

## **SB 89-181 Annual Report FY 2018-2019**

This annual report to the Water Quality Control Commission (WQCC) is required under the provisions of SB 89-181 and the Memorandum of Understanding (MOU) adopted by the Mined Land Reclamation Board (MLRB) and the WQCC. The Division of Reclamation, Mining and Safety (DRMS) is an implementing agency under the provisions of SB 89-181. As such, DRMS is responsible for ensuring that mine operators comply with state ground water quality standards. It is the responsibility of the WQCC to classify waters of the state and set standards for those classified waters.

If the WQCC has not set site specific ground water standards, DRMS uses the numeric protection levels, referenced in the WQCC adopted narrative ground water standards, to set appropriate permit conditions to protect groundwater.

### **Minerals Program**

DRMS analyzes all operations that have the potential to be classified as Designated Mining Operations (DMO) to ensure that their operations are protective of ground waters. All DMO sites are inspected at least annually. DRMS also requires non-DMO mining operations, including some aggregate operations, to initiate groundwater sampling where there is a potential for impacts to ground water quality.

As of this reporting period, the Minerals Program requires approximately 34 mine sites to conduct some type of ground water quality monitoring. Of these sites, 29 are hard rock mining operations, and 5 are construction material extraction operations.

Please see the attached activity status, summaries and table for specific information about these sites for the 2018-2019 reporting period.

### **Coal Program**

The Colorado Coal Program currently regulates a total of 25 coal mines, of which six were actively producing in FY18-19. The producing mines are both surface (2) and underground (4) operations. The remaining 19 mines are in various phases of reclamation or temporary cessation. The Coal Program also oversees the long term stability of 4 sites that had their permits revoked and reclamation bonds forfeited. Approximately 70 percent of Colorado's coal production comes from underground mining operations. The predominant method of underground mining is longwall mining.

During the 2018-2019 reporting period, the Coal Program accomplished the following functions:

- The Coal Program effectively implemented various rules pertaining to groundwater protection at Colorado coal mines. The Coal Program's current

requirements for ongoing monitoring and detailed pre-disturbance permitting will continue to provide proper ground water quality protection.

- The Coal Program has conducted analyses regarding Points of Compliance at all of its active operations and all operations in current reclamation or cessation.
- The Coal Program conducted reviews of Annual Hydrologic Reports submitted by operators. This allows for timely identification of hydrology sampling anomalies and deficiencies, in addition to water quantity and quality trends.
- The Coal Program continued to focus on coal mine permitting activities regarding minimization of impacts to the hydrologic balance and prevention of material damage. These activities included the ongoing review and update of Cumulative Hydrologic Impact Analyses (CHIAs).
- The Coal Program continued to conduct regular coal mine field inspections and monitoring activities regarding minimization of impacts to the hydrologic balance and prevention of material damage. During FY18-19, the Coal Program conducted 307 inspections.
- The Coal Program and WQCD communicated regularly during the last two years to discuss specific issues of mutual concern.

Please see the attached table for specific information about these sites.

## **Abandoned Mine Land Program**

### **Nonpoint Source and Water Quality Improvement Projects**

Since September 2018, final reclamation construction work was in-progress or completed on 6 legacy mining-related water quality improvement projects, and investigations and design is ongoing at 9 other sites. Mine sites that underwent reclamation construction in 2018/19 included:

- Mt. Emmons (ongoing), Gunnison Co.
- Standard Mine Level 5 and 98, Gunnison County
- Casino Mine, Clear Creek Co.
- Upper Boomerang Gulch, Clear Creek Co.
- Fairday Mine, Boulder Co.
- Evans Gulch Restoration, Lake Co.

The nine mine site projects currently underway to investigate, characterize, and develop final reclamation designs:

- Roy Pray Mine Pool Investigation, Hinsdale Co.
- Nelson Tunnel Remedial Investigation, Mineral Co.

- Daisy Mine waste rock reclamation, Gunnison Co.
- Sherman Mine, Lake Co.
- Perigo Mine, Gilpin Co.
- Emmett/Yellow Girl mines, Boulder Co.
- Bonita Peaks Mining District, San Juan Co.
- Prayer 9, Montrose Co.
- East Mancos River Watershed Study, Montezuma Co.

In addition to these on-the-ground projects, DRMS continues to provide technical assistance to watershed groups and federal agency partners, and provides matching funds for additional projects sponsored by those groups. DRMS is actively engaged in the Mining Impacted Stream Task Force and Colorado Mixed Ownership Group, providing a unique perspective on legacy mine related issues. DRMS is actively engaged with CDPHE-WQCD to evaluate the feasibility of developing a statewide inventory of non-point source related legacy mining issues.

In State FY 18-19, DRMS expended \$1,104,298.87 on legacy mining-related water quality improvement projects and investigations. This total encompasses funding from all sources, including CDPHE NPS grants, PA funding, grants and agreements from BLM, USFS, EPA, private contributions, as well as state sev-tax matching funds and local watershed grants.

**Hard Rock Mining Operations**  
**December 2019**

Company-Mine Name-Permit #	Site Conditions	FY18-19 Activity
<p><b>AGC RESOURCES LLC CASH AND WHO DO MINES (Permit No. M-1983-141) Boulder County  (HR01)</b></p>	<p>The Operator began a groundwater characterization program in 2007. This included sampling of two surface water stations and the Cash Mine water pool, and installation and sampling of monitoring wells above and below the mine. A comprehensive report of these activities was submitted in March 2009.</p>	<p>The operation returned to active status as of June 13, 2018. Mining activities will begin with hauling off from existing mine dumps. No underground mining activities are occurring at this time.</p> <p>The Mount Royale Adit continues to discharge to a nearby sediment pond located on top of a historic waste rock pile. WQCD determined the water flowing from the Mount Royale Adit is not a point-source discharge and therefore does not require the issuance of discharge permit.</p> <p>Groundwater monitoring will continue on a quarterly basis.</p> <p>The monitoring plan was last revised in 2013 with TR-7 to continue monitoring for the following parameters: Arsenic, Cadmium, Manganese, Zinc, Sulfate, pH, Temp, Conductivity, and TDS.</p> <p>Through TR-7, the Cash Well monitoring location was eliminated and replaced with the Cash Mine Pool from the 3rd Level Adit.</p>
<p><b>AGC RESOURCES LLC GOLD HILL MILL (Permit No. M-1994-117) Boulder County (HR02)</b></p>	<p>The mill is inactive. The permit requires monitoring of the four monitoring wells located below the mill tailings impoundment on a quarterly basis for verifying the integrity of the geo-membrane liner. Although not required by the permit, the Operator has previously sampled the pond</p>	<p>The operation returned to active status as of June 13, 2018. However, the mill is not in operation at this time.</p> <p>The Division approved AM-01 on September 18,</p>

	<p>in the tailings impoundment, the Times/Wynona Mine located above the tailings impoundment, the Hazel A Adit located below the tailings impoundment, and Left Hand Creek.</p>	<p>2019 to increase the affected area to account for installation of a freshwater pipeline from Left Hand Creek to the Times Mine portal. Through AM-01, the operator committed to quarterly monitoring of the mine pool (in Times Mine) for the following parameters: Arsenic, Cadmium, Copper, Iron, Lead, Manganese, Mercury, Silver, Sulfate, Zinc, Temp, pH, Conductivity, and TDS.</p> <p>Groundwater monitoring of wells below tailings impoundment will continue on a quarterly basis for the same parameters listed above.</p>
<p><b>CLIMAX MOLYBDENUM COMPANY HENDERSON MINE AND MILL (Permit No. M-1977-342) Clear Creek and Grand Counties (HR03)</b></p>	<p>Permit conditions protective of groundwater at the Henderson Mine and Mill include groundwater interception wells and seepage collection canals located at the toe of the tailings dams to pump potentially contaminated groundwater back into the mill water circuit for reuse. The seepage pipelines are tested for integrity at least once per year and a description of the testing and results are provided in the annual reclamation report.</p> <p>The groundwater monitoring plan includes three times per year monitoring of the one point of compliance well at the mine and four point of compliance wells at the mill.</p>	<p>An Environmental Protection Plan (EPP) and Groundwater Monitoring Plan (GMP) were approved by the Division in 2012 and implementation of the plans by Climax Molybdenum Company at the Henderson Mine and Mill facilities started in 2012.</p> <p>Monitoring activities at the site have continued in 2018. The Groundwater Monitoring Plan is evaluated for the mill and mine facilities based on the results of the groundwater monitoring results.</p>

<p><b>BATTLE MOUNTAIN RESOURCES INC. SAN LUIS PROJECT (Permit No. M-1988-112) Costilla County (HR04)</b></p>	<p>The San Luis Project is currently in full reclamation. Cyanide processing has not occurred since 1996. The permit requires groundwater monitoring at twenty-one wells, including several water wells located outside the permit area (Shalom Ranch and the San Luis Town Well).</p> <p>Groundwater monitoring is conducted at this site to verify containment of cyanide solution at the lined mill tailings facility and to assess the progress of groundwater management in the West Pit. West Pit groundwater quality is managed by pumping to prevent contact with polluting strata. The pumped water is then treated and discharged as regulated by the WQCD.</p>	<p>Monitoring activities at the site have continued unchanged during the past year. Monitoring is focused primarily on Fluoride and Manganese.</p> <p>Major storm water diversion projects including an upgraded upland diversion ditch and spillway structure have been completed. Reclamation activities throughout the site have continued. There have been no compliance issues during the past year.</p>
<p><b>EXXONMOBIL COLONY OIL SHALE PROJECT (Permit No. M-1980-047) Garfield County (HR06)</b></p>	<p>In the past, ExxonMobil has conducted ground and surface water monitoring programs of varying scopes with various objectives. However, the only reporting requirements were for surface discharge at Pond 5 as specified by the NPDES program. In June 2007 ExxonMobil implemented a water monitoring program taking monthly water levels and quarterly samples for chemical analysis in three wells (one up-gradient and two down-gradient). In January 2008 a fourth well was installed down-gradient of an electrofrac experiment location to provide rapid detection of any groundwater impact from the experiment. Drilling and fracturing tests were conducted in 2008.</p>	<p>No mining activity is currently being conducted at the site.</p>
<p><b>OCCIDENTAL OIL SHALE, INC. LOGAN WASH (Permit No. M-1977-424) Garfield County (HR07)</b></p>	<p>Final reclamation of the main facilities began during summer 2003 and continued through 2008. Maintenance of reclamation and remaining facilities continues. Discharge of water from within the sealed mine consists of mine water and retort water. Mine water from the lower portal and from the research portal are monitored for flow rate and sampled on a weekly, monthly and quarterly schedule (depending on analyte) when the site is accessible and flow is present at the</p>	<p>Mine water and retort water are monitored monthly at the portal locations for flow rate. The retort water discharges to an evaporation pond.</p>

	outfall. NPDES monitoring is reported to the WQCD.	
<b>LKA INTERNATIONAL, INC. GOLDEN WONDER MINE (Permit No. M-1978-091 UG) Hinsdale County (HR08)</b>	<p>KA International, Inc., (LKA) collects water from a shallow off-site sampling well on Deadman Gulch and from the Lake Fork above and below the confluence with Deadman Gulch. LKA collected surface water from several points along Deadman Gulch and ground water from the underground mine workings. Except during seasonal runoff periods, Deadman Gulch is dry.</p> <p>Adit discharge was not observed or reported for several years, since the operator has impounded water in an underground sump in the workings. Operator neutralizes underground impounded water with sodium bicarbonate. Groundwater monitoring locations are shallow sumps on and below the waste rock dump, acting as wells.</p> <p>Mine discharge was observed during an October 2016 site inspection. The operator was ordered to address the issue with a water treatment system. The majority of the treatment system was installed and observed by DRMS staff September 2017. DRMS was provided as-built certifications for the treatment system October 2017.</p> <p>Mine discharge was observed during the June 2019 inspection at 1 to 2 gpm. The discharge was not conveying into the water treatment system. The Operator was ordered to address the issue by December 1, 2019. The Operator has asked for an extension to address the issue and get the treatment system back on line by June 1, 2020.</p>	Lined diversion structures appear to be functioning effectively, as no seeps were noted at the toe of the waste dump in 2018. Diversion structure consists of welded polyethylene pipe and limestone-lined open ditch.
<b>COTTER CORPORATION SCHWARTZWALDER MINE (Permit No. M-1977-300) Jefferson County</b>	This underground uranium mine operated from 1953 to 2000, and is now in reclamation. The mine is a Designated Mining Operation. Mine pool water and groundwater in alluvial	The operator completed construction of a new water treatment facility adjacent to the Steve Level adit. The RO system and IX system have

<p>(HR09)</p>	<p>fill are contaminated with uranium, sulfate, and other constituents.</p> <p>The operator treats mine pool water using an in-situ biological process. The site also has a reverse osmosis system for treating pumped mine pool water and an ion exchange system for treating alluvial ground water that is captured in underground sumps.</p> <p>The operator monitors groundwater quality in 7 alluvial wells, 8 bedrock wells, and in the mine pool. Concentrations of selected analytes in mine pool water sampled on June 6, 2019 were:</p> <table border="1" data-bbox="587 734 1054 1167"> <thead> <tr> <th><u>Analyte Standard</u></th> <th><u>Concentration</u></th> </tr> </thead> <tbody> <tr> <td>Manganese 0.05 mg/L</td> <td>0.79 mg/L</td> </tr> <tr> <td>Molybdenum 0.035 mg/L</td> <td>1.22 mg/L</td> </tr> <tr> <td>Radium 226 (diss) 5 pCi/L</td> <td>130 pCi/L</td> </tr> <tr> <td>Sulfate 250 mg/L</td> <td>1510 mg/L</td> </tr> <tr> <td>Uranium 0.03 mg/L</td> <td>15.4 mg/L</td> </tr> </tbody> </table>	<u>Analyte Standard</u>	<u>Concentration</u>	Manganese 0.05 mg/L	0.79 mg/L	Molybdenum 0.035 mg/L	1.22 mg/L	Radium 226 (diss) 5 pCi/L	130 pCi/L	Sulfate 250 mg/L	1510 mg/L	Uranium 0.03 mg/L	15.4 mg/L	<p>both been transferred to the new facility and are operational.</p> <p>The mine pool was at 197 ft below Steve Level during the Division's November 7, 2019 inspection. The target elevation for the mine pool is 150 ft. below Steve Level. This represents compliance with the October 4, 2012 Mined Land Reclamation Board Order.</p> <p>No in-situ biological treatments to the mine pool occurred in 2019. In-situ treatments will resume in 2020.</p> <p>The Division approved TR-27 on January 17, 2019 for mine pool dewatering upgrade, sampling methodology and reporting, and change to groundwater sump sampling location.</p> <p>The Division approved TR-29 on December 2, 2019 for removal of alluvial monitoring wells MW-1, MW-2, MW-3A, and MW-9 to ensure the surrounding alluvial soils are appropriately excavated.</p>
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<p><b>DEADWOOD GULCH MINING CO. INCAS MINE (Permit No. M-1986-076) La Plata County (HR10)</b></p>	<p>The facility is permitted for a cyanide vat leach system to leach gold and silver, and previously produced small (~10 tons per year) quantities of tailings. The site is permitted as a DMO, and is required to sample surface and groundwater during the seasons that its mill and leaching facility is active. The site is monitored for pH, EC, TDS, sulfate and WAD cyanide. The site has an NPDES permit for historic adit discharge.</p>	<p>This site is in Temporary Cessation. There was no mining or milling activity during 2018-19, and no water quality samples were taken. The operation was put into temporary cessation in June of 2014 after verification that all hazardous materials had been removed from the site.</p>												



<p><b>SUNRISE MINING LLC MAY DAY IDAHO MINE COMPLEX</b> (Permit No. M-1981-185) La Plata County (HR11)</p>	<p>The permit was converted to a 112d in 2011 through approval of CN-01, which included the old permit area under M-2006-069 and M-2010-003. The operator has installed groundwater monitoring wells at the site, and surface water sample locations have been established in order to provide baseline conditions for 5 quarters. Mining and milling are not yet approved at this site.</p>	<p>In 2019 this site has entered temporary cessation and requested the water quality monitoring program be suspended as no mining activity has taken place. The Operator is still working through the La Plata County and CDPHE Permitting processes. Activity will commence when all proper permits have been obtained.</p>
<p><b>RESURRECTION MINING CO. BLACK CLOUD MINE</b> (Being Reclaimed under a Consent Decree File No. M-2008-083) Lake County (HR12)</p>	<p>The approved groundwater monitoring plan specifies quarterly monitoring of six wells and one surface water sampling station cross gradient and downgradient from the tailing impoundment. A point of compliance is established down gradient of the impoundment and numeric protection levels are established. The Black Cloud Mine pool is pumped and piped to the Yak Tunnel Water Treatment Plant.</p>	<p>Site under reclamation.</p>
<p><b>ENERGY FUELS RESOURCES CORPORATION, INC. WHIRLWIND MINE</b> (Permit No. M-2007-044) Mesa County (HR13)</p>	<p>The mine was on standby status as of October 2008. The Division placed the mine into temporary cessation on May 6, 2013. The operator installed a monitor well below proposed mine dump areas in October of 2008 as part of the requirements for a DMO EPP. An existing upgradient well is utilized for sampling to establish baseline data. Sampling was conducted from October 2008 through April 2010 on a bimonthly schedule. Groundwater sampling is, as of June 2010, required to be conducted and submitted to DRMS on an annual basis. The mine has a water treatment and discharge permit through WQCD. No treatment or discharge occurred in 2017-2018. A mine pool developed in historic workings over several decades. It is anticipated that the pool will reform over an extended period of time. The operator is monitoring pool levels and can turn on pumps if they reach undesirable levels prior to reactivation of the mine.</p>	<p>Quarterly well sampling and annual reporting continues.  Second period of temporary cessation granted on November 8, 2017.</p>
<p><b>RIO GRANDE SILVER, INC. BULLDOG MINE</b></p>	<p>Rio Grande Silver (RGS) has an Environmental Protection Plan (EPP) which</p>	<p>The mine is in Temporary Cessation (TC) status, and</p>

<p><b>(Permit No. M-1977-215)</b>  <b>Mineral County</b>  <b>(HR14)</b></p>	<p>includes a water sampling and monitoring program. The approved EPP has a WQ baseline requirement to established before the mine can be reactivated or possible mill constructed,. There is currently no observed discharge to the surface. RGS has been voluntarily sampling surface water throughout their unpatented claim area.</p>	<p>no construction, mining, or processing is occurring. Water sampling will occur on an annual basis while permit is in TC.</p>
<p><b>COTTER CORPORATION</b>  <b>JD-7 PIT</b>  <b>(Permit No. M-1979-094HR)</b>  <b>Montrose County</b>  <b>(HR15)</b></p>	<p>Due to HB-1161 this mine is a Designated Mining Operation (DMO) and the Division required the operator to submit an Environmental Protection Plan (EPP). The EPP was approved on February 21, 2014. The site is currently in temporary cessation. During mining, water accumulated in the underground mine is treated and discharged in accordance with an NPDES permit.</p>	<p>The site is in temporary cessation. There was no activity during the fiscal year.</p>
<p><b>COTTER CORPORATION</b>  <b>JD-9 MINE</b>  <b>(Permit No. M-1977-306)</b>  <b>Montrose County</b>  <b>(HR16)</b></p>	<p>Due to HB-1161 this mine is a Designated Mining Operation (DMO) and the Division required the operator to submit an Environmental Protection Plan (EPP). The EPP was approved on February 11, 2014. The site is currently in temporary cessation. During mining, water accumulated in the underground mine is treated and discharged in accordance with an NPDES permit.</p>	<p>The site is in temporary cessation. There was no activity during the fiscal year.</p>
<p><b>CAMP BIRD COLORADO, INC.</b>  <b>CAMP BIRD MINE</b>  <b>(Permit No. M-1982-090)</b>  <b>Ouray County</b>  <b>(HR17)</b></p>	<p>After several years of reclamation activity, the operator began new surface activity in the fall of 2012 including reconstruction of a sedimentation pond and a pipeline conveying portal discharge to the pond. The operator has applied for a new or renewed discharge permit from WQCD. Upstream and downstream surface water sampling has begun on a quarterly basis.</p>	<p>The EPA is currently conducting reclamation of "pre-law" waste dump piles outside of the permit area. The EPA has completed the slope reduction tasks and the tailings piles have been seeded and mulched. Reclamation monitoring will continue.</p>
<p><b>FORTUNE REVENUE SILVER MINES, INC.</b>  <b>REVENUE MINE</b>  <b>(Permit No. M-2013-032)</b>  <b>Ouray County</b>  <b>(HR18)</b></p>	<p>This operation was approved as a 112d-1 permit in 2014 and included an EPP. The main portal discharges water that is piped to lined settling pond, to reduce suspended zinc before it is piped to a passive bioreactive treatment system which then infiltrates to groundwater which was approved July 2016 under Technical Revision 8. The operator is required to monitor surface and groundwater and implement mine water handling plan.</p>	<p>Operator began quarterly surface and groundwater sampling in 2012. The Division approved a mine water handling plan to initiate on site treatment. The operator is currently refining the water treatment system. Water sampling, treatment and monitoring will continue as required.</p>

	<p>Sampling plan includes five locations for groundwater and four locations for surface water.</p> <p>A permit transfer from Fortune Revenue Silver Mines to Ouray Silver Mines was completed in November 2015.</p>	
<p><b>AMERICAN SODA, LLC YANKEE GULCH PROJECT (Permit No. M-1999-002) Rio Blanco County (HR19)</b></p>	<p>American Soda ceased production in 2004 and started reclamation of the site.</p>	<p>Groundwater quality monitoring is continuing at a reduced rate for both the interim status period and for the possibility that commercial production may once again resume.</p>
<p><b>NATURAL SODA, INC. NAHCOLITE PROJECT (Permit No. M-1983-194) Rio Blanco County (HR20)</b></p>	<p>Thirty two active monitoring wells are located at the mine with water quality samples obtained from discrete zones. A total of seventeen wells are equipped with continuous water level measurement transducers and data acquisition and storage systems. Groundwater monitoring includes water levels and over 50 water quality parameters. An annual monitoring report is submitted to DRMS, the BLM and the EPA.</p>	<p>Monitoring activities at the site have continued unchanged during the past year.</p>
<p><b>SUNNYSIDE GOLD CORPORATION SUNNYSIDE MINE (Permit No. M-1977-378) San Juan County (HR22)</b></p>	<p>Water monitoring continues twice per year in the Animas River above and below the Mayflower Mill site.</p>	<p>Sunnyside Gold Corporation continues towards completion of final reclamation, release of warranties, and termination of its reclamation permit.</p>
<p><b>PINON RIDGE MINING, LLC SUNDAY MINE (Permit No. M-1977-285) San Miguel County (HR23)</b></p>	<p>Lower portions of the underground workings accumulate groundwater, which was managed during periods of active mining by using it for drill water, underground dust control and by pumping it elsewhere in the extensive workings. No pumping or other water management is currently occurring. Accumulation of mine pool water has apparently equilibrated, during several years of temporary cessation, and the flooded portion of the workings is not expanding.</p>	<p>The Environmental Protection Plan (EPP) was approved in 2012 includes a groundwater monitoring plan. The mine is in temporary cessation. Minimal prospecting work has been conducted. The first Term of Temporary Cessation expires on April 19, 2020</p>
<p><b>PINON RIDGE MINING, LLC WEST SUNDAY MINE (Permit No. M-1981-021)</b></p>	<p>Lower portions of the underground workings accumulate groundwater, which was managed during periods of active mining by using it for drill water,</p>	<p>The Environmental Protection Plan (EPP) was approved in 2012 includes a groundwater monitoring</p>

<p><b>San Miguel County (HR24)</b></p>	<p>underground dust control and by pumping it elsewhere in the extensive workings. No pumping or other water management is currently occurring. Accumulation of mine pool water has apparently equilibrated during several years of temporary cessation, and the flooded portion of the workings is not expanding.</p>	<p>plan. The mine is in temporary cessation. The first Term of Temporary Cessation expires on April 19, 2020</p>
<p><b>PINON RIDGE MINING, LLC TOPAZ MINE (Permit No. M-1980-055 HR) San Miguel County (HR26)</b></p>	<p>Lower portions of the underground workings accumulated groundwater, which was managed during periods of active mining by using it for drill water, dust control, and by pumping it elsewhere in the extensive workings. No pumping or other water management is currently occurring. Accumulations of mine pool water has apparently equilibrated during several years of temporary cessation, and the flooded portion of the workings is not expanding.</p>	<p>The Environmental Protection Plan (EPP) was approved in 2012 includes a groundwater monitoring plan. The first Term of Temporary Cessation expires on April 19, 2020</p>
<p><b>CLIMAX MOLYBDENUM COMPANY CLIMAX MINE (Permit No. M-1977-493) Summit, Lake, and Eagle Counties (HR27)</b></p>	<p>Groundwater monitoring has continued as approved in the EPP for the site. This includes increased monitoring frequency (monthly) for pH in the GW#2 well located in the Tenmile drainage.</p> <p>All engineering measures to protect groundwater, including groundwater cutoff walls and pump-back systems, the 5-Shaft dewatering pumps, the sludge densification plant (SDP), and the new discharge water treatment plant are still in place and operational.</p> <p>A possible groundwater to surface water seep(s) was identified near the Storke yard collection area and characterization/monitoring is ongoing by Climax. DRMS directed Climax to contact CDPHE regarding this feature in Oct. 2013. To-date Climax is still monitoring these seeps while awaiting further direction from CDPHE.</p>	<p>DRMS, Climax, and WQCD have met several times to discuss if INS table value standards are appropriate for the analytes of concern (primarily Mn) when establishing site NPLs.</p> <p>WQCD has recommended table value standards for Tenmile drainage, and rulemaking to establish standards for Eagle and Arkansas drainages. Standards are not yet finalized and discussions between Climax, WQCD and DRMS are ongoing.</p>
<p><b>CRIPPLE CREEK &amp; VICTOR GOLD MINING COMPANY CRESSON PROJECT (Permit No. M-1980-244)</b></p>	<p>CC&amp;V continues to monitor groundwater at the Cresson Project. The monitoring plan was most recently reviewed in permit amendment No. 11 (AM-11), approved February 8, 2017. The plan requires</p>	<p>The operator recently installed new shallow monitoring well in Grassy Valley to monitor for impacts from the East</p>

<p><b>Teller County (HR28)</b></p>	<p>quarterly monitoring of 17 compliance wells. The Division is expecting an updated monitoring plan in 2020.</p> <p>The Division is evaluating the ongoing monitoring results and will determine if additional enhanced groundwater monitoring will be required.</p>	<p>Cresson Overburden Storage Area and two new monitoring wells in Poverty Gulch.</p> <p>The Division is reviewing an informal demonstration of compliance for groundwater quality. However, we are continuing to receive notices of exceedance. The Division approved TR-119 adjusting NPLs previously set by the Division lower than the most restrictive Table 41 standard to that Table 41 standard, thereby eliminating some exceedance notices.</p>
<p><b>VENTURE RESOURCES, INC. HUKILL GULCH MILLSITE (PERMIT NO. M-2009-076) Clear Creek County (HR29)</b></p>	<p>Venture Resources monitors groundwater in upgradient and downgradient monitoring wells to ensure there is no release of process water from the lined tailings impoundment. The wells are monitored and reported on a monthly basis.</p>	<p>DRMS accepted the repairs made to the composite liner system and recertified the Environmental Protection Facility (EPF) on November 2, 2017. Monthly monitoring of upgradient and downgradient wells has shown no loss of process solution from the EPF.</p>

**Construction Materials Operations**  
**December 2019**

Company-Mine Name-Permit #	Site Conditions	FY18-19 Activity
<p><b>CEMEX, INC. LYONS QUARRY (Permit No. M-1977-208) Boulder County (CM01)</b></p>	<p>Groundwater monitoring is required to verify the disposal of cement kiln dust (CKD) into the mined out limestone quarry (C-Pit) does not cause groundwater degradation. Groundwater protection requirements include: backfilling the pit with overburden and shale from ongoing quarry operations for reducing ponded water in C Pit to less than one-half acre, and lining portions of the Boulder Feeder Canal near C-Pit to reduce seepage into the pit.</p>	<p>A Stiff Diagram of the groundwater cation/anion data from CEM-004 compared to the average and 90th percentile of the cation/anion concentrations from the last four quarterly samples of C-Pit data shows the signature for</p>

	<p>The monitoring program requires continuous monitoring of water elevation in the C-pit and in an upgradient well, and quarterly monitoring of water elevation in a deep downgradient well. Water quality samples are collected quarterly from the C-Pit and from down gradient alluvial and bedrock wells.</p> <p>DRMS approved TR-12 on June 17, 2014, which revised the NPLs for Chloride and Sulfate. The previous NPLs for these analytes were based on drinking water standards. The drinking water standards were not appropriate as the groundwater downgradient from the operation is not used for human consumption. A chemical analysis of Chloride and Sulfate was performed on the water in C-Pit using a stiff diagram. The average concentrations of Chloride and Sulfate in C-Pit were used to establish the revised NPLs.</p> <p>The revised NPLs for Chloride and Sulfate are:</p> <p>Chloride (mg/L): 1,053 Sulfate (mg/L): 2,641</p>	<p>CEM-004 continues to be significantly different from that of C-Pit.</p>
<p><b>HOLCIM US, INC.</b> <b>PORTLAND LIMESTONE</b> <b>(Permit No. M-1977-344)</b> <b>Fremont County</b> <b>(CM02)</b></p>	<p>Holcim monitors groundwater to evaluate potential release of contaminants from cement kiln dust (CKD) stored on site. Holcim completed the collection of five quarters of baseline data and submitted their report on June 7, 2004. Three wells are designated as compliance and monitoring wells to be monitored for TDS, sulfate (SO<sub>4</sub>), potassium (K), sodium (Na), total iron (Fe) and manganese (Mn). In February 2015 the DRMS approved a technical revision requested by Holcim to replace the Na standard with K: Na ratio using 0.5 as a numeric protection limit.</p>	<p>Data are collected and submitted to DRMS annually. The required parameters and numeric protection levels for MW-7 and MW-13, respectively are:</p> <ol style="list-style-type: none"> <li>1) TDS (mg/L): 3918, 4026</li> <li>2) SO<sub>4</sub> (mg/L): 2080, 2200</li> <li>3) K (mg/L): 17, 13</li> <li>4) Na: K ratio: 0.5</li> <li>5) Fe (mg/L): 4.5, 0.13</li> <li>6) Mn (mg/L): 0.88, 0.30</li> </ol> <p>The only exceedance reported in 2019 was for total Fe in MW-7 at 9.03 mg/L.</p>

<p><b>HOLCIM, INC. BOETTCHER QUARRY (Permit No. M-1977-348) Larimer County (CM03)</b></p>	<p>The Boettcher Quarry and cement plant were permanently closed in 2002 and the cement plant was demolished in 2004. The site has been largely reclaimed, and the Cement Kiln Dust (CKD) disposal area has been capped and revegetated. Groundwater monitoring to date indicates a very tight formation with deep groundwater and little groundwater movement. Additional groundwater monitoring is being conducted at this time to determine if the site can be considered for final closure. Three additional monitoring wells were installed in 2013 to help characterize current conditions. Groundwater sampling will continue on a semi-annual basis as approved in TR-7 (in 2016) from a total of 7 wells (5 of which are downgradient from the CKD disposal areas).</p>	<p>DRMS is evaluating the ongoing monitoring results and will determine if additional characterization will be required, or if the site is eligible for final closure.</p> <p>The Division approved TR-9 on October 26, 2018 to expand the groundwater monitoring program to include sampling for parameters from WQCC's Regulation No. 41 Tables 1-4 at all monitoring wells, and comparing analytical results to the most restrictive TVS when reported to the Division. Implementation of this expanded program includes sampling for parameters that were dropped from the program in 2013/2014.</p> <p>Data from two semi-annual sampling events have been reported since TR-9 approval, which show TVS exceedances for the following parameters: Barium, Boron, Chloride, Fluoride, Iron, Manganese, Selenium, Uranium, Nitrate as N, Nitrate + Nitrite as N, Sulfate, and Gross Alpha. TDS exceeds 10,000mg/L in 3 of the downgradient monitoring wells. The Division is currently reviewing TR-10 which</p>
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		<p>essentially requests the Division to determine existing groundwater quality at the site (with the TVS exceedances listed above) is representative of quality as of January 31, 1994, and therefore, can be considered ambient conditions. The TR-10 decision date is currently set for December 18, 2019.</p> <p>The Division and operator met with WCQD on October 5, 2019 to discuss TR-10 and explore potential paths forward for the operation.</p>
<p><b>GCC RIO GRANDE, INC. PUEBLO CEMENT PLANT AND LIMESTONE QUARRY (Permit No. M-2002-004) Pueblo County (CM04)</b></p>	<p>GCC conducts semi-annual monitoring of a down gradient well. DRMS approved a permit revision in March 2013 that eliminated monitoring of four alluvial wells, based on a lack of hydrologic connection between them and the facility. DRMS approved a permit revision in August 2015 to allow the beneficial re-use of a portion of kiln feed material from the main kiln baghouse in the quarry area for reclamation backfill purposes.</p>	<p>Two groundwater monitoring wells were installed in January 2018. Quarterly monitoring has been ongoing since that time. In May 2019 DRMS met with Operator to discuss updates to the current groundwater monitoring plan and the need to complete installation of a deeper monitoring well committed to in TR-6. TR-7 was received in Oct. 2019 to update site groundwater sampling and analysis plan, review of TR is ongoing. Operator will be installing the deeper monitoring well in Jan 2020.</p>



<p><b>AGGREGATE INDUSTRIES - WCR, INC. PLATTE VALLEY OPERATION (PERMIT NO. M-1989-120) Weld County (CM05)</b></p>	<p>This sand and gravel mining operation has three open water basins. The Operator allows importation of inert material to backfill into the pit excavations. CDPHE inspected the site and found Broda Inert Fill (Broda) had possibly imported unauthorized waste to the site without obtaining a Certificate of Designation. CDPHE required Broda to install three groundwater monitoring wells at the site to test groundwater quality. These wells and a monitoring plan were incorporated into the DRMS mining and reclamation plans. These wells are monitored on a quarterly basis and the results sent to CDPHE and also reported to DRMS annually.</p>	<p>On September 5, 2017, Aggregate Industries submitted the quarterly groundwater measurement data collected by Aggregate Industries as well as groundwater quality monitoring and measurement data collected at the site. This data was also submitted to the Colorado Department of Public Health and Environment as required under the recycling license held by Broda Inert Fill and in accordance with Technical Revision No. 03.</p> <p>Aggregate Industries is working with Molen and Associates, LLC, Broda's environmental consultant, to provide the Division with the groundwater quality monitoring data and report for 2018 in accordance with Technical Revision No. 3. The Division is in discussions with CDPHE for CDPHE to relinquish their oversight of the backfilling operation to the Division.</p>
<p><b>LOVELAND READY-MIX CONCRETE, INC. (LRM) KNOX PIT (M-2017-036) LARIMER COUNTY</b></p>	<p>The application describes a construction materials mining operation with on-site processing of mined materials to include crushing, screening, washing and production of concrete products. The permit boundary includes 127 acres. Of the 127 acres, the mining operation is anticipated to affect the majority of the area. Affected lands would be reclaimed to</p>	<p>Mining operations have not started at this site. LRM has not submitted the baseline water quality data as of November 19, 2019.</p>

	<p>support Pastureland post-mining land use. The Operator will install a clay liner to prevent groundwater from flowing into the reclaimed pit basins.</p> <p>LRM is proposing a closed surface water system intended to capture all stormwater produced on the site and that which currently runs onto the site. Stormwater will be directed toward the mine excavations and stormwater retention ponds.</p> <p>LRM has submitted a groundwater sampling and analysis plan. The Division required and LRM agreed to collect baseline water quality data sufficient to characterize existing groundwater quality. The WQCC Basic Standards for Groundwater Regulation 41 table values were used to establish the analyte list and analytical detection limits of the monitoring plan. LRM shall not expose groundwater or initiate dewatering operations until they have collected the required baseline water quality data. During the life of the operation, LRM will continue to monitor water quality and shall submit the results of water quality monitoring with their annual report.</p> <p>The Applicant has committed to monitoring water levels within 14 monitoring wells installed at the site and several adjacent neighbors wells during the life of the mine.</p>	
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## Colorado Coal Mines – Activity Status

December 2019

### Colowyo Mine (Producing) – C-1981-019

Moffat and Rio Blanco Counties

Company Name: Colowyo Coal Company L.P.  
Mine Name: Colowyo Coal Mine  
Mine Type/Status: Surface/Federal/Active  
FY 18-19 Production: 1,415,901 tons  
No. Miners: 189  
Permit Acres: 27,529.24 (3,573.07 federal surface and 22,910.97 federal coal)  
Affected Acres: 5,867.80  
Disturbed Acres: 5,858.30  
Bond Amount: Required - \$144,748,614; Actual Held - \$108,025,721\*

Mining operations began in 1976 with the East Pit, a multi-seam coal operation with eight coal seams. Extraction of coal from the East Pit was terminated in 2006, and currently the only ongoing operation in the East Pit is reclamation of the final cut, including backfilling and grading of the pit and highwall reduction. Coal extraction from the multi-seam West Pit, including highwall mining, concluded in 2015. In 2006, Colowyo expanded the permit boundary by approximately 6,000 acres to the west and south into the South Taylor/Lower Wilson area. Mining, including highwall mining, in the South Taylor Pit will continue until 2019, with reclamation continuing until 2025. Permit Revision PR-04 approved mining in the new Collom Pit. The initial box cut for the Collom Pit was started in early 2019.

There are three groundwater points of compliance for the Collom Pit area. The operator is working with DRMS staff on establishing a point(s) of compliance for the Main mining area, consisting of the East Pit, West Pit, and Section 16 Pit.

\*The difference between the amount of bond required and the amount of bond held is due the Division's approval of Permit Revision PR-04. Colowyo currently has an incremental bond schedule in place. Prior to disturbing any surface, Colowyo will be required to submit the appropriate reclamation bond.

### Deserado Mine (Producing) – C-1981-018

Moffat and Rio Blanco Counties

Company Name: Blue Mountain Energy, Inc.  
Mine Name: Deserado Mine  
Mine Type/Status: Underground/Federal/Active  
FY 18-19 Production: 1,810,388 tons  
No. Miners: 161  
Permit Acres: 13,645.01 (13,325.01 federal surface and 13,645.01 federal coal)  
Affected Acres: 8,215.75  
Disturbed Acres: 624.56  
Bond Amount: Required - \$6,459,335; Actual Held - \$6,484,335.

The Deserado Mine is an underground longwall mine that is currently mining in the B-Seam. All coal

mined from Deserado Mine is shipped by train directly to the Bonanza Power Plant located near Bonanza, Utah. The Deserado Mine continually drills into their current longwall workings to allow nitrogen to be pumped into the mine as a fire preventative measure.

There is one groundwater point of compliance for the Deserado Mine. The POC is located down dip of the facilities area and coal refuse piles. It has been continually monitored since 2006.

**Foidel Creek Mine (Producing) - C-1982-056**

**Routt County**

Company Name: Twentymile Coal, LLC  
Mine Name: Foidel Creek Mine  
Mine Type/Status: Underground/Federal/Active  
FY 18-19 Production: 3,014,757 tons  
No. Miners: 199  
Permit Acres: 22,647 (6,070 federal surface and 8,484.8 federal coal)  
Affected Acres: 19,996.33  
Disturbed Acres: 793.40  
Bond Amount: Required - \$9,734,098; Actual Held - \$10,267,598

The Foidel Creek Mine is an underground longwall mine located near Oak Creek, Colorado. Mining at the Foidel Creek Mine has historically occurred in the Wadge seam. During 2015 and 2016, the company ramped down to, and conducted development mining in, the Wolf Creek seam. Longwall mining in the Wadge seam ended in June 2016. Longwall mining in the Wolf Creek seam began in September 2016.

There are five groundwater points of compliance at the mine. Three of these POCs are alluvial wells and two are bedrock wells. All of these wells have data from long-term monitoring.

**King Coal Mine (Producing) - C-1981-035**

**La Plata County**

Company Name: GCC Energy, LLC  
Mine Name: King Coal Mine  
Mine Type/Status: Underground/Federal/Active  
FY 18-19 Production: 552,619 tons  
No. Miners: 107  
Permit Acres: 2,705.40 (81.30 federal surface and 1,346.20 federal coal)  
Affected Acres: 1,654.70  
Disturbed Acres: 51.04  
Bond Amount: Required - \$906,877; Actual Held - \$908,673

The King Coal Mine, permitted by GCC Energy, LLC (GCC), is an underground mine west of Durango in La Plata County. Mining at the original mine (King I) was completed in 2009 and those portals have been sealed. Expansion to the King II Mine was approved in 2006 and coal extraction began in 2007. The King II mine's surface facilities were constructed in 2008. Coal is mined from the A-Seam using conventional room-and-pillar methods.

There are currently no points of compliance at the King II Mine. In 2015 and 2016 the operator

drilled several well clusters to better characterize the groundwater. It is anticipated that one or more of these wells will become a POC or it will help locate a better location for a POC.

**Trapper Mine (Producing) - C-1981-010**

**Moffat County**

Company Name: Trapper Mining, Inc.  
Mine Name: Trapper Mine  
Mine Type/Status: Surface/Federal/Active  
FY 18-19 Production: 1,940,086 tons  
No. Miners: 152  
Permit Acres: 11,156.69 (0.00 federal surface and 5,540.43 federal coal)  
Affected Acres: 3,287.01  
Disturbed Acres: 3,287.01  
Bond Amount: Required - \$22,222,906; Actual Held - \$23,400,000

The Trapper Mine, permitted by Trapper Mining, Inc., is a surface mine located south of Craig. Draglines, excavators, loaders and trucks are used to mine the coal. The coal is trucked directly to the Craig Power Station Power Plant located adjacent to the mine site. In October 2016, Tri-State Generation and Transmission, the company that operates the Craig Power Plant, announced that Unit No.1, the oldest unit, would be retired by December 31, 2025.

There are two points of compliance at the Trapper Mine. One POC is a bedrock well and one POC is an alluvial well.

**West Elk Mine (Producing) - C-1980-007**

**Delta and Gunnison Counties**

Company Name: Mountain Coal Company, LLC  
Mine Name: West Elk Mine  
Mine Type/Status: Underground/Federal/Active  
FY 18-19 Production: 3,967,980 tons  
No. Miners: 332  
Permit Acres: 19,854.90 (13,358.40 federal surface and 15,395.00 federal coal)  
Affected Acres: 15,953.10  
Disturbed Acres: 597.38  
Bond Amount: Required - \$14,428,380; Actual Held - \$15,000,000.00

The West Elk Mine is an underground longwall mine that produces coal from the E-Seam. In 2018 the operator started development mining in a new southern lease area. The existing coal wash plant and refuse pile are expected to provide sufficient capacity for the remaining life of mine. The operator continues to construct and reclaim mine ventilation boreholes and their associated drill pads and light-use roads.

There are no groundwater points of compliance at the West Elk Mine. It has not been considered necessary to date since groundwater resources are limited and discontinuous and the potential impacts to groundwater have been considered insignificant. The Division is currently reassessing the need for a groundwater POC.

**Colorado Coal Mines  
November 2019**

Permit #	Mine	Total Permitted Acreage	Inspections Required
	<b>Active</b>		
C-1980-007	West Elk Mine*	19,854.90	12
C-1981-010	Trapper Mine*	11,156.69	12
C-1981-012	New Elk Mine	4,201.90	12
C-1981-018	Deserado Mine*	13,645.01	12
C-1981-019	Colowyo Mine*	27,529.24	12
C-1981-022	Elk Creek Mine	15,676.51	12
C-1981-035	King Coal Mine*	2,705.40	12
C-1982-056	Foidel Creek*	22,647.00	12
C-1983-059	Terror Creek Load Out	20.00	12
C-2010-089	New Horizon North Mine	234.60	12
	<b>TOTAL ACTIVE</b>	<b>117,671.25</b>	<b>120</b>
	<b>Reclamation and Cessation</b>		
C-1980-004	McClane Canyon Mine (Temporary Cessation)	3,561.40	4
C-1981-008	New Horizon Mine	634.27	12
C-1981-025	North Thompson Mine (Phase II released)	1,093.50	4
C-1981-028	Keenesburg Mine	225.55	12
C-1981-038	Bowie No. 1	5,035.20	12
C-1981-041	Roadside Portals	548.00	12
C-1981-044	Williams Fork Mines (Temporary Cessation)	6,363.00	4
C-1982-057	Seneca IIW Mine	3,878.50	12
C-1984-065	Coal Ridge No. 1 Mine (Phase II released)	272.00	4
C-1992-081	H-G Loadout	391.20	12
C-1994-082	Yoast Mine	2,318.30	12
C-1996-083	Bowie No. 2 (Temporary Cessation)	10,987.40	4
C-1996-084	Lorencito Canyon Mine	384.00	12
C-2009-087	Peabody Sage Creek Mine	10,164.00	12
C-2010-088	Fruita Loadout (Temporary Cessation)	208.60	4
	<b>TOTAL RECLAMATION AND CESSATION</b>	<b>46,094.92</b>	<b>132</b>
	<b>Revoked</b>		
C-1981-015	Fruita No. 1 & 2	16.00	4
C-1981-014	Southfield Mine	1.45	2
C-1981-033	Bear Mine	1,108.40	12
C-1981-037	GEC Strip Mine	890.00	2
	<b>TOTAL REVOKED</b>	<b>2,015.85</b>	<b>20</b>
	<b>New</b>		
C-2006-085	Northfield Mine (pending bond)	1,157.00	0
	<b>TOTAL NEW</b>	<b>1,157.00</b>	<b>0</b>
	<b>Total</b>	<b>166,909.02</b>	<b>272</b>
	* Actively Producing Mines		

**COLORADO ABANDONED MINE LAND PROGRAM  
NONPOINT SOURCE AND WATER QUALITY IMPROVEMENT PROJECTS  
November 2019**

**SAN JUAN RIVER WATERSHED**

Project and Summary	Status	Partners
<p><b>Mancos Conservation District - East Mancos Study</b></p> <p>Synoptic sampling of the East Mancos River Watershed to quantify sources of metals contamination. Mountain Studies Institute (MSI) received the grant to complete the work and DRMS contributed cash and in-kind match to the project, as well as historical knowledge and data about the watershed. The final report will be complete in March of 2020.</p>	<p>Analysis - Ongoing Final Report - 2020</p>	<p>MSI, DRMS, Southwest Hydrologic, Mancos Conservation District</p>
<p><b>Bonita Peaks Mining District</b></p> <p>The Bonita Peaks Mining District (BPMD) was designated as a Superfund site by EPA following the 2015 Gold King event and renewed focus on impacts by "legacy" mines to the Animas River. DRMS is currently providing technical assistance to BLM, USFS, EPA, CDPHE and other partners within the BPMD. DRMS has been given funding by BLM, USFS, CDPHE, and EPA to provide technical assistance, reclamation project design, and potential implementation of reclamation projects on Private, BLM and USFS managed mine sites. DRMS is involved in the Hydrogeologic Workgroup, Characterization Workgroup, coordinating cultural clearances, collecting mine map information, facilitating safe entry into underground mines, and utilizing the legacy site knowledge to help inform the superfund partners. DRMS is currently funded by CDPHE to inspect the bulkheads in the mining district, and has completed the first round of inspections and an interim report. DRMS anticipates continued CDPHE funding</p>	<p>Monitoring, Analysis, Design and Technical Assistance - Ongoing</p>	<p>DRMS, BLM, USFS, EPA, CDPHE, ARSG, MSI, USGS</p>

to provide technical assistance, design and implementation of additional mine reclamation projects within the BPMD.		
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**LOWER COLORADO RIVER WATERSHED**

Project and Summary	Status	Partners
<p><b>Atlas Mill Tailings Project, Uncompaghre Watershed</b></p> <p>DRMS technical assistance and potential funding for two water quality projects in Sneffels Creek drainage. Partners Ouray Silver Mines and Trout Unlimited along with UWP using Supplemental Environmental Project funding from CDPHE to consolidate and amend the Atlas Mill tailings and provide stream bank stabilization, and runon/runoff controls. TU awarded contract for construction with project implementation scheduled for August 2020 dependent on FS NEPA/CERCLA.</p>	Construction - 2020	USFS, Ouray Silver Mines, Alpine Environmental Consultants, GeoSyntec, Trout Unlimited, DRMS
<p><b>Governor Basin Project, Uncompaghre Watershed</b></p> <p>DRMS staff providing technical assistance for a project utilizing CDPHE Idarado Natural Resource Damage Funds in assistance with Ouray Silver Mines and UWP to cap and cover acidic and oxidized waste rock with buffered non-oxidized waste rock in Governor Basin. Provide runon/runoff controls and revegetation.</p>	Design - Ongoing, Construction - 2021	USFS, Ouray Silver Mines, Alpine Environmental Consultants, GeoSyntec, Trout Unlimited, DRMS
<p><b>Carbonero Mine, Howards Fork/San Miguel River Watershed</b></p> <p>Ongoing water quality monitoring assistance with San Miguel Watershed Coalition to determine legacy mining impacts in the Howard Fork of the San Miguel River.</p> <p>Continued monitoring of adit discharge and flume and shed damage at Carbonero. Pulled</p>	Monitoring and Analysis - Ongoing	DRMS, EPA, CDPHE, USFS, San Miguel Watershed Coalition



<p>pressure transducers from groundwater monitoring wells in 2019.</p>		
<p><b>Prayer 9 Waste Rock Pile, Dolores Watershed</b></p> <p>The Prayer 9 uranium mine site is located in Montrose County at the top of a cliff overlooking La Sal Creek. During heavy storm events in 2017 a significant amount of the waste rock pile was washed down the cliff and deposited in an actively used irrigation diversion and pasture. The Program was contacted by the landowner requesting assistance to address the problem. A reclamation project was completed in 2018-2019 in which mine waste was removed from the diversion and pasture to an onsite consolidation area and revegetated. The Division is currently working with partners to develop a reclamation plan for the mine site that will reduce or eliminate future erosion of the waste rock onto the downstream property owner.</p>	<p>Analysis and Design - Ongoing</p>	<p>DRMS, CDPHE, UMETCO, BLM</p>
<p><b>Centennial/Suncup Maintenance, Dolores Watershed</b></p> <p>The inactive Centennial and Sun Cup Uranium Mines are located on U. S. Bureau of Land Management (BLM) managed lands in Disappointment Valley, seven miles east of the town of Slick Rock in western San Miguel County. The waste rock piles are located in or adjacent to drainages. Erosion of the waste rock was transporting selenium bearing and radioactive materials downstream. In 2016, the Program in cooperation with numerous partners relocated and consolidated a significant amount of waste rock, and worked to stabilize slopes through regrading and revegetation. Maintenance is currently being conducted onsite and includes additional revegetation.</p>	<p>Construction 2019 and 2020, Monitoring - Ongoing</p>	<p>DRMS, CDPHE, BLM</p>

<p><b>Gunsight Processing Area, Slate River/Gunnison River Watershed</b></p> <p>The Gunsight Processing Area is located outside of the Town of Crested Butte on lands managed by the Bureau of Land Management. The site comprises approximately 3 acres of disturbed lands, with approximately 3,000 cubic yards of ore and waste rock, presumably transported to the site in the mid-1950's from Redwell Basin likely the Daisy Mine. This site has significant run-off and seeps and springs associated with the waste rock/ore dump. Surface waters potentially impacted are Oh Be Joyful Creek, the Slate River, and associated wetland areas. The site was funded by the BLM and the 319 Non-point source program for reclamation and included the Coal Creek Watershed Coalition and the Gunnison Field Office of the BLM as project partners. After completion of construction in 2016 and 2017, along with maintenance in 2019, monitoring of BMP success is ongoing.</p>	<p>Maintenance Completed 2019, Monitoring - Ongoing</p>	<p>DRMS, CDPHE, BLM, CCWC</p>
<p><b>Daisy Mine, Slate River/Gunnison River Watershed</b></p> <p>The Daisy mine is the largest anthropogenic source of metals loading into Redwell Creek, Oh Be Joyful Creek, and the Slate River. High levels of Pb, Zn, As, Cu, and Cd run-off the waste rock area and contaminate the receiving streams. Low pH conditions within the waste rock dumps and draining adit facilitate the transport of metals from the site. 2019 site work included exploratory drilling to identify the presence or absence of impounded water behind the collapsed (draining) portal. The drilling was completed in October 2019, and identified approximately 4' of impounded water behind the portal collapse. A pressure transducer was installed within the well to monitor pool elevation.</p>	<p>Drilling completed 2019, Monitoring and Analysis - Ongoing</p>	<p>DRMS, CDPHE, FMI</p>

<p><b>Standard Mine Superfund Site, Coal Creek/Gunnison River Watershed</b></p> <p>DRMS has been providing technical assistance to CDPHE, EPA, and their contractor with respect to implementation of the Record of Decision for the Standard Superfund site. DRMS involvement included review of design documents, quality assurance with respect to construction of various remedies, and input on O&amp;M items.</p>	<p>Monitoring and Analysis - Ongoing</p>	<p>CDPHE, EPA</p>
<p><b>Standard Mine Level 98 and 5, Coal Creek/Gunnison River Watershed</b></p> <p>DRMS has partnered with USFS for Level 5 and Level 98 work at the Standard Mine. These levels were not included in the Standard Mine Superfund Project. Work includes diversion of Level 5 drainage, trench closure, waste consolidation, and wetland restoration at Level 98, and revegetation at both Level 5 and 98.</p>	<p>Construction in 2019, Completion in 2020</p>	<p>DRMS USFS</p>
<p><b>Mt. Emmons Mine, Coal Creek/Gunnison River Watershed</b></p> <p>DRMS is providing reclamation design and implementation of mine waste reclamation on Freeport owned property at the Mt. Emmons site. DRMS working under an agreement with Freeport McMoran to implement reclamation activities.</p> <p>2019 work included closure of the 2160 Ore Pass, grading and revegetation at 2000 Level, drainage work at 2000 and 2160, water bar installation at Standard Mine road turn, and maintenance at 1370. Construction was completed in 2019 by Trout Unlimited with DRMS providing oversight on the ore pass closure.</p>	<p>Construction completed 2019, Design and Analysis for Construction in 2020 - Ongoing</p>	<p>DRMS, FMI, TU</p>
<p><b>Roy Pray, Henson Creek/Gunnison River Watershed</b></p> <p>Post Reclamation Monitoring of the hydrologic bulkhead seal in the Roy Pray</p>	<p>Monitoring - Ongoing</p>	<p>DRMS, BLM</p>

<p>adit in underway. Construction of a drill hole and installation of a piezometer was completed in September 2018. Water sampling of the mine pool and the area around the Roy Pray was also completed and a report about mine pool conditions will be completed in the Spring of 2019. The work is being funded by the BLM.</p>		
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**UPPER COLORADO RIVER**

Project and Summary	Status	Partners
<p><b>Peru Creek/Snake River Watershed</b></p> <p>DRMS continues to provide in-kind technical assistance to the various agencies and groups investigating impacts to Peru Creek and the Snake River from the Pennsylvania Mine and other Legacy sites within the watershed.</p>	<p>Monitoring and Analysis - Ongoing</p>	<p>DRMS, EPA, CDPHE, USFS, USGS, Summit County Open Space</p>
<p><b>Pennsylvania Mine, Peru Creek/Snake River Watershed</b></p> <p>Following completion of bulkheads on both Level F and Level C of the Pennsylvania Mine, DRMS has provided monitoring of mine pool conditions and assisted with water sampling. Efforts are ongoing to determine the long term effectiveness of the installed bulkheads. In 2018, multiple monitoring wells were installed in an attempt to intercept mine pool waters for future monitoring.</p>	<p>Monitoring and Analysis - Ongoing</p>	<p>DRMS, EPA, CDPHE, USFS, USGS, Summit County Open Space</p>

<p><b>Saints John Mine, Snake River Watershed</b></p> <p>Periodic sampling of the Snake River and its tributaries near the Town of Montezuma in Summit County shows that the draining adit at the Saints John mine is a significant source of dissolved metals to Saints John creek and the upper Snake River. During the summer and fall of 2019, DRMS, EPA, and USGS installed a minisipper automated water sampler and a flow measurement flume with automated transducers at the portal of the draining adit. These instruments will provide detailed loading information for the mine discharge through the winter of 2019/20 and into the high flow period in the summer of 2020.</p>	<p>Monitoring - Ongoing</p>	<p>DRMS, EPA, USGS</p>
<p><b>Willard tunnel, Puzzle/Ouray mine, Germania mine, Blue River Watershed</b></p> <p>The CDPHE, EPA, USFS, USGS, USFWS, DRMS and Trout Unlimited (TU) have been investigating abandoned mine impacts to water quality in Illinois Gulch, a tributary to the Blue River, since 2012. These investigations have proceeded in consultation with local landowners, Summit County, and the Town of Breckenridge. DRMS and EPA conducted a comprehensive flow monitoring campaign at four locations near the Willard tunnel and the Germania mine beginning in the autumn of 2018, through the winter of 2018/19 and concluding in November 2019. The data is currently being assembled for analysis.</p>	<p>Monitoring and Analysis - Ongoing</p>	<p>TU, DRMS, CDPHE, EPA, USGS,USFS, USFWS</p>

**SOUTH PLATTE RIVER WATERSHED**

Project	Status	Partners
<p><b>Emmett/Yellow Girl, James Creek/Boulder Creek Watershed</b></p> <p>DRMS is working with EPA and TU to evaluate loading to James Creek in the vicinity of Jamestown. The Emmet and</p>	<p>Data Collection and Analysis - Ongoing</p>	<p>DRMS, EPA, TU, Boulder County</p>

<p>Yellow Girl mine sites have been identified a metal loading sources, so more refined data collection and analysis is ongoing. Conceptual reclamation projects are also being developed for each of the sites.</p>		
<p><b>Casino Mine, Virginia Canyon/Clear Creek Watershed</b></p> <p>The Casino Project is located within Virginia Canyon Area, north of Idaho Springs in Clear Creek County. This area is visited by, and is readily accessible to residents, tourists, and recreationists. The Casino mine site has a large waste pile that is located in a drainage, Seaton Gulch, immediately below Virginia Canyon road. A road culvert directs drainage from the road onto the waste pile during storm events and deep gullies have formed on the face of the pile. During storm events the runoff from the waste pile drains into Seaton Gulch and, eventually, Clear Creek. The waste rock at this site has the highest soluble manganese of all of the mine sites in Virginia Canyon. High cadmium, copper and zinc concentrations were also identified.</p> <p>To address erosion and offsite migration of mine waste, waste rock consolidation and regrading along with construction of a large concrete diversion wall are being used. Construction is currently ongoing with anticipated completion in 2020.</p>	<p>Construction - Ongoing</p>	<p>DRMS, FMI</p>
<p><b>Upper Boomerang, Virginia Canyon/Clear Creek Watershed</b></p> <p>The Upper Boomerang Gulch Project is located in Virginia Canyon, north of Idaho Springs in Clear Creek County. This area is visited by residents, tourists, and recreationists. The Project includes the Brighton mine and a portion of the Bride mine. The project site is located approximately one half mile above the confluence of Boomerang Gulch and Virginia Canyon. There are two distinct waste rock piles at the site that are separated</p>	<p>Construction Completed 2019</p>	<p>DRMS, FMI</p>

<p>by Boomerang Gulch. The principal water quality impact from this site is erosion of metal laden sediment from the mine waste piles during storm events. Waste rock piles completely block the original location of Boomerang Gulch. During storm events, the flow in the gulch infiltrates and erodes the waste piles forming deep gullies. Metal laden sediment is transported into the gulch, and eventually into Clear Creek. The waste rock at this site has one of the highest concentrations of soluble cadmium and zinc of all of the mine sites in Virginia Canyon.</p> <p>In the fall and winter of 2018, the IMRP completed a reclamation project to regrade and consolidate waste rock out of the existing drainage. Additionally, rock check dams were installed to reduce flow velocity and erosion. In 2019, maintenance on the drainage and tree plantings were completed.</p>		
<p><b>Captain Jack Superfund Site, Lefthand Creek, Boulder County</b></p> <p>DRMS is providing technical assistance to EPA and CDPHE regarding underground design elements of the Record of Decision, and is currently scheduled to contract and implement limited ground control in 2020.</p>	Ongoing	EPA, CDPHE
<p><b>Buckskin Joe a/k/a Phillips mine, Buckskin Gulch, Park County</b></p> <p>The draining adit and waste rock dump of the Buckskin Joe (Phillips) mine are located less than two miles west from the Town of Alma immediately south of Buckskin Creek and upstream of the intake gallery for the Town of Alma water supply. Water, sediment, and soil (mine waste rock and mill tailings) sampling and characterization was conducted by EPA and project partners beginning in 2011. In 2016, EPA and DRMS installed a dedicated flume and transducers at the Buckskin Joe portal to measure adit drainage rates over time. DRMS and EPA conducted a comprehensive flow monitoring</p>	Monitoring and Analysis -Ongoing	EPA, CDPHE, CUSP, DRMS, CGS, USFS, USFWS, Town of Alma, Park County, TU, USGS

<p>campaign at the Buckskin portal beginning in the autumn of 2018, through the winter of 2018/19 and concluding in November 2019. The data is currently being assembled for analysis.</p>		
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**ARKANSAS RIVER WATERSHED**

Project and Summary	Status	Partners
<p><b>Chalk Creek / Mary Murphy Mine, Golf Tunnel Hydrologic-Bulkhead, Arkansas River Watershed</b></p> <p>DRMS continues to coordinate with the USFS and EPA in addition to other stakeholders regarding ongoing monitoring and long term data collection within Chalk Creek. Future work within Chalk Creek may entail construction of a hydrologic bulkhead seal on the 1400 Level of the Mary Murphy to address discharge associated with the Golf Tunnel mine pool.</p>	<p>Monitoring - Ongoing</p>	<p>DRMS, EPA, CDPHE, USFS</p>
<p><b>Sherman Mine Waste Pile Stabilization, Arkansas River Watershed</b></p> <p>The Sherman Mine is located at the base of Mount Sherman in Lake County. The waste pile is composed mostly of fine-grained dolomitic rock that is prone to severe erosion during spring runoff and storm events. In 2016, DRMS contracted a third-party consultant to conduct a hydrologic analysis of the site and to design engineering controls to stabilize the waste pile and reduce erosion and sediment transport. Construction is scheduled for 2021 to install grouted riprap channels and other surface water control structures.</p>	<p>Design - Ongoing</p>	<p>DRMS, BLM, FMI</p>



## RIO GRANDE RIVER WATERSHED

Project	Status	Partners
<p><b>Nelson Tunnel Source Controls Remedial Investigation and Feasibility Study (RIFS), West Willow Creek- CDPHE, EPA, DRMS:</b></p> <p>The EPA, CDPHE and DRMS continue to investigate the feasibility of implementing source control measures at the Nelson Tunnel, Creede, Colorado. During this process, DRMS continues to provide technical assistance pertaining to RIFS documents and underground related information.</p> <p>DRMS will be working with CDPHE, EPA and their contractors to conduct a limited treatability study in the Bachelor Shaft to better refine the conceptual groundwater model for the site and further our understanding of source control possibilities.</p> <p>Future tasks for DRMS may involve facilitation of additional underground investigations, review and analysis of existing data, development of additional cost analysis for installation of multiple bulkheads, facilitation and cooperation with potential sampling well installations, and development of potential source control remedies.</p>	<p>Ongoing</p>	<p>DRMS, EPA, CDPHE, USFS</p>

**STATEWIDE MINING NPS INITIATIVES**

<b>Project</b>	<b>Status</b>	<b>Partners</b>
<p><b>Mixed Ownership</b></p> <p>In 2018, DRMS received an interagency agreement from CDPHE to provide technical assistance and field work related to Legacy Mine Mixed Ownership sites throughout the State. This work is continuing through 2019 and 2020, and also includes assessment of USFS Tronox sites in the GMUG National Forest.</p> <p>Technical assistance from DRMS will include in office and onsite field assessment of various AML Mixed Ownership sites as determined by the Mixed Ownership Group. The onsite activities may include, but are not limited to, waste pile and adit discharge sampling, site mapping, discharge and flow rate measurements. DRMS staff will also attend mixed ownership meetings and phone calls to discuss results of data collection, site prioritization, reclamation alternatives, and future project planning.</p>	<p>Ongoing</p>	<p>CDPHE, EPA, USFS, TU</p>
<p><b>Mine Impacted Stream Task Force</b></p>	<p>Ongoing</p>	<p>CDPHE (HMWD, WQCD), DRMS</p>