



COLORADO
Department of Public
Health & Environment

Annual Report

to the Colorado Water Quality Control Commission
from the Hazardous Materials & Waste Management Division
Colorado Department of Public Health & Environment



SB 181 Implementation

Compliance with water quality standards & classifications
for the fiscal year ending June 30, 2021

Hazardous Material and Waste Management Division

The division's mission, "to improve the quality of the environment and public health for the citizens of Colorado by continuously improving our efforts to ensure proper management of hazardous materials and waste," fuels our work each and every day in the Hazardous Materials & Waste Management Division (HMWMD). The division is committed to systematically addressing health equity and environmental justice issues through the administration of its programs, three of which are listed below, and by ensuring that meaningful decisions impacting the environment are made with the participation of affected citizens.

Remediation Program

The Remediation Program within HMWMD performs preliminary assessments and site investigations of potentially contaminated sites throughout Colorado, oversees remediation activities at Superfund and federal facilities sites, and facilitates the voluntary remediation and redevelopment of historically contaminated sites. This section summarizes the Remediation Program's efforts at federal facilities, Superfund, and Voluntary Cleanup and Redevelopment Program (VCUP) sites that protect water quality, and in turn, all Coloradans, by implementing state water quality standards. Although the program addresses a number of contaminants in groundwater at 34 facilities/sites across the state, the primary categories of contaminants of concern are summarized below. Site-specific examples of each contaminant are also highlighted.

Volatile organic compounds

The Remediation Program is addressing volatile organic compounds (VOCs) in groundwater at 19 facilities/sites. This includes two active federal facilities, seven former federal facilities, and six Superfund sites across the state. The main VOCs being treated and monitored at these sites are trichloroethylene (TCE), tetrachloroethylene (PCE), and their respective breakdown products. Removal methods for these contaminants vary on a site-by-site basis but are readily available and well-proven.

Additionally, the Remediation Program is addressing 1,4-dioxane, another VOC of concern, at two federal facilities and three Superfund sites. Because this contaminant is a relatively newer focus of environmental cleanups, technologies to remove 1,4-dioxane from groundwater are not as readily available. Currently, the Remediation Program and its federal partners are piloting technologies at multiple sites in Colorado to assess site-specific effectiveness and efficiency.

Site specific summary- Chemical Sales Company Superfund Site

For over 20 years, the Remediation Program has worked with the EPA to address groundwater contaminated with VOCs at the Chemical Sales Company (CSC) Superfund site. By 2014, the Remediation Program, with the EPA, implemented the final phases of a remedy to reduce source area concentrations of VOCs at the site. However, after detecting 1,4-dioxane in several water supply wells operated by South Adams County Water and Sanitation District, it was confirmed that the CSC site contributes to the elevated 1,4-dioxane levels, which are above the state groundwater standard.

In 2018, the Remediation Program secured a contract with a qualified engineering firm to conduct a Focused Feasibility Study (FFS) to consolidate and review site data, identify and define applicable remediation alternatives, and provide a detailed analysis for suitable remedial action alternatives. The Draft FFS, published in July 2020, recommended a pilot study to evaluate the effectiveness of in-situ chemical oxidation using alternative delivery methods. This pilot study also will address source area data gaps and evaluate the effectiveness of this remediation technique. Once the pilot study is complete, the FFS will be finalized, and the Remediation Program will help define a remedial path forward.

Heavy metals

The Remediation and Radiation Control Programs are addressing heavy metals at 16 sites, including one federal facility and 15 Superfund sites. Heavy metals contamination is particularly prevalent at former mining sites across the state. Removal methods for these contaminants vary on a site-by-site basis but are readily available and well-proven, including the installation of long-term water treatment plants.

Site specific summary- Central City/Clear Creek Superfund Site

Over the last 20 years, the Remediation Program has completed significant work within the four operable units that currently make up the Central City/Clear Creek Superfund site. Along the main stem of Clear Creek, the Remediation Program's cleanup efforts include capping more than 15 mine waste piles and constructing two water treatment plants. The Argo Tunnel water treatment plant is located in Idaho Springs and treats the Argo, Big Five tunnel discharges, and Virginia Canyon groundwater. The North Clear Creek water treatment plant is located in Black

Hawk and treats the National tunnel and Gregory Incline discharges. The Remediation Program has started initial investigations on a fifth operable unit to address waste piles in residential areas. Work to address these waste piles is anticipated to also have a beneficial impact on water quality.

Although remedial actions for several of the operable units are nearing completion, and despite significant improvements in water quality in the main stem, ambient water quality exceeds inorganic (metals) standards in several segments. In 2019, the CDPHE Water Quality Control Division (WQCD) completed a 303(d) listing review of the Clear Creek subbasin of the South Platte River basin. The WQCD included several segments in the basin in the 303(d) listing for impairment to aquatic life use due to heavy metals. The Remediation Program and EPA continue to evaluate the need for Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Technical Impracticability waivers of water quality standards on certain stream segments. To assist in this evaluation, a comprehensive water quality assessment is planned as part of the 2022 Five Year Review of the site remedy. In addition, the Remediation Program and EPA are preparing a Permit Equivalent Document (PED) for the North Clear Creek water treatment plant that will incorporate substantive provisions of the WQCD permitting regulations.

Per- and polyfluoroalkyl substances (PFAS)

Per- and polyfluoroalkyl substances (PFAS) are a class of emerging contaminants that includes over 5,000 compounds. PFAS have been used to make fluoropolymer coatings and products that are widely used by consumers, such as non-stick pans, due to their oil and water repellent characteristics. They also have been used to make surfactants, fire fighting foams, and mist suppressants for metal plating operations. The PFAS class includes thousands of anthropogenic compounds, many of which are environmentally persistent and bioaccumulative, therefore posing unique challenges in State environmental cleanup programs.

In May 2016, EPA published a Health Advisory Level (HAL) of 70 parts per trillion (ppt) for combined perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), two PFAS compounds. EPA Health Advisories, however, are not enforceable regulations and cannot be used to compel mitigation or cleanup actions.

In 2018, HMWMD proposed a site-specific groundwater standard of 70 ppt for combined PFOA/PFOS in a portion of the Widefield, Windmill Gulch, Sand Creek, Crews Gulch, and Fountain Creek alluvial aquifers and other adjacent confined aquifers (Specified Area 7),

consistent with the EPA HALs. This site-specific standard applies to the area of the state in El Paso County where drinking water sources are known to be affected by PFOA/PFOS contamination. This site-specific standard became effective on June 30, 2018. Also in 2018, the Colorado Solid and Hazardous Waste Commission listed PFOA and PFOS as hazardous constituents in Colorado.

During the past year, the Remediation Program has been addressing PFAS at six federal facilities and one VCUP site. To date, most of the work related to PFAS has focused on soil, groundwater and surface water investigation and characterization. Pilot studies to test new technologies for soil and groundwater cleanup are currently underway at Peterson Air Force Base (AFB) in El Paso County.

Site specific summary - Peterson AFB

During sampling under EPA's third Unregulated Contaminant Monitoring Rule (UCMR 3), PFAS was detected in the Widefield, Security, and Fountain public water systems of El Paso County. Subsequently, the U.S. Air Force initiated a CERCLA investigation at Peterson AFB to identify potential PFAS source areas and releases. The Peterson AFB Preliminary Assessment report, published in October 2016, identified five possible source areas on the base. Results from the Site Inspection and Expanded Site Inspection, published in 2017 and 2018 respectively, confirmed releases of PFAS from four of the five possible source areas and identified contaminant pathways from confirmed sources off the installation. The next step in the CERCLA process is the Remedial Investigation, which will delineate the full nature and extent of the contamination both on and off the installation. CDPHE worked with the Air Force to scope the Remedial Investigation efforts and has approved the work plan. Remedial Investigation fieldwork is expected to take place in Federal Fiscal Year 2022. Additionally, the Air Force is implementing multiple pilot studies at Peterson AFB, in which new and innovative groundwater and soil cleanup technologies are being tested, including active ex situ and passive in situ remediation techniques, and soil washing.

In addition to the ongoing CERCLA investigation and pilot studies, new drinking water mitigation measures have been installed, including new water treatment facilities for the affected public water systems. At this time, water being served by each of the affected systems is below the May 2016 EPA HALs. For private well owners whose water tested above the EPA HALs, the Air Force has installed reverse osmosis units and continues to maintain those systems.



Radionuclides

The Remediation Program works in conjunction with the Radiation Control Program to implement state water quality standards at three Superfund sites with radionuclides contamination. The Radiation Program implements the state water quality standards and regulates the operational activities and cleanup of current and former uranium processing and disposal facilities through radioactive materials licensing. The primary contaminants addressed by the program are radioactive and heavy-metal wastes and other by-products of uranium processing.

Site specific summary - Lincoln Park, Fremont County

The Cotter/Lincoln Park site consists of a former uranium processing mill located adjacent to the unincorporated community of Lincoln Park, approximately two miles south of Cañon City. The mill operated continuously from 1958 until 1979, and intermittently until ore processing ceased in 2006. All site operations are regulated primarily by a Colorado Radioactive Materials License, and the site is included in the National Priorities list of Superfund sites.

The Remediation Program and Radiation Control Program continue to monitor radionuclides such as lead, polonium, radium, thorium, and uranium quarterly in groundwater in the Lincoln Park area adjacent to the former Cotter uranium mill site. The CERCLA remedial investigation, which defines the nature and extent of the groundwater contamination, is ongoing.

Remediation Program data and information accessibility

The Remediation Program strives to make information regarding environmental cleanups at federal facilities, Superfund, and VCUP sites readily accessible. Information regarding Superfund sites in Colorado can be accessed via the [Superfund website](#). This website provides site-specific information for each Superfund site in Colorado as well as a [Superfund sites interactive map](#). The webpages for individual Superfund sites vary, as a function of the lead agency (EPA or CDPHE) and the needs of the specific communities and/or stakeholders. These websites are designed as a way to better serve the communities by being transparent about the work being done.

Information regarding sites at both active and former federal facilities can be accessed via the [federal facilities website](#). This website provides an [interactive map of Department of Defense](#)

[sites](#) and an [interactive map of Formerly Used Defense Sites](#). The website also provides information regarding each of the sites as well as CDPHE contacts for additional information.

Information regarding Colorado's Voluntary Cleanup and Redevelopment Program can be accessed via the [VCUP website](#). This website provides a listing of the VCUP sites in Colorado, a [VCUP sites interactive map](#), and CDPHE contacts for additional information.

To establish and maintain open communication and transparency with surrounding communities and stakeholders, the Remediation Program has helped form and support Community Advisory Groups and/or Restoration Advisory Boards for environmental cleanups at many federal facilities and Superfund sites. The intent of these groups is to provide a forum for community members and other stakeholders to present and discuss their needs and concerns related to the CERCLA decision-making process, so that the agencies can make more-informed decisions regarding CERCLA cleanups. It is important to the department to hear the voices and concerns of those who live, work, and play in the community. The Remediation Program strives to ensure that all community members are aware of the ongoing work and ways they can get involved.

Solid Waste and Materials Management Program

The Solid Waste and Materials Management Program (the Solid Waste Program) oversees the engineering design, operation, monitoring and environmental compliance of solid waste disposal sites, recycling facilities, and the beneficial use of waste materials throughout Colorado. Recycling facilities and solid waste disposal sites are required to implement the engineering and operational requirements adopted by the Solid and Hazardous Waste Commission in the Regulations Pertaining to Solid Waste Sites and Facilities, 6 CCR 1007-2, Part 1 (the Solid Waste Regulations) to ensure that solid waste sites fully contain waste to prevent negative impacts to groundwater and public health. When a release occurs, the Solid Waste Regulations prescribe steps to characterize and remedy the groundwater impact.

Through its regulatory oversight efforts, the Solid Waste Program implements the groundwater standards at over 440 solid waste disposal sites and facilities. This section details a few Solid Waste Program efforts to monitor for negative impacts to groundwater at active solid waste disposal sites and to remediate groundwater contamination when it is discovered. The Solid Waste Program is working to quantify the number of solid waste sites that are closed, or in post-closure care, that continue to monitor and remediate groundwater.

Volatile Organic Compounds

The Solid Waste Program currently requires 74 active solid waste disposal sites to sample and analyze for volatile organic compounds (VOCs) at points of compliance surrounding their facilities.

One of the most prominent VOCs found leaching from solid waste landfills is 1,4-dioxane. 1,4-dioxane is used to stabilize chemical solvents and is used in numerous industrial manufacturing processes. Landfills with a long operational history may have accepted wastes containing 1,4-dioxane for a long period of time before public health agencies identified their toxicity and mobility.

Site specific summary - Larimer County Landfill

The Larimer County Landfill is one solid waste landfill that detected 1,4-dioxane in groundwater monitoring wells at their facility. The Larimer County Landfill began operations in 1963, prior to landfill liner requirements. Like many landfills that were cited before the Solid Waste Regulations took place, the Larimer County Landfill is situated in a drainage area with natural surface water flows.

The Solid Waste Program is working with Larimer County to develop an assessment of corrective measures. During this process, the county will submit a proposal that includes an evaluation of potential actions they can take to reduce the off site migration of 1,4-dioxane. In Larimer County's case, the division will look to divert surface water away from the landfill to limit the saturation of landfilled waste and the leaching of 1,4-dioxane from the waste into groundwater.

Larimer County and Fort Collins own the property downgradient of the landfill, and both have agreed to restrict the use of the groundwater on their respective properties until the groundwater flowing to their properties meets the groundwater standards.

Heavy metals & Inorganics

The Solid Waste Program requires the sampling and analysis of heavy metals in groundwater at 105 solid waste facilities that actively accept solid waste for disposal or processing. The Solid Waste Program found that metals migrating from facilities vary by the facility type and the wastes they accept. Several solid waste sites have detected metals in the groundwater monitoring wells and are currently in assessment monitoring.

The Solid Waste Program also has observed nitrates leaching into groundwater at composting facilities, and chlorides leaching from impoundments at exploration and production waste impoundments. Many inorganics in groundwater, like nitrates and chlorides, come from acid leachate migrating beneath landfills.

Site specific summary - A1 Organics

A1 Organics in Keenesburg is Colorado's largest composting facility. The A1 facility accepts biosolids, manure, food waste, yard waste, wood waste, and miscellaneous industrial sludges. The facility sits on top of 15 to 20 feet of eolian sand which appears to be recharged from precipitation and potentially from the water used in A1's operations. A1's groundwater monitoring efforts discovered elevated nitrates in downgradient groundwater wells.

After detecting nitrates, A1 Organics began conducting assessment monitoring and confirmed that their composting activities are leaching nitrates to groundwater. Manure and biosolids are both significant sources of nitrate. Currently, A1 does not control surface water on the site, as precipitation falling on the site and contact water from the compost piles seep into the sandy soils below. The division is currently working with A1 to obtain an assessment of corrective measures that will provide operational or engineered changes to their site to prevent the seepage of nitrates into the underlying aquifer.

Per- and polyfluoroalkyl substances (PFAS)

Per- and polyfluoroalkyl substances (PFAS) are not included in the groundwater monitoring parameters in the Colorado Solid Waste Regulations. Due to this fact, the Solid Waste Program has not required monitoring of PFAS substances in groundwater at solid waste sites to date. The Solid Waste Program has required PFAS sampling in soil to ensure the complete cleanup of a PFAS containing solid waste that was improperly discharged to land. This is discussed in the section below.

Site specific summary - Security and Emergency Response Training Center

The Security and Emergency Response Training Center (SERTC), east of Pueblo, serves as a testing location for new railroad equipment and a training center for railroad employees and other emergency responders on extinguishing railroad related fires. SERTC is designed to capture and contain all of the solid waste generated during fire training.

In 2018, the Solid Waste Program learned that the Transportation Technology Center, Inc. (TTCI) employees were conducting fire training activities outside of the approved waste containment areas. Fire training activities included the use of PFAS-containing firefighting foam. The Solid Waste Program worked with TTCI to develop a waste removal plan. In addition to sampling soil for VOCs, the waste removal plan required PFAS soil sampling in an effort to ensure that PFAS did not remain in the soil and potentially contaminate groundwater. TTCI's soil sampling confirmed the complete removal of PFAS contaminated soil.

Radionuclides

The Solid Waste and Materials Management Program requires 13 solid waste facilities to sample and analyze for radionuclides as a part of their groundwater monitoring program. Analyzing for radionuclides is typically required at facilities that accept waste streams known to contain elevated radionuclides. The few solid waste facilities required to sample and analyze for radionuclides accept coal combustion residuals, drinking water treatment residuals, or exploration and production wastes.

To date, the Solid Waste Program has not found exceedances of the groundwater standards for radionuclides at any solid waste disposal sites. The Solid Waste Program will continue to work with the division's Radiation Control Program to evaluate groundwater monitoring and waste acceptance requirements to ensure that solid waste facilities are safely managing radionuclides.

Solid Waste Program data and information accessibility

The Solid Waste and Materials Management Program provides information to the public via the [Solid Waste and Materials Management website](#). The website includes directories of the different types of solid waste facilities, program guidance documents, a list of current stakeholder processes, Solid Waste Program staff contacts, and solid waste data and reports.

The [Solid waste guidance and policy webpage](#) provides guidance related to groundwater monitoring waivers for small landfills, memorandums of understanding with other state agencies, and engineering design requirements for solid waste facilities that ensure the protection of groundwater while managing solid waste.

Hazardous Waste Program

The Hazardous Waste Program, Colorado's equivalent of the Resource Conservation and Recovery Act (RCRA) program, is responsible for ensuring compliance with laws and regulations pertaining to the management of hazardous waste as well as oversees the remediation and cleanup of

hazardous waste facilities throughout the State. The Hazardous Waste Program continues to require hazardous waste sites to remediate groundwater to Colorado groundwater standards. The Hazardous Waste Program also evaluates low risk sites with low-level residual groundwater contamination, relative to the division's Conditional Closure Policy and Guidance (CCP&G). Although the CCP&G has been in effect since 2014, the Hazardous Waste Program has only approved five conditional closure requests. The Hazardous Waste Program did not approve any conditional closure requests in 2020.

Currently, the Hazardous Waste Program is helping to remediate approximately 200 hazardous waste sites in Colorado. The majority of the remediation efforts include impacts to groundwater. The sites range in complexity from the Rocky Flats Department of Energy site in Jefferson County, to small dry cleaning facilities.

Volatile Organic Compounds & Inorganics

Volatile organic compounds (VOCs) are the main contaminant of concern at over 90% of the sites being addressed in the Hazardous Waste Program. Semi-volatile organic compounds and inorganics are also contaminants of concern.

Site specific summary - Bright Cleaners

Bright Cleaners, located at 854 W. Buckley Road, operated as a dry cleaner from 1989 through 2015. In 2015, the property owner performed an environmental investigation of the site to facilitate a property transaction. Investigators determined that soil and groundwater were impacted with chlorinated solvents from dry cleaning operations.

The property owner's environmental consultant, with the Hazardous Waste Program's oversight, did not find significant sources of contamination in soil. Therefore, the site's remediation centered around cleaning up groundwater contamination. With support from the Hazardous Waste Program, the property owner's environmental consultant injected a treatment fluid called BOSS 100 into the subsurface to clean up groundwater at the site. They injected BOSS 100 at various depths and locations to remediate groundwater. Ultimately, the property owner's environmental consultant injected about 4500 lbs of BOSS 100 into the subsurface, using 8800 gallons of water, totaling 500 injections at 60 different injection points. It took about two weeks to complete injection activities. To verify that the groundwater met the applicable standards and contaminant concentrations were not rebounding, the Hazardous Waste Program supported groundwater monitoring from 2017 to 2019. In 2020, the Hazardous Waste Program issued a No

Further Action determination for this site, noting that it poses no unacceptable risk to human health or the environment.

Per- and polyfluoroalkyl substances (PFAS)

Following discoveries of PFAS in groundwater in Colorado, the Hazardous Waste Program added two PFAS constituents, perfluorooctanoic acid (PFOA) and perfluorooctyl sulfonate (PFOS), to the Appendix VIII list of regulated hazardous constituents in April of 2018. Through this listing, the Hazardous Waste Program requires sites performing corrective action for hazardous waste releases to also evaluate the nature and extent of PFOS/PFOA that may be released due to site operations. The Hazardous Waste Program can only require sites to analyze groundwater for PFOA and PFOS, because these two PFAS compounds are listed as hazardous constituents in the State's regulations. However, the majority of sites that perform monitoring for the Hazardous Waste Program include analyses for a broader range of PFAS.

To date, with support from the Hazardous Waste Program, facilities have performed groundwater investigations at 19 different sites. PFOA/PFOS were detected at 15 of those sites. These sites included: landfills, plating shops, oil and gas facilities, and electronics manufacturers. At the majority of these sites PFOA/PFOS contamination in groundwater is fairly limited, contained within the property boundary or extending a short distance offsite. There are a handful of sites, in or near industrialized areas, where groundwater monitoring shows potential releases of PFOA/PFOS at a corrective action facility commingled with other potential sources in the general area. These sites will take more time to fully investigate, due to the need for more comprehensive groundwater data. To date, the Hazardous Waste Program has not yet required corrective measures specifically for the remediation of PFOA/PFOS.

The Hazardous Waste Program routinely coordinates with the WQCD during PFOA/PFOS investigations to inform them of findings and ensure the general public is not exposed to contamination. Additional information regarding PFOA/PFOS is on the [state's PFAS website](#).

No Further Action Determinations involving groundwater

Over the past year, the Hazardous Waste Program approved the final remediation and closure of seven hazardous waste sites, four of which involved remediating contaminated groundwater. The Hazardous Waste Program facilitated remediation of all of the sites with groundwater impacts to WQCD Regulation 41 Standards.

Hazardous Waste Program data and information accessibility

The Hazardous Waste and Materials Management Program provides information to the public via the [Hazardous Waste Management website](#). The website includes public notices and proposed and active rulemakings with stakeholder process information. The website also includes Hazardous Waste Program reports for the past five years. hazardous waste includes program guidance documents, regulations, and statutes. a list of current stakeholder processes, Solid Waste Program staff contacts, and solid waste data and reports.

The [Hazardous Waste regulations and statutes website](#) provides statutes and regulations relative to the management of hazardous waste in Colorado. This website also includes information regarding regulations development.