Descriptions of State of Colorado Regulatory Programs associated with Coal Combustion Waste (CCW) Mine Placement

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Abstract

Two surface coal mines in the State of Colorado receive coal combustion wastes (CCWs). The CCWs that are placed into these mines consist of boiler fly ash, boiler bottom ash, and scubber sludge. These CCWs are generated by two coal burning power stations that are also situated within Colorado. Regulatory approval of CCW placement into areas within these two coal mines was coordinated between agencies within the Colorado Department of Natural Resources, the Colorado Department of Public Health and Environment, and the local county governments.

Introduction

Two surface coal mines in Colorado receive coal combustion wastes (CCWs). These mines are the Trapper Mine and the Keenesburg Mine. The Trapper Mine is an active coal-producing operation. The Keenesburg Mine, a former coal-producing operation, is in reclamation.

The Trapper Mine is situated near the city of Craig, in Moffat County, Colorado, and is permitted and operated by Trapper Mining Company of Craig, Colorado. The Keenesburg Mine is situated near the city of Keenesburg, in Weld County, Colorado, and is permitted and operated by Coors Energy Company of Golden, Colorado.

Boiler fly ash, boiler bottom ash, and scrubber sludge are being placed into the Trapper Mine. These CCWs are generated by the Yampa Project power station in Craig, Colorado, which is operated by Tri-State Generation and Transmission Association, Inc.

Boiler fly ash and boiler bottom ash are being placed into the Keenesburg Mine. These CCWs are generated by the Coors Brewery power station in Golden, Colorado, which is operated by Trigen – Colorado, L.L.L.P. As the Coors power station uses a baghouse instead of scrubbers, scrubber sludge is not generated at the Coors power station.

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Current Regulatory Schemes

The regulation of the placement of CCWs into coal mines in Colorado is coordinated primarily through two State agencies, in conjunction with local county governments. The two State agencies involved are the Colorado Department of Natural Resources and the Colorado Department of Public Health and Environment.

Within the Colorado Department of Natural Resources, the Division responsible for approving this activity at coal mines is the Division of Minerals and Geology, more specifically the Coal Program (DMG). The DMG is a State Regulatory Authority as recognized by the US Office of Surface Mining, Reclamation and Enforcement under the federal Surface Mining Control and Reclamation Act of 1977.

Within the Colorado Department of Public Health and Environment, the Division responsible for approving this activity is the Hazardous Materials and Waste Management Division, more specifically the Solid Waste Unit (SWU). The SWU is the State's RCRA (the federal Resource Conservation and Recovery Act of 1976) authority (it should be noted that the US EPA in April, 2000 chose to not declare CCWs as hazardous wastes).

Approval by SWU for placement of CCWs at the Trapper Mine and the Keenesburg Mine occurred in conjunction with the Boards of County Commissioners for Moffat and Weld Counties, respectively. Trapper Mining Company and Coors Energy Company applied for a Certificate of Designation (CD) for a Solid Waste Disposal facility from the county governments where the coal mines that receive the CCWs are situated. The county governments then coordinated their review of the CD applications with the SWU. The SWU subsequently recommended approval of the CD applications to the Moffat and Weld County government agencies, who then in turn approved the solid waste disposal facilities. Disposal of non-CCW mining-related solid wastes (trash, tires, etc) occurs at both the Keenesburg and Trapper Mines CCW placement areas.

Though placement of CCWs at the Keenesburg Mine now occurs on private land, CCW placement at one time occurred on land leased from the State of Colorado. Placement of CCWs at the Trapper Mine coincidentally currently occurs on land leased from the State. In both cases, the mining permittees had to obtain approval for placement of CCWs on State lands from the State Board of Land Commissioners (SBLC). The SBLC is another agency within the Colorado Department of Natural Resources.

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Basic Approach to Performance and Operating Standards

Standards for the design, construction, operation, maintenance, and closure of municipal solid waste disposal facilities within Colorado are established by the SWU. These municipal disposal facility standards may be applied to CCW placement facilities at coal mines at the discretion of the SWU, depending upon the nature of the CCW placement site.

DMG requires coal mining permittees that wish to operate CCW placement areas within coal mines to comply with certain applicable environmental performance standards of the Colorado Surface Coal Mining Reclamation Act (the Act) and the Regulations of the Colorado Mined Land Reclamation Board for Coal Mining (the Regulations).

DMG coal mining and reclamation environmental standards that may apply to CCW placement operations within coal mines address:

- salvaging of topsoil and subsoil from the CCW area for use in reclamation;
- protection of salvaged soils from wind and water erosion;
- protection of air quality at the CCW placement site during operation;
- protection of surface water quality and quantity at and around the CCW placement site during and after operation;
- protection of ground water quality and quantity at and around the CCW placement during and after operation;
- replacement of at least four feet of non-toxic soil over CCW materials;
- re-establishment of a positive-draining reclamation topography of approximately original elevation;
- re-establishment of a self-sustaining, diverse vegetative cover that leads to a beneficial post-mining land use of the CCW area.

State enforceablility

DMG has State enforceability for the activities approved through the DMG coal mining and reclamation permit. The SWU has some enforceability of the standards set by the SWU for CCW facilities. The counties have some enforceability of their approvals of the applications for Certificates of Designation for the CCW facilities.

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Citizen enforceablilty

Citizen enforceability of CCW placement in Colorado coal mines can be coordinated initially with DMG. DMG may request assistance from the SWU and county agencies if any citizen enforcement issues lie more squarely within the jurisdiction of those agencies.

State's position on beneficial uses of CCWs related to mine placement, including use at Abandoned Mine Land (AML) sites

While DMG has no official position on beneficial uses of CCWs related to mine placement, DMG has approved placement of CCWs at two surface coal mines in Colorado. DMG has no official position on the placement of CCWs at AML sites.

Nature of disposal practices

At the Keenesburg Mine, fly ash and bottom ash are end-dumped from haul trucks. A row across the pit is prepared for receipt of ash by formation of a berm across the pit. This is to prevent uncontrolled run-out of ash across the floor of the pit. The dump piles are leveled by a grader, bulldozer, or front-end loader. The ash is then sprayed with water. The ash is covered every other day by a thin layer of mine spoil cover material. After successive layers of ash and spoil bring the surface elevation to levels where the final cover will be placed, another row is started across the pit.

At the Trapper Mine, fly ash and bottom ash are end-dumped from haul trucks. Scrubber sludge is transported to the disposal area via mixer trucks.

Pre-placement site characterization/assessment
Acceptance/rejection criteria

The DMG has no specific acceptance/rejection criteria for CCW placement sites. Based upon the proposed location of the CCW placement facility within a coal mine, DMG would utilize applicable siting and environmental protection standards set forth in the State coal mining and reclamation act and regulations. Some of the State coal mining regulations that could form the basis for a potential denial of a proposed CCW placement site at a coal mine could include, but not be limited to, those addressing the proximity of the CCW site to a residence, a public facility, or a public road; the location of the CCW site in an area deemed

unsuitable due to its difficulty in achieving reclamation; the location of the CCW site being proposed within an alluvial valley floor; and the location of the CCW site being proposed within an area listed on the National Register of Historic Places.

Groundwater assessment (pre-use monitoring, modeling)

Groundwater assessment for CCW sites within the Trapper and Keenesburg Mines occurred via the baseline geologic and groundwater quality and quantity data gathering required by the State's coal mining and reclamation laws and regulations. The period of time requested by DMG for groundwater baseline data gathering is typically 12 months.

Trapper Mining Company has provided additional groundwater modeling at DMG's request, including simple evaluations of potential of cross-stratal migration of CCW leachate, the potential for surface water/ground water interaction, and the travel time of the CCW leachate.

Acid/base accounting

There were no pre-use acid/base accounting assessments conducted specifically for the CCW placement sites at the Trapper and Keenesburg mines. However, the permittees for both of these mines submitted chemical analyses of the overburden, interburden, and underburden materials. This was to demonstrate to DMG the acid-forming, toxic-forming, or alkalinity-producing potential of these materials as required by the DMG laws and regulations.

Floodplain assessments

The CCW placement sites at the Keenesburg and Trapper mines are located outside of floodplains. As such, there were no pre-use floodplain assessments required by the DMG. The DMG would likely not approve any future proposals for CCW placement sites in floodplains, due to the potential for surface water and alluvial ground water contamination.

Seismic assessments

The CCW placement sites at the Keenesburg and Trapper Mines are situated within areas from which coal has been extracted under the DMG coal mining permit. As such, the CCWs are being placed below grade, and are not at risk for being transported off-site in the event of

significant seismic events such as earthquakes or large surface mining blasts.

DMG laws and regulations do, however, have seismic safety construction factors associated with impoundment embankments of a certain size. If an application were submitted for a CCW impoundment, and that impoundment had an embankment of a certain size, the DMG might need to consider those seismic safety factors in its review of the proposal.

Surface water assessments (pre-use monitoring, modeling)

As with the groundwater assessments, all pre-use surface water quality and quantity assessments for CCW placement at the Trapper and Keenesburg Mines were conducted in accordance with the DMG laws and regulations pertaining to coal mining and reclamation. The period of this baseline surface water data gathering is typically 12 months.

The permittee for the Trapper Mine has provided additional modeling of the potential for surface water/groundwater interaction. This was provided after the approval of the CCW placement activity, during review of the mine operation's permit.

Soil and geologic assessments

Soil and geologic pre-use assessments were conducted in accordance with the requirements of the DMG laws and regulations for coal mining and reclamation. These included descriptions of regional stratigraphy and structural geology, geochemistry of the coal overburden for acid-generating potential, determinations of aquifer locations and extents, and assessments of suitability of soils for use as in reclamation and as a cover over the CCWs.

Public notice/approval, environmental justice issues

Public notice of the applications for the Certificates of Designations from the county governments were addressed at that level. Public notice of the approvals for the CCW placement within the coal mines were addressed by the DMG in conjunction with the public notice requirements described in the DMG laws and regulations.

There were no environmental justice issues raised during the DMG approval processes. Approval of the existence and location of CCW sites within counties occurs at the county

government level. It is possible that approval of CCW placement areas by DMG within previously-approved coal mines may have reduced any potentially negative environmental justice issues that might have been raised for these sites had the CCW placement areas been proposed in other locations within Colorado.

Waste characterization methods

Analytes, frequency

Toxics Characteristics Leaching Procedure (TCLP) tests are conducted on the CCWs being placed into the Keenesburg Mine. Analytes measured include arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, and Gross Alpha and Gross Beta. These tests are conducted annually, with tests also run whenever the source of the coal to the Coors Brewery power plant changes.

There are currently no TCLP tests required of the CCWs being placed into the Trapper Mine.

Acceptance/rejection criteria

There are no pre-established acceptance or rejection criteria pertaining to CCW characterization at either the Trapper or Keenesburg Mine.

Construction and placement criteria

At the Keenesburg Mine, pits were reclaimed to an elevation 5 feet above the groundwater table. The pits were then lined with clay material. CCW disposal cells are then covered with 6 feet of overburden soils and two feet of sandy topsoil. Thin overburden soil layers are placed on the layers of CCWs every other day. The width of the CCW layers is controlled by the placement of overburden soil berms across the floor of the pit.

At the Trapper Mine, CCW placement is limited to pre-approved locations selected so as not to hinder the reconstruction of approximate original topography.

Placement methods (layering, piling, intermixing with spoil, etc)

Layering is used at both the Keenesburg and Trapper Mines.

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Air emission (dust) limits/standards, required/acceptable practices

Air Pollution Emission Notices (APENs) are in effect at both the Keenesburg and Trapper Mines. These are maintained by the mining permittees in accordance with requirements established by the Air Pollution Control Division of the Colorado Department of Public Health and Environment.

Groundwater protection limits/standards, required/acceptable practices (e.g. liners, protective distance above water table)

Standards for groundwater protection in the State of Colorado are established by the Water Quality Control Commission of the Colorado Department of Public Health and Environment.

At the Keenesburg Mine, CCWs are placed into clay-lined pits, five feet or more above the water table.

CCWs at the Trapper mine are placed into an unlined pit constructed within backfilled coal mine spoil. CCW placement is limited to areas above projected groundwater saturation levels.

Surface water protection limits/standards, required/acceptable practices (e.g.stream diversion, contouring, etc)

Operations at both the Keenesburg and Trapper Mines are designed so that surface water runoff stays within the CCW placement pits during active disposal. There are no specific CCW surface water standards associated with the NPDES permits issued by the Water Quality Control Division to the mines.

At the Keenesburg Mine, the finished grades of the reclaimed cells are shaped to develop a positive drainage off of the reclaimed cell areas, to minimize infiltration of precipitation. Temporary perimeter ditches have been installed uphill of the CCW placement area to prevent overland runoff from washing across the active CCW placement area.

At the Trapper Mine, the CCW placement area is within a former coal excavation pit. This pit disturbed some natural ephemeral drainage channels. CCWs are restricted from being placed within 50 horizontal feet of these re-established drainages.

Cover material (daily, intermediate, final) and revegetation

At the Keenesburg Mine, CCWs are covered by a thin layer of overburden materials every other day. The final cover layer is six feet thick, overlaid by an additional two feet of sandy topsoil. Revegetation requirements are the same as for the other parts of the coal mine.

There is no daily requirement for cover placement at the Trapper Mine. CCWs are covered by a five foot thick layer of mine spoils, and are then overlaid by topsoil. Revegetation is the same as for the other parts of the coal mine.

Quantity and placement restrictions

There is no quantity restriction for CCW placement into the Keenesburg Mine. Placement must allow the cover requirements to be met, and must be placed in a clay-lined area at least five feet above the water table. CCWs generated at the Trigen power plant must come from only pre-approved sources of coal.

CCWs at the Trapper Mine are placed at the daily rate of generation from the Yampa Project power station (about 1500 cy/day). CCWs must be placed in the pit above the projected eventual groundwater saturation elevation, and must be located at least 50 horizontal feet from any reconstructed drainage channels.

Monitoring requirements
Groundwater (well design and placement, analytes, frequency)

At the Keenesburg Mine, groundwater monitoring is accomplished at two wells down-gradient from the CCW placement cells. Samples are tested for alkalinity, bicarbonate, carbonate, chloride, hydroxide, sodium absorption ratio, specific conductance, sulfate, pH, arsenic, barium, cadmium, calcium, hardness, iron, lead, magnesium, manganese, molybdenum, selenium, and sodium.

At the Trapper Mine, groundwater monitoring well design and sampling requirements are the same as for the rest of the coal mine.

Surface water (sampling points, analytes, frequency)

There are no specific surface water sampling points, analytes, or sampling frequency requirements for the CCW placement activity at either the Keenesburg or Trapper Mine. Surface water runoff from the CCW placement area is designed at both mines to be retained within the placement area.

Availability of data to public

All data associated with surface and ground water monitoring is available to the public at the DMG offices and at the mine offices.

Closure requirements

At the Keenesburg Mine, CCWs must be covered with six feet of coal overburden materials, then an additional two feet of topsoil. The replaced topsoil must be revegetated in accordance with the approved revegetation plan for the rest of the mine. The DMG would retain its regulatory jurisdiction until the permittee received approval of a Phase III bond release application.

At the Trapper Mine, CCWs must be covered by five feet of coal overburden materials, then an additional amount of topsoil. The replaced topsoil must be revegetated in accordance with the approved revegetation plan for the rest of the mine. The DMG would retain its regulatory jurisdiction until the permittee received approval of a Phase III bond release application.

Post-closure requirements
Monitoring, reporting, record-keeping

In Colorado, coal mine reclamation is usually not be released from DMG jurisdiction until all revegetation standards are met, and until at least ten years following the reclamation have passed. During these ten years, DMG requires monitoring of surface and ground water quality and quantity, and of revegetation success. Reporting of this information is usually provided by coal mining permittees in Annual Hydrology Reports and Annual Reclamation Reports. The DMG and the permittees keep these annual reports on file until the DMG terminates jurisdiction.

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Maintaining integrity of final cover

Maintenance of the final cover, such as protecting it from wind and water erosion, ensuring the revegetation of the cover is successful, and protecting the revegetation from noxious plant infestation, is required by DMG.

Subsequent use restrictions

Use of the reclaimed CCW areas at both the Keenesburg and Trapper Mines must be in accordance with the approved post-mining land uses approved for the rest of the reclaimed portions of the mine.

Corrective action/remediation

Same as for the rest of the mine-related disturbances.

Financial assurrance

The Solid Waste Unit (of the Colorado Department of Public Health and Environment's Hazardous Materials and Waste Management Division) requires some form of financial assurance, and deems this requirement as being met by the coal mine reclamation bond.