numbers of certifications under those permits. As of September 30, 2018, approximately 160 groundwater permits were active.

Biosolids

The division implements a state biosolids program consistent with the direction provided in Regulation 64. The regulation provides authority to the division for implementation independent of, and more stringent than, the federal biosolids requirements for land application. Both the federal and the Colorado regulations governing beneficial use of biosolids identify allowable levels of heavy metals and pathogens in the biosolids and set restrictions and management requirements. The regulations require that application rates be based upon the nutrient requirements of the crops under cultivation. In 2018, approximately 87.8 percent of biosolids generated by municipal wastewater treatment facilities in Colorado were beneficially reused and subject to regulation under the program. Because Colorado has not been formally delegated authority to implement the federal biosolids program, the EPA retains ultimate authority over the federal program.

Prereatment

The division implements a state pretreatment program consistent with the direction provided in Regulation 63. The division's administration of the program focuses on issuing permits or control mechanisms to significant industrial user facilities that discharge to domestic sewage systems without a federally approved local pretreatment program. The regulation provides authority to the division for implementation of requirements equivalent to and more stringent than the federal program.

The division currently has two state-authorized pretreatment programs and ten permits or control mechanisms for industrial user facilities. This tool is a strong complement to the federal pretreatment framework. Because Colorado has not been formally delegated authority to implement the federal pretreatment program, the EPA retains ultimate authority over the federal program.

Reclaimed water

The division implements a state reclaimed water program consistent with the direction provided in Regulation 84. There is not a corresponding federal regulation that addresses uses of reclaimed water. Regulation 84 requires permitting by the entity that treats and distributes the reclaimed domestic wastewater as well as each entity that uses reclaimed water. A total of 26 entities are authorized to treat and distribute reclaimed water. In 2018, 15.4 million gallons of reclaimed water were used for agricultural irrigation; 16.06 million gallons of reclaimed water were used for commercial zoo operations; 1.44 million gallons were used for industrial categories; and 4.23 billion gallons were used for landscape irrigation.

Permitting performance measures - Permit backlog and high priority permits

Backlog is a measure of uncompleted work. A backlogged permit is defined as a permit that has not been renewed prior to its expiration date or as a new individual permit that is not issued within 180 days of receipt of the permit application. In May 2000 as part of a national backlog reduction initiative, the EPA required a permit backlog reduction plan for the division due to its inability to keep up with permit renewals and requests. Shortly thereafter, the EPA first approved the division's backlog reduction plan, and backlog maintenance expectations have been included in the annual state EPA performance partnership agreement ever since.

In 2017, HB17-1285 - Refinance Water Pollution Control Program Act became law. The legislation has specific requirements for the annual reporting of backlog measurements, including non-federal programs like the groundwater permitting program. The numbers reported to the legislature in 2019 are shown below and are as of September 30, 2018.

	No. of backlogged permits	No. of current permits	Total	Percent of backlogged permits
Groundwater Process Water Individual Permits	13	5	18	72%
Groundwater Process Water General Permits	129	7	136	95%
Pesticides Application General Permit	0	75	75	0%
Surface Water Stormwater Individual Permits	6	1	7	86%
Surface Water Individual Permits	138	242	380	36%
Surface Water Process Water General Permits	291	1,091	1,382	21%
Surface Water Stormwater General Permits	5,792	61	5,853	99%
Total	6,369	1,482	7,851	81%

B. Environmental agriculture program

The environmental agriculture program administers regulatory, permitting, compliance assistance and compliance assurance activities for animal feeding operations (AFOs), concentrated animal feeding operations (CAFOs - e.g., large dairies, feedlots, poultry facilities) and housed commercial swine feeding operations (HCSFOs). The program utilizes a sector-based approach that takes into account the interaction and environmental impact of air, water and soil resources when making regulatory and policy decisions.

The program oversees 93 swine farms covered by nine individual HCSFO permits, 90 certifications under the general CAFO permit, one individual CAFO permit, 118 non-permitted CAFOs, and hundreds of AFOs. The program administers the following regulations: Water Quality Control Commission Regulation 61 - Colorado Discharge Permit System Regulations; Regulation 81 - Animal Feeding Operations Control Regulation; Regulation 66 - Financial Assurance Criteria Regulation for Colorado Housed Commercial Swine Feeding Operations; and Air Quality Control Commission Regulation 2, Part B - Odor Emission for HCSFOs.

During SFY2019, the program completed 227 compliance assurance inspections at animal feeding operations. Of these inspections, 41 were conducted at CAFOs and 186 were conducted at HCSFOs. CAFO inspections included 17 permitted CAFOs, 23 non-permitted CAFOs and one follow-up inspection at a non-permitted CAFO to verify compliance with corrective actions identified during the previous inspection year. In addition, the program conducted 25 compliance assistance site visits at CAFOs and AFOs to facilitate their understanding of the regulations and applicable record-keeping requirements. The program conducted 93 water quality inspections and 93 odor inspections at HCSFOs.

Overall compliance rates at CAFO facilities continued to be strong in SFY2019. On average, inspected non-permitted CAFOs were compliant with approximately 89% of relevant surface and groundwater requirements while permitted CAFOs were compliant with approximately 87% of relevant surface and groundwater requirements. HCSFO compliance rates remained very high with approximately 98% of sites in compliance with applicable air and water permitting requirements. No violations were found at 33% of the CAFOs inspected in SFY2019 and only three violations were identified during the 186 HCSFO inspections.

The number of days required for CAFO facilities to return to compliance following an inspection decreased in SFY2019. On average for inspected facilities that reached their compliance due date, non-permitted CAFOs returned to compliance in 87 days, down from 118 days in SFY2018 and permitted CAFOs returned to compliance in 69 days, down from 126 days in SFY2018. The number of days for HCSFO facilities to return to compliance remained consistent at 19 days in SFY2019.

The program completed the final three CAFO renewal certifications under general discharge permit COA933000 and certified an additional two CAFO facilities in SFY2019. The program currently has three new applications for permit coverage under review. Eight of the nine HCSFO individual discharge permits were renewed in SFY2019. The final HCSFO individual permit expires in January 2020 and will be renewed in SFY2020.

Program goals for SFY2020

- Enhance the program's inspection processes and the division's online database to conduct all CAFO and HCSFO inspections with program staff. Conducting all inspections in-house allows the program to oversee all aspects of compliance assurance, focus on compliance areas of concern, and continue to operate efficiently without increasing stakeholder fees.
- Develop a risk-based assessment tool that allows the program to identify CAFO operations that are in close proximity to surface water, groundwater, and urban development. Identification of facilities with high risk factors allows the program to focus resources on compliance assistance and best management practice implementation.

- Continue to utilize the AFO compliance binder along with compliance assistance site visits to assist small and medium-size AFOs with regulatory compliance and recordkeeping.
- Continue program improvements to maintain an efficient and effective program that meets stakeholder expectations and supports the department's strategic plan.

C. Water quality information systems

The division uses a rolling five-year technology plan to manage the modernization and integration of information systems. The plan currently includes several platforms to share information, complete internal workflows and facilitate external communications. These systems are provided by Google, Microsoft and custom software providers. A description of the current technological status in SFY2019 follows.

The Safe Drinking Water Program's July 2014 EPA Cross-Media Electronic Reporting Regulation (CROMERR) approval of its Colorado Drinking Water System (CDWS) enabled the program to receive compliance data and reports electronically. On June 15, 2015, pilot testing of the CDWS concluded and full implementation commenced. Since its implementation, the CDWS system has provided significant improvements in efficiency and effectiveness in the Safe Drinking Water Program's receipt of required compliance data and other reports. Of the approximately 2,000 public water systems that are required to submit compliance data, approximately 1,900 public water systems, 60 laboratories, and 2,000 individual users are utilizing the portal to submit reports and sampling data. The department routinely processes an average of 2,000 files per month through the portal. Implementation of the CDWS fulfills long-standing stakeholder requests to provide a reliable, easy to use electronic submittal mechanism. As the department's customer interface modernization project, Colorado Environmental Online Services (CEOS), is able to meet the business needs of the Safe Drinking Water Program and its stakeholders, it is planned that CDWS will be integrated into CEOS.

The EPA promulgated a new rule requiring electronic reporting for current paper-based National Pollution Discharge Elimination System (NPDES) reports, effective December 21, 2015. The division supports electronic reporting as it saves time and resources for permittees, the state, and the EPA while improving compliance and resulting in better protection of the nation's waters. The rule requires permittees and regulators to use information technology to electronically report information and data related to the NPDES permit program in lieu of filing written reports. The rule required Discharge Monitoring Reports (DMRs) to be submitted electronically by December 21, 2016, unless a waiver had been granted. Originally, all other documents were required be submitted electronically by December 21, 2020, unless a waiver had been granted, but the EPA recently extended the deadline for the electronic reporting rule until December 21, 2023. The division has made substantial progress in implementing the requirements of phase 1 of the EPA's Electronic Reporting Rule by requiring permittees to submit their DMRs electronically through the NetDMR system. The current permitted universe requiring a DMR is 2,462. There are currently 1,490 permits submitting DMRs electronically through NetDMR.

The department's environmental programs have embarked on a long-term project called Colorado Environmental Online Services (CEOS). This initiative is designed to create an umbrella system for customers to interface with all of the department's environmental divisions. This interface will provide a single point of entry for customers to electronically provide and obtain environmental information. This system will bring the division into compliance with the EPA's Electronic Reporting Rule. The following two groups within the division are using CEOS.

Grants and Loans Unit

The division's Grants and Loans Unit fully implemented CEOS in June of 2018 for both the Water Pollution Control and Drinking Water Revolving Fund programs. The system has been designed to manage each eligibility survey, submittal, and workflow with respect to a community's project funding. Further, the

system allows efficient and effective collaboration between the managing agencies, which are the Department of Local Affairs and the Colorado Water Resources and Power Development Authority.

Permits Section

The division's Permits Section began testing CEOS in August of 2018 with a small number of Colorado Discharge Permit System general permits. When CEOS is fully operational, the division will be able to accept all Colorado Discharge Permit System permit applications. Users will be able to perform a number of activities such as applying and paying for required permits, uploading documents required by regulation or statute, and also updating and modifying information on file. In turn, the division will be able to process requests from the regulated community and provide appropriate permits back through the same portal. The Permits Section has implemented the processing of dewatering and construction stormwater permits through CEOS. The process for receiving, processing, and issuing the permits is now much faster and more accurate. The division is now managing 8,751 permits through CEOS. There are 7,453 NPDES general permits and 383 individual permits managed through legacy systems. As with any large-scale system change, there are challenges. The division and vendor are addressing each challenge and resolving them to improve our interactions with permit holders. As the Permits Section moves more of its operation into CEOS, further efficiencies and customer service improvements will be gained.

Aside from CEOS, the division continues to update and improve other systems, including the standards database for the commission that manages and organizes all of the water quality standards, designations, classified uses, and temporary modifications. This database includes over 30,000 data records for more than 1,000 waterbody segments. The division continues to increase the availability of information online through the expansion of our online records system. The Colorado Environmental Records System allows citizens better access to vital environmental information, fosters quicker and more predictable interactions with stakeholders, and allows division personnel to make more informed decisions based on timely and accurate information. In conjunction with the department, the division is moving toward more modern, efficient platforms. The department is in the process of adopting an application program interface management system and a new document and workflow management platform. The division is also taking advantage of other available tools to improve processes. The department and division are moving into a more efficient and effective business driven design and application creation model.

The examples here illustrate the use and importance of the five-year information technology plan to map the strategic direction for the division's information systems. Each operational area is being examined to make sure the division is using the most efficient technology available.

V. STATE FUNDED GRANT PROGRAMS

A. Water Quality Improvement Fund

During the 2006 legislative session, the General Assembly created the Water Quality Improvement Fund (WQIF) (CRS Section 25-8-608[1.5]), and the commission adopted Regulation 55. The WQIF was created to provide grants to local communities/entities to improve water quality, health, and safety. Revenue for the fund comes from penalties assessed on polluters who have committed water quality violations.

During the 2012 legislative session, the General Assembly authorized an additional \$600,000 for capital construction funding. Historically, \$167,000 was appropriated annually with a requirement that the funds be expended within the fiscal year. The 2012 changes provided additional funding, required grants be issued for stormwater management training, and allowed the flexibility to expend the funds over three years.

During the 2018 legislative session, the spending authority for the Water Quality Improvement Fund was increased to \$1,500,000, if the fund balance supports this amount. The division issued a Request for Application in SFY2018-19. The table below shows the awardee and the amount of the award.

TABLE 1 - WATER QUALITY IMPROVEMENT FUND SFY2018-19

Award recipient	Award amount
Manzanola, Town of	\$72,161
Associated General Contractors	\$50,000
Colorado State University	\$50,000
Ramah, Town of	\$135,000
Steamboat Springs, City of	\$90,000
Vilas, Town of	\$135,000
Yuma, City of	\$100,000
Clifton Sanitation District	\$97,839
Total	\$730,000

B. Natural Disaster Grant Program

During the 2014 legislative session, the General Assembly created a new Natural Disaster Grant Program to assist communities with water/wastewater infrastructure projects as a result of any natural disasters. Further, the general assembly appropriated \$17 million to assist water and wastewater entities with rebuilding as a result of the September 2013 floods. Of the original 25 grants, there is one currently outstanding: Town of Lyons.

C. Small Community Grant Program

Senate Bill 14-025 revised and consolidated the small communities water and wastewater grant fund to be codified in CRS Section 25-1.5-208: Concerning the establishment of a grant program under the Colorado Water Quality Act to assist suppliers of water and domestic wastewater treatment works that serve a population of not more than 5,000 people with meeting their responsibilities for the protection of public health and water quality. Since this program is funded directly from energy severance tax, it has not received funding since 2016. This is a result of a significant decline in severance tax revenue.

VI. WATER QUALITY CHALLENGES

A. Legacy mining impacts to water quality

The discharge of low pH metals-laden water into the Animas River on August 5, 2015, at the Gold King Mine near Silverton highlighted the potential impacts of past mining activities on water quality in Colorado. The

division's response to the release during this reporting period included monitoring and data analysis. The division collected water quality, sediment, and fish tissue samples in the Animas and its tributaries and assessed the data after the release.

To continue to examine the impacts to water quality from mine activity throughout the state, the division formed an internal task force. The initial focus of this task force was to identify available data regarding mining impacts to water quality and to make recommendations about how to close any data gaps. The division continues to coordinate with the Colorado Department of Natural Resources/Division of Reclamation, Mining and Safety to identify potential source control projects that will improve water quality. The division will also coordinate with local public health agencies, the department's Hazardous Materials and Waste Management Division, and EPA Region VIII staff regarding long-term water management activities that will address mining-related water quality issues. Additional details regarding the monitoring and assessment work conducted by the task force is found above in the special studies section.

B. Possible health threats to drinking water

Lead

The events in Flint, Michigan created heightened awareness of lead in drinking water and generated public interest and media scrutiny. Additionally, the EPA modified its expectations for states to implement the Lead and Copper Rule (rule). The intensity of effort devoted to implementing this rule has not subsided. The division carefully implements the rule as written in accordance with the Colorado Primary Drinking Water Regulations and as directed by Dr. Larry Wolk in his 2016 letter to the EPA.

In March 2018, the division designated orthophosphate as the optimum corrosion control treatment (OCCT) for Denver Water based on the latter's corrosion control study. Several parties appealed that decision, but the appeals are now stayed while the division works with stakeholders regarding possible treatment modifications (if rule requirements can be met) and identifying, quantifying and mitigating potential water quality impacts. The stakeholder process was completed in September 2019 as the division completed a technical summary report regarding possible impacts and costs associated with orthophosphate addition and identified strategies to mitigate impacts and control sources of phosphorus. As the effort progressed, Denver Water, the EPA and the division determined that a possible approach involving a full lead service line inventory, accelerated lead service line removal, provision of filters to customers with lead service lines, and execution of a communication and outreach plan could be proposed by Denver Water as variance from the OCCT requirement. The EPA would need to approve that variance. Denver Water submitted its request on August 20, 2019, and the EPA's decision is expected by the end of 2019.

Toxic firefighting foam (scientifically referred to as PFAS)

In 2019, three more locations in Colorado beyond the Widefield Aquifer in El Paso County, Sugarloaf Mountain in Boulder County, and the aquifer underlying Commerce City were found to contain PFAS in groundwater: Boulder Mountain Fire District in Boulder County, Buckley Air Force Base near Denver and the U.S. Air Force Academy in El Paso County. The department is partnering with the EPA, local health agencies and the fire department to address these issues. Environmental sampling and investigations continue in all the PFAS contamination sites in Colorado.

The department has developed an action plan to address PFAS contamination in Colorado, and the division briefed the commission on the plan in August 2019. This effort will involve a number of actions designed to reduce human exposure to PFAS in drinking water including an assessment of possible regulatory approaches. This assessment of regulatory approaches will involve an evaluation of which approach(es) would be most effective along with gauging the resource needs to implement regulatory approaches. The

state is still working to understand the risk of PFAS contamination throughout the state and continuing efforts to develop an inventory of sites that might be associated with PFAS releases.

Harmful algae blooms

Cyanobacteria harmful algal blooms (cyanoHABs) have been detected in Colorado waterbodies since at least 2001 and may generate toxins that are dangerous to humans and animals. In 2019, the division helped numerous agencies and local waterbody managers respond to concerns associated with cyanoHABs. The division worked closely with Colorado Parks and Wildlife to collect and test water samples for toxins from numerous lakes. As of the end of August, warning and closure signs were posted for the following lakes after elevated levels of cyanotoxins were detected: Barr Lake, Windsor Lake, Prospect Lake and Homestead Ranch. Additional lakes were also closed by municipalities and private lake managers. More lakes will likely require closure later in the season. Many lakes were tested for cyanotoxins, but toxins were not found at elevated levels. The division has been working closely with the Laboratory Services Division to test samples and communicate results within 1-2 days. Public awareness concerning cyanotoxins has grown tremendously over the last year. So far this summer, the division has responded to numerous media requests and concerned citizen calls.

The division has been coordinating with Colorado Parks and Wildlife to investigate reports of dead dogs that were possibly linked to cyanotoxins. Tests indicated that cyanotoxins were not present in the waterbodies associated with possible dog deaths.

The division is using more sophisticated tools to monitor and screen waterbodies for cyanoHABs. The division has begun utilizing the EPA's Cyanobacteria Assessment Network Mobile Application (Cyan App) as a screening tool for possible bloom locations. In addition, the division is now part of the Cyanobacteria Monitoring Collaborative via the CyanoScope program. The program allows citizen scientists and water quality professionals to track and identify blooms, and this information is becoming increasingly important with growing public awareness and the rising frequency and distribution of cyanoHABs.

The division is coordinating with the EPA on monitoring results from drinking water treatment plants required to monitor for cyanotoxins as part of the agency's Unregulated Contaminant Monitoring Rule. So far in Colorado, there have been no confirmed cyanotoxins in treated drinking water.

In 2018/2019, the division received funding from the legislature to address concerns with cyanoHABs through dedicated staff support and funds to support sample analysis. A new staff person was hired in the spring of 2019, and initial project work has included the development and implementation of a cyanoHAB monitoring program to identify cyanotoxin risk in Colorado. The division is also providing effective and accurate health risk communications regarding exposure to cyanotoxins.

Unregulated Contaminant Monitoring Rule 4

The fourth round of unregulated contaminant monitoring based on the federal rule of the same name began in January 2018. All public drinking water systems above 10,000 in population along with a subset of smaller systems are required to sample for thirty unregulated contaminants. This process helps the EPA determine the occurrence and levels of contaminants around the nation and contributes to the EPA's decision-making regarding the need to regulate these chemicals. Manganese and some disinfection byproducts could be detected at levels of concern, but this has not happened yet. The division coordinated with the EPA and the Colorado Water Utility Council to prepare for this eventuality, but given resource constraints, we remain in a more reactive mode than desired.

VII. CONCLUSION

The division will continue to plan and implement improvements to its monitoring and permitting programs in an effort to maximize efficiencies and focus on those areas where there is the greatest potential for substantive water quality improvement. The division will continue these efforts by evaluating work processes to make systems more efficient by reducing or eliminating redundancy or waste. This may be done with the involvement of stakeholders where appropriate.

Finally, the division will continue to respond to drinking water impacts posed by regulated and unregulated contaminants. The division is involved in various national work groups regarding lead in drinking water and PFAS. The division is also engaging with stakeholders to begin building consensus toward a sustainable funding pathway for the future.

APPENDIX A

Colorado Water Quality Forum Work Groups

Work Group	Led by
10-Year Water Quality Roadmap	Division
MS4 Issues Forum	Division
Permit Issues Forum	Division
PFAS Narrative Policy	Division
Regulation 84 / Hydraulic Fracturing	City of Aurora

For the latest work group status, please visit the Colorado Water Quality Forum website:
<http://colowqforum.org>.