

US EPA ARCHIVE DOCUMENT

U.S. EPA Site Visit Report  
Coal Combustion Waste Minefill Management Practices  
- Illinois -

Draft Final  
December 11, 2002

DISCLAIMER:

This document was prepared by SAIC for the U.S. Environmental Protection Agency (EPA) Office of Solid Waste. This draft is part of an information collection effort. This document has been reviewed by EPA and the State. The mention of company or product names is not to be considered an endorsement by the U.S. Government or by EPA.

## OBJECTIVE

From September 2001 to October 2002, EPA conducted visits to selected states to collect information on coal combustion waste (CCW) minefill management practices. On September 12-13, 2001, EPA staff conducted an information collection visit to Illinois. The purpose of this visit was to gather information regarding the regulation of CCW minefill practices within the State of Illinois. The visit consisted of two parts: meetings with Illinois State regulators, and visits to two underground mine sites where CCW is currently being placed. At both of these sites, the CCW is placed in surface impoundments and not in the mine itself. The CCW Minefill Management Practices Discussion Guide developed by EPA was used as a guide during the visit. A completed version of the Discussion Guide is attached to this report.

## PLACES AND DATES

### Springfield, IL

Illinois Department of Natural Resources,  
Office of Mines and Minerals (IDNR/OMM)

September 12-13, 2001

Freeman United Crown III Mine

September 12-13, 2001

Turris Coal Elkhart Mine

September 12, 2001

## SUMMARY OF MEETINGS WITH ILLINOIS STATE REGULATORS

The information collection meetings were conducted on September 12-13, 2001, at the Illinois Department of Natural Resources, Office of Mines and Minerals (IDNR/OMM) in Springfield, Illinois. In attendance at the meetings were:

- Truett DeGeare, U.S. EPA
- Mike Clipper, U.S. EPA
- Randall Mills, U.S. Department of Interior, Office of Surface Mining (OSM)
- Kimery Vories, OSM
- Scott Fowler, IDNR/OMM
- Don Pflederer, IDNR/OMM
- Dan Wheeler, IDNR/OMM
- Danielle Glitz, SAIC

It was evident that IDNR/OMM expended substantial effort in thorough preparations for the meetings. IDNR/OMM prepared a binder for each participant. The binders included general information on the IDNR/OMM regulatory program, including extracted materials from pertinent laws, regulations, and operational guidance documents, and specific information on the two mines to be visited. Specific mine information included:

- Permitting history,

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- Extracted material (e.g., cumulative hydrologic impact assessments, or CHIA) from permits (including NPDES permit) and permit revisions,
- Maps, and
- Ground-water monitoring data.

IDNR/OMM also prepared and presented a briefing, including slides, describing their regulatory program. Also, IDNR/OMM had reviewed EPA's draft discussion guide prior to the meetings. IDNR/OMM's investment in thorough preparation contributed greatly to the productivity of the meetings.

The IDNR/OMM representatives described the regulatory program for mine placement of CCW in Illinois. The program is implemented jointly by IDNR/OMM and the Illinois Environmental Protection Agency (IEPA). Regrettably, due to a national emergency, representatives from IEPA were not present at the meetings. Approximately 1,300,000 tons of CCW are placed at mine sites in Illinois annually. There are currently approximately 6 active ash placement sites and approximately 8 to 10 approvals for beneficial use applications. In Illinois, 90% of coal mining is underground. Additional details regarding the Illinois program are summarized in the attached CCW Minefill Management Practices Questionnaire.

The IDNR/OMM representatives also gave a demonstration of the State's Ground-water Quality (GWQ) Database. "Paradox for Windows" is the software employed by IDNR. This database contains all CCW monitoring wells in Illinois identified by unit number and contains information such as depth of the well, casing elevation, screen location, status of the well, parameter lists, and frequency of monitoring. There are two separate data sets for SMCRA parameters and parameters regulated by the State (under Section 620 of its regulations). Monitoring well data can be submitted electronically to IDNR/OMM. Reports and parameter graphs are available from the GWQ database. This information is used to determine maximum and minimum allowances for permitting and background water quality assessments. These database analyses are used as a major tool in bond release determinations and mid-term reviews. IDNR/OMM said that they plan to give all operators the database for their sites. The Land Reclamation Division also has a coal permits database. The Land Reclamation Coal Database contains information including permits, data, insignificant permit revisions (IPRs), and permit changes for sites within the State of Illinois.

#### **SUMMARY OF SURFACE IMPOUNDMENT VISITS**

On September 12, 2001, EPA visited two underground mining facilities near Springfield, Illinois where CCW is managed using surface impoundments. In attendance at the site visits were:

- Truett DeGeare, U.S. EPA
- Mike Clipper, U.S. EPA
- Randall Mills, OSM

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- Kimery Vories, OSM
- Scott Fowler, IDNR/OMM
- Don Pflederer, IDNR/OMM
- Dan Wheeler, IDNR/OMM
- Danielle Glitz, SAIC

While both facilities visited are underground mines, CCW is placed above ground, rather than below. This is because the logistics and mechanics involved in preparing, transporting, and placing the CCW cause the economics of the process to favor surface, rather than underground, placement. Due to the existence of tight (permeabilities of less than  $10^{-6}$  cm/sec) natural clays, artificial liners are not employed at either CCW placement site. Impoundments at both mines, however, were required, through the initial permitting process, to compact in situ soils and conduct permeability testing.

### **Freeman United Crown III Mine<sup>1</sup>**

The first site visited was the Freeman United Crown III Mine. This is an underground mine where CCW is managed using slurry ponds and surface impoundments. The CCW is trucked from various sources onto the site. The Crown III mine reported receiving 175,477 tons of ash in the 2<sup>nd</sup> quarter of 2001. Based on this information, and assuming that the 2<sup>nd</sup> quarter of 2001 was a typical quarter, it is estimated that the Crown III mine manages approximately 700,000 tons of ash per year.

After the CCW is received at the site, it is discharged into an enclosed bag house where it is mixed with water to form a slurry. The bag house generates 2½ to 3 tons per minute of 25 percent solids by weight slurry consisting of ash and water. This slurry is pumped into trenches dug along the perimeter of the cell until they are full, at which time the slurry begins to fill up the interior of the cell. Channels are created within the slurry pond when the slurry swells. The result is a very low vertical permeability and a slightly higher horizontal permeability. The slurry will set up to an almost cement-like consistency. There was no visible dust from the operation. Water trucks were seen watering the driving surfaces of the impoundment during the visit.

Once a cell is full, it is used for direct placement of other CCWs such as industrial boiler ash and bottom ash. These types of CCWs are too dense to be slurried. A trench dug within the cell is filled with CCWs. Once the first trench is full, a second trench is dug right next to it. The material (set up slurry) dug up in the process is deposited onto the first, filled trench to cover the CCW contained within. In this manner, directly dumped ash is managed by means of isolation within an alkaline environment. As previously stated, the hardened slurry possesses a very low

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<sup>1</sup> Contact: Michael R. Caldwell, Vice President Operations and Engineering, Freeman United Coal Mining; phone: 217-793-7474; email: mcaldwell@freemanenergy.com

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vertical permeability. Ground-water leaching of CCW materials is not a primary concern in this area due to the very low vertical permeability and the lack of ground water in the area. Additionally, the ash hydration process is a net user of moisture, reducing opportunity for moisture to infiltrate downward. A representative from the mine, Bill Giles, stated that because of the limited supply, ground water is not used as a water source in the area. Natural soils are very tight clays.

There is also a circulating water pond on site next to the slurry impoundments. The pond is created from water decanted from the slurry. It is referred to as blue water. It was aqua blue in color and the bottom of the pond was white from precipitated lime. This water is recirculated back to the plant for reuse. There are plans to fill this blue water pond with ash this winter. The original soil profile has a hard clay horizon or layer that runs under the entire impoundment. Glacial till underlies the natural clay liner for a depth of 125 feet. Monitoring wells 2 inches in diameter in 6-inch diameter boreholes are used to monitor the ash impoundments. Wells are located 25 feet beyond the edge of the impoundment.

On September 13, 2001, Danielle Glitz, Truett DeGeare, Mike Clipper, and Dan Wheeler returned to the Freeman United Crown Mine III to tour the underground coal mining facility. The continuous mining procedures utilized in this mine were observed during the tour which was conducted during normal operation hours.

### **Turris Coal Elkhart Mine**<sup>2</sup>

The second facility visited on September 12, 2001, the Turris Coal Elkhart Mine, was also an underground coal mining facility utilizing surface impoundments to manage CCWs. At this facility, ash (mostly FBC ash) is trucked from off-site. The Turris Coal Company reported managing 41,524 tons of CCW in the 2<sup>nd</sup> quarter of 2001. Based on this information, and assuming that the 2<sup>nd</sup> quarter of 2001 was a typical quarter, it is estimated that the Turris Coal company manages approximately 166,000 tons of CCW per year.

After the CCW is received at the site, it is discharged into an enclosed, negative pressure discharge building where it is mixed with water in a pugmill to an "oatmeal" consistency before being dropped onto a conveyor belt carrying coarse coal refuse. The refuse and ash mixture is then loaded into a 38 cubic yard/38 ton scraper which places the mixture on the surface impoundment. Once in place, the mixture is compacted. Compaction is used as a means of dust control. However, fugitive dust was evident on the impoundment site, particularly when vehicles rode over the surface. The maximum allowable ash percentage in the mixture is 25 percent with 75 percent coarse refuse. However, the facility usually operates at around 18 percent ash content

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<sup>2</sup> Contact: Wally Schultz, Manager of Surface Engineering, Turris Coal Company; phone: 217-947-2697; email: wschultz@aeiresources.com

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in the mixture. Mixing coal refuse with FBC ash and water provides several benefits: (1) neutralizes acidic refuse; (2) prevents acid mine drainage; and (3) adds strength to the impoundment levy due to cementation of ash fines with coarse refuse.

There is a sediment pond in the middle of the surface impoundment. Site representatives stated that there has never been a problem with the pH of this pond. The impoundment contains fines from the coal refuse slurry and is surrounded by a berm constructed of the deposited and compacted mixture of ash and coal refuse. A sand aquifer used as a community water supply lies 40 feet below the impoundment. Quarterly monitoring is conducted at 28 monitoring wells located along the perimeter of the site because a community drinking water supply well is located near the facility.

## CCW MINEFILL MANAGEMENT PRACTICES DISCUSSION GUIDE\*

### Outline

- I. General**  
*Regulating agencies, program structure*
- II. Planning/Permitting**  
*Permit requirements, type/source of CCW, number of permits, quantity of waste, acid/base balances, reclamation plans, operational plans, closure/post-closure plans, future uses*
- III. Waste Characterization**  
*Timing (before/during placement), testing methods, parameters, performance standards/waste characterization limits*
- IV. Site Characterization**  
*Types of data, hydrology, criteria for acceptability, liners*
- V. Risk Assessment**  
*Formal assessment/modeling, methods/criteria*
- VI. Ground Water Monitoring**  
*Monitoring system design, timing (during placement/post-closure), frequency, location, parameters, performance standards/enforceable limits*
- VII. Surface Water Monitoring**  
*Monitoring system design, timing (during placement/post-closure), frequency, location, parameters, performance standards/enforceable limits*
- VIII. Placement Practices**  
*Appropriate practices for: underground mines, surface mines, active mines, closed mines, proximity to water table, grouting, soil conditioning, mine sealing, subsidence control, spoil encapsulation*
- IX. Operational Requirements/Design Requirements**  
*Dust controls, erosion/flooding controls, runoff controls, leachate collection, re-vegetation, access controls, post-closure maintenance*
- X. Corrective Action**  
*Circumstances/triggers for action, action measures, existing damage cases*
- XI. Financial Assurance**  
*Mechanisms, liability, bond release*
- XII. Reporting**  
*Inspection frequency (pre-, during, and post-placement), monitoring data review, compliance evaluation*
- XIII. Public Participation**  
*Availability of data (pre-, during, and post-placement), compliance participation*

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\*This document was prepared by the U.S. Environmental Protection Agency (EPA). It is being used to guide discussions with State and Tribal mining regulatory authorities on coal combustion waste (CCW) minefill management practices. This list of discussion items is part of an information collection effort. It is not a proposed model for CCW minefill regulation.



## CCW MINEFILL MANAGEMENT PRACTICES DISCUSSION GUIDE

September 12-13, 2001 - Illinois

<b>Interviewee Names:</b>	Dan Wheeler, Hydrologist Don Pflederer, Northern Manager Scott Fowler, Land Reclamation Division Manager
<b>Interviewee Agency:</b>	Illinois Department of Natural Resources, Office of Mines and Minerals
<b>Interview Date:</b>	September 12-13, 2001

### I. General

1. Is there a distinction between disposal and beneficial use? **Yes**
  - 1.1 If so, how is the distinction made (e.g., waste quantity, placement type)? **CCW may be brought back to a mine for disposal at a volume less than 35% of the coal production for the company. Exceptions to this volume are allowed if the coal combustion process generates ash at a percentage greater than 35% of the coal burned. To be classified as beneficial use, CCW must be used in a beneficial manner as well as meet regulatory requirements for characterization, operational procedures and reclamation. Also, CCWs for beneficial use must meet numerical acceptance criteria (see Question III.1).**
2. Under what program(s) does the state regulate mine placement (e.g., state SMCRA implementing regulations, state solid waste program)? **Joint program of the Illinois Department of Natural Resources (IDNR) Office of Mines and Minerals (IOMM) and Illinois Environmental Protection Agency (IEPA) (i.e., State SMCRA implementing regulations and State solid waste program).**
3. Are there differing requirements/policies applicable to different types of CCW (e.g., fly ash vs. FGD wastes)? **No. Only to the extent that the physical and chemical characteristics of the different types of ash may not be suitable for all placement or beneficial uses.**
4. Are there differing requirements/policies applicable for different types of placement? **No. Based on the chemical characteristics of the ash, some types of placement would be prohibited if the ash exhibited leachate test results that were expected to materially damage the hydrologic balance.**
5. Are there differing requirements/policies applicable for different kinds of mines (e.g., coal vs. non-coal mines such as quarries)? **Yes. Non-coal mines are held by the same criteria as coal mines under Sections 3.76 and 3.94 of the Environmental Protection Act. The non-coal mine sites are regulated by IEPA, but there are no non-coal mine sites where coal combustion material is placed in Illinois. The Office of Mines and Minerals (OMM) and IEPA/Mine Pollution Control have created a joint memorandum for regulating disposal and beneficial use of coal combustion**

materials at SMCRA permitted coal mine sites. This memorandum complies with Sections 3.76 and 3.94 of the Environmental Protection Act and incorporates the requirements of SMCRA.

## II Planning/Permitting

1. Are mine facilities required to obtain permits for CCW placement? **Yes.**
  - **Disposal: Separate approvals (and separate permits) from IOMM and IEPA are required. It should be noted that IEPA and IOMM may be applied to jointly through IOMM permit applications and Significant Permit Revisions which undergo public notice procedures, as IEPA will receive those proposals directly. However, IEPA must be applied to separately in the case of Insignificant Permit Revisions and incidental boundary revisions which are submitted to IOMM.**
  - **Beneficial use: May be applied for through a permit application, major or minor permit revision, or incidental boundary revision depending on the situation and magnitude of the changes proposed.**
2. Who issues the appropriate permits? **IOMM and IEPA**
3. Do the permits contain project-specific conditions or requirements? **Yes. As coordinated between IDNR and IEPA.**
4. Are there environmental justice considerations in the permitting process? **This has not been an issue.**
5. Is the operator required to identify:
  - 5.1 The type of CCW to be minefilled? **Yes.**
  - 5.2 The source of the CCW? **Yes.**
  - 5.3 The quantity of CCW to be minefilled? **Yes.**
6. How many permits have been authorized in the State for CCW mine placement? **There are 6 active disposal sites and there have been 8-10 approvals for beneficial use applications.**
7. What is the total quantity of CCW minefilled in the State per year? **Approximately 1,300,000 tons of CCW are disposed at mine sites in Illinois annually.**
8. Are operators required to address acid/base balances prior to placement? **This is not required for CCW placement. However, acid/base accounting is required for spoil handling. Also, for disposal, pH must be maintained as to prevent excessive leaching of metal ions. If co-disposed with refuse in an active pit, the composite leachate tests should have a pH between 6 and 9.**
  - 8.1 What procedures are used to conduct acid/base balances? **For co-disposal with refuse, representative mixtures are analyzed to assure excessive leaching of**

**metals will not occur.**

8.1.1 What are the shortcomings of these procedures, if any? **None observed.**

8.1.2 What is the long-term reliability of these procedures? **SMCRA basic concept: assumes that there will be no long-term pollutant effects or the permit will not be granted. According to Kim Vories of OSM: Should count on isolation in spoil, not neutralization.**

9. Is a reclamation plan required? **Yes, through the mine permit, per Memorandum 92-11, a reclamation plan is required consisting of an initial plan based on the best estimate of what the site will look like at the end.**

9.1 Is the plan required to specifically address the use of CCW? **Only if the CCW is being utilized in the reclamation plan (i.e., soil amendment). Otherwise, it is addressed in the operations plan, not the reclamation plan.**

9.2 What must the plan include? **For either disposal or beneficial use, final cover must be adequate to support continuous vegetation, generally, this is four feet of final cover. The initial plan must include the best estimate of what the site will look like at the end of the process. Significant revisions to this plan call for public review. In addition, for beneficial use, any modifications to soil grading, covering and/or amendment, seeding and mulching activities related specifically to the application area shall be described.**

9.3 What are the standards for reclamation (i.e., how is the end-point of reclamation defined)? **This is determined on a site-by-site basis. Described in the initial plan. As closure is approached, the plan is refined to match reality. If significant revision: public review. There is a minimum responsibility period that must be observed as well as a finding that the hydrologic balance has been maintained.**

10. Is an operational plan required? **Yes.**

10.1 Is the plan required to specifically address the use of CCW? **Yes.**

10.2 What must the plan include? **Regulations specify. Permit application form directs the applicant in providing required information.**

11. Is a closure plan and/or post-closure plan required? **“Reclamation plan” is part of permit application.**

11.1 Is the plan required to specifically address the use of CCW? **Yes, if the CCB is used beneficially as part of the reclamation.**

11.2 What must the plan include? **The plan must demonstrate that the CCB area will be covered in a manner that will support continuous vegetation. In most cases, the approved reclamation plan in the permit will be adequate for this purpose. However, any modifications to the soil grading or covering and/or amendment, seeding and mulching activities related specifically to a CCB area should be detailed to support this continuous vegetation requirement. Ground water and surface water will be monitored throughout the responsibility period to assure the hydrologic balance has been maintained.**

12. Are there procedures and criteria for determining what future uses are acceptable following closure? **No.**
- 12.1 How is the public involved in this determination? **Public participation is provided for in all permitting activities in SMCRA and during permit renewals. All records concerning the permit are public documents available for inspection.**
- 12.2 If use is restricted, what protects against inappropriate uses? **Nothing beyond normal zoning laws/requirements.**

### III. Waste Characterization

1. Is characterization of the CCW conducted prior to placement? **Yes.**
- 1.1 What analytes are measured?
- **Disposal: pH, alkalinity, acidity, TDS, TCLP for 19 metals and appropriate leaching procedure for chloride, cyanide, fluoride, and sulfate, weighted composite for all constituents listed plus antimony, beryllium, and thallium.**
  - **Beneficial use: Evaluation for 19 metals.**
- 1.2 What is the testing method used?
- **Disposal: TCLP**
  - **Beneficial Use: ASTM method D3987-85**
- 1.3 Are there numerical waste acceptance/rejection criteria?
- **Disposal: None specified, other than RCRA limits for approval or denial.**
  - **Beneficial Use: Yes**
- 1.3.1 If so, what are they? **For beneficial use, leachate from CCW for beneficial use may not exceed Class I Ground-water Standards for metals.**
- 1.3.2 If not, how are waste characteristics considered in pre-placement and planning? ***[Question not applicable]***
2. Is ongoing waste characterization required during placement? **Yes, for disposal. For beneficial use, may be required depending on the source variability/consistency and the proposed beneficial use.**
- 2.1 How do the analytes, testing methods, or waste acceptance/rejection criteria differ from those used prior to placement? **There is no difference.**
- 2.2 What is the required frequency of characterization? **Quarterly sampling and reporting on each CCW source to establish baseline. Once baseline characteristics are consistently established, operator may request a modification of monitoring plan. Any changes in CCW source materials or mixture requires notification and submission of chemical analysis of the alternative waste source material or mixture.**
- 2.3 How often is the waste characterization data reviewed by the appropriate regulatory agency? **Quarterly. IOMM (Dan Wheeler) does the chemical analysis reviews. Inspectors make sure data is submitted.**

3. What is the basis for any numerical acceptance/rejection criteria? **For disposal, the RCRA limits are used for guidance. For beneficial use, the leachate analysis may not exceed Illinois Class I Ground-water Standards for metals.**

#### **IV Site Characterization**

1. Is characterization of the site required prior to placement?
  - **Disposal: Yes**
  - **Beneficial Use: Yes**
  - 1.1 What factors are examined in characterizing a site? **Geology, hydrology, and soils. Summary of ground-water monitoring data for wells in the vicinity of the disposal area needs to be submitted in permit application.**
  - 1.2 What are the criteria for accepting/rejecting a site?  **$10^{-7}$  cm/sec<sup>2</sup> permeability of impoundment subsurface (use Shelby tube, approximately 24 inches long).**
2. Is consideration of the site hydrology (e.g., a probable hydrologic consequences determination under SMCRA) required? **Yes. Consideration of PHC (Probable Hydrologic Consequences) is required.**
  - 2.1 Does this consideration specifically address the use of CCW? **Yes.**
  - 2.2 What are the hydrologic criteria for site acceptance/rejection? **Disposal or use must not disturb the hydrologic balance or post mining land use.**
  - 2.3 Does consideration of site hydrology specifically address both ground water and surface water? **Yes. PHC: applicant addresses what exists and what they plan to do. CHIA: regulatory agency predictions of impacts, also addresses nearby mine operations.**
  - 2.4 What time period does PHC determination or other consideration of site hydrology address? **Life of all mining and reclamation activities and a finding that future contamination will not occur.**
3. Is background ground-water monitoring data required prior to placement? **Yes.**
  - 3.1 What analytes are measured? **pH, total dissolved solids, conductivity, hardness, acidity, alkalinity, SO<sub>4</sub>, NO<sub>3</sub>, iron (total and dissolved), manganese (total and dissolved), calcium, magnesium, sodium, zinc, chlorine, fluorine, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, copper, cyanide, lead, mercury, nickel, selenium, antimony, thallium, silver, molybdenum, and phenol.**
  - 3.2 How are the sampling locations selected? **IEPA requires a minimum of three monitoring wells: 1 upgradient and 2 downgradient of the placement site. IOMM determinations are made on a case-by-case basis. Background and downgradient water quality are to be obtained from these wells, so there must be enough wells to effectively gather data, yet there is no desire or need for excessive amounts of data.**
  - 3.3 How much data is required before placement? **Six analyses must be done within the first year. IOMM will determine background water quality characteristics from this data. This allows time to see what application**



**impacts will be/are being felt. Assume  $10^{-7}$  cm/sec<sup>2</sup> permeability protects against any problem during the first year while data is being collected.**

4. Is background surface water monitoring data required prior to placement? **Yes. It is required in the mine's original NPDES permit.**
  - 4.1 What analytes are measured? **At a minimum the following are measured: pH, total dissolved solids, total suspended solids, alkalinity, acidity, sulfates, total iron, total manganese, chloride and flow.**
  - 4.2 How are the sampling locations selected? **An upgradient and a downgradient location of all anticipated NPDES discharge points in the receiving stream.**
  - 4.3 How much data is required before placement? **Enough to show seasonal variations.**
5. Is the use of liners considered in site characterization? **Yes.**
  - 5.1 If a site is determined to be unacceptable for CCW placement, can it be made acceptable through the use of liners? **Yes.**
6. Are there any restrictions on the type of sites that can accept CCW? **Yes, for disposal, the proposed disposal site must be on the mine site. The operator is only allowed to dispose of CCW that comes from sources that purchased coal from said operator.**

## **V Risk Assessment**

1. Is a formal risk assessment performed? **Any risk assessment evaluations are done in the CHIA.**
  - 1.1 Is it based on site-specific, regional or other (please specify) data? **Site-specific. Data in permit and other publicly available information.**
  - 1.2 Describe the steps taken in this assessment. **Same as CHIA.**
  - 1.3 Who conducts the assessment? **Office of Mines and Minerals.**
2. Are specific air, surface water, and ground-water models, equations, etc., used to assess risk or impacts? **Ground-water modeling is not a common practice but has been required at some disposal project sites. For example, IEPA did require extensive ground-water modeling at the Turriss Coal Elkhart Mine for the proposed northern section of the impoundment due to the site being hydrologically sensitive.**
  - 2.1 What models are used? **At coal mine sites that would be hydrologically sensitive we have required the applicant to preform ground-water modeling to evaluate the vertical permeability of a proposed liner and foundation soils of a disposal site. In the case of Turriss, SEEP/W by Geo-slope was utilized in the evaluation. IEPA believes the Turriss site is the only location where ground-water modeling has been required to date. The need for ground-water modeling is determined on a case-by-case basis. A vast majority of the sites don't require modeling based on the local geology or absence of ground-water aquifers in the area of concern. Where ground-water resources could be in jeopardy, modeling and/or liners are required. Air and surface water**

**modeling are generally not a requirement at coal mine sites. There are operational standards that have to be met for fugitive dust and surface water effluent. These standards are usually health-based, so as long as the standards are met additional modeling is not required.**

- 2.2 What is the State's experience with these models (e.g., ease of use, value of results)? **The ground-water model results were useful to evaluate the liner design for the impoundment at Turris.**
3. How are risk assessments results expressed? {e.g., monetization of potential damages, calculated incremental health risks (illness, deaths), negative risk (i.e., benefits outweigh negative impacts), rationalization (e.g., aquifer is not potable anyway), comparative (current/future use of the resource)}. **Whether there is expected material damage to the hydrologic balance.**
4. How are the results interpreted to determine the level and acceptability of impacts to receptors? **Whether there is material damage to the hydrologic balance or a loss of use of the water resource.**
  - 4.1 Who is responsible for interpreting the results? **If analysis is done, then IEPA or OMM is responsible for the interpretation.**
5. If no risk assessment is completed, is there a presumption that placement is acceptable if certain criteria are met? (e.g., leachate characteristics, distance to ground water, liner placement, historical experience of the regulatory authority). **Yes.**
  - 5.1 Please list the pass/fail criteria below. **CCB leachate test that doesn't meet ground-water standards. CCW leachate that doesn't meet RCRA standards.**

## **VI Ground-Water Monitoring**

1. Is a ground-water sampling and analysis plan required? **Yes.**
2. Is ground-water monitoring required during placement? **Yes.**
  - 2.1 What analytes are measured? **pH, total dissolved solids, conductivity, hardness, acidity, alkalinity, SO<sub>4</sub>, NO<sub>3</sub>, iron (dissolved and total), manganese (dissolved and total), calcium, magnesium, sodium, zinc, chlorine, fluorine, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, copper, cyanide, lead, mercury, nickel, selenium, antimony, thallium, silver, molybdenum, and phenol.**
  - 2.2 How are the number of wells, well locations, and screening zones selected? **Under Section 620 regulations, wells are to be located 25 feet from edge of source or property boundary (whichever is less) and screened 15 feet from bottom of potential source or land surface (whichever is greater). Wells must be installed above fireclay liner to monitor horizontal flow through placement areas. Screen a distance of 15 feet below bottom of potential source (pile or impoundment) or land surface, whichever is deeper)**
  - 2.3 What is the frequency of monitoring? **Quarterly, semi-annually, and annually**

**depending on parameter and site-specific requirements**

3. Is post-closure ground-water monitoring required? **Monitoring must continue through bond release (see Question VI.4, below).**
  - 3.1 If so, how does it differ from ground-water monitoring conducted during placement (analytes monitored, frequency, etc.)? **No difference unless operator requests change and IOMM agrees.**
4. Can ground-water monitoring be discontinued? **Yes.**
  - 4.1 What are the criteria for discontinuing ground-water monitoring?  
**Discontinuation of monitoring can occur only after bond release. It must be determined that there will be no detrimental ground-water changes.**
5. How is ground-water monitoring designed to specifically detect/distinguish the effects of CCW placement? **It is very difficult to distinguish between the effects of CCWs and the effects of the spoil and/or refuse. This is not really an intended objective of the monitoring.**
6. How are large expanses dealt with? **This is not currently an issue as Illinois no longer has large area surface mines. Where CCW and CCB are used in a surface mine, monitoring of the ground water surrounding the mining limits is done.**
7. How is existing ground-water contamination dealt with as part of the monitoring program? **State establishes alternative standards based on background water quality using Maximum Allowable Result (MAR) calculations (Section 620 Regulations allow for this).**
8. What water quality standards/criteria must be met? **Ground-water standards per Section 620 regulations, which depend on ground-water quality and quantity at each site.**
9. Are alternative monitoring methods allowed? **No**
  - 9.1 What alternative monitoring methods are allowed? *[not applicable]*

**VII Surface Water Monitoring**

1. Is a surface water sampling and analysis plan required? **Yes, in NPDES permit.**
2. Is surface water monitoring required during placement? **Yes.**
  - 2.1 What analytes are measured? **Specific to ash characteristics.**
  - 2.2 How are sampling locations selected? **NPDES permit monitors all affected surface drainage.**
  - 2.3 What is the frequency of monitoring? **Minimum of one sample per month or per discharge event from each discharge point and reported quarterly.**



3. Is post-closure surface water monitoring required? **No.**
  - 3.1 If so, how does it differ from surface water monitoring conducted during placement (analytes monitored, frequency, etc.)? *[Question not applicable]*
4. Can surface water monitoring be discontinued? **Yes.**
  - 4.1 What are the criteria for discontinuing surface water monitoring? **The Department may modify the surface water monitoring requirements, except those required by the Illinois EPA, when such changes to the approved plan do not diminish the ability to detect adverse impacts to the hydrologic balance, including the parameters covered and sampling frequency if the operator demonstrates using the monitoring data that:**
    - 1) **The operator has minimized disturbance to the hydrologic balance in the permit and adjacent areas and prevented material damage to the hydrologic balance outside the permit are; water quality and quantity are suitable to support approved post-mining land uses; and the water rights of other users have been protected or replaced; or**
    - 2) **Monitoring is no longer necessary to achieve the purposes set forth in the original surface water monitoring plan established for the permit.**
5. How is surface water monitoring designed to specifically detect/distinguish the effects of CCW placement? **Sediment ponds receive all affected water on sites. NPDES-permitted discharge points sources can discharge off site, but slurry ponds cannot. Water quality standards must be met at the discharge points regardless of what is affecting the surface water.**
6. How is background surface water quality assessed? **Prior to mining the background water quality is established in the receiving stream of the mining area.**
7. What water quality standards/criteria must be met? **Mining area effluent must be in compliance with the Clean Water Act standards for the receiving stream.**

#### **VIII Placement Practices**

1. What types of CCW placement are allowed (i.e., into active mines, closed mines, surface mines, underground mines, etc)? **All of the above. IDNR does not permit abandoned mine lands (AML) sites. Section 21.r of the Environmental Protection Act exempts AML sites from regulation assuming ash placed at AML sites will be placed appropriately under AML law.**
2. Is placement into the water table allowed? **Yes.**
  - 2.1 If so, under what conditions? **Ash is permitted to exist in the ground-water table. It is assumed water table will be re-established relatively close to original ground-water table.**
  - 2.2 If not, how close to the water table is placement allowed? *[not applicable]*
  - 2.3 If a liner is required beneath the CCW, what are the design/performance standards

for the liner? **Sides: No liner; lateral seepage into ash reacts with ash, causing it to set up as a barrier to further seepage in or through the ash mass. Bottom: No liner; rely on fire clay underlayer less permeable than  $10^{-7}$  cm/sec<sup>2</sup>.**

3. Is placement into mine pools allowed? **There is presently no underground placement of CCBs or CCWs occurring in Illinois. According to Kim Vories of OSM, nationwide, this is done in only a few States and is done only on an experimental and closely monitored basis.**
  - 3.1 What placement techniques are used? *[not applicable]*
  - 3.2 Are there additional/special monitoring requirements after placement into a mine pool? *[not applicable]*
4. Are there specific design/operational requirements for the following types of projects and, if so, what are they?
  - 4.1 Placement into underground mines? **Underground placement is not presently occurring. Only experimental test runs have been done. Bill Giles and Mike Caldwell (from Freeman United Coal Company) described these test runs as attempts to inject slurried CCW into an underground mine in an effort to reduce pillar size and therefore extract more of the coal. The slurry was a paste with a quick set-up time and structural strength. Mixing slurried ash with acidic mine gob waste was also considered to produce a pumpable paste for subsurface placement. After the initial experimental runs, however, it was determined that the mechanics and the logistics of this type of CCW placement overwhelmed the benefits of such an undertaking. Therefore, this type of placement does not occur.**
  - 4.2 Placement into surface mines? **Specific design and operational requirements are detailed in the permit and operations plan.**
  - 4.3 Grouting? **Not presently occurring.**
  - 4.4 Acid mine drainage remediation? **There is one case in which CCWs were used to add alkalinity to process water. Fly ash caused a solids problem (suspended solids) and the practice was suspended.**
  - 4.5 Soil conditioning? **Not presently occurring. Razorback I and II coal mine sites were approved to use CCB as a soil conditioner during reclamation. Regardless of the CCB placement, these sites are required to meet all applicable reclamation criteria which would include, but not limited to, protection of the hydrologic balance (surface and ground-water quality and quantity), re-establishment of vegetation and post-mining land use requirements.**
  - 4.6 Mine sealing? **Not presently occurring. At Old Ben Mine 26, OMM has approved shaft backfilling with CCW. This has not been a concern since shafts are lined with concrete or steel and are capped with concrete. With this type of CCW placement ground water is physically isolated from the CCW.**

- 4.7      Subsidence control? **No.**
- 4.8      Spoil encapsulation? **Not really of relevance in Illinois.**

**IX      Operational Requirements/Design Requirements**

- 1.      How is the potential for flooding/washout addressed? **In Memorandum 92-11, Second Provision, “wind, water, erosion” section and SMCRA regulations.**
- 2.      Are runoff controls used/required? **During construction, perimeter ditches and sediment ponds are used. For final reclamation, encapsulation is used.**
- 3.      Are leachate collection systems used or required? **No.**
  - 3.1      Under what conditions? *[Question not applicable]*
  - 3.2      What are the design criteria? *[Question not applicable]*
- 4.      Is waste conditioning required? **Possibly, depends on the pH of the CCW.**
  - 4.1      What waste conditioning methods are allowed? **Spraying waste with water creates a “crust” layer over the surface of the waste which prevents fugitive dust. Also, mixing with water and/or coal refuse prior to placement.**
  - 4.2      What design criteria exist for waste conditioning? **Varies. Specific to ash and facility.**
- 5.      What fugitive dust controls are used or required:
  - 5.1      During transport and discharge from transport vehicles? **SMCRA requires an air pollution control plan. IEPA’s air pollution section is more specific than SMCRA regulations -- Section 3.94.10.D of the 1997 Illinois Environmental Protection Act states that “Fly ash shall be applied in a manner that minimizes the generation of airborne particles and dust using techniques such as moisture conditioning, granulating, inground application, or other demonstrated method.” In addition, DOT regulations apply during transport.**
  - 5.2      During/following placement? **See question IX.4, above. Portable sprays, truck covers.**
- 6.      Is a cover or cap required over the CCW? **Yes.**
  - 6.1      What are the design/performance criteria? **For either disposal or beneficial use, final cover must be adequate to support continuous vegetation, generally, this is four feet of final cover (see question II.9.2).**
  - 6.2      What kind of cover materials are required? **Stockpiled original soils and subsoil.**
  - 6.3      What minimum/maximum slopes are allowed for final cover? **30%, unless engineered to provide assurance that a steeper slope is acceptable for safety and erosional concerns.**
  - 6.4      What compaction criteria/standards apply to the cover/cap? **None.**
  - 6.5      What are the maintenance standards for covers/caps? **Vegetation and drainage controls must be adequate to prevent erosion. Once bond release is achieved**

**there are no further standards or requirements.**

7. Is re-establishment of surface streams required? **Temporary or permanent stream diversions can be approved. Temporary diversions must be re-established.**
  - 7.1 What determines when it is appropriate and how it should be done? **Must re-establish drainage post mining.**
  - 7.2 What are the design criteria? **Prevent flooding upstream and downstream. Re-establish equivalent habitat.**
8. Is contouring of waste so water drains away from the fill required? **The waste is covered with the appropriate amount of non-toxic cover to isolate the waste upon reclamation. Drainage of water from this area following reclamation is not required.**
  - 8.1 When is it appropriate to contour wastes? **All waste must be covered as part of the reclamation plan. Wastes are contoured if necessary to achieve the final reclamation contours.**
  - 8.2 What are the minimum slope and compaction criteria? **30% is generally the maximum slope allowed for final reclamation without a demonstration that a steeper slope will be stable. There are no criteria for compaction unless required for stability.**
9. Is re-vegetation required? **Yes.**
  - 9.1 What are the design criteria? **Dependant on the approved land use in the reclamation plan.**
  - 9.2 What kinds of plants are used? **Approved in the reclamation plan.**
  - 9.3 What kinds of topsoil/compost are required? **Cover requirements are approved in the reclamation plan.**
10. Is the operator required to restrict public access to the waste and facility? **Yes.**
  - 10.1 What design/performance standards or criteria apply? **Safety training is required to have access to the waste and facility (MSHA regulation).**
11. What are the post-closure maintenance requirements (e.g., maintaining cover integrity and effectiveness, slopes, vegetation, etc.)? **The operator is required to maintain vegetation and erosion control until the bond has been released.**
12. How long is the owner/operator responsible for post-closure maintenance? **Responsibility period is for a minimum of 5 years following reclamation.**
13. What other operational requirements exist?
  - **Disposal:**
    - **CCW must come from a supplier that has purchased coal from the mine.**
    - **The amount of CCW disposed may not exceed 35% of annual coal**

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**sales. Exceptions to this volume are allowed if the coal combustion process generates ash at a percentage greater than 35% of the coal burned.**

- **Adequate protection from wind and water erosion is required, including: goal of no visible emissions, and minimize contact with surface water and direct precipitation.**
- **Liners may be required for disposal in certain ground-water classes. (In-situ fire clay can meet the liner requirement.)**
- **Beneficial Use:**
  - **CCB cannot be mixed with hazardous waste.**
  - **Erosion control measures.**
  - **Dust control measures.**
  - **Maps of application areas.**
  - **Speculative accumulation is not permitted.**
  - **Notification, documentation of quality, and certification of compliance are required.**
  - **Cannot exceed ground-water standards for metals.**

## **X Corrective Action**

1. Under what circumstances are corrective actions required/what is the trigger for a corrective action?
  - **Disposal: Corrective action requirements will apply if storm and ground-water contamination levels established by the Illinois Environmental Protection Act and Ground-water Protection Act are exceeded. All corrective action is handled by the IEPA. In addition vegetation and erosion control must be maintained during the responsibility period.**
  - **Beneficial use: During the utilization of CCB, all applicable CCW criteria must be met.**
2. What types of corrective action measures are appropriate? **A zone of impairment is defined. Then procedures for rectifying, containing, and treating the problem are determined. Most likely, pump and treat.**
3. Does the state have any damage cases? **IEPA is currently investigating two mine sites, Peabody Eagle Site and Monterray #2 Site. Neither of these cases involves ash, only coal refuse.**

## **XI Financial Assurance**

1. Is financial assurance required? **Yes.**
  - 1.1 What types of financial assurance mechanisms are allowed? **A surety bond, a collateral bond, a self-bond, or a combination of any of these bonding methods.**
2. What is the period of liability? **For the duration of the surface mining and**

**reclamation operation and for a period which covers the extended responsibility.**

3. What is the amount of financial assurance required? **Individually calculated for each permit.**
4. What are the conditions for bond release? **Compliance with all regulatory requirements for bond release.**
5. Is there a separate State liability fund? **No.**
  - 5.1 What is the source of money for this fund? *[Question not applicable]*

## **XII Reporting**

1. How frequently is monitoring data on wastes, ground and surface water reported to the government? **Quarterly.**
2. Is the data maintained at the facility? **Yes. Also sent to DNR.**
3. How often are sites inspected? **Monthly; some bi-weekly.**
4. How often is compliance with permit requirements, performance standards, enforceable limits, etc., evaluated? **Monthly or bi-weekly during inspections and quarterly on receipt of quarterly data submissions.**
  - 4.1 Who is responsible for this evaluation? **Inspectors and DNR HQ (Dan Wheeler).**
5. What are the post-closure reporting requirements? **None.**
6. How frequently does the regulatory authority inspect the closed facility, and what are the criteria for terminating inspection? **Site must be inspected at least monthly until final bond release.**

## **XIII Public Participation**

1. Prior to permit issuance, does the public have an opportunity to review and comment on monitoring (surface and ground water) and/or modeling data and Probable Hydrologic Consequences determination? **In some cases. Public meetings are sometimes held which can lead to hearings. Documents are available for review at the county courthouse. If a PHC is done, the public has an opportunity to review it. There is no opportunity for public review if an Insignificant Permit Revision (IPR) is done. In the case of an IPR, a modified PHC is done as opposed to a full PHC.**
  - 1.1 What other opportunities for public involvement are there in the permitting process? **Public review process outlined in SMCRA.**
2. Is monitoring data available to the public? **Yes.**



3. What opportunity does the public have to participate in overseeing compliance at the site? **The public can participate in inspection for bond release. Also, citizens can file complaints with DNR and participate in an inspection of the facility as part of the complaint.**
4. Does the public have access to post-closure reports? **Yes.**
5. Are citizen actions allowed? **Yes. There is a formal citizens complaint process.**
  - 5.1 What types of actions are allowed (e.g., petitions, suits)? **Suits. Citizens can request an Administrative Review of a permit issuance.**
  - 5.2 Who adjudicates citizen actions (e.g., permitting agency, administrative law judge, State court, federal court)? **State court. Administrative law judge.**