Report of Dam Safety Assessment of Coal Combustion Surface Impoundments
Interstate Power and Light Company
M.L. Kapp Generating Station
Clinton, IA

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I certify that the management units referenced herein:

Interstate Power and Light Company's M.L. Kapp Power Station Emergency Ash Settling Ponds (Primary and Secondary) and Main Ash Settling Ponds (Primary and Secondary) were assessed on October 27, 2010. I further certify that this report was prepared under my direct personal supervision.

Signature Don W. Dotson
Don W. Dotson, PE
Senior Geotechnical Engineer

List of AMEC Participants who have participated in the assessment of the management units and in preparation of the report:

- Chris Eger
  CADD Technician
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  GIS Specialist
- Mary Sawitzki, PE
  Civil/Environmental Engineer
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1.0 INTRODUCTION AND PROJECT DESCRIPTION

1.1 Introduction

AMEC was contracted by the United States Environmental Protection Agency (EPA) contract BPA EP09W001702, to perform assessments of selected coal combustion byproducts surface impoundments. AMEC was directed by EPA, through the provided scope of work and verbal communications, to utilize the following resources and guidelines to conduct a site assessment and produce a written assessment report for the coal combustion waste facilities and impoundments.

- Coal Combustion Waste (CCW) Impoundment Inspection forms (hazard rating, found in Report Appendix A)
- Coal Combustion Dam Inspection Checklist (found in Report Appendix A)
- Impoundment Design Guidelines of the Mining Safety and Health Administration (MSHA) Coal Mine Impoundment Inspection and Plan Review Handbook (hydrologic, hydraulic, and stability conditions)
- National Dam Safety Review Board Condition Assessment Definitions (condition rating)

As part of this contract with EPA, AMEC was assigned to perform an assessment of Interstate Power and Light Company's (IPL) M.L. Kapp Generating Station (M.L. Kapp), which is located in Clinton, Iowa as shown on Figure 1, the Site Location and Vicinity Map.

A site visit to M.L. Kapp was made by AMEC on October 27, 2010. The purpose of the visit was to perform visual observations, to inventory coal combustion waste (CCW) surface impoundments, assess the containment dikes, and to collect relevant historical impoundment documentation.

AMEC engineers, Don Dotson, PE and Mary Sawitzki, PE, were accompanied during the site visit by the individuals listed on Table 1.

Table 1. Site Visit Attendees

Company or Organization	Name and Title
Interstate Power and Light Company	Greg Hudson, Plant Manager
Interstate Power and Light Company	Kurt Hubbart, Environmental and Safety Specialist
Alliant Energy Corporate Services, Inc.	William Skalitzky, Senior Environmental Specialist

Comments to the Draft[1] Report and additional documentation concerning the facility were received from Alliant Energy and IPL (an Alliant Energy Company) in early 2011. Comments from Alliant Energy noted:

> *IPL is claiming business confidentiality for both the Draft and Final Reports associated with the site assessment of the coal combustion residual impoundments at the M.L. Kapp Generating Station and for the comments*

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[1] AMEC submitted the Draft Report to EPA in December 2010.

submitted in this letter in their entirety, a claim which is being made in accordance with 40 C.F.R. Part 2, Subpart B.

1.2 Project Background

Coal fired power plants, like IPL's M.L. Kapp Generating Station, produce CCW as a result of the power production process. At M.L. Kapp, impoundments (dams) were designed and constructed to provide storage and disposal for the CCW that is produced. CCW impoundment areas at the M.L. Kapp facility are referred to as the Main Ash Settling and the Emergency Ash Settling areas. Each settling area contains a Primary and a Secondary Settling Pond that are located within the original ash pond foot print. The ponds were modified, as described in this report, to aid in the removal of settled ash. The Emergency Ash Settling Ponds do not receive CCW waste on a regular basis, but serve as an alternative sluicing destination when required. The ponds in both Ash Settling Areas were commissioned in 1965. Modifications were made to the Emergency and Main Ash Settling Areas in 2000 and 2002, respectively.

The National Inventory of Dams (NID), administered by the U.S. Army Corps of Engineers (USACE), provides a hazard rating for many dams within the United States. The Ash Settling Ponds at M.L. Kapp are not included in the NID.

1.2.1 Coal Combustion Dam Inspection and Checklist Forms

As part of the observations and evaluations performed at M.L. Kapp, AMEC completed EPA's Coal Combustion Dam Inspection Checklists and CCW Impoundment Inspection Forms. Inspection forms for each pond are presented in Appendix A. The Impoundment Inspection Forms include a section that assigns a "Hazard Potential" that is used to indicate what would occur following failure of an impoundment. "Hazard Potential" choices include "Less than Low," "Low," "Significant," and "High." As defined on the Inspection Form, dams assigned a "Significant Hazard Potential" 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." "Low Hazard Potential" classification definition is reserved for dams 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." "Less than Low Hazard Potential" classification is reserved for dams where "failure or misoperation results in no probable loss of human life and no economic or environmental losses."

Based on the site visit evaluation of the impoundments, AMEC engineers originally assigned a "Significant Hazard" potential to the Emergency Ash Secondary Settling Pond and a "Low Hazard" potential to each of the other three ponds. The Emergency Ash Secondary Settling Pond was assigned a "Significant Hazard" rating due to its proximity to Mill Creek and the Mississippi River. However, after review of comments regarding the Draft Report received from Alliant Energy and further internal review, in AMEC's opinion, the Emergency Ash Secondary Settling Pond hazard rating should be amended from "Significant" to "Low". The storage volume of the Emergency Secondary Pond is small and the pond does not contain significant amounts of CCW products as it is used to contain decant from the Emergency Ash Primary Settling Pond prior to discharge to a permitted NPDES outfall. The small volume of solids that are contained in this pond would, following any breach, settle below the impoundment in the grassy lowlands of Mill Creek.

1.2.2 State Issued Permits

The Iowa Department of Natural Resources issued an Iowa National Pollution Discharge Elimination System (NPDES) Permit to IPL. The current permit identification number is Iowa 2326103. This NPDES Permit authorizes IPL to discharge decant from the Main Ash Secondary Settling Pond through Outfall 003, as well as from the Emergency Ash Secondary Settling Pond through Outfall 004, to the Mississippi River. The effective date of the permit is July 16, 1999. The permit date of expiration was July 15, 2004. IPL submitted a permit renewal request and is authorized to continue discharging under the existing NPDES Permit since the NPDES Permit Renewal Application was submitted at least 180 days prior to the expiration of the permit. The reason for the delay in issuance of the permit is a backlog of NPDES permit renewal applications at the State of Iowa.

1.3 Site Description and Location

The M.L. Kapp Generating Station is located in the city of Clinton, Clinton County, Iowa. While Beaver Slough, a spur of the Mississippi River, is located directly adjacent to and east of the facility buildings and the Emergency Ash Settling Ponds, the remaining sides of the facility are surrounded by industry. The Main Ash Settling Pond area is located apart from the Emergency Ponds and facility buildings. The Aerial Site Plan, included as Figure 2, provides a view of the pond areas and their proximity to the creek and river.

Figure 3, the Critical Infrastructure Map, provides an aerial view of the region and indicates the location of the M.L. Kapp ash ponds in relation to schools, hospitals, and other critical infrastructure that is located within approximately 5 miles down gradient of the impoundments. A table that provides names and coordinate data for the infrastructure is included on the map. A Topographic Site Map is included as Figure 4.

1.4 Ash Ponds

M.L. Kapp utilizes coal in the production of electricity. In this process, two types of ash are generated: fly ash and bottom ash. Bottom ash, the heavier and coarser of the two is typically sluiced into the Main Ash Primary Settling Pond, but can, if necessary, be sluiced to the Emergency Ash Primary Settling Pond. Decant water from each Primary Pond is gravity discharged into the neighboring Secondary Pond. Settled decant is pumped from each Secondary Pond and discharged through permitted NPDES outfalls as described previously. Fly ash is not typically sluiced to either pond but is stored in the fly ash silo for implementation into the Beneficial Reuse Program as a replacement in the production of cement. Fly ash is only sluiced to the ponds if the ash silo is full and the cement producing facilities are no longer accepting IPL's product. The ash handling summary detailed above was based on review of provided documentation as well as communication with Westar personnel who are knowledgeable concerning the facility's operational processes.

A May 22, 2009 document, written by Alliant Energy in response to EPA's Request for Information under Section 104(e) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C 9604(e), provided the following general background for the ash ponds.

- Both ponds in the Main Ash Settling Area temporarily or permanently contain fly ash, bottom ash, pyrites, and other materials including ash transport water, boiler water wash, air heater wash (fly ash), and site storm water runoff.

- Both ponds in the Emergency Ash Settling Area temporarily or permanently contain fly ash, bottom ash, pyrites, coal pile stormwater runoff, ash transport waters, boiler water wash, air heater wash (fly ash), steam grade water production wastewaters, plant area storm water runoff, ash weir overflow, plant floor drains, non-chemical turbine/boiler cleans and clean rinsates waters from turbine/boiler chemical cleans that are tested for various metals prior to discharging into the emergency ash ponds..
- All Main and Emergency Settling Ponds were designed by and constructed under the supervision of a professional engineer.
- The Main or Emergency Settling Ponds are not presently inspected or monitored by a professional engineer.

IPL's March 18, 2009 response to EPA's Request for Information and other provided documentation, as well as recent communications with Alliant Energy personnel, provided the following additional information that is specific to each ash pond. Current descriptive information resulting from the site visit, as well as photographic references, are provided in Section 2 of this Assessment Report.

1.4.1 Main Ash Settling Area

The Main Ash Settling Area is located approximately 0.5 miles northwest of the main facility buildings and Emergency Ash Settling Ponds. This area was commissioned in 1965 as a single pond and received sluiced CCW from the facility. Discharge from the original pond was by gravity flow to Mill Creek through a discharge structure located on the north berm perimeter. As illustrated on Figure 5, the original berm was designed to have a crest width of 10 feet and an embankment height of 11 feet.

In 2002, dewatered ash in the pond was dredged to create the interior two pond system that currently exists. CCW from the facility is sluiced into the eastern corner of Main Ash Primary Settling Pond through a 10-inch pipeline. Decant from the Primary Pond flows by gravity to the Main Ash Secondary Settling Pond, entering into its west corner. Flow is discharged from the Secondary Pond by pump to permitted NPDES outfall 003. Table 2 provides a summary of surface area, height, storage capacity, and stored material volumes for these ponds.

1.4.2 Emergency Ash Settling Area

The Emergency Ash Settling Area, also commissioned in 1965, is located directly adjacent to the main facility buildings and the coal pile. It was necessary to enlarge the coal pile in 2001, which in turn required modification of the Emergency Settling Ponds. Figure 6 illustrates the layout of the ponds prior to 2001 and the modified layout that currently exists. Discharge from the original pond was by gravity to Mill Creek through a discharge structure located on the north embankment of the Emergency Ash Secondary Settling Pond. The northern embankment of the Secondary Pond is diked, all other perimeter locations are incised. Flow discharges from the Primary Pond into the Secondary Pond by gravity through an inverted culvert pipe located in the berm that separates the two ponds. Discharge from the Secondary Pond is by pump to permitted NPDES outfall 004. Table 2 provides a summary of surface area, height, storage capacity and stored material volumes for these ponds.

Table 2. Ash Settling Pond Size and Storage Data

Area	Surface Area (acre)	Maximum Height of Management Unit (feet)	Storage Capacity (cubic yards)	Store Material Volume (cubic yards)
Main Ash Settling Ponds				
Primary	6.9	25	167,000[1]	52,400[4]
Secondary	2.3	10	37,000[1]	14,800[4]
Emergency Ash Settling Ponds				
Primary	0.74	2	4,770[2]	1,190[3]
Secondary	0.54	10	3,460[2]	865[3]

[1] Measured in 2006.
[2] Measured in 2000.
[3] Measured in May 2009.
[4] Pond was undergoing active dredging in 2010, Alliant Energy records indicate 9,500 tons of ash removed and, at 1.5 tons per cubic yard, 14,250 cubic yards estimated removed. Stored material, as of late 2010 was 52,400 cubic yards, not the 66,700 cubic yards indicated in the Draft report as measured in 2006.

1.5 Previously Identified Safety Issues

Discussions with plant personnel and review of provided documentation indicate that there are no current or previously identified safety issues from the previous 5 years at the M.L. Kapp Generating Station.

1.6 Site Geology

The M.L. Kapp Generating Station is located at the interface of the Iowan Surface geologic formation and the Mississippi Alluvial Plain formation. These two formations consist of alluvial deposits of silt, clays, sands and gravels. The underlying bedrock of Clinton County is Niagara Limestone and dolomite of the Silurian System. The limestone’s chemical composition is a carbonate of lime and magnesium, with a small amount of silica and alumina, colored yellow by the hydrated oxide of iron. Most of the surface rock is a porous, disintegrated limestone with frequent pockets of crystals of dolomite. Ledges at greater depths are apt to be more fine-grained and compact.

1.7 Inventory of Provided Materials

IPL provided several documents to AMEC that pertained to the design and operation of the M.L. Kapp Generating Station. These documents were used in the preparation of this report and are listed in Appendix C, Inventory of Provided Materials.

2.0 FIELD ASSESSMENT

2.1 Visual Observations

AMEC performed visual assessments of M.L. Kapp's Ash Ponds, including the Main Primary and Secondary and Emergency Primary and Secondary, on October 27, 2010. Assessment of the ash ponds was completed in general accordance with FEMA's *Federal Guidelines for Dam Safety, Hazard Potential Classification System for Dams,* April 2004. The EPA Coal Combustion Dam Inspection Checklist and Coal Combustion Waste (CCW) Impoundment Inspection Form were completed for each ash pond during the site visit and provided to EPA via email within five business days following the site visit. Appendix A contains copies of the completed checklist forms. A Photo Location Map (B-1), as well as descriptive photos, can be found in Appendix B. Rainfall data for the Clinton, Iowa area was collected for thirty days prior to the site visit. Table 3, below, summarizes the rainfall data for the days and month immediately preceding AMEC's site visit.

Table 3. M.L. Kapp Rainfall Data

Rainfall Prior to Site Visit	
Date	**Rainfall (in.)**
October 19, 2010	0.00
October 20, 2010	0.00
October 21, 2010	0.00
October 22, 2010	0.00
October 23, 2010	0.49
October 24, 2010	0.24
October 25, 2010	0.00
October 26, 2010	0.79
October 27, 2010	0.00
Total (9 days prior to visit)	1.52
October Rainfall	1.52
Total (30 days prior to visit)	1.52

2.2 Visual Observations - Emergency Ash Primary and Secondary Settling Ponds

The Emergency Ash Primary and Secondary Ponds are located within the fenced facility building area and adjacent to the coal pile (Photo EP-2). Land use for the area outside of the fenced facility is primarily industrial and includes a sewage treatment plant that is located northeast of these ponds, directly across Mill Creek. Bottom ash and other CCW material enter the Emergency Primary Pond on its west boundary (Photo EP-3). A storm drain pipe, located on the southeast portion of the pond edge, provides a path for runoff from the coal pile to enter the pond (EP-4).

2.2.1 Emergency Ash Primary and Secondary Settling Ponds - Embankments and Crest

Emergency Primary Pond

This pond is incised and contains an internal dike on its northeast side that separates it from the Emergency Secondary Pond (EP-5). The internal dike allows for proper management of the Emergency Ash Pond system by creating a mechanism to remove settled ash on an as needed basis instead of allowing the ponds to be completely filled with settled ash. Upstream slopes are fairly evenly graded and covered by riprap in some locations (Photo EP-5); however, other locations are unevenly graded with a weedy, unmaintained grass cover (Photos EP-1, EP-3, and EP-4). The crest of the dividing dike is soil covered and has an approximate width of 15 feet (Photo EP-5).

Emergency Secondary Pond

The internal divider dike that separates the Primary and Secondary Ponds is located on the Secondary Pond's southwest side (EP-5). The crest of this pond has an approximate width of 15 feet and is primarily soil covered. As with the Primary Pond, the upstream embankment faces in the Secondary Pond are sometimes fairly evenly graded and covered with riprap (Photo EP-10) or, are steep and unevenly graded with sparse grass cover (Photos EP-6 and EP-7). The Secondary Pond is incised on its northwest and southeast sides; however, an approximately 10 to 12 foot embankment exists on its northeast side. The downstream embankment face was noted to be covered in overgrown, weedy vegetation and to contain animal burrows (Photos EP-11, EP-12, EP-13, and EP-15). The land at the downstream embankment toe is the floodplain for Mill Creek and the Mississippi River.

2.2.2 Emergency Ash Primary and Secondary Settling Ponds - Outlet Control Structures

Emergency Primary Pond

The Emergency Primary Pond discharges flow to the Emergency Secondary Pond by gravity through an inverted culvert pipe located in the internal divider dike (Photos EP-5 and EP-6).

Emergency Secondary Pond

Flow is discharged from the Emergency Secondary Pond by pump (Photos EP-7 and EP-9) to permitted NPDES outfall 004. Wastewater flows into the Outfall 004 pumphouse where three effluent pumps are located. Water levels in the pond are controlled by a pump float system and a weir box leading into the pumphouse. The water level in the pond is controlled by removable weir plates. Originally, flow from this pond was discharged by gravity through a now abandoned box weir structure located in the northeast embankment wall (Photos EP-8, EP-10, and EP-14).

2.3 Visual Observations - Main Primary and Secondary Ash Ponds

The Main Ash Settling Pond area is located approximately 0.4 miles to the northwest of the main facility building and the Emergency Ash Settling Ponds. The Main Pond area is bordered by roadway along its western and southern perimeter and by Mill Creek floodplain land to its north and east.

The existing two pond series system in the Main Ash Settling Pond area was originally constructed as a single settling pond. In 2002, the two ponds were created within the boundary of the original pond through dredging operations that utilized in-place, dried CCW material to form new internal divider and perimeter embankments. The resulting two ponds are smaller than the original single pond, which allows the facility to properly manage the settled ash in the pond by performing periodic dredging. During the visual portion of the assessment, the primary pond was out of service and was actively being dredged to increase the wastewater treatment capabilities of the pond. Figure 2, the Aerial Site Plan, illustrates the extent of the current two pond configuration, as well as the location of the existing, original embankment.

Sluiced bottom ash from the plant facility enters the southeast corner of the Main Primary Pond via approximately 1,750 feet of 10-inch pipe from the plant facility (Photos MP-3, MP-4, and M-10).

2.3.1 Main Primary and Secondary Ash Ponds - Embankments and Crest

There is a sizeable amount of dredged and stacked ash throughout the areas outside the ponds since the Main Primary Ash Pond was out of service and was actively being dredged to increase the wastewater treatment capabilities of the pond. Grass and natural ground cover exists in most areas outside the ponds. The dividing dike located between the ash ponds is not grass covered and appears to be dried CCW material (Photo MP-7 and MP-11). Upstream embankments of both the Primary and Secondary Ponds, having been created from dredged ash, vary somewhat in slope, and are not uniformly covered by grass, and feature bushy type vegetation in places (Photos MP-2, MP-6, MP-9, and MP-11).

The original pond embankment remains in-place; however, it does not directly support the ash ponds since the ponds themselves are situated well inside this original embankment. The narrowest distance between a pond boundary and the original downstream embankment face appears to be at the Secondary Pond discharge pump house, which is located at the eastern end of the pond. The original embankment has not been maintained and is covered in trees and vegetation (MP-15 through MP-18). An animal burrow was noted at the top of the northeastern embankment (Photo MP-14).

2.3.2 Main Primary and Secondary Ash Ponds - Outlet Control Structures

Flow is discharged from the northwest corner Primary Pond into the southwest corner of the Secondary Pond through a drop inlet (Photos MP-5 and MP-8)). The drop inlet was noted to be adjustable using extension pieces located nearby (Photo MP-7). The southwest corner of the Secondary Pond, where flow from the Primary Pond enters, was overgrown with grass and weeds and did not appear to have been active in some time (Photo MP-8).

The original, abandoned, single pond configuration outlet structure, a gravity flow weir box, is located on the western portion of the original, northern embankment. The discharge piping is located through the embankment and daylights at the downstream embankment toe, in the Mill Creek floodplain (Photos M-12 and M-13).

Wastewater flows into the Outfall 003 pumphouse where three effluent pumps are located. This structure is situated on the east end of the Secondary Main Ash Pond. Water levels in the pond are controlled by a pump float system and a weir box leading into the pumphouse. The water level in the pond is controlled by removable weir plates.

2.4 Monitoring Instrumentation

There is no geotechnical or groundwater monitoring instrumentation located at the M.L. Kapp Power Station.

3.0 DATA EVALUATION

3.1 Design Assumptions

AMEC has reviewed provided documentation related to design assumptions regarding both hydraulic adequacy and dike stability. However, some design assumptions were not available in the documentation, and have been listed as not provided where necessary.

3.2 Hydrologic and Hydraulic Design

3.2.1 Long Term Hydrologic Design Criteria

The Mine Safety and Health Administration provides minimum hydrologic criteria relevant to CCW impoundments in Impoundment Design Guidelines of the Mining Safety and Health Administration (MSHA) Coal Mine Impoundment Inspection and Plan Review Handbook (Number PH07-01) published by the U.S. Department of Labor, Mine Safety and Health Administration, Coal Mine Safety and Health, October 2007.

When detailing impoundment design storm criteria, MSHA states that dams need “to be able to safely accommodate the inflow from a storm event that is appropriate for the size of the impoundment and the hazard potential in the event of failure of the dam.” Additionally, MSHA notes that sufficient freeboard, adequate factors of safety for embankment stability, and the prevention of significant erosion to discharge facilities, are all design elements that are required for dam structures under their review. Additional impoundment and design storm criteria are as shown in Table 4, MSHA Minimum Long Term Hydrologic Design Criteria.

Table 4. MSHA* Minimum Long Term Hydrologic Design Criteria

Hazard Potential	Impoundment Size	
	< 1000 acre-feet < 40 feet deep	≥ 1000 acre-feet ≥ 40 feet deep
Low - Impoundments located where failure of the dam would result in no probable loss of human life and low economic and/or environmental losses.	100 - year rainfall**	½ PMF
Significant/Moderate - Impoundments located where failure of the dam would result in no probably loss of human life but can cause economic loss, environmental damage, or disruption of lifeline facilities.	½ PMF	PMF
High - Facilities located where failure of the dam will probably cause loss of human life.	PMF	PMF

*Mining Safety and Health Administration (MSHA) Coal Mine Impoundment Inspection and Plan Review Handbook (Number PH07-01) published by the U.S. Department of Labor, Mine Safety and Health Administration, Coal Mine Safety and Health, October 2007

**Per MSHA, the 24-hour duration shall be used with the 100-year frequency rainfall.

Probable maximum flood (PMF) is, per MSHA, “the maximum runoff condition resulting from the most severe combination of hydrologic and meteorological conditions that are considered reasonably possible for the drainage area.” Additionally, MSHA notes the designer should consider several components of the PMF that are site specific. These components are said to include: “antecedent storm; principal storm; subsequent storm; time and spatial distribution of the rainfall and snowmelt; and runoff conditions.” Basic agreement, it was noted, exists between dam safety authorities regarding “combinations of conditions and events that comprise the PMF;” however, there are “differences in the individual components that are used.” MSHA provided the following as a “reasonable set of conditions for the PMF:

- Antecedent Storm: 100-year frequency, 24 hour duration, with antecedent moisture condition II (AMC II), occurring 5 days prior to the principal storm.

- Principal Storm: Probable maximum precipitation (PMP), with AMC III. The principal storm rainfall must be distributed spatially and temporally to produce the most sever conditions with respect to impoundment freeboard and spillway discharge.

- Subsequent Storm: A subsequent storm is considered to be handled by meeting the “storm inflow drawdown criteria,” as described subsequently in the document.

With regard to storm influent drawdown criteria, MSHA Impoundment Design Guidelines noted that:

> *Impoundments must be capable of handling the design storms that occur in close succession. To accomplish this, the discharge facilities must be able to discharge, within 10 days, at least 90 percent of the volume of water stored during the design storm above the allowable normal operating water level. The 10-day drawdown criterion begins at the time the water surface reaches the maximum elevation attainable for the design storm. Alternatively, plans can provide for sufficient reservoir capacity to store the runoff from two design storms, while specifying means to evacuate the storage from both storms in a reasonable period of time - generally taken to be at a discharge rate that removes at least 90% of the second storm inflow volume within 30 days………When storms are stored, the potential for an elevated saturation level to affect the stability of the embankment needs to be taken into account.*

In, Mineral Resources, Department of Labor, Mine Safety and Health Administration, Title *30 CFR § 77.216-2 Water, sediment, or slurry impoundments and impounding structures; minimum plan requirements; changes or modifications, certification*, information relevant to the duration of the probable maximum precipitation is given. Sub-section *(10)* of *77.216-2* states that a “statement of the runoff attributable to the probable maximum precipitation of 6-hour duration and the calculations used in determining such runoff” shall be provided at minimum in submitted plans for water, sediment or slurry impoundments and impounding structures.

The definition of design freeboard, according to the MSHA Guidelines, is “the vertical distance between the lowest point on the crest of the embankment and the maximum water surface elevation resulting from the design storm.” Additionally, the Handbook states that “Sufficient documentation should be provided in impoundment plans to verify the adequacy of the freeboard.” Recommended items to consider when determining freeboard include “potential wave run-up on the upstream slope, ability of the embankment to resist erosion, and potential for embankment foundation settlement.” Lastly, the Handbook states, “Without documentation, and absent unusual conditions, a minimum freeboard of 3 feet is generally accepted for impoundments with a fetch of less than 1 mile.”

The CCW impoundments at the M.L. Kapp Power Station fall within the smallest storm event designation category on Table 4. Using MSHA long term hydrologic criteria, design for the 100-year, 24-hour rainfall event would be recommended.

3.2.2 Hydrologic Design Criteria - Main Ash Settling Ponds

AMEC was provided with a draft *Original Ash Settling Basin Drainage and Capacity* hydrologic design summary (2010 Drainage and Capacity Summary). This draft Summary, which included calculations, was completed by Sargent & Lundy, L.L.C. for Alliant Energy and was dated November 12, 2010 (Sargent & Lundy Calculation #MLK-C-001). The "Original Ash Settling Basin" refers to what is currently called the Main Ash Settling Pond area.

Design input included:

- A current topographical map of the Main Ash Settling Pond area, completed in November 2010 by Hinkle Engineering and Surveying L.L.C.;
- The current topographical map was utilized by Sargent & Lundy to delineate surface areas that are tributary to the Primary and Secondary Ponds in the Main Ash Settling Pond area;
- A 100-year, 24-hour storm event rainfall of 6.25 inches was used in the runoff calculations. The chosen rainfall amount was based on maps of the area provided in the Precipitation Frequency Atlas of the United States, National Oceanic and Atmospheric Administration (NOAA), Atlas 14, Volume 2, Version 3;
- Runoff volumes were calculated using the Soil Conservation Service (SCS) curve number method from Technical Release 55 (TR55); and,
- Discharge from the Secondary Pond is achieved by pump. Three, 550 gallon per minute (gpm) pumps are located in the pump house on the Pond's eastern boundary.

Design assumptions included:

- Two of the three Secondary Pond discharge pumps (rated at 550 gpm each) are sufficient to discharge flow at a rate higher than that of incoming sluiced CCW materials; and,
- Based on pumping capacity, the typical operating water surface elevation in the Secondary Pond does not exceed elevation 585.00 feet;

The total area inside the original Ash Settling area was noted to be 28.4 acres. However, only 18.4 acres of that total acreage currently drains into the Primary and Secondary Ponds. That area was further subdivided and assigned differing runoff curve numbers based on hydrologic soil groups that included:

- Gravel surface of main dike - CN = 90;
- Pond water surface - CN = 100; and,
- Ash and poorly vegetated areas - CN = 85.

As outlined in the SCS curve number method found in TR55, the maximum retention, S, in inches, as well as the runoff depth, D, in inches were calculated. The calculated runoff depth was applied to the surface area tributary to the Secondary Pond and a resulting water surface elevation was determined. Table 5, as presented in the 2010 Drainage and Capacity Summary, provides a summary of the hydrologic calculations.

Table 5. Summary of 2010 Discharge Pond Runoff Volume and Pond Capacity Calculation

Description	Value
Drainage Area, including pond area, A (acre)	18.39
100-year, 24-hour Rainfall (inch)	6.25
Potential Maximum Retention, S (inch)	1.1
Runoff Depth, D (inch)	5.1
Runoff Volume = A x D/12 (acre-feet)	7.82
Pond Capacity* (acre-feet)	8.66
*Note: Discharge pond connected with pump house (Secondary Pond) is assumed pumping the incoming waste water at elevation 585.00 feet. The storage volume for storm water is considered above elevation 585.50 feet (surface area 2.12 acre) to 589.00 feet (surface area 2.83 acre). Secondary Pond capacity = (2.12+2.83)/2 x (589.00 feet-585.50 feet)=8.66 acre-feet.	

Sargent & Lundy further determined that a runoff volume of 7.82 acre-feet would produce a water surface elevation of 588.66 feet in the Secondary Pond, just 0.38 feet below the lowest surveyed crest elevation of 589.04 feet. It was noted that it would be necessary for the additional pump to operate and, at 550 gpm, a total of 3.2 days would be required to evacuate the volume of stormwater runoff (7.82 acre-feet) from the pond.

The fact that the Secondary Pond could contain the stormwater runoff volume was noted by Sargent & Lundy. However, it was recognized that the resulting freeboard of 0.38 feet was not consistent with appropriate minimum design conditions. Sargent & Lundy provided the following two recommendations to increase the resulting freeboard.

- Raise the dike height to approximate elevation 590 feet (1 foot above existing), or
- Increase the Secondary Ponds available storage area by connecting the Secondary Pond area to the lower lying area to its north. Earthwork would be required for this option, but the survey indicated the low lying area totals approximately 4.1 acres.

Another concern was noted in the draft *Original Ash Settling Basin Drainage and Capacity* hydrologic design summary. Sargent & Lundy reported that an area of exposed ash exists south of the Secondary Pond that is higher than the original embankment crest height. Stormwater carrying this ash drains out of the containment area and into a swale, located along the southern and western site boundary that drains into Mill Creek. Recommendations to keep the ash within the embankment boundary were provided that included “providing permanent stabilized surfacing for the area, raising the perimeter dike, or redirecting the drainage to the [Secondary] Pond.”

Sargent and Lundy noted that issues regarding both the stormwater storage capacity and elevated exposed ash require more investigation.

AMEC believes the hydrologic methodology and calculations presented by Sargent & Lundy are acceptable. However, it was not clear what portion of the runoff would impact the Main Primary Settling Pond and what volume, if any, that pond could provide in balancing the storage requirement using the detention time available within that pond. A hydraulic evaluation of the entire pond system, namely the Primary Pond, Secondary Pond, and discharge pumps, should be completed to evaluate the minimum freeboard available during the storm event. The evaluation may show that the Primary Pond provides storage volume and detention time such that the peak runoff affecting the Secondary Pond has passed, allowing the Secondary Pond to process runoff from the Primary Pond while maintaining an acceptable freeboard depth.

AMEC is in agreement with Sargent & Lundy that both the stormwater storage capacity and elevated exposed ash issues require more investigation.

Calculation #MLK-C-001, as described in this section, was resubmitted as Appendix C in the January 2011 *Pond Examination Report, completed by Sargent & Lundy* and included in Draft Report response comments that were submitted by IPL and Alliant Energy.

In comments to the Draft report Alliant Energy noted the following regarding where AMEC noted a lack of clarity in the hydrologic methodology and calculations:

1. *Calculation MLK-C-001 assumed that the upper Main Ash Pond would be in constant operation during the 100-year, 24-hour rainfall event. Thus, the upper Main Ash Pond would have a water level just above the elevation of the decanting outlet structure and would provide no storage volume. Furthermore, due to the assumed lack of storage volume, the travel time from the upper Main Ash Pond to the discharge pond in the original Ash Settling Basin was not considered.*

2. *Information was not available on the peak waste stream flow rate into the Main Ash Pond, thus Calculation MLK-C-001 assumed that the pumping rate from the pump house within the discharge pond could convey the waste streams sluiced to the Main Ash Pond. The calculation assumed that the difference between the outflow from the pump house and the maximum waste stream inflow rate would be minimal. Thus, the ability of the pond to store the entire runoff volume was evaluated. Also, bottom ash is not sluiced to the main ash pond on a continuous basis. Since 2004, the ash sluice pumps ran an average of 364 minutes/day or a total flow into the ponds at 0.765 Million Gallons per Day. During plant operations, generally bottom ash is sluiced out to the ponds at least once per 8 hour shift. Normally, a sluicing event lasts between two and three hours in duration.*

No top invert elevation was provided for the decanting structure. Based on AMEC site visit photos and notes, the decanting structure's top invert elevation is variable based on available extension pieces. The statement that "the upper Main Ash Pond…….would provided no storage volume" infers the top elevation of the decanting structure is just below the pond's crest. The calculations also do not seem to reduce the amount of rainfall that would be directly tributary to the Primary Main Ash Pond (6.25 inches over the 6.9 acre pond or 3.6 acre-feet) from impacting the Secondary (Discharge) Main Ash Pond. If the Primary Main Ash Pond can in fact store the rainfall volume from the 100-year 24-hour storm, then it appears that the Secondary (Discharge) Main Ash Pond will have freeboard in addition to what was reported in MLK-C-001 and Table 5.

3.2.3 Hydrologic Design Criteria - Emergency Ash Ponds

Hydrologic and hydraulic criteria for the Emergency Ash Settling Ponds was not provided prior to submittal of the Draft Report. However, as part of comments to the Draft Report, Alliant Energy and IPL provided the *Pond Examination Report, completed by Sargent & Lundy and* dated January 2011, which contains drainage capacity calculations for the Emergency Ash Ponds. The calculations (#MLK-C-002), included in Appendix D of the *Pond Examination*

Report, were completed to determine the tributary drainage area contributing to the Emergency Ash Pond as well as the adequacy of the Emergency Ash Pond to store or pass the 100-year 24-hour rainfall event. The calculation also looked at the effect of the ½ PMF event, as that event is the MSHA design standard for the "Significant Hazard" potential rating assigned to the pond in the Draft Report. However, as noted in Section 1.2.1 of this final assessment report, the hazard rating for the Emergency Ash Secondary Settling Pond was amended to "Low". The appropriate design storm for the Low hazard potential rating is the 100-year 24-hour event.

PondPack Version 8.0 computer software was utilized by Sargent & Lundy for this calculation. Sargent & Lundy noted the following as Pond Pack input:

- Tributary Drainage Area
- SCS Runoff Curve Number of the tributary area
- Time of Concentration (T_c) for the tributary area
- SCS Rainfall Distribution Type
- Rainfall Depth
- Stage elevation-area information for the pond cells
- Parameters of the interconnecting pipe between the two cells
- Pond Outfall parameters (pumping structure)

This software program uses the SCS TR-55 Methodology to determine peak flows and volumes using the inputs provided above. Outputs include an inflow hydrograph and a maximum water surface elevation for the pond.

The following parameters were calculated and used as software input.

- Tributary Drainage Area, including Emergency Ponds - 13 acres
- Weighted SCS Runoff Curve Number for tributary drainage area – 90
- Time of Concentration for sheet, concentrated, and channel flow – 0.3 hours
- SCS Rainfall Distribution Type - II
- Rainfall Depth 100-year 24-hour – 6.25 inches
- Stage Elevation – Area of the Pond – Attachment 5 and note concerning lowest elevation of pond crest is 588.5 and exists on southern boundary (Primary Pond), exceedence will flood trailer area and parking lot
- Interconnecting pipe – 24 inch diameter, assumed zero slope alignment at elevation 485.17 feet
- Pond Outfall (3 pumps, each 550 gpm) – Lead pump on at elevation 586.0 feet, second on at elevation 586.5 feet, third on at elevation 587.0 feet
- Pond Routing – flow enters south (Primary) pond, flows through interconnecting pipe to north (Secondary) pond, is discharged via pump

Sargent & Lundy reported results of the design storm routing showed that, "in its current configuration, the Emergency Ash Pond is not sufficient to contain and convey the 100-year 24-hour rainfall event." Noted in the analysis was the fact that:

> *In 2000, the Emergency Ash Pond was reconfigured to accommodate a coal pile expansion. It appears that the engineering report to modify the Emergency Ash Pond did not evaluate the Emergency Ash Pond's ability to contain or route a specific storm event. The reconfiguration, among other things, added a divider dike between the north and south cells of the Emergency Ash Pond and an*

> *inverted culvert to contain any floating material in the southern pond. This culvert does not have sufficient capacity to convey the peak flows during the 100-year 24-hour rainfall from the southern cell of the Emergency Ash Pond to the northern cell. Therefore, the southern cell begins to overtop at its lowest elevation of 585.5 feet.*

Sargent & Lundy further noted that if the northern and southern cells were "hypothetically combined into a single cell", modeled using a 50-foot long weir set at an elevation of 587.75 feet, the single cell could contain the 100-year 24-hour rainfall. However, the resulting water surface elevation would be 588.4 feet resulting in a negligible freeboard of 0.1 foot. Sargent and Lundy noted that increasing the elevation of the outer dike as well as adding a connecting overflow weir appear to be "viable options for improving the Emergency Ash Pond."

Additionally, Sargent & Lundy stated that while developing these calculations, other issues that required noting were discovered. First, the routing capacity of the "perimeter swale around the coal pile and the trench running along the eastern side of the plant building" may not be adequate for "larger runoff events." Plant personnel did not have design drawings to aid in a hydraulic evaluation of the conveyance features. Secondly, Sargent & Lundy noticed an ash deposit on the southern edge of the south cell. Their calculations assumed ash deposits did not exist in the pond. Consequently, they directed facility personnel to remove the deposit from the pond.

3.3 Structural Adequacy & Stability

Two well regarded sources for embankment design and evaluation criteria include The United States Army Corps of Engineers (USACE) and the United States Mine Safety and Health Administration (MSHA). Minimum recommended factors of safety for different loading conditions can be found in those agency publications, as shown in Table 6 below.

Table 6. Minimum Stability Factors of Safety

Loading Condition	MSHA[1]	USACE[2]
Rapid Drawdown	1.3	1.1[3] - 1.3[4]
Long-Term Steady Seepage	1.5	1.5
Earthquake Loading	1.2	---[5]

[1] Coal Mine Impoundment Inspection and Plan Review Handbook, 2007, US Mine Safety and Health Administration
[2] Slope Stability Publication, EM1110-2-1902, 2003, US Army Corps of Engineers, Table 3-1: New Earth and Rock-Fill Dams
[3] Applies to drawdown from maximum surcharge pool
[4] Applies to drawdown from maximum storage pool
[5] Referred to USACE Engineer Circular "Dynamic Analysis of Embankment Dams" document that is still in preparation

To consider the structural adequacy and stability of the ash ponds at the M.L Kapp Generating Station, AMEC reviewed stability analysis material provided by IPL with respect to the load cases shown in Table 6. Factors of safety documented in the provided material were compared with those factors outlined in the table to help determine whether the impoundments meet the requirements for acceptable stability.

AMEC reviewed the November 11, 2010 report entitled *Slope Stability Analyses - Ash Settling Pond* prepared by Sargent & Lundy for the M.L. Kapp Generating Station prepared for Interstate Power and Light (Alliant Energy). The recently completed stability analyses are summarized in Section 3.3.1 and 3.3.2. The Sargent & Lundy analysis included the existing Main Ash Pond dike, which is within the Original Ash Settling Basin, and the Emergency Ash Pond dike. The report presented a summary of guidance documents and data that were reviewed, the geotechnical exploration that was performed by Huntingdon Engineering & Environmental, Inc, as well as the results of the structural stability analyses that were completed for two cross sections (one for each pond). It was noted that the study was not complete and a final report with analyses would be submitted at later time[2]. Factors of safety documented in the provided material were compared with those factors outlined in Table 6 to help determine whether the impoundments meet the requirements for acceptable stability.

Sargent & Lundy evaluated the overall stability of the dams by reviewing cross sections and previously collected drilling data for their study, as shown on Figure 7. Sargent & Lundy notes the cross sections selected for analysis “were estimated to present the most critical stability conditions for dike stability around the ponds”. The slope stability analyses were performed using SLOPE/W program version 5.211. Minimum acceptable factor of safety (FS) values for the static, seismic and the rapid drawdown conditions analyzed in this calculation were 1.5, 1.15 and 1.1 to 1.3, respectively. Sargent & Lundy stated in their report:

> *Since the original Ash Settling Basin has been filled with ash, the interior slope of the perimeter dike is not exposed and there is no potential for rapid drawdown condition to affect the overall stability of the interior slope. Also, since the top width of the Main Ash Pond dike (within the original Ash Settling Basin) is more than 65 feet, there is no potential for a rapid drawdown within the Main ash Pond to affect the overall stability of the interior slope of the original Settling Basin and allow materials to disperse outside the limits of the original Ash Settling Basin.”*

Therefore, Sargent & Lundy’s slope stability analyses included static and seismic (pseudo-static) conditions only for the downstream (exterior) dike face for the Main Ash Pond, and the study included static and seismic (pseudo-static) conditions for the downstream dike face and rapid drawdown condition for the interior face for the Emergency Ash Pond. For their study, Sargent & Lundy utilized the soil borings, B-1 and B-2 performed in 1994 by Huntingdon Engineering & Environmental, located adjacent to the Emergency Ash Pond and Main Ash Pond dikes, respectively. Table 7 and Table 8 provide a summary of the soil properties utilized in Sargent & Lundy’s report. We understand the two borings utilized by Sargent & Lundy for the basis of their slope stability analyses were drilled adjacent to the existing dikes; therefore, we understand the information utilized for the dike material was based on available construction documents.

Table 7. Soil Properties for Emergency Ash Pond (Boring B-1)

Material	Unit Weight γ (lb/ft^3)	Friction Angle, σ’ (Degrees)	Cohesion, c’ (lb/ft^2)
Consolidated Ash Fill	100	25	0
Dike Fill (Cohesive)	125	25	250
Clayey Silt	120	28	50
Silty Lean Clay	125	24	150
Bedrock	160	0	10,000

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[2] The M.L. Kapp Generating Station *Pond Examination Report*, dated January 2011, was prepared by Sargent and Lundy and provided following submittal of the December 2010 Draft report. See Section 4.2.2 of this pond assessment report for comments regarding the *Pond Examination Report*.

Table 8. Soil Properties for Main Ash Pond (Boring B-2)

Material	Unit Weight γ (lb/ft^3)	Friction Angle, σ' (Degrees)	Cohesion, c' (lb/ft^2)
Sluiced Ash	90	15	0
Consolidated Ash Fill	100	25	0
Dike Fill (Cohesive)	125	25	250
Clayey Silt	120	28	50
Silty Lean Clay (1)	125	24	150
Silty Lean Clay (2)	125	25	150
Silty Lean Clay (3)	125	20	150
Sand	110	26	0

3.3.1 MAIN ASH POND - Structural Adequacy & Stability

Static Analysis - Main Ash Pond

The Main Ash Pond was analyzed for static and seismic conditions utilizing soil strengths estimated from the single boring located in this area (Boring B-2). We have not been provided with laboratory data from this boring; therefore, we have assumed the soil parameters utilized were based on published correlations. Sargent & Lundy provided, as Figure 2 of their report, the cross-section which outlines their estimated soil profiles along with their corresponding soil parameters. The cross-section utilized for the Main Ash Pond has a top of dike elevation of 592 feet with a top of Main Ash Pond elevation of 600.5 feet (approximately 8.5 feet above the Main Ash Pond dike. In their analysis, a surcharge load of 1,000 pounds per square foot (psf) was considered. Their report stated that the surcharge load was to represent the weight of the equipment that operates in this area to remove the ash and the stockpiled load of the ash prior to be transported to a different location. Their analysis also included the phreatic surface within the consolidated ash. This surface was shown to begin at elevation 596 feet, drop to elevation 585 feet within the existing ash fill, and then drop again through the perimeter dike to elevation 580 feet. The latter elevation corresponds to the elevation of the water in the existing exterior ditch.

Sargent & Lundy's stability analyses indicated a factor of safety of 1.707 for the exterior face of the perimeter dike.

Seismic Analysis - Main Ash Pond

The seismic analysis was performed utilizing a horizontal load coefficient of 2 percent of gravity for the dike and ash fill materials as well as the subsoil layers. Sargent & Lundy chose to evaluate the seismic conditions in a pseudo-static condition and their report stated:

> *This value represents the lateral force generated during an earthquake on the dike as a fraction of the weight of the material in the cross-section analyzed, and is assumed to act at the same intensity during the earthquake (i.e., pseudo-static condition). In pseudo-static analyses, typically $^{2}/_{3}$ to $^{3}/_{4}$ of the peak acceleration is applied to the soil mass as an average value during earthquake since the acceleration history during an earthquake goes through a large number of acceleration cycles, all but one less than the peak acceleration. However, bedrock motions can also amplify, attenuate, or remain approximately at the same levels as the earthquake waves travel upward from the rock toward the soil*

> *surface. Recognizing the potential for some amplification through the in-situ soils, the peak bedrock acceleration obtained from the above references was conservatively applied at the soil surface without any reduction.*
>
> *'Effective Stress' strength parameters for the dike material and the in-situ soils were used in the analysis. . . since the earthquake acceleration levels for the site are very small and will not be capable of generating any significant excess porewater pressures (beyond hydrostatic pressure) within the portion the dike below the phreatic surface which would cause a reduction in the soil strength during an earthquake.*

Sargent & Lundy's report indicated the factor of safety obtained during their pseudo-static conditions for the downstream face of the dike to be 1.623. The calculated factors of safety for the critical cross section for the Main Ash Pond are shown in Table 9.

Table 9. Factors of Safety for Main Ash Pond at Critical Section

Analysis	Factors of Safety	
	Long Term	Earthquake Loading
Required Minimum Safety Factor	1.5[1]	1.2[1]
Existing Condition	1.707	1.623

[1] Based on the MSHA guidelines, Coal Mine Impoundment Inspection and Plan Review Handbook, 2007, US Mine Safety and Health Administration

The required minimum safety factor for earthquake loading is 1.2 per Coal Mine Impoundment Inspection and Plan Review Handbook, 2007, US Mine Safety and Health Administration; however, Sargent & Lundy set their required minimum safety factor for earthquake loading at 1.15. Minimum factors of safety were again included in the table by Sargent & Lundy for comparative purposes. Factors of safety for the critical section were determined to be greater than MSHA specified minimums, therefore the structural integrity of the dam was considered to be satisfactory.

3.3.2 Emergency Ash Pond - Structural Adequacy & Stability

Static Analysis - Emergency Ash Pond

The Main Ash Pond was analyzed for static and seismic conditions utilizing soil strengths estimated from the single boring located in this area (Boring B-1). We have not been provided with laboratory data from this boring; therefore, we have assumed the soil parameters utilized were based on either empirical data or published correlations. Sargent & Lundy provided, as Figure 5 of their report, the cross-section which outlines their estimated soil profiles along with their corresponding soil parameters. The cross-section utilized for the Emergency Ash Pond has a top of dike elevation of 590 feet and their report noted the top of the berm (dike) was designed to be 10 feet in width; however, during their site examination of October 28, 2010 the width of the dike appeared to be 25 feet in width. Sargent & Lundy estimated that approximately 15 feet of ash fill has been placed adjacent to the existing interior face of the dike thereby extending the existing dike width from 10 to 25 feet. Sargent & Lundy noted in their report that, with the exception of the ash located adjacent to the interior face of the dike, the remainder of the pond is full of water. Sargent & Lundy also noted that no seepage was observed during their October 28, 2010 site visit; therefore, they assumed the phreatic surface was configured during their analysis to be contained within the body of the dike.

Sargent & Lundy's stability analyses indicated a factor of safety of 1.861 for the exterior (downstream) face of the perimeter dike; and, they also noted the ash berm located on the interior face of the dike had no effect on the dike's exterior face stability.

Seismic Analysis - Emergency Ash Pond

The November 11, 2010 report does not outline the parameters utilized for the seismic (pseudo-static) analysis of the Emergency Ash Pond; however, AMEC has assumed the parameter were similar to those utilized in the Main Ash Pond (i.e., a horizontal load coefficient of 2 percent of gravity for the dike and ash fill materials as well as the subsoil layers, effective stress strength parameters for the soil, etc.). Sargent & Lundy's report and its corresponding Figure 6 indicated the factor of safety for the downstream face of the dike to be 1.768.

Rapid Drawdown Analysis - Emergency Ash Pond

Given the current CCW storage configuration of the Main Ash Pond, rapid drawdown at that location was not considered as a possibility. Rapid drawdown analysis was performed only for the Emergency Ash Pond. Sargent & Lundy stated in their report,

> *A rapid lowering of the water level inside the pond due to controlled or uncontrolled operational conditions may create potential instability for the interior slope of the dike. The basic mechanism that causes the instability condition is the loss of support from the hydrostatic pressure from water against the interior slope whereas the porewater pressures within the body of the dike cannot dissipate rapidly by drainage due to limited hydraulic conductivity of the dike material. The net result is increased weight of the soil (no longer buoyant, but still saturated) creating an increased downward pull of the dike materials whereas the shear strength of the soil remains essentially unchanged due to lack of drainage within the dike. This causes a reduction in the slope FS relative to the full pond condition.*
>
> *Under normal conditions, the pond water levels are generally stable due to the controlled discharge through a pump structure. A very fast drop in the pond water levels, in all likelihood, would be a result of a dike failure under static or earthquake condition. During rapid drawdown, the phreatic surface within the dike will gradually drop, and the time-rate of this drop will be a function of the hydraulic conductivity of the dike material. In rapid drawdown analyses, the phreatic surface is conservatively assumed to remain constant within the dike. The purpose of the rapid drawdown analyses is to investigate the potential for additional dike failures caused by such drops in the pond water levels.*
>
> *It is likely that the ash placed along the interior slope of the dike will drain partially as the water level within the pond drops during the rapid drawdown. This drainage should increase the stability of the ash as well as the dike. However, the extent of the internal drainage that takes place during the drawdown is difficult to estimate (permeability of the ash and the time-rate of drop in the water level will be required), and therefore, no drainage condition is conservatively considered within the ash as well as the dike fill.*

Sargent & Lundy's analyses included the 15-foot wide ash berm (as previously described in Section 3.3.1 *Static Analysis - Emergency Ash Pond*) located on the interior face of the 10-foot dike. The report indicated the factor of safety for this ash berm to be less than 1.0; thereby indicating the ash berm will likely result in a sliding instability in the event in a rapid drawdown. However, their report noted that the instability is not likely to affect the main body of the dike, and the factor of safety for a rapid drawdown condition for the Emergency Ash Pond was indicated to be 1.576.

The calculated factors of safety for the critical cross section for the Emergency Ash Pond are summarized in Table 10.

Table 10. Factors of Safety for Emergency Ash Pond at Critical Section

Analysis	Factors of Safety		
	Long Term	Earthquake Loading	Rapid Drawdown
Required Minimum Safety Factor	1.5[1]	1.2[1]	1.3[1]
Existing Condition	1.861	1.768	1.576

[1] Based on the MSHA guidelines, Coal Mine Impoundment Inspection and Plan Review Handbook, 2007, US Mine Safety and Health Administration

The required minimum safety factor for earthquake loading is 1.2 per Coal Mine Impoundment Inspection and Plan Review Handbook, 2007, US Mine Safety and Health Administration; however, Sargent & Lundy set their required minimum safety factor for earthquake loading at 1.15. Minimum factors of safety, were again included in the table by Sargent & Lundy for comparative purposes. Factors of safety for the critical section were determined to be greater than MSHA specified minimums, therefore the structural integrity of the dam was considered to be satisfactory.

Sargent & Lundy noted that based on their results, for the present conditions, the perimeter dikes around the Main Ash Pond, Original Ash Pond, and the Emergency Ash Pond meet the minimum FS requirements and are considered stable.

3.4 Foundation Conditions

Documentation was provided that describes the results of borings that were advanced into downstream embankment locations at both the Main Ash Settling Pond area and the Emergency Ash Settling Pond area. These two borings were completed by Huntingdon Engineering & Environmental on August 5, 1994 and described in a Geotechnical Exploration Test Boring Logs summary letter, dated August 9, 1994.

Boring B-1 was advanced into the northwestern downstream embankment toe of the Emergency Ash Settling Pond area. Boring B-2 was advanced into the eastern downstream embankment toe of the Main Ash Settling Pond area. Foundation soils encountered at these locations are as shown in Table 11.

Table 11. Emergency and Main Ash Settling Area Foundation Soils

Soil Description	Depth Range (feet)	Soil Description	Depth Range (feet)
Emergency Ash Settling Pond Area		**Main Ash Settling Pond Area**	
FINE-TO-COURSE SANDY CLAYEY SILT with some gravel, medium gray, medium stiff to rather stiff, moist (ML) - POSSIBLE FILL	0 - 4	CLAYEY SILT with fine gravel, dark gray, medium stiff (ML) -FILL	0 - 1
LEAN CLAY, medium reddish brown, medium stiff, moist (CL)	4 - 7	CLAYEY SILT, dark gray, medium stiff, with a trace of organics, moist (ML) - ALLUVIUM	1 - 5
SILTY LEAN CLAY, medium to dark brownish gray, medium stiff, moist (CL) - ALLUVIUM	7 - 13	SILTY LEAN CLAY, dark gray, medium stiff, moist (CL) - ALLUVIUM	5 - 7 ½
LEAN CLAY, mottled light gray and reddish brown, medium stiff, wet - ALLUVIUM	13 - 22 ½	SILTY LEAN CLAY, medium grayish brown, rather stiff, moist (CL) - ALLUVIUM	7 ½ - 10
AUGER REFUSAL @ 22 ½ FT Weathered Rock		Same, dark gray	10 - 13 ½
		SILTY LEAN CLAY, medium grayish brown, soft to medium stiff, wet (CL) - ALLUVIUM	13 ½ - 18 ½
		Same, with some gravel, soft - ALLUVIUM	18 ½ - 23
		MEDIUM-TO-COARSE SAND, gray and brown, very loose, wet (SP) - ALLUVIUM	23 - 26
		No reported auger refusal	

3.5 Operations and Maintenance

3.5.1 Safety Assessments

IPL personnel performed and recorded surface pond visual inspections of the Main and Emergency Ash Settling Ponds in March 2009 and March 2010. Each inspection report includes information concerning dike integrity, specifically the presence of animal activity, seepage, erosion, trees/vegetation, ponding, leakage from valving or piping, or damage due to heavy equipment use. Outfall structures are also inspected for the presence of many of the same issues. The dike walls and discharge structures are also checked for the presence of any settled ash.

Visual inspections performed in 2009 noted the presence of trees on the berm of the Main and Emergency Settling Ash Ponds. The provided recommendation was to cut the trees down and trim the area.

Visual inspections performed in 2010 on the Emergency Settling Ash Ponds noted animal activity in the northern dike, and some soft soil and erosion issues. Resulting actions included contacting local animal trapping services and operations to add acceptable soil material to the berm area. Build up of settled ash was also noted in the Emergency Pond area and plans for removal were reported. Visual inspections performed in 2010 on the Main Settling Ash Ponds noted the presence of weedy vegetation, as well as build up of settled ash. Recommendations were provided for removal of each.

As part of comments to the Draft Report, IPL submitted the *Pond Examination Report*, which was prepared by Sargent & Lundy and dated January 2011. The Pond Examination Report contains the results of a pond safety examination that included the summary of a site visit conducted by Sargent & Lundy personnel on October 28, 2010 to evaluate the pond's structural features. Conclusions and recommendations are provided at the close of the report and include:

- Berms are in "satisfactory to good condition" as there are "no signs of cracking, settlement or imminent slope instability;"
- Trees growing on upstream side slopes of Main Ash Pond and original Ash Settling Basin, as well as downstream slopes of original Ash Settling Basin and Emergency Ash Pond should be cut down;
- Regular mowing of the dikes should be performed as it will "aid in the visual inspections of the ash ponds and help to curtail tree growth;"
- Entire lengths of upstream and downstream slopes should be visually assessed again following tree cutting and mowing operations to locate problems that may have been missed in October 2010 due to presence of heavy vegetation;
- Monitor interior slopes of Emergency Ash Pond as they "exhibit signs of erosion", if condition worsens, slope regrading or placement of coarse gravel or riprap will become necessary;
- The inside slope of the plant north berm should have some "slope protection" placed on it as it acts as the outside berm of the pond;
- Following tree removal and mowing operations, bare areas should be repaired with riprap or topsoil and seed;
- CHDPE pipes "that drain runoff from the coal pile area into the Emergency Ash Pond" should be periodically cleaned; and,
- IPL personnel should continue a regular schedule of dike inspections.

3.5.2 Instrumentation

There is no geotechnical or groundwater monitoring instrumentation located at the M.L. Kapp Power Station.

3.5.3 State or Federal Inspections

No State or Federal inspections have taken place at the M.L. Kapp Power Station.

4.0 COMMENTS AND RECOMMENDATIONS

Condition assessment definitions, as accepted by the National Dam Safety Review Board, are as follows:

SATISFACTORY

No existing or potential dam safety deficiencies are recognized. Acceptable performance is expected under all loading conditions (static, hydrologic, seismic) in accordance with the applicable regulatory criteria or tolerable risk guidelines.

FAIR

No existing dam safety deficiencies are recognized for normal loading conditions. Rare or extreme hydrologic and/or seismic events may result in a dam safety deficiency. Risk may be in the range to take further action.

POOR

A dam safety deficiency is recognized for loading conditions which may realistically occur. Remedial action is necessary. POOR may also be used when uncertainties exist as to critical analysis parameters which identify a potential dam safety deficiency. Further investigations and studies are necessary.

UNSATISFACTORY

A dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution.

NOT RATED

The dam has not been inspected, is not under state jurisdiction, or has been inspected but, for whatever reason, has not been rated.

4.1 Acknowledgement of Management Unit Conditions

I certify that the management units referenced hereinafter were personally assessed by me and was found to be in the following condition:

Main Ash (Primary and Secondary) Settling Ponds: **Poor**

Emergency Ash (Primary and Secondary) Settling Ponds: **Poor**

4.2 Recommendations

In the Draft Report, the management units above were rated poor due to lack of documentation; specifically,

1) Completion of the hydrologic and hydraulic study for the Main Ash Ponds,
2) Hydrologic and hydraulic information for the Emergency Ash Ponds, and

3) More complete stability analyses.

Review of comments and studies provided by Alliant Energy and IPL in response to the Draft Report, resulted in sufficient information to evaluate the conditions of the ponds. The Poor ratings in this Final Report reflect the fact that, although additional information was provided, dam safety deficiencies are recognized for hydrologic and hydraulic loading conditions which may realistically occur. Remedial action is necessary.

The EPA is currently working to complete final rules for the CCW assessment program. Additionally, condition ratings noted in this *Report of Dam Safety Assessment of Coal Combustion Surface Impoundments* represent a snapshot in time. If the following recommendations are implemented and acceptable levels of protection are shown, it may be possible to improve the condition ratings if the CCW impoundments were to be re-evaluated in the future.

4.2.1 Hydrologic and Hydraulic

Draft Report

Main Ash Settling Ponds

Although hydrologic and hydraulic documentation was provided for the Main Settling Ash Ponds, the conclusions presented in the documentation indicated the Main Ash Secondary Pond could not provide sufficient freeboard for the 100-year, 24-hour storm event. The Main Ash Primary Settling Pond, although contributing runoff volume, did not appear to have been taken into account with respect to runoff volume detention. In Section 3.2.2, AMEC provided a recommendation regarding the completion of a hydraulic study utilizing the entire two pond system, before evaluating available freeboard. Whatever the outcome, the Main Ponds must be operated in such a way that an acceptable freeboard depth is available during the 100-year, 24-hour storm event.

Emergency Ash Settling Ponds

AMEC recommends that an appropriate design storm rainfall and freeboard depth in accordance with MSHA guidelines be applied to each impoundment„s watershed to assess whether the dam and decant system can safely store, control, and discharge the design flow. Based on the size and rating for the Emergency Ponds, the MSHA recommended design storm would be the 100-year 24-hour event. Hydraulic calculations should also be completed to determine the rate at which the discharge system could pass the design storm, if necessary, or draw down elevated water surfaces following such an event. The analysis should consider all critical stages over the life of the pond including full pond conditions.

Final Report

As the Main and Emergency Ash Settling Ponds were just able to contain design storm runoff volumes with little to no freeboard, AMEC recommends that Alliant Energy, IPL, and their consultants determine the most appropriate method to increase freeboard above the design storm water surface elevations for all facility CCW ponds and to perform the necessary steps to complete the improvements. MSHA suggests a minimum freeboard of 3 feet as described in Section 3.2.1 of this Assessment Report. However, in AMEC's opinion, a freeboard increase to at least 18 inches above the design storm water surface elevation, would merit improved condition ratings to the level of Fair for all ponds.

4.2.2 Geotechnical and Stability Recommendations

Draft Report

In the opinion of the assessing professional engineer, the criteria for minimum safety factors should be in accordance with USACE EM 1110-2-1902 with a minimum seismic safety factor of 1.2 as recommended by 2007 *MSHA Coal Mine Impoundment Inspection and Plan Review Handbook*, page 88. Likewise, if the dam does not meet the above seismic factor of safety, then the stability of the embankment should be analyzed and the amount of embankment deformation or settlement that may occur should be evaluated to assure that sufficient section of the crest will remain intact to prevent a release from the impoundment.

A November 2010 report by Sargent & Lundy, titled *Slope Stability Analyses - Ash Settling Pond Dikes*, for the M.L. Kapp Generating Station presents stability analyses for Main Ash Pond and the Emergency Ash Pond. Two cross sections were analyzed for static, seismic (pseudo-static condition, and rapid drawdown (for Emergency Ash Pond only). The locations of the cross sections were selected to represent the “most critical” areas within the perimeter berms. Sargent & Lundy’s report references two borings located “adjacent” to the existing dikes; however, laboratory data was not provided at the time of this report.

In the opinion of the assessing professional engineer, the analysis should consider all critical stages over the life of the pond including pond full conditions. These conditions would need to be determined in conjunction with the hydraulic recommendations above. The hydrologic and hydraulic analysis will provide maximum water levels in the pond and a phreatic surface through the embankment. A rapid-drawdown should be performed for downstream embankment in relation to flooding of the Mississippi River. Since Sargent & Lundy’s borings did not penetrate the CCW material, and documentation pertaining to the CCW’s degree of compaction is not known, the friction angle value used for the CCW in the analysis appears to be slightly high for ash material (friction angle of 25 was utilized). Typical ash friction values are 28 degrees for compacted, 24 degrees for loosely compacted, and 11 degrees for uncompacted material. Consideration should be given for lowering strength values to account for inconsistencies within the fill or foundation materials. The analyses presented appear limited to a circular surface; different types of failure surfaces should be analyzed and optimized.

Final Report

After the publication of the Draft Report, an additional study was prepared by Sargent and Lundy (M.L. Kapp Generating Station *Pond Examination Report*, dated January 2011) along with comments in regard to items in the Draft Report. Specifically, the following responses to comment items were presented:

> Comment Letter ITEM 1: The use of 1.2 as the minimum factor of safety for seismic load condition.
>
> Response: *The factor of safety varies from 1.0 to 1.3 as referenced in many text books on the subject. There is only a minor difference between the factor used (1.15) and the recommended value of 1.2. All of the stability analyses results have factors of safety greater than 1.2.*

Comment Letter ITEM 2: Perform slope stability analyses for the Maximum Water Levels in the Emergency Pond.

Response: *The water level selected (585') is the steady state level for the pond that is maintained by the plant. A higher level at 590', the top of dike, could be performed. However, if this higher level is due to the 100 year storm event and represents a short duration rise in the water level, there would only be an insignificant change in the phreatic line through the clay dike section due to the low permeability of the dike materials. Thus, the stability of the downstream slope of the dike would not be affected and the factor of safety would not change since the minimum factor of safety is located within the downstream slope of the dike (Figures 5 and 6 of calculation KAPP-SS-001).*

Comment Letter ITEM 3: Rapid drawdown event due to flooding from the Mississippi River.

Response: *A rapid rise and fall of the water against the downstream slope of the Emergency Pond due to a flood condition from the Mississippi River would have minimal effect on the dike stability. Since the dike material is composed of clay material, a short duration of water against the dike would result in minimal saturation of the downstream slope. This would be approximately 2" to 10" of saturation based on typical permeability values for compacted clay soils. Thus the results of the slope stability analyses would basically be unchanged from those shown on Figure 6 of calculation KAPP-SS-001. If saturation could occur, the results of this rapid drawdown case would be similar to that evaluated in Figure 9 of calculation KAPP-SS-001 since the dike slope is symmetrical.*

Comment Letter ITEM 4: Degree of compaction of the CCW material for the Main ash Pond.

Response: *S&L is not aware of any compaction reports for the ash material used to construct the dikes for the Main Ash Pond. However pictures taken during the walkdown of the ponds indicate that the loose material in the pond is standing on a near vertical face. See photographs P-23, P-24, and P-25 in the pond walkdown report. Considering a 2H:1V slope, the friction angle would be at least 26.50. These slopes are definitely steeper than 2H:1V. Published data is also available that states that flyash may also have a cohesion component, which increases with time after deposition in ponds or after fill compaction. This component is ignored in the calculation. Based on this, a friction angle of 250 seems appropriate and conservative.*

Comment Letter ITEM 5: Circular failure versus wedge analysis.

Response: *The circular failure surface is the most widely used approach because computer programs have been created to perform multiple analyses to determine the most critical failure surface with the lowest factor of safety. This is accomplished utilizing a general grid approach. Most engineers are satisfied with this approach when the geometry and geologic profile is relatively uniform. Wedge analyses are established based on the engineer's best guess for the potential critical surface utilizing the slope geometry and the subsurface profile data.*

Wedge analyses would be appropriate if one or more of the soil layers beneath the berm structure possessed exceptionally low strength (typically soft to very soft clays) and caused concern for potential instability along a plane through these materials. This is not the case with the in situ soil layers that support the dikes at the Kapp station. In the absence of such

> *weak materials in the ground beneath the dikes, it is more appropriate to use the circular failure plane configuration in the slope stability analyses.*

Based on the response to comments and the additional Sargent and Lundy report, dated January 2011, AMEC considers the geotechnical stability issues to have been satisfactorily addressed.

4.2.3 Inspection Recommendations

Annual visual inspections of each management unit should be performed by a Professional Engineer. Inspection reports should be maintained by the facility. Additionally, routine inspections (daily or weekly) performed by facility O&M personnel should be supported by an inspection checklist that could also serve as documentation of the inspection.

Vegetation on the impoundments should continue to be aggressively managed. We further recommend that vegetation be managed based on guidance in (a) Corps of Engineers EM 1110-2-301, *Guidelines for Landscape Planting and Vegetation Management at Floodwalls, Levees, and Embankment Dams* and (b) FEMA 534, *Technical Manual for Dam Owners: Impacts of Plants on Earthen Dams*. Additionally, animal impact should be mitigated based on guidance in FEMA 473, *Technical Manual for Dam Owners: Impacts of Animals on Earthen Dams*.

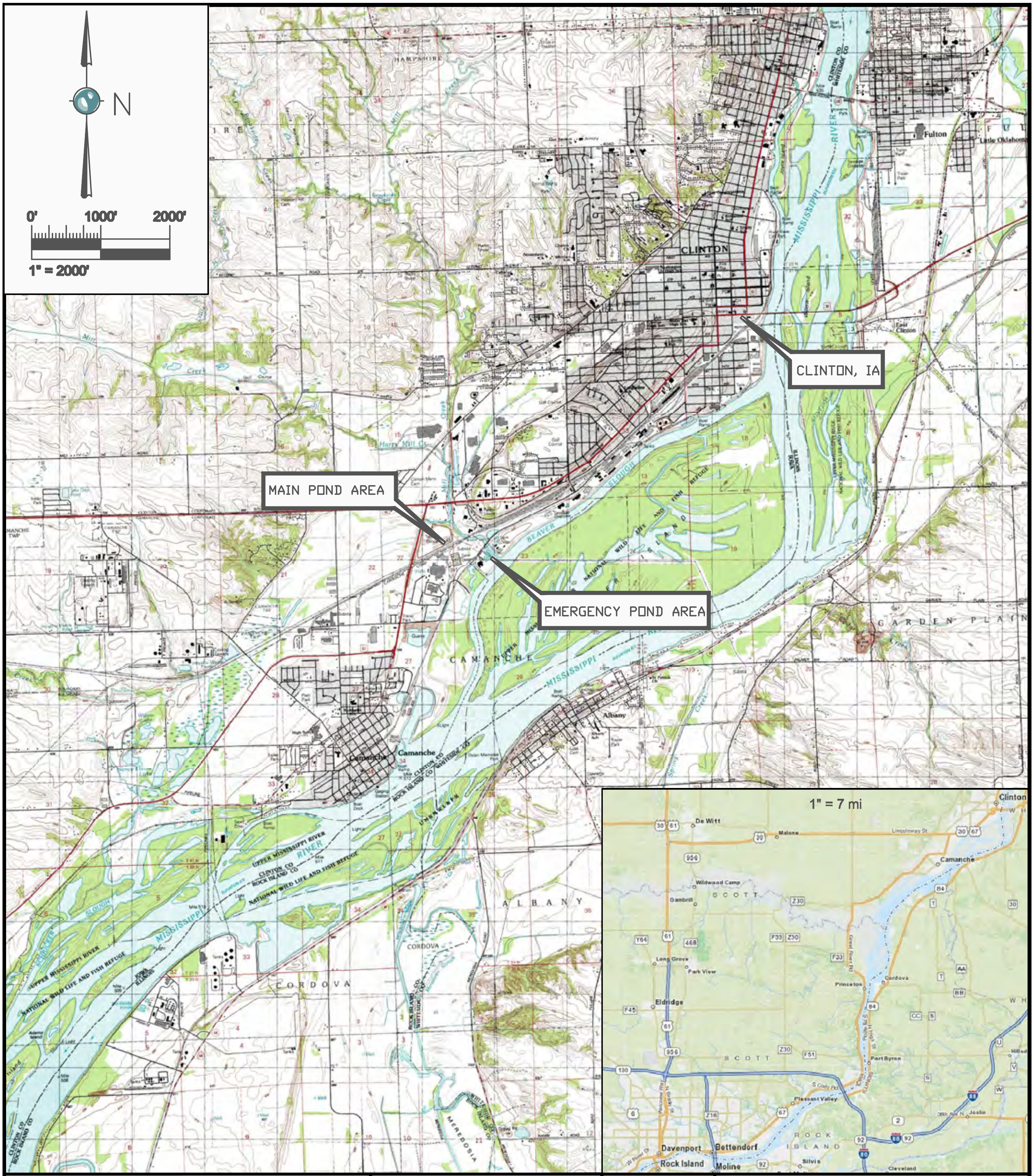
5.0 CLOSING

This report is prepared for the exclusive use of the Environmental Protection Agency for the site and criteria stipulated herein. This report does not address regulatory issues associated with storm water runoff, the identification and modification of regulated wetlands, or ground water recharge areas. Further, this report does not include review or analysis of environmental or regional geo-hydrologic aspects of the site, except as noted herein. Questions or interpretation regarding any portion of the report should be addressed directly by the geotechnical engineer.

Any use, reliance on, or decisions to be made based on this report by a third party are the responsibility of such third parties. AMEC accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The conclusions and recommendations given in this report are based on visual observations, our partial knowledge of the history of ML Kapp's impoundments, and information provided to us by others. This report has been prepared in accordance with normally accepted geotechnical engineering practices. No other warranty is expressed or implied.

FIGURES



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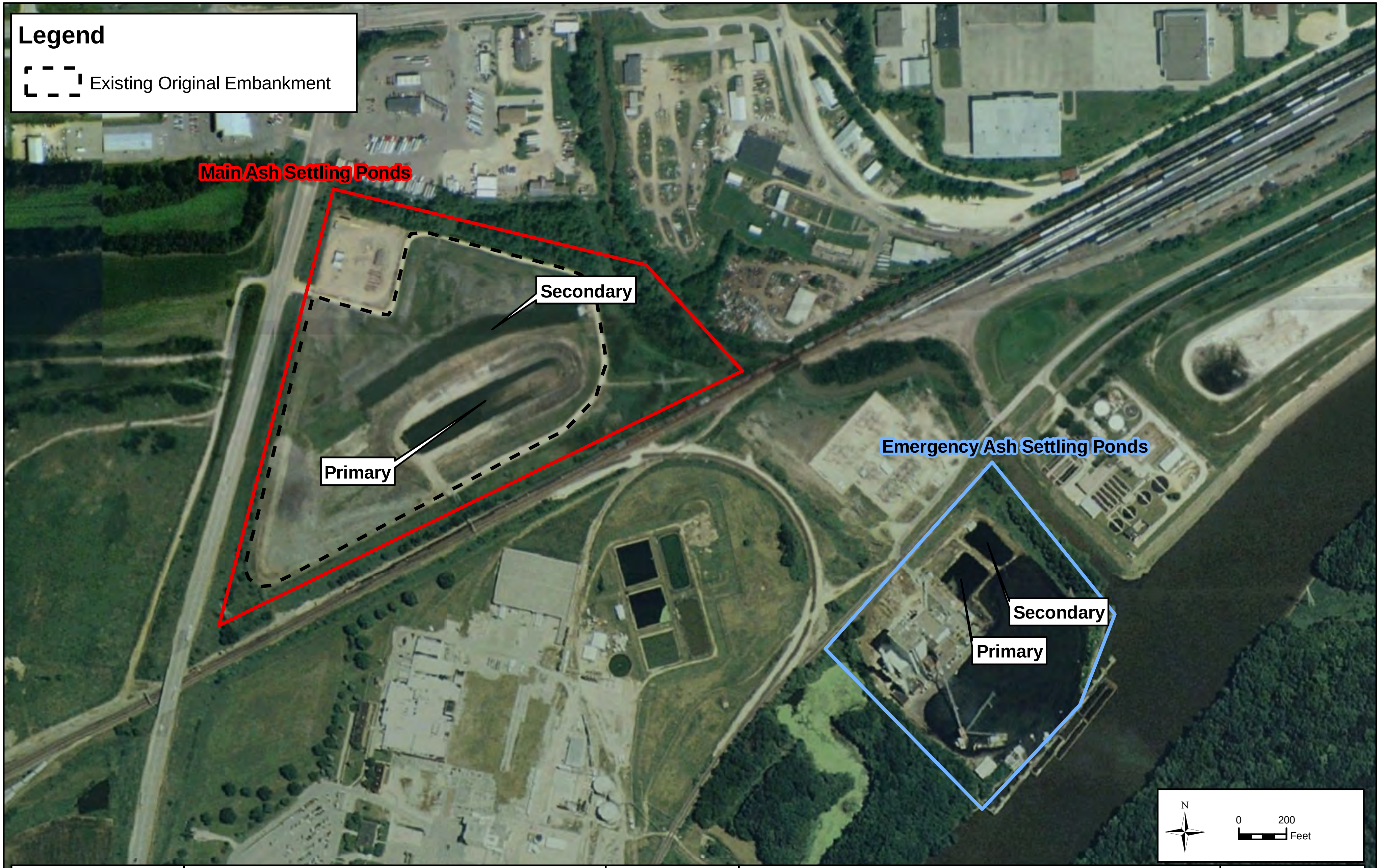
CLIENT LOGO

CLIENT
UNITED STATES
ENVIRONMENTAL
PROTECTION AGENCY

PROJECT
ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS

TITLE
INTERSTATE POWER AND LIGHT COMPANY
ML KAPP POWER STATION, CLINTON, IA
SITE LOCATION & VICINITY MAP

DWN BY: CAE
DATUM:
DATE: 11/15/10
CHK'D BY: MOS
REV. NO.:
PROJECT NO: 3-2106-0183.0002
PROJECTION:
SCALE: AS SHOWN
FIGURE: 1



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amec

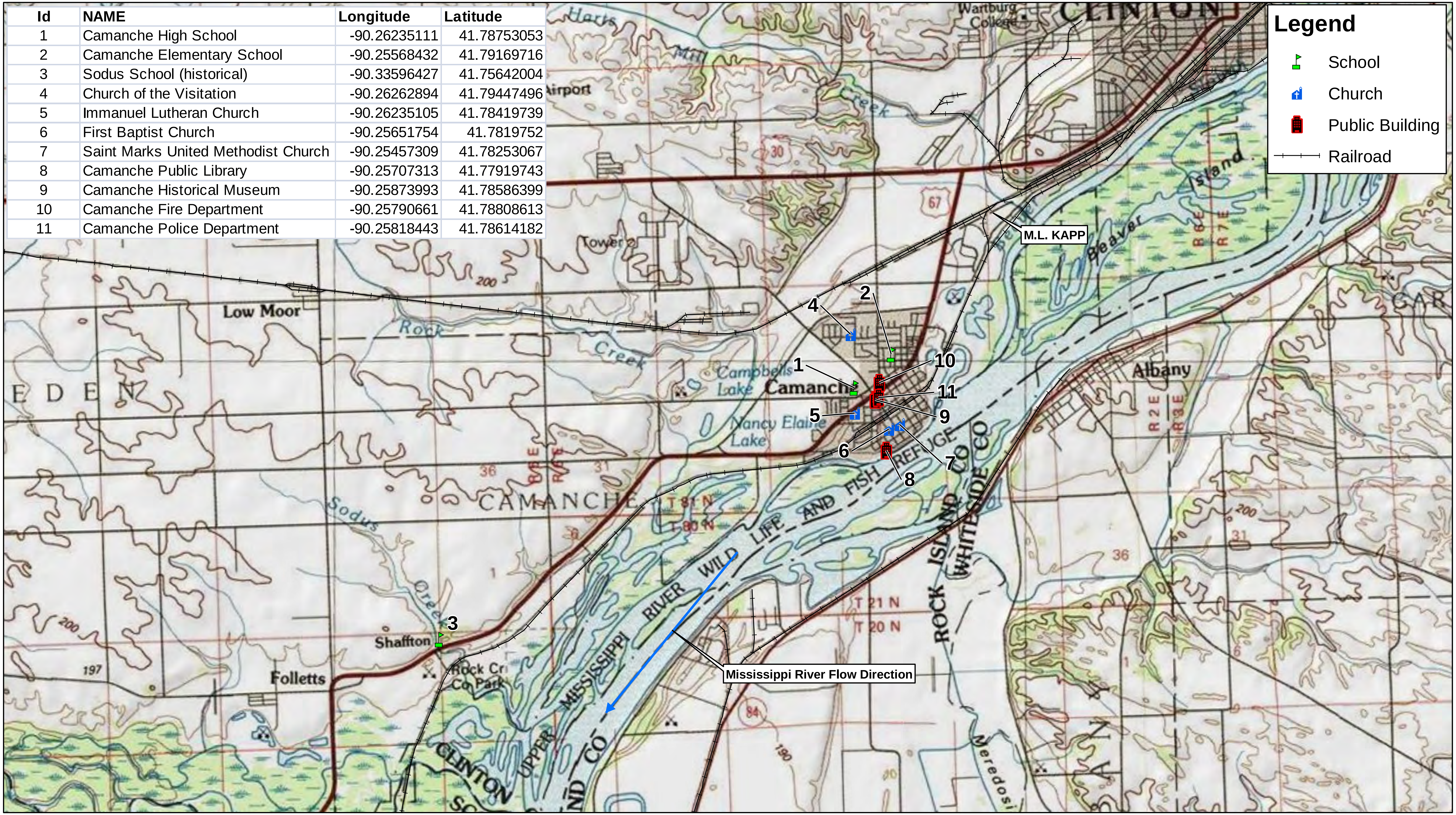
DWN BY: DJC
CKD BY: MS
Datum: NAD 83
Projection: UTM 15
Scale: As Shown

ASSESSMENT OF DAM SAFETY OF
COAL COMBUSTION SURFACE IMPOUNDMENTS

INTERSTATE POWER AND LIGHT COMPANY
ML KAPP POWER STATION, CLINTON, IA
AERIAL SITE PLAN

REV. No.: A
Date: 11-9-10
Project No: 3-2106-0183-0002
Figure No: 2

Id	NAME	Longitude	Latitude
1	Camanche High School	-90.26235111	41.78753053
2	Camanche Elementary School	-90.25568432	41.79169716
3	Sodus School (historical)	-90.33596427	41.75642004
4	Church of the Visitation	-90.26262894	41.79447496
5	Immanuel Lutheran Church	-90.26235105	41.78419739
6	First Baptist Church	-90.25651754	41.7819752
7	Saint Marks United Methodist Church	-90.25457309	41.78253067
8	Camanche Public Library	-90.25707313	41.77919743
9	Camanche Historical Museum	-90.25873993	41.78586399
10	Camanche Fire Department	-90.25790661	41.78808613
11	Camanche Police Department	-90.25818443	41.78614182



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DRAWN BY: DJC
CHK'D BY: MS
DATUM: NAD83
PROJECTION: UTM 15
SCALE: AS SHOWN
DATE: 11/9/2010

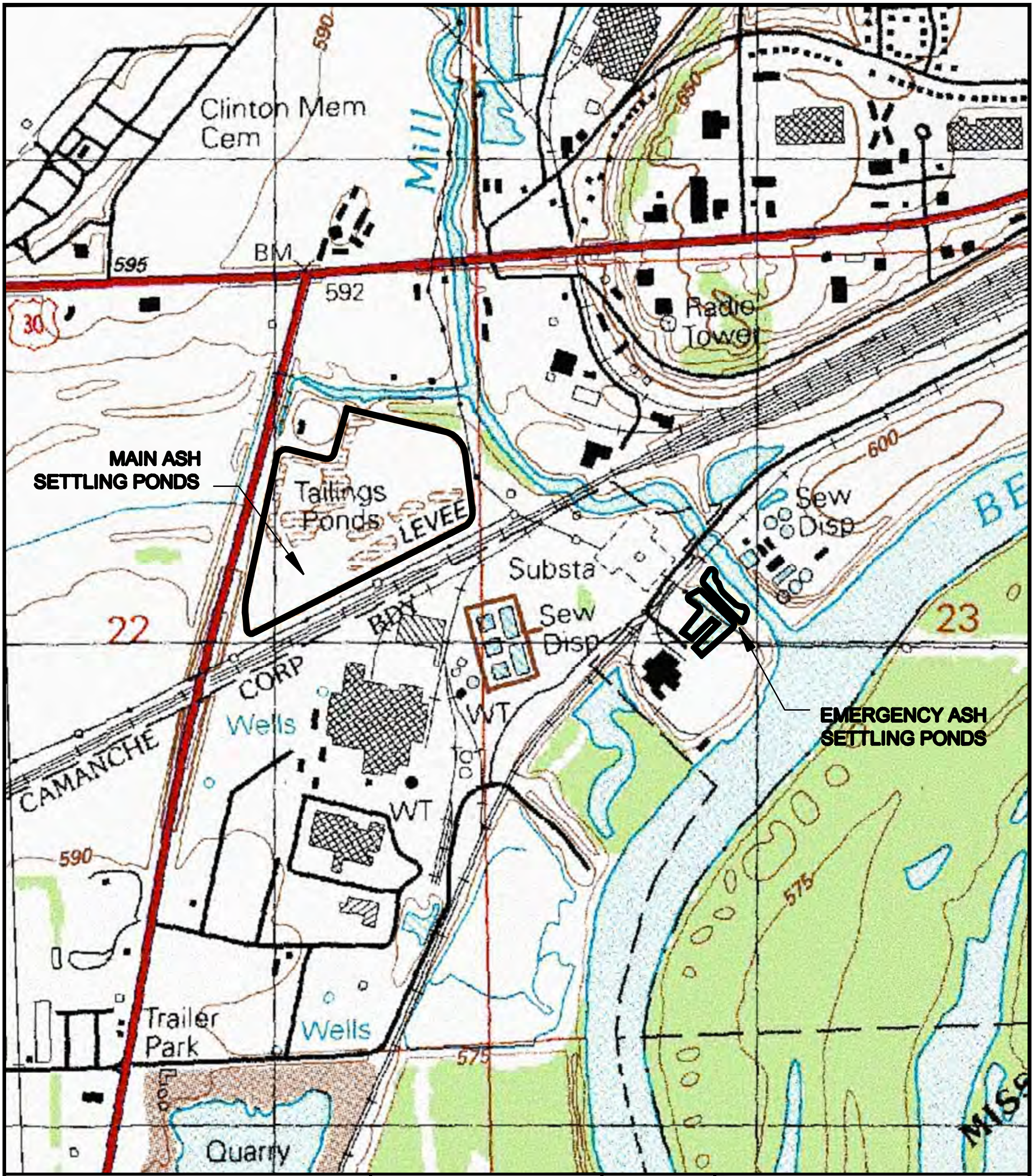
ASSESSMENT OF DAM SAFETY OF
COAL COMBUSTION SURFACE IMPOUNDMENTS

INTERSTATE POWER AND LIGHT COMPANY
ML KAPP POWER STATION, CLINTON, IA
CRITICAL INFRASTRUCTURE

N
0 1 Miles
0 1 Kilometers

Notes: Critical infrastructure data provided by ESRI

FIGURE
3



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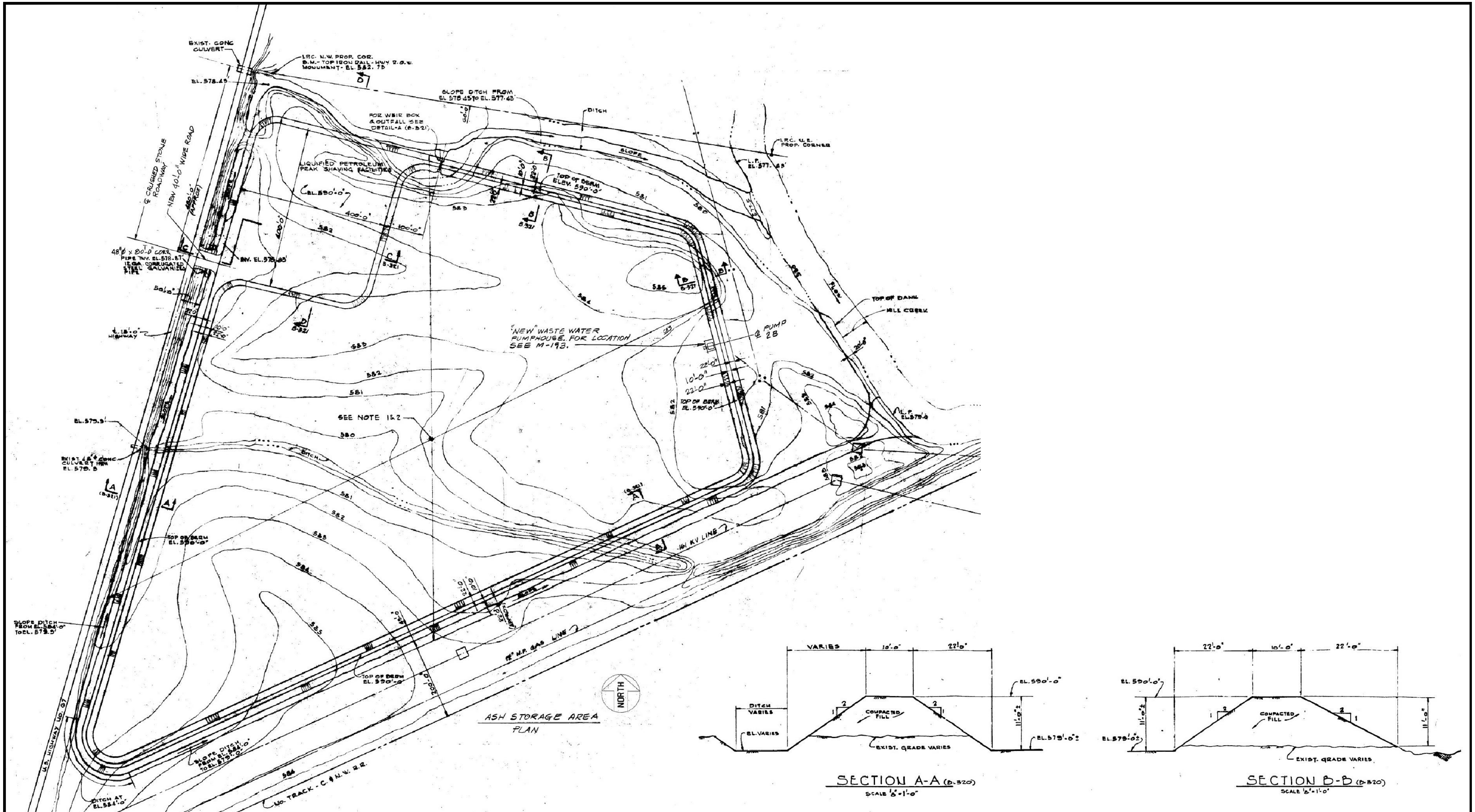
PROJECT
ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS

TITLE
INTERSTATE POWER AND LIGHT COMPANY
ML KAPP POWER STATION, CLINTON, IA
TOPOGRAPHIC SITE MAP

DWN BY: CAE
CHK'D BY: MOS
PROJECTION:
DATUM:
REV. NO.:
SCALE: AS SHOWN
DATE: 11/15/10
PROJECT NO: 3-2106-0183.0002
FIGURE: 4



SECTION A-A (D-320)
SCALE 1/8"=1'-0"

SECTION B-B (D-320)
SCALE 1/8"=1'-0"

NOTE: THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE AMEC EARTH & ENVIRONMENTAL REPORT

CLIENT LOGO	
CLIENT:	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
DWN BY:	CAE
CHK'D BY:	MOS
DATUM:	
PROJECTION:	
SCALE:	AS SHOWN
PROJECT	ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS
TITLE	INTERSTATE POWER AND LIGHT COMPANY ML KAPP POWER STATION, CLINTON, IA MAIN ASH SETTLING POND - ORIGINAL (1965) PLAN AND TYPICAL CROSS SECTIONS
DATE:	11/22/10
PROJECT NO:	3-2106-0183.0002
REV. NO.:	
FIGURE No.	5

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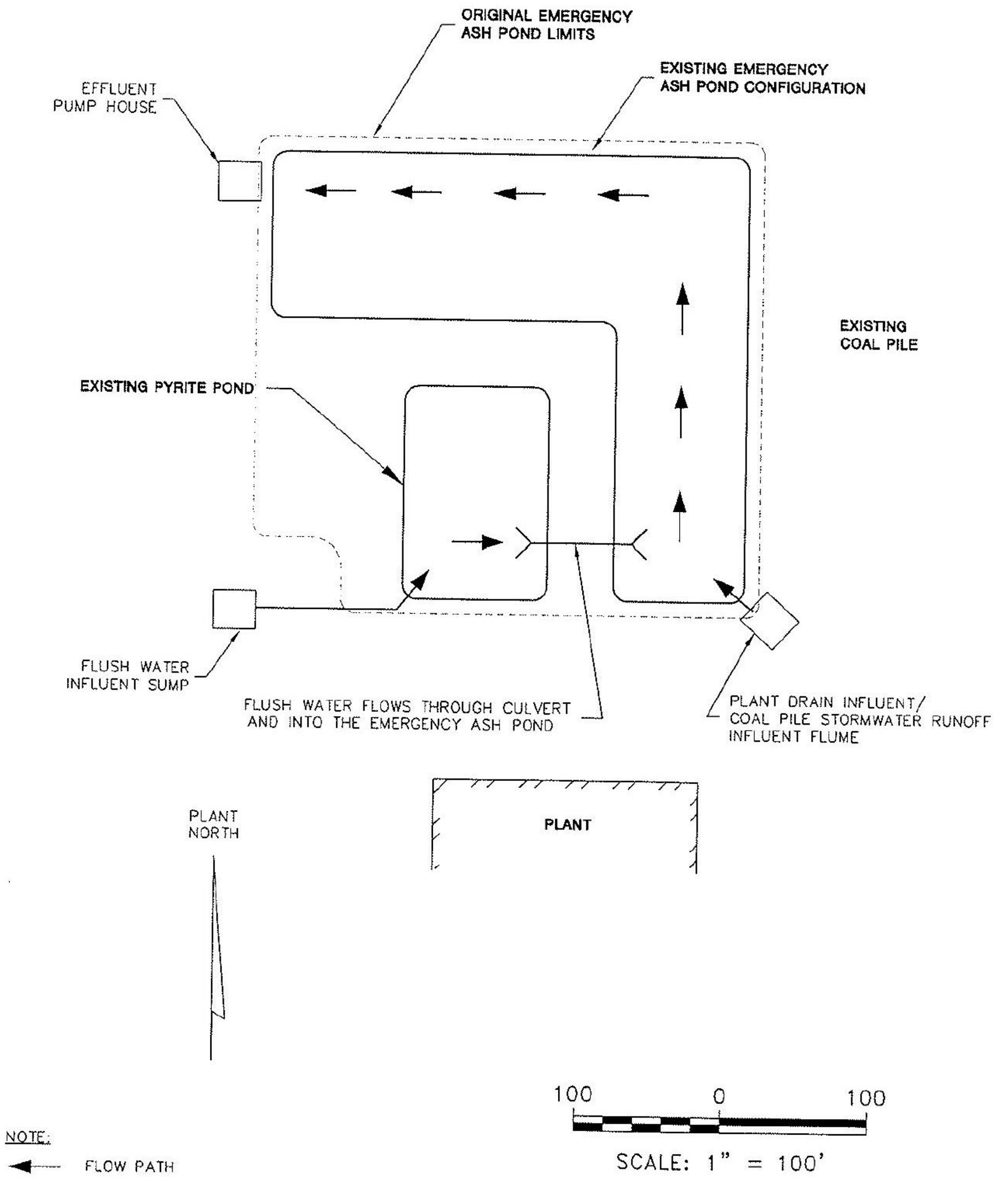
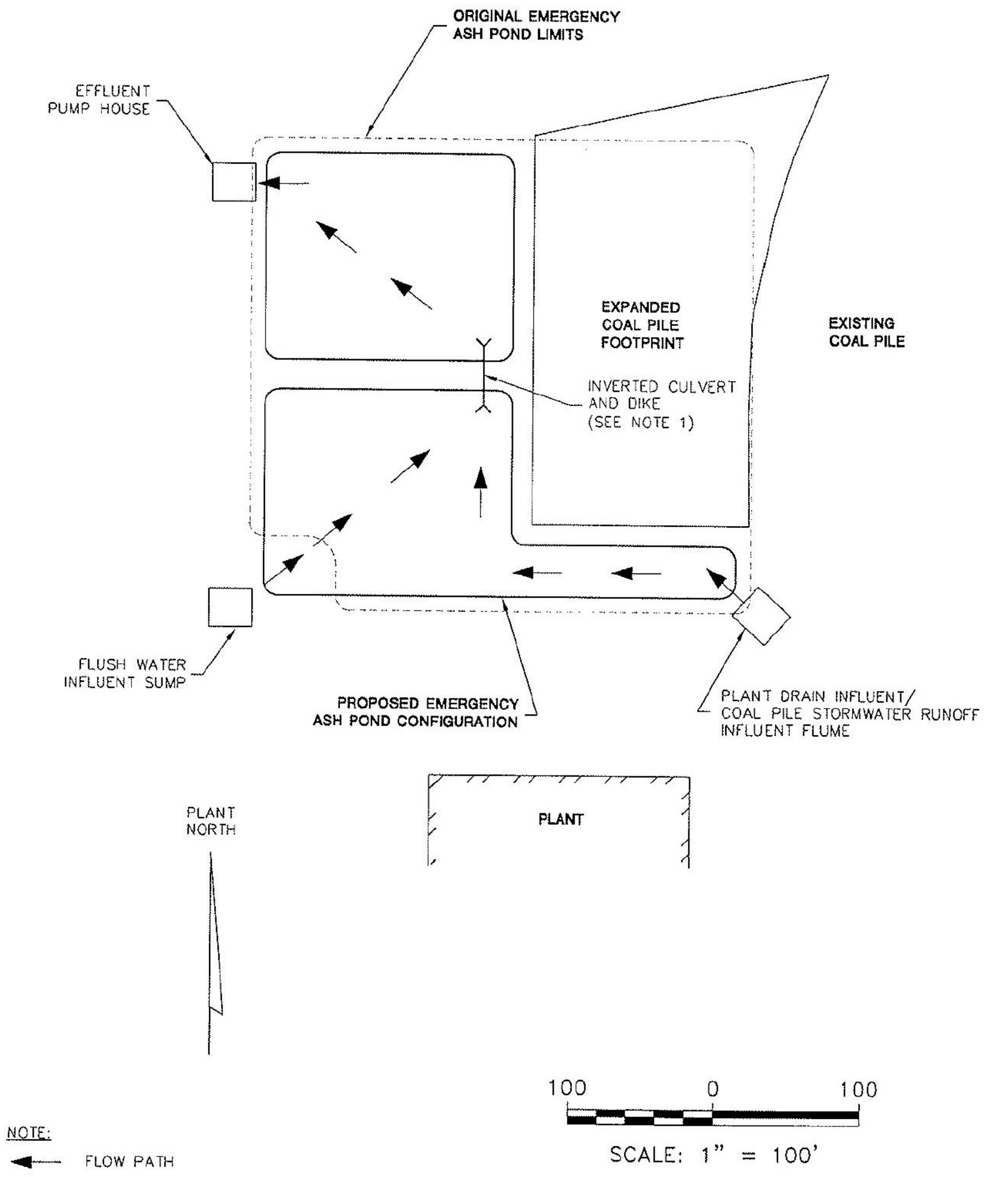
S:\Geosciences\Proposals\EPA Coal Impoundment Inspection\September Round 8\M.L. Kapp\ML Kapp Photos and CAD files\mlkappfig5.dwg – Layout1 – May. 04, 2011 2:36pm – chris.eger

ORIGINAL CONFIGURATION
(PRE 2001)



EXISTING CONFIGURATION



NOTE: THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE AMEC EARTH & ENVIRONMENTAL REPORT

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DWN BY: CAE
CHK'D BY: MOS
DATUM:
PROJECTION:
SCALE: AS SHOWN

PROJECT: ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS

TITLE: INTERSTATE POWER AND LIGHT COMPANY
ML KAPP POWER STATION, CLINTON, IA
EMERGENCY ASH SETTLING PONDS - ORIGINAL AND CURRENT CONFIGURATION

DATE: 11/29/30
PROJECT NO: 3-2106-0183.0002
REV. NO.:
FIGURE No. 6

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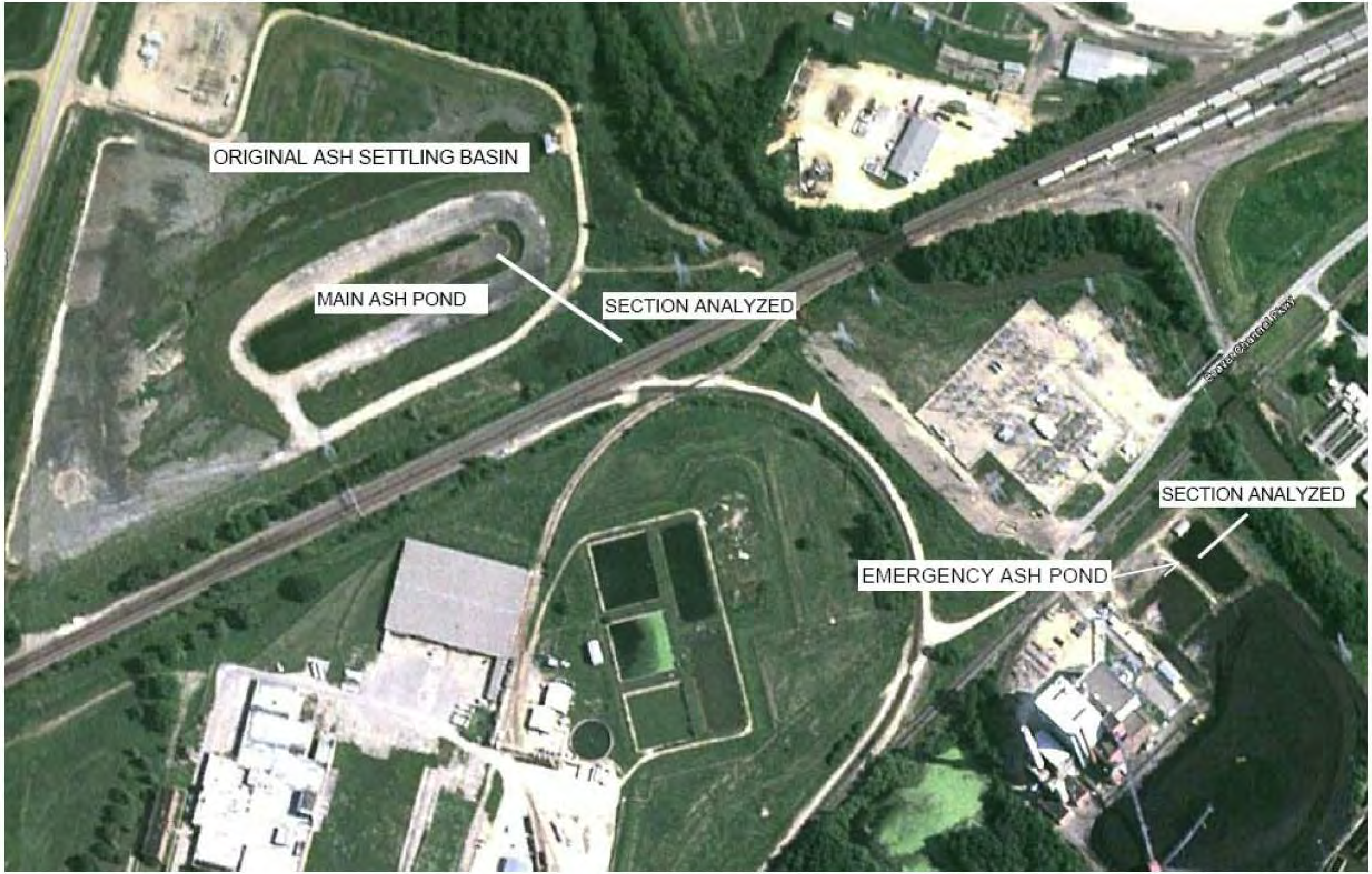

NOTE: THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE AMEC EARTH & ENVIRONMENTAL REPORT

CLIENT LOGO

CLIENT:
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

AMEC Earth & Environmental
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Louisville, Ky 40299
(502) 267-0700

DWN BY: CAE
CHK'D BY: MOS
DATUM:
PROJECTION:
SCALE: NTS

PROJECT
ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS

TITLE
INTERSTATE POWER AND LIGHT COMPANY
ML KAPP POWER STATION, CLINTON, IA
2010 STABILITY ANALYSES - ANALYZED SECTIONS

DATE: 11/29/30
PROJECT NO: 3-2106-0183.0002
REV. NO.:
FIGURE No. 7

APPENDIX A
Waste Impoundment Inspection Forms

Coal Combustion Dam Inspection Checklist Form

US Environmental
Protection Agency

Site Name: M.L. Kapp

Date: October 27, 2010

Unit Name: Emergency Primary Ash Settling Pond

Operator's Name: Alliant Energy, Inc.

Unit I.D.:

Hazard Potential Classification: High Significant [✓ Low]

Inspector's Name: Don Dotson/AMEC and Mary Sawitzki/AMEC

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?	See note		18. Sloughing or bulging on slopes?		X
2. Pool elevation (operator records)?	Not provided		19. Major erosion or slope deterioration?		X
3. Decant inlet elevation (operator records)?	Not provided		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	N/A		Is water entering inlet, but not exiting outlet?		X
5. Lowest dam crest elevation (operator records)?	590.0 ft		Is water exiting outlet, but not entering inlet?		X
6. If instrumentation is present, are readings recorded (operator records)?	N/A		Is water exiting outlet flowing clear?	No flow	
7. Is the embankment currently under construction?		X	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below): See Note		
8. Foundation preparation (remove vegetation,stumps, topsoil in area where embankment fill will be placed)?	X		From underdrain?		
9. Trees growing on embankment? (If so, indicate largest diameter below)		X	At isolated points on embankment slopes?		
10. Cracks or scarps on crest?		X	At natural hillside in the embankment area?		
11. Is there significant settlement along the crest?		X	Over widespread areas?		
12. Are decant trashracks clear and in place?	N/A		From downstream foundation area?		
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		X	"Boils" beneath stream or ponded water?		
14. Clogged spillways, groin or diversion ditches?	N/A		Around the outside of the decant pipe?		
15. Are spillway or ditch linings deteriorated?	N/A		22. Surface movements in valley bottom or on hillside?	N/A	
16. Are outlets of decant or underdrains blocked?		X	23. Water against downstream toe?	N/A	
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
1. Annually by Alliant Energy	
21. Pond is incised.	

EPA FORM -XXXX

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # Iowa 2326103 INSPECTOR Don Dotson/Mary Sawitzki (AMEC)

Date October 27, 2010

Impoundment Name M.L. Kapp Emergency Primary Ash Settling Pond

Impoundment Company Alliant Energy

EPA Region 7

State Agency (Field Office) Address

901 N. 5th Street
Kansas City, KS 66101

Name of Impoundment M.L. Kapp Emergency Primary Ash Settling 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: Alternative receiving location for CCW and related materials.

Nearest Downstream Town : Name Camanche, IA

Distance from the impoundment approx. 2 miles

Impoundment Location:

Longitude	-90	Degrees	13	Minutes	59.1	Seconds
Latitude	41	Degrees	48	Minutes	32.5	Seconds
State	IA	County	Clinton			

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

If So Which State Agency?______

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.

__X__**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.

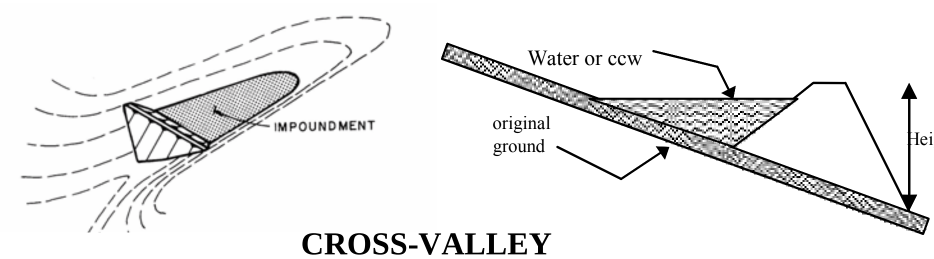
______**SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. 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.

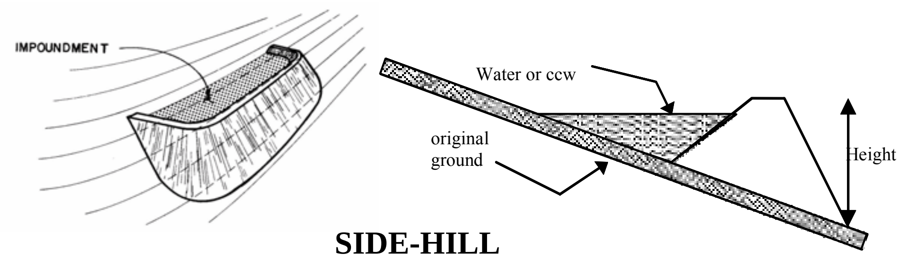
DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

Pond is incised.

CONFIGURATION:

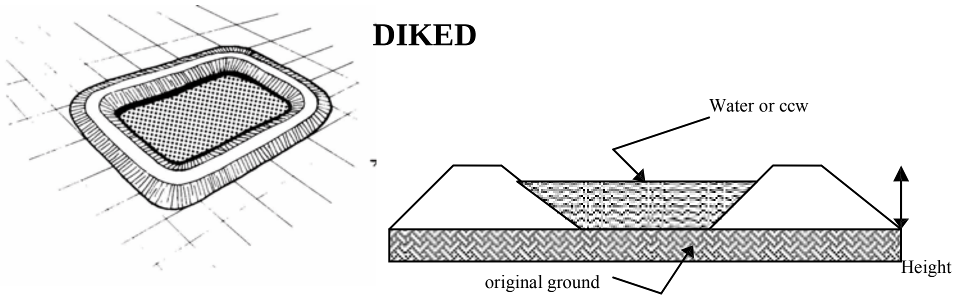


CROSS-VALLEY

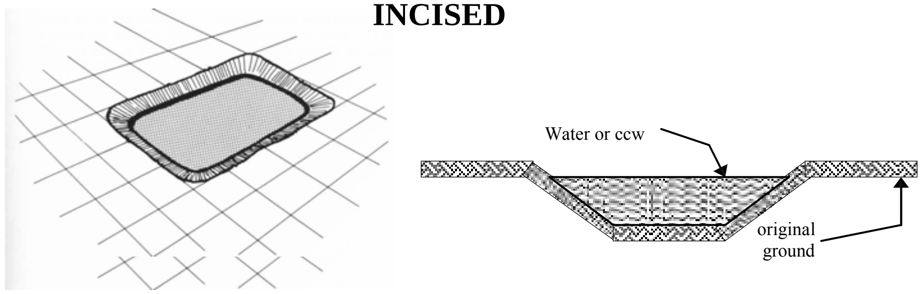


SIDE-HILL

DIKED



INCISED



______Cross-Valley
______Side-Hill
______Diked
__X__Incised (form completion optional)
______Combination Incised/Diked

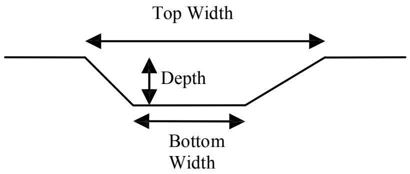
Embankment Height 0-2 feet Embankment Material Sandy Clayey Silt
Pool Area 0.74 acres Liner No
Current Freeboard* 4-5 feet Liner Permeability N/A
*Water level lower during excavation

TYPE OF OUTLET (Mark all that apply)

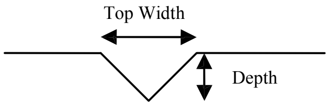
______**Open Channel Spillway**
______Trapezoidal
______Triangular
______Rectangular
______Irregular

______depth
______bottom (or average) width
______top width

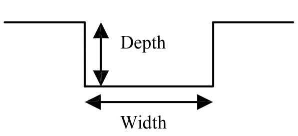
TRAPEZOIDAL



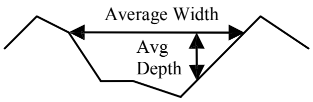
TRIANGULAR



RECTANGULAR

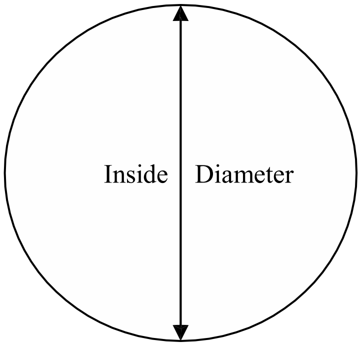


IRREGULAR



______**Outlet**

______inside diameter



Material
______corrugated metal
______welded steel
______concrete
______plastic (hdpe, pvc, etc.)
______other (specify) ______________________

Is water flowing through the outlet? YES* __X__ NO _______
*connection is open

______**No Outlet**

__X__**Other Type of Outlet** (specify) 18" - 24" pipe into emergency secondary ash pond – emergency primary and secondary ponds are hydraulically connected.

The Impoundment was Designed By Sargent & Lundy

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? N/A YES ________NO ________

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

If so Please Describe : ____

Coal Combustion Dam Inspection Checklist Form

US Environmental
Protection Agency

Site Name: M.L. Kapp

Date: October 27, 2010

Unit Name: Emergency Secondary Ash Settling Pond

Operator's Name: Alliant Energy, Inc.

Unit I.D.:

Hazard Potential Classification: High Significant [✓ Low][1]

Inspector's Name: Don Dotson/AMEC and Mary Sawitzki/AMEC

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?	See note		18. Sloughing or bulging on slopes?	See Note	
2. Pool elevation (operator records)?	Not provided		19. Major erosion or slope deterioration? See Note	X	
3. Decant inlet elevation (operator records)?	Not provided		20. Decant Pipes: See Note		
4. Open channel spillway elevation (operator records)?	N/A		Is water entering inlet, but not exiting outlet?		
5. Lowest dam crest elevation (operator records)?	590.0 ft		Is water exiting outlet, but not entering inlet?		
6. If instrumentation is present, are readings recorded (operator records)?	N/A		Is water exiting outlet flowing clear?		
7. Is the embankment currently under construction?		X	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below): See Note		
8. Foundation preparation (remove vegetation,stumps, topsoil in area where embankment fill will be placed)?	X		From underdrain? N/A		
9. Trees growing on embankment? (If so, indicate largest diameter below)		X	At isolated points on embankment slopes?		
10. Cracks or scarps on crest?		X	At natural hillside in the embankment area?		
11. Is there significant settlement along the crest?		X	Over widespread areas?		
12. Are decant trashracks clear and in place?	N/A		From downstream foundation area?		
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		X	"Boils" beneath stream or ponded water?		
14. Clogged spillways, groin or diversion ditches?	N/A		Around the outside of the decant pipe? N/A		
15. Are spillway or ditch linings deteriorated?	N/A		22. Surface movements in valley bottom or on hillside?	See Note	
16. Are outlets of decant or underdrains blocked?		X	23. Water against downstream toe?	See Note	
17. Cracks or scarps on slopes?	See note		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

1. Annual by Alliant Energy, beginning in 2009

9. No trees, but embankments were covered by thick vegetation.

17.-18. Could not determine due to heavy vegetation.

19. Oversteepened slopes evident, possibly caused by drawdown.

20. Water is pumped from impoundment, pumps were not operating on day of visit.

21, 22 & 23. Pond is primarily incised; however it is diked along entire northeast portion; heavy vegetation did not allow assessment for seepage or presence of water.

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[1] Pond was originally (Dec. 2010 Draft Report) assigned a Significant Hazard rating, following Draft Report comment review, hazard rating was revised to Low.

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # Iowa 2326103

INSPECTOR Don Dotson/Mary Sawitzki (AMEC)

Date October 27, 2010

Impoundment Name M.L. Kapp Emergency Ash Secondary Settling Pond

Impoundment Company Alliant Energy

EPA Region 7

State Agency (Field Office) Address

901 N. 5th Street
Kansas City, KS 66101

Name of Impoundment M.L. Kapp Emergency Ash Secondary Settling 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: Receives decant from Emergency (Alternative) Primary Ash. Pond and discharges to NPDES outfall 004

Nearest Downstream Town : Name Camanche, IA

Distance from the impoundment approx. 2 miles

Impoundment Location:

Longitude -90 Degrees 13 Minutes 58.2 Seconds
Latitude 41 Degrees 48 Minutes 33.8 Seconds
State IA County Clinton

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

If So Which State Agency?______

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.

__X[1]__**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.

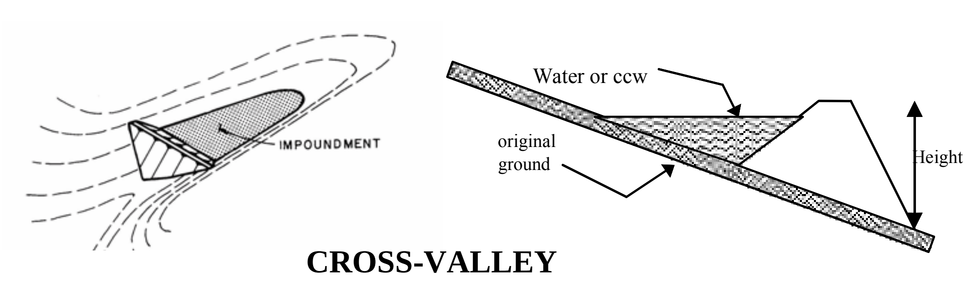
______**SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. 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.

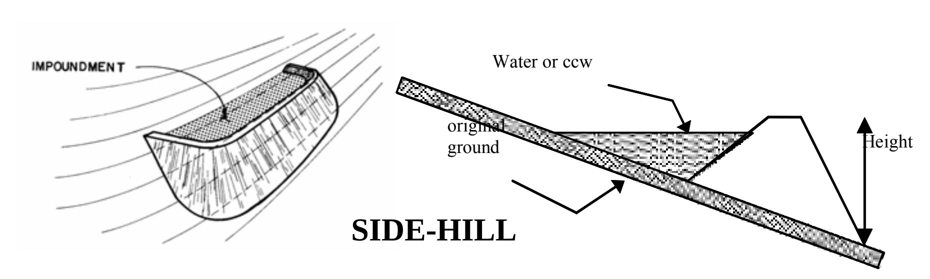
DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

[1] In the December 2010 Draft Report submitted by AMEC, The Emergency Ash Secondary Settling Pond was assigned a Significant Hazard rating. However, based on review of comments to the Draft Report provided by Alliant Energy and Interstate Power and Light Company and internal review by AMEC, it was determined that this pond should instead carry a Low Hazard rating. Minimal CCW material is present in the pond and this material, following any breach, would settle out into the low areas above Mill Creek and not cause environmental damage at a level consistent with a Significant Hazard rating.

CONFIGURATION:

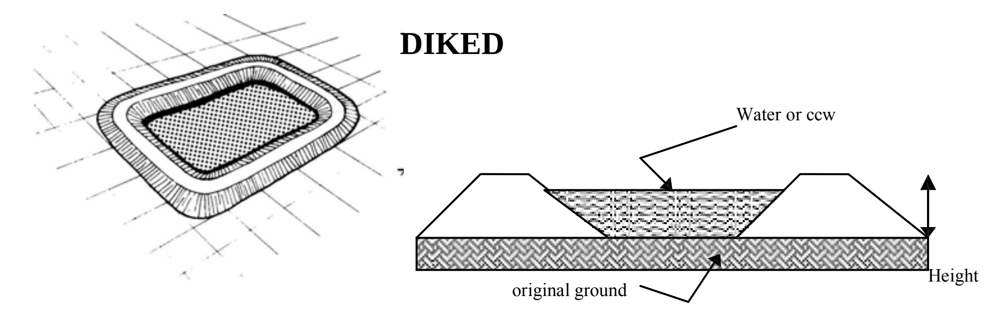


CROSS-VALLEY

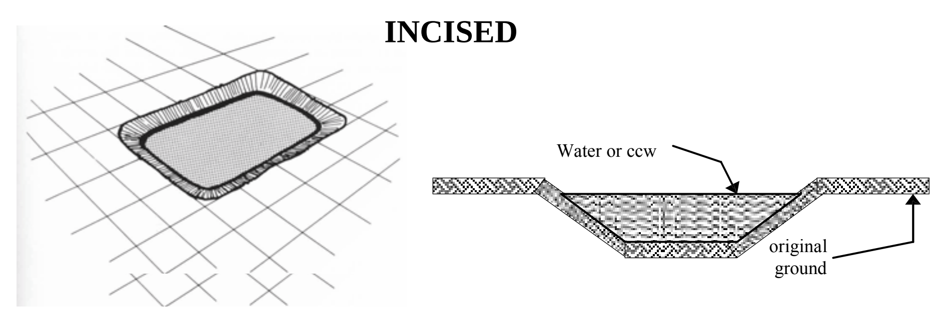


SIDE-HILL

DIKED



INCISED



______Cross-Valley
______Side-Hill
______Diked
______Incised (form completion optional)
__X__Combination Incised/Diked

Embankment Height __10______ feet
Pool Area __0.54__________ acres
Current Freeboard* __4-5______ feet

Embankment Material Sandy Clayey Silt; Lean Clay; and Silty Lean Clay
Liner _No_______________________
Liner Permeability _N/A____________

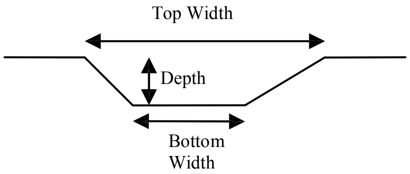
*Water level lower during excavation
** Pumped discharge - pump operation checked daily

TYPE OF OUTLET (Mark all that apply)

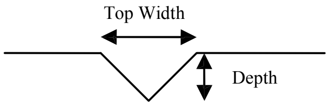
______**Open Channel Spillway**
______Trapezoidal
______Triangular
______Rectangular
______Irregular

______depth
______bottom (or average) width
______top width

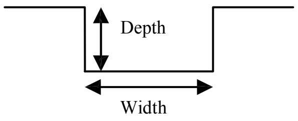
TRAPEZOIDAL



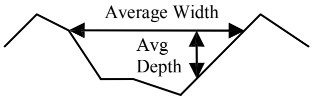
TRIANGULAR



RECTANGULAR

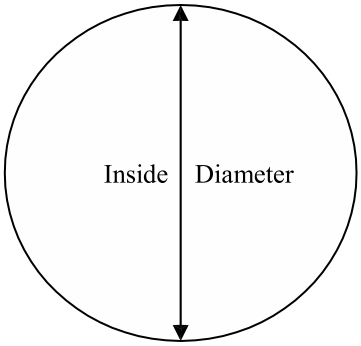


IRREGULAR



______**Outlet**

______inside diameter



Material
______corrugated metal
______welded steel
______concrete
______plastic (hdpe, pvc, etc.)
______other (specify) ______________________

Is water flowing through the outlet? YES ________ NO* __X__
*Pumps were not operating during assessment visit

______**No Outlet**

__X__**Other Type of Outlet** (specify) Pumped to NPDES Outfall 004

The Impoundment was Designed By Sargent & Lundy

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? N/A YES ________NO ________

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

If so Please Describe : ____

Coal Combustion Dam Inspection Checklist Form

US Environmental
Protection Agency

Site Name: M.L. Kapp

Date: October 27, 2010

Unit Name: Main Ash Primary Settling Pond

Operator's Name: Alliant Energy, Inc.

Unit I.D.:

Hazard Potential Classification: High Significant [✓ Low]

Inspector's Name: Don Dotson/AMEC and Mary Sawitzki/AMEC

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?	See note		18. Sloughing or bulging on slopes?	See Note	
2. Pool elevation (operator records)?	Not provided		19. Major erosion or slope deterioration? See Note	X	
3. Decant inlet elevation (operator records)?	Not provided		20. Decant Pipes: See Note		
4. Open channel spillway elevation (operator records)?	N/A		Is water entering inlet, but not exiting outlet?		
5. Lowest dam crest elevation (operator records)?	590.0 ft		Is water exiting outlet, but not entering inlet?		
6. If instrumentation is present, are readings recorded (operator records)?	N/A		Is water exiting outlet flowing clear?		
7. Is the embankment currently under construction?		X	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below): See Note		
8. Foundation preparation (remove vegetation,stumps, topsoil in area where embankment fill will be placed)?	X		From underdrain? N/A		
9. Trees growing on embankment? (If so, indicate largest diameter below) See Note		X	At isolated points on embankment slopes?		
10. Cracks or scarps on crest?		X	At natural hillside in the embankment area?		
11. Is there significant settlement along the crest?		X	Over widespread areas?		
12. Are decant trashracks clear and in place?	N/A		From downstream foundation area?		
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		X	"Boils" beneath stream or ponded water?		
14. Clogged spillways, groin or diversion ditches?	N/A		Around the outside of the decant pipe? N/A		
15. Are spillway or ditch linings deteriorated?	N/A		22. Surface movements in valley bottom or on hillside?	See Note	
16. Are outlets of decant or underdrains blocked?		X	23. Water against downstream toe?	See Note	
17. Cracks or scarps on slopes?	See note		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

1. Annual inspections by Alliant Energy, beginning in 2009

9. Heavy vegetation

17.-18. Could not determine due to heavy vegetation

19. Oversteepened slopes evident, possibly caused by drawdown.

20. Pond level was below vertical inlet into secondary pond; could not determine

21., 22., and 23. Could not determine due to heavy vegetation.

EPA FORM -XXXX

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # Iowa 2326103

INSPECTOR Don Dotson/Mary Sawitzki (AMEC)

Date October 27, 2010

Impoundment Name M.L. Kapp Main Ash Primary Settling Pond
Impoundment Company Alliant Energy
EPA Region 7
State Agency (Field Office) Address

Iowa Department of Natural Resources
502 E. 9th Street
Des Moines, IA 50319

USEPA Region 7
901 N. 5th Street
Kansas City, KS 66101

Name of Impoundment Alliant Energy M.L. Kapp Main Ash Primary Settling 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: Primary receiving location for CCW and related materials.

Nearest Downstream Town : Name Camanche, IA
Distance from the impoundment approx. 2 miles
Impoundment
Location: Longitude -90 Degrees 14 Minutes 22.3 Seconds
Latitude 41 Degrees 48 Minutes 40.3 Seconds
State IA County Clinton

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

If So Which State Agency?____

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.

__X__**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.

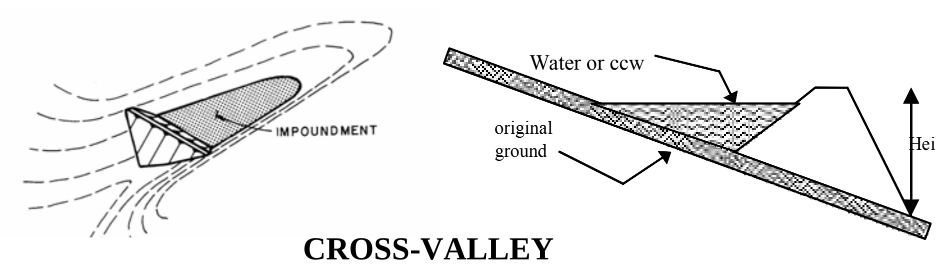
______**SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. 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.

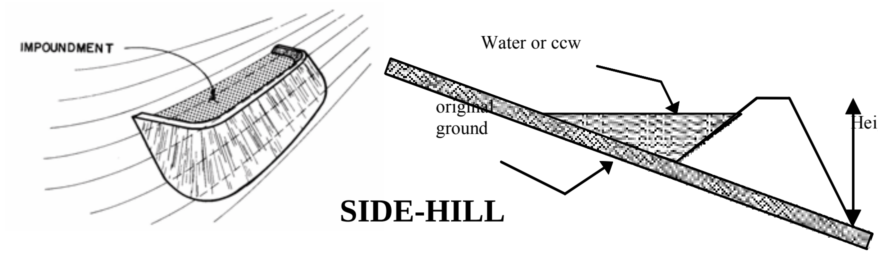
DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

Failure effects limited to large, isolated area

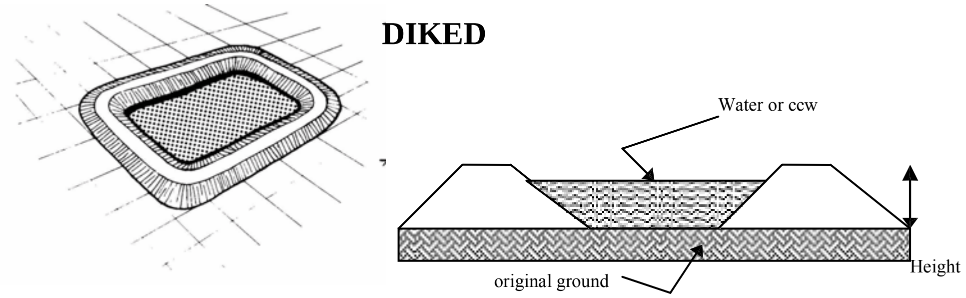
CONFIGURATION:



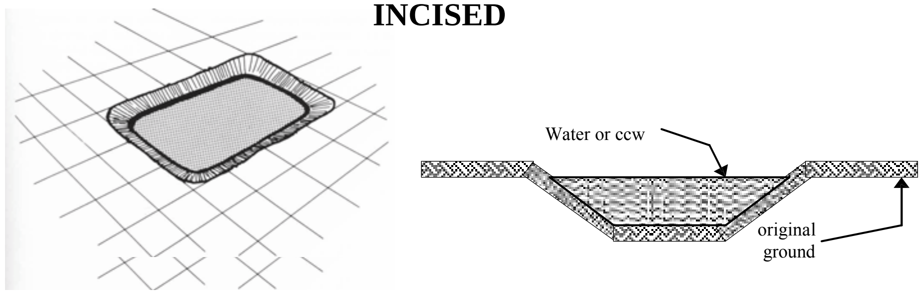
CROSS-VALLEY



SIDE-HILL



DIKED



INCISED

______Cross-Valley
______Side-Hill
______Diked
______Incised (form completion optional)
__X__Combination Incised/Diked

Embankment Height __11________feet
Pool Area ___6.9____________ acres
Current Freeboard* __4-5______ feet

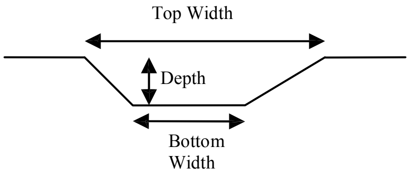
Embankment Material Clayey Silt and Silty Lean Clay__
Liner _No_____________________________
Liner Permeability _N/A______________

TYPE OF OUTLET (Mark all that apply)

______**Open Channel Spillway**
______Trapezoidal
______Triangular
______Rectangular
______Irregular

______depth
______bottom (or average) width
______top width

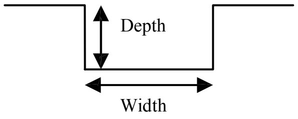
TRAPEZOIDAL



TRIANGULAR

Top Width
Depth

RECTANGULAR

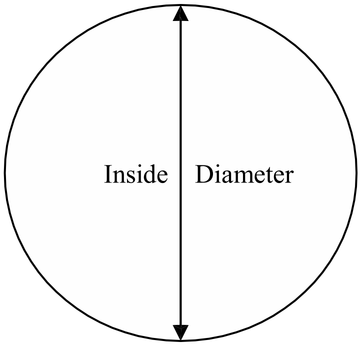


IRREGULAR

Average Width
Avg Depth

______**Outlet**

______inside diameter



Material
______corrugated metal
______welded steel
______concrete
______plastic (hdpe, pvc, etc.)
______other (specify) ______________________

Is water flowing through the outlet? YES _______ NO __X*___
*Water level below level of pipe culvert discharge

______**No Outlet**

______**Other Type of Outlet** (specify) discharges into Main Secondary Pond through a pipe culvert, not provided culvert diameter, appeared to be at least 18 inches. Culvert invert is adjustable using stacking pipe connectors

The Impoundment was Designed By Sargent & Lundy

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? N/A YES ________NO ________

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

If so Please Describe : ____

Coal Combustion Dam Inspection Checklist Form

US Environmental
Protection Agency

Site Name: M.L. Kapp

Date: October 27, 2010

Unit Name: Main Ash Secondary Settling Pond

Operator's Name: Alliant Energy, Inc.

Unit I.D.:

Hazard Potential Classification: High Significant [✓ Low]

Inspector's Name: Don Dotson/AMEC and Mary Sawitzki/AMEC

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?	See note		18. Sloughing or bulging on slopes?	See Note	
2. Pool elevation (operator records)?	Not provided		19. Major erosion or slope deterioration? See Note	X	
3. Decant inlet elevation (operator records)?	Not provided		20. Decant Pipes: See Note		
4. Open channel spillway elevation (operator records)?	N/A		Is water entering inlet, but not exiting outlet?		
5. Lowest dam crest elevation (operator records)?	590.0 ft		Is water exiting outlet, but not entering inlet?		
6. If instrumentation is present, are readings recorded (operator records)?	N/A		Is water exiting outlet flowing clear?		
7. Is the embankment currently under construction?		X	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below): See Note		
8. Foundation preparation (remove vegetation,stumps, topsoil in area where embankment fill will be placed)?	X		From underdrain? N/A		
9. Trees growing on embankment? (If so, indicate largest diameter below)	X		At isolated points on embankment slopes?		
10. Cracks or scarps on crest?		X	At natural hillside in the embankment area?		
11. Is there significant settlement along the crest?		X	Over widespread areas?		
12. Are decant trashracks clear and in place?	N/A		From downstream foundation area?		
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		X	"Boils" beneath stream or ponded water?		
14. Clogged spillways, groin or diversion ditches?	N/A		Around the outside of the decant pipe? N/A		
15. Are spillway or ditch linings deteriorated?	N/A		22. Surface movements in valley bottom or on hillside?	See Note	
16. Are outlets of decant or underdrains blocked?		X	23. Water against downstream toe?	See Note	
17. Cracks or scarps on slopes?	See note		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

1. Annual inspections by Alliant Energy, beginning in 2009

9. Heavy vegetation and trees 18” - 24”

17.-18. Could not determine due to heavy vegetation

19. Oversteepened slopes evident, possibly due to drawdown.

20. Water is pumped from impoundment; pumps were not operating on day of visit.

21, 22 & 23. Heavy vegetation did not allow assessment for seepage, surface movement, or presence of water at toe.

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # Iowa 2326103

INSPECTOR Don Dotson/Mary Sawitzki (AMEC)

Date October 27, 2010

Impoundment Name M.L. Kapp Main Ash Secondary Settling Pond

Impoundment Company Alliant Energy

EPA Region 7

State Agency (Field Office) Address

USEPA Region 7
901 N. 5^{th} Street
Kansas City, KS 66101

Name of Impoundment Alliant Energy M.L. Kapp Main Ash Secondary Settling 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: Receives decant from Main Primary Ash Pond and discharges to NPDES outfall 003

Nearest Downstream Town : Name Camanche, IA

Distance from the impoundment approx. 2 miles

Impoundment

Location: Longitude -90 Degrees 14 Minutes 21.7 Seconds

Latitude 41 Degrees 48 Minutes 43.5 Seconds

State IA County Clinton

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

If So Which State Agency? ______

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.

__X__**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.

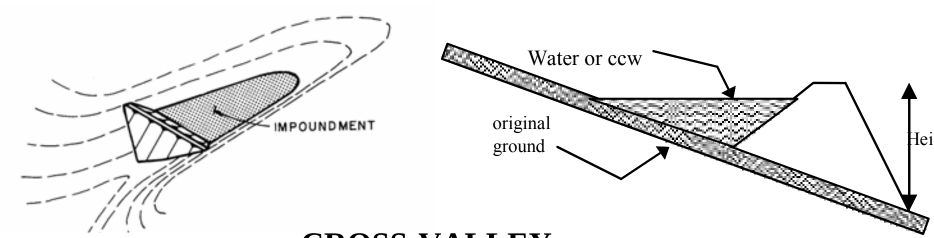
______**SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. 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.

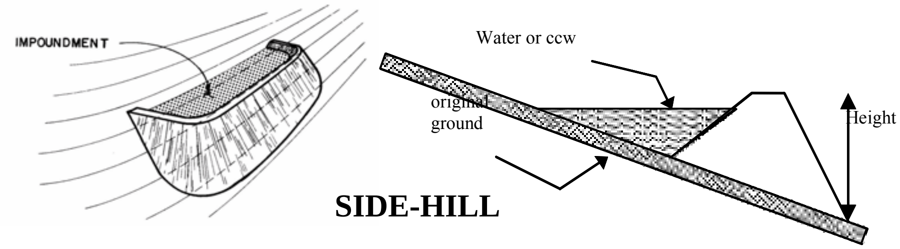
DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

Failure effects limited to large, isolated area

CONFIGURATION:

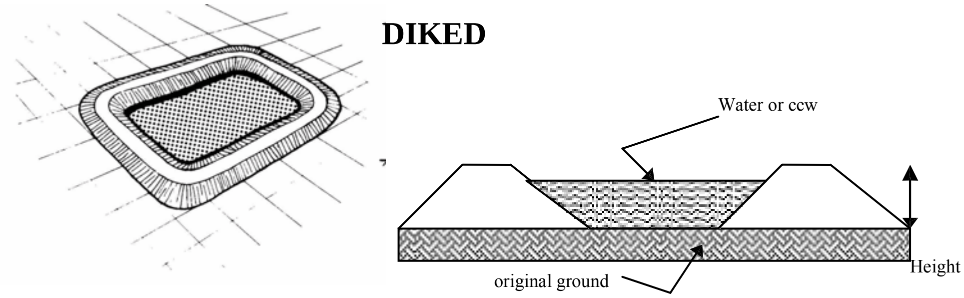


CROSS-VALLEY

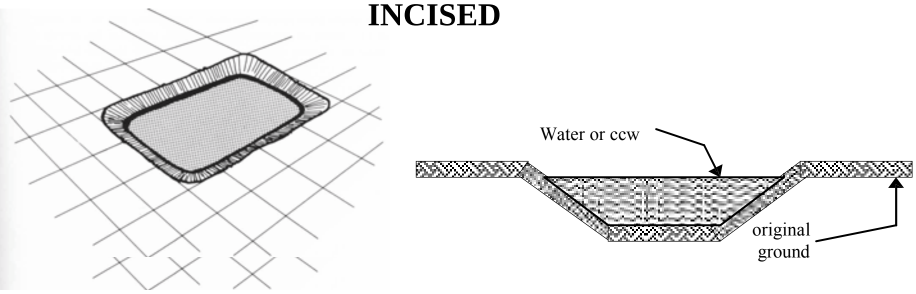


SIDE-HILL

DIKED



INCISED



______Cross-Valley
______Side-Hill
______Diked
______Incised (form completion optional)
__X__Combination Incised/Diked

Embankment Height __10__ feet
Embankment Material Clayey Silt and Silty Lean Clay
Pool Area __2.3__ acres
Liner __No__
Current Freeboard* __4-5__ feet
Liner Permeability __N/A__

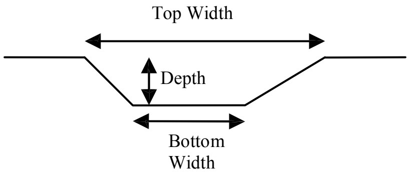
*Pump discharge – daily pump operation check

TYPE OF OUTLET (Mark all that apply)

______**Open Channel Spillway**
______Trapezoidal
______Triangular
______Rectangular
______Irregular

______depth
______bottom (or average) width
______top width

TRAPEZOIDAL

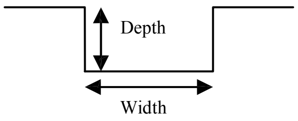


TRIANGULAR

Top Width

Depth

RECTANGULAR



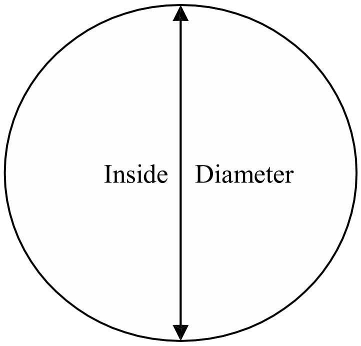
IRREGULAR

Average Width

Avg Depth

______**Outlet**

______inside diameter



Material
______corrugated metal
______welded steel
______concrete
______plastic (hdpe, pvc, etc.)
______other (specify) ______________________

Is water flowing through the outlet? YES ________ NO* __X__
*Pump not operating during site assessment

______**No Outlet**

__X__**Other Type of Outlet** (specify) pumped to NPDES outfall 003

The Impoundment was Designed By Sargent & Lundy

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? N/A YES ________NO ________

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

If so Please Describe : ____

APPENDIX B
Site Photo Log Map and Site Photos

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Louisville, KY 40299

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DWN BY:	DJC
CKD BY:	MS
Datum:	NAD 83
Projection:	UTM 15
Scale:	As Shown

ASSESSMENT OF DAM SAFETY OF
COAL COMBUSTION SURFACE IMPOUNDMENTS

INTERSTATE POWER AND LIGHT COMPANY
ML KAPP POWER STATION, CLINTON, IA
PHOTO LOCATION MAP

REV. No.:	A
Date:	11-9-10
Project No:	3-2106-0183-0002
Figure No:	B-1

EP-1

LOOKING NORTHWEST ACROSS EMERGENCY ASH PRIMARY AND SECONDARY SETTLING PONDS

EP-2

LOOKING SOUTH AT COAL PILE ADJACENT TO OPERATIONS/OFFICE BUILDING

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PROJECT
ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS

DWN BY: CAE

DATUM:

DATE: 11/15/10

TITLE
INTERSTATE POWER AND LIGHT COMPANY
ML KAPP POWER STATION, CLINTON IA
EMERGENCY POND SITE PHOTOS

CHK'D BY: MOS

REV. NO.:

PROJECT NO: 3-2106-0183.0002

PROJECTION:

SCALE: AS SHOWN

APPENDIX: B-2

EP-3

LOOKING WEST AT BOTTOM ASH INFLUENT PIPE INTO EMERGENCY ASH PRIMARY SETTLING POND

EP-4

UPSTREAM END OF STORM DRAIN PIPE FROM COAL PILE AREA INTO EMERGENCY ASH PRIMARY SETTLING POND

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INTERSTATE POWER AND LIGHT COMPANY
ML KAPP POWER STATION, CLINTON IA
EMERGENCY POND SITE PHOTOS

CHK'D BY: MOS

REV. NO.:

PROJECT NO: 3-2106-0183.0002

PROJECTION:

SCALE: AS SHOWN

APPENDIX: B-3

EP-5

LOOKING AT UPSTREAM END OF EMERGENCY ASH PRIMARY AND SECONDARY SETTLING PONDS INVERTED CONNECTION PIPE

EP-6

LOOKING SOUTHWEST AT DOWNSTREAM END OF EMERGENCY ASH PRIMARY AND SECONDARY PONDS INVERTED CONNECTION PIPE

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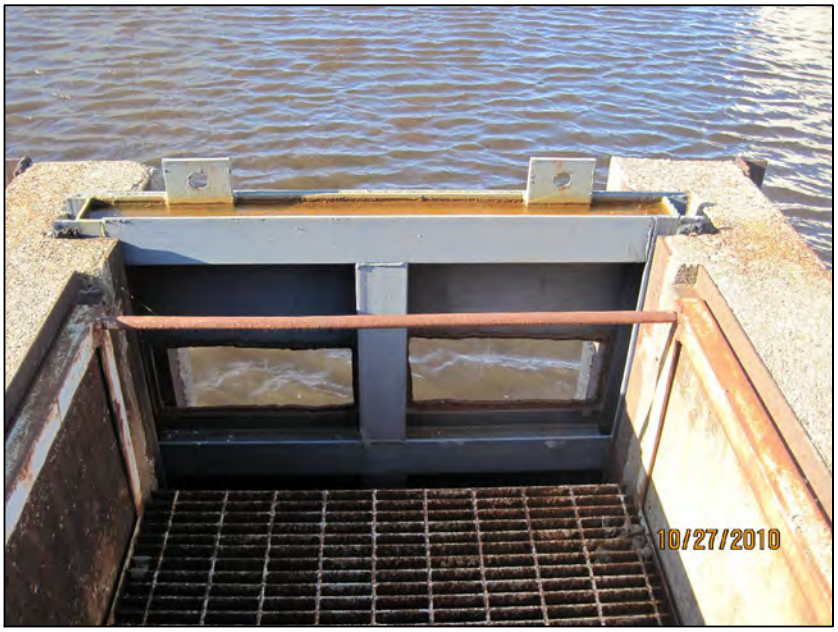
TITLE INTERSTATE POWER AND LIGHT COMPANY ML KAPP POWER STATION, CLINTON IA EMERGENCY POND SITE PHOTOS	CHK'D BY: MOS	REV. NO.:	PROJECT NO: 3-2106-0183.0002
	PROJECTION:	SCALE: AS SHOWN	APPENDIX: B-4

EP-7
LOOKING WEST AT EMERGENCY ASH SECONDARY POND OUTFALL PUMP HOUSE



EP-8
EMERGENCY ASH SECONDARY POND ABANDONED ORIGINAL DISCHARGE BOX STRUCTURE

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DWN BY: CAE
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DATE: 11/15/10

TITLE
INTERSTATE POWER AND LIGHT COMPANY
ML KAPP POWER STATION, CLINTON IA
EMERGENCY POND SITE PHOTOS

CHK'D BY: MOS
REV. NO.:
PROJECT NO: **3-2106-0183.0002**
PROJECTION:
SCALE: AS SHOWN
APPENDIX: B-5

EP-9
INFLUENT WELL AT EMERGENCY SECONDARY POND PUMP HOUSE

EP-10
LOOKING EAST FROM PUMPHOUSE AT ABANDONED ORIGINAL DISCHARGE BOX STRUCTURE

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PROJECT ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS	DWN BY: CAE	DATUM:	DATE: 11/15/10
TITLE INTERSTATE POWER AND LIGHT COMPANY ML KAPP POWER STATION, CLINTON IA EMERGENCY POND SITE PHOTOS	CHK'D BY: MOS	REV. NO.:	PROJECT NO: **3-2106-0183.0002**
	PROJECTION:	SCALE: AS SHOWN	**APPENDIX:** B-6

EP-11

ANIMAL BURROW OUTSIDE NORTH FENCE CORNER AT TOP OF EMERGENCY SECONDARY POND DOWNSTREAM EMBANKMENT SLOPE

EP-12

LOOKING SOUTHEAST ALONG CREST OF EMERGENCY SECONDARY POND DOWNSTREAM EMBANKMENT-MISSISSIPPI RIVER IN BACKGROUND

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	PROJECTION:	SCALE: AS SHOWN	APPENDIX: B-7

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EP-13
OUTLET OF ANIMAL BURROW SHOWN IN PHOTO EP-11

10/27/2010

EP-14
DOWNSTREAM PIPE OUTLET OF ABANDONED ORIGINAL DISCHARGE BOX STRUCTURE

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DWN BY: CAE

DATUM:

DATE: 11/15/10

TITLE
INTERSTATE POWER AND LIGHT COMPANY
ML KAPP POWER STATION, CLINTON IA
EMERGENCY POND SITE PHOTOS

CHK'D BY: MOS

REV. NO.:

PROJECT NO: 3-2106-0183.0002

PROJECTION:

SCALE: AS SHOWN

APPENDIX: B-8

EP-15
ANIMAL BURROW IN DOWNSTREAM EMBANKMENT

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PROJECT ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS		DWN BY: CAE	DATUM:	DATE: 11/15/10
TITLE INTERSTATE POWER AND LIGHT COMPANY ML KAPP POWER STATION, CLINTON IA EMERGENCY POND SITE PHOTOS		CHK'D BY: MOS	REV. NO.:	PROJECT NO: 3-2106-0183.0002
		PROJECTION:	SCALE: AS SHOWN	APPENDIX: B-9

MP-1
INFLUENT WELL AT MAIN SECONDARY POND DISCHARGE PUMP HOUSE

MP-2
LOOKING WEST ALONG MAIN ASH SECONDARY POND FROM DISCHARGE PUMP HOUSE

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TITLE INTERSTATE POWER AND LIGHT COMPANY ML KAPP POWER STATION, CLINTON IA MAIN POND SITE PHOTOS	CHK'D BY: MOS	REV. NO.:	PROJECT NO: 3-2106-0183.0002
	PROJECTION:	SCALE: AS SHOWN	APPENDIX: B-10

MP-3
LOOKING EAST AT CCW INFLUENT PIPE FROM ML KAPP FACILITY

MP-4
CCW INFLUENT PIPE-CONNECTION POINT OF NEW SECTION OF BASALT LINED CAST IRON

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PROJECT
ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS

TITLE
INTERSTATE POWER AND LIGHT COMPANY
ML KAPP POWER STATION, CLINTON IA
MAIN POND SITE PHOTOS

DWN BY: CAE
DATUM:
DATE: 11/15/10
CHK'D BY: MOS
REV. NO.:
PROJECT NO: 3-2106-0183.0002
PROJECTION:
SCALE: AS SHOWN
APPENDIX: B-11

MP-5
BOTTOM SECTION OF DROP INLET IN MAIN PRIMARY POND LEADING TO MAIN SECONDARY POND

MP-6
LOOKING EAST FROM WEST CREST ACROSS MAIN ASH PRIMARY POND

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TITLE INTERSTATE POWER AND LIGHT COMPANY ML KAPP POWER STATION, CLINTON IA MAIN POND SITE PHOTOS	CHK'D BY: MOS	REV. NO.:	PROJECT NO: 3-2106-0183.0002
	PROJECTION:	SCALE: AS SHOWN	APPENDIX: B-12

MP-7
DROP INLET EXTENSION PIECES SITTING UPSLOPE FROM DROP INLET IN MAIN ASH PRIMARY POND

MP-8
VEGETATION SURROUNDING PIPE DISCHARGE FROM MAIN ASH PRIMARY POND INTO SECONDARY POND

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TITLE
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ML KAPP POWER STATION, CLINTON IA
MAIN POND SITE PHOTOS

CHK'D BY: MOS
REV. NO.:
PROJECT NO: 3-2106-0183.0002
PROJECTION:
SCALE: AS SHOWN
APPENDIX: B-13

MP-9
LOOKING NORTHEAST ALONG SOUTH EMBANKMENT AND CREST OF MAIN SECONDARY POND

MP-10
LOOKING SOUTHEAST AT CCW PIPE INFLUENT INTO MAIN ASH PRIMARY POND

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ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS

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TITLE
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ML KAPP POWER STATION, CLINTON IA
MAIN POND SITE PHOTOS

CHK'D BY: MOS
REV. NO.:
PROJECT NO: 3-2106-0183.0002
PROJECTION:
SCALE: AS SHOWN
APPENDIX: B-14

MP-11
LOOKING SOUTHWEST ALONG NORTH EMBANKMENT AND CREST OF MAIN PRIMARY POND

MP-12
TOP OF ABANDONED MAIN POND OUTLET STRUCTURE

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TITLE INTERSTATE POWER AND LIGHT COMPANY ML KAPP POWER STATION, CLINTON IA MAIN POND SITE PHOTOS		CHK'D BY: MOS	REV. NO.:	PROJECT NO: 3-2106-0183.0002
		PROJECTION:	SCALE: AS SHOWN	APPENDIX: B-15

MP-13
DOWNSTREAM END OF ABANDONED MAIN POND OUTLET STRUCTUREAT TOE OF SLOPE OF ORIGINAL EMBANKMENT

MP-14
ANIMAL BURROW LOCATED AT NORTHEAST CORNER OF ORIGINAL POND EMBANKMENT

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PROJECT
ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS

DWN BY: CAE
DATUM:
DATE: 11/15/10

TITLE
INTERSTATE POWER AND LIGHT COMPANY
ML KAPP POWER STATION, CLINTON IA
MAIN POND SITE PHOTOS

CHK'D BY: MOS
REV. NO.:
PROJECT NO: 3-2106-0183.0002
PROJECTION:
SCALE: AS SHOWN
APPENDIX: B-16

10/27/2010

MP-15
LOOKING EAST ALONG DOWNSTREAM SLOPE OF ORIGINAL EMBANKMENT AT TREES/VEGETATION

10/27/2010

MP-16
LOOKING WEST ALONG DOWNSTREAM SLOPE OF ORIGINAL EMBANKMENT AT TREES/VEGETATION

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PROJECT ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS		DWN BY: CAE	DATUM:	DATE: 11/15/10
TITLE INTERSTATE POWER AND LIGHT COMPANY ML KAPP POWER STATION, CLINTON IA MAIN POND SITE PHOTOS		CHK'D BY: MOS	REV. NO.:	PROJECT NO: 3-2106-0183.0002
		PROJECTION:	SCALE: AS SHOWN	APPENDIX: B-17

MP-17
LOOKING SOUTHWEST ALONG SOUTHERN PORTION OF ORIGINAL EMBANKMENT

MP-18
LOOKING NORTHEAST ALONG SOUTHERN PORTION OF ORIGINAL EMBANKMENT

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TITLE INTERSTATE POWER AND LIGHT COMPANY ML KAPP POWER STATION, CLINTON IA MAIN POND SITE PHOTOS	CHK'D BY: MOS	REV. NO.:	PROJECT NO: 3-2106-0183.0002
	PROJECTION:	SCALE: AS SHOWN	**APPENDIX:** B-18

APPENDIX C
Inventory of Provided Materials

2002 Main Ash Pond Design Drawing.pdf
2010 Ash Pond Inspection.tif
alliant-mlkapp_RRFI.pdf
Ash Line Drawing B-322.pdf
Ash Pond - B323.pdf
Ash Pond Berm Earthwork 1993.pdf
Ash Pond Berm Soil Borings 1994.pdf
Ash Pond Berm Soil Specs 1965.pdf
Ash Pond Berm Soil Specs 1993.pdf
Ash Pond Drawing B321.pdf
Ash Pond Work 1965.pdf
E Ash Pond Redesign.pdf
EPA Ash Assessment KAPP Cover Ltr 102010.pdf
Genco Standard Guide for Pond Inspections Revision 0.pdf
Kapp Hydraulic Analysis.pdf
Kapp NPDES Permit 1999.pdf
Kapp Site Photo.pdf
Kapp Water Flow Diagram.pdf
M1 Conceptual Design.tif
Main and E Pond Piping.pdf
Main Ash Pond Drawing B320.pdf
ML Kapp Ash Pond Inspection 2009.pdf
Outdoor Piping.pdf
SLOPE STABILITY KAPP PONDS .pdf

Response to Draft Assessment Reports ML Kapp Generating Station, by Alliant Energy, dated February 22, 2011
ML Kapp Generating Station ML Kapp Pond Examination Program Pond Examination Report, by Sargent & Lundy, dated January 2011
Interstate Power and Light Company ML Kapp Generating Station Reply to AMEC Comment and Recommendations in the EPA Draft Report, undated