

## **MINEFILL REGULATORY CONCERNS**

(Including RCRA References)

August 14, Draft

- I. Ground-water Monitoring
  - A. Well Design and Deployment
  - B. Parameters
  - C. Frequency
  - D. Duration
- II. Performance Standards
  - A. Maximum Contaminant Levels (MCLs)
  - B. Non-degradation
- III. Prohibitions
  - A. Aquifer Avoidance
  - B. Unacceptable Ash Characteristics
    - 1. Method
    - 2. Frequency
  - C. Location Restrictions
    - 1. Flood Plain
    - 2. Wetlands
    - 3. Fault Areas
    - 4. Seismic Impact Zones
    - 5. Unstable Areas
    - 6. Proximity to Critical Receptors
- IV. Planning/Permitting
  - A. Acid-Base Balance
  - B. Deed Recordation
  - C. Baseline Monitoring
- V. Operational Requirements
  - A. Fugitive Dust Controls
- VI. Risk Assessments
  - A. Humans and Animals
  - B. Plants
  - C. Air Quality
  - D. Water Quality
  - E. Fish
- VII. Public Participation
  - A. Planning and Permitting
  - B. Monitoring Information
  - C. Citizen Suits
- VIII. Corrective Action
- IX. Post-closure/Post-reclamation Care
  - A. Maintenance and Inspection
  - B. Monitoring and Corrective Action
  - C. Financial Assurance

## MINEFILL REGULATORY CONCERNS (Including RCRA References)

I. **Ground-water Monitoring**: The owner/operator is to monitor ground water on-site to detect adverse impacts of ash placement on on-site ground water such that the owner/operator will have opportunity to intervene to avoid adverse impacts on off-site users and uses of ground water, including users and uses of surface waters affected by ground water.

A. **Well Design and Deployment**: The purpose of monitoring wells is to allow the acquisition of ground-water samples from which adverse impacts on ground water could be detected. Wells too few in number or which are located or screened in the wrong horizontal or vertical planes may fail to produce samples that adequately characterize impacts on ground water. Location is critical to the ability to detect effects of ash placement before the effects can spread widely, thereby adversely affecting current or future uses of the water resource.

*SMCRA APPROACH: Site-specific through the permitting process. Design and deployment are not necessarily for detection of ash placement impacts; rather, focus is more broadly on impacts of ANY practices/operations on the mine site. Regulations require a ground-water monitoring plan based on the probable hydrologic consequences determination/analysis. The regulations also provide that a permit cannot be issued until all hydrologic and geologic information is provided to the permitting agency.*

RCRA References: Part 258.51(a), (c), and (d) – Well design and deployment

B. **Parameters**: Samples are to be analyzed for specific constituents which will detect and define adverse impacts on ground water and for which valid statistical comparisons can be made among well samples to detect adverse impacts. Of particular concern in defining and detecting adverse impacts are the 8 metals which define the RCRA toxicity characteristic (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver). Additionally, boron and aluminum are of concern because they are often associated with ash.

*SMCRA APPROACH: Regulations require that the monitoring parameters be spelled out in the site-specific monitoring plan. Regulations specify minimum parameters but don't identify levels of concern: total dissolved solids or specific conductance, pH, total iron, total manganese, and water levels.*

RCRA References: Part 261.24 – Toxicity characteristic metals  
Part 258.54(a) and Appendix I – Monitoring parameters

- C. **Frequency:** Samples are to be acquired and analyzed at a frequency which will provide early warning of adverse impacts on water use. Without regulation, samples may be obtained so infrequently as to allow adverse impacts to go undetected, thereby jeopardizing off-site users/uses. The owner/operator may use ground-water flow and attenuation studies to seek re-definition of the sampling frequency.

*SMCRA APPROACH: Regulations require reporting of data every 3 months.*

RCRA References: Part 258.53(c) and (f) and Part 258.54(b) – Monitoring frequency

- D. **Duration:** Samples are to be acquired and analyzed over the time period for which the effects on ground water from ash placement could be reasonably expected to be measured or observed; i.e., considering aquifer recharge times and rate of migration of ground water through and away from the placed ash. This time period may extend beyond the completion of reclamation and the time of bond release for the overall mine site (see Section IX, below, on Post-closure maintenance). Where the owner/operator can demonstrate that there is no longer a potential for adverse impacts from the placed ash, monitoring may cease.

*SMCRA APPROACH: Regulations provide for cessation of ground-water monitoring at bond release, typically within a number of years following completion of revegetation. The number of years in the east is 5 and in the west is 10.*

RCRA References: Part 258.50(b) – Suspension of monitoring  
Part 258.61(a), (b), and (e) – Duration of post-closure period

- II. **Performance Standards:** Regulations can require compliance with either specific operating practices or performance standards. Where operating practices (which include practices for design and construction operations, as well as practices for operation of the facility) are specified, the owner/operator is restricted to the specified practices. Where performance standards are specified, the owner/operator has flexibility to use creative design, construction, and operational approaches and need only be concerned with compliance with the performance level specified. For minefill practices, the performance standard approach is preferred in order to allow increased flexibility. Performance standards are specified here for ground-water impacts only.

*SMCRA APPROACH: Regulations require permit to include a Hydrologic Reclamation Plan which must describe steps to be taken prior to bond release to “minimize disturbances” to the hydrologic balance within the permit area, prevent “material damage” outside the permit area, meet applicable Federal and State water quality laws and regulations, and “protect the rights” of present water users. Plan must specifically “address” any potential hydrologic adverse consequences and include preventive and remedial measures. Regulations are unclear as to the meaning of the terms “minimize disturbances,” “material damage,” “protect the rights,” and “address.” Should any monitoring sample indicate violation of permit conditions, the permittee must implement the steps identified in the Hydrologic Reclamation Plan. Regulations require replacement of water supplies where user obtains*

all or part of supply for domestic, agricultural, industrial or other use from a source where the supply has been “adversely impacted by contamination, diminution, or interruption proximately resulting from the surface mining activities.” Terminology (“contamination” and “proximately resulting from”) requires definition for complete understanding.

- A. Maximum Contaminant Levels (MCLs): For the 8 RCRA “toxicity characteristic” metals listed in item I.B., above, the MCLs specified under the Safe Drinking Water Act serve as the ground-water performance standard for mine placement of ash. The facility is to be operated so that it does not cause ground-water quality to exceed the MCLs. The point at which compliance is demonstrated is to be no more than 150 meters from the ash placement boundary and located on the facility property.

*SMCRA APPROACH: Regulations do not identify the elements of a performance standard: parameters to be assessed, allowable concentration levels, and point of compliance. Key terms (contamination, proximate resulting from, material damage, minimize disturbance, etc.) require definition.*

RCRA References:      Part 141 – MCLs  
                                 Part 258.40(d) – Point of compliance  
                                 Part 258.2 – Definition of “boundary”

- B. Non-degradation: There are likely to be situations where the facility owner/operator can demonstrate that ground water within 150 meters of the outermost boundary of placed ash or for potential placement of ash exceeds the MCLs solely for reasons other than impact of the ash; i.e., background levels attributable to prior mining activity or some up-gradient phenomenon unrelated to ash placement. Where this situation exists, the measured high background levels would be an affirmative defense for measured exceedences of the MCL performance standards. In such cases the performance standard would be no degradation beyond the measured high background levels, rather than no exceedence of the MCLs.

*SMCRA APPROACH: Same comment as for MCLs in item A, above.*

RCRA References:      Part 258.53(e) – Statistical procedures for detecting contamination  
                                 Part 258.40(d) – Point of compliance  
                                 Part 258.2 – Definition of “boundary”

III. **Prohibitions:** Because of the permanent, irreversible nature of mine placement of ash, and the more fragile character of certain environments, specific prohibitions are appropriate to protect human health and the environment.

- A. **Aquifer Avoidance:** Ash is not to be placed in direct contact with an aquifer unless the owner/operator can demonstrate in advance that placement will have no adverse impact on ground-water quality. As in 40 CFR Part 258, “aquifer” means a geological formation, group of formations, or portion of a formation capable of yielding significant quantities of ground water to wells or springs.

*SMCRA APPROACH: Under SMCRA, 30 CFR Part 700 defines “aquifer” as a zone, stratum, or group of strata that can store and transmit water in sufficient quantities for a specific use. Regulations require that the permittee provide a Probable Hydrologic Consequences Determination (PHC) which includes findings on: (1) whether adverse impacts may occur to the hydrologic balance; (2) whether acid- or toxic-forming materials are present that could contaminate surface or ground waters supplies; (3) whether the operation may proximately contaminate, diminish, or interrupt an underground or surface source of water within or adjacent to the permit area which is used for domestic, agricultural, industrial or other legitimate purpose; and (4) what impact the operation will have on sediment yields and various water quality parameters of local impact, flooding or streamflow alteration, ground-water and surface water availability, and other characteristics as required by the regulatory authority.*

RCRA References: Part 258.2 – Definition of “aquifer”

- B. **Unacceptable Ash Characteristics:** Ash characteristics vary as a result of coal composition and combustion practices. Ash may demonstrate characteristics which indicate that they are not compatible with mine placement. When characterized by the method described below, ash which produces an unacceptable leachate quality is not to be placed in mines. Unacceptable leachate quality may be defined as exceeding the MCLs for the 8 RCRA toxicity characteristic metals identified in item I.B., above, and/or exceeding appropriate limits for other constituents of concern, such as boron and aluminum.

1. **Method:** To test ash for unacceptable characteristics, the ash is to be subjected to a 30-day leaching by water representative of the ground water to which the ash would be exposed at the mine.
2. **Frequency:** Ash received for mine placement shall be tested for unacceptable characteristics every 6 months and when the source of coal or combustion changes.

*SMCRA APPROACH: Regulations include special restrictions on handling of toxic-forming and acid-forming materials at mines; however, definitions of these terms are not specific, and no testing or characterization of material is required. Toxic-forming materials means “...earth materials or wastes which, if acted upon by air, water, weathering, or microbiological processes, are likely to produce...conditions in soils or water...detrimental to biota or uses of water.”*

- C. Location Restrictions: Due to their particular sensitivities, sites of specific characteristics are not amenable to the permanent and irreversible nature of ash placement and cannot be used for ash placement.
1. Flood Plain: Because they are more prone to washout, areas within the 100-year flood plain are not appropriate for ash placement. Furthermore, placement in the 100-year flood plain could dangerously restrict the flow of waters at the 100-year or more frequent design level and/or reduce the storage capacity of the flood plain so as to pose a hazard to human health or the environment.
  2. Wetlands: Wetlands are sensitive areas of surface water which often serve as habitats of protected species. At mine sites ash is not to be placed in surface water or wetland in violation of State or federal law or in a manner that would jeopardize an endangered or threatened species or critical habitats or in a manner that would degrade wetlands.
  3. Fault Areas: It is not possible to project how ash placed in a mine site would react when subjected to major ground disturbances characterized by faults. Because of the potential for fault movements to expose ash to unanticipated forces (e.g., surface water flows and washout) and subsequently jeopardize human health or the environment, ash is not to be placed within 60 meters of faults that have experienced displacement during the Holocene Epoch.
  4. Seismic Impact Zones: Seismic movements can cause ash to unexpectedly contact surface or ground waters, with subsequent harm to human health or the environment. To help avoid this, ash is not to be placed in seismic impact zones. These are areas having a 10 percent or greater probability that the maximum expected horizontal acceleration in hard rock, expressed as a percentage of the earth's gravitation pull (g), will exceed 0.10g in 250 years.
  5. Unstable Areas: Placement of ash in unstable areas can cause unexpected exposure of ash to ground or surface waters, with subsequent harm to human health or the environment. To help avoid this, ash is not to be placed in unstable areas. Unstable areas are locations susceptible to natural or human-induced events or forces capable of impairing the integrity of some or all of the natural or artificial components responsible for preventing releases from the ash placement. Unstable areas can include poor foundation conditions, locations near blasting events, areas susceptible to mass movements, and Karst terrains.
  6. Proximity to Critical Receptors: Nearby users of surface and ground waters which could be adversely impacted by ash placement are of particular concern. In this context, the definition of the term "nearby" is

variable and depends on hydrologic characteristics of the area and the dynamics of possibly multiple, human-induced pumping cones. Owners/operators of ash mine placement facilities are to conduct site-specific hydrologic studies to demonstrate how the practice will avoid placing nearby users in jeopardy.

*SMCRA APPROACH: Of these sensitive locations, regulations address proximity to occupied dwellings and public buildings and impacts on fish and wildlife, including endangered and threatened species. Regulations require that the PHC assess impact of operations on flooding or streamflow alteration. PHC must also address whether acid- or toxic-forming materials are present that could contaminate surface or ground waters supplies and whether the operation may proximately contaminate, diminish, or interrupt an underground or surface source of water within or adjacent to the permit area which is used for domestic, agricultural, industrial or other legitimate purpose.*

RCRA References:      Part 258.11 – Flood plains  
                                 Part 258.12 – Wetlands  
                                 Part 258.13 – Fault areas  
                                 Part 258.14 – Seismic impact zones  
                                 Part 258.15 – Unstable areas

IV. **Planning/Permitting:** Institutionalized processes need to be in place to provide protection of human health and the environment.

- A. **Acid-Base Balance:** Where ash is placed for the purpose of providing a source of alkalinity to counteract a known acidic water environment, the owner/operator is to calculate an acid-base balance to demonstrate that, for the design life, the ash will provide adequate alkalinity to irreversibly achieve the intended acid mitigation.

*SMCRA APPROACH: Regulations do not require testing or characterization of ash.*

RCRA References:      None, generally not applicable to RCRA waste management units.

- B. **Deed Recordation:** The owner/operator is to ensure that official land records note the locations and dates for all ash placement on all portions of the property, particularly where the property may be subdivided for future use.

*SMCRA Approach: No requirement for recordation. Regulations require restoration of all disturbed areas to conditions capable of supporting those uses which the land supported prior to mining or to higher or better uses. There are no apparent restrictions on post-mining uses of land which would protect future users.*

RCRA References:      Part 258.60(i) – Deed recordation

- C. **Baseline Monitoring:** Prior to placing ash at a mine site, ground-water monitoring is to be conducted to establish “baseline” conditions for comparison with future monitoring data. This will aid in detection of any adverse impacts.

*SMCRA APPROACH: Regulations prohibit issuance of permit until baseline information is provided to characterize surface and ground water quality and flows and assesses likelihood of adverse impacts. Modeling may be included, but actual surface- and ground-water information may be required even where modeling is used.*

RCRA References: Part 258.53(e) – Establishing background

V. **Operational Requirements:** With a preference for the flexibility afforded by performance standards, the only area of concern for operational requirements is fugitive dust controls. Operational requirements are used for this area because monitoring to confirm compliance with a performance standard is not feasible.

A. **Fugitive Dust Controls:** Prior to discharge at a mine site, ash is to be conditioned by mixing with water to a moisture content of at least 5% by weight, but not to exceed 20% by weight. The purpose of conditioning is to reduce the likelihood that dust will become airborne during placement.

*SMCRA APPROACH: Regulations require protection and stabilization of all exposed surface areas to control air pollution attendant to erosion. A plan for fugitive dust control practices to achieve this is required, and the regulatory authority may require a monitoring program to assess the effectiveness of the practices to comply with applicable federal and State air quality standards.*

RCRA References: No comparable requirement under Subtitle D (see, however, Part 264.301(j) – Controlling wind dispersal, under Subtitle C)

VI. **Risk Assessments:** Owners/operators are to conduct risk assessments to inform themselves, regulators, and the public, of the likelihood that the placement of ash at the mine site will adversely impact critical receptors.

- A. Impact on humans and other animals via air and surface water pathways, including potential intermingling of ground water and surface water.
- B. Impact on plants via air and surface water pathways, including potential intermingling of ground water and surface water.
- C. Impact on air quality.
- D. Impact on water quality, including potential intermingling of ground water and surface water.
- E. Impact on fish, including potential intermingling of ground water and surface water and potential air transport of contaminants to surface water.

*SMCRA APPROACH: Regulations require that the permittee provide a Probable Hydrologic Consequences Determination (PHC) which includes findings on: (1) whether adverse impacts may occur to the hydrologic balance; (2) whether acid- or toxic-forming materials are present that could contaminate surface or ground waters supplies; (3) whether the operation may proximately contaminate, diminish, or interrupt an underground or surface source of water within or adjacent to the permit area which is used for domestic, agricultural, industrial or other legitimate purpose; and (4) what impact the operation will have on sediment yields and various water quality parameters of local impact, flooding or streamflow alteration, ground-water and surface water availability, and other characteristics as required by the regulatory authority. Permit application must include description of*



how, to the extent possible using the best technology available, operator will minimize disturbances and adverse impacts on fish and wildlife and related environmental values, including compliance with Endangered Species Act, and how operations will enhance these resources where practicable.

RCRA References: None.

VII. **Public Participation:** To be comfortable with allowing the placement of ash at mine sites, the public needs information, opportunity to raise concerns, and assurance that those concerns will be addressed.

A. **Planning and Permitting:** Prior to approving ash placement, the permitting authority is to inform the public of the planned operation, make public all risk assessment (item VI, above) and baseline monitoring (item IV, above) information, and provide for interactive public discussion.

*SMCRA APPROACH: Applicants must publish newspaper notice of availability of application and make application available for review at courthouse. Regulatory authority must notify federal, State, and local agencies of the application. Public is allowed to submit comments and objections to regulatory authority and request informal conference, and regulatory authority must honor request. Public has right to subsequent administrative review, including administrative hearing; as well as to judicial appeal of administrative review.*

RCRA References: Part 239.6(a) and (b) – Public Participation in Permitting

B. **Monitoring Information:** All monitoring data, reports, and other forms of information should be made available to the public. Access to all information is to be readily available to the public at an accessible location such as a government library.

*SMCRA APPROACH: See item A, above.*

RCRA References: No comparable requirements under Subtitle D (see, however, Part 260.2 – Availability of Information, under Subtitle C)

C. **Citizen Suits:** The public is to have the opportunity to file suit in appropriate courts to ensure compliance by the owner/operator.

*SMCRA APPROACH: Public has right to accompany inspections and to review monitoring results. SMCRA includes “citizen suit” provision comparable to RCRA Section 7002.*

RCRA References: RCRA Section 7002  
Part 254 – Prior Notice of Citizen Suits  
Part 239.9 – Citizen Intervention in Civil Enforcement Proceedings

VIII. **Corrective Action:** In the case of exceedence of the performance standards specified in item II, above, the owner/operator must undertake corrective action to protect human health and the environment. The first step in response to an exceedence may be to assess the scope of the problem through additional monitoring. The owner/operator may demonstrate that the exceedence results from

a source other than the ash placement or that the exceedence results from error in sampling, analysis, statistical evaluation, or natural variation in ground-water quality. If the exceedence is determined to result from the ash placement, however, corrective measures should be implemented. The steps in the corrective action process include: assessment of corrective measures, selection of a remedy, selection of a schedule for the remedy, and implementation of corrective action, including interim measures that may necessary for the immediate protection of human health and the environment.

*SMCRA APPROACH: Triggers for corrective action and determination of remedial measures are specified through permit-specific conditions and the hydrologic reclamation plan, rather than detailed in the regulations. When a ground-water sample indicates noncompliance with the permit conditions then the operator must immediately take action. The permittee must take all possible steps to minimize any adverse impact to the environment or public health and safety resulting from noncompliance with any term or condition of the permit, including immediate implementation of measures necessary to comply.*

RCRA References:       Part 258.54(c)(3) – Response to exceedences of performance standards  
                              Part 258.56 – Assessment of corrective measures  
                              Part 258.57 – Selection of remedy  
                              Part 258.58 – Implementation of corrective action

IX. **Post-closure/Post-reclamation Care** (post-SMCRA bond release): Monitoring and maintenance of the ash placement area should continue throughout the time period for which the effects on ground water from ash placement could be reasonably expected to be measured or observed. This time period may extend beyond the completion of reclamation and the time of bond release for the overall mine site.

A. **Maintenance and Inspection**: Post-closure activities are to include inspection and maintenance as needed of the vegetative cover over the ash placement area and of any other engineered controls, such as a final cover, that may have been placed.

*SMCRA APPROACH: Regulations provide for cessation of maintenance and monitoring at bond release, typically within a number of years following completion of revegetation. The number of years in the east is 5 and in the west is 10.*

RCRA References:       Part 258.61(a) – Post-closure activities  
                              Part 258.61(a), (b), and (e) – Duration of post-closure period

B. **Monitoring and Corrective Action**: As specified in Item I.D., above, maintenance and operation of the ground-water monitoring system for the ash placement area should continue throughout the post-reclamation period. These activities are to include evaluation of results against the performance standards specified in item II, above, and implementation, if needed, of corrective action as discussed in item VII, above.

*SMCRA APPROACH: Same as item A, above.*

RCRA References: Part 258.61(a)(3) – Post-closure ground-water monitoring  
Part 258.61(a), (b), and (e) – Duration of post-closure period

- C. Financial Assurance: In the event the post-closure/post-reclamation care period for the ash placement area extends beyond the time of bond release for the overall mine site, the owner/operator is to establish financial assurance to provide for maintenance and monitoring of the ash placement area, specifically, and for any potential corrective action associated with ash placement.

*SMCRA APPROACH: SMCRA bond release typically is within a number of years following completion of revegetation. The number of years in the east is 5 and in the west is 10.*

RCRA References: Part 258.72 – Financial assurance for post-closure care  
Part 258.73 – Financial assurance for corrective action  
Part 258.74 – Allowable mechanisms