These soil samples were tested for:

- Soil classification (ASTM D 2488);
- Moisture content (ASTM D 2216);
- Unconfined compressive strength (ASTM D 2166)

According to the construction plan drawings for the Dallman Ash Pond, dikes were constructed on areas of the old creek bed. The notes on these drawings indicate that the creek bed in these areas was over-excavated by at least 4.0 feet below the existing channel banks and bottom. These excavations were then filled in with cohesive material and compacted to at least 90 percent of optimum density as determined under AASHTO-T99 at optimum moisture.

2.10 Type, Size, Range, and Physical and Engineering Properties of the Materials Used in Constructing Each Zone or Stage of the CCR Surface Impoundment

The July 2, 1987 Engineering Report includes the results of an investigation of the embankments along the lime-softening ponds and the embankment separating the Lakeside Ash Pond from the Clarification Pond (see Attachment 3).

Although design information is limited for the surface impoundments, a stability analysis was performed by Testing Service Corporation (TSC) in 1994 for the design of the adjacent Unit 2 of the FGDS Landfill. The landfill is located in the northeastern half of the site, which is directly adjacent to the east perimeter of the Dallman Ash Pond and north of the Lakeside Ash Pond. This analysis included a review of all of the subsurface studies performed at the site (72 borings in total) as well as five additional borings drilled as part of the stability analysis study for the FGDS Landfill. Laboratory testing completed on cohesive soil samples from these five borings included analyses of moisture content, in-place dry density, unconfined compressive strength, and Atterberg limits. In addition, one sample was selected for triaxial shear testing, and another for direct shear testing.

For the Lakeside Ash Pond, a review of the historical documents found a previous geotechnical investigation and stability analysis, which was conducted prior to the upstream construction of Lakeside Ash Pond. The results of that geotechnical investigation are utilized within this assessment of the safety factors. Additionally, a literature review of technical papers was conducted to determine the geotechnical parameters for the fly ash within the impoundments. Table 1 of Attachment 17 presents highly conservative geotechnical parameters based upon the previous geotechnical investigation utilized in the static and seismic slope stability model.

Included in Appendix B of Attachment 17 are copies of the historical boring logs and cross sections that support the geotechnical parameters provided in Table 1. Technical papers supporting the ash geotechnical parameters are included in Appendix C of Attachment 17.

For the Dallman Ash Pond, a review of the historical documents revealed the original construction plans, with cross sections provided, was completed. More recent site investigations have been conducted in the area during the installation of piezometers, which provide the stratigraphic and in situ strengths of earthen materials that correlate well with the Lakeside Ash Ponds geotechnical data. The historical data have been used to develop conservative geotechnical parameters for slope stability analysis as provided in Table 2 of Attachment 17.

Included in Appendix D of Attachment 17 are copies of the boring log and cross section that support the geotechnical parameters provided in Table 2.

2.11 Method of Site Preparation and Construction of Each Zone of the CCR Surface Impoundment

During the construction of the ash ponds, the creek was abandoned and relocated to the west of the site. As a result, much of the shallow soils were displaced during area development. The old creek bed was filled with different types of soil, ranging from cohesive soils characterized as silty clays, to granular fill characterized as poorly graded silty to clayey sands.

The Lakeside Ash Pond is primarily a diked embankment with some incising along the east perimeter. The entire ash pond abuts the Lake Springfield dam to the south. The original portion of the ash pond abuts the Unit I landfill and the clarification pond to the north. The only portions of the Lakeside Ash Pond with open downstream slopes are the west dike of the original ash pond, and the vertical expansion berms, which were constructed on the east, west and south boundaries of the ash pond.

According to the July 2, 1987 Engineering Report the initial deposition of fly ash occurred in an area north of Spaulding Dam shortly after completion of the first power plant sometime in the middle 1930's. This original disposal area is within the southern portion of the Lakeside Ash Pond, encompassing the area that is now identified as the two eastern-most lime-softening ponds. The south portion of the west embankment of what would become the western-most lime-softening pond was part of the construction for the original ash disposal area.

In 1966, plans were prepared for expanding the disposal area to the north. The north embankment and the north portion of the west embankment were constructed in conjunction with this expansion. Slopes of 2.0H to 1.0V are indicated on the construction drawings, as is a crest width of 12 ft. The construction drawings note "Compact to 90% Maximum Density at Optimum Moisture." Reconstruction of the original west embankment occurred in 1971. The reconstructed downstream face contained a slope of 3.0H to 1.0V.

The clarifier pond, located immediately north of the Lakeside Ash Pond was constructed between 1971 and 1976. The construction drawings for the Dallman Ash Pond were prepared in 1976. The construction drawings included drawings for modification to the north portion of the west embankment of the Lakeside Ash Pond. These modifications include a sloped granular drainage blanket connected to an 8 in. diameter perforated pipe running the length of the embankment. Compacted material downstream of this drainage blanket flattened the downstream slope to 2.5H to 1.0V. The outlet of the drainage pipe is indicated to be north of the original west embankment (which had been reconstructed in 1971).

Based on the July 2, 1987 Engineering Report the north-south cross dikes were constructed over ponded ash material in the original disposal area subsequent to 1976 to form what are presently identified as the two eastern-most lime-softening ponds. In addition, a portion of the north embankment of the original ash disposal area, the Lakeside Ash Pond, was raised in height.

The most recent change made to the Lakeside Ash Pond system was a vertical expansion completed in 1988. The vertical expansion consisted of berms built on top and inside of the existing embankments in such a way that the toe of the outer slope of the expansion berms matches up with the top of the inner slope of the existing embankments. The berms were built on top of a stable base comprised of bottom ash on the inside of the existing berms. The vertical

expansion berms are approximately ten feet in height and were constructed with compacted cohesive materials. The top and outer slopes are covered with a 6-inch topsoil layer. The top of the berms are 10 feet wide. The outer slope of the berms was built at a 2H:1V slope; the inner slope of the berms was built at a 1H:1V slopes. During the vertical expansion in 1988, the Lakeside Ash Pond was separated to create lime softening ponds on the south section of the pond. There is no as-built construction documentation available for the Lakeside Ash Pond.

The entire Dallman Ash Pond was built in 1976 and is partially incised. Material from the center of the ash pond was excavated and utilized in the construction of the dikes. The Dallman Ash Pond has not been expanded. The berms for the Dallman Ash Pond were built to a height of approximately 27 feet, using slopes of 2.5H:1V for both the inner and outer slopes. Riprap was placed at the bottom section of the outer slopes for the west and north berms. The south berm for the Dallman Ash Pond is shared by the Clarification Pond located to the south. There is no as-built construction documentation is available for the Dallman Ash Pond. Notes in the construction plan drawings do call for dike materials to be compacted to “at least 90% of the minimum density at optimum moisture as determined by AASHTO-T99.”

2.12 Dates of Construction of Each Successive Stage of Construction of the CCR Surface Impoundment

Ash placement in what is the Lakeside Ash Pond originally occurred in the middle 1930’s. The pond was built prior to 1958. The most recent change made to the Lakeside Ash Pond system was a vertical expansion completed in 1988. During the vertical expansion, the Lakeside Ash Pond was separated to create lime softening ponds on the south section of the pond.

The Dallman Ash Pond was built in 1976; it has not been expanded.

2.13 Drawing Satisfying the Requirements of 35 IAC 845.220(a)(1)(F)

The drawings listed below were included in the 2016 History of Construction Report which was completed pursuant to 40 CFR Section 257.73. The subject report is contained in Attachment 4 to this application.

- Figure 1 – Site Map identifying the location of the CCR units.
- Figure 2 – Plan View of the surface impoundments and the locations of outlets, normal operating pool elevations, maximum pool elevations, and maximum depths of each CCR unit.
- Construction Drawings – Plan Views and Cross Sections of each CCR unit.

Plan Drawings and Cross Sections of the Lakeside Ash Pond were taken from the construction design drawings included in the 1987 Proposed Embankment Modifications report by Hanson Engineers, Inc. No as-built drawings are available for either the original pond construction prior to 1958 or the expansion in 1988. The Plan Drawing shows the proposed expansion with two lime softening ponds. The third lime softening pond was constructed from the southern portion of the expanded settling pond at a later time.

The Plan Drawing of the Dallman Ash Pond was taken from the 1976 Construction Grading Plan; cross sections for the Dallman Ash Pond were created based on this Plan Drawing. No as-built drawings are available for the construction of the Dallman Ash Pond.

Neither CCR unit contains foundation improvements, drainage provisions, diversion ditches, or instrumentation. No identifiable natural or manmade features that could adversely affect operation of the CCR unit due to malfunction or mis-operation are known to CWLP personnel.

2.14 Type, Purpose, and Location of Existing Instrumentation

According to CWLP personnel, none of the CCR units maintained by CWLP contains any such unit instrumentation, which would include dedicated piezometers, pool elevation and freeboard instrumentation or more sophisticated measuring devices for measuring pressure, seepage, internal movement, slope movement, and/or vibration.

2.15 Area Capacity Curves for the CCR Impoundment.

Area capacity curves have been developed for the subject CCR surface impoundments and are included as Attachment 4 in the document CWLP 2016 History of Construction Report. Construction of the area capacity curves were based on information from the construction drawings discussed in Section 2.13.

2.16 Spillway and Diversion Design Features, Capacities and Calculations Used in their Determination

Neither ash pond have a constructed or natural spillway.

The Lakeside Ash Pond and Lime Softening Ponds have a combined approximate storage capacity of 1,330,000 cubic yards. The Dallman Ash Pond has an approximate storage capacity of 1,500,000 cubic yards. During the vertical expansion, an outlet structure was constructed through the northern berm of the Lakeside Ash Pond, which drains into the adjacent Clarification Pond. The outlet is constructed with a 24-inch diameter reinforced concrete pipe (RCP). The length of the pipe is approximately 60 feet. The pipe was bedded in compacted cohesive material and an anti-seep collar at approximately halfway through the berm. In addition, the Lakeside Ash Pond has a 14-inch diameter pipe that drains decant water from the settling pond portion of the lime ponds. This pipe is 100 feet in length and similar to the outlet structure for the Dallman Ash Pond. The outlets appears to be structurally sound with no observed signs of significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, or debris

An outlet structure has also been constructed through the southern dike of the Dallman Ash Pond. This structure allows the Dallman Ash Pond to drains into the adjacent Clarification Pond. The outlet is a 24-inch diameter high-density polyethylene (HDPE) pipe. The length of the pipe is approximately 120 feet. The outlet appears to be structurally sound with no observed signs of significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, or debris.

Both the Dallman Ash Pond and the Lakeside Ash Pond are diked surface impoundments built vertically above the existing grades. Both CCR units are built in a manner in which there is no surficial flow of stormwater into the pond during precipitation events. Therefore, the only water that would flow into the pond during a precipitation event is that which falls directly into the ponds. Ditches located adjacent to the south and east of the impoundments route surface water around the impoundment area ultimately discharging to the South Fork of Sugar Creek. Sugar Creek is present along the western edge and northern perimeters of ash impoundment area.

The National Oceanic and Atmospheric (NOAA) Atlas 14, Volume 2, Version 3, the 100-year, 24 hour rainfall estimate for the site location is 6.22 inches.