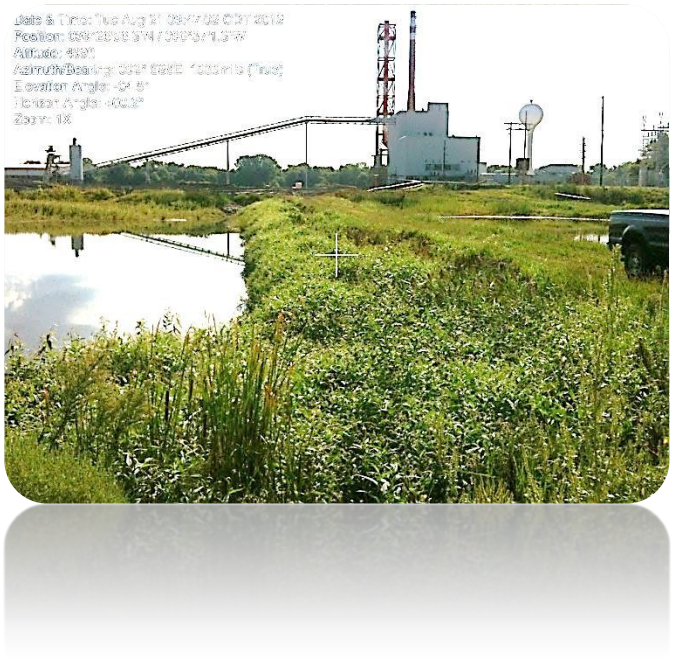
ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS – FINAL REPORT



Prairie Power, Inc.
Pearl Power Plant
Pearl, Illinois

Prepared for
United States Environmental Protection Agency
Washington, D.C.

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CDM Smith Project No.:
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CDM Smith

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1.1 INTRODUCTION

On December 22, 2008 the dike of a coal combustion waste (CCW) ash pond dredging cell failed at a facility owned by the Tennessee Valley Authority in Kingston, Tennessee. The failure resulted in a spill of over one billion gallons of coal ash slurry, which covered more than 300 acres, damaging infrastructure and homes. In light of the dike failure, the United States Environmental Protection Agency (USEPA) is assessing the stability and functionality of existing CCW impoundments at coal-fired electric utilities to ensure that lives and property are protected from the consequences of a failure.

CDM Smith Inc. was contracted by the USEPA to perform dam safety assessments of selected CCW surface impoundments. As part of the contract, CDM Smith performed an impoundment safety assessment of the Pearl Power Plant (PPP). One CCW impoundment, the Ash Pond, received coal ash slurry from the plant. PPP is owned by Prairie Power, Inc. (PPI) in Pearl, Illinois. On June 1, 2012 PPP stopped operations and since that time has not discharged ash slurry into the impoundment. CDM Smith visited the power plant on August 20 and 21, 2012 to collect relevant information and perform a visual assessment of the CCW impoundment. CDM Smith engineers Clement Bommarito, P.E. and Albert Ayenu-Prah, P.E. performed the on-site condition assessment of the CCW impoundment. Mr. Bommarito is a senior geotechnical engineer, licensed as a Professional Engineer in Kansas, Missouri, Oklahoma and Texas. Mr. Ayenu-Prah is licensed as a Professional Engineer in Louisiana and Texas. Michael Gilbert, P.E. is CDM Smith's Project Engineer for the site assessment of the CCW impoundment. Mr. Gilbert has over 35 years of professional experience in the area of geotechnical engineering and is licensed as a Professional Engineer in Illinois, Massachusetts, Minnesota, Missouri, Nebraska, Tennessee and Washington. Mr. Gilbert has provided oversight/direction to Mr. Bommarito and Mr. Ayenu-Prah during the site assessment and report preparation.

1.2 PURPOSE AND SCOPE

The purpose of the USEPA's CCW impoundment assessments includes the following:

- Identifying conditions that may adversely affect the structural stability and functionality of CCW impoundments and their appurtenant structures (if present);
- Noting the extent of deterioration, status of maintenance, and/or a need for immediate repair;
- Evaluating conformity with current design and construction practices;
- Evaluating the static and seismic stability of each impoundment; and

In August 2012, the USEPA sent out letters to the various utilities requesting information and access to their CCW impoundments as part of its assessment of the structural integrity of the following:

- CCW impoundments or similar diked or bermed impoundments at the facility;

- Areas at the facility designated as landfills that receive liquid-borne material from a CCW impoundment or similar diked or bermed CCW impoundments; and
- CCW impoundments at the facility that may not currently receive CCW, but that have not been closed in accordance with applicable state or federal regulations.

The CCW impoundment assessments are being undertaken under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) 42 U.S.C. 9601-9675. PPI commenced with formal closure proceedings with the State. As a result, the PPP impoundment no longer falls within the scope of the EPA's program. The formal closure proceedings were initiated by PPI after CDM Smith performed the PPP Ash Pond assessment and the Draft Assessment Report was issued with condition ratings, hazard potential rating, and formal recommendations for the Ash Pond. The Final Report does not include condition ratings, a hazard potential rating, or formal recommendations for the Ash Pond.

This report presents an evaluation of the condition of the Pearl Power Plant Ash Pond. Prior to the on-site assessment, CDM Smith reviewed information submitted to the USEPA, relevant publicly available information, and information via electronic mail (e-mail) and telephone communication with a representative of PPI. CDM Smith also e-mailed the PPI plant manager requesting information and materials that would assist in the on-site assessment, including hard copies of such materials, if available. In addition to the e-mail, regular expedited mail was also sent to the PPI representative.

1.3 LIMITATIONS

The assessment of the general condition of the impoundment is based upon available data and visual observations. Detailed investigations and analyses involving topographic mapping, subsurface investigations, testing and detailed computational evaluations are beyond the scope of this report.

In reviewing this report, it should be realized that the reported condition of the impoundment is based on observations of field conditions at the time of the assessment, along with data made available to the assessment team. In cases where an impoundment may have been lowered or drained prior to the assessment, such action, while improving the stability and safety of the impoundment, removes the normal load on the structure and may obscure certain conditions, which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is critical to note that the condition of impoundments depends on numerous and constantly changing internal and external conditions and is evolutionary in nature. It would be incorrect to assume that the present condition of the impoundment at the time of the assessment is representative of the condition of the impoundment at some point in the future. Only through continued care and assessment can unsafe conditions be detected.

1.4 CONCLUSIONS

Prior to CDM Smith's visit to the PPP, plant representatives indicated that the facility was off-line and was in the process of being closed. Regardless of this reported status by the plant manager, the USEPA indicated it had no confirmation that the plant was permanently closed and requested CDM Smith to proceed with the CCW impoundment assessment. During CDM Smith's visit to the site, the plant was not in operation. The following are CDM Smith's conclusions.

1.4.1 Conclusions Regarding the Structural Soundness of the CCW Impoundment

Evaluation of the structural soundness of the Ash Pond is generally based on available information for the impoundment in the following four areas:

- Design and Construction Data
- Operating Records
- Post-Construction Modifications to the Impoundment
- Static and Seismic Stability

Visual observations made by CDM Smith during the field visit did not reveal any major structural defects to the Ash Pond. Requests to the manager of the facility and discussions with Kevin Hill (a plant representative (PR) present during CDM Smith's site visit) did not yield sufficient information for evaluation of the four areas of concern for structural soundness. Records pertaining to these four areas of structural evaluation were very limited, and in most cases little or no documentation to evaluate and assess structural stability and soundness of the impoundment was provided by PPI. The limited information available for CDM Smith's review regarding structural soundness is in our opinion not sufficient for an assessment of the structural soundness of the Ash Pond at this time.

1.4.2 Conclusions Regarding the Hydrologic/Hydraulic Safety of the CCW Impoundment

The PR indicated that the impoundment has not had a major breach or overtopping event to his knowledge. Requests were made to the PR and the plant manager regarding documentation related to hydraulic safety of the Ash Pond. These requests included information on peak water levels and discharge rates into the impoundment, drainage rates for discharge of water from the impoundment, and written procedures followed in case of an embankment breach or overtopping event.

Documentation regarding the information requested on the impoundments history was not provided by the plant manager. Based on the lack of supporting documentation, an evaluation of the hydrologic/hydraulic safety of the Ash Pond is not possible at this time.

1.4.3 Conclusions Regarding the Adequacy of Supporting Technical Documentation

Supporting technical information regarding the site subsurface conditions, the facility's design and construction (including engineering analysis of stability and hydrology), documented history of maintenance, and any modification to the facility after its completion is considered inadequate. The plant manager did not provide the majority of information requested. The information requested is the minimum required for CDM Smith to evaluate the facility, and we cannot make these assessments of the impoundment without this documentation.

1.4.4 Conclusions Regarding the Description of the CCW Impoundment

Documentation in the form of plans and specifications for the initial construction and any post-construction modifications of the Ash Pond were not provided by the plant manager. An 8-1/2 by 11-inch site plan was provided with very little detail of the facility. The available plans and related

documentation describing this facility is insufficient to make an assessment of the physical description of the Ash Pond.

1.4.5 Conclusions Regarding the Field Observations

CDM Smith staff was provided access by plant personnel to all areas of the Ash Pond for observation and inspection. The PR provided CDM Smith with some of the requested documents and provided a tour of the facility.

Visual examination of the impoundment embankments not obstructed by vegetation or stockpiled fly ash showed no evidence of prior ash/water releases through the embankment, and no signs of seepage or previous repairs. However, there was evidence of isolated shallow slides and erosion failures on the interior slopes of some embankments. In general, the impoundment embankments were overgrown with vegetation in several areas. The vegetation obstructed view of some of the embankments forming the impoundment.

The west embankment crest supports both lanes of State Highway 100, and the south embankment also serves as the north embankment of the storm water pond immediately south of the ash impoundment. Visual observations of the outlet structure found the outfall portion of the pipe assembly broken and removed. The PR indicated there has been some soil sloughing of the interior embankment slopes along State Highway 100, and that it was occasionally necessary to place fill materials on these slides to build up the grade.

Visual observations of the east side of the impoundment indicated that stockpiled ash has covered the southern half of the east embankment. It is also apparent that the stockpiled ash has been placed beyond the eastern boundary of the impoundment, extending east toward the coal overhead conveyor (roughly aligned north-south between the plant and the Illinois River). Coal ash placed outside the limits of the impoundment are not contained and therefore subject to surface water runoff. Repeated rainfalls and/or a rise in the Illinois River could wash the ash waste materials downslope, eventually discharging into the Illinois River. This condition does not appear to represent an immediate threat to the environment. However, the condition should be remediated in the near-term. An animal burrow, about 8 inches in diameter, was observed on the interior slope of the east embankment.

Visual observations of the interior of the Ash Pond indicated the eastern half of this area was filled and stockpiled with fly ash. The ash was dry at the surface and stockpiled into a long oval shape aligned in a north-south direction. The height of the ash pile varied from a low of approximately 3 to 5 feet below the top of the embankment, to a high of about 15 to 20 feet above the embankment crest. Western portions of the interior of the impounded area contained standing water. In the northern portion of this standing water, dense overgrown vegetation obscured most of the water surface.

1.4.6 Conclusions Regarding the Adequacy of Maintenance and Methods of Operation

Operating records provide a means for evaluation of the impoundment performance under maximum loading conditions. The PR indicated that the impoundment was inspected every quarter, but documentation was not available to confirm these inspections.

Scheduled maintenance is critical in keeping the crests, slopes, and toe of the slopes clearly visible for early detection of hazards such as rodent excavation, erosion, shallow slides, etc. Although the PR indicated embankments of the Ash Pond were periodically mowed, visual observations indicate the

last mowing was limited to some northern areas of the impoundment, and vegetation overgrowth was still a problem in many areas of the embankment slopes. The PR could not provide documentation of regular maintenance beyond a verbal comment that maintenance was performed at least twice a year, as needed.

1.4.7 Conclusions Regarding the Adequacy of the Surveillance and Monitoring Program

Observation wells were recently installed at the site and were monitored during CDM Smiths visit. The PR indicated locations where wells were recently installed. These wells were associated with gathering information required in the plant's closing, but no further detail on the scope and/or progress of these previous studies was available for review. The PR pointed out previous monitoring well installations installed on two separate occasions in the past, but could not provide information on these well installations. Although observation wells have been installed at the site, documentation of information obtained from these wells and associated evaluations was not provided by PPI. CDM Smith is unable to evaluate the adequacy of the surveillance and monitoring program due to lack of documentation.

1.5 RECOMMENDATIONS

There are no formal recommendations, as the Ash Pond is no longer within the scope of the US EPA Coal Ash Assessment Program.

1.6 PARTICIPANTS AND ACKNOWLEDGMENT

1.6.1 List of Participants

- Kevin Hill, Pearl Power Plant
- Clement Bommarito, CDM Smith
- Albert Ayenu-Prah, formerly of CDM Smith

1.6.2 Acknowledgment and Signature

We acknowledge that the CCW impoundment referenced herein has been assessed on August 20, 2012.

Clement Bommarito, P.E.

Michael Gilbert, P.E.
Illinois Registration No. 062-042437

Section 2
DESCRIPTION OF THE COAL COMBUSTION WASTE IMPOUNDMENT

2.1 LOCATION AND GENERAL DESCRIPTION

The Pearl Power Plant (PPP) is located in Pike County at 13476 State Highway 100, Pearl, Illinois, 62361 (Latitude: 39° 26' 56" N, Longitude: 90° 37' 00.82" W). The Illinois River serves as the eastern property boundary of the plant and Highway 100 is the western boundary as shown on **Figure 2-1**. The City of Kampsville is located 10 miles downstream of the plant on the Illinois River. The surrounding area consists mostly of farm lands and crop fields.

The general topography of the region consists of hilly terrain, with the exception of a relatively level flood plain along the Illinois River that includes the PPP site. Pike County topographic maps indicate elevations range from a low of El. 425 feet to a high of El. 880 feet above mean sea level. A large rock outcrop is exposed west of Highway 100 (directly across from the plant) where the Illinois River flood plain borders the areas with hilly terrain to the west. An aerial view of the CCW impoundment is shown on **Figure 2-2**.

The plant has one CCW impoundment (Ash Pond) covering most of the northwest and west-central portions of the plant property. This impoundment was created by construction of a system of man-made embankments (including incorporation of the existing embankment supporting Highway 100 along the west perimeter of the plant property). The depth of ash slurry impoundment at normal operating pool was approximately 8 feet.

An existing storm water pond is located south of the Ash Pond on the west side of the plant. The storm water pond's northern embankment also serves as the south embankment for the ash impoundment. This storm water pond is approximately 400 feet square, with a roadway extending into the central portion of the pond from the northeast corner. At the time of the assessment, the storm water pond contained water with approximately 1.5 feet of freeboard available. According to the PR, the overall depth of the storm water pond is approximately 10 feet.

2.2 COAL COMBUSTION RESIDUE HANDLING

2.2.1 Fly and Bottom Ash

At the time of CDM Smith's on-site assessment, the power plant was closed and not producing CCW. According to the PR, procedures were on-going to finalize closure of the plant with the Illinois Environmental Protection Agency (IEPA).

When the plant was in operation, fly and bottom ash were sluiced from the coal furnace into the south end of the Ash Pond through three (3) 15-inch-diameter metal pipes. The ash was subsequently separated out from the slurry to air-dry for disposal offsite.

2.2.2 Boiler Slag and Flue Gas Desulphurization Gypsum

PPI has not provided information regarding the absence or existence of other CCW waste streams generated and managed at the Plant including boiler slag and flue gas desulphurization gypsum. The PR did not have documentation on plant operations at the time of CDM Smith's site visit.

2.3 SIZE CLASSIFICATION

According to the USACE Guidelines for Safety Inspection of Dams (1979), the impoundments may be placed in the size classification per **Table 2-1.**

Table 2-1 – USACE ER 1110-2-106 Size Classification

Category	Impoundment	
	Storage Capacity (acre -feet)	Embankment Height (feet)
Small	50 to < 1000	25 to < 40
Intermediate	1000 to < 50,000	40 to < 100
Large	> 50,000	> 100

Based on storage capacity and embankment height, the Ash Pond is considered a SMALL impoundment. It is not known if the Ash Pond currently has a Hazard Potential Classification. The Ash Pond is under the jurisdiction of the IEPA. The PR indicated verbally that inspection of the impoundment is performed quarterly by plant staff. Documentation provided by PPI did not include reports related to these inspections and did not provide information indicating the impoundment's hazard classification.

2.4 AMOUNT AND TYPE OF RESIDUALS CURRENTLY CONTAINED IN THE IMPOUNDMENT AND MAXIMUM CAPACITY

The Ash Pond is currently inactive and receives no new ash slurry. During normal operation, the impoundment would receive fly ash and bottom ash slurry from the plant's coal furnace. Information has not been made available to CDM Smith regarding the quantity of these materials (including the elevation of stockpiled fly ash). An accurate assessment of the amount of residuals stored in the Ash Pond could not be made from visual observations because CCW has been placed outside of the eastern embankment outside the limits of the impoundment perimeter.

2.5 PRINCIPAL PROJECT STRUCTURES

2.5.1 CCW Impoundment Embankments

The Ash Pond embankments have slopes of approximately 4H:1V, with 15-foot-wide crests. The embankment height ranged from 4 to 10 feet, with the lowest embankment on the east side and the tallest embankment at the north perimeter. Southern portions of the east embankment were not visible because stockpiled ash covered the embankment crest. Discussions of embankment characteristics are limited to portions of the impoundment visible during CDM Smith's site visit.

2.5.2 Outlet Structure

The outlet structure is a 20-inch-diameter fiberglass reinforced plastic pipe drawing water from the southeast corner of the impoundment. This outlet structure was damaged (the 45-degree pipe elbow serving as a drop inlet was broken) at the time of CDM Smith's site visit. Rocks (up to 3 to 5 inches in

serving as a drop inlet was broken) at the time of CDM Smith's site visit. Rocks (up to 3 to 5 inches in maximum dimension) had been placed in front of this inlet to filter pond water reaching the broken intake pipe. No observations could be made at the time of the site visit to see if the rocks were functioning as a filter because water levels in the pond were below the level of this rock. The outlet structure directs water through the outlet pipe into the Illinois River by gravity flow. The outlet structure for the storm water pond also discharges into the Illinois River. This outlet structure's discharge is located on the shore of the Illinois River, east and slightly south of the Ash Pond outlet.

2.5.3 Ash Slurry Discharge

There are three ash-slurry pipes serving as discharges into the Ash Pond. Each discharge consists of a 15-inch-diameter metal pipe that discharges into the south end of the Ash Pond. There was no flow in any of the inlets pipes at the time of CDM Smith's site visit because the plant was not in operation.

2.6 CRITICAL INFRASTRUCTURE WITHIN FIVE MILES DOWNGRADIENT

The PPP facility is located in a predominantly rural and farm region with no critical infrastructure within 5 miles downgradient of the impoundment. The land use downstream of the site is primarily for agricultural purposes and/or is the flood plain of the Illinois River.

A breach of the impoundment embankments would most likely impact the agricultural fields surrounding the plant, and eventually be discharged into the Illinois River. A breach of the Ash Pond's west embankment would damage State Highway 100, making it impassable until repairs could be made.

Section 3
SUMMARY OF RELEVANT REPORTS, PERMITS, AND INCIDENTS

3.1 SUMMARY OF REPORTS ON THE SAFETY OF THE CCW IMPOUNDMENT

Safety reports regarding the CCW impoundment at the PPP were not available for CDM Smith's review during the course of this assessment. This information was requested (in an email) prior to CDM Smith's on-site assessment, and again during the visit. The PR indicated to his knowledge there have been no known structural or operational problems associated with the CCW impoundment, but this could not be confirmed with documentation.

3.2 SUMMARY OF LOCAL, STATE, AND FEDERAL ENVIRONMENTAL PERMITS

At the time of CDM Smith's assessment of PPP, discharge from the CCW impoundment to the Illinois River was governed by a National Pollutant Discharge Elimination System (NPDES) permit issued by IEPA. A copy of the permit was not available for CDM Smith's review. A 2008 NPDES permit public notice was located for the PPP on IEPA's website. The NPDES permit number is IL0036765.

3.3 SUMMARY OF SPILL/RELEASE INCIDENTS

According to the PR, there have been no known spills or releases related to the impoundment. No documentation was available to confirm this history of the facility.

Section 4
SUMMARY OF HISTORY OF CONSTRUCTION AND OPERATION

4.1 SUMMARY OF CONSTRUCTION HISTORY

4.1.1 Original Construction

The PPP started operations in 1968. CDM Smith's request for information about the plant's history and design resulted in very little historical information, no information on design of the existing impoundment, and limited soil data associated with the subsurface conditions on the property.

The Ash Pond was created in 1968 by construction of embankments 4 to 10 feet high on the north, east and south perimeter of the basin, forming a collection basin having a surface area of approximately 13 acres. The soils used to construct the embankments visually appear to be clay-type materials similar to the on-site soils in surrounding areas.

Subsurface information provided by the PR during CDM Smith's site visit consisted of copies of three Logs of Boring performed by Layne-Western Co. (Layne) dated May 20, 1964. The borings are located in the nearby Illinois River (drilled off shore), and are spaced approximately 500 feet apart along the river's western bank. The boring location sketch and the logs are attached in **Appendix C**. No analysis, or report was provided with the Logs of Boring and the PR indicated he had no knowledge of the purpose of these borings.

Based on soil descriptions contained in the Logs of Boring, the subsoil in the riverbed was relatively uniform and horizontally bedded. Two principal strata were encountered; a soft, gray organic silty clay from the mudline surface to a depth of about 7 feet, underlain by loose, gray, and fine to medium silty sand containing traces of gravel and shells. The borings were terminated at a depth of 31 feet below the mudline in the silty sand stratum. The water depth ranged from 3.7 to 7 feet at the location of these offshore borings.

The PR also provided a drawing showing an ash pond discharge pipe that penetrates through the east embankment of the Ash Pond at a depth of approximately 6.7 feet. The PR indicated that the pipe elevation shown on the drawing may not reflect the as-built condition. The PR did confirm that the pipe shown on the drawing is 20 inches in diameter and serves as an outlet pipe for the impoundment, transporting water by gravity flow from the Ash Pond to the Illinois River. The inlet and outlet of this pipe could clearly be seen during our walk of the property. The drawing is attached in **Appendix C**.

4.1.2 Significant Changes/Modifications in Design since Original Construction

According to the PR, there have been no major changes or modifications to the Ash Pond. PPI provided no documentation to confirm this information.

4.1.3 Significant Repairs/Rehabilitation since Original Construction

According to the PR, there have been no significant repairs/rehabilitation to the CCW impoundment since original construction, although he did indicate that fill materials were placed along the west side

of the embankment to compensate for apparent erosion of this embankment. No documentation could be provided regarding this fill placement.

4.2 SUMMARY OF OPERATIONAL PROCEDURES

4.2.1 Original Operational Procedures

There was no written documentation provided by PPI on operational procedures associated with the Ash Pond. A verbal description by the PR indicated operation of the impoundment generally consisted of discharge of ash slurry from the plant into the south end of the Ash Pond. The ash slurry is stored in the impoundment, allowing time for the settlement of the ash solids to the bottom. As the ash solids accumulate on the bottom of the impoundment, they are excavated and placed in areas of stockpiled ash above the water in the impoundment, and spread to allow them to dry. The dry ash is stockpiled for eventual disposal offsite. The water separated from the ash solids is collected in the impoundment outlet structure, and discharged through gravity flow into the Illinois River.

4.2.2 Significant Changes in Operational Procedures and Original Startup

The PR indicated verbally that there have been no significant changes in operational procedures related to the Ash Pond since original startup. Documentation was not provided by PPI regarding what operational procedures are followed.

4.2.3 Current Operational Procedures

As described earlier in this report, ash slurry is pumped into the Ash Pond and stored to allow ash solids to settle and the remaining water to be discharged via gravity-flow through a 20-inch-diameter fiberglass reinforced pipe to the Illinois River. To CDM Smith's knowledge, PPI has no written operation procedures or standards for the impoundment's operation.

4.2.4 Other Notable Events since Original Startup

Based on the limited information on plant operation provided by PPI and no information specifically related to the day-to-day operations of the plant, CDM Smith does not have sufficient information to determine if any notable events occurred at the Ash Pond since its startup. PPI began decommissioning the PPP coal-fired boiler and associated equipment at the PPP station as documented in letters, dated June 8, 2012, to the ILEPA and the USEPA. Copies of the June 8, 2012 letters are included in **Appendix C**.

Section 5
FIELD OBSERVATIONS

5.1 PROJECT OVERVIEW AND SIGNIFICANT FINDINGS

CDM Smith has completed a CCW impoundment safety assessment at the Pearl Power Plant. The task included performing a visual assessment of the impoundment, collecting relevant information regarding inflow and discharge of materials to and from the impoundment, history of damage or failure to the impoundment structures, and design analyses (i.e. slope stability and seepage analyses) of impoundment embankments.

CDM Smith representatives Clement Bommarito, and Albert Ayenu-Prah were accompanied by a power plant representative Mr. Kevin Hill during the site visit and visual observations of the CCW impoundment on August 20 and August 21, 2012.

The assessments were completed following the general procedures and considerations contained in the *Federal Emergency Management Agency's (FEMA) Federal Guidelines for Dam Safety (April 2004)* regarding settlement, movement, erosion, seepage, leakage, cracking, and deterioration. Two USEPA forms were completed on-site for the impoundment during the site visit:

- A Coal Combustion Dam Inspection Checklist Form, and
- A Coal Combustion Waste (CCW) Impoundment Inspection Form.

Copies of the forms are included in **Appendix B**. Photograph GPS coordinates are listed in **Appendix D**. Additional photographs are also included in **Appendix D**. The locations of photographs that were taken during our field assessment are shown on **Figure 5-1.**

The weather conditions on the day of the site visit consisted of mostly clear skies with a high and low temperatures ranging from about 50 and 80 degrees Fahrenheit, respectively. According to the National Weather Service, daily total precipitation for week prior to and on the days of the site visit was not significant (< 0.1 inch).

5.2 CCW IMPOUNDMENT

The Ash Pond contained areas of dry stockpiled ash, as well as areas where standing water was observed. Portions of the eastern embankment are covered with fly ash and therefore did not show a clear embankment boundary.

Visual observations of the surface of the impoundment surface indicated the eastern half of this area was filled and stockpiled with fly ash. The ash was dry at the surface, and stockpiled into a long, narrow pile aligned in a north-south direction. The height of the ash pile varied from a low visually estimated to be 3 to 5 feet below the embankment crest, to a high of about 15 to 20 feet above the embankment crest (**Photograph 5.1**).

Photograph 5.1 - Dry Ash Covering Southeast Corner of Pond, with Ash Pile in Background Looking Northwest

Based on a visual projection of the horizontal alignment of the east embankment (where it was exposed at the north end of the site), fly ash covered the embankment and extended beyond the exterior toe of the east embankment eastern boundary of the impoundment to the coal overhead conveyor to the east.

Western portions of the impoundment contained standing water in most areas. Northern portions of this water-filled area contained dense overgrown vegetation obscuring most of the water surface.

The west embankment crest supports both lanes of State Highway 100, while the south embankment serves as the north embankment of the storm water pond located directly to the south. CDM Smith observed no evidence of prior releases, failures, or repairs to the embankments at the time of the site visit, although the PR indicated there has been some soil sloughing along State Highway 100, and fill materials were placed in this area to build up the grade.

5.3 CCW IMPOUNDMENT EMBANKMENTS

5.3.1 Crest

The crests of the embankments of the CCW impoundment (where they could clearly be seen) appeared to be nearly level and have a generally consistent width of 10 to 15 feet, with no evidence of prior breaches or overtopping erosion (**Photograph 5.2**). Some areas of the crest were grass-covered (up to about 10 inches in height). The surface of the west embankment was covered by State Highway 100, and the southern portion of the east embankment was covered by fly ash.

Photograph 5.2 - Crest of South Embankment Looking East – Ash Pond on Left Side of Photograph

5.3.2 Interior Slope

The interior slopes of the embankments were generally in fair condition (**Photographs 5.3 and 5.4**). The inclination of these slopes were approximately 4H:1V (horizontal: vertical) or flatter. Most of the interior slopes were covered with thick grass-like vegetation up to 3 feet high on the north, south, and east embankments. The west embankment contained much denser vegetation up to 5 feet high.

Photograph 5.3 - North Embankment Interior Slope Looking West

Photograph 5.4 - Interior Slope of South Embankment Looking East

Visual observations of the interior slope of the east embankment towards the north end detected what appeared to be an animal burrow about 8 inches in diameter (**Photograph 5.5**).

Photograph 5.5 - Animal Burrow on Interior Slope of East Embankment

Other visual observations of the interior slopes consisted of an apparent shallow erosion feature on the south embankment near the mid-point of this side of the impoundment, (**Photograph 5.6**), and on the interior slope of the west embankment toward the north end of the west side (**Photograph 5.7**).

5.3.3 Exterior Slope and Toe

The exterior slopes of the embankments were generally in fair condition. The inclination of exterior slopes were approximately 4H:1V or flatter. Most slopes were grass covered. The grass ranged in height from about 6 to 18 inches (**Photograph 5.8**). The PR indicated that the outer slopes are mowed at least once or twice a year.

No evidence of animal burrows, cracks, or erosion was observed on the exterior slopes of the impoundment. No evidence of seepage was observed along the exterior slopes, including the toe of the slope where seepage is more-likely to occur. There was dried ash covering the southern portion of the east embankment (**Photographs 5.1**), preventing visual assessment of this area. Several small erosion rills were observed on the exterior slope of the southeast embankment perimeter (**See Photograph 5.9**).

Photograph 5.6 - Erosion Feature on Interior Slope of South Embankment

Photograph 5.7 - Erosion Feature on West Embankment along Highway 100

Photograph 5.8- Vegetation on Exterior Slope at Southeast Corner of Pond

Photograph 5.9- Erosion Rills on Exterior Slope at Southeast Corner of Pond

5.4 OUTLET STRUCTURES

5.4.1 Overflow Discharge Structure

The impoundment outlet structure is located near the southeast corner of the impoundment. This outlet collects water from the impoundment and directs it into a gravity drain line discharging to the Illinois River. This outlet consisted of a 20-inch-diameter fiberglass reinforced plastic pipe with a 90-degree pipe bend attached to serve as a drop inlet for this discharge line. The pipe bend was broken and the end of the conduit was exposed (**Photograph 5.10**). Rocks (up to 3 to 5 inches in maximum dimension) were placed in front of this inlet to filter pond water reaching the broken intake pipe. No observations could be made at the time of the site visit to see if the rocks were functioning as a filter for the water entering the inlet pipe for discharge in the river.

5.4.2 Outlet Conduit

The outlet conduit is a 20-inch-diameter fiberglass reinforced plastic pipe directing water by gravity flow from the overflow discharge structure down to the outlet discharge into the Illinois River (**Photograph 5.11**).

5.4.3 Emergency Spillway

The CCW impoundment has no emergency spillway. This was visually confirmed during the site visit.

5.4.4 Low-Level Outlet

Based on our visual observations at the site and limited information provided by the owner of the plant, the impoundment does not have a low-level outlet.

Photograph 5.10 - 20-inch-diameter Outlet Pipe in South Embankment

Photograph 5.11 - Pond Discharge Outlet to Illinois River

Section 6
HYDROLOGIC/HYDRAULIC SAFETY

6.1 SUPPORTING TECHNICAL DOCUMENTATION

6.1.1 Flood of Record

No documentation was provided by PPI documenting what the flood of record is for the Ash Pond. According to the plant representatives, there has been no known flooding of the impoundment during their tenure at the plant.

Review of Federal Emergency Management Agency (FEMA) Pike County Flood Map, Panel 0603 indicates the PPP property is within a Special Flood Hazard Area subject to flood evaluation using a 2-percent chance of annual flood (50-year flood).

6.1.2 Inflow Design Flood

Records provided by PPI did not include information regarding the inflow design flood for this facility or no related documentation on hydrologic/hydraulic analyses of the Ash Pond was available for CDM Smith's review.

6.1.3 Outlet Capacity

No documentation was provided by PPI regarding the Ash Pond outlet discharge capacity. Search of NPDES records located a January-February 2008, Public Notice for the PPP facility listing an actual daily average flow (DAF) of 2.54 MGD for combined discharges of the Ash Pond and adjacent storm water pond at outfall A01A. Documentation and/or analysis of the Ash Pond outlet design capacity compared to the expected DAF was not provided by PPI.

6.1.4 Downstream Flood Analysis

PPI did not provide data, documentation of an analysis, or results of flood studies for a breach of any of the embankments forming the Ash Pond.

A qualitative analysis based on on-site observations by CDM Smith and review of available data is provided below. Based on the observations and available data, it is not expected that there would be loss of human life in the event of a breach on any of the four sides of the Ash Pond.

6.1.4.1 North and East Embankments

In the event of a breach in the embankment on the north and east sides of the Ash Pond, gravity flow of the discharge would enter a ditch draining eastward along the property line separating the PPP facility from the agricultural fields to the north. Once the breach discharge enters the ditch, it would continue by gravity flow to the east, crossing the northern portion of the plant property. A major breach in the north embankment could quickly fill the ditch and flood the southern portion of the adjacent agricultural fields to the north. Eventually, gravity flow would continue further to the east, discharging into the Illinois River.

6.1.4.2 West Embankment

A breach of the Ash Pond's west embankment would damage State Highway 100, making it impassable until repairs could be made. The grading observed on the west side of the Ash Pond indicated a breach

in the west embankment (supporting State Highway 100) would flow northwards. Water discharged east of State Highway 100 would flow north and enter the existing ditch between the plant and the property to the north (in a manner similar to that described for a north embankment breach).

6.1.4.3 South Embankment

The south embankment of the Ash Pond is shared with an adjacent storm water pond. A breach in this embankment would result in the merging of the Ash Pond and the storm water pond contents. The liquids from the two ponds would be confined to the coupled impoundment area.

6.2 ADEQUACY OF SUPPORTING TECHNICAL DOCUMENTATION

No supporting technical documentation was provided. Documentation was inadequate.

6.3 ASSESSMENT OF HYDROLOGIC/HYDRAULIC SAFETY

An assessment of hydrologic/hydraulic safety of the Ash Pond is not possible at this time due to unavailability of supporting documentation. According to the plant representatives, there has not been an overtopping of the Ash Pond since original operations started. No evidence of overtopping was observed during the site visit.

Section 7
STRUCTURAL STABILITY

7.1 SUPPORTING TECHNICAL DOCUMENTATION

7.1.1 Stability Analyses and Load Cases Analyzed

PPI did not provide CDM Smith with any geotechnical analyses, construction plans or other related documentation for analysis of slope stability or seepage of the existing CCW impoundment. Based on our limited discussions with the PPI representatives, geotechnical investigations and construction plans for the impoundment have not been performed, and no geotechnical study was completed for the initial design of the facility. Without this information, CDM Smith cannot assess the existing embankments with regard to stability or seepage.

The Illinois dam safety law is contained in Illinois Compiled Statutes (615ILCS5), originally enacted June 10, 1911, and last amended February 7, 1996. The rules pertaining to the dam safety program are contained in the Illinois Administrative Code, Title 17 (Conservation), Chapter I (Dept. of Natural Resources), Subchapter h (Water Resources). These rules were originally adopted September 2, 1980, and last revised April 10, 1998. The regulations are administered by the Illinois Department of Natural Resources (IDNR). The IDNR defines a dam as "all obstructions, walls, embankments, or barriers, together with their abutments and appurtenant works, if any, constructed for the purpose of storing or diverting water or creating a pool.

The Illinois Administrative Code, Title 17 states the owner of a dam that was permitted and built in compliance with an Illinois Department of Natural Resources, Office of Water Resources (OWR) permit before September 2, 1980, and that is currently in good repair shall not be required, except in compliance with Sections 3702.150 or 3702.190 (major modifications or breach of an existing dam), to make changes in the design, structure, or construction of such dam. The owner of a dam that was permitted and built before September 2, 1980, but is not in accordance with the OWR permit or is not in good repair, shall be required to meet all current standards for existing dams. The Ash Pond at the PPP was put in service in 1968.

The IDNR requires USACE standards be used for structural and geotechnical design of CCW impoundments, and major modifications of existing facilities. The IDNR specifies use of USACE ER 1110-2-106, **Appendix D** for this purpose.

7.1.2 Design Parameters and Dam Materials

CDM Smith was not provided with any geotechnical subsurface analyses or evaluation of geotechnical parameters on the existing soil conditions at this site. Subsurface boring information was provided at three locations along the Illinois River, but these locations are too far from the site to provide relevant data. Based on our discussions with the owner, soil analyses and/or evaluation of soil parameters and supporting data are not available for this facility.

CDM Smith's visual observations of the embankment surfaces and surrounding soils indicated soil conditions consisted predominantly of lean (sandy) clay. No laboratory testing is available to confirm these observations.

7.1.3 Uplift and/or Phreatic Surface Assumptions

Although groundwater observation wells have been installed at the site, documentation related to the analysis of underseepage or piping beneath the embankment (and related assumptions on the phreatic surface) was not provided by PPI. Based on our discussions with PPI, documents containing these assumptions in an analysis or data to support such assumptions are not available.

No evidence of seepage or moist surface soil conditions associated with a shallow phreatic surface/underseepage beneath the embankment was observed on the exterior slopes or at the toe of the slopes during the on-site visual observations.

7.1.4 Factors of Safety and Base Stresses

An evaluation of the existing impoundment in accordance with USACE ER-1110-2-106 was not available for review, and the limited data on the soil and groundwater available is too far from the impoundment to be considered relevant. Therefore, without the necessary geotechnical data, an evaluation of the impoundment in accordance with the requirements in ER-1110-2-106 cannot be performed.

If the analysis or data to perform the analysis were to become available, **Table 7-1** indicates the minimum required factors of safety used to evaluate the results, as recommended by the USACE for new dams in accordance with EM 1110-2-1902. The actual analysis conditions that need consideration depend on several factors. It should not be necessary to analyze end-of-construction stability for existing dams unless the embankment cross section has been modified from its original design.

Table 7-1: Minimum Required Factors of Safety: New Earth and Rock-Fill Dams[1]

Analysis Condition	Required Minimum Factor of Safety	Slope
End-of-Construction (including staged construction)	1.3	Upstream and Downstream
Long-term (steady seepage, maximum storage pool, spillway crest or top of gates)	1.5	Downstream
Maximum surcharge pool	1.4	Downstream
Rapid drawdown	1.1-1.3[2]	Upstream

1 Table 3-1 in USACE's EM 1110-2-1902, October 31, 2003

2FS = 1.1, drawdown from maximum surcharge pool; FS = 1.3, drawdown from maximum storage pool

Table 7-2 shows recommended minimum required seismic factors of safety by the FEMA Federal Guidelines for Dam Safety, Earthquake Analyses and Design of Dams.

Table 7-2: Minimum Required Seismic Factors of Safety[1]

Analysis Condition	Required Minimum Factor of Safety
Seismic Condition at Normal Pool Elevation	1.0
Liquefaction	1.3

1FEMA Federal Guidelines for Dam Safety – Earthquake Analyses and Design of Dams (pgs. 31, 32, 38), May 2005

7.1.5 Liquefaction Potential

As previously discussed, geotechnical analysis was not available for this site. Without geotechnical information, the analysis of the liquefaction potential of the embankment and foundation cannot be performed. In the absence of this information, CDM Smith is unable to evaluate the liquefaction potential of the embankments and underlying foundation soils at this time.

7.1.6 Critical Geological Conditions and Seismicity

The power plant site is located on the western bank of the Illinois River. United States Geological Survey (USGS) studies in the area indicate the site is part of the Lincoln Hills section of the Ozark Plateaus Provence. The Lincoln Hills section is a secondary structure to the larger Ozark dome (which lies south of the plant). The section consists of sedimentary units of rock deposited over Precambrian extrusive and intrusive igneous rocks. The Illinois State Geological Survey indicates alluvial deposits overlying the Lincoln Hills formations consist of alluvium deposits referred to as the Cahokia. These Cahokia soils are Quaternary alluvial deposits consisting of sands mixed with silt and clay.

Information on the website of the United States Geological Survey (USGS) indicates that the CCW impoundment is in an area of generally low seismic hazard. Based on a 2008 USGS seismic hazard map for Illinois, the dam site is located in an area with a potential to experience between 0.08g and 0.10g (horizontal) ground acceleration with a probability of exceedance of 2 percent in 50 years.

7.2 ADEQUACY OF SUPPORTING TECHNICAL DOCUMENTATION

Documentation provided to CDM Smith was very limited, and did not allow review of analyses for most requirements in ER 1110-2-106, **Appendix D**. Therefore, the supporting technical documentation is considered inadequate based on IDNR requirements.

7.3 ASSESSMENT OF STRUCTURAL STABILITY

Documentation related to the analysis of the structural stability or data to support such an analysis of the impoundment at the PPP facility was not provided by the plant owner. In the absence of this information, CDM Smith is unable to comment on the structural stability of the impoundment and related features.

Section 8
ADEQUACY OF MAINTENANCE AND METHODS OF OPERATION

8.1 OPERATING PROCEDURES

CDM Smith requested access to the plant's Operations Manual (specifically those aspects of the manual pertaining to the CCW impoundment). The plant owner was unable to provide this manual for our review, and the adequacy of the methods of operation could not be evaluated.

Visual observations made at the plant, and discussion with the PR indicated that wet CCW was sluiced from the coal furnaces through a 15-inch-diameter metal pipe to discharge at the south end of the CCW impoundment. As the ash solids accumulate on the bottom of the impoundment, they are excavated and placed in areas of stockpiled ash above the water in the impoundment, and spread to allow them to dry. The dry ash is stockpiled for eventual disposal offsite. At the time of CDM Smith's site assessment, ash from these drying beds was stockpiled within or near the edge of the impoundment limits. CDM Smith understands that some of this dry ash is sold or given to contractors for use off-site.

The Ash Pond's outlet structure is located near the southeast corner of the impoundment. This outlet collects water from the surface of the impoundment. The water is then discharged by gravity flow through a 20-inch-diameter pipeline into the nearby Illinois River.

8.2 MAINTENANCE OF THE DAM AND PROJECT FACILITIES

The plant owner could not produce any documentation related to periodic inspections or maintenance operations of the CCW impoundment. According to the PR, the embankments are periodically inspected for any potential safety issues, and the exterior slopes and surrounding areas are mowed a few times a year.

The PR indicated that the impoundment's crest and exterior slopes are mowed at least once or twice a year. Observations made during the site assessment suggested mowing operations were inadequate. Mowed areas, at the time of our site visit, consisted primarily of the exterior slopes of the north embankment and northern portion of the east embankment. Exterior slopes were generally covered with grassy vegetation 6 to 18 inches tall. The crest was generally covered with grass up to about 10 inches tall. The majority of the interior slopes were covered with thick grass-like vegetation up to 3 feet tall on the north, south, and east embankments. The west embankment interior slope was covered with much denser vegetation, up to 5 feet tall.

Standing water was observed within the interior of the impoundment along most of its western perimeter. Dense overgrown vegetation was present in most of these areas of standing water and continued up the interior slope of the west embankment. This dense vegetation made it difficult to observe and report on the condition of the interior slope of this embankment.

In addition to maintenance issues related to vegetation, observations of the alignment of the east embankment from north to south indicated stockpiled ash has covered the southern portions of this

embankment and continues east beyond the exterior toe of the east embankment. Based on this observation, stockpiling operations are not maintaining ash storage within the limits of the impoundment and where ash remains outside the embankments, it is subject to surface water runoff and possible discharge into the nearby Illinois River.

8.3 ASSESSMENT OF MAINTENANCE AND METHODS OF OPERATIONS

8.3.1 Adequacy of Operating Procedures

CDM Smith cannot make an assessment of the operating procedures for the impoundment at the plant because an Operations Manual for the CCW impoundment was not provided by the owner. The impoundment is no longer in operation (because the power plant has been shut down at the time of CDM Smith's visit to the site) and PR indicated that the impoundment water level has been drawn down considerably since the decision in June of 2012 to close the facility. Although the operators of the plant are in the process of draining the Ash Pond as part of their closing procedures, it still contains some standing water and CCW ash slurry along most of the western perimeter. No plan was given by the owner regarding how the remaining water will be removed from the Ash Pond and other procedures planned in association with closing of the impoundment.

8.3.2 Adequacy of Maintenance

The information regarding regular maintenance of the CCW impoundment was provided in verbal conversations with the PR during CDM Smith's site visit. Based on the PR's comments, some limited inspections of the impoundment are performed a few times a year, but no documentation or details were provided regarding maintenance actions resulting from these inspections. The PR indicated that the grass on the exterior slopes of the embankments is mowed with about the same frequency as the inspections.

Visual examination of the impoundment indicates some maintenance tasks were either partially or fully in need of improvement and need to be performed and documented on a more-regular basis. A maintenance program that includes regular mowing and trimming of vegetation on the crest, exterior slopes (including the toe of the slope), and exposed interior slopes (above the water level) of the embankments needs to be implemented.

Other maintenance issues consisted of evidence of small erosion features on the interior slopes of the west and south embankments, and an animal burrow on the interior slope of the east embankment. Based on visual observations of the mechanical systems of the impoundment, maintenance of the outlet structure appeared inadequate. The outfall portion of the gravity-flow pipe was broken off and the outlet discharge is covered by overgrown vegetation.

Section 9
SURVEILLANCE AND MONITORING PROGRAM

9.1 SURVEILLANCE PROCEDURES

According to the PR, Pearl Power Plant personnel inspect the ash pond embankments once every quarter. There was no documentation on the quarterly inspections. PPI was unable to provide any documentation of inspections or inspection procedures.

9.2 INSTRUMENTATION MONITORING

Three observation wells were observed around the perimeter of the impoundment, one of them recently installed in 2012. According to the PR, the groundwater observation wells recently installed are part of the plant's permanent closure process. The older wells were used to monitor groundwater, although records of readings were not available at the time of the assessment. No records of well readings were provided by PPI.

9.3 ASSESSMENT OF SURVEILLANCE AND MONITORING PROGRAM

9.3.1 Adequacy of Inspection Program

PPI was unable to provide any documentation of inspections or inspection procedures. Based on the lack of documentation, the inspection program at this CCW impoundment is considered inadequate.

9.3.2 Adequacy of Instrumentation Monitoring Program

Groundwater observation wells have been installed at the site. However, no records of well readings were provided by PPI. Therefore, CDM Smith considers the monitoring program at this CCW impoundment inadequate.

Appendix A

Figures

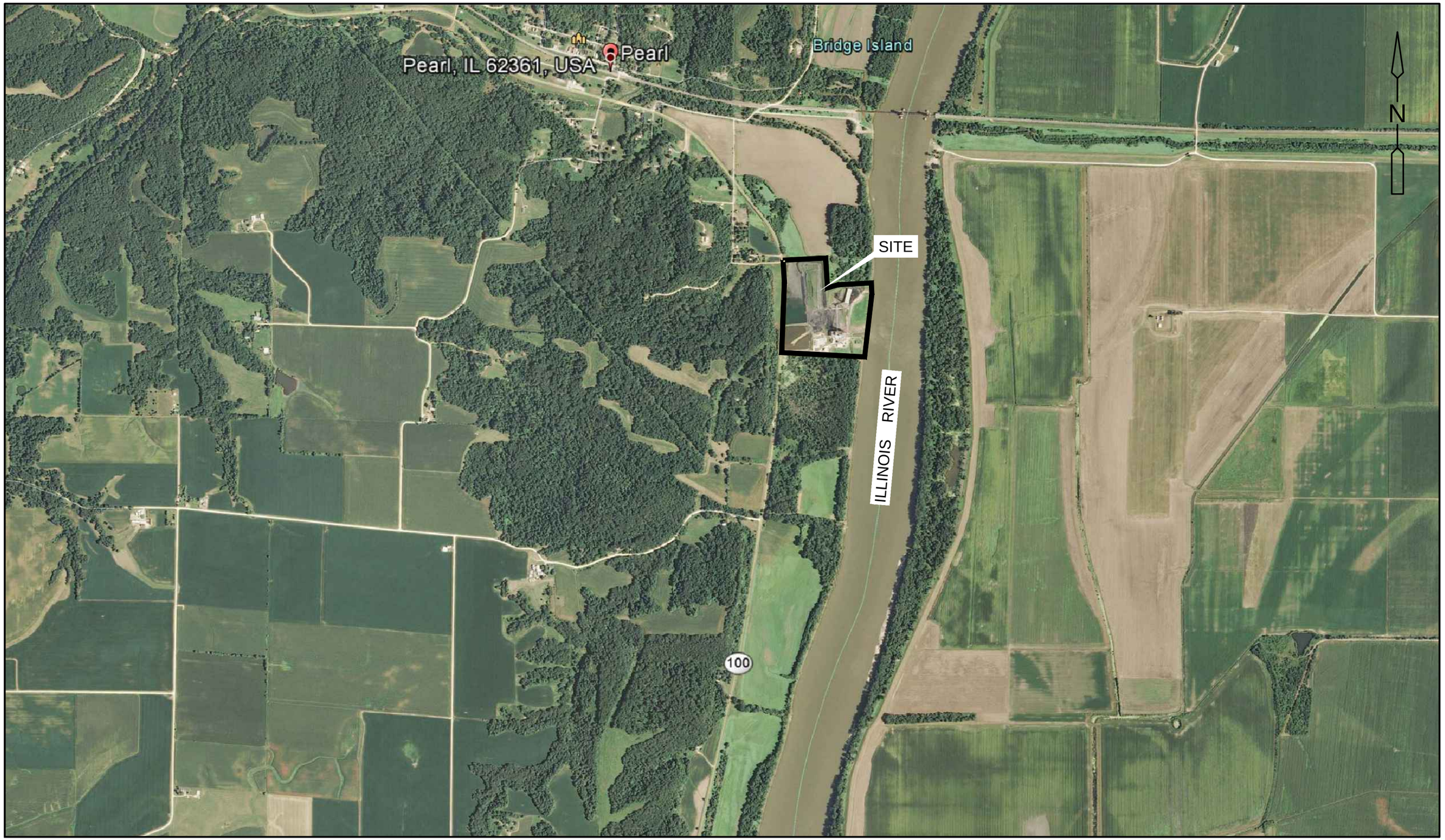


IMAGE OBTAINED FROM GOOGLE EARTH PRO SEPTEMBER 2012

1" = 975'

487.5 0 975

CDM Smith

Figure No. 2-1
VICINITY MAP PEARL POWER PLANT
PEARL, ILLINOIS
OCT 2012

AERIAL PHOTOGRAPH SOURCE:
GOOGLE EARTH PRO.

CDM Smith

PEARL POWER PLANT
PEARL, ILLINOIS
AERIAL PLAN
FIGURE 2-2

AERIAL PHOTOGRAPH SOURCE:
GOOGLE EARTH PRO.

LEGEND:

2 PHOTOGRAPH NUMBER AND ORIENTATION

SCALE: 1"= 200'

100 0 200

CDM Smith

PEARL POWER PLANT
PEARL, ILLINOIS
PHOTOGRAPH LOCATIONS PLAN
FIGURE 5-1

Appendix B

Assessment Checklists

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name:	Pearl Power Plant	Date:	August 20, 2012
Unit Name:	Ash Pond	Operator's Name:	Prairie Power, Inc.
Unit I.D.:	N/A	Hazard Potential Classification:	High Significant Low
Inspector's Name:	Clement Bommarito, Albert Ayenu-Prah		

Check the appropriate box below. Provide comments when appropriate. If not applicable or not available, record "N/A". Any unusual conditions or construction practices that should be noted in the comments section. For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?	3 months		18. Sloughing or bulging on slopes?	X	
2. Pool elevation (operator records)?	N/A		19. Major erosion or slope deterioration?	X	
3. Decant inlet elevation (operator records)?	N/A		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	N/A		Is water entering inlet, but not exiting outlet?	D/N/A	
5. Lowest dam crest elevation (operator records)?	N/A		Is water exiting outlet, but not entering inlet?	D/N/A	
6. If instrumentation is present, are readings recorded (operator records)?	See Note		Is water exiting outlet flowing clear?	D/N/A	
7. Is the embankment currently under construction?		X	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation,stumps, topsoil in area where embankment fill will be placed)?	N/A		From underdrain?		X
9. Trees growing on embankment? (If so, indicate largest diameter below)		X	At isolated points on embankment slopes?		X
10. Cracks or scarps on crest?		X	At natural hillside in the embankment area?		X
11. Is there significant settlement along the crest?		X	Over widespread areas?		X
12. Are decant trashracks clear and in place?		X	From downstream foundation area?		X
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		X	"Boils" beneath stream or ponded water?		X
14. Clogged spillways, groin or diversion ditches?	D/N/A		Around the outside of the decant pipe?		X
15. Are spillway or ditch linings deteriorated?	D/N/A		22. Surface movements in valley bottom or on hillside?		X
16. Are outlets of decant or underdrains blocked?		X	23. Water against downstream toe?		X
17. Cracks or scarps on slopes?		X	24. Were Photos taken during the dam inspection?	X	

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

Inspection Issue #	Comments
2, 3, 4, 5.	Owner/Operator could not produce records.
6.	Observation wells installed; however, no operator readings/records available.
11.	Embankment crest is irregular, and difficult to determine if settlement has contributed to this condition.
18.	Small sloughing failure on east embankment interior slope.
19.	Localized erosion on east and south embankment outer slope
20.	Plant is closed; no water entering inlet or exiting outlet.
General Note #1 -	West embankment of pond is roadway embankment (State Rte 100), which was inspected.

---COMMENTS CONTINUE ON ATTACHED SHEET

N/A = Not Available
D/N/A = Does Not Apply

EXTRA PAGE – CCD INSPECTION CHECKLIST FORM – PEARL POWER PLANT, IL

August 20, 2012

General Note #2 – Dried ash has been placed outside east limit (river side) of the pond; it appears runoff is contained within the general area of the ash and allowed to air-dry.

General Note #3 – Water level lowered by about half since plant closing in June 2012.

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # IL0036765 INSPECTOR Clement Bommarito, Albert Ayenu-Prah

Date August 20, 2012

Impoundment Name Ash Pond

Impoundment Company Pearl Power Plant (owned by Prairie Power, Inc.)

EPA Region 5

State Agency (Field Office) Addresss N/A

Name of Impoundment Ash Pond

(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New X Update _____

	Yes	No
Is impoundment currently under construction?	_____	X
Is water or ccw currently being pumped into the impoundment?	_____	X

IMPOUNDMENT FUNCTION: Storage of CCW

Nearest Downstream Town : Name Kampsville

Distance from the impoundment 10 miles

Impoundment Location: Longitude -90 Degrees 37 Minutes 0 Seconds (Source: Google Earth)

Latitude 39 Degrees 26 Minutes 56 Seconds

State IL County Pike

Does a state agency regulate this impoundment? YES X NO _____

If So Which State Agency? Illinois Environmental Protection Agency (IEPA)

Note: Management of CCW is required to meet applicable IEPA regulations

HAZARD POTENTIAL (In the event the impoundment should fail, the following would occur):

_____ **LESS THAN LOW HAZARD POTENTIAL:** Failure or misoperation of the dam results in no probable loss of human life or economic or environmental losses.

_____ **LOW HAZARD POTENTIAL:** Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

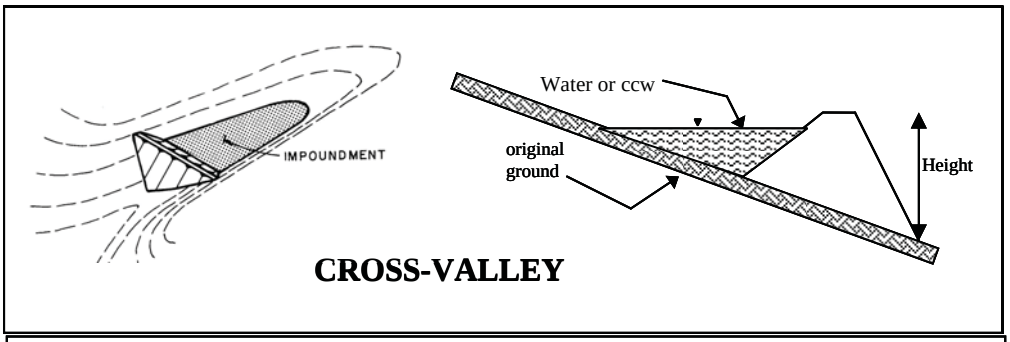
_____ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

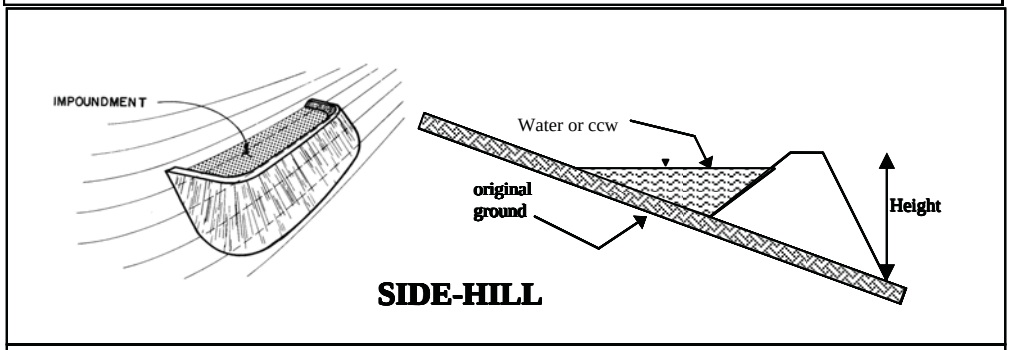
_____ **HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

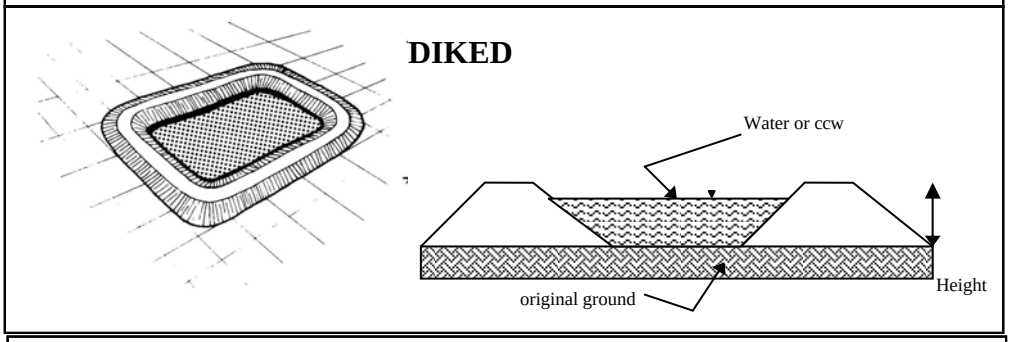
DESCRIBE HAZARD POTENTIAL:

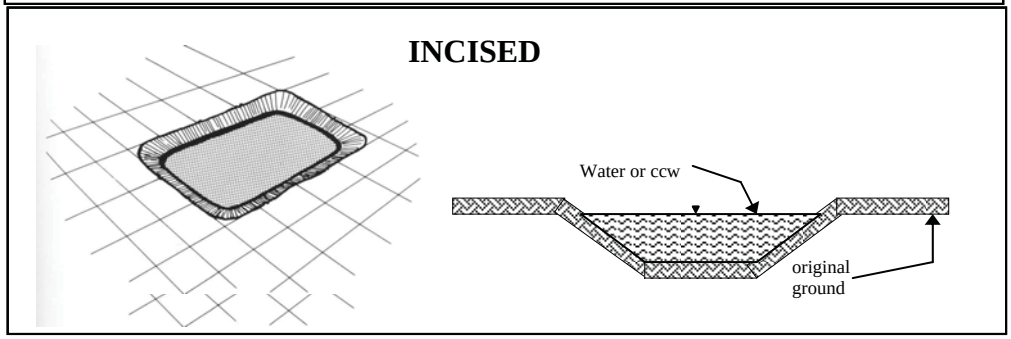
If a breach were to occur in the containment embankments on the north and east sides of the pond, surrounding grades would result in gravity flow of fly ash to the east across plant property and through crop fields into the nearby Illinois River. A breach in the west embankment would flow to the north end of the pond and turn downgrade to the east (to the Illinois River) in a manner similar to that described for a north embankment breach. The south embankment of the coal ash pond is shared with an adjacent storm water pond. Breach of this embankment would discharge ash into this pond. Based on CDM Smith's visual observations, a breach of this embankment would discharge stormwater into the CCW impoundment.

CONFIGURATION:









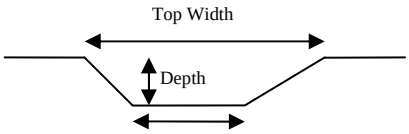
_____ Cross-Valley
_____ Side-Hill
__X__ Diked
_____ Incised (form completion optional)
_____ Combination Incised/Diked

Embankment Height ____4-10____ feet
Pool Area (source: Google Earth) 13 acres
Current Freeboard ____3____ feet

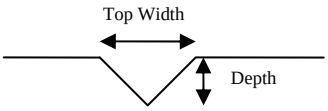
Embankment Material ____Clay____
Liner ____Clay____
Liner Permeability ____N/A____

TYPE OF OUTLET (Mark all that apply)

TRAPEZOIDAL



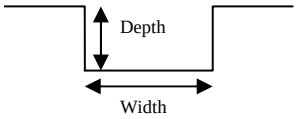
TRIANGULAR



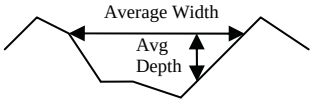
N/A **Open Channel Spillway**
_____ Trapezoidal
_____ Triangular
_____ Rectangular
_____ Irregular

_____ depth
_____ bottom (or average) width
_____ top width

RECTANGULAR

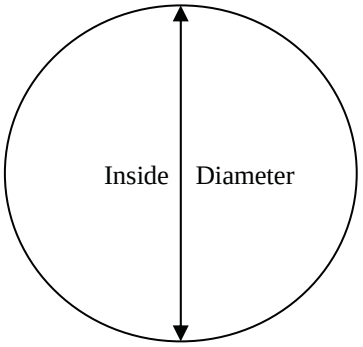


IRREGULAR



X **Outlet**

20" inside diameter



Material
_____ corrugated metal
_____ welded steel
_____ concrete
_____ plastic (hdpe, pvc, etc.)
X other (specify) Fiber Reinforced Plastic
- Vertical portion of outlet pipe broken

Is water flowing through the outlet? YES _____ NO X

_____ **No Outlet**

_____ **Other Type of Outlet** (specify) _____

The Impoundment was Designed By N/A - Neither design drawings nor as-built drawings available at the time of assessment.

Has there ever been a failure at this site? YES _____ NO _____X_____

If So When? _____

If So Please Describe : _____

Has there ever been significant seepages at this site? YES _____ NO ___X___

If So When? _____

IF So Please Describe: _____

Has there ever been any measures undertaken to monitor/lower Phreatic water table levels based on past seepages or breaches at this site? YES _____ NO ____X____

If so, which method (e.g., piezometers, gw pumping,...)? _____

If so Please Describe : Note: Piezometers installed at various times, including as recent as this year; they were not installed in response to past seepage or breach.

ADDITIONAL INSPECTION QUESTIONS

Concerning the embankment foundation, was the embankment construction built over wet ash, slag, or other unsuitable materials? If there is no information just note that.

It is unknown if the embankment construction was over wet ash, slag, or other unsuitable materials.

Did the dam assessor meet with, or have documentation from, the design Engineer-of-Record concerning the foundation preparation?

The assessor did not meet with, or have documentation from, the design Engineer of Record concerning foundation preparation.

From the site visit or from photographic documentation, was there evidence of prior releases, failures, or patchwork on the dikes?

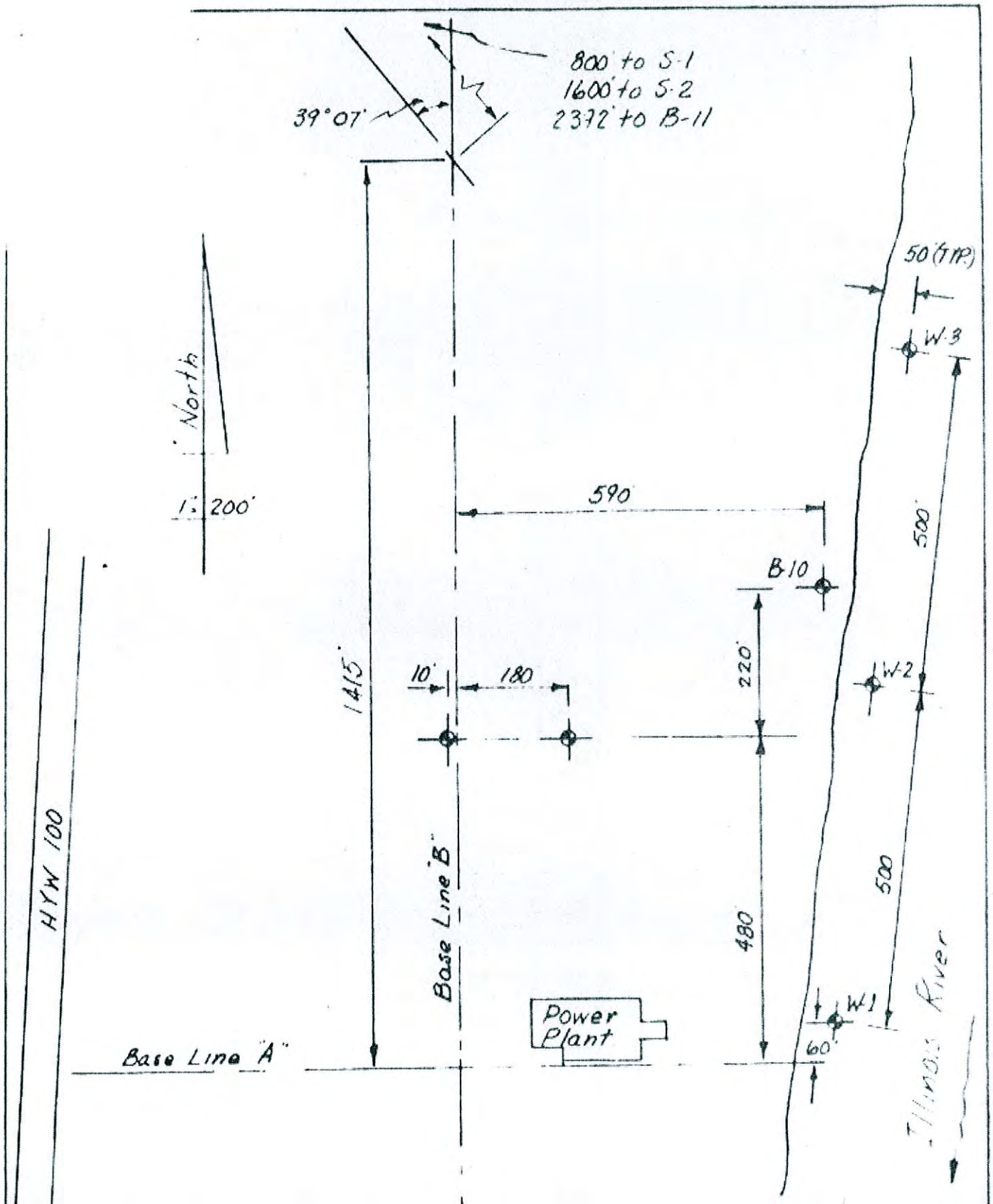
There was no indication of prior releases, failures or patchwork on the embankments.

Appendix C

Documentation from Pearl Power Plant

Appendix C

Doc 01: Soil Boring Logs



Bench Mark · RR spike in S. side of 25" poplar, W. side of Hyw 100, just N. of Base Line "A" Elev. 430.9'

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A-13

BORING LOCATION SKETCH

Western Illinois Power Cooperative
First Unit · Pearl Station
Pearl, Illinois

LAYNE-WESTERN CO.

RECORD OF FIELD EXPLORATION

BORING W-1 CONTRACT C-943-K

FOREMAN Schaefer LOGGED BY [illegible] DATE STARTED 5/20/64 DATE COMPLETED 5/20/64

LOCATION per sketch BORING METHOD Rotary CASING 30' of 4"

NOTES	D	M.C.	TYPE	NO.	Q.U.	BLOWS/FT.	ELEV.	DESCRIPTION	DEPTH
							421 ±	SURFACE	16.5
Surface elevation approximate.									
								WATER	
water depth 6'.							415.0		6.0
								Soft black ORGANIC SILT to CLAYEY SILT	
S-1, sample fell out of ST - Top ½ is organic silt, bottom ½ silty sand w/ wood fragments.			ST	1	-	-	410.0		5.0
			SS	2	-	4/8			
			SS	3	-	3/6		loose fine to medium SILTY SAND, trace of gravel, with shells	
trace to some fine-med. gravel 22'-24'.			SS	4	-	4/6			
			SS	5	-	4/6			
			SS	6	-	1'2	391.5 389.0	*	30.0 33.5
								Bottom of hole @ 33.5'	
								* Soft red-brown CLAY	

GROUND WATER DEPTH

SCALE 1" = 6' AT COMPLETION 16' @ AFTER ___ HRS @ AFTER ___ HRS

RECORD OF FIELD EXPLORATION

BORING W-2 CONTRACT C-943-K

FOREMAN Schafer LOGGED BY Kilman DATE STARTED 5/20/64 DATE COMPLETED 5/20/64

LOCATION per sketch BORING METHOD Rotary CASING 25' of 4"

NOTES	D	M.C.	TYPE	NO.	QU	BLOWS FT.	ELEV.	DESCRIPTION	DEPTH
Surface elevation approximate.							421 ±	SURFACE	±3.7
water depth 3.7'.								WATER	
							417.3		0.0
								Soft grey ORGANIC CLAY, some sand, sand pockets	
	109	19.4	ST	1	0.24	-			
							409.3		8.0
			ST	2	-	-			
			SS	3	-	2/5		Loose grey fine to medium SILTY SAND, trace fine to medium gravel, with shells	
			SS	4	-	5/6			
			SS	5	-	3/7			
			SS	6	-	3/5	386.3		31.0
								Bottom of hole @ 31.0'	

GROUND WATER DEPTH

SCALE 1" = 6' AT COMPLETION 3.7' @ AFTER ___ HRS @ AFTER ___ HRS

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LAYNE-WESTERN CO.

RECORD OF FIELD EXPLORATION

BORING W-3 CONTRACT D-543-K

DATE COMPLETED

CASING

DATE STARTED

BORING METHOD

LOGGED BY

FOREMAN

LOCATION

NOTES	D	MC	TYPE	NO.	QU	BLOWS/FT	ELEV.	DESCRIPTION	DEPTH
Surface elevation approximate.							421.1	SURFACE	+7.0
								WATER	
water depth 7'.									
							414.0		0.0
								Very soft dark grey ORGANIC SILT & CLAY with shell wood fragments	
							407.0		7.0
			ST	1	-	-			
			SS	2	-	5/5			
			SS	3	-	5/6		Loose dark grey fine to medium SAND	
			SS	4	-	3/6			
			SS	5	-	4/6			
			SS	6	-	4/5	384.0		[illegible]
								Bottom of hole @ 30.0'	

GROUND WATER DEPTH

SCALE 1" = 6' AT COMPLETION +7' @ AFTER HRS. @ AFTER HRS.

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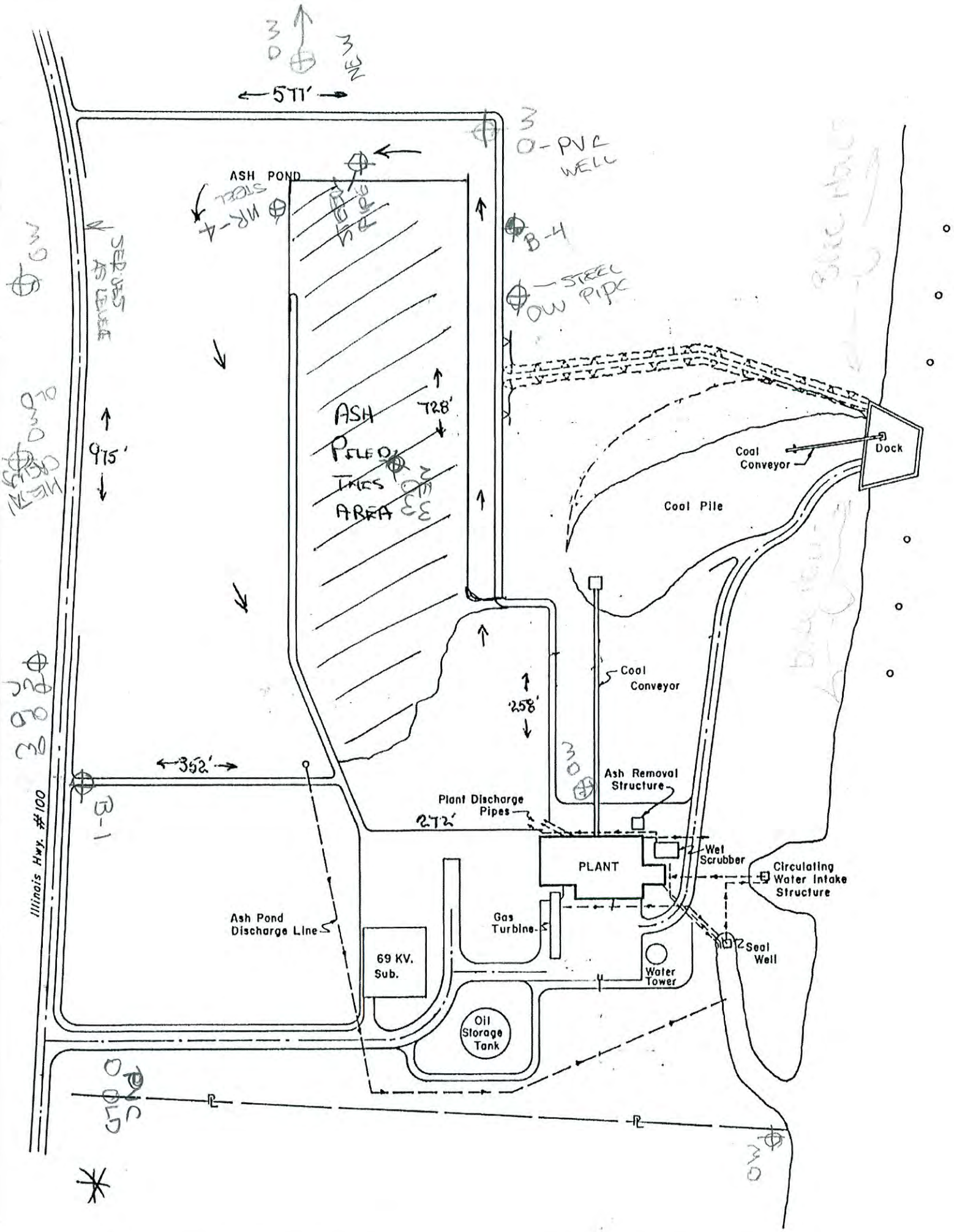
LAYNE-WESTERN CO.

Appendix C

Doc 02: Site Map of Pearl Power Plant


577'
ASH POND
MR-4
B-4
PVC WELL
STEEL OW PIPE
ASH PILED TILES AREA
728'
975'
Coal Conveyor
Dock
Coal Pile
Cool Conveyor
258'
352'
Ash Removal Structure
Plant Discharge Pipes
272'
PLANT
Wet Scrubber
Circulating Water Intake Structure
Ash Pond Discharge Line
Gas Turbine
69 KV. Sub.
Seal Well
Water Tower
Oil Storage Tank
B-1
Illinois Hwy. #100

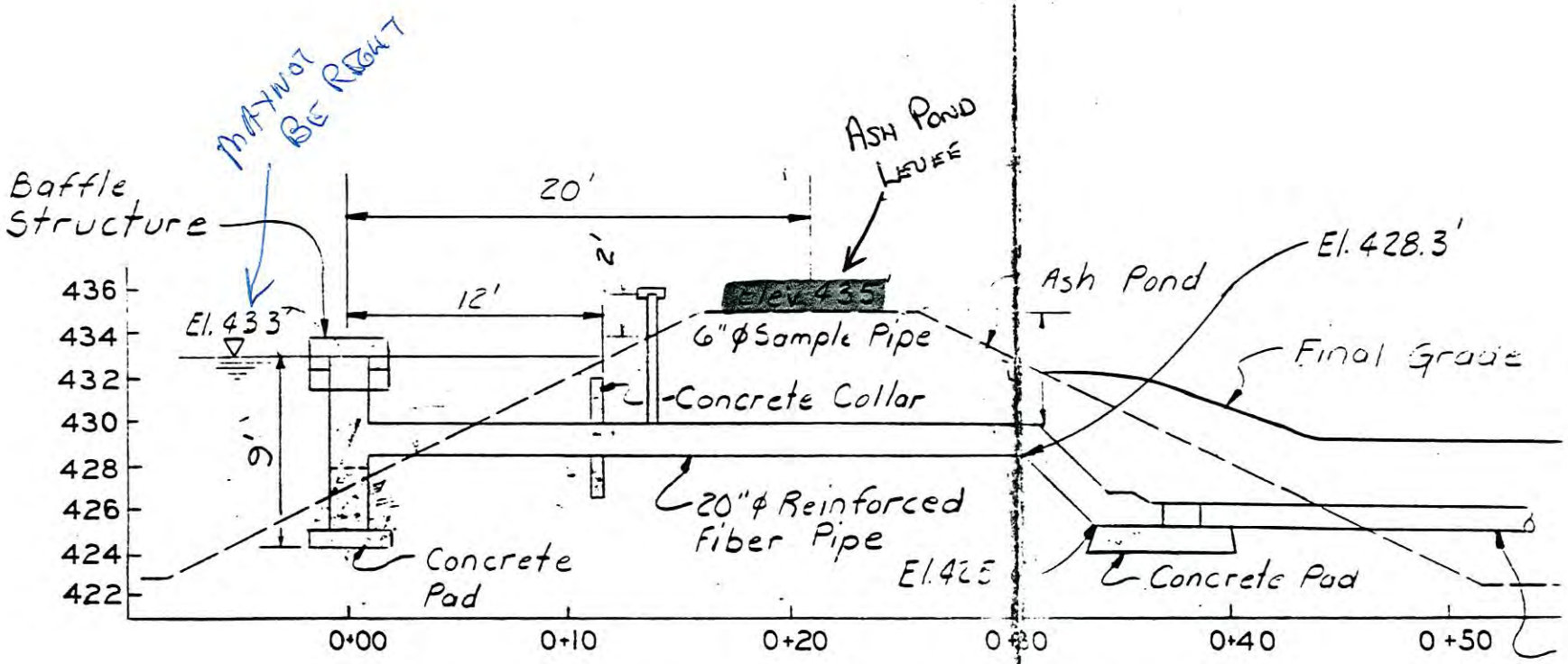
Appendix C

Doc 03: Ash Pond Discharge Piping

3/16/92

PIPE MAY BE AT THIS ELEVATION BUT DO NOT COUNT ON IT.

RF



PROPOSED ASH POND DISCHARGE PIPING THROUGH DIKE

Scale: 1"=8'

Appendix C

Doc 04: Prairie Power Letters Re: Decommissioning of Pearl Station

PRAIRIE POWER INC.

P.O. Box 610
Jacksonville, IL 62651
Telephone: 217/245-6161
Fax: 217/245-1705
www.ppi.coop

June 8, 2012

VIA CERTIFIED MAIL

Mr. Edwin Bakowski, P.E.
Manager, Permit Section
Illinois Environmental Protection Agency
Division of Air Pollution Control - MC #11
1021 North Grand Avenue East
P. O. Box 19276
Springfield, Illinois 62794-9276

Re: Shutdown of Coal-fired Boiler
Prairie Power, Inc.
Highway 100 South, Pearl
Facility I.D. No. 149817AAB
Permit No. 95080060

Dear Mr. Bakowski:

On June 1, 2012, Prairie Power, Inc. ("PPI") began decommissioning the coal-fired boiler and associated equipment at the Pearl Station ("Pearl"). PPI has drained the fuel oil system that serves the boiler and has removed portions of the piping, rendering the boiler inoperable. In addition, the water has been removed from the boiler, and the make-up water system has been drained.

The coal-fired boiler at Pearl is currently permitted under PPI's CAAPP permit (No. 95080060). PPI is compiling a submittal to the Illinois Environmental Protection Agency ("Illinois EPA") to revise its CAAPP permit to reflect the changed operations at Pearl. The submittal will request revisions to the CAAPP permit to eliminate the boiler and the following associated equipment: coal handling equipment, crusher house, fly ash equipment, lime handling equipment, and heating boiler. Since PPI will continue to operate the combustion turbine, the turbine and its associated fuel tank will remain permitted.

COPY

Finally, also note that PPI's submittal to Illinois EPA will include a request to withdraw construction permit (No. 10020011), which was issued to PPI for Pearl on December 2, 2010. If you should have any questions regarding the above, please do not hesitate to contact me.

Sincerely,

Jay Bartlett
President and CEO

pc: N. LaDonna Driver, Esq.

PRAIRIE POWER INC.

P.O. Box 610
Jacksonville, IL 62651
Telephone: 217/245-6161
Fax: 217/245-1705
www.ppi.coop

June 8, 2012

VIA CERTIFIED MAIL

Sabrina M. Argentieri, Esq.
Assistant Regional Counsel
U.S. Environmental Protection Agency
Region V, C14J
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

Re: Shutdown of Coal-fired Boiler
Prairie Power, Inc.
Highway 100 South, Pearl
Facility I.D. No. 149817AAB
Permit No. 95080060

Dear Ms. Argentieri:

On June 1, 2012, Prairie Power, Inc. ("PPI") began decommissioning the coal-fired boiler and associated equipment at the Pearl Station ("Pearl"). PPI has drained the fuel oil system that serves the boiler and has removed portions of the piping, rendering the boiler inoperable. In addition, the water has been removed from the boiler, and the make-up water system has been drained.

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COPY

Finally, also note that PPI's submittal to Illinois EPA will include a request to withdraw construction permit (No. 10020011), which was issued to PPI for Pearl on December 2, 2010. If you should have any questions regarding the above, please do not hesitate to contact me.

Sincerely,

Jay Bartlett
President and CEO

pc: N. LaDonna Driver, Esq.
USEPA Region V Compliance Tracker

Appendix D

Photographs

Photograph D.1. Interior Slope of South Embankment Showing Inlet Piping Looking West

Photograph D.2. Crest of East Embankment Covered by Dry Ash Looking North

Photograph D.3. Plant Discharge into River

Photograph D.4. Intake to Plant from River

Photograph D.5. Unidentified Pipe Inlet to Pond

Photograph D.6. Crest of East Embankment Looking North

Photograph D.7. Exterior Slope of East Embankment Looking North

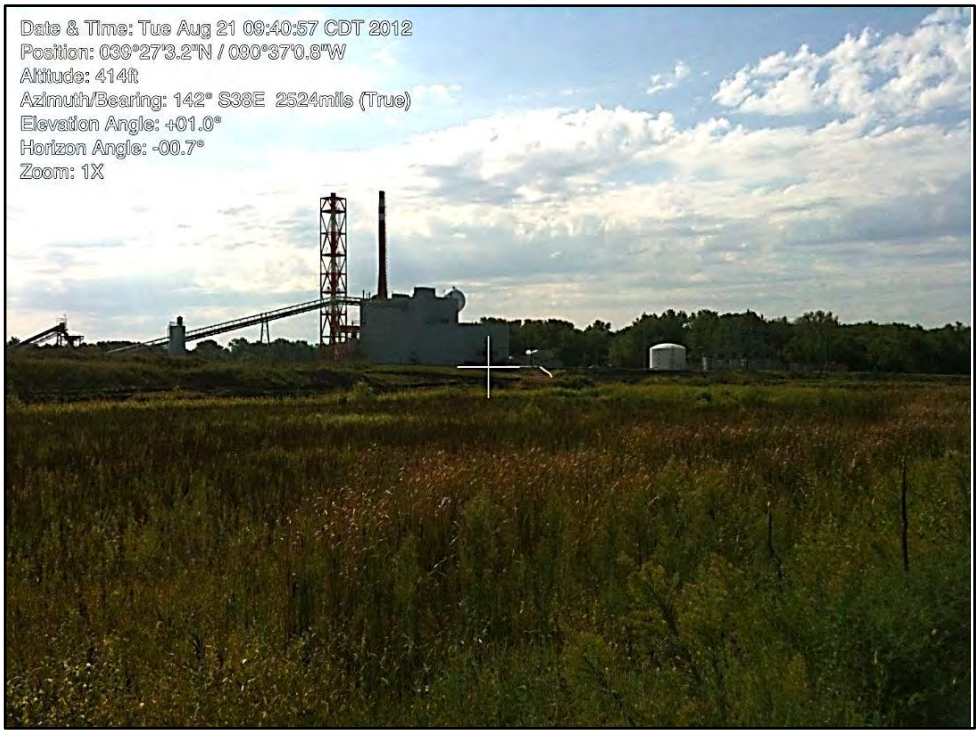
Photograph D.8. Interior Slope of East Embankment Looking North with Portion of Ash Pile on Left Side of Photo

Photograph D.9. Old Observation Well-Typical

Photograph D.10. Interior Slope of West Embankment Looking Southwest with Railing of Highway 100 in the Background

Photograph D.11. New Observation Well-Typical

Photograph D.12. West Embankment Along Highway 100 Looking South



Photograph D.13. View of Pond from Northwest Corner Looking Southeast

Photograph D.14. Interior Slope of West Embankment along Highway 100 Looking North

Photograph D.15. Overview Picture of CCW Impoundment Looking Northwest

Appendix D
Photo GPS Locations

Site: Pearl Power Plant
Datum: NAD 1983
Coordinate Units: Decimal Degrees

Photograph	Latitude	Longitude
D.1	39.44883	-90.61433
D.2	39.44883	-90.61433
D.3	39.44850	-90.61333
D.4	39.44867	-90.61317
D.5	39.44950	-90.61467
D.6	39.44983	-90.61467
D.7	39.45050	-90.61450
D.8	39.45033	-90.61483
D.9	39.45183	-90.61583
D.10	39.45167	-90.61617
D.11	39.45183	-90.61667
D.12	39.45167	-90.61683
D.13	39.45083	-90.61683
D.14	39.44900	-90.61683
D.15	39.44883	-90.61400
5.1	39.44950	-90.61400
5.2	39.44900	-90.61683
5.3	39.45167	-90.61483
5.4	39.44900	-90.61700
5.5	39.45150	-90.61483
5.6	39.44883	-90.61483
5.7	39.45050	-90.61683
5.8	39.45183	-90.61483
5.9	39.44900	-90.61417
5.10	39.44917	-90.61583
5.11	39.44817	-90.61333