

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:)
) R14-10
COAL COMBUSTION WASTE (CCW))
SURFACE IMPOUNDMENTS AT POWER) (Rulemaking- Water)
GENERATING FACILITIES: PROPOSED)
NEW 35 ILL. ADM. CODE 841)

NOTICE OF FILING

PLEASE TAKE NOTICE that I have filed today with the Illinois Pollution Control Board ILLINOIS ENVIRONMENTAL PROTECTION AGENCY'S POST HEARING COMMENTS, a copy of which is herewith served upon you.

Respectfully submitted,

ILLINOIS ENVIRONMENTAL
PROTECTION AGENCY

By: /s/Joanne M. Olson
Joanne M. Olson
Assistant Counsel
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Date: March 25, 2014

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THIS FILING IS SUBMITTED ELECTRONICALLY AND SERVED ON RECYCLED PAPER

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

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ILLINOIS ENVIRONMENTAL PROTECTION AGENCY'S
POST HEARING COMMENTS

NOW COMES the ILLINOIS ENVIRONMENTAL PROTECTION AGENCY,
(Illinois EPA of Agency) by and through its counsel, and hereby submits its responses to
Questions raised at the First hearing. In support therefore, the following statements are made:

1. The Illinois EPA filed it proposed rulemaking for coal combustion waste (CCW) surface impoundments at power generating facilities on October 28, 2013.
2. On February 26-27, 2014, the Illinois Pollution Control Board (Board) held its first set of hearings on the Agency's proposal.
3. On March 3, 2014, the Hearing Officer issued an order directing the Agency to respond by March 25, 2014, to questions and requests for information raised during the first hearing.
4. The Agency's written responses are contained in Attachment 1.
5. The Agency proposes changes to the rule language in response to prefiled questions and questions raised during the hearing. A revised proposed rule is contained in Attachment 2.
6. Attachment 3 is an article entitled "Coal Ash: Characteristics, Management and Environmental Issues" published by the Electric Power Reach Institute, 2009.

7. Attachment 4 is the sample results for organic compounds at Southern Illinois Power Cooperative, City Water Light and Power, Waukegan, Will County and Joliet 29.

8. Attachment 5 contains the draft certification forms required by the proposed rules.

Respectfully submitted,

ILLINOIS ENVIRONMENTAL
PROTECTION AGENCY

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CERTIFICATE OF SERVICE

Joanne M. Olson, Assistant Counsel for the Illinois EPA, herein certifies that she has served a copy of the foregoing NOTICE OF FILING and ILLINOIS ENVIRONMENTAL PROTECTION AGENCY'S POST HEARING COMMENTS upon persons listed on the Service List by mailing, unless otherwise noted on the Service List, a true copy thereof in an envelope duly addressed bearing proper first class postage and deposited in the United States mail at Springfield, Illinois on March 25, 2014.

By: /s/Joanne M. Olson

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ATTACHMENT 1

Agency's Responses to Questions
Raised at the Frist Hearing

Attachment 1—Agency's Responses to Questions Raised at the Frist Hearing

1. **In its initial filing, the Agency proposed requiring owner or operators to monitor for all chemical constituents identified in 35 Ill. Adm. Code 620.410(a) and (e) except radium-226 and radium-228 on at least a semi-annual basis. During the hearing, questions were raised whether Agency would consider reducing the chemical constituents or the monitoring frequency. The Agency was also asked whether it would consider reducing required monitoring based on the chemical constituents found in the CCW leachate or influent to the surface impoundment. Hrg. Transcript Feb. 26, 2014, p 67-85, 203.**

AGENCY RESPONSE: Due to changes in source material over time, the potential for continued interaction between CCW, leachate, and naturally existing hydrologic and geochemical conditions, the Agency does not believe that current influent water quality adequately represents groundwater quality. Review of monitoring data from the various generating stations across the State confirms that all of the chemical constituents proposed for monitoring from Part 620 and from the proposed federal Part 257, with the exception of Mercury, have had confirmed detections in one or more monitoring wells at one or more generating stations. In response to pre-filed questions, the Agency has already recommended that the Board not include perchlorate in the chemical constituent monitoring list. Since controls to prevent air emissions of Mercury have only recently been implemented, the Agency does not believe it appropriate to eliminate Mercury from the list of monitored constituents in this proposed Part. Further, this proposed Part applies to both unlined and lined units of various ages, some of which are still being used as CCW treatment units and leachate storage units, some of which are not. In addition to the other concerns discussed here-in, the less commonly detected chemical constituents were detected sporadically near some regulated units, but not at all units at a site or even all monitoring wells at a regulated unit. The proposed Part currently only requires semi-annual monitoring for chemical constituents that do not exceed a numerical standard or that do not have a statistically significant increasing concentration. The sporadic nature of some chemical constituents will make statistical analysis complex, and therefore some relief from monitoring consistently non detected constituents may have merit under some circumstances. However, a reduction of monitoring frequency below semi-annually may jeopardize the ability to detect newly emerging constituents, especially if they have a seasonal component to their occurrence. The sporadic occurrence of certain constituents favors any relief from monitoring being of a site specific nature, although this Part is a rule of general applicability. Lastly, some sort of groundwater monitoring will be required at all regulated units, whether it is to confirm the efficacy of an engineered liner, corrective action or closure. In consideration of all these factors, the Agency has proposed a new Subsection 841.230(c) allowing monitoring relief for regulated units that meet specific criteria and has proposed modifications to Section 841.215 and new corresponding subsections 841.220(e) and 841.235(e).

Accordingly, the Agency proposes the following changes:

Section 841.230 Sampling Frequency

Attachment 1—Agency's Responses to Questions Raised at the Frist Hearing

- a) Semi-Annual Monitoring. Except as provided by this Section, allAll chemical constituents monitored pursuant to this Part shall be sampled at least semi-annually if allowed by the statistical method selected pursuant to Section 841.225 of this Part.
- b) Quarterly Monitoring. ~~In addition to semi-annual monitoring required under subsection (a) of this Section, the following shall apply:~~
- 1) An owner or operator must increase semi-annual monitoring to quarterly monitoring under the following circumstances.
- A) If any chemical constituents monitored pursuant to this Part exceed the standards set forth in 35 Ill. Adm. Code 620.Subpart D the owner or operator shall sample each well on a quarterly basis for those chemical constituents that exceed the standards in 35 Ill. Adm. Code 620.Subpart D.
- B)2) Pursuant to Section 841.235(c)(2) of this Part, when a unit(s) may be the cause of a statistically significant increasing concentration, the owner or operator shall sample each well on a quarterly basis for any chemical constituents with a statistically significant increasing concentration.
- C)3) If any chemical constituents monitored pursuant to this Part have a concentration that differs to a statistically significant degree from the concentrations detected in the up-gradient wells, the owner or operator shall sample each well on a quarterly basis for those chemical constituents that differ to a statistically significant degree.
- 2)e) ~~Reduction of Quarterly Monitoring.~~ Any owner or operator of a unit conducting quarterly sampling pursuant to subsection (b)(1) of this Section may reduce the quarterly sampling to semi-annual sampling when:
- A)1) the monitored chemical constituent is not detectable in the down-gradient wells for four consecutive quarters;
- B)2) the monitored chemical constituent has a concentration that does not differ to a statistically significant degree from the concentration detected in the up-gradient wells for four consecutive quarters; or
- C)3) the Agency has approved the owner or operator's alternative cause demonstration pursuant to Sections 841.305 or 841.235(c)(1) of this Part.

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- c) Reduced monitoring. Monitoring frequency may be reduced for individual monitoring wells for particular chemical constituents. Reduced monitoring is prohibited when the unit or units associated with monitoring well does not have a liner with two feet of compacted earthen material with a hydraulic conductivity of less than or equal to 1×10^{-7} centimeters per second or a synthetic liner that provides equivalent protection.
 - 1) If the monitoring well is up gradient from a unit, the monitoring frequency for that monitoring well may be reduced to once every five years for a chemical constituent that has not been detected in that monitoring well in the last five so long as the chemical constituent has not been detected in all monitoring wells located down gradient from the unit.
 - 2) If the monitoring well is down gradient from a unit, the monitoring frequency for that monitoring well may be reduced to once every five years for a chemical constituent that has not been detected in that monitoring well in the last five years.
- d) The owner or operator of the unit must modify the groundwater monitoring plan and obtain Agency approval pursuant to Subpart E of this Part before reducing monitoring.
- e) The owner or operator of a unit may discontinue groundwater monitoring upon Agency approval of the certified post-closure report for that unit required by Section 841.440 of this Part.

Section 841.220 Determining Background Values

- c)b) Where wells up-gradient of the unit could be affected by activities at the site, the owner or operator may, with Agency approval, use the intrawell statistical method as specified in the 2009 Unified Guidance to determine background values.
- d)e) The owner or operator shall recalculate background chemical constituent concentrations consistent with the recommendations contained in the 2009 Unified Guidance, but no less often than every five years.
- e) Detections of chemical constituents for which monitoring has been reduced pursuant to Section 841.230(c) shall be included by the owner or operator in background calculations.

Section 841.235 Annual Statistical Analysis

- e) For the purposes of this Section, detections of chemical constituents for which monitoring has been reduced pursuant to Section 841.230(c) shall be considered statistically significant increases, and the owner or operator

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must investigate the cause pursuant to subsection (c) of this Section and notify the Agency within 60 days of the cause of the detection. If the chemical constituents exceed the numerical groundwater standards of 35 Ill. Adm. Code 620, Subpart D, then the owner or operator shall monitor the chemical constituents pursuant to Section 841.230(b)(1).

- f) The annual statistical analysis shall be submitted to the Agency in accordance with a schedule approved by the Agency in the groundwater monitoring plan pursuant to Section 841.210 of this Part.

2. **For those facilities that are exempt under proposed Part 841, or to which proposed Part 841 does not apply, should the facilities be required to maintain records demonstrating how the unit is not subject to proposed Part 841? Hrg. Transcript Feb. 27, 2014, p. 32, 101.**

AGENCY RESPONSE: The Agency's proposal does not require CCW surface impoundments not subject to the proposed rules to make a demonstration that the CCW surface impoundment is exempt from the proposed rules or otherwise falls outside the proposed rule's applicability. During the hearing, the Board asked whether it would be advantageous for a facility to have some documentation to show that the unit qualifies for the exemption. While the Agency believes it would be advantageous for power generating facilities to keep records showing how a CCW surface impoundment is not subject to proposed Part 841, it does not believe such a requirement should be codified into the rules. Instead, the Agency proposes the Board add a note which states the following:

BOARD NOTE: A unit not subject to this Part should maintain records demonstrating how the exemption in subsection (b) applies or how the unit is outside the scope of application set forth in subsection (a).

3. **Has Pond 2S at Will County Station already been lined? Hrg. Transcript Feb. 26, 2014, p 90.**

AGENCY RESPONSE: Pond 2S has been lined.

4. **Midwest Generation asked the Agency's witness whether an owner or operator must calculate an upgradient background value and background for every analyzed parameter for each well in the network? Hrg. Transcript Feb. 26, 2014, p 171-178.**

AGENCY RESPONSE: Page 2 of Mr. Dunaway's prefiled testimony included the following statement "In the proposed Part, the term 'background' is applied broadly, because background values must be calculated for all monitoring wells, not just those wells which are up gradient of regulated units." This statement reflects the text in Section 841.225(a) which states in pertinent part:

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“The statistical test chosen must be conducted separately for each monitored chemical constituent in each well.”

As pointed out by Midwest Generation and the Board proposed Section 841.225 should be clarified. It is not the Agency’s intent that background calculations be done where no purpose will be served by doing so. The Agency acknowledges there will be instances when only up gradient wells will need to have background calculated. There will be other instances when it may be appropriate to calculate background (i.e. existing concentrations) for all or some subset of wells at a site. The Agency’s expectation is that background is to be calculated for any well, as necessary, to assess compliance with this proposed Part and Part 620. The Agency therefore proposes the following changes to Section 841.225.

Section 841.225 Statistical Methods

- a) When determining background values and when conducting compliance or assessment monitoring, the owner or operator of the unit must specify one or more of the following statistical methods to be used. The statistical test chosen must be conducted separately for each monitored chemical constituent in each well as necessary to demonstrate compliance with this Part and Part 620. Where PQLs are used in any of the following statistical procedures to comply with subsection (b)(5) of this Section, the PQL must be proposed by the owner or operator and approved by the Agency. Use of any of the following statistical methods must adequately protect human health and the environment and must comply with the performance standards outlined in subsection (b) of this Section.

5. Does CCW contain cadmium? Hrg. Transcript Feb. 26, 2014, p 180.

AGENCY RESPONSE: See Attachment 3, “Coal Ash: Characteristics, Management and Environmental Issues,” Electric Power Reach Institute, 2009.

6. How does the Agency evaluate preexisting plans that are allowed to be resubmitted under proposed Section 841.145 to ensure that they’re reflective of the current conditions; if, for example, the previous plans predate current developments, like new homes moving in closer to the facility or putting in wells? Hrg. Transcript Feb. 26, 2014, p 186.

AGENCY RESPONSE: If previously submitted hydrogeologic site characterizations are re-submitted to the Agency under this rule, the characterizations must be updated with any changes to the site that have occurred since the original submission.

7. Can the Agency identify all CCW impoundments known by the Agency to have been constructed over a mine void? Hrg. Transcript Feb. 26, 2014, p 239.

AGENCY RESPONSE: The Agency believes the following CCW surface impoundments may have been constructed over a mine void: Hennepin Station-

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Secondary Pond, Vermillion Station- Old East Pond, Vermillion Station- New East Pond C1, Edwards Station- Pond 1, Coffeen Station- Bottom Ash/Recycle Pond, Coffeen Station- Ash Pond 2, and City Water Light and Power- Dallman Pond.

8. **Can the Agency identify all CCW impoundments known by the Agency to have been constructed over a groundwater recharge area? Hrg. Transcript Feb. 26, 2014, p 239.**

AGENCY RESPONSE: The Agency believes the following CCW surface impoundments may have been constructed over a groundwater recharge area: Will County Station- North Pond, Will County Station- South Pond 1, Will County Station- South Pond 2, Will County Station- South Pond 3, Waukegan Station- East Pond, Waukegan Station- West Pond, Powerton- Ash Basin, Powerton- Secondary Ash Basin, Powerton- Metal Cleaning Basin, Powerton- Bypass Basin, Powerton- Old Ash Pond, Joliet 29- Pond 1, Joliet 29- Pond 2, Joliet 29- Pond 3, Baldwin Energy Center- Pond 1, Baldwin Energy Center- Pond 2, Baldwin Energy Center- Pond 3, Baldwin Energy Center- Pond 4, Baldwin Energy Center- Pond 5, Baldwin Energy Center- Pond 6, Baldwin Energy Center- Pond 7, Havana Station- East Pond C1, Havana Station- East Pond C2, Havana Station- East Pond C3, Havana Station- East Pond C4, Hennepin Station- Pond 1, Hennepin Station- Secondary Pond, Hennepin Station- Pond 3, Hennepin Station- Pond 4, Hennepin Station- New Primary, Hennepin Station- New Secondary, Hennepin Station- Pond 2 East, Wood River Station- Pond 1, Wood River Station- Pond 2 West, Wood River Station- Pond 2 East, Wood River Station- Pond 3, Wood River Station- New East Ash Pond, Vermillion Station- North Pond Cell 1, Vermillion Station- North Pond Cell 2, Vermillion Station- Old East Pond, Vermillion Station- Old East Pond C1, Vermillion Station- New East Pond C2, Edwards Station- Pond 1, Meredosia Station- Bottom Ash Pond, Meredosia Station- Fly Ash Pond C1, Meredosia Station- Fly Ash Pond C2, Meredosia Station- Old Ash Pond, Hutsonville Station- Pond A, Hutsonville Station- Pond B, Hutsonville Station- Pond C, Hutsonville Station- Pond D, Hutsonville Station- Bottom Ash, Venice- North Pond, Venice- South Pond, Grand Tower- Ash Pond, Kincaid Generation- Ash Pond, and Prairie Power, Inc.- North Pond.

9. **Can the Agency identify all CCW impoundments known by the Agency to have been constructed over a wetland? Hrg. Transcript Feb. 26, 2014, p 239.**

AGENCY RESPONSE: The Agency believes the following CCW surface impoundments that have been constructed over a wetland: Powerton- Ash Basin, Powerton- Bypass Basin, Powerton- Old Ash Pond, Electric Energy, Inc.- West Ash Pond, Electric Energy, Inc.- East Ash Pond, Wood River Station- New East Ash Pond, Venice- North Pond, Venice- South Pond, and City Water Light and Power- Lake Side Pond.

10. **Can the Agency identify all CCW impoundments known by the Agency to have been constructed over a shallow aquifer? Hrg. Transcript Feb. 26, 2014, p 239.**

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AGENCY RESPONSE: The Agency believes the following CCW surface impoundments may have been constructed over a shallow aquifer: Will County Station-North Pond, Will County Station- South Pond 1, Will County Station- South Pond 2, Will County Station- South Pond 3, Waukegan Station- East Pond, Waukegan Station- West Pond, Powerton- Ash Basin, Powerton- Secondary Ash Basin, Powerton- Metal Cleaning Basin, Powerton- Bypass Basin, Powerton- Old Ash Pond, Joliet 29- Pond 1, Joliet 29- Pond 2, Joliet 29- Pond 3, Electric Energy, Inc.- West Ash Pond, Electric Energy Inc.- East Ash Pond, Baldwin Energy Center- Pond 1, Baldwin Energy Center- Pond 2, Baldwin Energy Center- Pond 3, Baldwin Energy Center- Pond 4, Baldwin Energy Center- Pond 5, Baldwin Energy Center- Pond 6, Baldwin Energy Center- Pond 7, Havana Station- East Pond C1, Havana Station- East Pond C2, Havana Station- East Pond C3, Havana Station- East Pond C4, Hennepin Station- Pond 1, Hennepin Station- Secondary Pond, Hennepin Station- Pond 3, Hennepin Station- Pond 4, Hennepin Station- New Primary, Hennepin Station- New Secondary, Hennepin Station- Pond 2 East, Wood River Station- Pond 1, Wood River Station- Pond 2 West, Wood River Station- Pond 2 East, Wood River Station- Pond 3, Wood River Station- New East Ash Pond, Vermillion Station- North Pond Cell 1, Vermillion Station- North Pond Cell 2, Vermillion Station- Old East Pond, Vermillion Station- Old East Pond C1, Vermillion Station- New East Pond C2, Newton Station- Primary Ash, Newton Station- Secondary Ash, Edwards Station- Pond 1, Coffeen Station- Landfill Runoff Pond, Meredosia Station- Bottom Ash Pond, Meredosia Station- Fly Ash Pond C1, Meredosia Station- Fly Ash Pond C2, Meredosia Station- Old Ash Pond, Hutsonville Station- Pond A, Hutsonville Station- Pond B, Hutsonville Station- Pond C, Hutsonville Station- Pond D, Hutsonville Station- Bottom Ash, Venice- North Pond, Venice- South Pond, Grand Tower- Ash Pond, City Water Light and Power- Lake Side Pond, City Water Light and Power- Dallman Pond, Kincaid Generation- Ash Pond, and Prairie Power, Inc.- North Pond.

11. **During the hearing, the Agency agreed to compare Exhibits 9 -11, drinking water health advisories for boron, manganese and sulfate with the groundwater quality standards in Part 620. Hrg. Transcript Feb. 26, 2014, p 253.**

AGENCY RESPONSE: The Agency has reviewed Exhibit 9, Drinking Water Health Advisory for Boron; Exhibit 10, Drinking Water Health Advisory for Manganese; and Exhibit 11, Drinking Water Advisory: Consumer Acceptability Advice and Health Effects Analysis on Sulfate. The Class I groundwater quality standards for these three contaminants were established by the Board in R89-14. The standards are as follows: Boron (2.0 Mg/L); Manganese (0.15 Mg/L); and Sulfate (400 Mg/L).

Exhibit 9 refers to a number of studies completed during the 1990's and 2000's. The referenced studies indicate the possibility of effects to the reproductive system from high concentrations of Boron. The Agency will request that the Toxicology Assessment Unit review the current 2.0 Mg/L Class I groundwater standard and determine if a different groundwater standard is more appropriate. Should the Agency's Toxicology Assessment Unit determine a different Boron groundwater standard is more appropriate, the Agency will propose a new Boron groundwater standard in its next regular update to Part 620.

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Exhibit 10 provides information regarding health and organoleptic (taste and odor) effects of Manganese. The current Class I groundwater standard for Manganese was based on the Board's adopted Maximum Allowable Concentration (MAC). The MACs were applicable before the adoption of the National Primary Drinking Water Standards. No Primary Drinking Water Standard exists for Manganese, though an unenforceable Secondary Drinking Water Standard of 0.05 Mg/L (taste threshold) does exist. When establishing the MAC, the Board noted that taste and odor complaints increased noticeably above 0.15 Mg/L. The Board further noted that an increase in concentration from 0.05 Mg/L to 0.15 Mg/L brought approximately 50 percent of water systems into compliance with the MAC without the cost of further treatment for Manganese. Given these considerations, the Board adopted an MAC at 0.15 Mg/L. Untreated water monitoring data collected from community water supply wells indicates that approximately 25 percent of the wells monitored contain a natural Manganese concentration that exceeds 0.15 Mg/L. The information in Exhibit 10 states that 0.3 Mg/L is below a health effect level for children, who are considered the most vulnerable population. Given the history of the development of the current Class I groundwater standard for Manganese and lack of health effects until the concentration is doubled, the Agency does not believe any change to the Class I groundwater standard for Manganese is warranted at this time.

Exhibit 11 provides information regarding health and organoleptic effects of sulfate. The current Class I groundwater standard for sulfate is based on its occurrence in untreated water from community water supply wells that were sampled statewide. Ninety five percent of these wells had a sulfate concentration of 400 Mg/L or less. The references provided in Exhibit 11 show that organoleptic effects are reported between 250 Mg/L to 500 Mg/L. The references further state that no health effects occur below 500 Mg/L. Since the current Class I groundwater standard falls in the range of organoleptic detection and is below the concentration at which any health effects have been recorded, the Agency does not believe any change to the Class I groundwater standard for sulfate is warranted at this time.

12. How many existing impoundments would be exempt from proposed Part 841 under proposed Section 841.105(b)(4)? Hrg. Transcript Feb. 27, 2014, p 23.

AGENCY RESPONSE: Based on a telephone survey of generating station owners and operators, the Agency does not believe any existing impoundments are exempt from proposed Part 841 under proposed Section 841.105(b)(4).

13. Would the Agency be willing to propose language in Proposed Section 841.155, pertaining to the Construction Quality Assurance Program, to include criteria that would need to be met for closure by removal of CCW? Hrg. Transcript Feb. 27, 2014, p 34.

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AGENCY RESPONSE: See the Agency's proposed revisions below. Note that portions of the Section that are unaffected by the proposed revisions have not been included in the Agency's response.

Section 841.155 Construction Quality Assurance Program

- a) The following components of a preventive response plan pursuant to Subpart B of this Part, a corrective action plan pursuant to Subpart C of this Part and a closure plan pursuant to Subpart D of this Part must be completed according to a CQA program, if applicable:
 - 3) Application of final cover, including installation of the geomembrane; ~~and~~
 - 4) Construction of ponds, ditches, lagoons and berms; and
 - 5) Removal of CCW.
- b) The CQA program must meet the following requirements, if applicable:
 - 3) The CQA officer must certify the following, when applicable:
 - I) proper filter material consisting of uniform granular fill, to avoid clogging, is used in construction; ~~and~~
 - J) the filter material as placed possesses structural strength adequate to support the maximum loads imposed by the overlying materials and equipment used at the facility; ;
 - K) CCW stabilization, transport, and disposal; and
 - L) site restoration, if any
 - 5) The CQA officer must be present to provide supervision and assume responsibility for performing all inspections of the following activities, when applicable:
 - C) Installation of the groundwater collection system and discharge system; ~~and~~
 - D) Construction of ponds, ditches, lagoons and berms; and
 - E) Removal of CCW.

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14. **With respect to proposed Section 841.200, would the Agency be willing to propose language specifying what information is necessary for inclusion within the required hydrogeologic site characterization? Hrg. Transcript Feb. 27, 2014, p 36.**

AGENCY RESPONSE: See the Agency's proposed revisions below. Note that portions of the Section that are unaffected by the proposed revisions have not been included in the Agency's response.

Section 841.200 Hydrogeologic Site Characterization

- c) Hydrogeologic site characterization shall include but not be limited to the following:
- 1) Geologic well logs/boring logs;
 - 2) Climatic aspects of the site;
 - 3) Identification of nearby surface water bodies;
 - 4) Identification of nearby pumping wells;
 - 5) Geologic setting;
 - 6) Structural characteristics;
 - 7) Geologic cross-sections;
 - 8) Soil characteristics;
 - 9) Identification of confining layers;
 - 10) Identification of potential migration pathways;
 - 11) Groundwater quality data;
 - 12) Vertical and horizontal extent of the geologic layers to a minimum depth of 100 feet below land surface;
 - 13) Chemical and physical properties of the geologic layers to a minimum depth of 100 feet below land surface;
 - 14) Hydraulic characteristics of the geologic layers to a minimum depth of 100 feet below the land surface, including:
 - A) Water table depth;

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- B) Hydraulic conductivities;
- C) Porosities;
- D) Direction and velocity of groundwater flow; and
- E) Map of the potentiometric surface; and

15) Any other information requested by the Agency.

15. **Would the Agency consider an amendment that requires an owner or operator to redo its corrective action plan if it did not have a proper NPDES permit, but required one? Hrg. Transcript Feb. 27, 2014, p 60.**

AGENCY RESPONSE: Section 841.320(a) of this Part states "Water discharged to waters of the United States must be discharged in accordance with an NPDES Permit." Hence an NPDES Permit is required for a discharge. If an owner or operator did not receive a proper NPDES permit where one is required the owner or operator would need to secure the appropriate permit or consider other alternatives for the discharge of the water. Those alternatives could include but are not limited to modification of the corrective action plan or resubmission of a NPDES application. The Agency considers an amendment requiring an owner or operator to redo its corrective action plan if it did not have a proper NPDES permit, overly restrictive and prefers to avail the owner or operator all opportunities to implement the corrective action.

16. **Which of the 36 units identified as not receiving CCW have groundwater monitoring wells? Hrg. Transcript Feb. 27, 2014, p 80-83.**

AGENCY RESPONSE: The Agency believes the following CCW surface impoundments which cannot receive CCW have monitor wells: Will County Station- N. Pond and S. Pond 3; Powerton- Old Ash Pond; Electric Energy Inc.- West Ash Pond; Baldwin Energy Center- Pond 1; Hennepin Station- Pond 1, Pond 2, Pond 3 and Pond 4; Wood River Station- Pond 1 and Pond 2 West; Vermillion Station- North Pond Cell 1, North Pond Cell 2, Old East Pond, New East Pond C1 and New East Pond C2; Duck Creek Station- Pond 1 and Pond 2; Coffeen Station- Ash Pond 2; Meredosia Station- Bottom Ash Pond, Fly Ash Pond C1, Fly Ash Pond C2 and Old Ash Pond; Hutsonville Station- Pond A, Pond B, Pond C and Pond D; Venice- N. Pond and S. Pond; Grand Tower- Ash Pond; and Prairie Power Inc.- N. Pond.

17. **Can the Agency submit into the record the test results showing that organic compounds are not a concern with the disposal of CCW. Hrg. Transcript Feb. 27, 2014, p 84.**

AGENCY RESPONSE: The sample results for organic compounds at Southern Illinois Power Coop, CWLP, Powerton, Waukegan, Will County and Joliet 29 have been provided in Attachment 4. Organic analysis does not appear to have been completed at

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Crawford. Crawford's inclusion in the list of facilities which have completed organic analysis appears to have been in error.

18. **Would it be possible for the Agency to identify which sites they believe that more confirmation sampling is needed on a site-specific basis? Hrg. Transcript Feb. 27, 2014, p. 84-86.**

AGENCY RESPONSE: Under the Ash Impoundment strategy, those sites where monitoring showed an exceedence of the groundwater quality standards in 35 Ill. Adm. Code 620 had to conduct confirmation sampling. Under the proposed rules, all sites will have to continue groundwater monitoring. Any site with a exceedence of the groundwater quality standards would have to perform confirmation sampling.

19. **When were the Notices of Intent to Pursue Legal Action (NIPLA) issued to Dynegy and Ameren facilities? Hrg. Transcript Feb. 27, 2014, p. 86.**

AGENCY RESPONSE: NIPLAs were issued for the four Ameren facilities on February 13, 2013. NIPLAs were issued for the two Dynegy facilities on December 13, 2012.

20. **Is Exhibit 14 accurate? Hrg. Transcript Feb. 27, 2014, p. 44-45.**

AGENCY RESPONSE: The information contained in Exhibit #14 was provided to the Agency's Bureau of Water, Division of Water Pollution Control, Industrial Permit Section in 2009 by the operators of the coal fired generation stations. This information has been reviewed to assess the accuracy of the information using the best available data as of March, 2014. The results of this review are provided below for each facility. The most up to date information on the CCW impoundments at the 24 facilities is provided in Exhibit N of with the Agency's answers to the prefiled questions Submitted to the Board.

Will County Station-The information contained in Exhibit #14 for this facility under the column headings titled Name of Facility, NPDES Number, Number of Ash Ponds, and Volume/ Other Information, appears to be accurate. The information contained in Exhibit #14 for this facility under the column headings titled Number Active (A), Number Lined (Active), Number Inactive (I), Number Lined (Inactive), and Number Above vs. Below Grade does not appear to be accurate.

Waukegan Station-The information contained in Exhibit #14 for this facility under the column headings titled Name of Facility, NPDES Number, Number of Ash Ponds, Number Active (A), Number Lined (Active), Number Inactive (I), Number Lined (Inactive), and Volume/ Other Information, appears to be accurate. The information contained in Exhibit #14 for this facility under the column heading titled Number Above vs. Below Grade does not appear to be accurate.

Powerton- The information contained in Exhibit #14 for this facility under the column headings titled Name of Facility, NPDES Number, Number Lined (Inactive), and Volume/ Other Information, appears to be accurate. The information contained in Exhibit #14 for this facility under the column headings titled Number of Ash Ponds, Number

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Active (A), Number Lined (Active), Number Inactive (I), and Number Above vs. Below Grade does not appear to be accurate.

Joliet 29- The information contained in Exhibit #14 for this facility under the column headings titled Name of Facility, NPDES Number, Number of Ash Ponds, Number Active (A), Number Lined (Active), Number Inactive (I), Number Lined (Inactive), and Volume/ Other Information appears to be accurate. The information contained in Exhibit #14 for this facility under the column headings titled Number Above vs. Below Grade does not appear to be accurate.

Joliet 9- The ash generated at this facility is disposed at the Lincoln Stone Quarry which is a permitted land fill under Subtitle G regulations.

Crawford- This facility is closed. CCW was removed from this impoundment in accordance with the Agency approved Compliance Commitment Agreement. The impoundment no longer receives CCW.

Electrical Energy Inc.- The information contained in Exhibit #14 for this facility appears to be accurate.

Baldwin Energy Center- The information contained in Exhibit #14 for this facility appears to be accurate.

Havana Station- The information contained in Exhibit #14 for this facility under the column headings titled Name of Facility, NPDES Number, Number Lined (Inactive), and Number Above vs. Below Grade appears to be accurate. The information contained in Exhibit #14 for this facility under the column headings titled Number of Ash Ponds, Number Active (A), Number Lined (Active), Number Inactive (I), and Volume/ Other Information does not appear to be accurate.

Hennepin Station- The information contained in Exhibit #14 for this facility under the column headings titled Name of Facility, NPDES Number, and Number Lined (Inactive) appears to be accurate. The information contained in Exhibit #14 for this facility under the column headings titled Number of Ash Ponds, Number Active (A), Number Lined (Active), Number Inactive (I), Volume/ Other Information, and Number Above vs. Below Grade does not appear to be accurate.

Wood River Station- The information contained in Exhibit #14 for this facility under the column headings titled Name of Facility, NPDES Number, Number Inactive (I), and Number Lined (Inactive) appears to be accurate. The information contained in Exhibit #14 for this facility under the column headings titled Number of Ash Ponds, Number Active (A), Number Lined (Active), Volume/ Other Information, and Number Above vs. Below does not appear to be accurate.

Vermillion Station- The information contained in Exhibit #14 for this facility under the column headings titled Name of Facility, NPDES Number, Number of Ash Ponds, Number Active (A), Number Lined (Active), Number Inactive (I), Number Lined (Inactive), and Volume/ Other Information, appears to be accurate. The information

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contained in Exhibit #14 for this facility under the column heading titled Number Above vs. Below Grade does not appear to be accurate.

Newton Station- The information contained in Exhibit #14 for this facility appears to be accurate.

Edwards Station- The information contained in Exhibit #14 for this facility appears to be accurate.

Duck Creek Station- The information contained in Exhibit #14 for this facility under the column headings titled Name of Facility, NPDES Number, and Number Lined (Active) appears to be accurate. The information contained in Exhibit #14 for this facility under the column headings titled Number of Ash Ponds, Number Active (A), Number Inactive (I), Number Lined (Inactive), and Volume/ Other Information, does not appear to be accurate.

Coffeen Station- The information contained in Exhibit #14 for this facility under the column headings titled Name of Facility, NPDES Number, Number Inactive (I), Number Lined (Inactive), appears to be accurate. The information contained in Exhibit #14 for this facility under the column headings titled Number of Ash Ponds, Number Active (A), Number Lined (Active) and Volume/ Other does not appear to be accurate.

Meridosia Station- The information contained in Exhibit #14 for this facility under the column headings titled Name of Facility, NPDES Number, Number Lined (Active), and Number Lined (Inactive) appears to be accurate. The information contained in Exhibit #14 for this facility under the column headings titled Number of Ash Ponds, Number Active (A), and Number Inactive (I) does not appear to be accurate.

Hutsonville Station- The information contained in Exhibit #14 for this facility appears to be accurate.

Vencie- The information contained in Exhibit #14 for this facility under the column headings titled Name of Facility, NPDES Number, Number of Ash Ponds, Number Lined (Active), and Number Lined (Inactive) appears to be accurate. The information contained in Exhibit #14 for this facility under the column headings titled Number Active (A), and Number Inactive (I) does not appear to be accurate.

Grand Tower- The information contained in Exhibit #14 for this facility appears to be accurate.

Kincaid Generation- The information contained in Exhibit #14 for this facility appears to be accurate.

City Water Light and Power- The information contained in Exhibit #14 for this facility appears to be accurate.

Prairie Power Inc.- The information contained in Exhibit #14 for this facility appears to be accurate.

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Southern Illinois Power Co-op- The information contained in Exhibit #14 for this facility under the column headings titled Name of Facility, NPDES Number, and Number Lined (Inactive) appears to be accurate. The information contained in Exhibit #14 for this facility under the column headings titled Number of Ash Ponds, Number Active (A), Number Lined (Active), Number Inactive (I), and Number Lined (Inactive) does not appear to be accurate.

21. **Does the Agency know when the impoundments listed on page 2 of Exhibit 14 as being under construction at the Coffeen and Duck Creek facilities were built? Hrg. Transcript Feb. 27, 2014, p. 95.**

AGENCY RESPONSE: At Coffeen the Bottom Ash /Recycle pond was formerly known as Ash pond 1. The bottom Ash/Recycle Pond was reconstructed as provided by Water Pollution Control permit 1978-EA-389 issued by the Agency on May 26, 1978. It is believed that reconstruction took place in 1978 or 1979. The Gypsum Stack and the Gypsum Stack Recycle units were permitted in 2008 and have been in operation since 2010. Landfill runoff pond has been in operation since March of 2010.

At Duck Creek Pond 1 was operated from 1976 to 1986. Pond 2 was operated from 1984 to 2009. The new bottom ash sluice and volume waste treatment basin began operation in 2009. The Gypsum Pond and Gypsum Reclaim Pond began to operate in November of 2007.

22. **Would there be any location criteria for new surface impoundments? Hrg. Transcript Feb. 27, 2014, p. 93.**

AGENCY RESPONSE: The Agency anticipates that location criteria for new surface impoundments would be included in design criteria.

23. **Is the Lincoln Stone Quarry a surface impoundment, as defined in these rules? Does the definition of surface impoundment need to be clarified? Hrg. Transcript Feb. 27, 2014, p. 105-107.**

AGENCY RESPONSE: Lincoln Stone Quarry operates under a solid waste permit. The rules governing solid waste permits define "landfill" as

"a unit or part of a facility in or on which waste is placed and accumulated over time for disposal, and which is not a land application unit, a surface impoundment or an underground injection well. For the purposes of this Part and 35 Ill. Adm. Code 811 through 815, landfills include waste piles, as defined in this Section."

35 Ill. Adm. Code 810.103. Part 810 defines "surface impoundment" as

"a natural topographical depression, man-made excavation, or diked area into which flowing wastes, such as liquid wastes or wastes containing free liquids, are placed. For the purposes of this Part and 35 Ill. Adm. Code 811 through 815, a surface impoundment is not a landfill."

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35 Ill. Adm. Code 810.103. In order to achieve internally consistent definitions, the Agency recommends that the definition of surface impoundment in proposed Section 841.110 be amended as follows:

"Surface impoundment" means a natural topographical depression, man-made excavation, or diked area where earthen materials provide structural support for the containment of liquid wastes or wastes containing free liquids, and which is not a landfill, as defined in 35 Ill. Adm. Code 810.103.

24. **In its response to a question raised by the Board, the Agency proposed changes to proposed Section 841.130, specifically requiring existing units to submit a groundwater monitoring plan within one year of the effective date of the proposed rules, and obtaining approval of the groundwater monitoring plan within two years of the effective date. If the Agency is getting close to the two-year mark and it has not finished reviewing fully groundwater monitoring plan, will it just simply disapprove it at that point. Hrg. Transcript Feb. 27, 2014, p. 32, 110-112.**

AGENCY RESPONSE: The Agency would not deny a plan because the proposed two year mark is approaching. To address the concerns Midwest Generation raised during the hearing, the Agency proposes the following changes. Note that portions of the Sections that are unaffected by the proposed revisions have not been included in the Agency's response.

Section 841.130 Compliance Period.

- a) Except as provided in this Section, theThe compliance period begins when the unit first receives coal combustion waste, or leachate from coal combustion waste, or on the effective date of this Partone year after the effective date of this rule, whichever occurs later, and ends when the post-closure care period ends. The post-closure care period for a unit is the time period described in Section 841.440(a) of this Part.
- b) If the unit was in operation on or before the effective date of this Part, theThe owner or operator shall conduct a hydrogeologic site characterization, establish background values, develop a groundwater monitoring system, and submit a groundwater monitoring plan within one year of the effective date of this Part before the compliance period begins. If the owner or operator wishes to use previous site investigations or characterization, plans or programs to satisfy the requirements of this Part pursuant to ~~Section 841.145~~, the owner or operator must submit the previous investigations, characterizations, plans or programs in accordance with Section 841.140 of this Part to the Agency for approval pursuant to Section 841.145 of this Part within one year of the effective date of this Partto the Agency for approval of this Part before the compliance period begins.

Section 841.500 Plan Review, Approval and Modification

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g) If the Agency disapproves any plan submitted pursuant to Sections 841.130(b), 841.310(d) or 841.405, and the owner or operator does not elect to appeal the Agency's decision to the Board, the owner or operator must resubmit the plan within 90 days of the post-marked date the notice is mailed.

25. Is the Agency willing to consider extending the public comment period for posted plans to 45 or 60 days? Hrg. Transcript Feb. 27, 2014, p 123.

AGENCY RESPONSE: The Agency does not object to extending the public comment period. Currently, the Agency proposes that it has 90 days to review submitted plans, with a 30 day comment period. The Agency requests that any extension to the comment period also results in an extended Agency review time. Therefore, if the Board elects to extend the comment period to 45 days, the Agency requests the review time specified in proposed Section 841.500 be extended to 105 days. Likewise, if the comment period is extended to 60 days, the Agency requests the review time be extended to 120 days.

26. Is the Agency opposed to amending Section 841.125 to state that a unit must comply with the groundwater quality standards at all times? Hrg. Transcript Feb. 27, 2014, p. 114-115.

AGENCY RESPONSE: The Agency proposes the following change.

Section 841.125 Groundwater Quality Standards

The owner or operator shall comply with the groundwater standards in 35 Ill. Adm. Code 620, including the corrective action process in 35 Ill. Adm. Code 620.250, at all times. Compliance shall be measured at the compliance point, or compliance points if more than one compliance point exists. The number and kinds of samples collected to establish compliance must be appropriate for the form of statistical test employed, as prescribed in Section 841.225 of this Part and the 2009 Unified Guidance, incorporated by reference in Section 841.120 of this Part.

27. Does the Agency anticipate including the documents in Exhibit J, the certification forms required by the proposed rules, as appendices to the proposed rules? If so, would the Agency consider revising Section 2 of the Certification of Surface Impoundment – Corrective Action form to include additional possible alternatives?

AGENCY RESPONSE: The Agency would prefer if the certifications in Exhibit J are not included in the rule as appendices. The Agency would like to have flexibility to change the forms without completing a Board rulemaking. As this a new program and the forms are still in draft form, the Agency may need to modify the form to meet still unknown programmatic needs.

The Board's rules contain numerous examples of Agency prescribed forms without including the forms in the appendix. See 35 Ill. Adm. Code 125.202; 35 Ill. Adm. Code

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218.586; 35 Ill. Adm. Code 244.141; 35 Ill. Adm. Code 309.103; 35 Ill. Adm. Code 502.201; 35 Ill. Adm. Code 602.111; 35 Ill. Adm. Code 603.105; 35 Ill. Adm. Code 702.123; 35 Ill. Adm. Code 807.205.

Updated draft forms are included as Attachment 5.

- 28. During the first set of hearings, questions were raised regarding the applicability of the Tiered Approach to Corrective Action Objectives (TACO), and the use of institutional controls. Hrg. Transcript Feb. 26, 2014, p 144-156. Hrg. Transcript Feb. 27, 2014 p 119-120**

AGENCY RESPONSE: The Agency is still reviewing these questions and will file a supplemental response by April 30, 2014.

- 29. Correction to Agency Response to ELPC's prefiled question #1 to Richard P. Cobb:**

City Water Light and Power (CWLP) provided the Agency with supplemental information in a letter dated March 6, 2014 from Ms. Christine Zeman, CWLP Regulatory Affairs Director indicating that CWLP's Dallman Unit 4 handles both fly ash and bottom ash dry. The Agency proposes to augment the Agency's response to ELPC's prefiled Question 1 to Richard P. Cobb with this information provided by CWLP.

ATTACHMENT 2

Revised Proposed Part 841

Attachment 2 – Revised Proposed Part 841

TITLE 35: ENVIRONMENTAL PROTECTION
SUBTITLE G: WASTE DISPOSAL
CHAPTER I: POLLUTION CONTROL BOARD
SUBCHAPTER j: COAL COMBUSTION WASTE SURFACE IMPOUNDMENTS

PART 841
COAL COMBUSTION
WASTE SURFACE IMPOUNDMENTS AT POWER GENERATING FACILITIES

SUBPART A: GENERAL

Section	
841.100	Purpose
841.105	Applicability
841.110	Definitions
841.115	Abbreviations and Acronyms
841.120	Incorporations by Reference
841.125	Groundwater Quality Standards
841.130	Compliance Period
841.135	Recordkeeping
841.140	Submission of Plans, Reports and Notifications
841.145	Previous Investigations, Plans and Programs
841.150	Modification of Existing Permits
841.155	Construction Quality Assurance Program
841.160	Photographs
841.165	Public Notice
<u>841.170</u>	<u>Inspection¹</u>

SUBPART B: MONITORING

Section	
841.200	Hydrogeologic Site Characterization
841.205	Groundwater Monitoring System
841.210	Groundwater Monitoring Plan
841.215	Chemical Constituents and Other Data to Be Monitored
841.220	Determining Background Values
841.225	Statistical Methods
841.230	Sampling Frequency
841.235	Annual Statistical Analysis
841.240	Inspection²

SUBPART C: CORRECTIVE ACTION

Section	
841.300	Confirmation Sampling

¹ Hearing Exhibit 5, attachment 1, p.22.

² Hearing Exhibit 5, attachment 1, p.22.

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- 841.305 Alternative Cause Demonstration
- 841.310 Corrective Action Plan
- 841.315 Groundwater Collection System
- 841.320 Groundwater Discharge System
- 841.325 Corrective Action Report and Certification

SUBPART D: CLOSURE

Section

- 841.400 Surface Impoundment Closure
- 841.405 Closure Prioritization
- 841.410 Closure Plan
- 841.415 Final Slope and Stabilization
- 841.420 Final Cover System
- 841.425 Closure Report and Certification
- 841.430 Post-Closure Maintenance of Cover System
- 841.435 Post-Closure Care Plan
- 841.440 Post-Closure Report and Certification
- 841.445 Closure and Post-Closure Annual Reporting
- 841.450 Resource Conservation and Recovery Act

SUBPART E: AGENCY REVIEW PROCEDURES

Section

- 841.500 Plan Review, Approval, and Modification
- 841.505 Review and Approval of Reports and Certifications

AUTHORITY: Implementing Sections 12 and 22 of the Environmental Protection Act [415 ILCS 5/12 and 22] and authorized by Sections 13, 22, 27, and 28 of the Environmental Protection Act [415 ILCS 5/13, 22, 27, and 28].

SOURCE: Adopted in R__ - __ at __ Ill. Reg.____, effective _____.

SUBPART A: GENERAL

Section 841.100 Purpose

This Part establishes criteria, requirements and standards for site characterization, groundwater monitoring, preventive response, corrective action and closure of surface impoundment units containing coal combustion waste or leachate from coal combustion waste at power generating facilities.

Attachment 2 – Revised Proposed Part 841

Section 841.105 Applicability

- a) Except as specified in subsection (b) of this Section, this Part applies to all surface impoundments at power generating facilities containing coal combustion waste or leachate from coal combustion waste that are:
 - 1) operated on or after the effective date of these rules, or
 - 2) not operated after the effective date of these rules, but whose coal combustion waste or leachate from coal combustion waste causes or contributes to an exceedence of the groundwater quality standards on or after the effective date of these rules.

- b) This Part does not apply to any surface impoundment unit:
 - 1) operated under a solid waste landfill permit issued by the Agency;
 - 2) operated pursuant to procedural requirements for a landfill exempt from permits under 35 Ill. Adm. Code 815;
 - 3) subject to 35 Ill. Adm. Code 840;
 - 4) used to store coal combustion waste or leachate from coal combustion waste when all of the following conditions are met:
 - A) at least two feet of material with a permeability equal or superior to 1×10^{-7} centimeters per second, or an equivalent synthetic liner lines the bottom of the unit;
 - B) the coal combustion waste or leachate from coal combustion waste remains in the unit for no longer than one year; and
 - C) the unit's maximum volume is no more than 25 cubic yards; or
 - 5) that does not contain more than one cubic yard of CCW and is³ used to only collect stormwater runoff, which does not contain leachate.

BOARD NOTE: A unit not subject to this Part should maintain records demonstrating how the exemption in subsection (b) applies or how the unit is outside the scope of application set forth in subsection (a).⁴

³ Hearing Exhibit 5, attachment 1, p.11.

⁴ Illinois EPA's Post Hearing Comments, attachment 1, p. 4, March 25, 2014.

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Section 841.110 Definitions

Unless otherwise specified, the definitions of the Environmental Protection Act (Act) [415 ILCS 5] apply to this Part. The following definitions also apply:

"Agency" means the Illinois Environmental Protection Agency.

"Aquifer" means saturated (with groundwater) soils and geologic materials which are sufficiently permeable to readily yield economically useful quantities of water to wells, springs, or streams under ordinary hydraulic gradients. [415 ILCS 55/3(b)]

"Board" means the Illinois Pollution Control Board.

"Certified Laboratory" means any laboratory certified pursuant to Section 4(o) of the Act [415 ILCS 5/4(o)], or certified by USEPA.⁵

"Coal combustion waste" means any fly ash, bottom ash, slag, or flue gas or fluid bed boiler desulfurization by-products generated as a result of the combustion of:

- (1) coal, or*
- (2) coal in combination with: (i) fuel grade petroleum coke, (ii) other fossil fuel, or (iii) both fuel grade petroleum coke and other fossil fuel, or*
- (3) coal (with or without: (i) fuel grade petroleum coke, (ii) other fossil fuel, or (iii) both fuel grade petroleum coke and other fossil fuel) in combination with no more than 20% of tire derived fuel or wood or other materials by weight of the materials combusted; provided that the coal is burned with other materials, the Agency has made a written determination that the storage or disposal of the resultant wastes in accordance with the provisions of item (r) of Section 21 would result in no environmental impact greater than that of wastes generated as a result of the combustion of coal alone, and the storage disposal of the resultant wastes would not violate applicable federal law. [415 ILCS 5/3.140]*

"Compliance point"⁶ means any point in groundwater designated at a lateral distance of 25 feet measured parallel to the land surface from the outer edge of the unit and projected vertically downward, or property boundary, whichever is less, and a depth of 15 feet from the bottom of the unit or 15 feet into the groundwater table, whichever is greater. If the owner or operator has a GMZ pursuant to 35 Ill. Adm. Code 620.250 for the site or unit, compliance point means any point as

⁵ Hearing Exhibit 5, attachment 1, p.20.

⁶ Hearing Exhibit 5, attachment 1, p.12-13.

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~~specified in an approved corrective action process in the groundwater at which a contaminant released from the unit could pass beyond the Agency approved GMZ boundary.~~ There may be more than one compliance point for a particular unit(s)/GMZ.

"Contaminant" means any solid, liquid or gaseous matter, any odor, or any form of energy, from whatever source. [415 ILCS 5/3.165]

*"Groundwater" means underground water which occurs within the saturated zone and geologic materials where the fluid pressure in the pore space is equal to or greater than atmospheric pressure. [415 ILCS 5/3.210]*⁷

*"High priority resource groundwater" means Class I groundwater under 35 Ill. Adm. Code 620.210(a)(1), (a)(2), or (a)(3), or Class III groundwater under 35 Ill. Adm. Code 620.230.*⁸

"Leachate" means any liquid, including any suspended components in the liquid, that has been or is in direct contact with, percolated through or drained from coal combustion waste. Leachate does not include stormwater runoff that may come into contact with fugitive ash.

"Off-site" means not on-site.

"On-site", "on the site", or "on the same site" means the same or geographically contiguous property which may be divided by public or private right-of-way, provided the entrance and exit between the properties is at a crossroads intersection and access is by crossing as opposed to going along the right-of-way. Noncontiguous properties owned by the same person but connected by a right-of-way which he controls and to which the public does not have access is also considered on-site property.

"Operator" means the person responsible for the operation and maintenance of a unit.

"Owner" means a person who has an interest, directly or indirectly, in land, including a leasehold interest, on which a person operates and maintains a unit. The "owner" is the "operator" if there is no other person who is operating and maintaining a unit.

"Person" is any individual, partnership, co-partnership, firm, company, limited liability company, corporation, association, joint stock company, trust, estate, political subdivision, State agency, or any other legal entity, or their legal representative, agent or assigns. [415 ILCS 5/3.315]

⁷ Hearing Exhibit 5, attachment 1, p.12.

⁸ Hearing Exhibit 5, attachment 4, p.9.

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"Practical Quantitation Limit" or "PQL" means the lowest concentration or level that can be reliably measured within specified limits of precision and accuracy during routine laboratory operating conditions in accordance with "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods", EPA Publication No. SW-846, incorporated by reference at Section 841.120.

"Professional engineer" means *a person licensed under the laws of the State of Illinois to practice professional engineering.* [225 ILCS 325].

"Professional geologist" means *an individual who is licensed under the Professional Geologist Licensing Act to engage in the practice of professional geology in Illinois.* [225 ILCS 745]

"Site" means *any location, place, tract of land and facilities, including but not limited to buildings, and improvements used for purposes subject to regulation or control by the Act or regulations thereunder.* [415 ILCS 5/3.460]

"Statistically significant" means the application of a statistical method pursuant to Section 841.225 of this Part to determine whether consecutive groundwater sampling data showing greater or lesser concentrations of chemical constituents represents a pattern rather than chance occurrence.

~~"Storm" means a maximum 24-hour precipitation event with a probable recurrence interval of once in 25 years, as defined by the National Weather Service in NOAA Atlas 14 Precipitation Frequency Atlas of the United States, Volume 2, Version 3.0 (2004), found at http://hdsc.nws.noaa.gov/hdsc/pfds/orb/il_pfds.html.~~⁹

"Surface impoundment"¹⁰ means a natural topographical depression, man-made excavation, or diked area where earthen materials provide structural support for the containment of liquid wastes or wastes containing free liquids, and which is not a landfill, as defined in 35 Ill. Adm. Code 810.103.

"Unit" means any surface impoundment at a power generating facility that contains coal combustion waste or leachate from coal combustion waste.

"Woody species" means perennial plants with stem(s) and branches from which buds and shoots develop.

"25- year, 24-hr Storm" means the maximum 24-hour precipitation event with a probable recurrence interval of once in 25 years, as defined by NOAA Atlas 14; Precipitation Frequency Atlas of the United States, incorporated by reference in Section 841.120.¹¹

⁹ Hearing Exhibit 5, attachment 1, p.14-15.

¹⁰ Illinois EPA's Post Hearing Comments, attachment 1, p. 15-16, March 25, 2014.

¹¹ Hearing Exhibit 5, attachment 1, p.14-15.

Section 841.115 Abbreviations and Acronyms

Agency	Illinois Environmental Protection Agency ¹²
CQA	Construction Quality Assurance
GMZ	Groundwater Management Zone
Mg\L	Milligrams per Liter
NPDES	National Pollutant Discharge Elimination System
TDS	Total Dissolved Solids
PQL	Practical Quantitation Limit

Section 841.120 Incorporations by Reference

- a) The Board incorporates the following material by reference:

NTIS. National Technical Information Service, 5285 Port Royal Road, Springfield VA 22161, (703) 605-6000.

"Methods for Chemical Analysis of Water and Wastes," March 1983, Doc. No. PB84-128677. EPA 600/4-79-020 (available on-line at <http://nepis.epa.gov/>).

"Methods for the Determination of Inorganic Substances in Environmental Samples," August 1993, Doc. No. PB94-120821 (referred to as "USEPA Environmental Inorganic Methods"). EPA 600/R-93-100 (available online at <http://nepis.epa.gov/>).

"Methods for the Determination of Metals in Environmental Samples," June 1991, Doc. No. PB91-231498. EPA 600/4-91-010 (available on-line at <http://nepis.epa.gov/>).

"Methods for the Determination of Metals in Environmental Samples Supplement I," May 1994, Doc. No. PB95-125472. EPA 600/4-94-111 (available on-line at <http://nepis.epa.gov/>).

"Methods for the Determination of Organic and Inorganic Compounds in Drinking Water: Volume I," EPA 815-R-00-014 (August 2000) (available on-line at <http://nepis.epa.gov/>).

"Practical Guide for Ground-Water Sampling," EPA Publication No. EPA/600/2-85/104 (September 1985), Doc. No. PB 86-137304,

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," USEPA Publication No. SW-846, as amended by Updates I, II, IIA, IIB,

¹² Hearing Exhibit 5, attachment 1, p.15.

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III, IIIA, and IIIB (Doc. No. 955-001-00000-1), (available on-line at <http://www.epa.gov/epaoswer/hazwaste/test/main.htm>).

USEPA, NSCEP. United States Environmental Protection Agency, National Service Center for Environmental Publications, P.O. Box 42419, Cincinnati, OH 45242-0419 (accessible on-line and available by download from <http://www.epa.gov/nscep/>).

2009 Unified Guidance. “Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities—Unified Guidance,” March 2009, EPA 530/R-09-2007.

USGS. United States Geological Survey, 1961 Stout St., Denver CO 80294, (303) 844-4169.

"Techniques of Water Resources Investigations of the United States Geological Survey, Guidelines for Collection and Field Analysis of Ground-Water Samples for Selected Unstable Constituents," Book I, Chapter D2 (1976).

“NOAA Atlas 14: Precipitation-Frequency Atlas of the United States.” United States Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, Volume 2, Version 3.0 (2004), revised 2006. Available from NOAA, NWS, Office of Hydrologic Development, 1325 East West Highway, Silver Spring, MD 20910 (Available online at http://www.nws.noaa.gov/oh/hdsc/PF_documents/Atlas14_Volume2.pdf)¹³

- b) This Section incorporates no later editions or amendments.

Section 841.125 Groundwater Quality Standards¹⁴

- a) The owner or operator shall comply with the groundwater standards in 35 Ill. Adm. Code 620 at all times, ~~including the corrective action process in 35 Ill. Adm. Code 620.250.~~
- b) Compliance with the groundwater quality standards shall be measured at the compliance point, or compliance points if more than one compliance point exists.
- d) The number and kinds of samples collected to establish compliance with the groundwater quality standards must be appropriate for the form of statistical test employed, as prescribed in Section 841.225 of this Part and the 2009 Unified Guidance, incorporated by reference in Section 841.120 of this Part.

¹³ Hearing Exhibit 5, attachment 1, p.14-15.

¹⁴ Hearing Exhibit 5, attachment 4, p.11; Illinois EPA’s Post Hearing Comments, attachment 1, p. 17, March 25, 2014.

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Section 841.130 Compliance Period¹⁵

- a) ~~Except as provided in this Section, the~~The compliance period begins when the unit first receives coal combustion waste, or leachate from coal combustion waste, or on the effective date of this Part~~one year after the effective date of this rule,~~ whichever occurs later, and ends when the post-closure care period ends. The post-closure care period for a unit is the time period described in Section 841.440(a) of this Part.
- b) ~~If the unit was in operation on or before the effective date of this Part, the~~The owner or operator shall conduct a hydrogeologic site characterization, establish background values, develop a groundwater monitoring system, and submit a groundwater monitoring plan within one year of the effective date of this Part before the compliance period begins. If the owner or operator wishes to use previous site investigations or characterization, plans or programs to satisfy the requirements of this Part pursuant to ~~Section 841.145,~~ the owner or operator must submit the previous investigations, characterizations, plans or programs in accordance with Section 841.140 of this Part to the Agency for approval pursuant to Section 841.145 of this Part within one year of the effective date of this Part~~to the Agency for approval of this Part before the compliance period begins.~~

Section 841.135 Recordkeeping

- a) The owner or operator of the unit must maintain paper copies of the following on-site:
- 1) groundwater monitoring plan;
 - 2) all monitoring data, including inspection reports, for 10 years following generation of the data;
 - 3) corrective action plan, until completion of the corrective action;
 - 4) corrective action report for 10 years following Agency approval of the report;
 - 5) closure plan until the end of the post-closure period;
 - 6) closure report for 10 years following Agency approval of the report;
 - 7) post-closure care plan for 10 years following the certification of the post-closure report;

¹⁵ Hearing Exhibit 5, attachment 1, p.15-17; Illinois EPA's Post Hearing Comments, attachment 1, p. 16-17, March 25, 2014.

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- 8) post-closure report for 10 years following Agency approval of the report; and
 - 9) any CQA reports for 2 years following the completion of the construction.
- b) All information required to be maintained by an owner or operator under this Part must be made available to the Agency upon request for inspection and photocopying during normal business hours.

Section 841.140 Submission of Plans, Reports and Notifications

- a) All reports, plans, modifications and notifications required under this Part to be submitted to the Agency must be submitted in writing to the Bureau of Water, Division of Public Water Supplies, Attn: Hydrogeology and Compliance Unit, 1021 North Grand Avenue East, P.O. Box 19276, Springfield, Illinois 62794-9276 or electronically as authorized by the Agency.
- b) Whenever any of the following documents are submitted to the Agency, the document must contain the seal and signature of either a professional engineer or professional geologist.
 - 1) hydrogeologic site characterization;
 - 2) groundwater monitoring system; and
 - 3) groundwater monitoring plan;
- c) Whenever any of the following documents are submitted to the Agency, the document must contain the seal and signature of a professional engineer.
 - 1) corrective action plan, corrective action report and corrective action certification;
 - 2) closure plan, closure report and closure certification; and
 - 3) post-closure care plan, post-closure report and post-closure certification.

Section 841.145 Previous Investigations, Plans and Programs

The Agency may approve the use of any hydrogeologic site investigation or characterization, groundwater monitoring well or system, groundwater monitoring plan, groundwater management zone or preventive response plan, compliance commitment agreement, or court or Board order existing prior to the effective date of these rules to satisfy the requirements of this Part.

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Section 841.150 Modification of Existing Permits

The owner or operator of the unit must submit to the Agency an application to revise any state operating permits or NPDES permits issued by the Agency as necessary as a result of preventive response, corrective action, or closure under this Part.

Section 841.155 Construction Quality Assurance Program¹⁶

- a) The following components of a preventive response plan pursuant to Subpart B of this Part, a corrective action plan pursuant to Subpart C of this Part and a closure plan pursuant to Subpart D of this Part must be constructed according to a CQA program, if applicable:
 - 1) Installation of the groundwater collection system and discharge system;
 - 2) Compaction of the final cover system subgrade and foundation to design parameters;
 - 3) Application of final cover, including installation of the geomembrane; ~~and~~
 - 4) Construction of ponds, ditches, lagoons and berms; and
 - 5) Removal of CCW.
- b) The CQA program must meet the following requirements, if applicable:
 - 1) The operator must designate a CQA officer who is an Illinois licensed professional engineer.
 - 2) At the end of each week of construction until construction is complete, a summary report must be prepared either by the CQA officer or under the supervision of the CQA officer. The report must include descriptions of the weather, locations where construction occurred during the previous week, materials used, results of testing, inspection reports, and procedures used to perform the inspections. The CQA officer must review and approve the report. The owner or operator of the unit shall retain all weekly summary reports approved by the CQA officer pursuant to Section 841.135 of this Part.
 - 3) The CQA officer must certify the following, when applicable:
 - A) the bedding material contains no undesirable objects;

¹⁶ Hearing Exhibit 5, attachment 4, p.8; Illinois EPA's Post Hearing Comments, attachment 1, p. 8-9, March 25, 2014.

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- B) the preventive response, closure plan or corrective action plan has been followed;
 - C) the anchor trench and backfill are constructed to prevent damage to a geosynthetic membrane;
 - D) all tears, rips, punctures, and other damage are repaired;
 - E) all geosynthetic membrane seams are properly constructed and tested in accordance with the manufacturer's specifications;
 - F) the groundwater collection system is constructed to intersect the water table;
 - G) a groundwater collection system is properly constructed to slope toward extraction points, and the extraction equipment is properly designed and installed;
 - H) appropriate operation and maintenance plans for the groundwater collection system and extraction and discharge equipment are provided;
 - I) proper filter material consisting of uniform granular fill, to avoid clogging, is used in construction; ~~and~~
 - J) the filter material as placed possesses structural strength adequate to support the maximum loads imposed by the overlying materials and equipment used at the facility;
 - K) CCW stabilization, transport, and disposal; and
 - L) site restoration, if any.
- 4) The CQA officer must supervise and be responsible for all inspections, testing and other activities required to be implemented as part of the CQA program under this Section.
- 5) The CQA officer must be present to provide supervision and assume responsibility for performing all inspections of the following activities, when applicable:
- A) Compaction of the subgrade and foundation to design parameters;
 - B) Application of final cover, including installation of the geomembrane;

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- C) Installation of the groundwater collection system and discharge system; and
 - D) Construction of ponds, ditches, lagoons and berms.
- 6) If the CQA officer is unable to be present as required by subsection (b)(5) of this Section, the CQA officer must provide the following in writing:
- i) the reasons for his or her absence;
 - ii) a designation of a person who must exercise professional judgment in carrying out the duties of the CQA officer-in-absentia;
 - iii) and a signed statement that the CQA officer assumes full responsibility for all inspections performed and reports prepared by the designated CQA officer-in-absentia during the absence of the CQA officer.
- 7) The CQA program must ensure, at a minimum, that construction materials and operations meet design specifications.

Section 841.160 Photographs

When photographs are used to document the progress and acceptability of work performed under this Part, each photograph shall be identified with the following information:

- a) the date, time and location of photograph;
- b) the name of photographer; and
- c) the signature of photographer.

Section 841.165 Public Notice

- a) The Agency shall post all proposed corrective action plans and closure plans, or modifications thereto, on the Agency's webpage for a period not shorter than 30 days.
- b) The Agency shall accept written comments for a period of 30 days beginning on the day the proposed corrective action or closure plan, or modification thereto, was posted on the Agency's webpage.
- c) While the Agency may respond to the comments received pursuant to subsection (b) of this Section, such response is not required.

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- d) The Agency shall take any comments received into consideration in making its final decision and shall post its final decisions on the proposed corrective action plans and closure plans, or modifications thereto, on the Agency's webpage for a period not shorter than 30 days.

Section 841.170 Inspection¹⁷

- a) While a unit is in operation, it must be inspected at least once every seven days and after each 25-year, 24-hour Storm to detect evidence of any of the following:
 - 1) Deterioration, malfunctions or improper operation of overtopping control systems;
 - 2) Sudden drops in the level of the unit's contents;
 - 3) Severe erosion (eg. rills, gullies, and crevices six inches or deeper) or other signs of deterioration (eg. failed or eroded vegetation in excess of 100 square feet or cracks) in dikes or other containment devices; and
 - 4) A visible leak.
- b) The owner or operator shall prepare a report for each inspection which includes the date of the inspection, condition of the unit, any repairs made to the unit and the date of the repair and shall maintain a record of such reports pursuant to Section 841.135 of this Part.
- c) The owner or operator shall notify the Agency when a visual inspection shows the level of liquids in the unit suddenly and unexpectedly drops and the drop is not caused by changes in the influent or effluent flows.

SUBPART B: MONITORING

Section 841.200 Hydrogeologic Site Characterization¹⁸

- a) The owner or operator of any unit must design and implement a hydrogeologic site characterization to determine the nature and extent of the stratigraphic horizons that are potential contamination migration pathways, and to develop hydrogeologic information for the uses set forth in this Section.
- b) The uses of the hydrogeologic site characterization shall include, but not be limited to:

¹⁷ Hearing Exhibit 5, attachment 1, p.22.

¹⁸ See Hearing Exhibit 5, attachment 4, p.8-9; Illinois EPA's Post Hearing Comments, attachment 1, p. 10-11, March 25, 2014.

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- 1) Providing information to define hydrogeology, including a map of the potentiometric surface and background groundwater quality concentrations, and to assess whether there are any impacts to groundwater quality attributable to any releases from the unit;
 - 2) Providing information to establish a groundwater monitoring system; and
 - 3) Providing information to develop and perform modeling to assess possible changes and benefits of potential groundwater impact mitigation alternatives.
- c) Hydrogeologic site characterization shall include but not be limited to the following:
- 1) Geologic well logs/boring logs;
 - 2) Climatic aspects of the site;
 - 3) Identification of nearby surface water bodies;
 - 4) Identification of nearby pumping wells;
 - 5) Geologic setting;
 - 6) Structural characteristics;
 - 7) Geologic cross-sections;
 - 8) Soil characteristics;
 - 9) Identification of confining layers;
 - 10) Identification of potential migration pathways;
 - 11) Groundwater quality data;
 - 12) Vertical and horizontal extent of the geologic layers to a minimum depth of 100 feet below land surface;
 - 13) Chemical and physical properties of the geologic layers to a minimum depth of 100 feet below land surface;
 - 14) Hydraulic characteristics of the geologic layers to a minimum depth of 100 feet below the land surface, including:
 - A) Water table depth;

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- B) Hydraulic conductivities;
 - C) Porosities;
 - D) Direction and velocity of groundwater flow; and
 - E) Map of the potentiometric surface; and
- 15) Any other information requested by the Agency.

Section 841.205 Groundwater Monitoring System

- a) The owner or operator of a unit must develop and submit a proposal for a groundwater monitoring system as a part of the groundwater monitoring plan required by Section 841.210 of this Part. If the site contains more than one unit, separate groundwater monitoring systems are not required for each unit, provided that provisions for sampling the groundwater will enable detection and measurements of contaminants that enter the groundwater from all units.
- b) Standards for monitoring well design and construction.
 - 1) All monitoring wells must be cased in a manner that maintains the integrity of the bore holes.
 - 2) Wells must be screened to allow sampling only at a specified interval.
 - 3) All wells must be covered with vented caps, unless located in flood-prone areas, and equipped with devices to protect against tampering and damage.
- c) The groundwater monitoring system must consist of a sufficient number of wells, installed at appropriate locations and depths to yield groundwater samples to:
 - 1) represent the background quality of groundwater that has not been affected by the unit;
 - 2) represent the quality of groundwater at the compliance point or points;
 - 3) determine compliance with applicable groundwater quality standards in 35 Ill. Adm. Code Part 620; and
 - 4) distinguish between chemical constituent concentrations attributable to a regulated unit and other activities.
- d) The groundwater monitoring system must include monitoring well(s) must be located in stratigraphic horizons that are potential contamination

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migration pathways as identified by the hydrogeologic site characterization conducted pursuant to Section 841.200.¹⁹

- e) The groundwater monitoring system must be approved by the Agency pursuant to Subpart E of this Part as a part of the groundwater monitoring plan.

Section 841.210 Groundwater Monitoring Plan

- a) The owner or operator of a unit must develop a groundwater monitoring plan to monitor and evaluate groundwater quality to demonstrate compliance with the groundwater quality standards in 35 Ill. Adm. Code Part 620, and to determine the full extent, measured or modeled, of the presence of any contaminant monitored pursuant to Section 841.215 of this Part above background concentrations, if any.
- b) The groundwater monitoring plan must contain the following:
 - 1) A groundwater monitoring quality assurance program for sample collection, preservation and analysis.
 - 2) A site map that identifies the following:
 - A) all the units located at the site;
 - B) all existing and proposed groundwater monitoring wells;
 - C) all buildings and pertinent features; and
 - D) other information if requested by the Agency.
 - 3) A description of the unit(s), including but not limited to:
 - A) the date each unit began operation;
 - B) a description of the contents of each unit, specifying, to the extent practicable and where such information is available:
 - i) the date when each unit began receiving coal combustion waste, or leachate from coal combustion waste;
 - ii) changes in the coal source (e.g. Powder River Basin versus Illinois Basin) including dates and/or tons of material from each coal source;
 - iii) changes in the type of coal combustion waste, or leachate deposited (e.g. fly ash versus flue gas desulfurization

¹⁹ Hearing Exhibit 5, attachment 1, p.19.

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- sludge) including dates and/or tons of each material deposited; and
- iv) if applicable, the date when the unit stopped receiving coal combustion waste or leachate.
- C) the estimated volume of material contained in each unit; and
- D) a description of the engineered liner, if any, including the date of installation for each unit.
- 4) A description and results of all hydrogeologic site characterizations performed at the site.
- 5) Plans, specifications, and drawings for the groundwater monitoring system developed pursuant to Section 841.205 of this Part.
- 6) A maintenance plan for the groundwater monitoring system.
- 7) An explanation of sample size, sample procedure and statistical method used to determine background, assessment monitoring and compliance monitoring.
- 8) The location of compliance points.
- 9) A schedule for submission of annual reports pursuant to Section 841.235 of this Part.
- c) Representative samples from the groundwater monitoring system must be collected and analyzed in accordance with the procedures for groundwater monitoring and analysis set forth in the following documents, incorporated by reference at Section 841.120 of this Part, or other procedures approved by the Agency in the groundwater monitoring program plan:
 - 1) "Methods for Chemical Analysis of Water and Wastes";
 - 2) "Methods for the Determination of Inorganic Substances in Environmental Samples";
 - 3) "Methods for the Determination of Metals in Environmental Samples";
 - 4) "Methods for the Determination of Metals in Environmental Samples – Supplement I";
 - 5) "Methods for the Determination of Organic and Inorganic Compounds in Drinking Water: Volume I";

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- 6) "Practical Guide for Ground-Water Sampling";
 - 7) "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods" (SW-846), as amended by Updates I, II, IIA, IIB, III, IIIA, and IIIB;
 - 8) "Techniques of Water Resources Investigations of the United States Geological Survey, Guidelines for Collection and Field Analysis of Ground-Water Samples for Selected Unstable Constituents";
 - 9) "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities—Unified Guidance."
- d) Sampling and analysis data from groundwater monitoring must be reported to the Agency within 60 days after completion of sampling.
 - e) All groundwater samples taken pursuant to this Section must be analyzed for the chemical constituents listed in Section 841.215 of this Part by a certified laboratory.
 - f) The groundwater monitoring plan and any modifications to the groundwater monitoring plan must be approved by the Agency pursuant to Subpart E of this Part.

Section 841.215 Chemical Constituents and Other Data to Be Monitored

The owner or operator of a unit shall monitor for all chemical constituents identified in 35 Ill. Adm. Code 620.410(a) and (e) except, perchlorate,²⁰ radium-226 and radium-228. Field parameters of specific conductance, groundwater elevation, monitoring well depth and field pH must be determined and recorded with the collection of each sample, and does not need to be analyzed by a certified laboratory.

Section 841.220 Determining Background Values

- a) The owner or operator of a unit must determine the background values of the chemical constituents to be monitored pursuant to Section 841.215 of this Part and must submit the background value determination with the annual statistical analysis pursuant to Section 841.235 of this Part.
- b) The number and kinds of samples collected to establish background must be appropriate for the type of statistical test employed, as prescribed in Section 841.225 of this Part and the 2009 Unified Guidance, incorporated by reference in Section 841.120 of this Part.

²⁰ Hearing Exhibit 5, attachment 3, p.24.

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- c)b) Where wells up-gradient of the unit could be affected by activities at the site, the owner or operator may, with Agency approval, use the intrawell statistical method as specified in the 2009 Unified Guidance to determine background values.
- d)e) The owner or operator shall recalculate background chemical constituent concentrations consistent with the recommendations contained in the 2009 Unified Guidance, but no less often than every five years.
- e) Detections of chemical constituents for which monitoring has been reduced pursuant to Section 841.230(c) shall be included by the owner or operator in background calculations.²¹

Section 841.225 Statistical Methods

- a) When determining background values and when conducting compliance or assessment monitoring, the owner or operator of the unit must specify one or more of the following statistical methods to be used. The statistical test chosen must be conducted separately for each monitored chemical constituent in each well as necessary to demonstrate compliance with this Part and Part 620.²² Where PQLs are used in any of the following statistical procedures to comply with subsection (b)(5) of this Section, the PQL must be proposed by the owner or operator and approved by the Agency. Use of any of the following statistical methods must adequately protect human health and the environment and must comply with the performance standards outlined in subsection (b) of this Section.
 - 1) A parametric analysis of variance followed by multiple comparisons procedures to identify statistically significant evidence of contamination.
 - 2) An analysis of variance based on ranks followed by multiple comparisons procedures to identify statistically significant evidence of contamination.
 - 3) A tolerance or prediction interval procedure in which an interval for each chemical constituent is established from the distribution of the background data, and the level of each chemical constituent in each compliance well is compared to the upper tolerance or prediction limit. In the case of pH, the upper and lower limits shall be considered.
 - 4) A control chart approach that gives control limits for each chemical constituent.
 - 5) Another statistical test method submitted by the owner or operator and approved by the Agency.

²¹ Illinois EPA's Post Hearing Comments, attachment 1, p. 1-4, March 25, 2014.

²² Illinois EPA's Post Hearing Comments, attachment 1, p. 4-5, March 25, 2014.

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- b) Any statistical method chosen pursuant to subsection (a) of this Section must comply with the following performance standards, as appropriate:
- 1) The statistical method used to evaluate groundwater monitoring data must be appropriate for the distribution of chemical constituent concentrations. If the distribution of the chemical constituent concentrations is shown by the owner or operator to be inappropriate for a normal theory test, then the data should be transformed or a distribution-free theory test should be used. If the distributions for the chemical constituent concentrations differ, more than one statistical method may be needed.
 - 2) If an individual well comparison procedure is used to compare an individual compliance well chemical constituent concentration with background chemical constituent concentrations, the test must be done at a Type I error level no less than 0.01 for each testing period. If a multiple comparisons procedure is used, the Type I experiment-wise error rate for each testing period must be no less than 0.05; however, the Type I error of no less than 0.01 for individual well comparisons must be maintained. This performance standard does not apply to tolerance intervals, prediction intervals or control charts.
 - 3) If a control chart approach is used to evaluate groundwater monitoring data, the specific type of control chart and its associated parameter value must be proposed by the owner or operator and may be approved by the Agency if the Agency finds it to adequately protect human health and the environment.
 - 4) If a tolerance interval or a prediction interval is used to evaluate groundwater monitoring data, the levels of confidence and, for tolerance intervals, the percentage of the population that the interval must contain, must be proposed by the owner or operator and may be approved by the Agency if the Agency finds these parameters to adequately protect human health and the environment. These parameters will be determined after considering the number of samples in the background database, the data distribution, and the range of the concentration values for each constituent of concern.
 - 5) The statistical method must account for data below the limit of detection with one or more statistical procedures that adequately protect human health and the environment. Any PQL approved by the Agency pursuant to subsection (a) of this Section that is used in the statistical method must be the lowest concentration level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility.

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- 6) The statistical method must include procedures to control or correct for seasonal and spatial variability, as well as temporal correlation in the data.
- c) Sample Size: The sample size must be as large as necessary to ensure with reasonable confidence that a contaminant release to groundwater from a facility will be detected.

Section 841.230 Sampling Frequency²³

- a) Semi-Annual Monitoring. Except as provided by this Section, all chemical constituents monitored pursuant to this Part shall be sampled at least semi-annually if allowed by the statistical method selected pursuant to Section 841.225 of this Part.

- b) Quarterly Monitoring. ~~In addition to semi-annual monitoring required under subsection (a) of this Section, the following shall apply:~~

- 1) An owner or operator must increase semi-annual monitoring to quarterly monitoring under the following circumstances.

- A) If any chemical constituents monitored pursuant to this Part exceed the standards set forth in 35 Ill. Adm. Code 620.Subpart D the owner or operator shall sample each well on a quarterly basis for those chemical constituents that exceed the standards in 35 Ill. Adm. Code 620.Subpart D.

- B) Pursuant to Section 841.235(c)(2) of this Part, when a unit(s) may be the cause of a statistically significant increasing concentration, the owner or operator shall sample each well on a quarterly basis for any chemical constituents with a statistically significant increasing concentration.

- C) If any chemical constituents monitored pursuant to this Part have a concentration that differs to a statistically significant degree from the concentrations detected in the up-gradient wells, the owner or operator shall sample each well on a quarterly basis for those chemical constituents that differ to a statistically significant degree.

- 2) ~~Reduction of Quarterly Monitoring.~~ Any owner or operator of a unit conducting quarterly sampling pursuant to subsection (b)(1) of this Section may reduce the quarterly sampling to semi-annual sampling when:

- A) the monitored chemical constituent is not detectable in the down-gradient wells for four consecutive quarters;

²³ Illinois EPA's Post Hearing Comments, attachment 1, p. 1-4, March 25, 2014.

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- ~~B)2)~~ the monitored chemical constituent has a concentration that does not differ to a statistically significant degree from the concentration detected in the up-gradient wells for four consecutive quarters; or
- ~~C)3)~~ the Agency has approved the owner or operator's alternative cause demonstration pursuant to Sections 841.305 or 841.235(c)(1) of this Part.
- c) Reduced monitoring. Monitoring frequency may be reduced for individual monitoring wells for particular chemical constituents. Reduced monitoring is prohibited when the unit or units associated with monitoring well does not have a liner with two feet of compacted earthen material with a hydraulic conductivity of less than or equal to 1×10^{-7} centimeters per second or a synthetic liner that provides equivalent protection.
- 1) If the monitoring well is up gradient from a unit, the monitoring frequency for that monitoring well may be reduced to once every five years for a chemical constituent that has not been detected in that monitoring well in the last five so long as the chemical constituent has not been detected in all monitoring wells located down gradient from the unit.
- 2) If the monitoring well is down gradient from a unit, the monitoring frequency for that monitoring well may be reduced to once every five years for a chemical constituent that has not been detected in that monitoring well in the last five years.
- d) The owner or operator of the unit must modify the groundwater monitoring plan and obtain Agency approval pursuant to Subpart E of this Part before reducing monitoring.
- e) The owner or operator of a unit may discontinue groundwater monitoring upon Agency approval of the certified post-closure report for that unit required by Section 841.440 of this Part.

Section 841.235 Annual Statistical Analysis

- a) The owner or operator of a unit must perform an annual statistical analysis using the appropriate statistical method pursuant to Section 841.225 of this Part for each monitoring well located down-gradient of any unit for all chemical constituents monitored in accordance with Section 841.215 of this Part.
- b) When a chemical constituent monitored pursuant to Section 841.215 of this Part does not exceed the numerical groundwater standards in 35 Ill. Adm. Code 620,

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the annual statistical analysis shall determine whether any increase of the chemical constituent's concentration is statistically significant.

- c) If the increase is statistically significant, the owner or operator of the unit must investigate the cause.
 - 1) If an investigation attributes a statistically significant increasing concentration to an alternate cause, the owner or operator must notify the Agency in writing within 60 days after submission of the annual statistical analysis, stating the cause of the increasing concentration and providing the rationale used in that determination. The procedures in Section 841.305 of this Part shall apply to the alternative cause demonstration made pursuant to this subsection.
 - 2) If there is not an alternative cause for the statistically significant increasing concentration, then the owner or operator must:
 - A) sample any chemical constituent with statistically significant increasing concentration on a quarterly basis;
 - B) conduct further investigation that includes groundwater flow and contaminant transport modeling when the unit is located over a high priority resource groundwater~~Class I groundwater under 35 Ill. Adm. Code 620.210(a)(1), (a)(2), or (a)(3), or Class III groundwater under 35 Ill. Adm. Code 620.230;~~²⁴
 - C) determine whether the statistically significant increasing concentration demonstrates that a release attributable to the unit threatens a resource groundwater such that:
 - i) Treatment or additional treatment is necessary to continue an existing use or to assure a potential use of such groundwater; or
 - ii) An existing or potential use of such groundwater is precluded; and
 - D) notify the Agency in writing of the findings within 30 days of making the determinations.
 - 3) When the owner or operator determines pursuant to subsection (c)(2)(C) of this Section that release attributable to a unit causes, threatens or allows an impairment or exclusion of existing or potential use, and the groundwater is a high priority resource groundwater~~Class I groundwater under 35 Ill. Adm. Code 620.210(a)(1), (a)(2), or (a)(3), or Class III~~

²⁴ Hearing Exhibit 5, attachment 4, p.9.

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~~groundwater under 35 Ill. Adm. Code 620.230,~~²⁵ the owner or operator of the unit shall develop a preventive response plan to control, minimize and prevent migration of any release from the unit to the resource groundwater. This preventive response plan shall:

- A) be consistent with the requirements of 35 Ill. Adm. Code 620.310;
 - B) be submitted to the Agency within 180 days after the submission of the annual statistical analysis; and
 - C) require the owner or operator to conduct a hydrogeologic investigation or additional site investigation if the statistically significant increasing concentration continues over a period of two or more consecutive years.
 - D) be approved by the Agency pursuant to Subpart E of this Part.
- d) If a groundwater management zone is established pursuant to 35 Ill. Adm. Code 620.250, the annual statistical analysis shall be conducted as set forth in the groundwater management zone or as otherwise approved by the Agency.
- e) For the purposes of this Section, detections of chemical constituents for which monitoring has been reduced pursuant to Section 841.230(c) shall be considered statistically significant increases, and the owner or operator must investigate the cause pursuant to subsection (c) of this Section and notify the Agency within 60 days of the cause of the detection. If the chemical constituents exceed the numerical groundwater standards of 35 Ill. Adm. Code 620, Subpart D, then the owner or operator shall monitor the chemical constituents pursuant to Section 841.230(b)(1).²⁶
- f) The annual statistical analysis shall be submitted to the Agency in accordance with a schedule approved by the Agency in the groundwater monitoring plan pursuant to Section 841.210 of this Part.

~~Section 841.240 – Inspection~~²⁷

- a) ~~While a unit is in operation, it must be inspected at least once every seven days and after each storm to detect evidence of any of the following:~~
 - 1) ~~Deterioration, malfunctions or improper operation of overtopping control systems;~~
 - 2) ~~Sudden drops in the level of the unit's contents;~~

²⁵ Hearing Exhibit 5, attachment 4, p.9.

²⁶ Illinois EPA's Post Hearing Comments, attachment 1, p. 1-4, March 25, 2014.

²⁷ Hearing Exhibit 5, attachment 1, p.22.

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- ~~3) Severe erosion (eg. rills, gullies, and crevices six inches or deeper) or other signs of deterioration (eg. failed or eroded vegetation in excess of 100 square feet or cracks) in dikes or other containment devices; and~~
- ~~4) A visible leak.~~
- ~~b) The owner or operator shall prepare a report for each inspection which includes the date of the inspection, condition of the unit, any repairs made to the unit and the date of the repair and shall maintain a record of such reports pursuant to Section 841.135 of this Part.~~
- ~~e) The owner or operator shall notify the Agency when a visual inspection shows the level of liquids in the unit suddenly and unexpectedly drops and the drop is not caused by changes in the influent or effluent flows.~~

SUBPART C: CORRECTIVE ACTION

Section 841.300 Confirmation Sampling

- a) If the results of groundwater monitoring conducted pursuant to this Part show an exceedence of the groundwater quality standards in 35 Ill. Adm. Code 620 at the compliance point(s), the owner or operator shall confirm the detection by resampling the monitoring well or wells. This resampling shall be analyzed for each chemical constituent exceeding the groundwater quality standards in the first sample. The confirmation sampling results must be submitted to the Agency within 30 days after the date on which the original sample analysis was submitted to the Agency pursuant to Section 841.210(d) of this Part.
- b) If confirmation sampling confirms the detection of concentrations above any groundwater quality standard, the owner or operator shall:
 - 1) submit to the Agency an alternative cause demonstration pursuant to Section 841.305 of this Part that shows the exceedence of the groundwater quality standard at a compliance point is not attributable to a release from a unit or units on-site;
 - 2) submit to the Agency a corrective action plan as provided in Section 841.310 of this Part; or
 - 3) submit to the Agency a closure plan as provided in Subpart D of this Part.
- c) When an exceedence of the groundwater quality standards has been confirmed, the owner or operator must notify the Agency of the owner or operator's intended action pursuant to subsection (b) of this Section. This notification must indicate in which wells and for which chemical constituents a groundwater standard has

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been exceeded, and must be submitted within 30 days after submitting the confirmation sample results.

Section 841.305 Alternative Cause Demonstration

An owner or operator may demonstrate that an exceedence of a groundwater quality standard confirmed at a compliance point is not attributable to a release from a unit. A release is not attributable to a unit when any exceedence is due to error in sampling, analysis or evaluation, any exceedence is due to natural causes, or any exceedence is due to a source other than the unit.

- a) In making such demonstration, the owner or operator shall submit a report to the Agency that demonstrates an alternative cause within 180 days after the date of submission of the confirmation samples pursuant to Section 841.300 of this Part.
- b) The Agency shall provide a written response within 90 days to the owner or operator based upon the written demonstration and any other relevant information submitted by the owner or operator that specifies either:
 - 1) Concurrence with the written demonstration; or
 - 2) Non-concurrence with the written demonstration and the reasons for non-concurrence.
- c) An owner or operator who receives a written response of non-concurrence pursuant to subsection (b) shall
 - 1) submit a corrective action plan in accordance with the requirements of this Subpart or a closure plan in accordance with the requirements of Subpart D of this Part within 90 days of the day the Agency's non-concurrence was mailed to the owner or operator; or
 - 2) appeal the Agency's decision of non-concurrence to the Board within 35 days of the day the Agency's non-concurrence was mailed to the owner or operator.

Section 841.310 Corrective Action Plan

Whenever any applicable groundwater quality standards under 35 Ill. Adm. Code 620.Subpart D are exceeded, this exceedence is confirmed pursuant to Section 841.300 of this Part, the owner or operator has not made an alternative cause demonstration pursuant to Section 841.305 of this Part, and the owner or operator does not elect to close the unit(s), the owner or operator shall undertake the following corrective action:

- a) Sample and analyze on a quarterly basis according to the provisions of Section 841.230(b) of this Part.

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- b) If a release from a unit has impacted a potable water supply well that is in use, the owner or operator of the unit shall act to replace the water supply with a supply of equal or better quality and quantity within 30 days of discovering that such impact has occurred. For the purposes of this Section, a potable water supply well is impacted if the concentration of any chemical constituent monitored pursuant to this Part exceeds the groundwater quality standards in 35 Ill. Adm. Code 620.Subpart D within the well's setback zone.
- c) The owner or operator shall take corrective action that results in compliance with the groundwater quality standards.
- d) The owner or operator shall submit a corrective action plan within 180 days after submission of confirmation sampling results. This requirement is waived if no groundwater quality standard is exceeded in the samples taken pursuant to subsection (a) of this Section for two consecutive quarters.
- e) The corrective action plan must contain the following:
 - 1) description of the activities to be performed at the site, in accordance with the requirements of this Part, to mitigate the groundwater quality standard exceedence;
 - 2) proposed plans, specifications, and drawings for the proposed corrective action;
 - 3) proposed timeline for implementation and completion of all proposed corrective actions;
 - 4) a copy of the following plans and investigations:
 - A) groundwater monitoring plan required pursuant to Section 841.210 of this Part,
 - B) hydrogeologic site characterization required by Section 841.200 of this Part and any other hydrogeological site investigation performed under this Part; and
 - C) a copy of the most recent annual statistical analysis required by Section 841.235 of this Part;
 - 6) estimates of the cost of the corrective action;
 - 7) a proposal for a GMZ as set forth in 35 Ill. Adm. Code 620.250, if applicable, including but not limited to groundwater modeling results and supporting documentation;

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- 8) description of the CQA program required by Section 841.155 of this Part.
 - 9) description of institutional controls prohibiting potable uses, if applicable, and copies of the instruments achieving those controls.;
 - 10) an evaluation of the effects of a cover, when requested by the Agency;
 - 11) description of any preventive response plan developed pursuant to Section 841.235 of this Part or 35 Ill. Adm. Code 620.230, if applicable, including, but not limited to, plans, specifications, and drawings for any structures or devices that were constructed; and
 - 12) the signature and seal of the professional engineer supervising the preparation of the corrective action plan.
- f) The Agency may request additional information from the owner or operator when necessary to evaluate the proposed corrective action plan.
 - g) Upon Agency approval of the corrective action plan, an owner or operator shall implement corrective action in accordance with the timelines approved in the corrective action plan, and shall provide annual progress reports to the Agency regarding implementation of the corrective action plan.
 - h) The owner or operator shall continue corrective action measures to the extent necessary to ensure that no groundwater quality standard is exceeded at the compliance point or points.
 - i) If the owner or operator determines that the corrective action program no longer satisfies the requirements of this Section, the owner or operator shall, within 90 days of that determination, submit a modification of the corrective action plan to the Agency.
 - j) The Agency shall review the corrective action plan, and any modifications, according to the provisions of Subpart E of this Part.

Section 841.315 Groundwater Collection System

- a) A groundwater collection system includes, but is not limited to, recovery wells, trenches, sumps or piping.
- b) When the corrective action plan includes the use of a groundwater collection system, the owner or operator must:
 - 1) include plans for the groundwater collection system, including, but not limited to, a plan for operation and maintenance, which must be approved by the Agency in the corrective action plan.

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- 2) construct the groundwater collection system in accordance with a CQA program that meets the requirements of Section 841.155 of this Part.
- c) Once compliance with the groundwater quality standards set forth in 35 Ill. Adm. Code 620 or in the groundwater management zone established pursuant to 35 Ill. Adm. Code 620.250 have been achieved, the owner or operator of the unit may discontinue operation of the groundwater collection system.
 - 1) Upon discontinuing operation of the groundwater collection system, the owner or operator must perform four quarterly samples of the groundwater monitoring system wells to ensure compliance with the applicable groundwater quality standards.
 - 2) Results of the four quarterly samples must be included in the corrective action report documentation under Section 841.325. If compliance is not confirmed, operation of the groundwater collection system and discharge system must be resumed, and the owner or operator must notify the Agency.

Section 841.320 Groundwater Discharge System

When the corrective plan includes the use of a groundwater discharge system:

- a) Water discharged to waters of the United States must be discharged in accordance with an NPDES Permit.
- b) The groundwater discharge system must be constructed according to a CQA program that meets the requirements of Section 841.155 of this Part.
- c) Plans for the groundwater discharge system, including, but not limited to, a plan for operation and maintenance, must be approved by the Agency in the corrective action plan.

Section 841.325 Corrective Action Report and Certification

- a) No later than 90 days after the completion of all corrective actions contained in the corrective action plan approved by the Agency, the owner or operator must prepare and submit a corrective action report and corrective action certification for Agency review and approval.
- b) The corrective action report also must contain supporting documentation, including, but not limited to:
 - 1) Engineering and hydrogeology reports, including, but not limited to, monitoring well completion reports and boring logs, all CQA reports,

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- certifications, and designations of CQA officers-in-absentia required by Section 841.155 of this Part;
- 2) Photographs of construction activities;
 - 3) A written summary of corrective action requirements and activities as set forth in the corrective action plan and this Part; and
 - 4) Any other information relied upon by the professional engineer in making the corrective action certification.
 - 5) The signature and seal of the professional engineer supervising the implementation of the corrective action plan, and the preparation of the corrective action report.
- c) The corrective action certification must be made on forms prescribed by the Agency and must contain a certification by a professional engineer that the release attributable to the unit has been mitigated in accordance with the approved corrective action plan required by Section 841.310 of this Part and the requirements of this Part. The certification must be signed by the owner or operator and by the certifying registered professional engineer.

SUBPART D: CLOSURE

Section 841.400 Surface Impoundment Closure

- a) All units shall be closed in a manner that:
 - 1) Controls, minimizes or eliminates releases from the unit; and
 - 2) Minimizes the need for maintenance during and beyond the post-closure care period;
- b) If closure is to be by removal of all impounded coal combustion waste, and leachate from coal combustion waste, the owner or operator shall remove all coal combustion waste, ~~as well as containment system components (liners, etc).~~²⁸ All coal combustion waste must be properly disposed in accordance with the applicable laws and regulations²⁹ unless beneficially reused.
- c) If closure is not to be by removal of all impounded coal combustion waste and leachate from coal combustion waste, the owner or operator shall:
 - 1) Eliminate free liquids by removing liquid wastes or solidifying the remaining wastes and waste residues.

²⁸ Hearing Exhibit 5, attachment 3, p.18-19.

²⁹ Hearing Exhibit 5, attachment 1, p.25-26.

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- 2) Stabilize remaining wastes to a bearing capacity sufficient to support final cover.
 - 3) Cover the unit with a final cover designed and constructed to meet the requirements of Section 841.420 of this Part.
- d) Deed notation
- 1) Following closure of a unit at a site, the owner or operator shall record a notation on the deed to the facility property or some other instrument that is normally examined during title search. The owner or operator shall place a copy of the instrument in the operating record, and shall notify the Agency that the notation has been recorded and a copy has been placed in the operating record.
 - 2) The notation on the deed or other instrument must be made in such a way that in perpetuity notify any potential purchaser of the property that:
 - A) The land has been used as a coal combustion waste surface impoundment; and
 - B) The land's use is restricted pursuant to Section 841.430(h)-(i).³⁰

Section 841.405 Closure Prioritization

- a) Whenever any applicable groundwater standards under 35 Ill. Adm. Code 620.Subpart D are exceeded, this exceedence is confirmed pursuant to Section 841.300 of this Part, the owner and operator has not made an alternative cause demonstration pursuant to Section 841.305 of this Part, and the owner or operator elects to close the unit(s), the owner or operator shall close the unit according to the following schedule:
 - 1) Category 1: Impact to Existing Potable Water Supply
 - A) Category 1 applies where an existing potable water supply well is impacted by a release attributable to the unit. An existing potable water supply is impacted if the level of a contaminant attributable to a release from the unit exceeds an applicable groundwater standard in 35 Ill. Adm. Code 620.Subpart D within the setback of an existing potable water supply well.
 - B) If the unit meets the criteria for Category 1, the owner or operator must take immediate steps to mitigate the impact to any existing potable water supply. The owner or operator of the unit shall act to

³⁰ Hearing Exhibit 5, attachment 1, p.27.

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replace the water supply with a supply of equal or better quality and quantity within 30 days of notice that such impact has occurred.

- C) If Category 1 applies, the owner or operator shall submit a closure plan to the Agency that meets Section 841.410 of this Part within 180 days from the submission of groundwater monitoring results confirming the impact. The unit shall be closed within two years of the Agency's approval of the closure plan, unless the Agency approves a longer timeline.

2) Category 2: Inactive Unit

- A) Unless Category 1 or 4 apply, Category 2 applies where the unit is inactive. For the purposes of this Part, a unit is considered inactive if it has not received coal combustion waste, or leachate from coal combustion waste within the most recent period of eighteen months.

- B) If the unit is inactive, a closure plan must be submitted to the Agency within 180 days from the submission of groundwater monitoring results confirming an exceedence of the applicable groundwater quality standards attributable to a release from a unit at an approved compliance point. The unit shall be closed within five years of the Agency's approval of the closure plan, unless the Agency approves a longer timeline.

3) Category 3: Active Unit

- A) Unless Category 1 or 4 apply, Category 3 applies where the unit is active. For the purposes of this Part, a unit is considered active if it has received coal combustion waste, or leachate from coal combustion waste within the most recent period of eighteen months.

- B) If the unit is active, a closure plan must be submitted to the Agency within 2 years from the submission of groundwater monitoring results confirming an exceedence of the applicable groundwater quality standards attributable to a release from a unit at an approved compliance point. The unit shall be closed within five years of the Agency's approval of the closure plan, unless the Agency approves a longer timeline.

4) Category 4: Class IV Groundwater

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- A) Unless Category 1 applies, Category 4 applies where the unit is located on a site that has been characterized as Class IV groundwater pursuant to 35 Ill. Adm. Code 620.240³¹ beyond a lateral distance of 25 feet from the edge of the unit.
 - B) If the unit is located in a Class IV groundwater area, a closure plan must be submitted to the Agency within three years from the submission of groundwater monitoring results confirming an exceedence of the applicable groundwater quality standards attributable to a release from a unit at an approved compliance point. The unit shall be closed within six years of the Agency's approval of the closure plan, unless the Agency approves a longer timeline.
- b) Whenever the applicable groundwater standards under 35 Ill. Adm. Code 620.Subpart D are not exceeded and the owner or operator elects to close the unit, the closure schedule shall be determined by the owner or operator and approved by the Agency in the closure plan.

Section 841.410 Closure Plan

Before a unit may be closed, the owner or operator must submit a closure plan to the Agency for review and approval.

- a) The closure plan must contain, at a minimum, the following information or documents:
 - 1) description of the closure activities to be performed in accordance with this Part and any additional activities performed by the owner or operator with regards to closing the unit, including any dewatering;
 - 2) proposed plans, specifications and drawings for the closure of the unit, which may include but are not limited to the following illustrative measures:
 - A) the groundwater collection system and discharge system, if applicable, set forth in Sections 841.315 and 841.320 of this Part;
 - B) the final slope design and construction and demonstration of compliance with the stability criteria required in Section 841.415 of this Part;
 - C) the final cover system required by Section 841.420 of this Part;
 - D) containment using a low permeability vertical barrier; and

³¹ Hearing Exhibit 5, attachment 1, p.27

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- E) other remedial measures approved by the Agency;
 - 3) evaluation of alternatives to the proposed closure activities, when requested by the Agency.
 - 4) proposed timeline for implementation and completion of all proposed closure activities, including an estimate of the time required for hydrostatic equilibrium of groundwater beneath the unit.
 - 5) estimates of the cost of closure and post-closure care;
 - 6) a copy of the following plans and investigations:
 - A) groundwater monitoring plan required pursuant to Section 841.210 of this Part,
 - B) hydrogeologic site characterization required by Section 841.200 of this Part and any other hydrogeological site investigation performed under this Part; and
 - C) a copy of the most recent annual statistical analysis required by Section 841.235 of this Part;
 - 7) a proposal for a GMZ as set forth in 35 Ill. Adm. Code 620.250, if applicable, and including, but not limited to, plans, specifications, drawings for any structures or devices that must be constructed, and groundwater modeling results and supporting documentation where appropriate;
 - 8) description of the CQA program required by Section 841.155 of this Part.
 - 9) description of institutional controls prohibiting potable uses, if applicable, and copies of the instruments achieving those controls;
 - 10) description of previous preventive response plan developed pursuant to Section 841.235 of this Part or 35 Ill. Adm. Code 620.230, or corrective action pursuant to Subpart C of this Part or 35 Ill. Adm. Code 620.250, if applicable, including, but not limited to, plans, specifications, and drawings for any structures or devices that were constructed; and
 - 11) the signature and seal of the professional engineer supervising the preparation of the closure plan.
- b) The Agency may request additional information from the owner or operator when necessary to evaluate the proposed closure plan.

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Section 841.415 Final Slope and Stabilization

When closure is not by removal of all coal combustion waste or leachate from coal combustion waste:

- a) All final slopes must be designed and constructed to achieve a minimum static slope safety factor of 1.5 and a minimum seismic safety factor of 1.3, and a grade capable of supporting vegetation and minimizing erosion.
- b) All slopes must be designed to drain runoff away from the cover and to prevent ponding, unless otherwise approved by the Agency.
- c) The unit must meet the stability criteria of 35 Ill. Adm. Code 811.304.
- d) The owner or operator may use coal combustion waste generated at the site in establishing the final grade and slope as provided below:
 - 1) The earthen berms surrounding the unit must be regraded to eliminate any freeboard between the top of the berm and the adjacent surface of the coal combustion waste, unless otherwise approved by the Agency.
 - 2) Additional coal combustion waste may be placed only directly on top of coal combustion waste that is already in place;

Section 841.420 Final Cover System

- a) When the unit is closed by means other than removal of all coal combustion waste, the owner or operator shall design and install a final cover system for the unit. The final cover must be designed and constructed to:
 - 1) Provide long-term minimization of the migration of liquids through the closed impoundment unit;
 - 2) Function with minimum maintenance;
 - 3) Promote drainage and minimize erosion or abrasion of the final cover; and
 - 4) Accommodate settling and subsidence so that the cover's integrity is maintained.
- b) The final cover system must consist of a low permeability layer and a final protective layer.
 - 1) Standards for the low permeability layer. The low permeability layer must have a permeability less than or equal to 1 X 10⁻⁷ cm/sec. If the CCW unit

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has a liner system, the low permeability layer must have a permeability less than or equal to the permeability of any bottom liner system. ~~In the event that there is no bottom liner present, the cover shall have a permeability of less than or equal to 1×10^{-7} cm/sec.~~³² The low permeability layer must be constructed in accordance with the following standards in either subsections (b)(1)(A) or (b)(2)(B) of this Section, unless the owner or operator demonstrates that another low permeability layer construction technique or material provides equivalent or superior performance to the requirements of either subsections (b)(1)(A) or (b)(2)(B) of this Section and is approved by the Agency.

- A) A compacted earth layer constructed in accordance with the following standards:
 - i) The minimum allowable thickness must be 0.91 meter (3 feet); and
 - ii) The layer must be compacted to achieve a permeability of 1×10^{-7} centimeters per second or less and minimize void spaces.

- B) A geomembrane constructed in accordance with the following standards:
 - i) The geosynthetic membrane must have a minimum thickness of 40 mil (0.04 inches) and, in terms of hydraulic flux, be equivalent or superior to a 3 foot layer of soil with a hydraulic conductivity of 1×10^{-7} centimeters per second.
 - ii) The geomembrane must have strength to withstand the normal stresses imposed by the waste stabilization process.
 - iii) The geomembrane must be placed over a prepared base free from sharp objects and other materials that may cause damage.

- 2) Standards for the final protective layer. The final protective layer must, unless otherwise approved by the Agency, meet the following requirements:
 - A) Cover the entire low permeability layer.
 - B) Be at least 3 feet thick and must be sufficient to protect the low permeability layer from freezing and minimize root penetration of the low permeability layer.

³² Hearing Exhibit 5, attachment 1, p.28-29.

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- C) Consist of soil material capable of supporting vegetation.
 - D) Be placed as soon as possible after placement of the low permeability layer.
 - E) Be covered with vegetation to minimize wind and water erosion.
- 3) CQA Program. The final cover system must be constructed according to a CQA program that meets the requirements of Section 841.155 of this Part.

Section 841.425 Closure Report and Certification

- a) No later than 90 days after the completion of all closure activities required by this Part and approved in the closure plan, the owner or operator of the unit must prepare and submit to the Agency a closure report and a closure certification for review and approval.
- b) The closure report must contain supporting documentation, including, but not limited to:
 - 1) Engineering and hydrogeology reports, including, but not limited to, monitoring well completion reports and boring logs, all CQA reports, certifications, and designations of CQA officers-in-absentia required by Section 841.155 of this Part;
 - 2) Photographs of the final cover system and groundwater collection system, if applicable, and any other photographs relied upon to document construction activities;
 - 3) A written summary of closure requirements and completed activities as set forth in the closure plan and this Part;
 - 4) Any other information relied upon by the professional engineer in making the closure certification; and
 - 5) The signature and seal of the professional engineer supervising the implementation of the closure plan, and the preparation of the closure report.
- c) The closure certification must be made on forms prescribed by the Agency and must contain a certification by a professional engineer that the unit has been closed in accordance with the approved closure plan required by Section 841.410 of this Part and the requirements of this Part. The certification must be signed by the owner or operator and by the certifying registered professional engineer.

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Section 841.430 Post-Closure Maintenance of Cover System

If a final cover system is used to close the unit, the owner or operator of the unit must maintain the surface of the cover system beginning immediately after construction until approval of the post-closure report by the Agency.

- a) After closure, and until completion of the post-closure report, the owner or operator of the unit must conduct inspections of the cover system quarterly and after a 25-year, 24-hour storm events.³³
- b) The owner or operator of the unit must fill all rills, gullies, and crevices six inches or deeper. Areas identified as particularly susceptible to erosion must be recontoured.
- c) The owner or operator of the unit must repair all eroded and scoured drainage channels and must replace lining material, if necessary.
- d) The owner or operator of the unit must fill and recontour all holes and depressions created by settling so as to prevent standing water.
- e) The owner or operator of the unit must revegetate all areas of failed or eroded vegetation in excess of 100 square feet, cumulative.
- f) The owner or operator of the unit must repair all tears, rips, punctures, and other damage to the geosynthetic membrane.
- g) The owner or operator must prevent the growth of woody species on the protective cover.
- h) Postclosure use of the property must not disturb the integrity of the final cover, liner, any other components of the containment system, or the function of the monitoring systems, unless necessary to comply with the requirements of this Part.
- i) Any disturbance of the final cover, liner or any other components of the containment system, or the function of monitoring systems and post closure use must be approved by the Agency prior to such disturbance or use.

Section 841.435 Post-Closure Care Plan

- a) The owner or operator of the unit must prepare and submit to the Agency a post-closure care plan for review and approval at the same time it submits the closure plan pursuant to Section 841.410 of this Part.

³³ Hearing Exhibit 5, attachment 1, p.14-15.

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- b) The owner or operator must maintain the post-closure care plan on-site or at a location specified in the post-closure care plan.
- c) The post-closure care plan, or modification of the plan, must include, at a minimum, the following elements:
 - 1) description of the post-closure care activities required by Section 841.430 of this Part;
 - 2) description of the operation and maintenance that will be required for the groundwater collection system and discharge systems, if applicable;
 - 3) the information and documents required in the closure plan pursuant to Section 841.410 of this Part; and
 - 4) a description of the planned uses of the property during the postclosure care period.
 - 5) The signature and seal of the professional engineer supervising the preparation of the post-closure care plan.

Section 841.440 Post-Closure Report and Certification

- a) Post-closure care must continue until
 - 1) compliance with the groundwater quality standards set forth in 35 Ill. Adm. Code 620 or in a groundwater management zone established pursuant to 35 Ill. Adm. Code 620.250; and
 - 2) a minimum of ten years from the Agency's approval of the closure report.
- b) The owner or operator of the unit must prepare and submit to the Agency for review and approval a post-closure report and post-closure certification within 90 days after the post closure period specified in subsection (a) of this Section.
- c) A professional engineer or professional geologist may supervise post-closure care activities as appropriate under the Professional Engineering Practice Act [225 ILCS 325] or the Professional Geologist Licensing Act [225 ILCS 745].
- d) The post-closure report also must contain supporting documentation, including, but not limited to:
 - 1) Engineering and hydrogeology reports, including, but not limited to, documentation of compliance with the applicable groundwater quality standards;

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- 2) Any photographs relied upon to document construction activities, including but not limited to, photographs of the final cover system and groundwater collection system, if applicable;
 - 3) A written summary of post-closure care requirements and activities as set forth in the post-closure care plan and their completion;
 - 4) Any other information relied upon by the professional engineer or professional geologist, as appropriate for the activity, in making the post-closure care certifications;
 - 5) The signature and seal of the professional engineer or professional geologist supervising the implementation of the post-closure care plan; and
 - 6) The signature and seal of the professional engineer supervising preparation of the post-closure report.
- e) The post-closure certification must be made on forms prescribed by the Agency and must contain a certification by a professional engineer that the post-closure care period for the unit was performed in accordance with the specifications in the approved post-closure plan required by Section 841.435 of this Part and the requirements set forth in this Part. The certification must be signed by the owner or operator and by the certifying registered professional engineer.

Section 841.445 Closure and Post-Closure Annual Reporting

- a) The owner or operator of the unit must file an annual report with the Agency no later than January 31 of each year during the closure of the unit and for the entire post-closure care period. Once the requirements of Section 841.440 of this Part have been met, annual reports are no longer required.
- b) All annual reports must contain the following information:
 - 1) Annual statistical analyses required by Section 841.235 of all groundwater monitoring data generated by the groundwater monitoring program required by Section 841.210 of this Part;
 - 2) A copy of any notice submitted to the Agency pursuant to Section 841.235(c)(1) of this Part;
 - 3) A discussion of any statistically significant increasing concentrations and actions taken to mitigate such increases in accordance with Section 841.235(c)(3) of this Part; and

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- 4) The completed closure or post-closure activities performed during the preceding year.

Section 841.450 Resource Conservation and Recovery Act

Nothing in this Subpart shall be construed to be less stringent than or inconsistent with the provisions of the federal Resource Conservation and Recovery Act of 1976 (P.L. 94-580), as amended, or regulations adopted under that Act. To the extent that any rules adopted in this Subpart are less stringent than or inconsistent with any portion of RCRA applicable to the closure of a unit, RCRA will prevail.

SUBPART E: AGENCY REVIEW PROCEDURES

Section 841.500 Plan Review, Approval, and Modification

Any plan prepared and submitted to the Agency pursuant to this Part, and any modifications to those plans, must be reviewed and approved by the Agency prior to implementation.

- a) The Agency will have 90 days from the receipt of a plan or proposed modification to conduct a review and make a final determination to approve or disapprove a plan or modification or to approve a plan or modification with conditions.
 - 1) The Agency's record of the date of receipt of a plan or proposed modification to a plan will be deemed conclusive unless a contrary date is proved by a dated, signed receipt from the Agency or certified or registered mail.
 - 2) Submission of an amended plan or amended modification to a plan restarts the time for review.
 - 3) The owner or operator may in writing waive the Agency's decision deadline upon a request from the Agency or at the owner's or operator's discretion.
- b) A proposed modification to any plan must include the reason for the modification, all the information and supporting documentation that will be changed from or will supplement the information provided in the original or most recently approved plan, and the signature and seal of the professional engineer or professional geologist, as appropriate, supervising the preparation of the proposed modification.
- c) When reviewing a plan or modification, the Agency must consider:
 - 1) Whether the plan or modification contains, at a minimum, all the elements required pursuant to this Part and has been accompanied by the information and supporting documentation necessary to evaluate the

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- compliance of the proposed plan relative to the standards and requirements of this Part;
- 2) Whether the activities, structures and devices proposed are in accordance with the applicable standards and requirements of this Part and are otherwise consistent with generally accepted engineering practices and principles of hydrogeology, accepted groundwater modeling practices, appropriate statistical analyses, and appropriate sampling techniques and analytical methods;
 - 3) When reviewing a corrective action plan, closure plan or post closure plan, or modification to any of these plans:
 - A) The likelihood that the plan or modification will result in the containment of the coal combustion waste or leachate from coal combustion waste and the attainment of the applicable groundwater quality standards set forth in 35 Ill. Adm. Code 620.
 - B) The management of risk relative to any remaining contamination, including, but not limited to, provisions for the use of long-term restrictions on the use of groundwater as a potable water supply, if appropriate;
 - 5) Whether the plan or modification contains the required professional signatures and seals.
- d) Upon completion of the review, the Agency must notify the owner or operator in writing of its final determination on the plan or proposed modification. The notification must be post-marked with a date stamp. The Agency's final determination will be deemed to have taken place on the post-marked date that the notice is mailed. If the Agency disapproves a plan or modification or approves a plan or modification with conditions, the written notification must contain the following information, as applicable:
- 1) An explanation of the specific type of information or documentation, if any, that the Agency deems the owner or operator did not provide;
 - 2) A list of the provisions of the Act, this Part, or other applicable regulations that may be violated if the plan or modification is approved as submitted;
 - 3) A statement of the specific reasons why the Act, this Part, or other applicable regulations may be violated if the plan or modification is approved as submitted; and
 - 4) A statement of the reasons for conditions if conditions are required.

Attachment 2 – Revised Proposed Part 841

- e) If the Agency disapproves a plan or modification, or approves a plan or modification with conditions, the owner or operator may, within 35 days after the date of service of the Agency's final decision~~after the post-marked date that the notice is mailed~~³⁴ or after the expiration of the review period specified in subsection (a) of this section, file an appeal with the Board. Appeals to the Board are subject to review under Section 40 of the Act [415 ILCS 5/40]. The Agency's failure to issue a final determination within the applicable review time shall be considered a disapproval of the plan or modification.

Section 841.505 Review and Approval of Reports and Certifications

The corrective action report, certification of corrective action, closure report, certification of closure, post-closure report, and certification of completion of post-closure care prepared and submitted to the Agency in accordance with this Part must be reviewed and approved by the Agency prior to the completion of corrective action, closure, or post-closure care.

- a) Corrective action, closure and post-closure activities will not be deemed complete until the reports are approved by the Agency.
- b) Submission, review, and approval procedures and deadlines, notification requirements, and rights of appeal shall be the same as those set forth in Section 841.500 of this Part.
- c) When reviewing a corrective action report and certification of corrective action, the Agency must consider whether the documentation demonstrates that the activities, structures and devices approved in the corrective action plan have been completed, operated and maintained in accordance with this Part and the approved corrective action plan.
- d) When reviewing a closure report and certification of completion of closure, the Agency must consider whether the documentation demonstrates that the activities, structures and devices approved in the closure plan have been completed in accordance with this Part and the approved closure plan.
- e) When reviewing a post-closure report and certification of completion of post-closure care plan, the Agency must consider whether the documentation demonstrates that the activities, structures and devices approved in the post-closure care plan have been completed, operated and maintained in accordance with this Part and the approved post-closure care plan.

³⁴ Hearing Exhibit 5, attachment 1, p.30.

ATTACHMENT 3

“Coal Ash: Characteristics, Management and Environmental Issues” published by the Electric Power Reach Institute, 2009.



Coal Ash: Characteristics, Management and Environmental Issues

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Coal-fired power plants in the United States produce more than 92 million tons of coal ash per year. About 40% is beneficially used in a variety of applications, and about 60% is managed in storage and disposal sites. This technical update summarizes information and data on the physical and chemical characteristics of coal ash, beneficial use applications, disposal practices, and management practices to mitigate environmental concerns.

Introduction

The U.S. electric utility industry burns more than 1 billion tons of coal annually, with coal-fired generation supplying about 50% of the electricity used in the United States. The solids collected from the furnace and removed from the flue gas after the coal is combusted are collectively referred to as coal combustion products (CCPs), and can be broadly categorized as coal ash and flue gas desulfurization (FGD) solids. Information on FGD gypsum, the solid product from wet FGD systems with forced oxidation, is presented in a companion technical update document.

Coal is composed primarily of carbon and hydrogen, but all coal also contains some mineral matter (for example, clays, shales, quartz, and calcite); the percentage varies by coal type and source. Coal ash is the mineral matter that is collected after the coal is combusted, along with some unburned carbon. The amount of coal ash produced at a power plant depends on the volume of coal burned, the amount of mineral matter in the coal, and the combustion conditions. In 2007, U.S. coal-fired power plants produced about 92 million tons of coal ash, including 72 million tons of fly ash, 18 million tons of bottom ash, and 2 million tons of boiler slag.¹

Formation and Physical Characteristics

The physical and chemical properties of coal ash are determined by reactions that occur during the high-temperature combustion of the coal and subsequent cooling of the flue gas. A considerable amount of research has gone into understanding how coal ash forms, its characteristics, and how it weathers in the environment.

Fly Ash

Fly ash refers to the lightweight particles that travel with the flue gas as it exits the furnace and moves away from the high-temperature combustion zone. Power plants are equipped with particulate collection devices, either electrostatic precipitators (ESPs) or baghouses, designed to remove nearly all of the fly ash from the flue gas prior to the stack to prevent it from being emitted to the atmosphere (Figure 1). An ESP uses electrically charged wires and plates to capture the fly ash; baghouses use fabric filters, similar to vacuum cleaner bags. Dry fly ash collected in the ESP or baghouse is then either pneumatically conveyed to a hopper or storage silo (dry management), or mixed with water and sluiced through a series of pipes to an on-site impoundment (wet management).

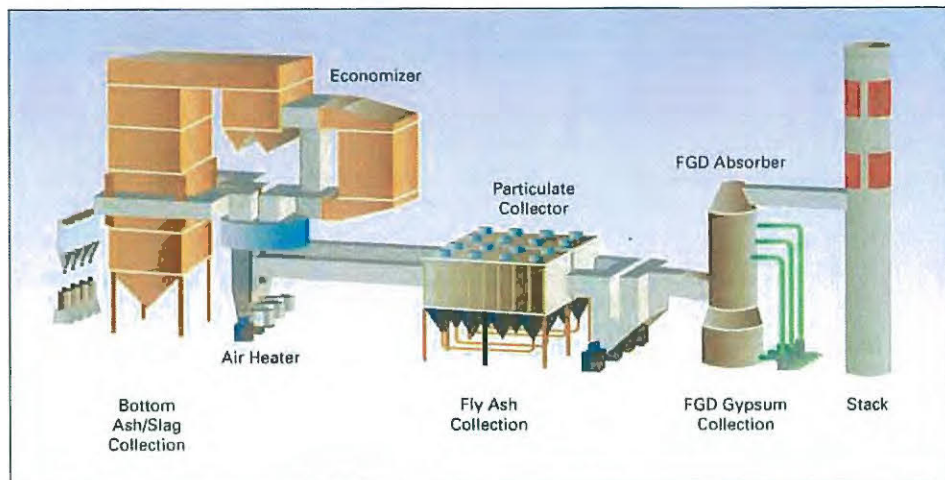


Figure 1. Typical power plant layout showing location of fly ash and bottom ash collection.

Fly ash is composed mainly of amorphous or glassy aluminosilicates. Fly ash particles are typically silt-sized spheres, ranging from 1 to 100 microns in diameter.

Fly ash particles are composed mainly of amorphous or glassy aluminosilicates. However, the particles also contain some crystalline compounds that either pass through the combustion zone unchanged or are formed at high temperatures. Elements such as arsenic and selenium that become volatile at high temperatures, preferentially condense on the surface of the ash particles as the flue gas cools.

Fly ash particles are typically spherical in shape, either solid or with vesicles (Figure 2). A small percentage are thin-walled hollow particles called cenospheres. The particles are fine-grained, typically silt-sized, ranging from 1 to 100 microns in diameter, with median particle diameter of 20 to 25 microns.² Fly ash is usually tan to dark gray in color.

Bottom Ash/Boiler Slag

Bottom ash consists of heavier particles that fall to the bottom of the furnace (see Figure 1). Bottom ash is also composed primarily of amorphous or glassy aluminosilicate materials derived from the melted mineral phases. Most bottom ash is produced in dry-bottom boilers, where the ash cools in a dry state. Boiler slag is a type of bottom ash collected in wet-bottom boilers (slag-tap or cyclone furnaces, which operate at very high temperatures), where the molten particles are cooled in a water quench.

Bottom ash is coarser than fly ash, with a sandy texture and particles ranging from about 0.1 mm to 50 mm in diameter.

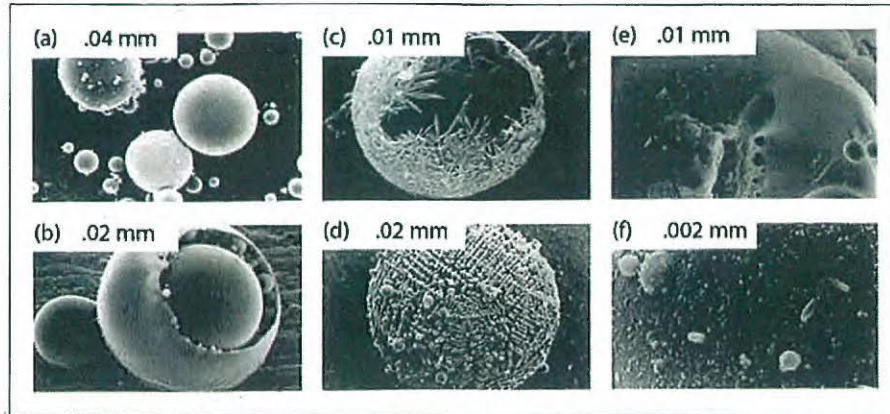


Figure 2. Scanning electron micrographs of fly ash. (a) Typical spherical morphology of glassy particles. (b) A large hollow sphere formed when entrapped gas expanded during thermal decomposition of calcium carbonate (CaCO_3). (c) A particle etched with hydrofluoric acid to remove surface glass and reveal a shell of interlocking mullite crystals. (d) A typical magnetic spinel mineral (magnetite) separated from ash after removal of encapsulating glass. (e) A fractured ash particle containing numerous vesicles. (f) The accumulation of tiny granules of inorganic oxides, crystals, and coalesced ash on the surface of a larger particle.

Whether collected from dry-bottom or wet-bottom boilers, bottom ash is usually mixed with water and conveyed away from the furnace in a sluice pipe. It is transported either to a dewatering bin or to an on-site impoundment.

Bottom ash is coarser than fly ash, with a sandy texture and particles ranging from about 0.1 mm to 50 mm in diameter. Bottom ash from dry-bottom boilers is generally dull black and porous in appearance. It typically has the consistency of coarse sand to gravel and higher carbon content than fly ash. Boiler slag is black and angular, and has a smooth, glassy appearance.

The properties of fly ash and bottom ash make them useful for a variety of construction applications. Table 1 lists ranges for some of the important geotechnical properties of fly ash and bottom ash.

The properties of fly ash and bottom ash make them useful for a variety of construction applications.

Table 1. Typical ranges for geotechnical properties of fly ash and bottom ash.³

Property	Fly Ash	Bottom Ash
Specific Gravity	2.1 – 2.9	2.3 – 3.0
Bulk Density (compacted), lbs/ft ³	65 – 110	65 – 110
Optimum Moisture Content, %	10 – 35	12 – 26
Hydraulic Conductivity, cm/s	10^4 – 10^6	10^1 – 10^3
Porosity	0.40 – 0.50	0.25 – 0.40
Angle of Internal Friction, degrees	25 – 40	35 – 45

Chemical Composition

The chemical composition of coal ash is determined primarily by the chemistry of the source coal and the combustion process. Because ash is derived from the inorganic minerals in the coal, such as quartz, feldspars, clays, and metal oxides, the major elemental composition of coal ash is

Because ash is derived from the inorganic minerals in the coal, the major elemental composition of coal ash is similar to a wide variety of rocks. Oxides of silicon, aluminum, iron, and calcium make up more than 90% of the mineral component of fly ash; trace constituents collectively make up less than 1 percent.

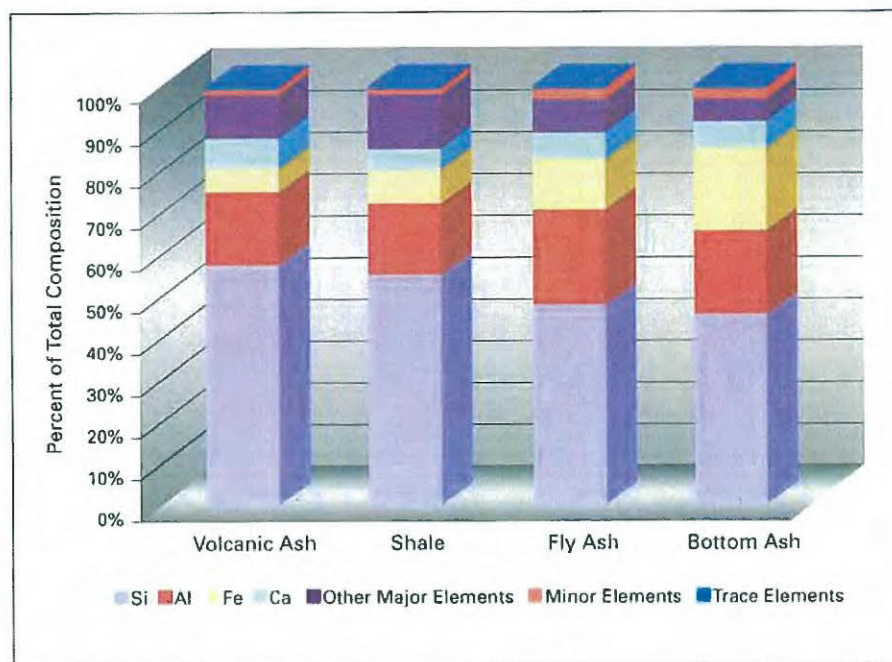


Figure 3. Elemental composition for bottom ash, fly ash, shale, and volcanic ash. Median values for ash are from EPRI database³, and for rock are from Taylor and Litche (1980)⁴ and Hem (1992).⁵

Fly ash also contains a variable amount of unburned carbon, depending on the combustion conditions. Unburned carbon is often measured by a laboratory test called loss-on-ignition (LOI). LOI values can range from less than 1% to more than 20%.

The relative calcium, iron, and sulfur contents of fly ash influence its fundamental chemical properties and reactivity. Subbituminous and lignite coal ashes typically contain relatively high concentrations of calcium, with concentrations exceeding 15% (expressed as CaO), and produce alkaline solutions (pH 11 – 12) on contact with water. Bituminous coal ashes generally contain much less calcium, and yield slightly acidic to slightly alkaline solutions (pH 5 – 10) on contact with water.

The chemical composition of coal ash can change as power plants change fuels or add new air emissions controls to prevent releases to the atmosphere.¹⁰ Examples of air emissions controls that can impact fly ash composition include the use of ammonia-based systems to control NO_x, powdered activated carbon injection to control mercury, and sodium-based sorbents to control SO₂. Examples of fuel changes include blending of different coal types, and co-firing of biomass with

coal. EPRI maintains active research programs to evaluate the impacts of changes in emissions controls on the environmental and engineering characteristics of the ash.¹¹⁻¹³

Table 2. Range (10th percentile - 90th percentile) in bulk composition of fly ash, bottom ash, rock, and soil.

	Fly Ash*	Bottom Ash*	Rock**	Soil***
Aluminum, mg/kg	70,000 - 140,000	59,000 - 130,000	9,800 - 96,000	15,000 - 100,000
Calcium, mg/kg	7,400 - 150,000	5,700 - 150,000	6,000 - 83,000	1,500 - 62,000
Iron, mg/kg	34,000 - 130,000	40,000 - 160,000	8,800 - 95,000	7,000 - 50,000
Silicon, mg/kg	160,000 - 270,000	160,000 - 280,000	57,000 - 380,000	230,000 - 390,000
Magnesium, mg/kg	3,900 - 23,000	3,400 - 17,000	700 - 56,000	1,000 - 15,000
Potassium, mg/kg	6,200 - 21,000	4,600 - 18,000	4,000 - 45,000	4,500 - 25,000
Sodium, mg/kg	1,700 - 17,000	1,600 - 11,000	900 - 34,000	1,000 - 20,000
Sulfur, mg/kg	1,900 - 34,000	BDL - 15,000	200 - 42,000	840 - 1,500
Titanium, mg/kg	4,300 - 9,000	4,100 - 7,200	200 - 5,400	1,000 - 5,000
Antimony, mg/kg	BDL - 16	All BDL	0.08 - 1.8	BDL - 1.3
Arsenic, mg/kg	22 - 260	2.6 - 21	0.50 - 1.4	2.0 - 12
Borium, mg/kg	380 - 5100	380 - 3600	67 - 1,400	200 - 1,000
Beryllium, mg/kg	2.2 - 26	0.21 - 1.4	0.10 - 4.4	BDL - 2.0
Boron, mg/kg	120 - 1000	BDL - 335	0.2 - 220	BDL - 70
Cadmium, mg/kg	BDL - 3.7	All BDL	0.5 - 3.6	BDL - 0.5
Chromium, mg/kg	27 - 300	51 - 1100	1.9 - 310	15 - 100
Copper, mg/kg	62 - 220	39 - 120	10 - 120	5.0 - 50
Lead, mg/kg	21 - 230	8.1 - 53	3.8 - 44	BDL - 30
Manganese, mg/kg	91 - 700	85 - 890	175 - 1400	100 - 1,000
Mercury, mg/kg	0.01 - 0.51	BDL - 0.07	0.1 - 2.0	0.02 - 0.19
Molybdenum, mg/kg	9.0 - 60	3.8 - 27	1.0 - 16	All BDL
Nickel, mg/kg	47 - 230	39 - 440	2.0 - 220	5 - 30
Selenium, mg/kg	1.8 - 18	BDL - 4.2	0.60 - 4.9	BDL - 0.75
Strontium, mg/kg	270 - 3100	270 - 2000	61 - 890	20 - 500
Thallium, mg/kg	BDL - 45	All BDL	0.1 - 1.8	0.20 - 0.70
Uranium, mg/kg	BDL - 19	BDL - 16	0.84 - 43	1.2 - 3.9
Vanadium, mg/kg	BDL - 360	BDL - 250	19 - 330	20 - 150
Zinc, mg/kg	63 - 680	16 - 370	25 - 140	22 - 99

In 2007, 32 million tons of fly ash and 9.0 million tons of bottom ash and boiler slag were beneficially used. The primary use for fly ash was as a replacement for portland cement in making concrete.

BDL - Below Detection Limit

* Source for most fly ash and bottom ash data is EPRI CP-INFO Database³. Beryllium, thallium, mercury (bottom ash only) and boron (bottom ash only) are from the EPRI PISCES Database⁶

** Source for rock data is US Geological Survey National Geochemical database.⁷

*** Source for most soils data is Shacklette and Baerngen (1984)⁸; cadmium and thallium data are from Smith et al (2005).⁹

Beneficial Use

The physical and chemical properties of coal ash make it suitable for many construction and geotechnical uses. In 2007, 32 million tons of fly ash were beneficially used, representing 44% of the total fly ash produced.¹ Similarly, 7.3 million tons of bottom ash (40%) and 1.7 million short tons of boiler slag (80%) were used. Figure 4 shows the amounts of fly ash used in various applications.

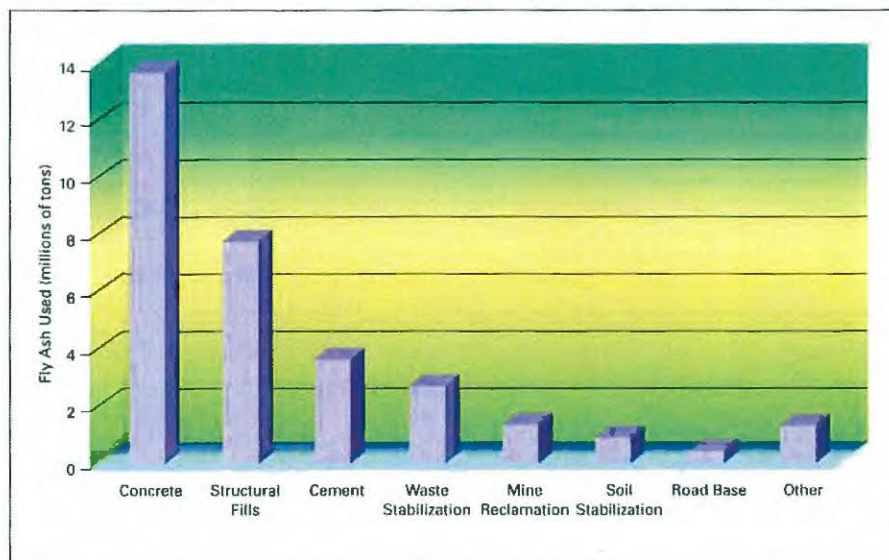


Figure 4. Beneficial uses of coal fly ash. Data are from the 2007 ACAA survey.¹

In 2007, the use of fly ash to replace cement in concrete yielded energy savings equivalent to the annual energy use by over a half million households, and reduced CO₂ emissions equivalent to removing over 1.5 million cars from the road.

The primary use for fly ash is as an ingredient in concrete. Fly ash act as a pozzolan, a siliceous/aluminous material that develops cementitious properties when combined with calcium hydroxide and water. Fly ash can be used as a direct replacement for portland cement in concrete, and has been used in a wide variety of concrete applications in the United States for more than 60 years. The use of fly ash can significantly improve many concrete qualities, for example, strength, permeability, and resistance to alkali silicate reactivity. Standard specification ASTM C618 establishes the physical and chemical requirements of fly ash for use in concrete.¹⁴

In addition to improving the quality of concrete, the use of fly ash greatly reduces the energy use and CO₂ emissions associated with the production of concrete. In 2007, use of fly ash in concrete resulted in an estimated 55 trillion Btu in energy savings, and 10 million tons in avoided CO₂ emissions.¹⁵ These numbers are equivalent to the annual energy use for over 600,000 households and removal of 1.7 million cars from the road, respectively. Other benefits of using ash include conservation of virgin materials such as limestone used in cement production, and reduced need for disposal sites.

In addition to concrete, applications that use more than 1 million tons per year of fly ash are structural fills, cement production, waste stabilization, and mine reclamation. The primary uses for the coarser bottom ash and boiler slag are for structural fills and road base materials, as blasting grit/roofing granules, and for snow and ice traction control.

US EPA actively promotes coal ash use under the Coal Combustion Partnership Program (C²P²), and has set a goal of 50% utilization by 2011.¹⁶ The Federal Highway Administration provides technical guidance on the use and benefits of fly ash for highway construction projects.¹⁷

Disposal

Coal ash that is not beneficially used is placed in landfills and impoundments. About 60% of disposed fly ash is managed dry in landfills, and 40% is managed wet in impoundments. There

A study performed by US DOE and US EPA found that nearly all new CCP disposal units (55 of 56 units) studied between 1994 and 2004 employed liners to control leachate release.

is a long-term trend toward increased use of dry management practices.^{18,19}

Dry fly ash is typically loaded on trucks, wetted to prevent dusting, and then transported to a dedicated landfill facility. The landfill may be located on or off the power plant property. Wet-managed fly ash is typically sluiced to an on-site impoundment or series of impoundments, where the fly ash settles to the bottom of the ponds. In some cases, treatment chemicals may be added to the ash pond to improve settling, remove dissolved constituents, or control pH. The settled ash solids may either be dredged for beneficial use or for disposal, or may be left in place.

Ash management sites vary in age, size, and design. In most cases, the sites are operated under state-issued permits that specify applicable requirements for siting criteria, engineering controls (for example, liners, leachate collection, caps, slopes, and runoff control), groundwater monitoring, site closure, corrective action, and financial assurance. A study by US EPA and US Department of Energy (DOE) published in 2006 found that regulatory and engineering controls for new or expanded units permitted between 1994 and 2004 had tightened considerably, establishing engineering controls and groundwater monitoring as standard practice.¹⁸ For example, 55 of 56 units assessed in that study employed engineered liners, with the only exception being one landfill that managed only bottom ash.

In 1993 and again in 2000, following several years of study, the US EPA published regulatory determinations that coal ash and other combustion products did not warrant regulation as a hazardous waste.^{20,21} Disposal is currently regulated under non-hazardous provisions by individual states. In 2009, US EPA is again evaluating the appropriate federal role in regulating disposal of coal combustion products.

Environmental Issues

Leaching

One of the primary environmental concerns at large storage and disposal sites is leaching and release of trace constituents to groundwater and surface water. Extensive testing has shown that coal ash rarely, if ever, exceeds hazardous waste criteria contained in the the Toxicity Characteristic Leaching Procedure (TCLP) promulgated under the Resource Conservation and Recovery Act.

Laboratory studies have demonstrated that the leaching process is complex and depends on a number of factors, primarily chemical speciation of the constituent, solution pH, and availability of the constituent for leaching. Availability for leaching depends on whether the element resides on the surface of the ash particle, in the outer glass hull, or within the interior glass matrix (see Figure 2).

In addition, subsequent chemical interactions and secondary mineral formation can further modify leaching characteristics of the ash. For example, because arsenic typically condenses on the surface of the fly ash particle, it may initially be available for leaching. However, the presence of calcium in the ash can limit the release of dissolved arsenic by formation of calcium-arsenic precipitates.²² Weathering and formation of iron hydroxide compounds can also serve to sequester arsenic. Detailed leaching studies under controlled conditions are used to elucidate the mechanisms controlling constituent release and provide the best indication of the long-term potential for release and environmental risk.

While laboratory studies are used to define long-term leaching mechanisms, field studies provide

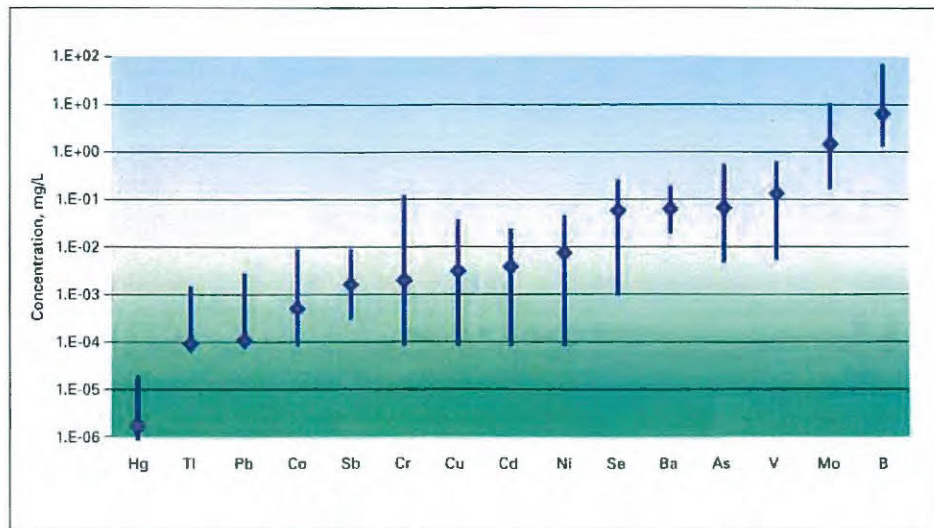


Figure 5. Field leachate concentrations for coal ash disposal sites. Bars show 10th percentile to 90th percentile, and diamond shows median. Source: EPRI CP-INFO Database.³

Coal ash rarely, if ever, exceeds hazardous waste criteria contained in the the Toxicity Characteristic Leaching Procedure (TCLP). While laboratory studies are used to understand leaching mechanisms, field studies provide the best information on leachate quality under actual environmental conditions.

the best information on leachate quality under actual environmental conditions. In 2006, EPRI, with support from the US DOE, completed an extensive characterization of field leachates at over 30 coal combustion product disposal facilities (Figure 5).²³ This study provides the most comprehensive database available for ash leachate characteristics representative of typical environmental conditions at disposal sites. The data in Figure 5 represent initial concentrations in the management facility, not the concentration that the public is exposed to; these data can be used as input to infiltration and groundwater transport models to assess the risk of contamination to a receptor, either a drinking water well or surface water body, and to develop the best management methods to prevent or mitigate those risks.

Leachate runoff and infiltration to groundwater can be controlled by a variety of standard engineering practices employed at disposal facilities. Depending on site-specific conditions, these practices may include use of liners, leachate collection systems, diversion ditches, caps, and vegetation. Monitoring networks are used to ensure the performance of the engineering controls in protecting groundwater and surface water resources.

Windblown Ash

Because of its fine-grained texture, dry fly ash is susceptible to blowing under windy conditions. Studies of the potential health effects associated with ash dust have largely focused on power plant workers, for whom exposure to dusty conditions is much more common than for the general public. While direct inhalation of fly ash or any respirable dust should be avoided, research has shown that worker exposure to ash dust during normal power plant operation does not result in exposures above health criteria.^{24,25} Standard precautions such as dust masks are recommended when working in high-dust environments at power plants. At disposal sites, windblown ash is generally controlled by periodic wetting of open ash areas, and by covering inactive areas with bottom ash, soil, or vegetation.

Research by US EPA, EPRI, and others has all shown that mercury is stable on fly ash at ambient temperatures, with very little potential for leaching or volatilization.

"Radioactive elements in coal and fly ash should not be sources of alarm. The vast majority of coal and the majority of fly ash are not significantly enriched in radioactive elements, or in associated radioactivity, compared to soil or rocks."—US Geological Survey

Mercury

Mercury is an element of significant environmental interest because of its toxicity and occurrence in lakes and rivers. The median mercury concentration in coal is 0.11 mg/kg, and 80% of coal samples contain less than 0.25 mg/kg.²⁶ Information collected by the US EPA in the late 1990s indicated that in the United States about 40% of the mercury in coal was captured by the fly ash and/or the then existing SO₂ control, and 60% was released to the atmosphere.²⁷ The amount of mercury captured at any particular plant was found to depend on a number of factors, including coal type, coal chlorine content, particulate collection device, NO_x control, and flue gas desulfurization systems.

Mercury in fly ash generally ranges from about 0.05 mg/kg up to about 2 mg/kg, with typical concentrations between 0.1 mg/kg and 0.5 mg/kg. One of the leading approaches to further reduce mercury emissions from power plants is injection of activated carbon into the flue gas. The mercury sorbs onto the carbon, which is then captured with the fly ash in the ESP or baghouse. Although the mercury and carbon content in the fly ash are increased by this process, research by US EPA, EPRI, and others, has consistently shown that the carbon-bound mercury is very stable on the fly ash at ambient temperatures, with very low potential for leaching or volatilization.^{13,28,29} Similarly, concrete containing fly ash exhibits very little mercury release and does not present a significant risk to the public.^{30,31} High-temperature fly ash uses, such as use in cement kilns and hot-mix asphalt, may release mercury from fly ash to the air due to volatilization.

Radioactivity

Coal contains naturally occurring radioactive constituents, such as uranium and thorium and their decay products. Uranium and thorium are each typically present in coal at concentrations of 1 to 4 mg/kg.³² These constituents are captured by the fly ash following combustion of the coal. Any radon gas present in the coal is lost to stack emissions.

Although the radionuclides are enriched in the fly ash in comparison to the coal itself, the US Geological Survey determined that the average radionuclide concentrations in ash are within

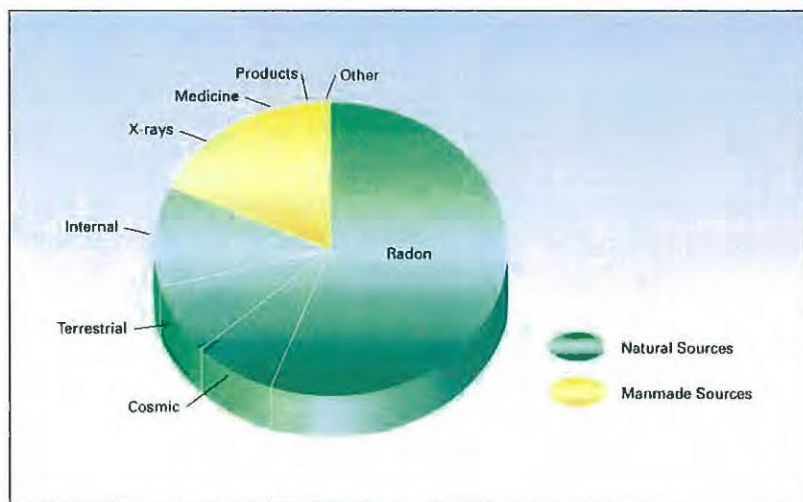


Figure 6. Distribution of background radiation sources comprising the total annual average radiation dose in the United States.^{32,33}

the range of concentrations found in other geologic materials, such as granite and shale.³² Background radiation exposure to the U.S. population is about 360 mrems/yr, with natural sources, primarily geologic materials and cosmic rays, accounting for about 82% of that total (Figure 6).^{32,33} Man-made sources account for the remaining 18% of total exposure, with X-rays being the largest single source.

In a worst case evaluation, exposure to an outdoor worker at an ash storage facility (8 hrs/day for 225 days/yr) was estimated as 8 mrems/yr, or only about 2.3% of background exposure.³³ Similar results have been found in examining potential for radioactivity exposure to concrete made with a high proportion of fly ash.³² Research by US EPA, US Geological Survey, EPRI, and others has shown that exposure to radiation from coal ash or concrete products made with fly ash does not represent a significant health risk.

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ATTACHMENT 5

Draft Certification Forms
required by Proposed Part 841



Illinois Environmental Protection Agency

Bureau of Water • 1021 N. Grand Avenue E. • P.O. Box 19276 • Springfield • Illinois • 62794-9276

DRAFT Certification of Surface Impoundment Closure Pursuant to 35 Ill. Adm. Code Part 841

Submit the original, with original signatures, three (3) photocopies and one electronic copy of all forms and supporting documentation, including plan sheets and maps, to:

1. Site Identification:

Site Name: _____ BOW ID Number: _____

Street Address: _____ P.O. Box: _____

City: _____ State: IL Zip Code: _____ County: _____

2. Closure Description:

Provide a description of the closure. Also indicate the BOW unit permit number and date of issuance, date on which the closure plan was approved, date closure plan was last modified and when the closure care period began as identified by the Agency in approval of the closure plan.

BOW Permit No. _____ Date Issued _____

Closure Plan Approval No. _____ Approval Date _____ Date Last Modified _____

Date Closure Period Began _____

3. Required Information:

Pursuant to 35 Ill. Adm. Code 841, to certify closure the owner/operator of the CCW unit shall submit the following documentation to the Permit Section, Division of Water Pollution Control, at the above address. Submit an original, three copies and an electronic copy of all documents.

- a. Submit information documenting that the unit has been closed in accordance with the approved closure plan required by Section 841.410. Provide plan sheets for the closed site which indicate final contours achieved at the completion of closure activities. Necessary documentation shall be provided to demonstrate the final cover system for the CCW area was completed and that all other aspects of the closure plan were completed if ash was left in place (i.e., final grading, seeding, security, etc.) or necessary documentation shall be provided to demonstrate the that CCW removal was completed for the entire CCW area and that all other aspects of the closure plan were completed.
- b. Identify the date the unit ceased accepting CCW and the date closure pursuant to an approved closure plan was completed.
- c. Date Site Ceased Accepting CCW: _____
Date Closure Completed: _____

Failure to provide any of the items described above will result in rejection of the closure notice.

4. Owner/Operator/Engineer Identification:

Owner/Operator	Engineer
Name: _____	Name: _____
Street Address _____	Street Address: _____
PO Box: _____	PO Box: _____
City: _____ State: _____	City: _____ State: _____
Zip Code: _____ Phone: _____	Zip Code: _____ Phone: _____
Contact: _____	Contact: _____
Email Address: _____	Email Address: _____

5. Signatures:

Original signatures are required. Signature stamps or applications transmitted electronically or by FAX are not acceptable.

I hereby affirm that closure has been provided for the referenced site in accordance with the approved closure plan, and that all information contained in this submission is true and accurate to the best of my knowledge and belief.

I do hereby swear that I am a duly authorized representative of the owner/operator and I am authorized to sign this certification.

Any person who knowingly makes a false, fictitious, or fraudulent material statement, orally or in writing, to the Illinois EPA commits a Class 4 felony. A second or subsequent offense after conviction is a Class 3 felony. (415 ILCS 5/44(h))

 Owner/Operator Signature:

 Printed Name:

 Title:

 Engineer Signature

 Printed Name:

 Engineer's Title:

Registration Number: _____

Professional Engineer's Seal:



Illinois Environmental Protection Agency

Bureau of Water • 1021 N. Grand Avenue E. • P.O. Box 19276 • Springfield • Illinois • 62794-9276

DRAFT Certification of Surface Impoundment Corrective Action Pursuant to 35 Ill. Adm. Code Part 841

Submit the original, with original signatures, three (3) photocopies and one electronic copy of all forms and supporting documentation, including plan sheets and maps, to:

1. Site Identification:

Site Name: _____ IEPA ID Number: _____
Street Address: _____ P.O. Box: _____
City: _____ State: IL Zip Code: _____ County: _____

2. Corrective Action Description:

Provide a description of the corrective action. Also indicate the BOW unit permit number and date of issuance, date on which the corrective action plan was approved, date corrective action was last modified and when the corrective action began as identified by the Agency in approval of the corrective action.

BOW Unit Permit No. _____ Date Issued _____
Corrective Action Plan Approval No. _____ Approval Date _____ Date Last Modified _____
Date Corrective Action Began _____

3. Required Information:

Pursuant to 35 Ill. Adm. Code 841, to certify corrective action completion the owner/operator of the unit shall submit the following documentation to the Permit Section, Division of Water Pollution Control, at the above address. Submit an original, three (3) photocopies and one electronic copy of supporting documentation.

- a. Submit information documenting that the release attributable to the unit has been mitigated in accordance with the approved corrective action plan required by Section 841.310
- b. Identify the date corrective action requirements were completed. Necessary documentation should be provided to demonstrate that all aspects of the corrective action plan were completed.
- c. Date Corrective Action Completed: _____

Failure to provide any of the items described above will result in rejection of the corrective action notice.

4. Owner/Operator/Engineer Identification:

Owner/Operator	Engineer
Name: _____	Name: _____
Street Address: _____	Street Address: _____
PO Box: _____	PO Box: _____
City: _____ State: _____	City: _____ State: _____
Zip Code: _____ Phone: _____	Zip Code: _____ Phone: _____
Contact: _____	Contact: _____
Email Address: _____	Email Address: _____

5. Signatures:

Original signatures are required. Signature stamps or applications transmitted electronically or by FAX are not acceptable.

I hereby affirm that the corrective action has been completed for the referenced site in accordance with the approved corrective action plan, and that all information contained in this submission is true and accurate to the best of my knowledge and belief.

I do hereby swear that I am a duly authorized representative of the owner/operator and I am authorized to sign this certification.

Any person who knowingly makes a false, fictitious, or fraudulent material statement, orally or in writing, to the Illinois EPA commits a Class 4 felony. A second or subsequent offense after conviction is a Class 3 felony. (415 ILCS 5/44(h))

 Owner/Operator Signature:

 Printed Name:

 Title:

 Engineer Signature

 Printed Name:

 Engineer's Title:

Registration Number: _____

Professional Engineer's Seal:



Illinois Environmental Protection Agency

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DRAFT Certification of Surface Impoundment Post-Closure Care Pursuant to 35 Ill. Adm. Code Part 841

Submit the original, with original signatures, three (3) photocopies and one electronic copy of all forms and supporting documentation, including plan sheets and maps, to:

1. Site Identification:

Site Name: _____ BOW ID Number: _____
Street Address: _____ P.O. Box: _____
City: _____ State: IL Zip Code: _____ County: _____

2. Post-Closure Care Description

Provide a description of the post-closure care. Also indicate the BOW unit permit number and date of issuance, date on which the post-closure care plan was approved, date the post-closure care plan was last modified and when the post-closure care period began as identified by the Agency in approval of the post-closure care plan.

BOW Permit No. _____ Date Issued _____
Post-Closure Care Plan Approval No. _____ Approval Date _____ Date Last Modified _____
Date Post-Closure Care Period Began _____

3. Required Information:

Pursuant to 35 Ill. Adm. Code Subtitle G, 841, to certify closure the operator of the waste management site shall submit the following documentation to the Permit Section, Division of Water Pollution Control, at the above address. Submit an original and two copies of all documents* (for plan sheets, submit three copies only).

- a. Submit information documenting the post-closure care for the unit was performed in accordance with the specifications in the approved post-closure plan required by Section 841.435.
- b. Identify the date the post-closure care requirements were completed. Necessary documentation shall be provided to demonstrate that all aspects of the post-closure care plan were completed.
- c. Date Post-Closure Care Completed: _____

Failure to provide any of the items described above will result in rejection of the post-closure care notice.

4. Owner/Operator/Engineer Identification:

Owner/Operator		Engineer	
Name:	_____	Name:	_____
Street Address:	_____	Street Address:	_____
PO Box:	_____	PO Box:	_____
City:	_____ State: _____	City:	_____ State: _____
Zip Code:	_____ Phone: _____	Zip Code:	_____ Phone: _____
Contact:	_____	Contact:	_____
Email Address:	_____	Email Address:	_____

5. Signatures:

Original signatures are required. Signature stamps or applications transmitted electronically or by FAX are not acceptable.

I hereby affirm that post-closure care has been provided for the referenced site in accordance with the approved post-closure care plan, and that all information contained in this submission is true and accurate to the best of my knowledge and belief.

I do hereby swear that I am a duly authorized representative of the owner/operator and I am authorized to sign this certification.

Any person who knowingly makes a false, fictitious, or fraudulent material statement, orally or in writing, to the Illinois EPA commits a Class 4 felony. A second or subsequent offense after conviction is a Class 3 felony. (415 ILCS 5/44(h))

Owner/Operator Signature:

Printed Name:

Title:

Engineer Signature

Printed Name:

Engineer's Title:

Registration Number: _____

Professional Engineer's Seal: