COLORADO

Hazardous Materials
& Waste Management Division

Department of Public Health & Environment

Annual Report
to the Colorado Water Quality Control Commission
from the Hazardous Materials and Waste Management Division
Colorado Department of Public Health and Environment
SB 89-181 Implementation
Compliance with water quality standards and classifications
for the Fiscal Year Ending June 30, 2019

January 2020

This is the annual report provided to the Colorado Water Quality Control Commission (Commission, WQCC) by the Hazardous Materials and Waste Management Division (HMWMD). This report documents HMWMD activities that protect water quality in Colorado, support the mission of the commission, and implement state water quality standards.

The paragraphs that follow present issues and examples of sites where releases have impacted groundwater quality and where HMWMD decisions and actions concerning water quality classifications and standards have established clean-up criteria. There are numerous other examples, not chosen, where the state water quality standards have been used to determine the need for further site investigations or remediation to address chemical releases to the soil, groundwater, or surface water. Any additional information will be provided to the commission upon request.

Hazardous Waste Program

No major changes have been made in the Hazardous Waste Program over the last year, which is Colorado's equivalent of the Federal RCRA, Subtitle C program. The program continues to require groundwater at hazardous waste sites to be remediated to applicable state groundwater standards, while evaluating some low risk sites with low-level residual groundwater contamination relative to, the HMWMD's Conditional Closure Policy and Guidance (CCP&G). Although the CCP&G has been in effect since 2014, only five conditional closure requests have been approved by the program.

The Hazardous Waste Program is currently involved in the remediation of approximately 200 hazardous waste sites in Colorado. The vast majority of these sites include impacts to groundwater. The sites range in complexity from the Rocky Flats Department of Energy site in Jefferson County, to your local small business dry cleaning facility.

No further action determinations involving groundwater
Over the past calendar year, the Hazardous Waste Program was notified of nine new sites with releases of hazardous waste that require remediation. At the same time, the remediation of 11 other sites was determined to be complete, and the sites were closed. Of the 11 sites closed, four had impacts on groundwater. The four with groundwater impacts were remediated below WQCD's Regulation 41 Standards, one example being Couture Fabric Care Cleaners.

Site specific summary– Couture Fabric Care Cleaners
Couture Fabric Care Cleaners was a dry cleaning facility located in Colorado Springs, Colorado. An investigation performed at the site in 2006 identified tetrachloroethylene (PCE) in the soil and groundwater onsite. Due to the fact that low levels of contamination had been identified in soil, and the highest concentration of PCE found in groundwater was only 170 ug/l, the program decided to monitor the site over time to see if natural attenuation would be able complete the remediation of the groundwater contamination in a reasonable period of time.

Groundwater at the site was monitored until 2015, when it was determined that the PCE plume was not attenuating as quickly as desired. So, in 2015 additional soil sampling was performed

inside the building to further define the source area that was continuing to impact groundwater. Following this soil sampling effort, a Soil Vapor Extraction (SVE) system was pilot tested in the subsurface beneath the building in early 2017. The pilot test indicated that the SVE system may be effective in reducing subsurface contamination. Following the pilot test, a full scale SVE system was installed at the site in late 2017 which consisted of two SVE wells and nine SVE monitoring points. The two SVE wells were designed to extract 100 cubic feet of soil vapor per minute from the subsurface, while the nine SVE monitoring points were used to determine the system's radius of influence and evaluate the vacuum response. The system was operated for about eight months until the concentration of vapors removed by the system became asymptotic. Based on the vapor readings over time, the SVE system removed about 10.8 pounds of PCE. At this point, groundwater standards were met in all of the site's wells, and the site was given a No Further Action determination.

Emerging contaminants– PFOS/PFOA

Due to the discovery of Perfluorooctyl sulfonate and Perfluorooctanoic acid (PFOS/PFOA) in groundwater and drinking water in the state of Colorado, the Hazardous Waste Program added PFOS/PFOA to the Appendix VIII list of regulated hazardous constituents in April 2018. Through this listing, the Hazardous Waste Program requires sites performing corrective action for hazardous waste releases to evaluate the nature and extent of PFOS/PFOA that may be released due to site operations. To date, groundwater investigations have begun at 18 sites, 16 of which have detected PFOS/PFOA in groundwater at some concentration. The Hazardous Waste Program uses the EPA's Health Advisory level of 0.07 ug/L of PFOS/PFOA combined to evaluate water quality results. Of the 16 sites where PFOS/PFOA have been detected, the majority of the plumes are relatively small and their migration offsite is minimal. The largest PFOS/PFOA plume discovered by the Hazardous Waste Program so far has been in the area of the Suncor refinery, which may be the result of releases from more than one facility. In an effort to share data between the WQCD and the Hazardous Waste Program, the Hazardous Waste Program routinely meets with the Colorado Department of Public Health and Environment's (CDPHE) Emerging Contaminants Coordinator.

General program observations

Most sites remediated and closed by the Hazardous Waste Program exhibit certain characteristics:

- They are relatively small in size
- The source areas, if found, are small in size and are indicative of a limited release to the environment
- The groundwater contamination is of limited extent
- They take between five and 10 years to remediate
- Contaminant concentrations in groundwater are generally under 200 µg/L when they are brought to the program's attention

These sites have the greatest chance of achieving state groundwater standards in a reasonable period of time, assuming that the responsible party has the will and financial resources to perform the necessary work.

Other sites managed by the program have larger source areas and higher levels of contamination in soil and groundwater. These sites may take considerably longer to remediate, potentially decades. The sites are required to perform any and all reasonable tasks necessary to reduce contamination in the source area and reduce groundwater contaminant concentrations. These longer-term cleanups often rely on long-term monitored natural attenuation to further reduce groundwater contaminant concentrations and demonstrate that the contamination will meet standards in the foreseeable future, which makes them eligible for closure pursuant to the HMWMD's Conditional Closure Policy and Guidance.

Radiation Program

The Radiation Program, in part, regulates the operational activities and cleanup of current and former uranium processing and disposal facilities. It works to isolate the radioactive and heavy-metal wastes and by-products produced in Colorado from the public and environment. This program works in conjunction with remediation programs in the HMWMD and implements the water quality regulations for surface and groundwater at those sites. The program works with the Division of Reclamation, Mining and Safety, and with the Oil and Gas Conservation Commission on issues relating to treatment or monitoring of radioactive materials in groundwater. The program issues and oversees licenses for uranium mills and other activities involving radioactive material.

Site specific summary- Lincoln Park/Cotter, Fremont County
Uranium and molybdenum continue to be monitored in groundwater in the Lincoln Park Water Use Area (Operable Unit 2) near the Cotter/Canon City uranium mill tailings site. Ownership of the site was transferred from Cotter to Colorado Legacy Land, LLC in March 2018. Groundwater concentrations of uranium and molybdenum have declined down gradient of the Old Ponds Area and in Lincoln Park. The investigation into the source, extent and nature of uranium and Trichloroethylene (TCE) found in the groundwater moving north-northwest from the Cotter facility is being conducted pursuant to the Comprehensive Environmental Response Compensation Liability Act (CERCLA or Superfund). The Superfund remedial investigation/feasibility study process is progressing. In addition, the Cotter facility is undergoing full decommissioning of its radioactive materials license and will meet Superfund and Colorado requirements.

All wells tested in Lincoln Park, with the exception of one, show molybdenum contamination is below groundwater standards. The Colorado molybdenum groundwater standard is 210 ug/L. However, the Nuclear Regulatory Commission (NRC) cleanup goal of 100 ug/L molybdenum for groundwater is applicable. Five wells in Lincoln Park show uranium contamination above the Colorado standard of 30 ug/L.

Site specific summary- UMETCO/Uravan site, Uravan, Montrose County
Complete remediation of the Uravan site was accomplished in 2008. Alternate concentration limits (ACLs) are in place for several contaminants in groundwater. A long-term program of groundwater and surface water monitoring is in place to demonstrate that the ACLs continue to be protective of the river and that contaminant concentrations are stable or decreasing now

that the source has been removed. At license termination and deletion from the Superfund National Priorities List (NPL), the facility will be transferred to the U.S. Department of Energy for long-term surveillance. EPA and CDPHE signed a Record of Decision for the site in June 2018. The Record of Decision requires specific institutional controls for the areas in Uravan with residual contamination above the cleanup levels for unrestricted uses. Institutional controls will be implemented in accordance with the Record of Decision. Institutional controls will also be implemented through the Restrictive Notices in accordance with the radioactive materials license and Colorado Environmental Covenant Statute.

Department of Energy atomic blast sites, Garfield and Rio Blanco Counties
The Radiation Control Program advises the Oil and Gas Conservation Commission on the monitoring and testing of groundwater for radioactive materials from gas wells being drilled near the Rulison and Rio Blanco atomic blast sites.

Remediation Program

Superfund and site assessment unit

Site specific summary- Captain Jack Mill, Boulder County
Located approximately one mile south of Ward in Boulder County, the Captain Jack Mill Superfund site was added to the NPL to address soil contamination and acid mine drainage from the Big Five tunnel. Surface remediation was completed in 2012 which removed mine waste from floodplains, consolidated and capped the waste, and installed run-on and run-off controls. A flow-through bulkhead was installed in the Big Five tunnel in 2017 along with an in-site mine pool treatment system and monitoring arrays. On May 9, 2018, the innovative treatment system began operating. A comprehensive monitoring plan was developed to include frequent data collection that evaluates the treatment and system performance. While the mine pool developed, no water exited the tunnel. Once the mine pool operating level was obtained, the flow-through valve was partially opened, maintaining static elevation for the water quality exiting the tunnel.

In September 2018, HMWMD and EPA began a planned controlled release of water from the Big Five Tunnel. This release was organized in response to higher than anticipated increases in water levels within the tunnel. On October 22, 2018, HMWMD and EPA were notified of a fish kill in Left Hand Creek downstream of the site. Subsequent investigation, including water quality sampling determined that the controlled release of mining-impacted-water from the Big Five Tunnel resulted in elevated metals levels in Left Hand Creek, causing the fish kill. Impacts to Left Hand Creek were limited to a reach extending approximately five miles downstream of the site. The EPA Emergency Response Program set up a temporary active water treatment system at the site to treat the tunnel discharge and draw down the level of the mine pool. As expected, the level of mine pool was returned to baseline conditions and water quality restored to historical (Pre-remedy construction) conditions. The temporary water treatment plant was scheduled for shutdown in December 2019. Discharge from the mine will be directed into the upper and lower settling ponds.

HMWMD and EPA are working toward optimizing and modifying the in-tunnel treatment remedy that was selected in the 2008 Record of Decision for the site. It is anticipated that implementing and testing will require approximately two years. Upon successful implementation of the selected remedy, we anticipate that water quality in Left Hand Creek will be reliably and consistently improved in the long term. If the in-situ treatment system does not accomplish an acceptable water quality standard in Left Hand Creek downstream of the site, an ex-situ passive treatment system will be required.

Site specific summary- Central City/Clear Creek, Clear Creek and Gilpin Counties
Over the last 20 years, significant work has been completed within the four operable units that make up the Central City\Clear Creek Superfund site. Along the main stem of Clear Creek, clean-up efforts have resulted in the capping of more than 15 mine waste piles and the construction of 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.

Although remedial actions for the Central City Clear Creek site 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 WQCD will complete a 303(d) listing review of this basin. HMWMD and EPA are currently evaluating the need for CERCLA Technical Impracticability waivers of water quality standards on certain segments of the watershed. In addition, HMWMD and EPA are preparing a Permit Equivalent Document (PED) for the North Clear Creek water treatment plant that will incorporate substantive provisions of the Colorado Department of Public Safety (CDPS) permitting regulations.

Site specific summary- Eagle Mine Superfund site, Eagle County
The September 2017 Eagle Mine Operable Unit 1 Record of Decision amendment formally adopted the WQCC site-specific standards for copper, cadmium, and zinc as applicable or relevant and appropriate requirements (ARARs) for remediation. The Operable Unit 1 decision also required additional remediation to meet the surface water standards. With regard to the arsenic 0.02 ug/l water + fish standard, the Operable Unit 1 Record of Decision amendment formally waived this standard and replaced it with an alternate remedial goal (ARG) of 3 ug/l to be applied as an effluent limit for the Eagle Mine water treatment plant (WTP). Through discussion with WQCD staff HMWMD learned that they were not able to incorporate the arsenic ARG into the Eagle Mine WTP CDPS permit. As a result, EPA and HMWMD prepared a Permit Equivalent Document (PED) for the Eagle Mine WTP that contains key procedural elements, standards, and requirements from the CDPS permit to create an enforceable arsenic limit for the discharge at 3 ug/L. The PED will also maintain enforceable, WQCC limits for other contaminants. The draft PED for Eagle Mine Water Treatment Plant, prepared by HMWMD, is currently under review by the EPA.

Similarly, a PED will also be prepared for the Liberty No. 4 (LIB-4) well, associated with the Eagle Mine Site. The LIB-4 pumping system reduces the amount of clean water inflow that would otherwise recharge the Eagle Mine and consequently require treatment at the Eagle Mine WTP.

Untreated water pumped from the LIB-4 well has been historically discharged to Willow Creek under provisions of a CDPS permit.

Once finalized, the PEDs will replace the CDPS permits. Therefore, the responsible party has withdrawn their earlier appeal to the March 2018 Eagle Mine WTP CDPS permit renewal. Additionally, the responsible party submitted an application to renew the current CDPS permit for LIB-4 in July 2019. The responsible party will continue operating both the Eagle Mine WTP and LIB-4 well under existing permits until a new Consent Decree has been negotiated and they have gone through the formal CDPS permit termination processes. After which, both the treatment plant and LIB-4 will operate under PEDs.

Superfund/Brownfields unit

Site specific summary- Chemical Sales Company, Adams County

HMWMD has been working with EPA to address groundwater contaminated with volatile organic compounds (VOCs) at the Chemical Sales Company Superfund site (CSC) for over 20 years. By 2014, HMWMD was implementing the final phases of a remedy to reduce source area concentrations of VOCs at the site. However, due to the emergence of 1,4-dioxane as an additional contaminant of concern at sites with VOC contamination, as well as in response to the detection of 1,4–dioxane in several water supply wells operated by the South Adams County Water and Sanitation District (SACWSD), HMWMD has confirmed that the CSC site contributes to elevated 1,4-dioxane levels, above the state groundwater standard, present in SACWSD water supply wells.

In 2018, HMWMD secured a contract with a qualified engineering firm to conduct a Focused Feasibility Study (FFS) to provide site characterization, define remediation alternatives and provide a detailed analysis for suitable remedial action alternatives for VOCs and 1,4-dioxane. CDPHE is working with the contracted party to get the FFS into its final stages. EPA and CDPHE are finalizing the FFS. Additionally, HMWMD completed annual groundwater monitoring throughout OU1 and OU2 to provide current data for VOCs and 1,4-dioxane.

Voluntary cleanup and redevelopment activities

The Voluntary Cleanup and Redevelopment Act (VCRA) staff continues to encounter issues related to surface and groundwater contamination. The staff works closely with the WQCD on each site-specific decision to assure compliance with the appropriate regulations. Meeting groundwater standards is an ongoing issue at VCRA sites. Since these sites are most often the subject of real estate transactions, the buyers and sellers try to ensure that the cost of cleanup does not make the economics of the deal unfeasible. Therefore, most cleanup plans focus on source control or removal, rather than treatment of contaminated groundwater plumes. The VCRA staff strives to assure that groundwater standards are met at the property boundary. For sites where groundwater standards are not achieved at the property boundary, HMWMD policy allows applicants to apply to the WQCC for a variance, a site-specific standard, or HMWMD will

consider an alternate point of compliance, provided the applicant can demonstrate that there is no current or future exposure risk.

Federal facilities remediation and restoration unit

Site specific standard summary Per- and Polyfluoroalkyl Substances (PFAS), Fountain Creek Aquifer

Per- and polyfluoroalkyl substances (PFAS) were detected in the Widefield, Security, and Fountain public water systems of El Paso County during sampling under EPA's third Unregulated Contaminant Monitoring Rule(UCMR 3). Subsequently, the U.S. Air Force (USAF) initiated a CERCLA investigation at Peterson Air Force Base (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 installation. The July 2017 site Inspection report and the 2018 expanded site inspection confirmed releases of PFAS from four of the five possible source areas on Peterson AFB and delineated the contaminant pathways from confirmed sources off the installation. The next step in the CERCLA process is the Remedial Investigation, which will help identify potential remediation approaches. The Remedial Investigation is expected to begin in late 2020/early 2021. In the meantime, the Air Force intends to implement 5 engineering evaluations/cost estimates (EE/CAs) in 2020. These include pilot remedial projects for specific locations that address the PFAS drinking water and groundwater contamination.

In addition to the ongoing CERCLA investigation, the Air Force, together with the Army Corps of Engineers installed new drinking water mitigation measures, including new water treatment facilities for the affected public water systems of Security, Widefield, and Fountain. At this time, water being served by each of the affected systems is below the May 2016 EPA Lifetime Health Advisory Levels (HALs). USAF is working on connecting private well owners to the public water systems. For private well owners, unable to connect to the public water systems whose wells tested above the EPA HALs, the USAF has installed reverse osmosis units and continues to maintain those systems. Also, the USAF continues to sample additional private wells in the affected area, as requested.

PFAS were also detected at Fort Carson and the Army has confirmed the PFAS is migrating past the installation boundaries. However, no one is drinking the impacted water. Fort Carson intends to start addressing the PFAS concentration exceedances during the Fiscal Year (FY) 20-22.

Per- and Polyfluoroalkyl Substances (PFAS), El Paso County

The United States Air Force (USAF) identified PFOA/PFOS at the United States Air Force Academy (USAFA) at levels above the Lifetime Health Advisory Levels (HALs) of 70 ppt combined PFOA/PFOS. Due to the migration pathway of the groundwater and potential for drinking water sources and exposure, USAF sampled on and off base drinking water wells. PFOA/PFOS were detected below the HALs in the down-gradient wells from USAFA. Additional remedial actions to meet the site specific standard for PFOA/PFOS on base will occur in accordance with the CERCLA process.

Schriever AFB had very high detections of PFAS in their surface water lagoon as well. There are potential drinking water receptors down gradient. USAF will be re-attempting to drill groundwater wells in 2020 to assess whether the lagoon is leaching into groundwater.

Per- and Polyfluoroalkyl Substances (PFAS), Aurora

The United States Air Force (USAF) identified concentrations of PFOA/PFOS on base at the Buckley Air Force Base in Aurora, Colorado exceeding the Lifetime Health Advisory Levels (HALs) of 70 ppt combined for PFOA/PFOS. USAF is developing an off-base sampling plan downgradient from the on base locations in which PFAS exceeded the HALs and will take necessary actions to ensure that no one is drinking water with PFAS concentrations above the HALs.

Other issues

The Federal Facilities staff regularly encounters issues related to groundwater contamination. The staff works to identify contaminants of concern that need to be addressed as part of the remedy on a site-specific basis to assure compliance with the appropriate regulations. Meeting groundwater standards is an ongoing issue that is addressed through source removal or remedial action objectives. Alternatively, when groundwater standards cannot be achieved, staff works with facilities to obtain institutional controls to ensure protection of public health and environment.

Solid Waste and Materials Management Program

SB 181 MOA

In coordination with the WQCD, the Solid Waste and Materials Management Program finalized revisions to the Memorandum of Agreement (MOA) for the Implementation of SB 181 Amendments. The MOA clarifies the responsibilities for each agency in implementing the groundwater standards at solid waste facilities and during solid waste management.

The revised MOA includes Table A, which was created after many years of discussion between the Solid Waste Program and the WQCD. Table A provides waste management scenarios each agency has encountered and the table identities which agency is responsible for ensuring compliance with the groundwater standards for each scenario. Table A was created to provide regulatory predictability to internal and external stakeholders.

The MOA presents two major changes for areas of program overlap:

First, because of the wording within SB 181, the WQCD has determined that they will no longer permit land application of solid waste liquids. In the past, the Solid Waste Program implemented regulatory control of land application for solid waste liquids where the application rate was less than the evapotranspiration (ET) rate, and the WQCD permitted land application of solid waste liquids at rates greater than the ET rate as a groundwater discharge. Moving forward, the Solid

Waste Program will continue to oversee land application of solid waste liquids at rates less than the ET rate, and because the WQCD will not regulate land application of solid waste liquids at all, application of solid waste liquids at rates higher than the ET rate will not be allowed.

Second, the WQCD assumes regulatory control over all Type A solid waste surface impoundments that are hydrologically connected to surface water. Most of these impoundments are part of water treatment facilities that are fully regulated by the WQCD. Type A impoundments contain very low risk wastes.

Lack of authority at government owned landfills in La Plata County

In 2016, La Plata County District Court found that counties are immune from Solid Waste Act enforcement due to Colorado's Governmental Immunity Act. This decision means HMWMD cannot require La Plata County to remedy known groundwater contamination. In addition, the County argued that counties are not a "person" under the Solid Waste Act. While HMWMD has appealed this decision, the Solid Waste Program currently cannot implement groundwater standards at landfills owned by La Plata County. Some other counties have raised this argument, stalling Solid Waste Program environmental protection efforts elsewhere in Colorado.

The Solid Waste Program continues to implement the groundwater standards at all county owned solid waste facilities, outside of La Plata County, while awaiting the decision on the appeal.