

US EPA ARCHIVE DOCUMENT

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

Draft Final  
December 17, 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.

Indiana - February 5, 2002

## **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 February 5, 2002, EPA staff conducted an information collection visit to Indiana. The purpose of this visit was to gather information regarding the regulation of CCW minefill practices within the State of Indiana. The visit consisted of a meeting with Indiana State regulators. This information collection visit did not consist of any mine site visits. 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.

## **SUMMARY OF MEETING WITH INDIANA STATE REGULATORS**

The meeting was conducted on February 5, 2002, at the Indiana Department of Natural Resources (DNR) office in Jasonville, Indiana. Among those in attendance were:

- Anthony Carrell, U.S. EPA
- Deborah Dale, Indiana DNR
- Ron Pearson, Indiana DNR
- Bruce Stevens, Indiana DNR
- Marvin Ellis, Indiana DNR, Division of Reclamation
- John Richardson, Indiana DNR, Division of Reclamation
- Danielle Glitz, SAIC

The Indiana Department of Natural Resources (DNR) completed the CCW Minefill Management Practices Discussion Guide prior to the meeting. In light of questions raised during the meeting, the Indiana DNR made some clarifications to the answers they provided in the discussion guide and submitted a revised version to EPA following the meeting. This revised Discussion Guide is attached to this report.

## 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

February 5, 2002 – Indiana

<b>Interviewee Names:</b>	Bruce Stevens, Director John Richardson, Asst Director Ron Pearson, Marvin Ellis, Debra Dale, Hydrogeologists.
<b>Interviewee Agency:</b>	Indiana Department of Natural Resources - Division of Reclamation
<b>Interview Date:</b>	February 5, 2002

### I. General

1. Is there a distinction between disposal and beneficial use? **Yes.**
  - 1.1 How is the distinction made (e.g., waste quantity, placement type)? **By placement type: only specific activities are permissible for beneficial use as authorized by state law, IC 13-19-3-3 (see attachment 1, e.g., mine subsidence, mine fire control, mine sealing, structural fills). Please refer to IDNR-DoR Memorandum 99-2 for recognized beneficial uses at mine sites regulated under IC 14-34 (see attachment 2). Anything that is not listed as a permissible beneficial use activity is considered disposal and falls under the requirements of Memorandum 92-1 (see attachment 3) and a permit to dispose must be obtained.**
2. Under what program(s) does the State regulate mine placement (e.g., SMCRA implementing regulations, State solid waste program)? **The Indiana Department of Natural Resources, Reclamation Division (DNR-RD) has sole jurisdiction over the disposal and beneficial use of CCW on active mine sites and has developed policies addressing both. The disposal of CCW at mining facilities regulated by DNR-RD and the beneficial uses of CCW are exempt from the State's solid waste regulation.**
3. Are there differing requirements/policies applicable to different types of CCW (e.g., fly ash vs. FGD wastes)? **Yes. Flue gas desulfurization (FGD) can only be disposed at mine sites if in mixture with fly or bottom ash as per statutory requirements at IC 13-19-3-3. The DNR-RD policy regarding beneficial use does differentiate between CCW types. For example, if material were intended to be used as an anti-skid material, it would have to have abrasive or anti-skid characteristics such as bottom ash. Flue-gas desulfurization sludge would not be allowed to be utilized for this type of use as it would not have abrasive/friction causing qualities.**
4. Are there differing requirements/policies applicable for different types of placement? **See Question 1.1 above.**
5. Are there differing requirements/policies applicable for different kinds of mines (e.g., coal vs. non-coal mines such as quarries)? **There are Indiana regulations that address non-coal mine disposal of coal combustion waste. Non-mine disposal is regulated by the Indiana Department of Environmental Management (IDEM). IDEM's**

jurisdiction would include locations such as quarries, if this were to be proposed. The Division of Reclamation does not have regulatory authority for non-coal mine placement.

## II. Planning/Permitting

1. Are mine facilities required to obtain permits for CCW placement?  
**Disposal: New sites proposing mining and coal combustion waste disposal must be permitted including full public notice and appeal provisions. Significant revision of existing mining permit to add CCW disposal is required including full public notice and appeal provisions.**  
**Beneficial Use: written notification is required, but no permit revision. The notifications are reviewed and if they are determined to be a legitimate beneficial use, a written acknowledgment is provided to the permittee within fifteen (15) days of receipt of the notification. However, the Department does carefully review these notifications and inspects mines where utilization is intended to assure that the beneficial use is consistent with the intended regulatory exemption. Use at a mine site not consistent with the exemption could result in SMCRA enforcement action.**
2. Who issues the appropriate permits? **See Section I, above.**
3. Do the permits contain project-specific conditions or requirements? **By statute, beneficial use is not regulated but the intended use must be determined to meet the conditions of a legitimate beneficial use. Beneficial use of CCW is not allowed if the intended use will compromise the ability to comply with the requirements of the Surface Mine Control and Reclamation Act (SMCRA). For disposal at a mine site, a detailed site evaluation and operational plan is submitted and reviewed as part of the permit review process (see Part IV.O of the surface mine permit application). A copy of this permit module is included with this questionnaire as Attachment 4. Also, see other sections in this questionnaire that address waste characterization, operational requirements, and design requirements.**
4. Are there environmental justice considerations in the permitting process? **There are no environmental justice provisions in the mining regulations. Coal is only present in the southwestern portion of Indiana. The mining of coal, and any disposal of CCW associated with it, take place in areas that coal is present in sufficient quantities to be mined. Disposal of CCW in a setting which is disturbed by mining reduces the need for landfill space. The siting of landfills are at times in areas of environmental justice considerations.**
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 for both disposal applications and beneficial use notifications. Consideration for disposal will be limited to CCW generated in**

**Indiana or CCW generated from burning Indiana coal as stated in Memorandum 92-1.**

- 5.3 The quantity of CCW to be minefilled? **Yes. The annual volume and the total volume of coal combustion waste to be disposed over the life of the operation and the ratio of waste to spoil. Disposal shall not exceed ten feet in thickness unless approved as a monofill. A monofill is considered any area in which the disposal of CCW exceeds 10 feet in thickness.**
6. How many permits have been authorized in the State for CCW mine placement? **Sixteen (16) approved of which one (1) has been withdrawn; two (2) of the approved permits have completed mining without disposal occurring, thus canceling the permits; and two (2) have completed disposal. This leaves four (4) permits approved with no disposal to date; four (4) permits presently disposing; and two (2) permits that were previously disposing are not doing so currently, but could resume.**
7. What is the total quantity of CCW minefilled in the State per year?
- |      |              |       |                |
|------|--------------|-------|----------------|
| 1989 | 270,364 tons | 1996  | 150,804 tons   |
| 1990 | 254,806 tons | 1997  | 148,908 tons   |
| 1991 | 0            | 1998  | 292,388 tons   |
| 1992 | 320,000 tons | 1999  | 274,072 tons   |
| 1993 | 0            | 2000  | 1,097,520 tons |
| 1994 | 0            | 2001  | 1,093,235 tons |
| 1995 | 185,942 tons | TOTAL | 4,088,058 tons |
8. Are operators required to address acid/base balances prior to placement? **Yes. Although Indiana does not have prevalent acid mine drainage issues, any application for disposal of coal combustion waste must contain acid base accounting for each proposed coal combustion waste source. Likewise, each application for mining requires each stratum down to and including the stratum located beneath the lowest coal seam to be mined to be analyzed for acid base accounting.**
- 8.1 What procedures are used to conduct acid/base balances? **Results of laboratory analyses are submitted by the operator and are reviewed as part of the permitting process. The parameters for the acid/base balance calculations are analyzed in accordance with the "Field and Laboratory Methods Applicable to Overburden Material", EPA-600/2-78-054. Note: Potential acidity is calculated by multiplying percent pyritic sulfur by 31.25.**
- 8.1.1 What are the shortcomings of these procedures, if any? **No problems have been noted.**
- 8.1.2 What is the long-term reliability of these procedures? **The requirements for acid base accounting were initiated in 1992 and have been utilized in the permitting process and for the quarterly reporting requirements. As long as the permit requirements are followed, there have been no issues.**



9. Is a reclamation plan required? **Yes.**
- 9.1 Is the plan required to specifically address the use of CCW? **Yes. A description of the type of disposal operation (i.e., backfill, monofill) and an explanation of types of CCW to be disposed (e.g., fly ash, bottom ash, etc.) as well as the annual and total volume of CCW to be disposed must be provided.**
- 9.2 What must the plan include? **The disposal plan must include a description of how minimization of adverse impacts upon the prevailing hydrologic balance will be accomplished. A description of the restoration of the approximate original contour, post-mining land use, and a revegetation plan is also required. See the attached permit module for more information (attachment 4).**
- 9.3 What are the standards for reclamation (i.e., how is the end-point of reclamation defined)? **All mining and reclamation activities must be performed in accordance with SMCRA. The endpoint is determined by conformance with SMCRA and demonstrated compliance with bond release criteria.**
10. Is an operational plan required? **Yes.**
- 10.1 Is the plan required to specifically address the use of CCW? **Yes, for disposal. For beneficial use, the use must be described and determined to be a legitimate beneficial use in accordance with state law.**
- 10.2 What must the plan include? **The plan must include a description of the proposed compaction, a description of the methods to be used to reduce infiltration or contact with water, (liners, caps, co-disposal with coal processing waste, etc. Detailed maps, plans, and cross-sections, and a dust control plan shall be provided. See the attached permit module (attachment 4) for additional requirements.**
11. Is a closure plan and/or post-closure plan required? **Yes. Both closure and post-closure plans are required and are dictated by compliance with SMCRA, adherence to provisions described in the permit and bond release criteria set by regulation. A reclamation plan is the equivalent of a closure plan. The period after reclamation is complete (including all CCW disposal operations) is considered the post-closure plan.**
- 11.1 Is the plan required to specifically address the use of CCW? **See the responses to Questions 9, 10, and 11 above.**
- 11.2 What must the plan include? **See the responses to Questions 9, 10, and 11 above.**
12. Are there procedures and criteria for determining what future uses are acceptable following closure? **There are procedures and criteria required for determining that a mine area has fulfilled its obligations under SMCRA. These provisions are performance based in that a demonstration must be made that pollution is not occurring, that all areas are stable, and that specific productivity data for the post-mine land use have been achieved. The demonstration takes place for several years (a minimum of five but normally longer) after coal production at the site has ceased. This is somewhat similar to landfill post-closure in that wastes are no longer being**



disposed at the landfill during the time following disposal and demonstrations to applicable standards are taking place during this time. (See attachment 5 for bond release requirements)

- 12.1 How is the public involved in this determination? **Landowners and adjacent landowners are notified of pending bond releases and have the right to attend and provide comment on applications for bond release. Upon approval of an area for bond release, these individuals have the right to appeal the DNR-RD's decision.**
- 12.2 If use is restricted, what protects against inappropriate uses? **N/A**

### III. Waste Characterization

- 1. Is characterization of the CCW conducted prior to placement? **Yes.**
  - 1.1 What analytes are measured? **Memorandum 92-1: Arsenic, barium, boron, cadmium, chloride, chromium, fluoride, iron, lead, manganese, mercury, molybdenum, nickel, selenium, silver, sodium, sulfate, sulfide, total dissolved solids, total organic carbon, zinc, acid/base accounting, potential acidity, neutralization potential, net neutralization potential, and pH. Attachment IV.O of permit application requires, in addition to 92-1 list, the following parameters: aluminum, magnesium, potassium, and vanadium.**
  - 1.2 What is the testing method used? **Screening for chemical constituents using bulk analysis. A short term, 18 hour leaching test and a long term leaching test for 30 days shall be used for the elements listed in Question III.1.1. Both the short and long leach tests have historically used ASTM D3987-85.**
  - 1.3 Are there numerical waste acceptance/rejection criteria? **Yes.**
    - 1.3.1 If so, what are they? **Leach test concentrations for both the short term (18 hour) and long term (30 day) must not be greater than one-quarter the RCRA limit in order to be permissible for disposal.**
    - 1.3.2 If not, how are waste characteristics considered in pre-placement and planning? **N/A**
- 2. Is ongoing waste characterization required during placement? **Yes.**
  - 2.1 How do the analytes, testing methods, or waste acceptance/rejection criteria differ from those used prior to placement? **The ongoing waste characterization criteria does not differ from the pre-placement criteria described in Part III, 1.1 through 1.3 above.**
  - 2.2 What is the required frequency of characterization? **Periodic coal combustion waste sampling and analyses for each active waste stream shall be conducted at least quarterly with the results submitted according to a schedule approved by the Director. Sampling frequency may later be reduced based upon the consistency of the analyses. To date, sampling frequency has not been reduced.**
  - 2.3 How often is the waste characterization data reviewed by the appropriate regulatory agency? **It is reviewed quarterly upon submission of the data.**

3. What is the basis for any numerical acceptance/rejection criteria? **Leach test concentrations for both the short term (18 hour) and long term (30 day) must not be greater than one-quarter the RCRA limit.**

#### **IV. Site Characterization**

1. Is characterization of the site required prior to placement? **Yes.**
  - 1.1 What factors are examined in characterizing a site? **Area hydrology and geology, including the presence of aquifers, permeability of natural materials and whether natural buffers or liners exist. Maps, plans and cross sections which show the extent of the disposal area, including the expected rate and direction of groundwater movement in the vicinity of the disposal area must also be included.**
  - 1.2 What are the criteria for accepting/rejecting a site? **Upon consideration of factors such as those identified in 1.1 above, and other provisions of SMCRA, if it is determined that adverse impacts to the hydrologic balance will occur, then no disposal can occur. For example, proposed disposal into areas containing permeable alluvial deposits would be, and have been in the past, rejected.**
2. Is consideration of the site hydrology (e.g., a probable hydrologic consequences determination under SMCRA) required? **Yes.**
  - 2.1 Does this consideration specifically address the use of CCW? **Each application for coal combustion waste disposal must contain a narrative, with supporting data, which establishes the probable hydrologic consequences of the disposal plan. The director utilizes this information for generating the cumulative hydrologic impact assessment in order to determine if any adverse impact due to the proposed operation will occur.**
  - 2.2 What are the hydrologic criteria for site acceptance/rejection? **Consideration of the probable hydrologic consequences of the mining and reclamation operations identified in the permit application and a finding by the director through the assessment of the probable cumulative impacts of the proposed operation have been designed to prevent material damage to the hydrologic balance outside the proposed permit area.**
  - 2.3 Does consideration of site hydrology specifically address both ground water and surface water? **Yes. Proposed disposal applications must include a minimum of six months of baseline monitoring for surface and ground water in and within 1000 feet of the permit area.**
  - 2.4 What time period does PHC determination or other consideration of site hydrology address? **The PHC is permit specific. It includes a consideration of pre-mine baseline information, on-going surface and ground water monitoring during the mining and reclamation operations, and post-mining monitoring prior to the release of all reclamation bond. The description included in the determination of the PHC is for the permit and adjacent areas with respect to the quantity and quality of surface and ground water**

**systems under all seasonal conditions. The PHC is based on baseline hydrologic and geologic information collected for the permit application.**

3. Is background groundwater monitoring data required prior to placement? **Yes.**
  - 3.1 What analytes are measured? **Memorandum 92-1: Arsenic, barium, boron, cadmium, chloride, chromium, copper, fluoride, iron, lead, manganese, mercury, molybdenum, nickel, pH, selenium, silver, sodium, specific conductance, sulfate, sulfide, temperature, total dissolved solids, total organic carbon, zinc, cation/anion balance, pH (lab), specific conductance, and temperature. Attachment IV.O of permit application requires, in addition to 92-1 list, the following parameters: aluminum, magnesium, calcium, alkalinity, acidity, hardness, and static water elevation. Parameters other than those specified above may be required by the Director in order to ensure the protection of public health and safety and the environment.**
  - 3.2 How are the sampling locations selected? **Permit specific, determined either during pre-application submittal meeting with the applicant, or during the technical review process of the application, and are based on site-specific geologic and hydrologic information/conditions, such as the results of exploratory drilling, location and extent of aquifers, wells utilized for domestic, agricultural, and other purposes, and other ground water resources.**
  - 3.3 How much data is required before placement? **A minimum of six months of baseline monitoring (within 1,000 feet of the permit area) is required.**
4. Is background surface water monitoring data required prior to placement? **Yes.**
  - 4.1 What analytes are measured? **Memorandum 92-1: Arsenic, barium, boron, cadmium, chloride, chromium, copper, fluoride, iron, lead, manganese, mercury, molybdenum, nickel, pH, selenium, silver, sodium, specific conductance, sulfate, sulfide, temperature, total dissolved solids, total organic carbon, zinc, cation/anion balance, pH (lab), specific conductance, and temperature. Attachment IV.O of permit application requires, in addition to 92-1 list, the following parameters: aluminum, magnesium, calcium, alkalinity, acidity, total suspended solids, and discharge rate. Parameters other than those specified above may be required by the Director in order to ensure the protection of public health and safety and the environment.**
  - 4.2 How are the sampling locations selected? **Baseline surface water data can be collected from either streams or sediment control basins. If no basins are present, then streams will be the baseline monitoring points. Locations are permit specific and are determined either during pre-application submittal meeting with the applicant, or during the technical review process of the application. Both upstream and downstream monitoring is required. Monitoring must take place at all streams, impoundments, and etc. that may be potentially impacted or into which water from the ash disposal areas will be discharged.**

- 4.3 How much data is required before placement? **A minimum of six months of baseline monitoring (within 1,000 feet of the permit area) is required from each designated surface water monitoring location (stream and/or basins) prior to disposal.**
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? **Liners can be required if the natural materials are not sufficient or site location characteristics are not otherwise favorable. When encountered in the past, disposal in these settings was not allowed.**
6. Are there any restrictions on the type of sites that can accept CCW? **The evaluation of a proposal to dispose CCW on surface mines considers the hydrogeologic conditions, the proximity of public and private water supplies, or other critical off-site features. Disposal is allowed at either surface or underground mines so long as the criteria of Memorandum 92-1 for disposal operations and Memorandum 99-2 for beneficial use notifications are met. The DNR-RD has no regulatory authority over non-coal mine facilities.**
- V. **Risk Assessment**
1. Is a formal risk assessment performed? **A formal risk assessment is not performed using specific risk assessment models. Evaluation of a proposal to dispose of CCW on surface coal mines will consider, at a minimum, the risk assessment factors described as follows:**
- Proximity of public and private water supplies or other critical off-site features.**
  - CCW characteristics including MPC (maximum possible concentration) calculated from solids concentration and appropriate leachate tests.**
  - Geologic and hydrologic site characteristics, such as type and extent of aquifers, overburden characteristics, expected spoil characteristics.**
  - Expected attenuation, dispersion, and dilution.**
  - Direction of ground water flow.**
  - Baseline water quality and quantity.**
  - Volume of waste proposed for disposal.**
  - Impact on natural liners, artificial liners, compaction, capping or other operational features.**
  - Type of proposed disposal operation, i.e. backfill, monofill.**
- All information is then considered in the DNR-RD generation of the cumulative hydrologic impact assessment (CHIA).**
- 1.1 Is it based on site-specific, regional or other (please specify) data? **It is based on site-specific, regional, and other information available to the director at the time of decision**
- 1.2 Describe the steps taken in this assessment. **See Question V.1 above.**

- 1.3 Who conducts the assessment? **The regulatory authority (IDNR-RD).**
2. Are specific air, surface water, and ground water models, equations, etc., used to assess risk or impacts? **Groundwater flow software is are used to determine hydrologic characteristics such as transmissivity and hydraulic conductivity.**
- 2.1 What models are used? **AQTESOLV is the groundwater software used in determining hydraulic characteristics.**
- 2.2 What is the State's experience with these models (e.g., ease of use, value of results)? **As discussed in V1 above, no formal risk based model is used. In regard to the use of AQTESOLV, it is considered user friendly.**
3. How are the risk assessment 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)} **No formal risk assessment using a specific model is performed.**
4. How are the results interpreted to determine the level and acceptability of impacts to receptors? **The reclamation plan must include measures to be taken during the mining and reclamation process that will assure the protection of the surface and ground water systems within the permit area and adjacent areas from adverse effects of the mining and reclamation processes. As long as SMCRA bonds are held by IDNR, the coal operator is responsible for the replacement of domestic water supplies found to have been adversely affected by coal mining operations. This is not a remediation of the ground water, but rather a replacement of the drinking water sources, by whatever means determined. After SMCRA bonds have been released, IDNR is responsible for the replacement of an affected drinking water source with the use of its post-1977 abandoned mine reclamation fund, IC 14-34-6-15. (See Attachment 6).**
- 4.1 Who is responsible for interpreting the results? **The regulatory authority (IDNR- RD)**
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). **As stated previously, if a RCRA constituent exceeds 25% the RCRA limit in either the 18 hour or 30 day leach test, disposal is not permitted although there is not a presumption that disposal can occur if this is the case . The risk assessment factors, identified in V.1. above are evaluated, as well as all other information available such as published research materials, and experience of the regulatory authority in the decision making process. 5.1 Please list the pass/fail criteria below. If the results of the technical review indicate the disposal of CCW will not cause material damage outside the permitted area and will not adversely affect the quality of the surface and ground water beyond that provided in SMCRA, will not create public health**



hazards, and will not affect the establishment of revegetation which supports the approved postmining land use of the permit area, and all information available to the DNR-RD indicate that adverse impacts resultant of the disposal operation will not occur, then the application for consideration of disposal would be approved.

**VI. Ground Water Monitoring**

1. Is a ground water sampling and analysis plan required? **Yes**
2. Is groundwater monitoring required during placement? **Yes.**
  - 2.1 What analytes are measured? **Memorandum 92-1: Arsenic, barium, boron, cadmium, chloride, chromium, copper, fluoride, iron, lead, manganese, mercury, molybdenum, nickel, pH, selenium, silver, sodium, specific conductance, sulfate, sulfide, temperature, total dissolved solids, total organic carbon, zinc, cation/anion balance, pH (lab), specific conductance, and temperature. Attachment IV.O of permit application requires, in addition to 92-1 list, the following parameters: aluminum, magnesium, calcium, alkalinity, acidity, hardness, and static water elevation. Parameters other than those specified above may be required by the Director in order to ensure the protection of public health and safety and the environment.**
  - 2.2 How are the number of wells, well locations, and screening zones selected? **Water monitoring programs are dependant on site specific conditions. Factors considered when determining the number of wells and their locations include geologic and hydrologic information, disposal location(s) within the permit area, and the type of disposal (monofill versus backfill). Wells must be located upgradient and downgradient of the disposal location(s) with at least one monitoring well located in the expected path of the leachate migration. If monofills are utilized, at least one additional well must be established within the initial monofill disposal area.**

**Monitoring wells and compliance wells are installed similarly to domestic wells located within the vicinity of the disposal operations. Monitoring and compliance well constructions will be tailored to the specific site with either the screened interval across a specific zone and/or across multiple lithologic units depending on local domestic wells. The rationale behind this requirement is to ensure the ground water monitoring program is adequate to sufficiently characterize and monitor the same potable ground water resources being utilized in the area surrounding the disposal site.**
  - 2.3 What is the frequency of monitoring? **With the exception of one site that has a semi-annual monitoring frequency, the frequency of monitoring is quarterly through final bond release. Results of the monitoring plan must be submitted in accordance with a schedule approved by the Director.**

3. Is post-closure ground water monitoring required? **Yes. Ground water monitoring must continue through final bond release. By regulation, bond cannot be released until a minimum of five (5) years after reclamation of the site is complete. Normally, a site does not receive release of final bond until five (5) years after the site has been restored and seeded. This five (5) year timeframe is the performance period in which productivity for each of the post-mine land uses must be proven. For some post-mine land uses, three demonstration years are required. In the event that all productivity has not been met or areas remain that are not stable at the end of this five years, bond is not released and will not be released until such time that these requirements are met. After final bond is released, jurisdiction of the site is terminated. (See attachment 5 for bond release requirements)**
- 3.1 If so, how does it differ from ground water monitoring conducted during placement (analytes monitored, frequency, etc.)? **No difference.**
4. Can ground water monitoring be discontinued? **Not until final bond release is attained.**
- 4.1 What are the criteria for discontinuing ground water monitoring? **By regulation, consideration for bond release is based on a determination that performance standard regulations have been met and that pollution is not occurring.**
5. How is ground water monitoring designed to specifically detect/distinguish the effects of CCW placement? **Wells are placed both upgradient and downgradient of the areas in which disposal takes place. Data submitted quarterly, both during disposal and after disposal until bond release, is compared to baseline (pre-disposal) data to determine if adverse impacts have occurred.**
6. How are large expanses dealt with? **During the technical review process, the well locations are selected to ensure their proximity to the disposal locations. Oftentimes large expanses are permitted for disposal using the backfill method. The backfill method is considered to be disposal in mined out areas as the pit progresses. CCW disposal using this method generally is buried beneath several tens of feet of spoil (rock and soil disturbed as a part of the mining process). The backfill method disperses the CCW with large volumes of the spoil disturbed as a part of the mining process. CCW disposal rarely takes place in all areas permitted. This necessitates that during disposal and after disposal monitoring wells be relocated in order to ensure wells are in proximity to the areas in which CCW disposal actually took place. Data from these wells are then compared to data obtained from the baseline characterization wells in the manner discussed in Question 5 above and by evaluation of data trends.**
7. How is existing ground water contamination dealt with as part of the monitoring program? **If “existing” refers to the water quality that is present prior to CCW disposal, then the quality data is considered during the review process, but would not necessarily lead to a restriction on disposal; however, it may result in the installation of additional monitoring wells or a revision to the ground water monitoring plan, such as changes to increase the frequency of monitoring or to**



require additional parameters be included in the plan. At this time, in the absence of a ground water standard, all future monitoring data collected during the disposal and after disposal monitoring phases, would then be compared to the baseline data and evaluated to determine if any adverse trends are apparent that could be associated with the CCW disposal.

The Indiana Department of Environmental Management (IDEM) has recently adopted a groundwater standards rule. According to the IDEM, the anticipated effective date of the rule is March 4, 2002. The DNR-RD is currently drafting rules to implement these standards. This rulemaking will implement these groundwater standards making them applicable to operations disposing of coal combustion waste. The rules adopted by IDEM include a classification system for ground water, numeric standards for each class of water, and a mechanism to establish compliance monitoring points. Under those rules, which will be incorporated into the DNR rulemaking, existing contamination would be considered in the classification of water, and therefore the standard that must be met in waters of that class.

8. What water quality standards/criteria must be met? **The Indiana Department of Environmental Management has recently adopted a groundwater standards rule. According to the IDEM, the anticipated effective date of the rule is March 4, 2002. The DNR-RD is currently drafting rules to implement these standards. This rulemaking will make the groundwater standards applicable to operations disposing of coal combustion waste.**
9. Are alternative monitoring methods allowed? **No. While Memorandum 92-1 provides for consideration of frequency and parameters, this has never occurred. Monitoring is required at the designated locations through final bond release.**
  - 9.1 What alternative monitoring methods are allowed? *[Question not applicable]*

## **VII. Surface Water Monitoring**

1. Is a surface water sampling and analysis plan required? **Yes.**
2. Is surface water monitoring required during placement? **Yes. Baseline monitoring and on-going monitoring at the designated points during and subsequent to disposal is required. Locations of the on-going monitoring points are permit specific and are determined either during pre-application submittal meetings with the applicant, or during the technical review process of the application. Both upstream and downstream monitoring is required. Monitoring must take place at all streams, impoundments, and etc. that may be potentially impacted or into which water from CCW disposal areas will be discharged.**
  - 2.1 What analytes are measured? **Memorandum 92-1: Arsenic, barium, boron, cadmium, chloride, chromium, copper, fluoride, iron, lead, manganese, mercury, molybdenum, nickel, pH, selenium, silver, sodium, specific conductance, sulfate, sulfide, temperature, total dissolved solids, total organic carbon, zinc, cation/anion balance, pH (lab), specific conductance,**

and temperature. Attachment IV.O of permit application requires, in addition to 92-1 list, the following parameters: aluminum, magnesium, calcium, alkalinity, acidity, total suspended solids, and discharge rate. Parameters other than those specified above may be required by the Director in order to ensure the protection of public health and safety and the environment.

- 2.2 How are sampling locations selected? **Monitoring must take place both upstream and downstream of the operation. See Question Part VII.2.**
- 2.3 What is the frequency of monitoring? **Monitoring is required through final bond release. The majority of the disposal permits contain quarterly frequencies through phase II bond release, then semi-annual through final bond release. Results of the monitoring plan must be submitted in accordance with a schedule approved by the Director.**
3. Is post-closure surface water monitoring required? **Yes. Surface water monitoring must continue through final bond release. Bond cannot be released until a minimum of five (5) years after reclamation of the site is complete. After final bond is released, DNR-RD jurisdiction of the site is terminated.**
  - 3.1 How does it differ from surface water monitoring conducted during placement (analytes monitored, frequency, etc.)? **Monitoring during placement is quarterly. Once a disposal area has been covered and has met revegetation (Phase II bond release) criteria, the operator can request a reduction in the monitoring frequency. The minimum monitoring frequency after Phase II bond release is semi-annual.**
4. Can surface water monitoring be discontinued? **Not until final bond release is attained.**
  - 4.1 What are the criteria for discontinuing surface water monitoring? **By regulation, a consideration for final bond release is based on a determination that performance standard regulations have been met and that pollution is not occurring.**
5. How is surface water monitoring designed to specifically detect/distinguish the effects of CCW placement? **Surface water monitoring locations are placed both upstream and downstream of the areas in which disposal takes place. Data submitted quarterly, both during disposal and after disposal until bond release, is compared to baseline (pre-disposal) data to determine if adverse impacts have occurred.**
6. How is background surface water quality assessed? **Background surface water quality is collected and submitted as part of the permitting process prior to CCW disposal. The water quality data is reviewed to ensure all the required parameters have been analyzed, the minimum number of samples have been collected, and the results are meaningful.**
7. What water quality standards/criteria must be met? **Water discharge from a point source associated with sediment control basins must meet National Pollution**

Discharge Elimination System (NPDES) effluent standards. The Indiana Department of Environmental Management is the regulatory authority for NPDES. All other water monitoring data is compared to baseline data for a determination if adverse impacts have occurred resultant of the CCW disposal operation.

#### VIII. Placement Practices

1. What types of CCW placement are allowed (i.e., into active mines, closed mines, surface mines, underground mines, etc)? **Disposal in active surface mines and beneficial uses including mine subsidence control, mine fire control, and mine sealing. Please refer to IDNR-DoR Memorandum 99-2 for recognized beneficial uses at mine sites which are regulated under IC 14-34 (copy of memorandum is attached). Anything that is not listed as a permissible beneficial use activity is considered disposal and a permit to dispose must be obtained. When Indiana's CCW disposal at mine site program began, disposal was allowed at sites no longer producing coal. The program has been altered such that all but one site actively disposing and all future disposal sites must meet a tonnage provision. The tonnage of CCW disposed must not exceed 50% of the tonnage coal mined on an annual basis. Disposal at underground mines is permissible but no request for disposal of CCW at an underground mine has been received.**
2. Is placement into the water table allowed? **Yes.**
  - 2.1 If so, under what conditions? **The DNR does not restrict placement of coal combustion materials beneath the water table at coal mines. An increase in the mineralization of water that accumulates in the area from which coal has been extracted is an unavoidable outcome of surface coal mining. This increased mineralization occurs, because the rock strata is pulverized during the mining process, thereby, exposing considerably more surface areas of the rocks to ground water. For the most part, this increased mineralization pertains to secondary drinking water parameters (i.e. total dissolved solids, specific conductivity, sulfates, etc.). The increased mineralization is, in part, one of the reasons why ground water that develops in mined areas has rarely been used in Indiana as a potable water source.**
  - 2.2 If not, how close to the water table is placement allowed? *[Question not applicable]*
  - 2.3 If a liner is required beneath the CCW, what are the design/performance standards for the liner? **Liners can be required, however, DNR-RD does not allow disposal in areas that would typically require a liner. Moreover, the characteristics of the naturally occurring underclay provides permeability criteria which would meet or exceed those required for a landfill for the same materials.**
3. Is placement into mine pools allowed? **There is no specific regulatory prohibition for this practice. This practice did occur at one Indiana site permitted in the late 1980's but is not a preferred method under the current program.**

- 3.1 What placement techniques are used? **Unlike ash ponds located at generating facilities which receive an influx of CCW materials via a slurry line, ash placement at mines is of the dry materials, not slurry, and typically occurs in the mined-out pit or in the spoil created by the mining activities. While minimal quantities of water may accumulate in the pits, this water is routinely pumped to sediment control structures in order to facilitate the mining activity, therefore placement in mine pools generally does not occur at an active mine site.**
- 3.2 Are there additional/special monitoring requirements after placement into a mine pool? **No, both surface and ground water monitoring was required at the one mine pool site referred to in 3.1 above.**
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? **Design and operational requirements would be determined on a site specific basis. Monitoring would consist of the same parameters and frequency as surface mine disposal sites. To date, no applications have been received requesting disposal at an underground mine.**
- 4.2 Placement into surface mines? **Placement is limited to CCW generated in Indiana or from coal mined in Indiana. CCW cannot exceed 10 feet in thickness unless approved as a monofill. See response to Part VIII, 1., for volume restrictions.**
- 4.3 Grouting? **If a grouting project is for a legitimate beneficial use identified in Memorandum 99-2, then no permit from the DNR-DoR would be required. If the project could not be considered beneficial use, then the activity is considered disposal and design and operational requirements would be required.**
- 4.4 Acid mine drainage remediation? **CCW has been used as a capping and alkaline recharge material for the purposes of reclaiming abandoned mine sites under the Abandoned Mine Land (AML) program. Only those types of CCW materials conducive to these projects are utilized for this purpose.**
- 4.5 Soil conditioning? **No. The use of CCW for soil conditioning is not recognized as a legitimate beneficial use or as disposal. The Indiana Department of Environmental Management administers land application requests and permitting processes.**
- 4.6 Mine sealing? **No. The use of CCW for mine sealing is considered a legitimate beneficial use and requires notification per the requirements of Memorandum 99-2.**
- 4.7 Subsidence control? **No. The use of CCW for mine subsidence control is considered a legitimate beneficial use and requires notification per the requirements of Memorandum 99-2.**
- 4.8 Spoil encapsulation? **Any request in this regard would be considered a disposal practice and evaluated as such.**

**IX. Operational Requirements/Design Requirements**

1. How is the potential for flooding/washout addressed? **No disposal is permitted below the 100 year flood elevation. In the event an application proposes disposal within 100 feet of a perennial stream, a post mine stream, or drainageway where flooding/washout could occur, a detailed narrative considering the operation and possible impacts must be submitted justifying the proposal prior to a determination by the DNR-RD.**
2. Are runoff controls used/required? **Above ground disposal is not allowed. Drainage from disposal areas, including pit pumpage, is required to be routed to an approved sediment control structure prior to discharge from the permit area.**
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? **No**
  - 4.1 What waste conditioning methods are allowed? *[Question not applicable]*
  - 4.2 What design criteria exist for waste conditioning? *[Question not applicable]*
5. What fugitive dust controls are used or required? **Site-specific disposal plans must include a plan to control dust in a manner which prevents damage to public or private property pursuant to 310 IAC 12-5-69 (recodified to 312 IAC 25-6-65 in January, 2002) through 12-5-71 (recodified to 312 25-6-68 in January, 2002). Specifically, plans shall discuss techniques to show how wind erosion and dust will be prevented during transport, placement, and disposal of CCW. Typical handling procedures at the waste generation site produce materials with up to approximately 30 percent moisture content. Water spraying equipment is available at the mine site for dust suppression. Other practices used to control dust emissions at the mine site include minimization of drop distance when dumping, minimization of transportation distances, and the avoidance of double-handling of the CCW.**
  - 5.1 During transport and discharge from transport vehicles? **See Question 5 above.**
  - 5.2 During/following placement? **See Question 5 above.**
6. Is a cover or cap required over the CCW? **Yes.**
  - 6.1 What are the design/performance criteria? **Above ground disposal is not allowed at a surface coal mine. There are no specific design/performance criteria for below ground disposal settings. Backfill disposal operations usually have CCW placed at great depths. Monofills that have waste to within five feet of the surface are reclaimed such that positive drainage exists to ensure waste water drains away from the fill area. A minimum final soil cover of five feet of non-toxic earthen material is required.**
  - 6.2 What kind of cover materials are required? **See Question 6.1 above.**



- 6.3 What minimum/maximum slopes are allowed for final cover? **The maximum slope allowed by SMCRA is 33% but the reclaimed slopes are generally much less, <10%.**
- 6.4 What compaction criteria/standards apply to the cover/cap? **None**
- 6.5 What are the maintenance standards for covers/caps? **By regulation, all exposed surface areas shall be protected and stabilized to effectively control erosion and air pollution attendant to erosion.**
7. Is re-establishment of surface streams required? **Yes**
- 7.1 What determines when it is appropriate and how it should be done? **By regulation surface streams must be designed and constructed to restore or approximate the premining characteristics of the original surface stream channel, including the natural riparian vegetation, to promote the recovery and the enhancement of the aquatic habitat.**
- 7.2 What are the design criteria? **Surface streams must be designed to minimize adverse impacts to the hydrologic balance within the permit and adjacent areas, prevent material damage to public or private property, and assure the safety of the public. Any permanent stream channel must be designed to pass the peak discharge of a 10 year/6 hour storm event if the drainage area is less than one square mile. If the drainage area is greater than one square mile, the design storm event is 100 year/6 hour**
8. Is contouring of waste so water drains away from the fill required? **This is not applicable to below ground surface disposal settings. Monofills that have waste to within five feet of the surface are reclaimed such that positive drainage exists to ensure water drains away from the fill area.**
- 8.1 When is it appropriate to contour wastes? **When CCW is within 5 feet of the surface and a possibility that ponding could result.**
- 8.2 What are the minimum slope and compaction criteria? **The maximum slope allowed under SMCRA is 33% but the reclaimed slope is generally much less, <10%. Refer to Question 6.1 above as this is not relevant to backfill operations at which wastes end up at great depths.**
9. Is re-vegetation required? **Yes**
- 9.1 What are the design criteria? **By regulation, a diverse, effective, and permanent vegetative cover of the same seasonal variety native to the area that supports the post-mine land use must be established.**
- 9.2 What kinds of plants are used? **Species that are capable of stabilizing the soil surface from erosion and that support the approved post-mine land use. Grasses and legumes such as orchard grass, smooth brome, and red clover are commonly used.**
- 9.3 What kinds of topsoil/compost are required? **All topsoil must be removed, segregated, and redistributed as a part of the mining process. At all times, a minimum of 5 feet of non-toxic earthen material must be utilized for cover.**

10. Is the operator required to restrict public access to the waste and facility? **The public is not allowed access to disposal sites during active operations unless the permittee provides permission or if it is part of the citizen complaint investigation process discussed in Part XIII . Prior to access to an active area, hazard training in accordance with federal Mine Safety and Health Administration provisions must be taken.**
- 10.1 What design/performance standards or criteria apply? **By regulation, the mine area must have signs displayed at all points of access to the permit area from public roads and highways informing the public of the presence of the mine site.**
11. What are the post-closure maintenance requirements (e.g., maintaining cover integrity and effectiveness, slopes, vegetation, etc.)? **Maintenance requirements are those outlined in SMCRA until final reclamation bond is released. Refer to 6.5. After final bond release, the DNR-RD has no jurisdiction over the site.**
12. How long is the owner/operator responsible for post-closure maintenance? **See Question IX.11. above.**
13. What other operational requirements exist? **Landowner concurrence for the disposal of CCW is required. A detailed narrative must be supplied for justification of proposed disposal operations to occur within 100 feet of surface impoundments, post-mine drainageways, property boundaries, intermittent or perennial streams, floodplains, underground mines, past or proposed augering operations, natural springs or wet weather seeps, permeable strata, and coal waste or coal processing waste or non-coal waste disposal areas. Further, justification must be provided for proposed disposal to occur within 1000 feet of a domestic or agricultural well.**
- X. Corrective Action**
1. Under what circumstances are corrective actions required/what is the trigger for a corrective action? **Indiana has limits which are written into the application and thus are enforceable in that no leachate analysis from any waste stream can exceed one quarter the RCRA limit. Corrective action requirements include provisions in the statute and regulations for replacement of sources of water. Likewise, through the enforcement process and abatement of enforcement actions, corrective action can be established by the director.**
2. What types of corrective action measures are appropriate? **Although there are not specific corrective action requirements, in the event of damage the DNR-RD would take appropriate action as a part of the enforcement process to resolve the situation. This action could include removal of the waste, treatment of drainage, water supply replacement, cessation of disposal operations, additional monitoring to determine extent of damage and effectiveness of action program, and any other action needed to satisfy requirements of the law.**



3. Does the State have any damage cases? **No damage case resultant of CCW disposal operations has been determined at sites regulated by the IDNR-RD.**

#### **XI. Financial Assurance**

1. Is financial assurance required? **None beyond SMCRA performance bond.**
  - 1.1 What types of financial assurance mechanisms are allowed? *[Question not applicable]*
2. What is the period of liability? **Performance bond must be maintained a minimum of five years beyond the completion of all grading and soil replacement and initial revegetation.**
3. What is the amount of financial assurance required? **SMCRA performance bond will vary based on site specific factors, but will range between \$3,000 to \$10,000 per acre.**
4. What are the conditions for bond release? **All mining and reclamation activities have satisfied the requirements of the permit, and mining laws and regulations including a finding that pollution is not occurring.**
5. Is there a separate State liability fund? **Yes, for water replacement. After SMCRA bonds have been released, IDNR is responsible for the replacement of the drinking water source.**
  - 5.1 What is the source of money for this fund? **A fund known as the Post-1977 abandoned mine reclamation fund, IC 14-34-6-15.**

#### **XII. Reporting**

1. How frequently is monitoring data on wastes, ground and surface water reported to the government? **Each calendar quarter.**
2. Is the data maintained at the facility? **Yes. Indiana requires that all waste quality, volume, and surface and groundwater data be available for public inspection at the office of the Division of Reclamation. The water quality data may also be maintained at the mine site.**
3. How often are sites inspected? **Sites disposing of CCW are inspected at least once a month as required by regulation.**
4. How often is compliance with permit requirements, performance standards, enforceable limits, etc., evaluated? **During each inspection, at mid-term permit review, and at permit renewal.**
  - 4.1 Who is responsible for this evaluation? **The regulatory authority. DNR Division of Reclamation.**
5. What are the post-closure reporting requirements? **Water monitoring through release of final reclamation (SMCRA) bond. Waste reporting throughout duration of the**

**disposal operations. After final bond release, the DNR-RD jurisdiction of the site is terminated.**

6. How frequently does the regulatory authority inspect the closed facility, and what are the criteria for terminating inspection? **The DNR-RD continues to inspect the site on a monthly basis until all bond is released. After final reclamation bond has been released, then jurisdiction by the DNR-RD is terminated and no inspection is required.**

### **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? **Yes**
  - 1.1 What other opportunities for public involvement are there in the permitting process? **CCW disposal applications require full public notice and appeal procedures. Notification is provided to each landowner within the proposed permit area and within 300 feet outside the permit area. An informal conference on the application for a permit, significant revision to the permit, or renewal of a permit may be requested by any person having an interest that is or may be adversely affected by the decision on the application. The purpose of an informal conference is for the director to accept oral or written statements or any other relevant information from any party to the conference.**
2. Is monitoring data available to the public? **Indiana requires that all waste quality, volume and surface and groundwater data be available for public inspection at the office of the Division of Reclamation.**
3. What opportunity does the public have to participate in overseeing compliance at the site? **The surface mining regulations in Indiana require an avenue for public participation in compliance through the citizen complaint process. This regulation requires that the director investigate a complaint from a citizen, provides for the citizen to accompany the director or the directors representative on the inspection, if they so desire, and requires response to the person(s) filing the complaint within ten days.**
4. How does the public have access to post-closure reports? **All records are maintained in the office of the Division of Reclamation and are available for public inspection for a period of three years following the release of final reclamation bond.**
5. Are citizen actions allowed? **Yes**
  - 5.1 What types of actions are allowed (e.g., petitions, suits)? **Administrative review proceedings including requests for temporary relief (stay of operations) through the provisions contained in SMCRA. Citizens also have an avenue**

**to petition for adoption, amendment, or repeal of a rule in accordance with provisions in the statute, IC 14-34-2-7.**

- 5.2 Who adjudicates citizen actions (e.g., permitting agency, administrative law judge, State court, federal court)? **The Administrative Law Judge initially. Upon confirmation by the DNR Natural Resource Commission (DNR review board), the action can then be appealed for judicial review at local trial courts. The local trial court can be appealed to the Court of Appeals, and the Court of Appeals decision can be appealed to the Indiana Supreme Court.**