Cynthia Vodopivec
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September 29, 2020

Sent via email

Mr. Andrew R. Wheeler, EPA Administrator
Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Mail Code 5304-P
Washington, DC 20460

Re: Coffeen Power Station Alternative Closure Demonstration

Dear Administrator Wheeler:

Illinois Power Generating Company (IPGC) hereby submits this request to the U.S. Environmental Protection Agency (EPA) for approval for a site-specific alternative deadline to initiate closure pursuant to 40 C.F.R. § 257.103(f)(1) for the two CCR surface impoundments (Gypsum Management Facility Gypsum Stack Pond and the GMF Recycle Pond, collectively referred to as the GMF Ponds) located at the Coffeen Power Station near Coffeen, Illinois. IPGC is requesting an alternative deadline to continue to receive CCR and non-CCR wastestreams at the GMF Ponds after April 11, 2021 in order to install a new landfill leachate management system at Coffeen.

Enclosed is a demonstration prepared by Burns & McDonnell that addresses all of the criteria in 40 C.F.R. § 257.103(f)(1)(i)-(iii) and contains the documentation required by 40 C.F.R. § 257.103(f)(1)(iv). As allowed by the agency, in lieu of hard copies of these documents, electronic files were to Kirsten Hillyer, Frank Behan, and Richard Huggins via email. If you have any questions regarding this submittal, please contact Phil Morris at 618-343-7794 or phil.morris@vistracorp.com.

Sincerely,

Cynthia Vodopivec
VP - Environmental Health & Safety

Enclosure

cc: Kirsten Hillyer
Frank Behan
Richard Huggins

Coffeen CCR Surface Impoundment Demonstration for a Site-Specific Alternative to Initiation of Closure Deadline

Illinois Power Generating Company

Coffeen Power Station
Project No. 122702

Revision 0
September 28, 2020

Coffeen CCR Surface Impoundment Demonstration for a Site-Specific Alternative to Initiation of Closure Deadline

Prepared for

Illinois Power Generating Company
Coffeen Power Station
Project No. 122702
Coffeen, Illinois

Revision 0
September 28, 2020

Prepared by

Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri

INDEX AND CERTIFICATION

Illinois Power Generating Company
Coffeen CCR Surface Impoundment
Demonstration for a Site-Specific Alternative to Initiation of Closure Deadline

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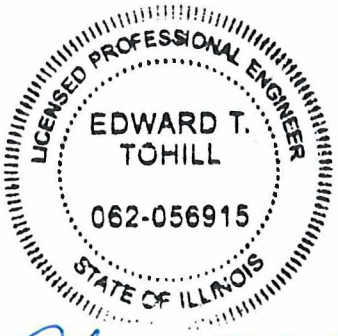
Certification

I hereby certify, as a Professional Engineer in the state of Illinois, that the information in this document as noted in the above Report Index was assembled under my direct personal charge. This report is not intended or represented to be suitable for reuse by the Illinois Power Generating Company or others without specific verification or adaptation by the Engineer.



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Edward T. Tohill, P.E. (Illinois License No. 062-056915)

Date: September 28, 2020

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LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
AP1	Ash Pond No. 1
AP2	Ash Pond No. 2
CCR	Coal Combustion Residual
C.F.R.	Code of Federal Regulations
Coffeen	Coffeen Power Station
CY	Cubic Yards
ELG	Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category
EPA	Environmental Protection Agency
FGD	Flue Gas Desulfurization
gal	Gallons
GCL	Geosynthetic Clay Liner
GMF	Gypsum Management Facility
gpd	Gallons per Day
GWPS	Groundwater Protection Standards
HDPE	High Density Polyethylene
IPGC	Illinois Power Generating Company
RCRA	Resource Conservation and Recovery Act
SAP	Sampling and Analysis Plan
SSI(s)	Statistically Significant Increases
SSL(s)	Statistically Significant Levels

1.0 INTRODUCTION

On April 17, 2015, the Environmental Protection Agency (EPA) issued the federal Coal Combustion Residual (CCR) Rule, 40 C.F.R. Part 257, Subpart D, to regulate the disposal of CCR materials generated at coal-fueled electric generating units. The rule is being administered under Subtitle D of the Resource Conservation and Recovery Act (RCRA, 42 U.S.C. § 6901 et seq.).

On August 28, 2020, the EPA Administrator issued revisions to the CCR Rule that require all unlined surface impoundments to cease receipt of CCR and non-CCR waste and initiate closure by April 11, 2021, unless an alternative deadline is requested and approved. 40 C.F.R. § 257.101(a)(1) (85 Fed. Reg. 53,516 (Aug. 28, 2020)). Specifically, owners and operators of a CCR surface impoundment may seek and obtain an alternative closure deadline by demonstrating that there is currently no alternative capacity available on or off-site and that it is not technically feasible to complete the development of alternative capacity prior to April 11, 2021. 40 C.F.R. § 257.103(f)(1). To make this demonstration, the facility is required to provide detailed information regarding the process the facility is undertaking to develop the alternative capacity. 40 C.F.R. § 257.103(f)(1). Any extensions granted cannot extend past October 15, 2023, except an extension can be granted until October 15, 2024, if the impoundment qualifies as an "eligible unlined CCR surface impoundment" as defined by the rule. 40 C.F.R. § 257.103(f)(1)(vi). Regardless of the maximum time allowed under the rule, EPA explains in the preamble to the Part A rule that each impoundment "must still cease receipt of waste as soon as feasible, and may only have the amount of time [the owner/operator] can demonstrate is genuinely necessary." 85 Fed. Reg. at 53,546.

This document serves as Illinois Power Generating Company's (IPGC's) Demonstration for a site-specific alternative deadline to initiate closure pursuant to 40 C.F.R. § 257.103(f)(1) for the CCR surface impoundments at the Coffeen Power Station (Coffeen), which include the following:

- Gypsum Management Facility (GMF) Gypsum Stack Pond, also referred to as the GMF Pond
- GMF Recycle Pond

EPA should note there are two other CCR surface impoundments onsite at Coffeen. Ash Pond No. 1 (AP1) will initiate closure prior to April 11, 2021, and Ash Pond No. 2 (AP2) is expected to complete closure in October 2020; therefore, these facilities are not included within this demonstration.

To obtain an alternative closure deadline under 40 C.F.R. § 257.103(f)(1), a facility must meet the following three criteria:

1. **§ 257.103(f)(1)(i)** - There is no alternative disposal capacity available on-site or off-site. An increase in costs or the inconvenience of existing capacity is not sufficient to support qualification;

2. **§ 257.103(f)(1)(ii)** - Each CCR and/or non-CCR wastestream must continue to be managed in that CCR surface impoundment because it was technically infeasible to complete the measures necessary to obtain alternative disposal capacity either on or off-site of the facility by April 11, 2021; and

3. **§ 257.103(f)(1)(iii)** - The facility is in compliance with all the requirements of the CCR rule.

To demonstrate that the first two criteria above have been met, 40 C.F.R. § 257.103(f)(1)(iv)(A) requires the owner or operator to submit a work plan that contains the following elements:

- A written narrative discussing the options considered both on and off-site to obtain alternative capacity for each CCR and/or non-CCR wastestream, the technical infeasibility of obtaining alternative capacity prior to April 11, 2021, and the option selected and justification for the alternative capacity selected. The narrative must also include all of the following:
    - An in-depth analysis of the site and any site-specific conditions that led to the decision to select the alternative capacity being developed;
    - An analysis of the adverse impact to plant operations if the CCR surface impoundment in question were to no longer be available for use; and
    - A detailed explanation and justification for the amount of time being requested and how it is the fastest technically feasible time to complete the development of the alternative capacity.
- A detailed schedule of the fastest technically feasible time to complete the measures necessary for alternative capacity to be available, including a visual timeline representation. The visual timeline must clearly show all of the following:
    - How each phase and the steps within that phase interact with or are dependent on each other and the other phases;
    - All of the steps and phases that can be completed concurrently;
    - The total time needed to obtain the alternative capacity and how long each phase and step within each phase will take; and
    - At a minimum, the following phases: engineering and design, contractor selection, equipment fabrication and delivery, construction, and start up and implementation.
- A narrative discussion of the schedule and visual timeline representation, which must discuss the following:
    - Why the length of time for each phase and step is needed and a discussion of the tasks that occur during the specific step;

  - Why each phase and step shown on the chart must happen in the order it is occurring;
  - The tasks that occur during each of the steps within the phase; and
  - Anticipated worker schedules.

- A narrative discussion of the progress the owner or operator has made to obtain alternative capacity for the CCR and/or non-CCR wastestreams. The narrative must discuss all the steps taken, starting from when the owner or operator initiated the design phase up to the steps occurring when the demonstration is being compiled. It must discuss where the facility currently is on the timeline and the efforts that are currently being undertaken to develop alternative capacity.

To demonstrate that the third criterion above has been met, 40 C.F.R. § 257.103(f)(1)(iv)(B) requires the owner or operator to submit the following information:

- A certification signed by the owner or operator that the facility is in compliance with all of the requirements of 40 C.F.R. Part 257, Subpart D;
- Visual representation of hydrogeologic information at and around the CCR unit(s) that supports the design, construction and installation of the groundwater monitoring system. This includes all of the following:
  - Map(s) of groundwater monitoring well locations in relation to the CCR unit(s);
  - Well construction diagrams and drilling logs for all groundwater monitoring wells; and
  - Maps that characterize the direction of groundwater flow accounting for seasonal variations.
- Constituent concentrations, summarized in table form, at each groundwater monitoring well monitored during each sampling event;
- A description of site hydrogeology including stratigraphic cross-sections;
- Any corrective measures assessment conducted as required at § 257.96;
- Any progress reports on corrective action remedy selection and design and the report of final remedy selection required at § 257.97(a);
- The most recent structural stability assessment required at § 257.73(d); and
- The most recent safety factor assessment required at § 257.73(e).

2.0 WORKPLAN

To demonstrate that the criteria in 40 C.F.R. § 257.103(f)(1)(i) and (ii) have been met, the following is a workplan, consisting of the elements required by § 257.103(f)(1)(iv)(A). Specifically, this workplan documents that there is no alternative capacity available on or off-site for each non-CCR wastestream that IPGC plans to continue to manage in the GMF Pond and GMF Recycle Pond (collectively the GMF Ponds) at Coffeen and discusses the options considered for obtaining alternative disposal capacity. As discussed in more detail below, **IPGC has elected to install a new landfill leachate management system at Coffeen.** The workplan provides a detailed schedule for the project, including a narrative description of the schedule and an update on the progress already made toward obtaining the alternative capacity. In addition, the narrative includes an analysis of the site-specific conditions that led to the decision to install a landfill leachate management system and an analysis of the adverse impact to plant operations if Coffeen were no longer able to use the GMF Ponds.

2.1 No Alternative Disposal Capacity and Approach to Obtain Alternative Capacity - § 257.103(f)(1)(iv)(A)(1)

IPGC owns Coffeen, a former two-unit coal-fired facility located near Coffeen, IL that was retired from operation on November 1, 2019. Coffeen has four CCR surface impoundments (listed in Table 2-1) which were used to manage the plant's various CCR and non-CCR wastestreams. An aerial view of the Coffeen site and the CCR surface impoundments can be found on Figure 1 in Appendix A. Each impoundment has its own groundwater monitoring network. AP1 and AP2 are not included within this demonstration. The GMF Pond and GMF Recycle Pond must continue to receive CCR landfill leachate after the April 11, 2021 cease placement date.

Table 2-1: Coffeen CCR Surface Impoundment Summary

CCR Surface Impoundment Name	Year Placed in Service	Impoundment Size (acres) / Storage Volume (acre-feet)	Lined?	Meets Location Restrictions?	Groundwater Status
GMF Gypsum Stack Pond	2010	77.3 / 1150	Yes	No	Detection Monitoring began in October 2017. SSIs have been detected for calcium in intermittent sampling events; however, successful ASDs have been completed for each such sampling event to date. The unit remains in Detection Monitoring.
GMF Recycle Pond	2010	17.1 / 470	No	No	Assessment Monitoring was initiated in May 2018. No SSLs have been identified to date and the unit remains in Assessment Monitoring.

2.1.1 CCR Wastestreams

The generating units at Coffeen have been retired and their CCR wastestreams are no longer generated.

2.1.2 Non-CCR Wastestreams

The existing site water balance is included in Appendix A of this demonstration (see Figure 2).

IPGC evaluated each non-CCR wastestream placed in the GMF Pond at Coffeen. The generating units at Coffeen have been retired and decommissioning activities are underway. For the reasons discussed below in Table 2-2, each of the following non-CCR wastestreams must continue to be placed in the GMF Ponds due to lack of alternative capacity both on and off-site. The water balance diagram shows AP2 dewatering flows being routed to the GMF Ponds; however, that flow has ceased and AP2 will complete closure in October 2020. Consequently, this wastestream has not been included in the table below.

Table 2-2: Coffeen Non-CCR Wastestreams

Non-CCR Wastestream	Average Flow (gpm)	Description	IPGC Notes
Landfill Leachate	Unknown (Intermittent, depends on rainfall)	Landfill contact storm water flows to the Landfill Stormwater Pond to the southwest of the landfill and ultimately to Coffeen Lake via Outfall 018. Leachate discharge is not allowed to the pond nor to the lake. Leachate is collected in one of three sumps at the landfill and then pumped to the GMF Pond via a wet well submersible pump system. The landfill at Coffeen is still active and available for receiving materials during impoundment closure and/or plant decommissioning activities.	The landfill was designed and constructed with a historical permit exemption for CCR landfills in Illinois. Consequently, no leachate treatment or management systems were designed for post-closure or plant retirement conditions. Those systems must now be added to support removing this wastestream from the GMF Ponds at Coffeen.

2.1.3 Site-Specific Conditions Supporting Alternative Capacity Approach - § 257.103(f)(1)(iv)(A)(1)(i)

As shown on Figure 1 in Appendix A, Coffeen is equipped with several ponds and potential treatment facilities; however, none of these facilities are currently permitted to receive and discharge the remaining non-CCR wastestreams (leachate) that are still generated onsite. This landfill leachate cannot be eliminated as it is sourced from rain events. There is not an existing storage facility onsite that is either permitted to receive and discharge leachate or large enough to capture these flows to support offsite disposal. Additionally, IPGC has contacted seven publicly-owned treatment works locations within a 75-mile radius of the site to inquire about hauling leachate offsite for disposal; however, each of these locations has either been non-responsive or has responded to indicate they will not accept additional wastewater at this time.

Consequently, Coffeen must continue to use the GMF Ponds for storage of landfill leachate until the following activities can occur:

- Construct alternative storage and treatment capacity (or repurpose an existing site impoundment for this storage)
- Add an evaporation system or modify the site discharge permit to allow for the new storage facility to evaporate or discharge the non-CCR wastestreams (with or without additional treatment), thus eliminating the need for the additional storage within the GMF Ponds
- Reroute the non-CCR wastestreams to the new storage and evaporation/treatment facilities

2.1.4 Impact to Plant Operations if Alternative Capacity Not Obtained – § 257.103(f)(1)(iv)(A)(1)(ii)

There are no longer any plant operations at the Coffeen site beyond the current landfill management and decommissioning efforts. The GMF Ponds currently receive landfill leachate from the site landfill that must remain available throughout the decommissioning efforts prior to receiving its final cap. This leachate flow will be significantly reduced once the cap is installed but will continue indefinitely and will need to be managed throughout the post-closure care period for the landfill. As described in Sections 2.1.1 through 2.1.3 of this demonstration, in order to continue decommissioning efforts and comply with both the CCR Rule and the discharge permit conditions, Coffeen must continue to use the GMF Ponds for storage of non-CCR wastestreams until alternative disposal capacity can be developed. The flows currently routed to the GMF Ponds are sourced from stormwater which IPGC cannot cease or control with any other available systems onsite. A permit modification would be required if this flow is discharged from a current site impoundment or another storage/treatment system that must be developed.

IPGC intends to maintain storage capacity of both the GMF Pond and the GMF Recycle Pond. Neither of these ponds are permitted to discharge (except in emergency conditions). During the historical plant operations, this was sustainable based on the evaporative capacity of the plant scrubber systems. The GMF Ponds are both required to maintain adequate storage capacity over the duration of this extension without the need for discharge of the leachate flows. During rain events, these ponds have approached capacity limits within the last year.

2.1.5 Options Considered Both On and Off-Site to Obtain Alternative Capacity

The options considered for alternative disposal capacity of the wastestreams currently routed to the GMF Ponds are summarized in Table 2-3. Additional details on the non-CCR wastestreams included in this demonstration request are found in Table 2-2.

Table 2-3: Alternatives for Disposal Capacity

Alternative Capacity Technology	Average Time (Months)[1]	Feasible at Coffeen?	Selected?	IPGC Notes
Conversion to dry handling	33.8	No	No	The Coffeen plant has been retired and CCR wastestreams are no longer being generated. Consequently, a dry ash handling system would not address Coffeen's capacity needs.

Alternative Capacity Technology	Average Time (Months)[1]	Feasible at Coffeen?	Selected?	IPGC Notes
Non-CCR wastewater basin	23.5	Yes	No	A new non-CCR wastewater basin could be constructed to receive, treat, and discharge the landfill leachate; however, the time required to design, permit, and construct this facility is expected to take longer than the selected approach.
Wastewater treatment facility	22.3	Yes	No	A new wastewater treatment facility could be constructed to receive, treat, and discharge the landfill leachate; however, the time required to design, permit, and construct this facility is expected to take longer than the selected approach.
New CCR surface impoundment	31	No	No	The Coffeen plant has been retired and CCR wastestreams are no longer being generated. Consequently, a new CCR surface impoundment would not address Coffeen's capacity needs.
Retrofit of a CCR surface impoundment	29.8	Yes	No	The Coffeen plant has been retired and CCR wastestreams are no longer being generated. Retrofit of the CCR impoundments could be performed to allow continued receipt of non-CCR wastestreams if the facility could be permitted to discharge these flows. The schedule for this effort is expected to take longer than the selected solution to manage leachate.
Multiple technology system	39.1	Yes	Yes	This is being implemented at Coffeen to include onsite storage of the leachate followed by evaporation and land application. Implementing this system is expected to take another 14 months (until December 2021). This approach will not require the addition of a new site outfall (and the associated anti-degradation study and permit modification efforts) to discharge leachate.
Temporary treatment system	Not defined	No	No	Temporary (frac tank) storage is being implemented as part of the selected approach; however, IPGC is not aware of any offsite alternatives for disposal or temporary evaporation of the leachate. IPGC has chosen to focus on implementing the necessary measures for the selected technologies described above rather than try to develop temporary solutions for treatment of the remaining non-CCR wastestreams.

[1]From Table 3. See 85 Fed. Reg. at 53,534.

2.1.6 Approach to Obtain Alternative Capacity

In order to initiate closure of the GMF Ponds, either the Coffeen discharge permit must be modified by Illinois EPA to allow for treatment and discharge of the landfill leachate, or a separate storage and evaporation system must be installed to manage this non-CCR wastestream. Modifications to the discharge permit to use other settling ponds onsite is not the preferred method based on concerns with any future discharge limits that may become applicable to leachate as a result of the Fifth Circuit Court's decision in April 2019 (*Southwestern Electric Power Company v. EPA*, 920 F.3d 999, 1018 n.20 (5th Cir. 2019)). In December 2019, IPGC began developing a request for proposal and selected Hanson Professional Services to provide an analysis of the following leachate alternatives, including site plans, process flow diagrams, and capital and O&M cost estimates.

Table 2-4: Alternatives Considered for Non-CCR wastestreams

System	Technology	Practicability or Feasibility for Coffeen
Leachate	Onsite storage with recycling of leachate by land application to the landfill (for dust control during dry periods)	Feasible
Leachate	Onsite storage with offsite disposal	Not practical; there are a lack of offsite disposal locations that will accept the leachate within a reasonable distance from the plant location
Leachate	Onsite storage with thermal evaporation	Feasible
Leachate	Onsite storage with chemical precipitation/reverse osmosis	Not practical; Reverse osmosis reject water quality will likely require an evaporation system and this option likely extends the compliance schedule compared to the other feasible alternatives since modifications to the site discharge permit and associated anti-degradation studies would be required to discharge the treated wastewater as part of this approach

Hanson prepared a report detailing their analysis which was provided to IPGC in July 2020. IPGC believes the hybrid approach is the best solution. This preferred solution will require:

- Improvements to the leachate pumping system, including replacing existing sump pumps and installing flow monitoring equipment to establish the evaporation system design basis
- A propane-powered forced thermal evaporator (container-based system for 40 gallons per hour)

- A 1,000-gallon propane tank
- Four frac tanks with an approximate total storage volume of 20,000 gallons
- A package booster pump located in an insulated enclosure adjacent to the tanks
- Foundations for the new tanks and booster pumps
- Power feed to the new evaporator and pump systems (from local distribution system)
- A grid with multiple large bore impact or similar sprinklers zoned to dose the landfill for dust control and prevent runoff (preliminary design basis indicated approximately 40 gpm per sprinkler, 120 gpm per zone, 10 zones to cycle through)
- Over 2,000 linear feet (estimated) of piping from the tanks and booster pumps to the sprinkler system

2.1.7 Technical Infeasibility of Obtaining Alternative Capacity prior to April 11, 2021

IPGC began developing a request for proposal and selected Hanson Professional Services to provide an analysis of the following leachate alternatives, including site plans, process flow diagrams, and capital and O&M cost estimates in December 2019. Hanson prepared a report detailing their analysis which was provided to IPGC in July 2020 and IPGC evaluated the solutions and selected a preferred hybrid approach that consists of onsite storage for land application at the landfill as well as a thermal evaporation system. This work is expected to be completed in late 2021 as described in Sections 2.2 and 2.3. Consequently, it is not possible to implement the measures discussed above by April 11, 2021.

2.1.8 Justification for Time Needed to Complete Development of Alternative Capacity Approach – § 257.103(f)(1)(iv)(A)(1)(iii)

The schedule for developing alternative disposal capacity is described in more detail in Sections 2.2 and 2.3. The expected milestones for progress are summarized in Table 2-52-5 below, which summarizes the phasing required to complete the project. IPGC believes this represents the fastest technically feasible timeframe for compliance at Coffeen, and recognizes this timeframe is completed faster than the estimated average time identified by EPA to implement a multiple technology system (see Table 2-3).

Table 2-5: Compliance Project Progress Milestones

Year or Progress Reporting Period	Status	Milestone Description	IPGC Notes
2020	Completed	Selection of leachate solution, procurement of pumps and flow meters.	Detailed design for pumps, evaporator, and BOP systems and initiation of permitting activities.
2020	On Schedule	Install new forwarding pumps and flow meters, prepare specifications and issue bids for leachate management equipment.	
April 30, 2021	Scheduled	Award equipment contracts, submit permit applications, and initiate detailed design.	
October 31, 2021	Scheduled	Award construction contracts and initiate construction for foundations, set equipment/tanks/pumps, and near completion of electrical and mechanical piping installation.	Startup and punch list items will be completed within one month of this progress report, projected to cease by December 1, 2021.

2.2 Detailed Schedule to Obtain Alternative Disposal Capacity - § 257.103(f)(1)(iv)(A)(2)

The required visual timeline representation of the schedule is included in Appendix B of this demonstration and described further in Section 2.3 below.

2.3 Narrative of Schedule and Visual Timeline - § 257.103(f)(1)(iv)(A)(3)

The third section for the workplan is a "detailed narrative of the schedule and the timeline discussing all the necessary phases and steps in the workplan, in addition to the overall timeframe that will be required to obtain capacity and cease receipt of waste." 85 Fed. Reg. at 53,544. As EPA explained in the preamble to the Part A rule, this section of the workplan must discuss "why the length of time for each phase and step is needed, including a discussion of the tasks that occur during the specific stage of obtaining alternative capacity. It must also discuss the tasks that occur during each of the steps within the phase." 85 Fed. Reg. at 53,544. In addition, the schedule should "explain why each phase and step shown on the chart must happen in the order it is occurring and include a justification for the overall length of the phase" and the "anticipated worker schedule." 85 Fed. Reg. at 53,544. EPA notes the overall "discussion of the schedule assists EPA in understanding why the time requested is accurate." 85 Fed. Reg. at 53,544.

Initial Design and Equipment Procurement: IPGC has initiated the improvements to the existing landfill leachate management system to include new leachate pumps, controls (as needed) and flow meters. IPGC has awarded a contract to procure new pumps to forward leachate from the existing leachate collection sumps to the new leachate management system. Once the new leachate pumps are operable, leachate flow rates will be monitored to provide a basis of design for the leachate management system discussed in Section 2.1.6. These pumps, and their associated flow monitoring equipment, will be installed to replace the existing forwarding pumps to route water from the landfill collection sumps to the GMF Ponds once they arrive onsite and while the remainder of the leachate system is being procured and constructed. The projected lead time is 6 weeks for this equipment. Once installed, the flow monitoring equipment will provide a better estimate of the leachate production at the site. Leachate flow data will be recorded throughout the first month of operation so the data may be included in the new system design specifications.

IPGC will award a contract for engineering to design the leachate management system. The design will be used for the procurement and permitting activities necessary for the project. IPGC will procure the storage tanks, new evaporation system, and pumps required to forward water from the tanks to the evaporator or to the landfill sprinkler system. The equipment specifications will be prepared concurrently (and finishing one week after) the flow monitoring period to confirm the design basis. The equipment will be bid out over a three-week period and will be awarded within one month of receiving bids. Based on Burns & McDonnell experience on similar projects, leachate management system equipment including the tanks, evaporators, and pumps are expected to have lead times of 4 to 6 months from contract award to delivery. Consequently, the equipment should be onsite in August of 2021 and will be installed as shown in the schedule in Appendix B.

Permitting Activities: Once the initial submittals are received from the equipment suppliers, IPGC's engineer will prepare the required permit applications. The design submittals should be received within one month of contract award, allowing for completion of the preliminary design and submittal of the necessary permit applications at this time. Table 2-6 provides a list of the anticipated permits required for the leachate management system at Coffeen. As shown in Appendix B, these permits will be acquired concurrently with the fabrication and delivery of the equipment, such that the construction can begin as soon as possible following receipt of these items.

Table 2-6: Anticipated Permitting Requirements

Permits Needed for Construction of Leachate Management System	Time to Develop Permit Application	Anticipated Time to Receive Permit
1. Wastewater Treatment Construction Permit for new system (includes evaporator, tanks, pumps, etc.). Required by Subpart B to 35 IAC 309.	1 Month	6 Months
2. Land Disturbance Permit (three submittals and approvals are required from three different agencies). a. IEPA Notice of Intent (NOI) to Disturb > 1 acre i. Need to submit Stormwater Plan b. Illinois Historic Preservation Request/Approval c. IDNR Threatened and Endangered Species Request/Approval	3 Months	5 Months for All
3. New Emission Source Air Permit as required by 35 IAC 201.	1 Month	3 Months
Total Time for Permitting (assuming Concurrent Activities):		**6 Months**

Detailed Design and Construction Procurement: As stated previously, the equipment design submittals should be received within one month of contract award, allowing for the start of the detailed design for the foundations and power supply systems. This detailed design will be completed approximately three months after receipt of the equipment submittals based on typical preparation and review time for the technical documents and includes IPGC development of the commercial terms for the construction contract. Once the bid documents are ready to be issued, the construction contract will be bid and awarded. IPGC has assumed the bid period will be four weeks long and that it will take two weeks to evaluate bids and select the preferred contractor and another six weeks to negotiate the commercial terms for award of the contract. This bid and award phase will be performed concurrently with acquiring the necessary permits for this project and the equipment delivery phase.

Leachate System Construction Activities: The durations shown on the project schedule are estimates by Burns & McDonnell and are based on an average work schedule of five days per week and ten hours per day, are subject to delays from periods with significant rain events, and are based on the following scope of work which must be performed in the sequence listed below:

- Contractor will order necessary materials and mobilize to the site upon award of the contract. The lead time for the piping materials are shown on the Appendix B schedule and are based on Burns & McDonnell estimates for this scope of work. The permits listed in Table 2-6 will be received prior to mobilization.

- Contractor will construct the HDPE piping for the landfill sprinkler system. These lines are each approximately 2,400 feet in length and will require fusion of the piping, trenching, and backfill operations. This work is anticipated to require 6-8 weeks of effort. It can be completed prior to having the tank and pumps in place and available, but not until the initial deliveries of pipe material are completed. This work is anticipated to begin upon mobilization and cannot finish until at least two weeks after the final delivery of pipe material is completed.
- Contractor will construct the foundation for the new tanks and pump skid. This can be completed once the contractor is onsite and the necessary materials have been received. Four weeks were allotted for preparing subgrade, formwork, rebar, pouring this foundation, and concrete curing. Burns & McDonnell has assumed that deep foundations and piling will not be required for this equipment.
- Contractor will erect the tanks once the foundations are complete. Burns & McDonnell has included 5 days to set the tanks in place on the new foundations.
- Contractor will set the evaporator and pump skid(s) following (1) construction of the foundation and (2) delivery of the equipment. The pump skids will be installed after the tank erection is completed due to exclusion zone requirements for safe construction. These will be set in place and final piping tie-ins completed after the equipment is installed.
- Contractor will install raceway and cable for the evaporator and new pump power feeds. These activities are based on a four-week duration. They will begin once the first equipment is set in place (evaporator) and cannot be completed until after the final equipment is set in place (assumed to be the pumps installed after the tanks are in place).
- Once the tanks, evaporator, pumps, piping, and power systems are installed, the Contractor can start up the new system and divert the non-CCR wastestreams away from the GMF Ponds. At this time, IPGC can initiate closure of these impoundments. IPGC has assumed two weeks will be required for startup/checkout and an additional two weeks to close out any punchlist items or issues with the new equipment.

2.4 Progress Towards Obtaining Alternative Capacity - § 257.103(f)(1)(iv)(A)(4)

In the preamble to the final Part A rule, EPA explains that this "section [of the workplan] must discuss all of the steps taken, starting from when the owner or operator initiated the design phase all the way up to the current steps occurring while the workplan is being drafted." 85 Fed. Reg. at 53,544. The discussion also "must indicate where the facility currently is on the timeline and the processes that are currently being undertaken at the facility to develop alternative capacity." 85 Fed. Reg. at 53,545.

As shown in Appendix B and described in Section 2.1.6, IPGC has already undertaken planning and implementation steps towards providing additional storage and treatment capacity to remove non-CCR flows from the Coffeen CCR surface impoundments, specifically the GMF Ponds. IPGC has evaluated and selected the preferred solution. IPGC has also procured the new pumps and metering equipment necessary to forward leachate from the landfill to the eventual leachate management system and perform flow monitoring to confirm the design basis for the new evaporation and land application system. The pumps are being fabricated and will be installed later this fall, which will allow for flow measurement and continuation of the preliminary design and permitting support activities.

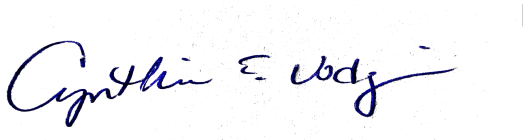
3.0 DOCUMENTATON AND CERTIFICATION OF COMPLIANCE

To demonstrate that the criteria in 40 C.F.R. § 257.103(f)(1)(iii) has been met, the following information and submissions are submitted pursuant to 40 C.F.R. § 257.103(f)(1)(iv)(B) to demonstrate that the GMF Ponds at Coffeen are in compliance with the CCR rule.

3.1 Owner's Certification of Compliance - § 257.103(f)(1)(iv)(B)(1)

In accordance with 40 C.F.R. § 257.103(f)(1)(iv)(B)(1), I hereby certify that, based on my inquiry of those persons who are immediately responsible for compliance with environmental regulations for the GMF Pond and the GMF Recycle Pond at Coffeen, the facilities are in compliance with all of the requirements contained in 40 C.F.R. Part 257, Subpart D – Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments. Coffeen's CCR compliance website is up-to-date and contains all the necessary documentation and notification postings.

ILLINOIS POWER GENERATING COMPANY



Cynthia Vodopivec
VP – Environmental Health & Safety
September 28, 2020

3.2 Visual Representation of Hydrogeologic Information - § 257.103(f)(1)(iv)(B)(2)

Consistent with the requirements of § 257.103(f)(1)(iv)(B)(2)(i) – (iii), IPGC has attached the following items to this demonstration:

- Map(s) of groundwater monitoring well locations in relation to the CCR unit (Appendix C1)
- Well construction diagrams and drilling logs for all groundwater monitoring wells (Appendix C2)
- Maps that characterize the direction of groundwater flow accounting for seasonal variations (Appendix C3)

3.3 Groundwater Monitoring Results - § 257.103(f)(1)(iv)(B)(3)

Tables summarizing constituent concentrations at each groundwater monitoring well through the first 2020 semi-annual monitoring period are included as Appendix C4.

3.4 Description of Site Hydrogeology - § 257.103(f)(1)(iv)(B)(4)

A description of site hydrogeology and stratigraphic cross-sections of the site are included as Appendix C5.

3.5 Corrective Measures Assessment - § 257.103(f)(1)(iv)(B)(5)

For the GMF Pond, detection monitoring has indicated statistically significant increases (SSIs) above the background concentrations; however, IPGC has completed successful alternate source demonstrations and the facility remains in detection monitoring. Accordingly, an assessment of corrective measures is not required for the GMF Pond.

For the GMF Recycle Pond, the first assessment monitoring samples were collected in May 2018. The results, through the first 2020 semi-annual monitoring period, indicate there have been no SSLs for any Appendix IV constituents, and the facility remains in assessment monitoring. Accordingly, an assessment of corrective measures is not required for the GMF Recycle Pond.

IPGC will continue to conduct groundwater monitoring in accordance with all state and federal requirements.

3.6 Remedy Selection Progress Report - § 257.103(f)(1)(iv)(B)(6)

As noted above, assessments of corrective measures and the resulting remedy selection efforts are not currently required for the GMF Ponds.

3.7 Structural Stability Assessment - § 257.103(f)(1)(iv)(B)(7)

Pursuant to § 257.73(d), the initial structural stability assessments for the GMF Pond and GMF Recycle Pond were prepared in October 2016 and are included as Appendix C6. As required for compliance, additional stability assessments will be completed in October 2021.

3.8 Safety Factor Assessment - § 257.103(f)(1)(iv)(B)(8)

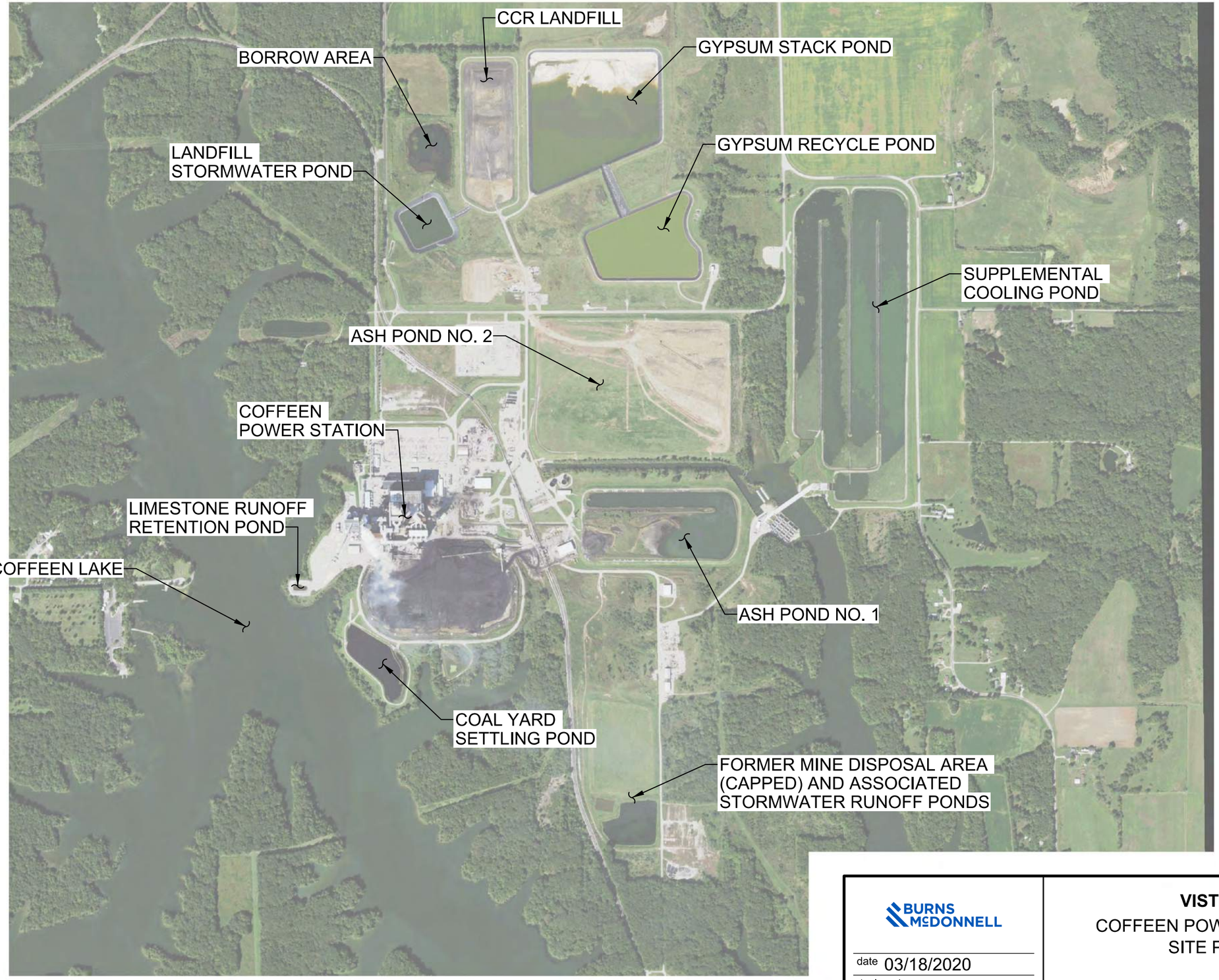
Pursuant to § 257.73(e), the initial safety factor assessments for the GMF Pond and GMF Recycle Pond were prepared in October 2016 and are included as Appendix C7. As required for compliance, additional safety factor assessments will be completed in October 2021.

4.0 CONCLUSION

Based upon the information submitted in this demonstration, it has been shown that the GMF Ponds at Coffeen qualify for the site-specific alternative deadline for the initiation of closure as allowed by 40 C.F.R. § 257.103(f)(1).

Therefore, IPGC requests that EPA approve the demonstration and grant an alternative deadline of December 1, 2021 to cease routing all remaining non-CCR flows to the GMF Ponds at Coffeen and initiate closure as required under 40 C.F.R. § 257.101(a) or (b)(1). IPGC will update EPA on the project and any potential schedule impacts as part of the semi-annual progress reports required at 40 C.F.R. § 257.103(f)(1)(x), and if a need for a later compliance deadline is determined, IPGC will seek additional time as described in 40 C.F.R. § 257.103(f)(1)(vii).

APPENDIX A – SITE PLAN AND WATER BALANCE DIAGRAM



PRELIMINARY - NOT FOR CONSTRUCTION

N

0 1000' 2000'

SCALE IN FEET

BURNS McDONNELL

date 03/18/2020

designed A. MYERS

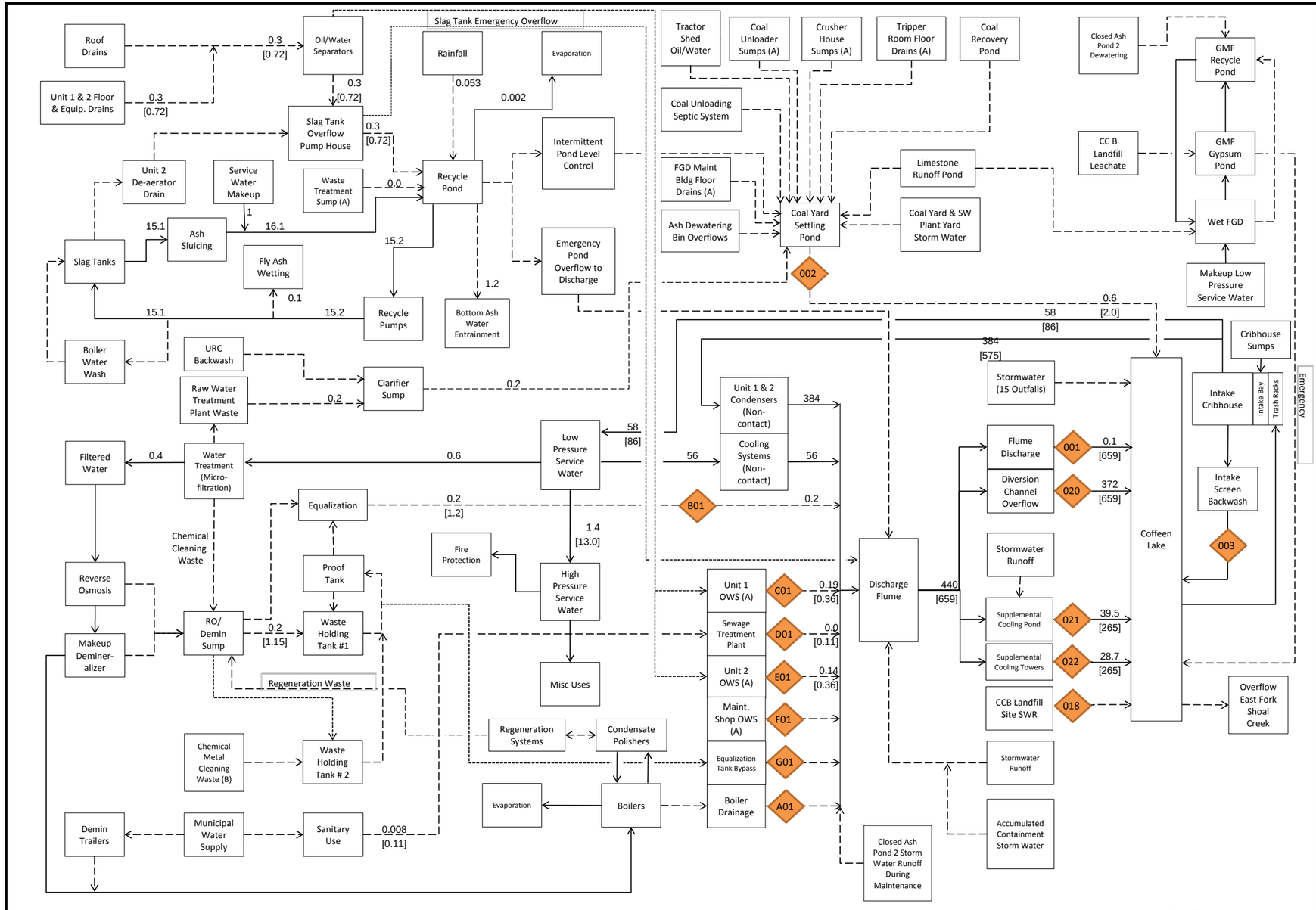
VISTRA

COFFEEN POWER STATION
SITE PLAN

project 122702

contract -

FIGURE 1 -



Notes:

1. Flows shown as: Average [Maximum]
2. Flow units = Million Gallons per Day
3. Outfall 001, 020, 021, 022 flows from Coffeen Total Flow Reports 1/1/2010 through 11/30/2011 and 1/1/2015 through 6/30/2015.
4. RO/Demin Sump Flow from integrator and pump capacity data 1/1/2008 through 8/5/2015
5. Sewage Plant Flow from integrator and pump capacity data 1/1/2008 through 8/5/2015
6. Source of flows not otherwise indicated is the Coffeen NPDES Permit Appllication Water Balance, updated July 27, 2012.
7. Components representing boiler wash water have been added. Boiler wash water is drawn from recycle pump discharge water and collected in the slag tanks.
8. Components representing Overflow to East Fork Shoal Creek, Clarfier Sump, RO/Demin Sump, and WTS "Proof Tank" have been added.
9. Components representing Maintenance Building (Tractor Shed) STP, Raw water treatment & Demineralizer Regen Waste (B01), and Fuel Unloading Oil/Water Separator have been added.
10. "A" includes one or more of the following Non-Chemical Metal Cleaning Wastewaters:
    Precipitator Cleaning
    Economizer Cleaning
    Air Heater Cleaning
    Boiler Waterside Cleaning
    Condenser Tube Cleaning
    Misc. Non-Chemical Metal Cleaning
11. "B" includes one or more of the following Chemical Metal Cleaning Wastewaters:
    Boiler Tube Cleaning
    Condenser Tube Cleaning
    Misc. Chemical Metal Cleaning
12. Acronyms

CCB	Coal Combustion Byproduct
FGD	Flue Gas Desulfurization
OWS	Oil Water Separator
URC	Ultrasonic Resin Cleaner
RO	Reverse Osmosis
GMF	Gypsum Management Facility
SWR	Storm Water Runoff

Drawing Release Record

Rev	Date	Prepared	Reviewed	Approved	Purpose
A0	4-Sep-15	M. Heermann	M. Rosen	A. Baker	Initial Issue
A1	12-Oct-15	M.Heermann	M.Rosen	A. Baker	Incorporated Client Comments

Project No: 12160-162

Owner: DYNEGY

Engineer: Sargent & Lundy LLC

Dynegy

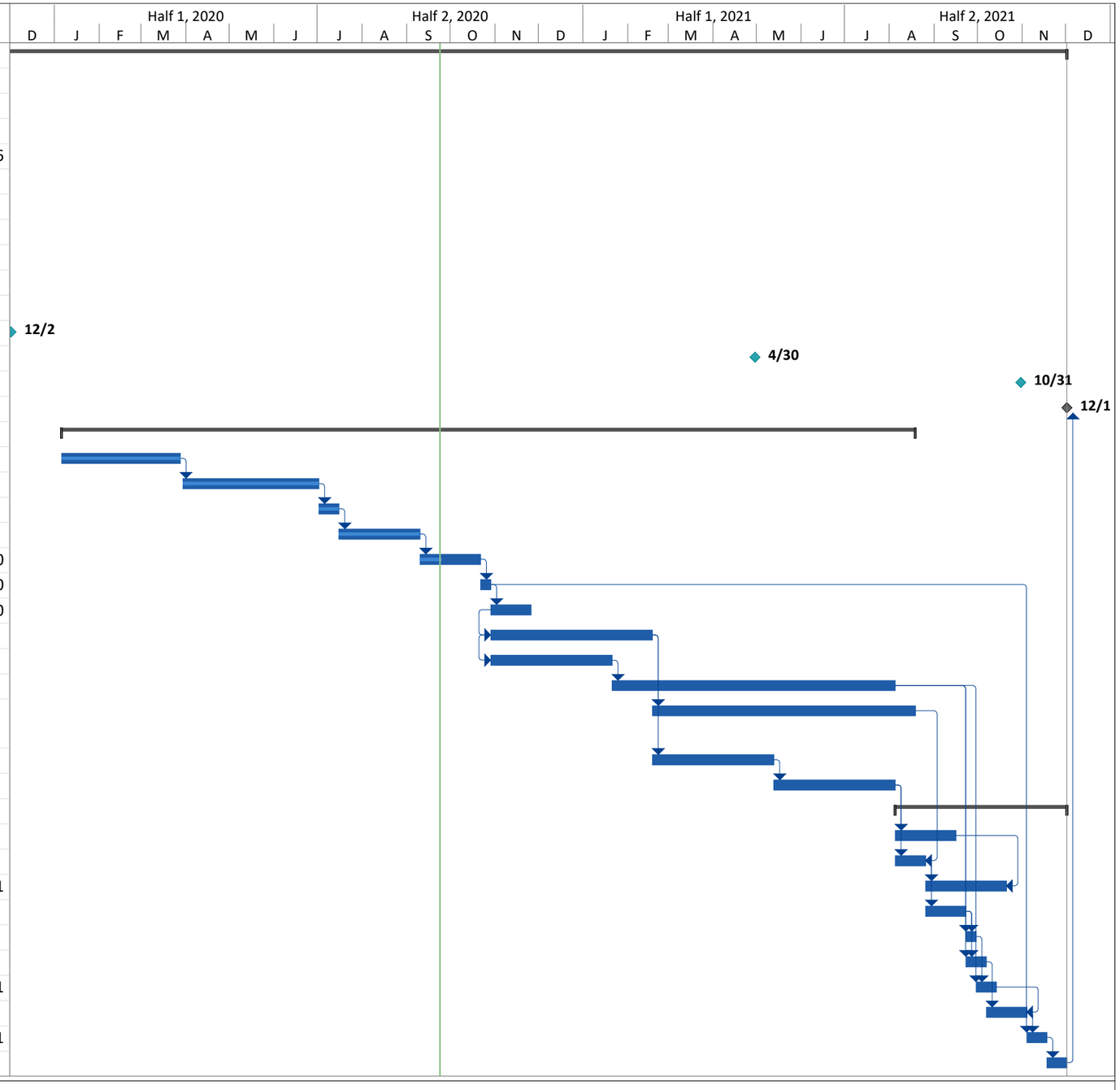
Effluent Limitation Guidelines Compliance Planning Study
Preliminary Water Balance - Coffeen

MSK-COF-WB-001

FIGURE 2

APPENDIX B – SCHEDULE

ID	Task Name	Duration	Start	Finish
1	**CCR Compliance Efforts**	**1729 days**	**Fri 4/17/15**	**Wed 12/1/21**
2	Final CCR Rule Published in Federal Register	0 days	Fri 4/17/15	Fri 4/17/15
3	Background Groundwater Sampling	434 days	Wed 11/18/15	Mon 7/17/17
4	Hanson/AECOM Completed Liner Documentation	0 days	Thu 10/13/16	Thu 10/13/16
5	AECOM Prepared Surface Impoundment History of Construction	0 days	Mon 10/17/16	Mon 10/17/16
6	First Detection Monitoring Samples	9 days	Wed 10/25/17	Sat 11/4/17
7	Recycle Pond Assessment Monitoring Program - First Round	15 days	Fri 5/11/18	Thu 5/31/18
8	Recycle Pond Assessment Monitoring Program - Second Round	6 days	Fri 8/3/18	Fri 8/10/18
9	H&A completed Location Restriction Demonstrations	0 days	Tue 10/16/18	Tue 10/16/18
10	Recycle Pond Assessment Monitoring Program - Third Round	3 days	Mon 1/21/19	Wed 1/23/19
11	Recycle Pond Assessment Monitoring Program - Fourth Round	8 days	Thu 8/15/19	Mon 8/26/19
12	EPA Released CCR Holistic Approach to Closure Part A Rule	0 days	Mon 12/2/19	Mon 12/2/19
13	Semi-Annual Progress Report #1	0 days	Fri 4/30/21	Fri 4/30/21
14	Semi-Annual Progress Report #2	0 days	Sun 10/31/21	Sun 10/31/21
15	Cease leachate flow to GMF Ponds	0 days	Wed 12/1/21	Wed 12/1/21
16	**Leachate Management - Engineering/Permitting/Procurement**	**423 days**	**Mon 1/6/20**	**Wed 8/18/21**
17	Bid and Award Engineering Services for Alternatives Assessment	60 days	Mon 1/6/20	Fri 3/27/20
18	Hanson Performed Alternatives Analysis for Leachate	68 days	Mon 3/30/20	Wed 7/1/20
19	IPGC Reviewed/Selected Preferred Alternative	10 days	Thu 7/2/20	Wed 7/15/20
20	Spec/Bid/Award Leachate Pumps	40 days	Thu 7/16/20	Wed 9/9/20
21	Pump Fabrication/Delivery	30 days	Thu 9/10/20	Wed 10/21/20
22	Pumps Installed by IPGC Contractors	5 days	Thu 10/22/20	Wed 10/28/20
23	Flow Monitoring to establish Evaporation System Design Basis	20 days	Thu 10/29/20	Wed 11/25/20
24	Preliminary Design: Leachate Management System	80 days	Thu 10/29/20	Wed 2/17/21
25	Spec/Bid/Award Evaporator, Tank, and Pumps	60 days	Thu 10/29/20	Wed 1/20/21
26	Fabricate/Deliver Equipment	140 days	Thu 1/21/21	Wed 8/4/21
27	Permitting (Wastewater Treatment Construction Permit, Land Disturbance Permits, Air Permit)	130 days	Thu 2/18/21	Wed 8/18/21
28	Detailed Design: Leachate Management System	60 days	Thu 2/18/21	Wed 5/12/21
29	IPGC Bid/Award Leachate Management System Construction	60 days	Thu 5/13/21	Wed 8/4/21
30	**Leachate Management System Construction**	**85 days**	**Thu 8/5/21**	**Wed 12/1/21**
31	Pipe Material and Sprinkler System Acquisition (by Contractor)	30 days	Thu 8/5/21	Wed 9/15/21
32	Contractor Mobilization to Site	15 days	Thu 8/5/21	Wed 8/25/21
33	Install piping from tank location to landfill sprinklers	40 days	Thu 8/26/21	Wed 10/20/21
34	Construct Foundations for Tank/Pumps	20 days	Thu 8/26/21	Wed 9/22/21
35	Erect Tank	5 days	Thu 9/23/21	Wed 9/29/21
36	Set Evaporator, propane tank, sprinklers, and ancillary equipmen	10 days	Thu 9/23/21	Wed 10/6/21
37	Set Pumps	10 days	Thu 9/30/21	Wed 10/13/21
38	Provide Electrical Supply and finish piping tie ins	20 days	Thu 10/7/21	Wed 11/3/21
39	Startup new Systems	10 days	Thu 11/4/21	Wed 11/17/21
40	Punchlist and Contract Closeout	10 days	Thu 11/18/21	Wed 12/1/21

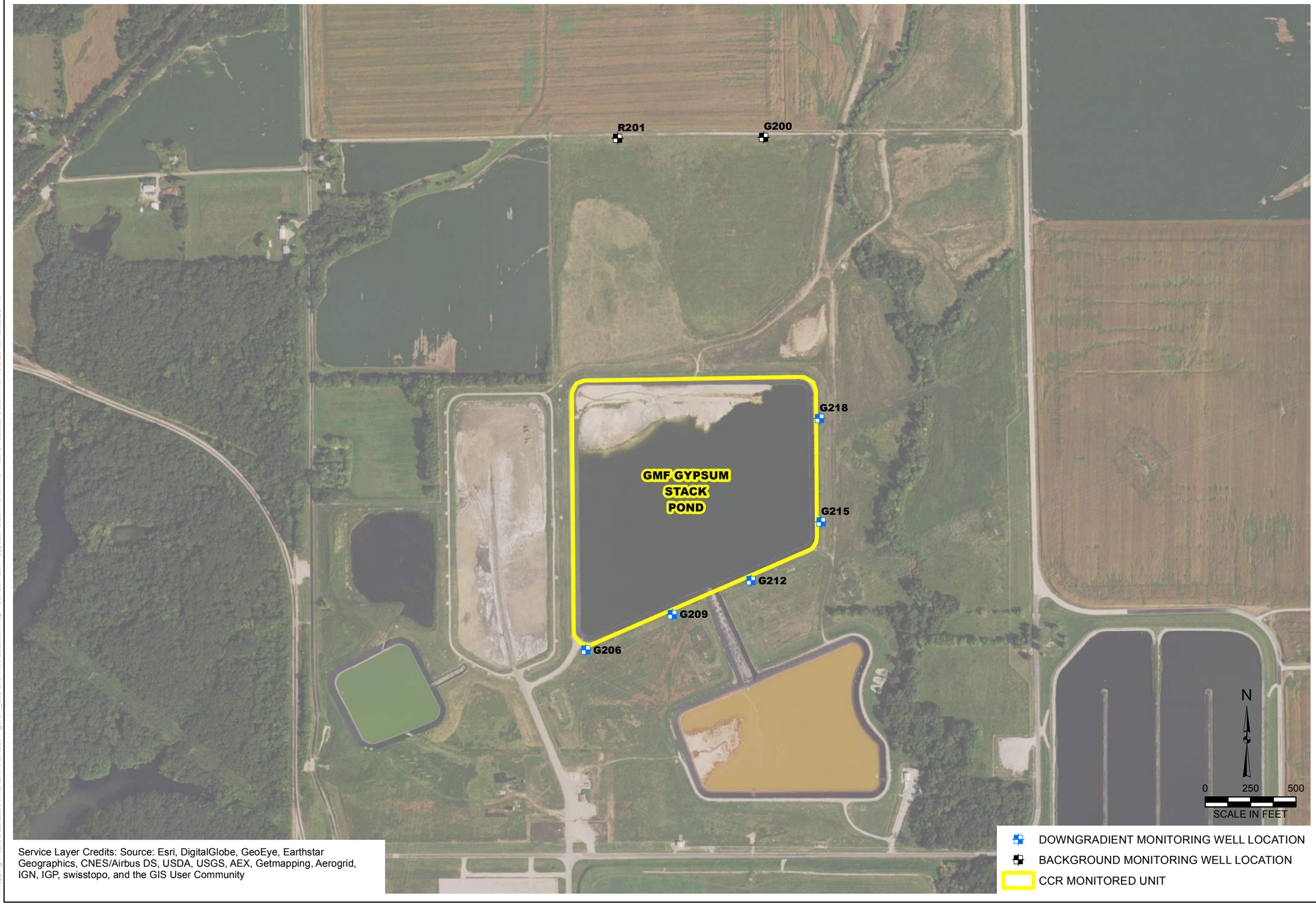


Project: Coffeen CCR Surface Impoundment Extension Demonstration
Date: Thu 9/24/20

Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline
Split	External Tasks	Inactive Summary	Manual Summary	Progress
Milestone	External Milestone	Manual Task	Start-only	Manual Progress
Summary	Inactive Task	Duration-only	Finish-only	

APPENDIX C – COMPLIANCE DOCUMENTS

APPENDIX C1 – MAP OF GROUNDWATER MONITORING WELL LOCATIONS



Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

SITE AND WELL LOCATION MAP
COFFEEN GMF GYPSUM STACK POND
UNIT ID: 103

SAMPLING AND ANALYSIS PLAN
DYNEGY CCR RULE GROUNDWATER MONITORING
COFFEEN POWER STATION
COFFEEN, ILLINOIS

DRAWN BY/DATE:
SDS 10/6/16
REVIEWED BY/DATE:
YAD 10/6/16
APPROVED BY/DATE:
SJC 9/14/17

PROJECT NO: 2285/4.3

FIGURE NO: 1

NATURAL RESOURCE TECHNOLOGY

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

UPGRADIENT MONITORING WELL LOCATION
DOWNGRADIENT MONITORING WELL LOCATION
CCR MONITORED UNIT

SITE AND WELL LOCATION MAP
COFFEEN GMF RECYCLE POND
UNIT ID: 104

SAMPLING AND ANALYSIS PLAN
DYNEGY CCR RULE GROUNDWATER MONITORING
COFFEEN POWER STATION
COFFEEN, ILLINOIS

DRAWN BY/DATE:
MDM 10/13/15
REVIEWED BY/DATE:
YAD 10/14/15
APPROVED BY/DATE:
SJC 10/16/15

PROJECT NO: 2285/4.3

FIGURE NO: 1

NATURAL RESOURCE TECHNOLOGY

APPENDIX C2 – WELL CONSTRUCTION DIAGRAMS AND DRILLING LOGS

FIELD BORING LOG

HANSON

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: **Start:** 2/25/2008
Finish: 2/25/2008
WEATHER: Overcast, cold

CONTRACTOR: Testing Service Corp.
Rig mfg/model: CME-650 Track Drill
Drilling Method: 3¼" HSA w/SS & CME samplers
FIELD STAFF: **Driller:** B. Williamson
Helper: R. Keedy
Eng/Geo: .

BOREHOLE ID: G200
Well ID: G200
Surface Elev: 624.20 ft. MSL
Completion: 18.00 ft. BGS
Station: 877,930.59N
2,515,649.96E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Coffeen, IL
Township: East Fork
Section 2, **Tier** 7N; **Range** 3W

WATER LEVEL INFORMATION:
▼ = 13.50 - While drilling
▼ = 2.75 - 3/12/08
▽ =

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
	24/24 100%	ss	3-2 3-3 N=5					Very dark grayish brown (10YR3/2), moist, firm, friable, clayey SILT		624	
1A				31		1.36 B	2	Dark gray (10YR4/1) with 5% yellowish brown (10YR5/6) mottles, moist, firm, silty CLAY		622	
2A	19/24 79%	ss	3-3 6-6 N=9	26		1.94 BSh					
2B				26		2.33 Sh	4	Dark gray (10YR4/1) with 70% yellowish brown (10YR5/8) mottles, moist, firm, silty CLAY		620	
3A	19/24 79%	ss	3-3 4-5 N=7	26		1.59 B		Dark gray (10YR4/1) with 70% yellowish brown (10YR5/8) mottles, moist, firm, silty CLAY, slight trace sand			
3B				23		1.55 B	6	Very dark gray (10YR3/1), moist, firm, silty CLAY, slight trace sand		618	
4A	22/24 92%	ss	5-5 5-5 N=10	29		0.31 B		Dark gray (10YR4/1) with 10% yellowish brown (10YR5/8) mottles, moist, firm, silty CLAY, trace coarse sand			
5A	20/24 83%	ss	2-2 3-5 N=5	25		1.09 B	8			616	
6A	22/24 92%	ss	1-3 2-3 N=5	22		1.01	10	Dark gray (10YR4/1) with 10% yellowish brown (10YR5/8) mottles, moist, firm, silty CLAY, sand and slight trace gravel		614	
7A	24/24 100%	ss	3-3 5-6 N=8	15		0.50 B	12	Yellowish brown (10YR5/8), moist, soft, sandy CLAY		612	
7B				18				Gray (10YR5/1), wet, soft, fine- to coarse-grained SAND			
8A	19/24 79%	ss	0-3 5-8 N=8	24		0.27 B	14	Gray (10YR5/1), wet, soft, silty CLAY, trace sand and gravel		610	
8B				17				Yellowish brown (10YR5/4), wet, soft, fine- to coarse-grained SAND, trace gravel			
9A	24/24 100%	ss	8-15 30-50 N=45	13			16			608	
9B				8			18	Gray (10YR5/1), moist, hard, silty CLAY, trace sand and gravel			

End of Boring = 18.0 ft. BGS

NOTE(S):

FIELD BORING LOG

HANSON

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: **Start:** 10/14/2010
Finish: 10/14/2010
WEATHER: Sunny, warm, breezy (lo-70's)

CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA w/SS samplers
FIELD STAFF: **Driller:** D. Mahurin
Helper: J. Litsch/D. Smail
Eng/Geo: .

BOREHOLE ID: G206
Well ID: G206
Surface Elev: 630.54 ft. MSL
Completion: 24.00 ft. BGS
Station: 875,103.91N
2,514,669.16E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Coffeen, IL
Township: East Fork
Section 11, **Tier** 7N; **Range** 3W

WATER LEVEL INFORMATION:
▼ = 22.00 - While drilling
▼ = 21.54 - Upon completion
▽ =

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
1A	12/24 50%	ss	2-2 3-2 N=5	18			0	FILL - Grayish brown (10YR5/2), moist, firm, silty CLAY with trace sand and gravel.		630	
2A	20/24 83%	ss	2-2 3-5 N=5	16			4	FILL - Dark gray (10YR4/1) with 30% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand and gravel.		626	
3A	20/24 83%	ss	4-9 6-8 N=15	19			8	Very dark gray (10YR3/1) with 20% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand, trace roots.		622	
4A	19/24 79%	ss	2-4 5-6 N=9	20			8	Dark grayish brown (10YR4/2) with 35% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand.			
5A	17/24 71%	ss	2-3 4-5 N=7	30			10	Gray (10YR5/1) with 20% dark yellowish brown (10YR4/6) mottles, moist, firm, clayey SILT with trace sand and gravel.		620	
6A	22/24 92%	ss	2-3 4-6 N=7	19			12	Gray (10YR5/1) with 15% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand and gravel.		618	
7A	23/24 96%	ss	1-2 3-4 N=5	23			14	Gray (10YR5/1) with 15% dark yellowish brown (10YR4/6) mottles, moist, soft, silty CLAY with trace sand and gravel.		616	
8A	22/24 92%	ss	1-1 3-3 N=4	22			16	Dark yellowish brown (10YR4/6) with 30% gray (10YR5/1) mottles, moist, soft, silty CLAY with trace sand and gravel.		614	
9A	24/24 100%	ss	1-1 2-2 N=3	21			16	Gray (10YR5/1) with 15% dark yellowish brown (10YR4/6) mottles, moist, soft, silty CLAY with trace sand and gravel.			
10A	24/24 100%	ss	woh-woh 1-5	25			18	Gray (10YR5/1) with 15% dark yellowish brown (10YR4/6) mottles, moist, very soft, silty CLAY with trace sand and gravel.		612	
							18	Gray (10YR5/1), moist, very soft, very fine- to fine-grained sandy CLAY with trace gravel.			
							20	Gray (10YR5/1), moist, firm, very fine- to fine-grained			

NOTE(S): G206 installed in borehole.

FIELD BORING LOG

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: **Start:** 10/14/2010
Finish: 10/14/2010
WEATHER: Sunny, warm, breezy (lo-70's)

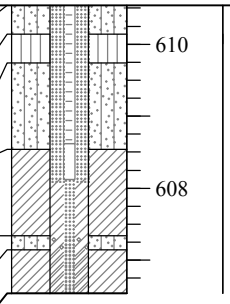
CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA w/SS samplers
FIELD STAFF: **Driller:** D. Mahurin
Helper: J. Litsch/D. Smail
Eng/Geo: .

BOREHOLE ID: G206
Well ID: G206
Surface Elev: 630.54 ft. MSL
Completion: 24.00 ft. BGS
Station: 875,103.91N
2,514,669.16E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Coffeen, IL
Township: East Fork
Section 11, **Tier** 7N; **Range** 3W

WATER LEVEL INFORMATION:
▼ = 22.00 - While drilling
▼ = 21.54 - Upon completion
▽ =

SAMPLE			TESTING					
Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description
11A	22/24 *92%*	ss	*19-6 13-19* N=19	13				sandy CLAY with trace gravel.
11B				16				Dark yellowish brown (10YR4/6), wet dense, silty, fine- to coarse-grained SAND with trace gravel.
								Dark yellowish brown (10YR4/6), moist, hard, clayey SILT with sand and gravel.
							▼ 22	Grayish brown (10YR5/2), moist, dense, silty, very fine- to fine-grained SAND.
12A	20/24 *83%*	ss	*11-20 19-13* N=39	10				Dark gray (10YR4/1), slightly moist, hard, very silty CLAY with sand and gravel.
12B				10				Dark gray (10YR4/1), wet, dense, silty, fine- to coarse-grained SAND with gravel.
							24	Dark gray (10YR4/1), slightly moist, hard, very silty CLAY with sand and gravel.



End of Boring = 24.0 ft. BGS

Borehole Detail | Elevation ft. MSL | Remarks

NOTE(S): G206 installed in borehole.

FIELD BORING LOG

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: **Start:** 10/7/2010
Finish: 10/7/2010
WEATHER: Sunny, cool (lo-50's)

CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA w/SS samplers
FIELD STAFF: **Driller:** D. Mahurin
Helper: J. Litsch/D. Smail
Eng/Geo: .

BOREHOLE ID: G209
Well ID: G209
Surface Elev: 630.57 ft. MSL
Completion: 24.00 ft. BGS
Station: 875,298.23N
2,515,149.56E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Coffeen, IL
Township: East Fork
Section 11, **Tier** 7N; **Range** 3W

WATER LEVEL INFORMATION:
▼ = Dry - While drilling
▼ = 22.40 - Upon completion
▽ =

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
1A	24/24 100%	ss	4-4 4-6 N=8	21			0	FILL - Brown (10YR5/3) with 10% gray (10YR5/1) and 5% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand and gravel.		630	
2A	24/24 100%	ss	3-4 6-6 N=10	13			2			628	
3A	24/24 100%	ss	2-3 6-8 N=9	19			4			626	
4A	22/24 92%	ss	2-3 6-8 N=9	17			6			624	
5A	18/24 75%	ss	2-3 3-5 N=6	20			8	Grayish brown (10YR5/2), moist, firm, clayey SILT with trace sand and gravel.		622	
6A	24/24 100%	ss	1-2 2-5 N=4	26			10	Dark gray (10YR4/1) with 15% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand.		620	
7A	22/24 92%	ss	1-3 4-4 N=7	22			12	Dark gray (10YR4/1) with 25% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand.		618	
8A	24/24 100%	ss	woh-1 2-3 N=3	25			14			616	
9A	19/24 79%	ss	woh-1 2-3 N=3	24			16	Gray (10YR5/1) with 15% dark yellowish brown (10YR4/6) mottles, moist, soft, silty CLAY with trace sand and gravel.		614	
10A	14/24 58%	ss	woh-2 3-3 N=5	20			18			612	
							20				

NOTE(S): G209 installed in borehole.

FIELD BORING LOG

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: **Start:** 10/7/2010
Finish: 10/7/2010
WEATHER: Sunny, cool (lo-50's)

CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA w/SS samplers
FIELD STAFF: **Driller:** D. Mahurin
Helper: J. Litsch/D. Smail
Eng/Geo: .

BOREHOLE ID: G209
Well ID: G209
Surface Elev: 630.57 ft. MSL
Completion: 24.00 ft. BGS
Station: 875,298.23N
2,515,149.56E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Coffeen, IL
Township: East Fork
Section 11, **Tier** 7N; **Range** 3W

WATER LEVEL INFORMATION:
▼ = Dry - While drilling
▼ = 22.40 - Upon completion
▽ =

SAMPLE			TESTING						
Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Elevation ft. MSL
11A	1/24 *4%*	ss	*woh-1 1-1* N=2	21				Gray (10YR5/1) with 15% dark yellowish brown (10YR4/6) mottles, moist, soft, silty CLAY with trace sand and gravel. *[Continued from previous page]*	610
							22 ▼		
12A	20/24 *83%*	ss	*9-16 17-26* N=33	7				Dark gray (10YR4/1), slightly moist, hard, very silty CLAY with sand and gravel.	608
							24	**End of Boring = 24.0 ft. BGS**	

NOTE(S): G209 installed in borehole.

FIELD BORING LOG

HANSON

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: **Start:** 10/11/2010
Finish: 10/11/2010
WEATHER: Sunny, warm (lo-80's)

CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA w/SS samplers
FIELD STAFF: **Driller:** D. Mahurin
Helper: J. Litsch/D. Smail
Eng/Geo: .

BOREHOLE ID: G212
Well ID: G212
Surface Elev: 630.59 ft. MSL
Completion: 24.00 ft. BGS
Station: 875,486.50N
2,515,583.03E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Coffeen, IL
Township: East Fork
Section 11, **Tier** 7N; **Range** 3W

WATER LEVEL INFORMATION:
▼ = 19.00 - While drilling
▼ = 20.72 - Upon completion
▽ =

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
1A	24/24 100%	ss	4-3 3-6 N=6	17			0	FILL - Brown (10YR4/3), slightly moist, firm, silty CLAY with trace sand and gravel.		630	
2A	24/24 100%	ss	2-3 4-5 N=7	21			2	FILL - Dark gray (10YR4/1) with 20% brown (10YR4/3) and 10% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand.		628	
3A	24/24 100%	ss	2-5 6-7 N=11	13			4	FILL - Brown (10YR4/3) with 15% dark gray (10YR4/1) and 10% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand and gravel.		626	
4A	24/24 100%	ss	2-5 7-10 N=12	15			6			624	
5A	24/24 100%	ss	2-2 4-7 N=6	29			8	Dark gray (10YR4/1) with 10% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY, slight trace roots.		622	
6A	18/24 75%	ss	2-3 4-6 N=7	23			10	Dark gray (10YR4/1) with 10% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand.		620	
7A	17/24 71%	ss	1-2 2-2 N=4	25			12			618	
8A	24/24 100%	ss	woh-1 2-3 N=3	27			14	Dark gray (10YR4/1) with 15% dark yellowish brown (10YR4/6) mottles, moist, soft, silty CLAY with trace sand and gravel.		616	
9A	22/24 92%	ss	1-1 2-2 N=3	25			16			614	
10A	24/24 100%	ss	woh-woh 1-2	19			18	Gray (10YR5/1) with 30% dark yellowish brown (10YR4/6) mottles, very moist, very soft, silty, very fine- to fine-grained sandy CLAY with trace gravel.		612	
10B				22			20	Gray (10YR5/1), loose, wet, silty, very fine- to			

NOTE(S): G212 installed in borehole.

FIELD BORING LOG

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: **Start:** 10/11/2010
Finish: 10/11/2010
WEATHER: Sunny, warm (lo-80's)

CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA w/SS samplers
FIELD STAFF: **Driller:** D. Mahurin
Helper: J. Litsch/D. Smail
Eng/Geo: .

BOREHOLE ID: G212
Well ID: G212
Surface Elev: 630.59 ft. MSL
Completion: 24.00 ft. BGS
Station: 875,486.50N
2,515,583.03E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Coffeen, IL
Township: East Fork
Section 11, **Tier** 7N; **Range** 3W

WATER LEVEL INFORMATION:
▼ = 19.00 - While drilling
▼ = 20.72 - Upon completion
▽ =

SAMPLE Number	Recov / Total (in) *% Recovery*	Type	TESTING *Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
11A	7/24 *29%*	ss	*1-6* *10-22* N=16	19				medium-grained SAND. Brown (10YR5/3), moist, medium dense, SILT with trace sand and gravel.		610	
							22	Dark gray (10YR4/1), slightly moist, hard, very silty CLAY with sand and gravel.		608	
12A	20/24 *83%*	ss	*5-21* *18-27* N=39	12							
							24	**End of Boring = 24.0 ft. BGS**			

NOTE(S): G212 installed in borehole.

FIELD BORING LOG

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: **Start:** 10/13/2010
Finish: 10/13/2010
WEATHER: Sunny, warm, windy (hi-60's)

CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA w/SS samplers
FIELD STAFF: **Driller:** D. Mahurin
Helper: J. Litsch/D. Smail
Eng/Geo: .

BOREHOLE ID: G215
Well ID: G215
Surface Elev: 630.48 ft. MSL
Completion: 24.31 ft. BGS
Station: 875,810.19N
2,515,971.55E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Coffeen, IL
Township: East Fork
Section 11, **Tier** 7N; **Range** 3W

WATER LEVEL INFORMATION:
▼ = Dry - While drilling
▼ = Dry - Upon completion
▽ = 22.52 - 10/14/10

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
1A	23/24 96%	ss	5-3 3-5 N=6	18			0		630	
2A	19/24 79%	ss	3-3 5-6 N=8	17			2	FILL - Brown (10YR4/3) with 30% dark gray (10YR4/1) and 10% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand and gravel.	628	
3A	20/24 83%	ss	2-3 7-7 N=10	13			4		626	
4A	23/24 96%	ss	3-6 6-7 N=12	16			6	FILL - Dark grayish brown (10YR4/2), moist, firm, silty CLAY with trace sand and gravel.	624	
4B				27			8	FILL - Gray (10YR5/1) with 15% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand.	622	
5A	20/24 83%	ss	3-3 3-5 N=6	20				Very dark gray (10YR3/1), moist, firm, silty CLAY with trace sand, trace roots.		
6A	13/24 54%	ss	2-2 3-5 N=5	24			10	Dark gray (10YR4/1) with 30% dark yellowish brown (10YR4/6) moist, firm, silty CLAY with trace sand.	620	
7A	19/24 79%	ss	2-3 4-6 N=7	17			12	Gray (10YR5/1) with 30% dark yellowish brown (10YR4/6) mottles, moist, firm, clayey SILT with trace sand.	618	
8A	20/24 83%	ss	2-3 4-5 N=7	19			14	Dark gray (10YR4/1), moist, firm, clayey SILT with trace sand.	616	
9A	22/24 92%	ss	1-3 3-4 N=6	19			16	Dark gray (10YR4/1) with 30% Dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand and gravel.	614	
10A	24/24 100%	ss	woh-1 2-2 N=3	17			18	Dark gray (10YR4/1) with 30% Dark yellowish brown (10YR4/6) mottles, moist, soft, sandy CLAY with trace gravel.	612	
							20			

NOTE(S): G215 installed in borehole.

FIELD BORING LOG

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: **Start:** 10/13/2010
Finish: 10/13/2010
WEATHER: Sunny, warm, windy (hi-60's)

CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA w/SS samplers
FIELD STAFF: **Driller:** D. Mahurin
Helper: J. Litsch/D. Smail
Eng/Geo: .

BOREHOLE ID: G215
Well ID: G215
Surface Elev: 630.48 ft. MSL
Completion: 24.31 ft. BGS
Station: 875,810.19N
2,515,971.55E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Coffeen, IL
Township: East Fork
Section 11, **Tier** 7N; **Range** 3W

WATER LEVEL INFORMATION:
▼ = Dry - While drilling
▼ = Dry - Upon completion
▽ = 22.52 - 10/14/10

SAMPLE Number	Recov / Total (in) *% Recovery*	Type	TESTING *Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
11A	20/24 *83%*	SS	*2-4* *4-4* N=8	17				Dark yellowish brown (10YR4/6), moist, medium dense, clayey SILT with sand and trace gravel.		610	
								Yellowish brown (10YR5/6), moist, medium dense, silty, very fine- to fine-grained SAND.			
								Dark yellowish brown (10YR4/6) with 30% dark gray (10YR4/1) mottles, moist, firm, sandy CLAY with trace gravel.			
							22 ▽				
12A	24/24 *100%*	SS	*7-11* *17-19* N=28	11				Grayish brown (10YR5/2), slightly moist, very firm, very silty CLAY with sand and gravel.		608	
12B	0/4 *0%*	BD		9			24	Dark gray (10YR4/1), slightly moist, hard, very silty CLAY with sand and gravel.			

End of Boring = 24.3 ft. BGS

NOTE(S): G215 installed in borehole.

FIELD BORING LOG

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: **Start:** 10/12/2010
Finish: 10/12/2010
WEATHER: Partly cloudy, warm (lo-70's)

CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA w/SS samplers
FIELD STAFF: **Driller:** D. Mahurin
Helper: J. Litsch/D. Smail
Eng/Geo: .

BOREHOLE ID: G218
Well ID: G218
Surface Elev: 630.64 ft. MSL
Completion: 26.00 ft. BGS
Station: 876,380.92N
2,515,962.16E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Coffeen, IL
Township: East Fork
Section 11, **Tier** 7N; **Range** 3W

WATER LEVEL INFORMATION:
▼ = 24.00 - While drilling
▼ = 24.76 - Upon completion
▽ =

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
1A	18/24 75%	ss	4-1 2-1 N=3	20			0	FILL - Brown (10YR4/3) with 15% dark gray (10YR4/1) and 5% dark yellowish brown (10YR4/6) mottles, moist, soft, silty CLAY with trace sand and gravel.		630	
2A	22/24 92%	ss	2-2 3-5 N=5	20			2			628	
3A	19/24 79%	ss	2-3 4-8 N=7	17			4	FILL - Dark gray (10YR4/1) with 30% brown (10YR4/3) and 10% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand and gravel.		626	
4A	22/24 92%	ss	2-5 6-8 N=11	14			6			624	
5A	20/24 83%	ss	3-4 8-7 N=12	17			8	FILL - Brown (10YR5/3) with 10% dark gray (10YR4/1) mottles, slightly moist, firm, clayey SILT with trace sand and gravel.		622	
6A	19/24 79%	ss	2-2 3-5 N=5	19			10	Dark grayish brown (10YR4/2) with 5% dark yellowish brown (10YR4/6) mottles, moist, firm, clayey SILT with trace sand.		620	
6B				25			12	Gray (10YR5/1) with 30% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with trace sand, slight trace roots.		618	
7A	22/24 92%	ss	2-3 5-7 N=8	22			14	Dark gray (10YR4/1) with 15% dark yellowish brown (10YR4/6) mottles, moist, firm, clayey SILT with trace sand.		616	
8A	18/24 75%	ss	2-3 4-5 N=7	19			16			614	
9A	24/24 100%	ss	2-2 2-4 N=4	19			18	Gray (10YR5/1) with 10% dark yellowish brown (10YR4/6) mottles, moist, soft, silty CLAY with trace sand and gravel.		612	
10A	24/24 100%	ss	1-2 2-3 N=4	18			20				

NOTE(S): G218 installed in borehole.

FIELD BORING LOG

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: **Start:** 10/12/2010
Finish: 10/12/2010
WEATHER: Partly cloudy, warm (lo-70's)

CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA w/SS samplers
FIELD STAFF: **Driller:** D. Mahurin
Helper: J. Litsch/D. Smail
Eng/Geo: .

BOREHOLE ID: G218
Well ID: G218
Surface Elev: 630.64 ft. MSL
Completion: 26.00 ft. BGS
Station: 876,380.92N
2,515,962.16E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Coffeen, IL
Township: East Fork
Section 11, **Tier** 7N; **Range** 3W

WATER LEVEL INFORMATION:
▼ = 24.00 - While drilling
▼ = 24.76 - Upon completion
▽ =

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
11A	22/24 92%	ss	woh-woh woh-woh	16			22	Gray (10YR5/1) with 10% dark yellowish brown (10YR4/6) mottles, moist, very soft, clayey, very fine- to coarse-grained SAND with trace gravel.	610	
12A	24/24 100%	ss	1-1 1-3 N=2	10				Yellowish brown, wet, loose, silty, very fine- to coarse-grained SAND with trace gravel.	608	
12B				16				Dark gray (10YR4/1) with 10% dark yellowish brown (10YR4/6) mottles, moist, soft, silty CLAY with trace sand and gravel.		
13A	24/24 100%	ss	1-5 9-13 N=14	20			▼ 24	Gray (10YR5/1), wet, loose, silty, very fine- to coarse-grained SAND with trace gravel.	606	
13B				17			26	Dark gray (10YR4/1), slightly moist, very firm, very silty CLAY with sand and gravel.		

End of Boring = 26.0 ft. BGS

NOTE(S): G218 installed in borehole.

FIELD BORING LOG

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: **Start:** 10/15/2010
Finish: 10/15/2010
WEATHER: Sunny (mid-50's)

CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA (blind drill)
FIELD STAFF: **Driller:** D. Mahurin
Helper: J. Litsch/D. Smail
Eng/Geo: R. Hasenyager

BOREHOLE ID: R201
Well ID: R201
Surface Elev: 624.02 ft. MSL
Completion: 17.22 ft. BGS
Station: 877,925.26N
2,514,841.96E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Coffeen, IL
Township: East Fork
Section 2, **Tier** 7N; **Range** 3W

SAMPLE			TESTING						
Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft^3)	Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
							0	Very dark grayish brown (10YR3/2), moist, soft, friable, clayey SILT, slight trace sand and gravel		624	
							2	Dark brown (10YR3/3), moist, soft, silty CLAY		622	
							4	Yellowish brown (10YR5/8) with 20% gray (10YR5/1) mottles, moist, firm, silty CLAY, trace sand, slight trace gravel		620	
							6	Gray (10YR5/1) with 5% yellowish brown (10YR5/6) mottles, moist, firm, silty CLAY, sand and trace gravel		618	
							8	Gray (10YR5/1), moist, firm, sandy CLAY, trace silt and slight trace gravel		616	
							10	Yellowish brown (10YR5/8) with 10% gray (10YR5/1) mottles, moist, firm, sandy CLAY, trace gravel		614	
							12	Yellowish brown (10YR5/8), wet, soft, silty SAND, trace gravel		612	
							12	Yellowish brown (10YR5/8), moist, firm, clayey SILT		612	
							14	Greenish gray (5GY6/1), moist, firm, interbedded clayey SILT and SILT		610	
							16	Yellowish brown (10YR5/8), wet, soft, fine- to coarse-grained SAND, slight trace gravel		608	
							16	Yellowish brown (10YR5/8), wet, firm, very fine- to fine-grained silty SAND		608	
								Gray (10YR5/1), wet, soft, SILT			
								Gray (10YR5/1), wet, soft, fine- to coarse-grained SAND, slight trace gravel			
								Gray (10YR5/1), moist, hard, very silty CLAY, trace sand and gravel			
								End of Boring = 17.22 ft. BGS			

NOTE(S): R201 blind drilled in borehole approximately 8 ft. west of G201. Lithology taken from G201.

FIELD BORING LOG

HANSON

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: **Start:** 2/26/2008
Finish: 2/26/2008
WEATHER: Overcast, cold

CONTRACTOR: Testing Service Corp.
Rig mfg/model: CME-650 Track Drill
Drilling Method: 3¼" HSA w/SS & CME samplers
FIELD STAFF: **Driller:** B. Williamson
Helper: R. Keedy
Eng/Geo: .

BOREHOLE ID: G270
Well ID: G270
Surface Elev: 622.92 ft. MSL
Completion: 18.27 ft. BGS
Station: 874,801.92N
2,514,996.84E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Coffeen, IL
Township: East Fork
Section 11, **Tier** 7N; **Range** 3W

WATER LEVEL INFORMATION:
▼ = 16.00 - While drilling
▼ = 5.62 - 3/12/08
▽ =

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
	20/24 83%	ss	2-2 2-4 N=4					Dark grayish brown (10YR4/2), moist, firm, clayey SILT	622	
1A				24				Dark grayish brown (10YR4/2), moist, firm, silty CLAY		
							2	Dark grayish brown (10YR4/2) with 5% yellowish brown (10YR5/8) mottles, moist, firm, silty CLAY, slight trace sand		
2A	19/24 79%	ss	3-4 5-9 N=9	22		2.33 B			620	
2B				20		5.04 Sh	4	Gray (10YR5/1) with 70% yellowish brown (10YR5/8) mottles, moist, firm, silty CLAY, slight trace sand and gravel		
	20/24 83%	ss	14-5 7-8 N=12						618	
3A				17		2.52 Sh	▼ 6	Dark gray (10YR4/1) with 5% yellowish brown (10YR5/8) mottles, moist, firm, silty CLAY, trace sand, slight trace gravel		
4A	24/24 100%	ss	8-6 7-5 N=13	21		1.24 BSh			616	
4B				21		1.20 B	8	Gray (10YR5/1) with 10% yellowish brown (10YR5/8) mottles, moist, firm, silty CLAY, trace sand, slight trace gravel		
	22/24 92%	ss	2-3 4-4 N=7						614	
5A				21		1.36 B	10	Gray (10YR5/1) with 60% yellowish brown (10YR5/8) mottles, moist, firm, silty CLAY, trace sand, slight trace gravel		
6A	24/24 100%	ss	1-2 2-3 N=4	21		0.74 BSh			612	
6B				24		0.78 B	12	Gray (10YR5/1), moist, soft, sandy CLAY		
	17/24 71%	ss	2-2 2-3 N=4					Gray (10YR5/1), moist, soft, sandy CLAY, trace gravel	610	
7A				21						
8A				20			14	Gray (10YR5/1), moist, soft, fine- to coarse-grained SAND, trace gravel		
	19/24 79%	ss	1-3 5-6 N=8					Dark yellowish brown (10YR4/4), moist, soft, sandy CLAY	608	
8B				17		4.46 Sh		Gray (10YR5/1) with 10% yellowish brown (10YR5/8) mottles, moist, firm, silty CLAY, slight trace sand and gravel		
							▼ 16			
9A	24/24 100%	ss	6-8 30-35 N=38	20				Yellowish brown (10YR5/4), wet, soft, fine to coarse SAND	606	
9B				8			18	Gray (10YR5/1), moist, hard, silty CLAY, trace sand and gravel		

End of Boring = 18.27 ft. BGS

NOTE(S):

FIELD BORING LOG

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: **Start:** 9/9/2009
Finish: 9/10/2009
WEATHER: Sunny, warm (70's)

CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA w/SS & CME samplers
FIELD STAFF: **Driller:** G. Mills
Helper: J. Twellman
Eng/Geo: R. Hasenyager

BOREHOLE ID: G271
Well ID: G271
Surface Elev: 622.89 ft. MSL
Completion: 16.00 ft. BGS
Station: 874,239.38N
2,515,517.12E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Coffeen, IL
Township: East Fork
Section 11, **Tier** 7N; **Range** 3W

WATER LEVEL INFORMATION:
▼ = 12.70 - While drilling
▼ = 12.50 - 9/21/09
▽ =

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
1A	20/24 83%	ss	2-5 5-6 N=10	27			0	FILL - Yellowish brown (10YR5/4), moist, firm, silty CLAY with trace sand.		622	
							0.5	Grayish brown (10YR5/2), dry, friable, clayey SILT.			
2A	24/24 100%	ss	2-6 5-5 N=11	23			2	Yellowish brown (10YR5/6) with 10% gray (10YR6/1) mottles, moist, firm, silty CLAY with trace sand and slight trace gravel.		620	
3A	23/24 96%	ss	4-5 4-5 N=9	18			4	Gray (10YR6/1), moist, firm, very silty CLAY with slight trace sand.		618	
4A	24/24 100%	ss	2-4 4-5 N=8	17			6	Gray (10YR5/1) with 30% brownish yellow (10YR6/6) mottles, moist, firm, silty CLAY with sand and trace gravel.		616	
5A	24/24 100%	ss	2-4 4-6 N=8	20			8			614	
							9	Very dark gray (10YR3/1), organic-rich (PEAT), silty CLAY and trace sand.			
6A	24/24 100%	ss	2-4 4-5 N=8	22			10	Brownish yellow (10YR6/8) with 20% gray (10YR5/1) mottles, moist, firm, silty CLAY with sand and trace gravel.		612	
6B				20							
7A				20			12	Gray (10YR6/1) with 20% brownish yellow (10YR6/8) mottles, very moist, soft, sandy CLAY with silt and slight trace gravel.			
7B	20/24 83%	ss	2-2 3-7 N=5	19			13	Brownish yellow (10YR6/6), very moist to wet, soft, sandy CLAY with silt and slight trace gravel.		610	
							13.5	Gray (10YR6/1), wet, loose, very fine to medium SAND with silt.			
8A	24/24 100%	ss	10-19 30-33 N=49	7			14	Gray (10YR5/1), slightly moist, hard, very silty CLAY with sand and gravel.		608	
							16	**End of Boring = 16.0 ft. BGS**			

NOTE(S):

FIELD BORING LOG

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: **Start:** 9/10/2009
Finish: 9/10/2009
WEATHER: Sunny, warm (70's)

CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA w/SS & CME samplers
FIELD STAFF: **Driller:** G. Mills
Helper: J. Twellman
Eng/Geo: R. Hasenyager

BOREHOLE ID: G273
Well ID: G273
Surface Elev: 620.17 ft. MSL
Completion: 16.00 ft. BGS
Station: 874,235.24N
2,515,975.49E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Coffeen, IL
Township: East Fork
Section 11, **Tier** 7N; **Range** 3W

WATER LEVEL INFORMATION:
▼ = 13.50 - While drilling
▼ = 9.89 - 9/21/09
▽ =

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
1A	16/24 67%	ss	3-3 3-3 N=6	24			0	FILL -Dark yellowish brown (10YR4/6), moist, firm, silty CLAY with slight trace sand.		620	
2A	24/24 100%	ss	3-4 5-7 N=9	28			2	FILL - Gray (10YR5/1) with 20% dark yellowish brown (10YR4/6) mottles, moist, firm, silty CLAY with slight trace sand and gravel.		618	
3A				18			4	Brownish yellow (10YR6/8) with 40% gray (10YR5/1) mottles, moist, firm, silty CLAY with trace sand and slight trace gravel.		616	
3B	24/24 100%	ss	3-5 6-8 N=11	25			6	Gray (10YR6/1) with 10% brownish yellow(10YR6/6) mottles, moist, firm, silty CLAY with trace sand and slight trace gravel.		614	
4A				19			8	Gray (10YR5/1), moist, firm, silty CLAY with sand and trace gravel.		612	
4B	24/24 100%	ss	3-5 5-6 N=10	16							
5A	23/24 96%	ss	2-4 5-4 N=9	19							
5B				21			10 ▼	Yellowish brown (10YR5/8) with 30% gray (10YR6/1) mottles, moist, soft, sandy CLAY with silty and slight trace gravel.		610	
6A	24/24 100%	ss	1-2 3-4 N=5	19				Brownish yellow (10YR6/8) with 10% gray (10YR6/1) mottles, very moist, soft, sandy CLAY with silt and slight trace gravel.			
7A	24/24 100%	ss	4-8 17-24 N=25	11			12	Gray (10YR6/1), moist, hard, very silty CLAY with sand and trace gravel.		608	
7B				11			14 ▼	Light yellowish brown (10YR6/4), wet, loose, very fine- to very coarse-grained SAND with trace silt.		606	
8A	22/24 92%	ss	9-22 22-23 N=44	8				Light yellowish brown (10YR6/4), wet, dense, sandy, silty CLAY. Gray (10YR6/1), moist, hard, very silty CLAY with sand and trace gravel.			
							16	**End of Boring = 16.0 ft. BGS**			

NOTE(S):

FIELD BORING LOG

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: **Start:** 9/16/2009
Finish: 9/16/2009
WEATHER: Sunny, mild (70'S)

CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA w/SS & CME samplers
FIELD STAFF: **Driller:** G. Mills
Helper: J. Twellman
Eng/Geo: R. Hasenyager

BOREHOLE ID: G276
Well ID: G276
Surface Elev: 629.14 ft. MSL
Completion: 28.00 ft. BGS
Station: 874,438.60N
2,516,358.83E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Coffeen, IL
Township: East Fork
Section 11, **Tier** 7N; **Range** 3W

WATER LEVEL INFORMATION:
▼ = Dry - While drilling
▼ = 25.55 - 9/21/09
▽ =

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
1A	17/24 71%	ss	5-8 9-10 N=17	10			0	FILL - Yellowish brown (10YR5/4) with 20% gray (10YR5/1) mottles, moist, hard, silty CLAY with trace sand and slight trace gravel.	628	
2A	19/24 79%	ss	7-7 10-14 N=17	15			2			
3A	11/24 46%	ss	5-10 14-27 N=24	14			4		626	
4A	24/24 100%	ss	5-9 10-14 N=19	8			6	FILL - Yellowish brown (10YR5/4) with 20% gray (10YR5/1) mottles, slightly moist, hard, silty CLAY with trace sand and slight trace gravel.	624	Rock fragment in split spoon shoe
4B				5			7.5	FILL - Yellowish brown (10YR5/4) with 10% gray (10YR5/1) mottles, slightly moist, hard, friable, clayey SILT with sand and trace gravel.	622	
5A	17/24 71%	ss	4-4 8-19 N=12	22			8			
6A	17/24 71%	ss	4-5 8-14 N=13	14			10	FILL - Yellowish brown (10YR5/4) with 25% gray (10YR5/1) mottles, slightly moist, firm, silty CLAY with slight trace sand and gravel.	620	
7A	16/24 67%	ss	6-7 2-4 N=9	20			12		618	
8A	20/24 83%	ss	2-4 6-6 N=10	21			13.5	Gray (10YR6/1) with 10% yellowish brown (10YR5/8) mottles, moist, firm, silty CLAY with slight trace sand and gravel.	616	
9A				17			14			
9B	22/24 92%	ss	1-4 5-7 N=9	13			16		614	
10A	23/24 96%	ss	2-3 8-12 N=11	20			17.5	Gray (10YR6/1) with 20% yellowish brown (10YR5/6) mottles, moist, soft, sandy CLAY with silt and slight trace gravel.	612	
							18			
							19.5	Gray (10YR6/1) with 30% yellowish brown (10YR5/8) mottles, moist, firm, silty CLAY with sand and slight trace gravel.	610	
							20			

NOTE(S):

FIELD BORING LOG

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: **Start:** 9/16/2009
Finish: 9/16/2009
WEATHER: Sunny, mild (70'S)

CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA w/SS & CME samplers
FIELD STAFF: **Driller:** G. Mills
Helper: J. Twellman
Eng/Geo: R. Hasenyager

BOREHOLE ID: G276
Well ID: G276
Surface Elev: 629.14 ft. MSL
Completion: 28.00 ft. BGS
Station: 874,438.60N
2,516,358.83E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Coffeen, IL
Township: East Fork
Section 11, **Tier** 7N; **Range** 3W

WATER LEVEL INFORMATION:
▼ = Dry - While drilling
▼ = 25.55 - 9/21/09
▽ =

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
11A	24/24 100%	ss	1-3 5-7 N=8	21			22	Gray (10YR6/1) with 30% yellowish brown (10YR5/8) mottles, moist, firm, silty CLAY with sand and slight trace gravel. *[Continued from previous page]*		608	
12A	24/24 100%	ss	1-4 6-7 N=10	16			24	Yellowish brown (10YR5/8), moist, firm, silty CLAY with sand and slight trace gravel.		606	
13A	24/24 100%	ss	2-3 4-6 N=7	16			▼	Gray (10YR6/1) with 25% yellowish brown (10YR5/6) mottles, very moist, soft, silty CLAY with sand and trace gravel. Gray (10YR6/1), very moist, loose, very fine- to fine-grained, SAND		604	
14A	24/24 100%	ss	1-5 15-29 N=20	16			26	Gray (10YR6/1) with 25% yellowish brown (10YR5/6) mottles, very moist, soft, silty CLAY with sand and trace gravel. Gray (10YR6/1), very moist, firm, clayey SILT with trace very fine-grained sand.		602	
							28	Gray (10YR6/1) with 40% yellowish brown (10YR5/4) mottles, moist, hard, very silty CLAY with sand and trace gravel. Yellowish brown (10YR5/4), moist, hard, very silty CLAY with sand and trace gravel.			

End of Boring = 28.0 ft. BGS

NOTE(S):

FIELD BORING LOG

HANSON

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: **Start:** 9/10/2009
Finish: 9/10/2009
WEATHER: Sunny, warm (80's)

CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA w/SS & CME samplers
FIELD STAFF: **Driller:** G. Mills
Helper: J. Twellman
Eng/Geo: R. Hasenyager

BOREHOLE ID: G279
Well ID: G279
Surface Elev: 629.19 ft. MSL
Completion: 28.00 ft. BGS
Station: 875,028.06N
2,516,245.60E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Coffeen, IL
Township: East Fork
Section 11, **Tier** 7N; **Range** 3W

WATER LEVEL INFORMATION:
▼ = 23.60 - While drilling
▼ = 24.68 - 9/21/09
▽ =

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
1A	24/24 100%	ss	3-3 5-6 N=8	18			0	FILL - Brown (10YR4/3) with 30% yellowish brown (10YR5/6) mottles, moist, firm, silty CLAY with sand and trace gravel.		628	
2A	24/24 100%	ss	5-9 10-11 N=19	14			4			626	
3A	24/24 100%	ss	5-9 9-10 N=18	17			6			624	
4A	24/24 100%	ss	4-5 7-6 N=12	21			8	FILL - dark gray (10YR4/1) with 10% brownish yellow (10YR6/6) mottles, moist, hard, silty CLAY with sand and trace gravel.		622	
5A	24/24 100%	ss	3-3 5-7 N=8	19			10			620	
6A	24/24 100%	ss	3-4 6-9 N=10	17			12			618	
7A	23/24 96%	ss	2-5 5-6 N=10	23			14	Brownish yellow (10YR6/8) with 30% gray (10YR5/1) mottles, moist, firm, silty CLAY with slight trace sand and gravel.		616	
8A	24/24 100%	ss	2-3 7-6 N=10	23			16	Yellowish brown (10YR5/8) with 20% gray (10YR6/1) mottles, moist, firm, silty CLAY with slight trace sand and gravel.		614	
9A	18/24 75%	ss	4-7 8-9 N=15	25			18			612	
10A	24/24 100%	ss	3-6 7-10 N=13	17			20	Gray (10YR6/1) with 25% yellowish brown (10YR5/8) mottles, moist, firm, silty CLAY with sand and trace gravel.		610	

NOTE(S):

FIELD BORING LOG

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: **Start:** 9/10/2009
Finish: 9/10/2009
WEATHER: Sunny, warm (80's)

CONTRACTOR: Layne-Western Co
Rig mfg/model: CME-750 ATV Drill
Drilling Method: 4¼" HSA w/SS & CME samplers
FIELD STAFF: **Driller:** G. Mills
Helper: J. Twellman
Eng/Geo: R. Hasenyager

BOREHOLE ID: G279
Well ID: G279
Surface Elev: 629.19 ft. MSL
Completion: 28.00 ft. BGS
Station: 875,028.06N
2,516,245.60E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Coffeen, IL
Township: East Fork
Section 11, **Tier** 7N; **Range** 3W

WATER LEVEL INFORMATION:
▼ = 23.60 - While drilling
▼ = 24.68 - 9/21/09
▽ =

SAMPLE Number	Recov / Total (in) *% Recovery*	Type	TESTING *Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
11A	23/24 *96%*	ss	*2-4* *5-7* N=9	18				Gray (10YR6/1) with 25% yellowish brown (10YR5/8) mottles, moist, firm, silty CLAY with sand and trace gravel. *[Continued from previous page]*		608	
12A	19/24 *79%*	ss	*4-9* *8-9* N=17	13			22	Yellowish brown (10YR5/8), moist, firm, clayey SILT and very fine-grained SAND with slight trace gravel.		606	
12B				12			▼ 24				
13A	17/24 *71%*	ss	*1-5* *5-7* N=10	18			▼	Light brownish gray (10YR6/2), wet, loose, very fine- to coarse-grained SAND.		604	
14A				16			26				
14B	24/24 *100%*	ss	*10-10* *18-18* N=28	14				Brownish yellow (10YR6/6), moist, hard, very silty CLAY with sand and trace gravel. Gray (10YR6/1), moist, hard, very silty CLAY with sand and trace gravel.		602	
							28	**End of Boring = 28.0 ft. BGS**			

NOTE(S):

FIELD BORING LOG

HANSON

CLIENT: AEG Coffeen Power Station
Site: CCB Management Facility
Location: Coffeen, Illinois
Project: 05S3004A
DATES: **Start:** 2/26/2008
Finish: 2/26/2008
WEATHER: Overcast, cold

CONTRACTOR: Testing Service Corp.
Rig mfg/model: CME-650 Track Drill
Drilling Method: 3¼" HSA w/SS & CME samplers
FIELD STAFF: **Driller:** B. Williamson
Helper: R. Keedy
Eng/Geo: .

BOREHOLE ID: G280
Well ID: G280
Surface Elev: 622.95 ft. MSL
Completion: 17.98 ft. BGS
Station: 875,045.11N
2,515,679.48E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Coffeen, IL
Township: East Fork
Section 11, **Tier** 7N; **Range** 3W

WATER LEVEL INFORMATION:
▼ = 15.60 - While drilling
▼ = 4.34 - 3/12/08
▽ =

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
1A	24/24 100%	ss	5-3 4-4 N=7	23			0	Dark grayish brown (10YR4/2), moist, firm, clayey SILT	622	
1B				26		2.33 B	2	Brown (10YR4/3) with 20% yellowish brown (10YR5/8) mottles, moist, firm, silty CLAY		
2A	24/24 100%	ss	3-4 4-6 N=8	30		1.28 BSh		Dark yellowish brown (10YR4/4), moist, firm, silty CLAY	620	
2B				25			4	Dark gray (10YR4/1) with 40% yellowish brown (10YR5/8) mottles, moist, firm, silty CLAY		
3A	19/24 79%	ss	3-4 6-6 N=10	14		3.10 Sh			618	
4A	22/24 92%	ss	9-11 10-8 N=21	18		1.67 BSh	6	Dark gray (10YR4/1) with 40% yellowish brown (10YR5/8) mottles, moist, firm, silty CLAY, slight trace sand	616	
5A	19/24 79%	ss	2-2 4-4 N=6	20		1.47 B	8	Dark gray (10YR4/1) with 40% yellowish brown (10YR5/8) mottles, moist, firm, silty CLAY, trace sand, slight trace gravel	614	
5B				21		1.28 B	10	Dark gray (10YR4/1) with 40% yellowish brown (10YR5/8) mottles, moist, firm, silty CLAY, sand, trace gravel		
6A	22/24 92%	ss	2-3 3-3 N=6	20			12	Yellowish brown (10YR5/8) with 20% light gray (10YR6/1) mottles, moist, soft, sandy CLAY	612	
7A	23/24 96%	ss	3-14 23-21 N=37	13				Yellowish brown (10YR5/8), moist, soft, fine to coarse SAND, trace gravel Yellowish brown (10YR5/8), moist, firm, sandy CLAY, trace gravel	610	
8A	23/24 96%	ss	12-17 24-26 N=41	9			14	Yellowish brown (10YR5/4), moist, firm, clayey SILT, trace sand and gravel	608	
8B				15			16	Yellowish brown (10YR5/4), wet, soft, fine- to coarse-grained SAND, trace gravel		
9A	24/24 100%	ss	11-27 54-43 N=81	26				Gray (10YR5/1), moist, hard, silty CLAY, trace sand and gravel	606	
9B				7						

End of Boring = 17.98 ft. BGS

NOTE(S):

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Montgomery Well #: G200

Site Name: AEG Coffeen Power Station CCB Management Facility Borehole #: G200

~~State~~ Plant ~~Plane~~ Coordinate: X 877,930.6 Y 2,515,650.0 (or) Latitude: ____° ____' ____" Longitude: ____° ____' ____"

Surveyed By: Jeffrey D. Emrick IL Registration #: 035-003507

Drilling Contractor: Testing Service Corporation Driller: B. Williamson

Consulting Firm: Hanson Professional Services Inc. Geologist: Rhonald W Hasenyager, LPG #196-000246

Drilling Method: Hollow stem auger Drilling Fluid (Type): _____

Logged By: Suzanna L Simpson Date Started: 2/25/2008 Date Finished: 2/25/2008

Report Form Completed By: Suzanna L Simpson Date: 2/29/2008

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: Bentonite chips

Installation Method: Gravity

Setting Time: >24 hr.

Type of Bentonite Seal -- (Granular) Pellet Slurry (choose one)

Installation Method: Gravity

Setting Time: >24 hr.

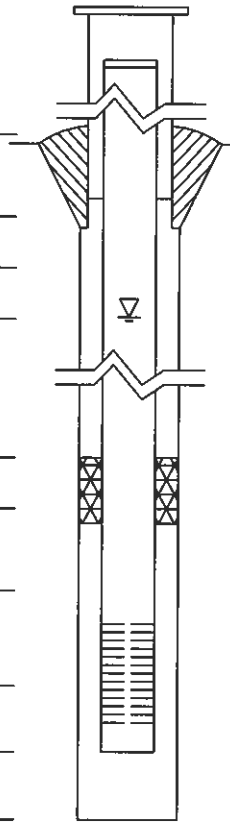
Type of Sand Pack: Quartz sand

Grain Size: 10/20 (sieve size)

Installation Method: Gravity

Type of Backfill Material: Formation Sand (if applicable)

Installation Method: Slough



Elevations (MSL)*	Depths (BGS)	(0.01 ft.)
626.54	-2.34	Top of Protective Casing
625.94	-1.74	Top of Riser Pipe
624.20	0.00	Ground Surface
620.70	3.50	Top of Annular Sealant
621.45	2.75	Static Water Level (After Completion) 3/12/2008
620.70	3.50	Top of Seal
614.20	10.00	Top of Sand Pack
612.01	12.19	Top of Screen
607.22	16.98	Bottom of Screen
606.84	17.36	Bottom of Well
606.20	18.00	Bottom of Borehole

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIALS

(Choose one type of material for each area)

Protective Casing	SS304	SS316	PTFE	PVC	OTHER: (Steel)
Riser Pipe Above W.T.	SS304	SS316	PTFE	(PVC)	OTHER:
Riser Pipe Below W.T.	SS304	SS316	PTFE	(PVC)	OTHER:
Screen	SS304	SS316	PTFE	(PVC)	OTHER:

CASING MEASUREMENTS

Diameter of Borehole	(inches)	8.0
ID of Riser Pipe	(inches)	2.0
Protective Casing Length	(feet)	5.0
Riser Pipe Length	(feet)	13.93
Bottom of Screen to End Cap	(feet)	0.38
Screen Length (1st slot to last slot)	(feet)	4.79
Total Length of Casing	(feet)	19.10
Screen Slot Size **	(inches)	0.010

**Hand-Slotted Well Screens Are Unacceptable

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Montgomery Well #: G206

Site Name: CCB Management Facility Borehole #: G206

State Plane Coordinate: X 2,514,669.2 Y 875,103.9 (or) Latitude: 39° 4' 2.600" Longitude: -89° 23' 54.800"

Surveyed By: Jeffrey D. Emrick IL Registration #: 035-003507

Drilling Contractor: Layne-Western Co Driller: D. Mahurin

Consulting Firm: Hanson Professional Services Inc. Geologist: Rhonald W. Hasenyager, LPG #196-000246

Drilling Method: Hollow stem auger Drilling Fluid (Type): n/a

Logged By: Suzanna Simpson Date Started: 10/14/2010 Date Finished: 10/14/2010

Report Form Completed By: Suzanna Simpson Date: 10/15/2010

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: High-solids bentonite

Installation Method: Tremie

Setting Time: >24 hr.

Type of Bentonite Seal -- (Granular) Pellet Slurry (choose one)

Installation Method: Gravity

Setting Time: 15 min

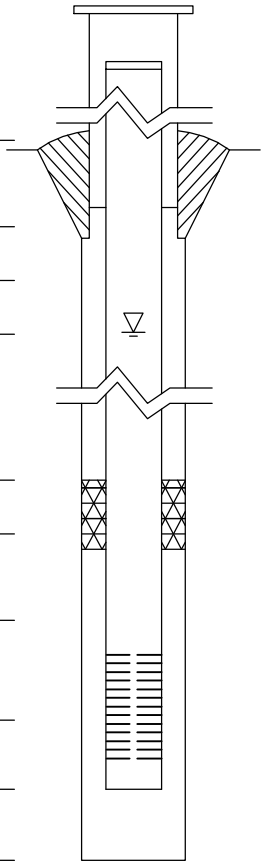
Type of Sand Pack: Quartz sand

Grain Size: 10/20 (sieve size)

Installation Method: Gravity

Type of Backfill Material: n/a (if applicable)

Installation Method: n/a



	Elevations (MSL)*	Depths (BGS) (0.01 ft.)
Top of Protective Casing	633.07	-2.53
Top of Riser Pipe	632.82	-2.28
Ground Surface	630.54	0.00
Top of Annular Sealant	627.84	2.70
Static Water Level (After Completion) 11/15/2010	611.96	18.58
Top of Seal	616.24	14.30
Top of Sand Pack	615.04	15.50
Top of Screen	613.03	17.51
Bottom of Screen	608.62	21.92
Bottom of Well	608.12	22.42
Bottom of Borehole	606.54	24.00

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIALS

(Choose one type of material for each area)

Protective Casing	SS304	SS316	PTFE	PVC	OTHER:
Riser Pipe Above W.T.	SS304	SS316	PTFE	(PVC)	OTHER:
Riser Pipe Below W.T.	SS304	SS316	PTFE	(PVC)	OTHER:
Screen	SS304	SS316	PTFE	(PVC)	OTHER:

CASING MEASUREMENTS

Diameter of Borehole	(inches)	8.0
ID of Riser Pipe	(inches)	2.0
Protective Casing Length	(feet)	5.0
Riser Pipe Length	(feet)	19.79
Bottom of Screen to End Cap	(feet)	0.50
Screen Length (1st slot to last slot)	(feet)	4.41
Total Length of Casing	(feet)	24.70
Screen Slot Size **	(inches)	0.010

**Hand-Slotted Well Screens Are Unacceptable

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Montgomery Well #: G209

Site Name: CCB Management Facility Borehole #: G209

State Plane Coordinate: X 2,515,149.6 Y 875,298.2 (or) Latitude: 39° 4' 4.500" Longitude: -89° 23' 48.700"

Surveyed By: Jeffrey D. Emrick IL Registration #: 035-003507

Drilling Contractor: Layne-Western Co Driller: D. Mahurin

Consulting Firm: Hanson Professional Services Inc. Geologist: Rhonald W. Hasenyager, LPG #196-000246

Drilling Method: Hollow stem auger Drilling Fluid (Type): n/a

Logged By: Suzanna Simpson Date Started: 10/7/2010 Date Finished: 10/7/2010

Report Form Completed By: Suzanna Simpson Date: 10/8/2010

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: High-solids bentonite

Installation Method: Tremie

Setting Time: >24 hr.

Type of Bentonite Seal -- (Granular) Pellet Slurry (choose one)

Installation Method: Gravity

Setting Time: 15 min

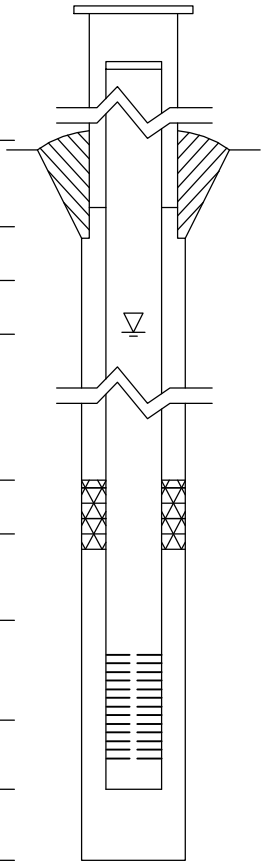
Type of Sand Pack: Quartz sand

Grain Size: 10/20 (sieve size)

Installation Method: Gravity

Type of Backfill Material: n/a (if applicable)

Installation Method: n/a



Elevations (MSL)*	Depths (BGS) (0.01 ft.)	
633.16	-2.59	Top of Protective Casing
632.91	-2.34	Top of Riser Pipe
630.57	0.00	Ground Surface
627.57	3.00	Top of Annular Sealant
615.52	15.05	Static Water Level (After Completion) 11/15/2010
616.07	14.50	Top of Seal
614.67	15.90	Top of Sand Pack
612.83	17.74	Top of Screen
608.29	22.28	Bottom of Screen
607.76	22.81	Bottom of Well
606.57	24.00	Bottom of Borehole

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIALS

(Choose one type of material for each area)

Protective Casing	SS304	SS316	PTFE	PVC	OTHER:
Riser Pipe Above W.T.	SS304	SS316	PTFE	(PVC)	OTHER:
Riser Pipe Below W.T.	SS304	SS316	PTFE	(PVC)	OTHER:
Screen	SS304	SS316	PTFE	(PVC)	OTHER:

CASING MEASUREMENTS

Diameter of Borehole	(inches)	8.0
ID of Riser Pipe	(inches)	2.0
Protective Casing Length	(feet)	5.0
Riser Pipe Length	(feet)	20.08
Bottom of Screen to End Cap	(feet)	0.53
Screen Length (1st slot to last slot)	(feet)	4.54
Total Length of Casing	(feet)	25.15
Screen Slot Size **	(inches)	0.010

**Hand-Slotted Well Screens Are Unacceptable

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Montgomery Well #: G212

Site Name: CCB Management Facility Borehole #: G212

State Plane Coordinate: X 2,515,583.0 Y 875,486.5 (or) Latitude: 39° 4' 6.300" Longitude: -89° 23' 43.100"

Surveyed By: Jeffrey D. Emrick IL Registration #: 035-003507

Drilling Contractor: Layne-Western Co Driller: D. Mahurin

Consulting Firm: Hanson Professional Services Inc. Geologist: Rhonald W. Hasenyager, LPG #196-000246

Drilling Method: Hollow stem auger Drilling Fluid (Type): n/a

Logged By: Suzanna Simpson Date Started: 10/11/2010 Date Finished: 10/11/2010

Report Form Completed By: Suzanna Simpson Date: 10/19/2010

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: High-solids bentonite

Installation Method: Tremie

Setting Time: >24 hr.

Type of Bentonite Seal -- (Granular) Pellet Slurry (choose one)

Installation Method: Gravity

Setting Time: 17 min

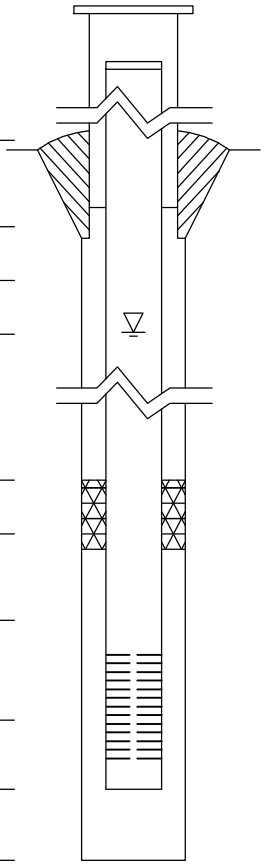
Type of Sand Pack: Quartz sand

Grain Size: 10/20 (sieve size)

Installation Method: Gravity

Type of Backfill Material: n/a (if applicable)

Installation Method: n/a



Elevations (MSL)*	Depths (BGS) (0.01 ft.)	
633.12	-2.53	Top of Protective Casing
632.89	-2.30	Top of Riser Pipe
630.59	0.00	Ground Surface
627.59	3.00	Top of Annular Sealant
616.10	14.49	Static Water Level (After Completion) 11/15/2010
616.89	13.70	Top of Seal
615.79	14.80	Top of Sand Pack
613.85	16.74	Top of Screen
609.30	21.29	Bottom of Screen
608.78	21.81	Bottom of Well
606.59	24.00	Bottom of Borehole

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIALS

(Choose one type of material for each area)

Protective Casing	SS304	SS316	PTFE	PVC	OTHER:
Riser Pipe Above W.T.	SS304	SS316	PTFE	(PVC)	OTHER:
Riser Pipe Below W.T.	SS304	SS316	PTFE	(PVC)	OTHER:
Screen	SS304	SS316	PTFE	(PVC)	OTHER:

CASING MEASUREMENTS

Diameter of Borehole	(inches)	8.0
ID of Riser Pipe	(inches)	2.0
Protective Casing Length	(feet)	5.0
Riser Pipe Length	(feet)	19.04
Bottom of Screen to End Cap	(feet)	0.52
Screen Length (1st slot to last slot)	(feet)	4.55
Total Length of Casing	(feet)	24.11
Screen Slot Size **	(inches)	0.010

**Hand-Slotted Well Screens Are Unacceptable

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Montgomery Well #: G215

Site Name: CCB Management Facility Borehole #: G215

State Plane Coordinate: X 2,515,971.6 Y 875,810.2 (or) Latitude: 39° 4' 9.500" Longitude: -89° 23' 38.200"

Surveyed By: Jeffrey D. Emrick IL Registration #: 035-003507

Drilling Contractor: Layne-Western Co Driller: D. Mahurin

Consulting Firm: Hanson Professional Services Inc. Geologist: Rhonald W. Hasenyager, LPG #196-000246

Drilling Method: Hollow stem auger Drilling Fluid (Type): n/a

Logged By: Suzanna Simpson Date Started: 10/13/2010 Date Finished: 10/13/2010

Report Form Completed By: Suzanna Simpson Date: 10/19/2010

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: High-solids bentonite

Installation Method: Tremie

Setting Time: >24 hr.

Type of Bentonite Seal -- (Granular) Pellet Slurry (choose one)

Installation Method: Gravity

Setting Time: 20 min

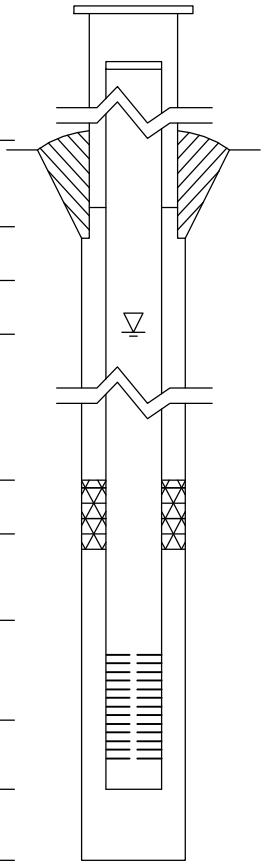
Type of Sand Pack: Quartz sand

Grain Size: 10/20 (sieve size)

Installation Method: Gravity

Type of Backfill Material: n/a (if applicable)

Installation Method: n/a



Elevations (MSL)*	Depths (BGS) (0.01 ft.)	
633.30	-2.82	Top of Protective Casing
633.06	-2.58	Top of Riser Pipe
630.48	0.00	Ground Surface
627.58	2.90	Top of Annular Sealant
607.64	22.84	Static Water Level (After Completion) 11/15/2010
614.08	16.40	Top of Seal
612.98	17.50	Top of Sand Pack
611.07	19.41	Top of Screen
606.68	23.80	Bottom of Screen
606.17	24.31	Bottom of Well
606.17	24.31	Bottom of Borehole

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIALS

(Choose one type of material for each area)

Protective Casing	SS304	SS316	PTFE	PVC	OTHER:
Riser Pipe Above W.T.	SS304	SS316	PTFE	(PVC)	OTHER:
Riser Pipe Below W.T.	SS304	SS316	PTFE	(PVC)	OTHER:
Screen	SS304	SS316	PTFE	(PVC)	OTHER:

CASING MEASUREMENTS

Diameter of Borehole	(inches)	8.0
ID of Riser Pipe	(inches)	2.0
Protective Casing Length	(feet)	5.0
Riser Pipe Length	(feet)	21.99
Bottom of Screen to End Cap	(feet)	0.51
Screen Length (1st slot to last slot)	(feet)	4.39
Total Length of Casing	(feet)	26.89
Screen Slot Size **	(inches)	0.010

**Hand-Slotted Well Screens Are Unacceptable

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Montgomery Well #: G218

Site Name: CCB Management Facility Borehole #: G218

State Plane Coordinate: X 2,515,962.2 Y 876,380.9 (or) Latitude: 39° 4' 15.200" Longitude: -89° 23' 38.200"

Surveyed By: Jeffrey D. Emrick IL Registration #: 035-003507

Drilling Contractor: Layne-Western Co Driller: D. Mahurin

Consulting Firm: Hanson Professional Services Inc. Geologist: Rhonald W. Hasenyager, LPG #196-000246

Drilling Method: Hollow stem auger Drilling Fluid (Type): n/a

Logged By: Suzanna Simpson Date Started: 10/12/2010 Date Finished: 10/12/2010

Report Form Completed By: Suzanna Simpson Date: 10/19/2010

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: High-solids bentonite

Installation Method: Tremie

Setting Time: >24 hr.

Type of Bentonite Seal -- (Granular) Pellet Slurry (choose one)

Installation Method: Gravity

Setting Time: 17 min

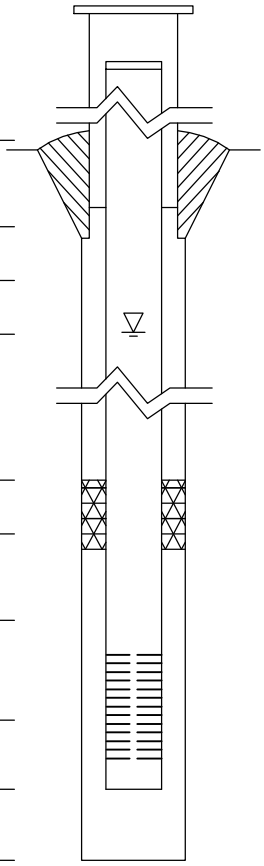
Type of Sand Pack: Quartz sand

Grain Size: 10/20 (sieve size)

Installation Method: Gravity

Type of Backfill Material: n/a (if applicable)

Installation Method: n/a



	Elevations (MSL)*	Depths (BGS) (0.01 ft.)
Top of Protective Casing	633.34	-2.70
Top of Riser Pipe	633.11	-2.47
Ground Surface	630.64	0.00
Top of Annular Sealant	627.14	3.50
Static Water Level (After Completion) 11/15/2010	609.89	20.75
Top of Seal	613.14	17.50
Top of Sand Pack	612.14	18.50
Top of Screen	610.31	20.33
Bottom of Screen	605.87	24.77
Bottom of Well	605.37	25.27
Bottom of Borehole	604.64	26.00

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIALS

(Choose one type of material for each area)

Protective Casing	SS304	SS316	PTFE	PVC	OTHER:
Riser Pipe Above W.T.	SS304	SS316	PTFE	(PVC)	OTHER:
Riser Pipe Below W.T.	SS304	SS316	PTFE	(PVC)	OTHER:
Screen	SS304	SS316	PTFE	(PVC)	OTHER:

CASING MEASUREMENTS

Diameter of Borehole	(inches)	8.0
ID of Riser Pipe	(inches)	2.0
Protective Casing Length	(feet)	5.0
Riser Pipe Length	(feet)	22.80
Bottom of Screen to End Cap	(feet)	0.50
Screen Length (1st slot to last slot)	(feet)	4.44
Total Length of Casing	(feet)	27.74
Screen Slot Size **	(inches)	0.010

**Hand-Slotted Well Screens Are Unacceptable

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Montgomery Well #: R201

Site Name: CCB Management Facility Borehole #: R201

State Plane Coordinate: X 2,514,842.0 Y 877,925.3 (or) Latitude: 39° 4' 30.500" Longitude: -89° 23' 52.300"

Surveyed By: Jeffrey D. Emrick IL Registration #: 035-003507

Drilling Contractor: Layne-Western Co Driller: D. Mahurin

Consulting Firm: Hanson Professional Services Inc. Geologist: Rhonald W. Hasenyager, LPG #196-000246

Drilling Method: Hollow stem auger Drilling Fluid (Type): n/a

Logged By: Rhonald W. Hasenyager Date Started: 10/15/2010 Date Finished: 10/15/2010

Report Form Completed By: Suzanna Simpson Date: 10/19/2010

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: High-solids bentonite

Installation Method: Tremie

Setting Time: >24 hr.

Type of Bentonite Seal -- (Granular) Pellet Slurry (choose one)

Installation Method: Gravity

Setting Time: 48 min

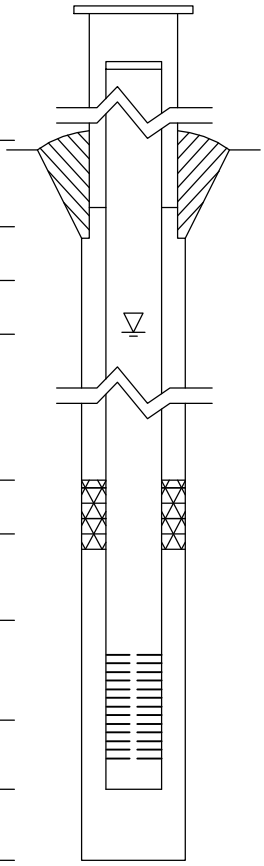
Type of Sand Pack: Quartz sand

Grain Size: 10/20 (sieve size)

Installation Method: Gravity

Type of Backfill Material: n/a (if applicable)

Installation Method: n/a



	Elevations (MSL)*	Depths (BGS) (0.01 ft.)
Top of Protective Casing	626.51	-2.49
Top of Riser Pipe	626.34	-2.32
Ground Surface	624.02	0.00
Top of Annular Sealant	621.52	2.50
Static Water Level (After Completion) 11/15/2010	618.70	5.32
Top of Seal	614.47	9.55
Top of Sand Pack	612.90	11.12
Top of Screen	611.75	12.27
Bottom of Screen	607.36	16.66
Bottom of Well	606.80	17.22
Bottom of Borehole	606.80	17.22

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIALS

(Choose one type of material for each area)

Protective Casing	SS304	SS316	PTFE	PVC	OTHER: ( )
Riser Pipe Above W.T.	SS304	SS316	PTFE	(PVC)	OTHER:
Riser Pipe Below W.T.	SS304	SS316	PTFE	(PVC)	OTHER:
Screen	SS304	SS316	PTFE	(PVC)	OTHER:

CASING MEASUREMENTS

Diameter of Borehole	(inches)	8.0
ID of Riser Pipe	(inches)	2.0
Protective Casing Length	(feet)	5.0
Riser Pipe Length	(feet)	14.59
Bottom of Screen to End Cap	(feet)	0.56
Screen Length (1st slot to last slot)	(feet)	4.39
Total Length of Casing	(feet)	19.54
Screen Slot Size **	(inches)	0.010

**Hand-Slotted Well Screens Are Unacceptable

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Montgomery Well #: G270

Site Name: CCB Management Facility Borehole #: G270

State Plane Coordinate: X 2,514,996.8 Y 874,801.9 (or) Latitude: 39° 3' 59.600" Longitude: -89° 23' 50.700"

Surveyed By: Jeffrey D. Emrick IL Registration #: 035-003507

Drilling Contractor: Testing Service Corp. Driller: B. Williamson

Consulting Firm: Hanson Professional Services Inc. Geologist: Rhonald W. Hasenyager, LPG #196-000246

Drilling Method: Hollow stem auger Drilling Fluid (Type): _____

Logged By: Suzanna Simpson Date Started: 2/26/2008 Date Finished: 2/26/2008

Report Form Completed By: Suzanna Simpson Date: 2/29/2008

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: Bentonite chips

Installation Method: Gravity

Setting Time: >24 hr.

Type of Bentonite Seal -- (Granular) Pellet Slurry (choose one)

Installation Method: Gravity

Setting Time: >24 hr.

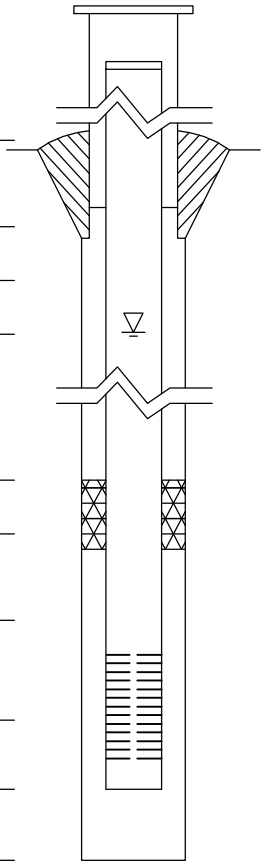
Type of Sand Pack: Quartz sand

Grain Size: 10/20 (sieve size)

Installation Method: Gravity

Type of Backfill Material: n/a (if applicable)

Installation Method: n/a



Elevations (MSL)*	Depths (BGS) (0.01 ft.)	
626.41	-3.49	Top of Protective Casing
625.97	-3.05	Top of Riser Pipe
622.92	0.00	Ground Surface
619.92	3.00	Top of Annular Sealant
617.30	5.62	Static Water Level (After Completion) 3/12/2008
619.92	3.00	Top of Seal
610.92	12.00	Top of Sand Pack
609.79	13.13	Top of Screen
605.00	17.92	Bottom of Screen
604.65	18.27	Bottom of Well
604.65	18.27	Bottom of Borehole

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIALS

(Choose one type of material for each area)

Protective Casing	SS304	SS316	PTFE	PVC	OTHER:
Riser Pipe Above W.T.	SS304	SS316	PTFE	(PVC)	OTHER:
Riser Pipe Below W.T.	SS304	SS316	PTFE	(PVC)	OTHER:
Screen	SS304	SS316	PTFE	(PVC)	OTHER:

CASING MEASUREMENTS

Diameter of Borehole	(inches)	8.0
ID of Riser Pipe	(inches)	2.0
Protective Casing Length	(feet)	5.0
Riser Pipe Length	(feet)	16.18
Bottom of Screen to End Cap	(feet)	0.35
Screen Length (1st slot to last slot)	(feet)	4.79
Total Length of Casing	(feet)	21.32
Screen Slot Size **	(inches)	0.010

**Hand-Slotted Well Screens Are Unacceptable

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Montgomery Well #: G271

Site Name: CCB Management Facility Borehole #: G271

State Plane Coordinate: X 2,515,517.1 Y 874,239.4 (or) Latitude: 39° 3' 54.000" Longitude: -89° 23' 44.100"

Surveyed By: Jeffrey D. Emrick IL Registration #: 035-003507

Drilling Contractor: Layne-Western Co Driller: G. Mills

Consulting Firm: Hanson Professional Services Inc. Geologist: Rhonald W. Hasenyager, LPG #196-000246

Drilling Method: Hollow stem auger Drilling Fluid (Type): _____

Logged By: Rhonald W. Hasenyager Date Started: 9/9/2009 Date Finished: 9/10/2009

Report Form Completed By: Suzanna Simpson Date: 10/7/2009

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: High-solids bentonite

Installation Method: Tremie

Setting Time: >24 hr.

Type of Bentonite Seal -- [Granular] Pellet Slurry (choose one)

Installation Method: Gravity

Setting Time: 10 min

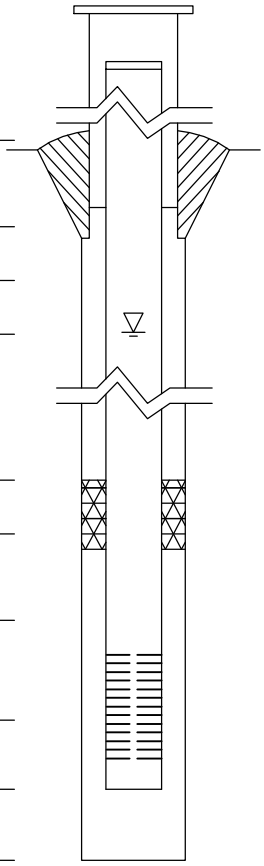
Type of Sand Pack: Quartz sand

Grain Size: 10/20 (sieve size)

Installation Method: Gravity

Type of Backfill Material: Quartz sand (if applicable)

Installation Method: Gravity



	Elevations (MSL)*	Depths (BGS) (0.01 ft.)
Top of Protective Casing	625.88	-2.99
Top of Riser Pipe	625.57	-2.68
Ground Surface	622.89	0.00
Top of Annular Sealant	619.89	3.00
Static Water Level (After Completion) 9/21/2009	610.39	12.50
Top of Seal	616.16	6.73
Top of Sand Pack	613.87	9.02
Top of Screen	612.93	9.96
Bottom of Screen	608.58	14.31
Bottom of Well	608.10	14.79
Bottom of Borehole	606.89	16.00

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIALS

(Choose one type of material for each area)

Protective Casing	SS304	SS316	PTFE	PVC	OTHER: ( )
Riser Pipe Above W.T.	SS304	SS316	PTFE	[PVC]	OTHER:
Riser Pipe Below W.T.	SS304	SS316	PTFE	[PVC]	OTHER:
Screen	SS304	SS316	PTFE	[PVC]	OTHER:

CASING MEASUREMENTS

Diameter of Borehole	(inches)	8.0
ID of Riser Pipe	(inches)	2.0
Protective Casing Length	(feet)	5.0
Riser Pipe Length	(feet)	12.64
Bottom of Screen to End Cap	(feet)	0.48
Screen Length (1st slot to last slot)	(feet)	4.35
Total Length of Casing	(feet)	17.47
Screen Slot Size **	(inches)	0.010

**Hand-Slotted Well Screens Are Unacceptable

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Montgomery Well #: G273

Site Name: CCB Management Facility Borehole #: G273

State Plane Coordinate: X 2,515,975.5 Y 874,235.2 (or) Latitude: 39° 3' 53.900" Longitude: -89° 23' 38.300"

Surveyed By: Jeffrey D. Emrick IL Registration #: 035-003507

Drilling Contractor: Layne-Western Co Driller: G. Mills

Consulting Firm: Hanson Professional Services Inc. Geologist: Rhonald W. Hasenyager, LPG #196-000246

Drilling Method: Hollow stem auger Drilling Fluid (Type): _____

Logged By: Rhonald W. Hasenyager Date Started: 9/10/2009 Date Finished: 9/10/2009

Report Form Completed By: Suzanna Simpson Date: 10/7/2009

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: High-solids bentonite

Installation Method: Tremie

Setting Time: >24 hr.

Type of Bentonite Seal -- [Granular] Pellet Slurry (choose one)

Installation Method: Gravity

Setting Time: 10 min

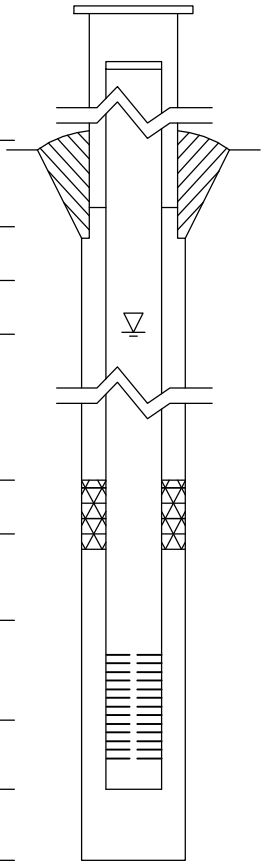
Type of Sand Pack: Quartz sand

Grain Size: 10/20 (sieve size)

Installation Method: Gravity

Type of Backfill Material: Quartz sand (if applicable)

Installation Method: Gravity



	Elevations (MSL)*	Depths (BGS) (0.01 ft.)
Top of Protective Casing	623.33	-3.16
Top of Riser Pipe	623.02	-2.85
Ground Surface	620.17	0.00
Top of Annular Sealant	617.17	3.00
Static Water Level (After Completion) 9/21/2009	610.28	9.89
Top of Seal	614.07	6.10
Top of Sand Pack	612.45	7.72
Top of Screen	611.09	9.08
Bottom of Screen	605.61	14.56
Bottom of Well	605.07	15.10
Bottom of Borehole	604.17	16.00

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIALS

(Choose one type of material for each area)

Protective Casing	SS304	SS316	PTFE	PVC	OTHER:
Riser Pipe Above W.T.	SS304	SS316	PTFE	[PVC]	OTHER:
Riser Pipe Below W.T.	SS304	SS316	PTFE	[PVC]	OTHER:
Screen	SS304	SS316	PTFE	[PVC]	OTHER:

CASING MEASUREMENTS

Diameter of Borehole	(inches)	8.0
ID of Riser Pipe	(inches)	2.0
Protective Casing Length	(feet)	5.0
Riser Pipe Length	(feet)	11.93
Bottom of Screen to End Cap	(feet)	0.54
Screen Length (1st slot to last slot)	(feet)	5.48
Total Length of Casing	(feet)	17.95
Screen Slot Size **	(inches)	0.010

**Hand-Slotted Well Screens Are Unacceptable

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Montgomery Well #: G276

Site Name: CCB Management Facility Borehole #: G276

State Plane Coordinate: X 2,516,358.8 Y 874,438.6 (or) Latitude: 39° 3' 55.900" Longitude: -89° 23' 33.400"

Surveyed By: Jeffrey D. Emrick IL Registration #: 035-003507

Drilling Contractor: Layne-Western Co Driller: G. Mills

Consulting Firm: Hanson Professional Services Inc. Geologist: Rhonald W. Hasenyager, LPG #196-000246

Drilling Method: Hollow stem auger Drilling Fluid (Type): _____

Logged By: Rhonald W. Hasenyager Date Started: 9/16/2009 Date Finished: 9/16/2009

Report Form Completed By: Suzanna Simpson Date: 10/7/2009

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: High-solids bentonite

Installation Method: Tremie

Setting Time: >24 hr.

Type of Bentonite Seal -- [Granular] Pellet Slurry (choose one)

Installation Method: Gravity

Setting Time: 15 min

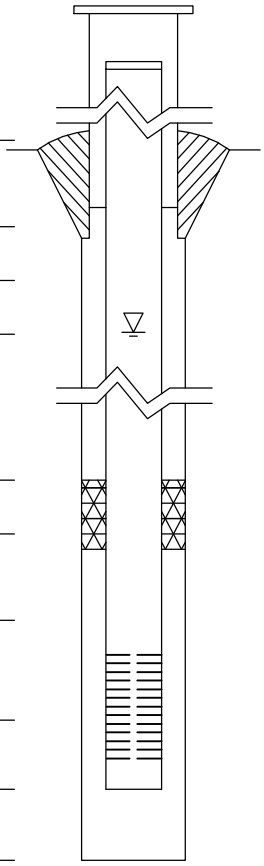
Type of Sand Pack: Quartz sand

Grain Size: 10/20 (sieve size)

Installation Method: Gravity

Type of Backfill Material: Quartz sand (if applicable)

Installation Method: Gravity



	Elevations (MSL)*	Depths (BGS) (0.01 ft.)
Top of Protective Casing	632.40	-3.26
Top of Riser Pipe	632.00	-2.86
Ground Surface	629.14	0.00
Top of Annular Sealant	626.14	3.00
Static Water Level (After Completion) 9/21/2009	603.59	25.55
Top of Seal	610.06	19.08
Top of Sand Pack	608.11	21.03
Top of Screen	606.73	22.41
Bottom of Screen	601.92	27.22
Bottom of Well	601.49	27.65
Bottom of Borehole	601.14	28.00

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIALS

(Choose one type of material for each area)

Protective Casing	SS304	SS316	PTFE	PVC	OTHER: ( )
Riser Pipe Above W.T.	SS304	SS316	PTFE	[PVC]	OTHER:
Riser Pipe Below W.T.	SS304	SS316	PTFE	[PVC]	OTHER:
Screen	SS304	SS316	PTFE	[PVC]	OTHER:

CASING MEASUREMENTS

Diameter of Borehole	(inches)	8.0
ID of Riser Pipe	(inches)	2.0
Protective Casing Length	(feet)	5.0
Riser Pipe Length	(feet)	25.27
Bottom of Screen to End Cap	(feet)	0.43
Screen Length (1st slot to last slot)	(feet)	4.81
Total Length of Casing	(feet)	30.51
Screen Slot Size **	(inches)	0.010

Well Completion Form (revised 02/06/02)

**Hand-Slotted Well Screens Are Unacceptable

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Montgomery Well #: G279

Site Name: CCB Management Facility Borehole #: G279

State Plane Coordinate: X 2,516,245.6 Y 875,028.1 (or) Latitude: 39° 4' 1.800" Longitude: -89° 23' 34.800"

Surveyed By: Jeffrey D. Emrick IL Registration #: 035-003507

Drilling Contractor: Layne-Western Co Driller: G. Mills

Consulting Firm: Hanson Professional Services Inc. Geologist: Rhonald W. Hasenyager, LPG #196-000246

Drilling Method: Hollow stem auger Drilling Fluid (Type): _____

Logged By: Rhonald W. Hasenyager Date Started: 9/10/2009 Date Finished: 9/10/2009

Report Form Completed By: Suzanna Simpson Date: 10/7/2009

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: High-solids bentonite

Installation Method: Tremie

Setting Time: >24 hr.

Type of Bentonite Seal -- [Granular] Pellet Slurry (choose one)

Installation Method: Gravity

Setting Time: 18 min

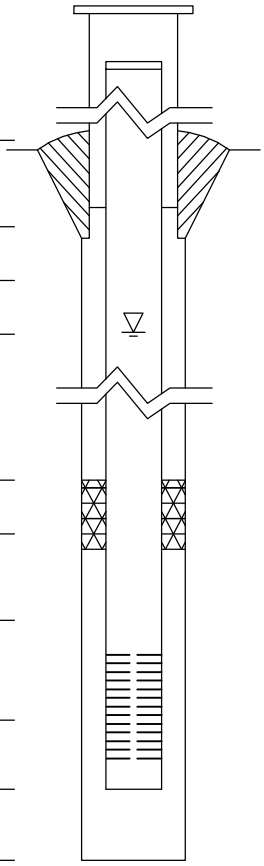
Type of Sand Pack: Quartz sand

Grain Size: 10/20 (sieve size)

Installation Method: Gravity

Type of Backfill Material: Quartz Sand (if applicable)

Installation Method: Gravity



Elevations (MSL)*	Depths (BGS) (0.01 ft.)	
632.33	-3.14	Top of Protective Casing
632.04	-2.85	Top of Riser Pipe
629.19	0.00	Ground Surface
626.19	3.00	Top of Annular Sealant
601.66	27.53	Static Water Level (After Completion) 9/21/2009
610.45	18.74	Top of Seal
608.77	20.42	Top of Sand Pack
606.79	22.40	Top of Screen
602.40	26.79	Bottom of Screen
~~604.51~~	~~24.68~~ 27.3	Bottom of Well
601.19	28.00	Bottom of Borehole

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIALS

(Choose one type of material for each area)

Protective Casing	SS304	SS316	PTFE	PVC	OTHER:
Riser Pipe Above W.T.	SS304	SS316	PTFE	[PVC]	OTHER:
Riser Pipe Below W.T.	SS304	SS316	PTFE	[PVC]	OTHER:
Screen	SS304	SS316	PTFE	[PVC]	OTHER:

CASING MEASUREMENTS

Diameter of Borehole	(inches)	8.0
ID of Riser Pipe	(inches)	2.0
Protective Casing Length	(feet)	5.0
Riser Pipe Length	(feet)	25.25
Bottom of Screen to End Cap	(feet)	0.53
Screen Length (1st slot to last slot)	(feet)	4.39
Total Length of Casing	(feet)	30.17
Screen Slot Size **	(inches)	0.010

**Hand-Slotted Well Screens Are Unacceptable

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Montgomery Well #: G280

Site Name: CCB Management Facility Borehole #: G280

State Plane Coordinate: X 2,515,679.5 Y 875,045.1 (or) Latitude: 39° 4' 2.000" Longitude: -89° 23' 42.000"

Surveyed By: Jeffrey D. Emrick IL Registration #: 035-003507

Drilling Contractor: Testing Service Corp. Driller: B. Williamson

Consulting Firm: Hanson Professional Services Inc. Geologist: Rhonald W. Hasenyager, LPG #196-000246

Drilling Method: Hollow stem auger Drilling Fluid (Type): _____

Logged By: Suzanna Simpson Date Started: 2/26/2008 Date Finished: 2/26/2008

Report Form Completed By: Suzanna Simpson Date: 2/29/2008

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: Bentonite chips

Installation Method: Gravity

Setting Time: >24 hr.

Type of Bentonite Seal -- (Granular) Pellet Slurry (choose one)

Installation Method: Gravity

Setting Time: >24 hr.

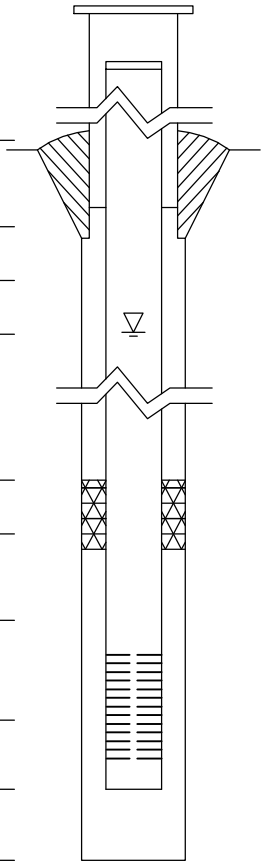
Type of Sand Pack: Quartz sand

Grain Size: 10/20 (sieve size)

Installation Method: Gravity

Type of Backfill Material: n/a (if applicable)

Installation Method: n/a



Elevations (MSL)*	Depths (BGS) (0.01 ft.)	
625.79	-2.84	Top of Protective Casing
625.30	-2.35	Top of Riser Pipe
622.95	0.00	Ground Surface
620.85	2.10	Top of Annular Sealant
618.61	4.34	Static Water Level (After Completion) 3/12/2008
620.85	2.10	Top of Seal
611.75	11.20	Top of Sand Pack
610.16	12.79	Top of Screen
605.32	17.63	Bottom of Screen
604.97	17.98	Bottom of Well
604.97	17.98	Bottom of Borehole

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIALS

(Choose one type of material for each area)

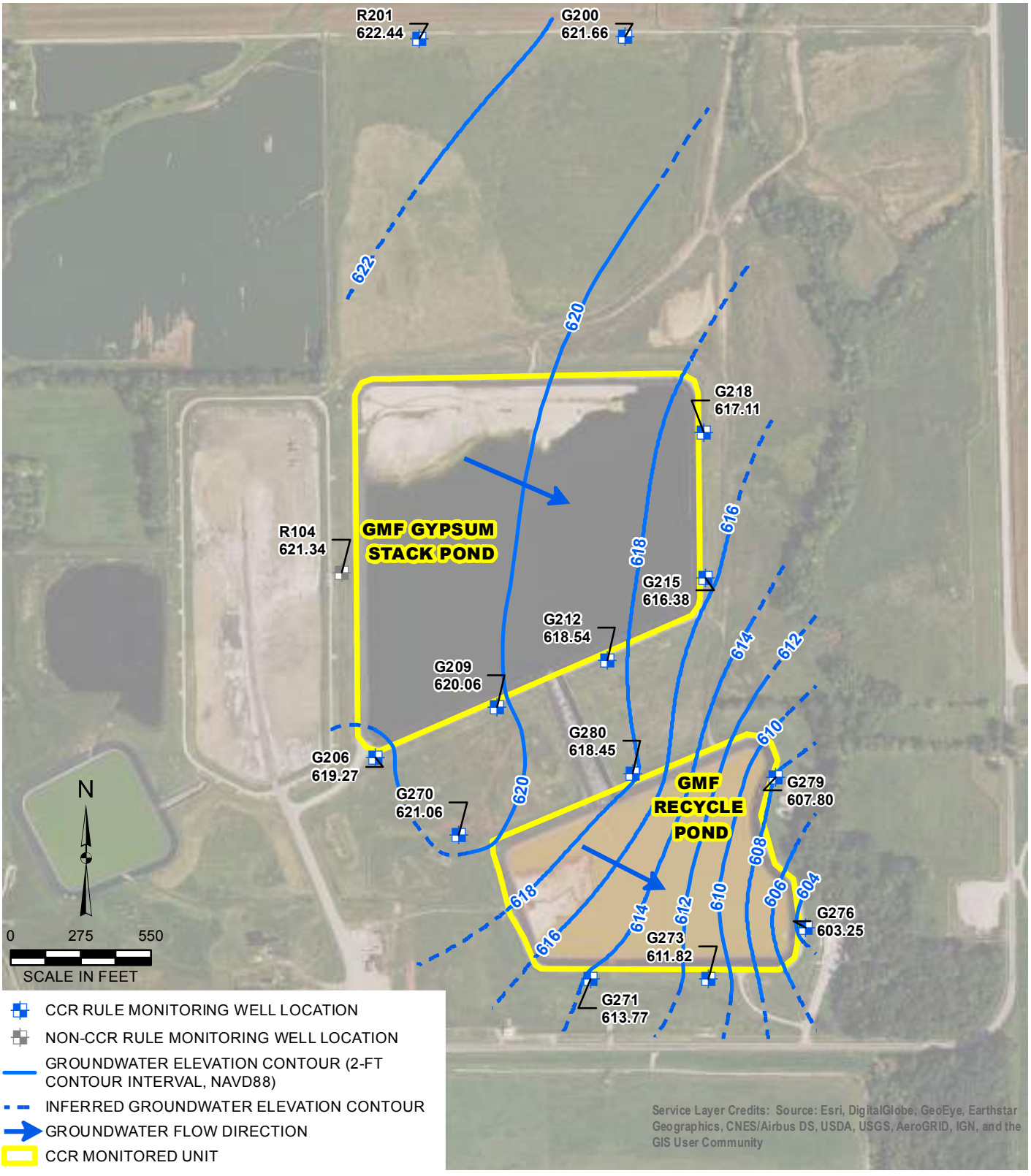
Protective Casing	SS304	SS316	PTFE	PVC	OTHER:
Riser Pipe Above W.T.	SS304	SS316	PTFE	(PVC)	OTHER:
Riser Pipe Below W.T.	SS304	SS316	PTFE	(PVC)	OTHER:
Screen	SS304	SS316	PTFE	(PVC)	OTHER:

CASING MEASUREMENTS

Diameter of Borehole	(inches)	8.0
ID of Riser Pipe	(inches)	2.0
Protective Casing Length	(feet)	5.0
Riser Pipe Length	(feet)	15.14
Bottom of Screen to End Cap	(feet)	0.35
Screen Length (1st slot to last slot)	(feet)	4.84
Total Length of Casing	(feet)	20.33
Screen Slot Size **	(inches)	0.010

**Hand-Slotted Well Screens Are Unacceptable

APPENDIX C3 – MAPS OF THE DIRECTION OF GROUNDWATER FLOW



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DRAWN BY/DATE:
SDS 1/23/17
REVIEWED BY/DATE:
TBN 1/25/17
APPROVED BY/DATE:
JJW 2/7/17

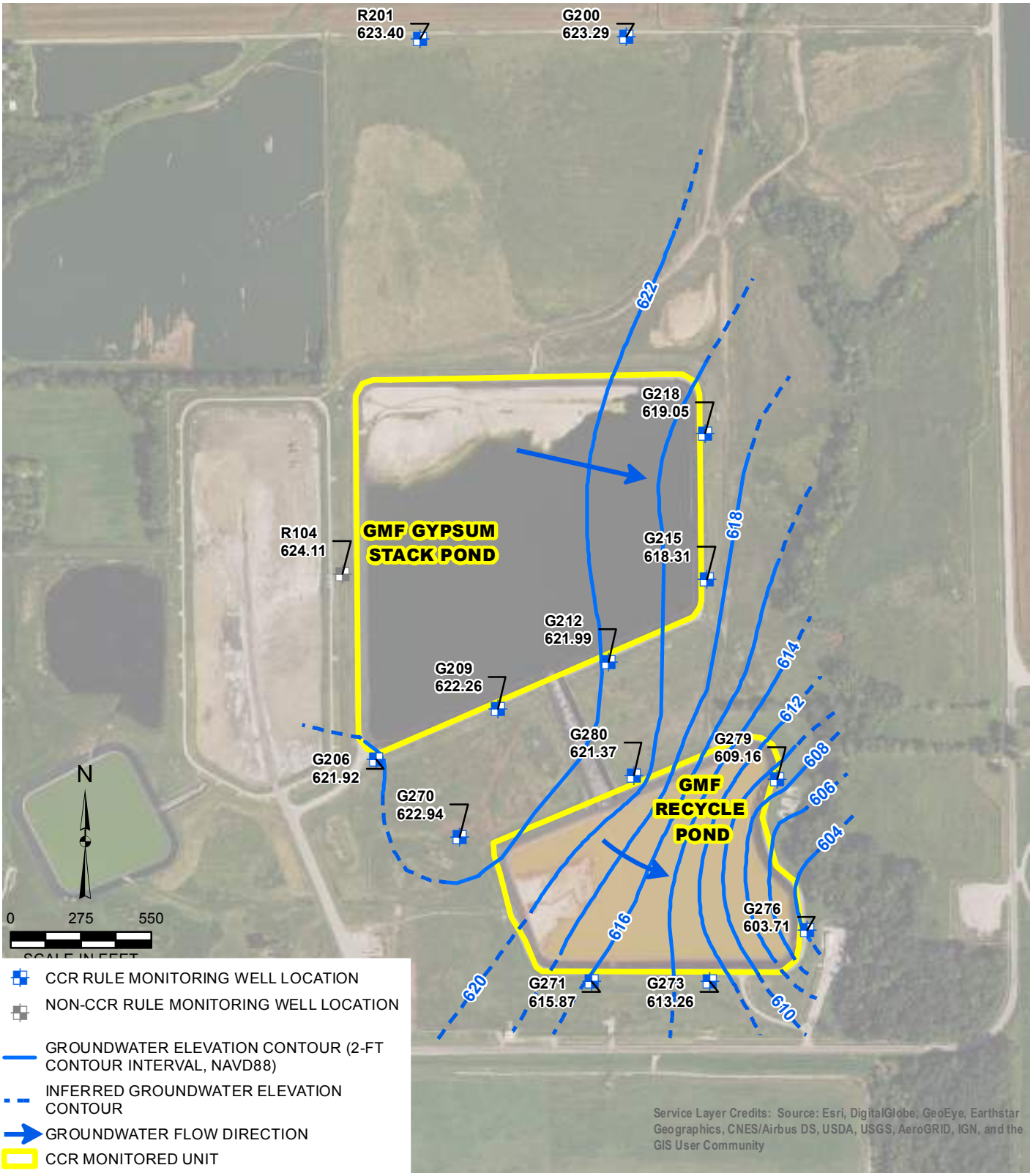
COFFEEN GMF GYPSUM STACK POND (UNIT ID: 103) AND COFFEEN GMF RECYCLE POND (UNIT ID: 104) UPPERMOST AQUIFER UNIT GROUNDWATER ELEVATION CONTOUR MAP ROUND 1: NOVEMBER 16, 2015

DYNEGY CCR RULE GROUNDWATER MONITORING
COFFEEN POWER STATION
COFFEEN, ILLINOIS

PROJECT NO: 2285

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY



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SDS 1/23/17
REVIEWED BY/DATE:
TBN 1/25/17
APPROVED BY/DATE:
JJW 2/8/17

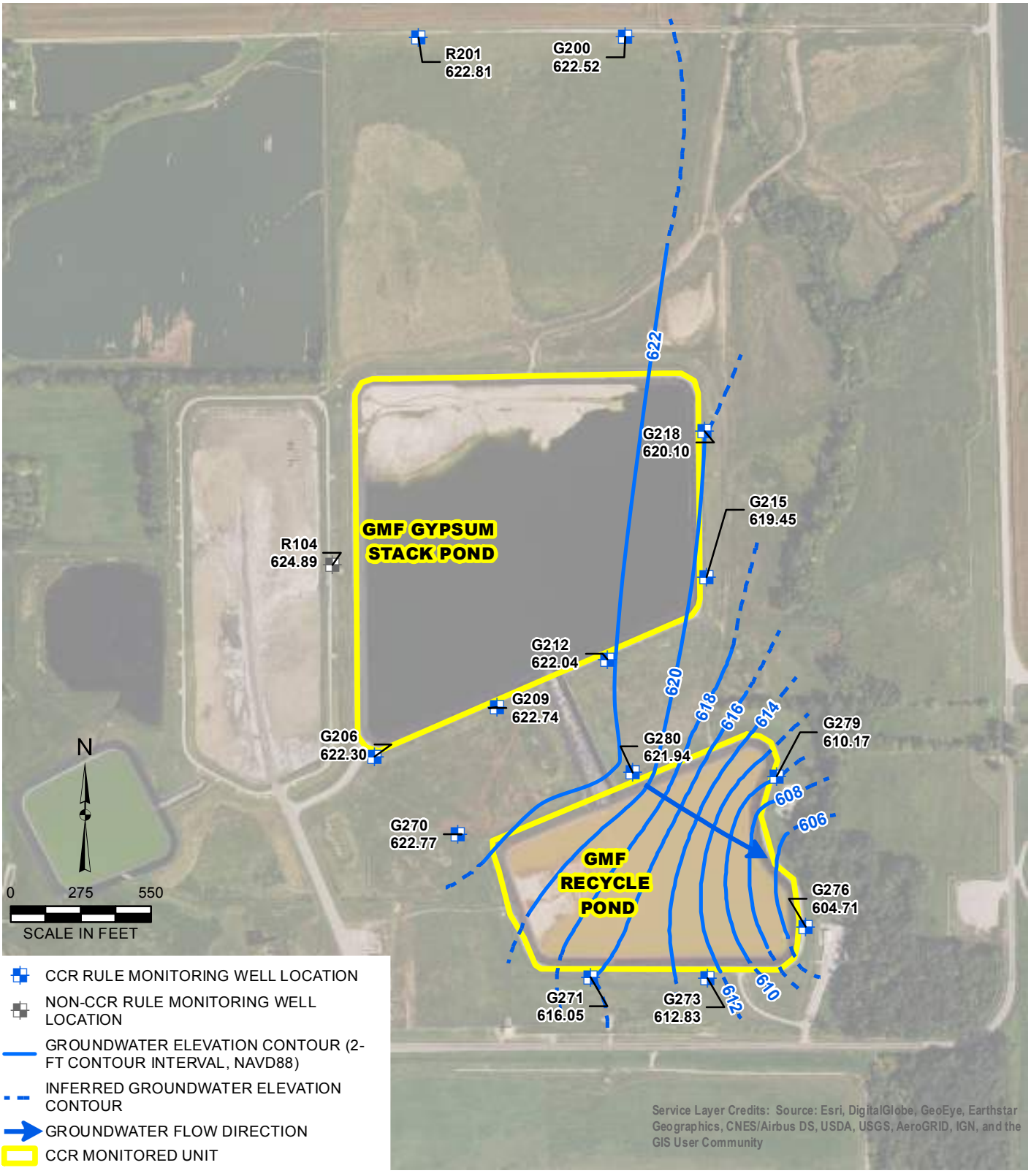
COFFEEN GMF GYPSUM STACK POND (UNIT ID: 103) AND COFFEEN GMF RECYCLE POND (UNIT ID: 104) UPPERMOST AQUIFER UNIT GROUNDWATER ELEVATION CONTOUR MAP ROUND 2: FEBRUARY 8, 2016

DYNEGY CCR RULE GROUNDWATER MONITORING
COFFEEN POWER STATION
COFFEEN, ILLINOIS

PROJECT NO: 2285

FIGURE NO: 1

NATURAL RESOURCE TECHNOLOGY



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REVIEWED BY/DATE:
TBN 1/25/17
APPROVED BY/DATE:
JJW 2/8/17

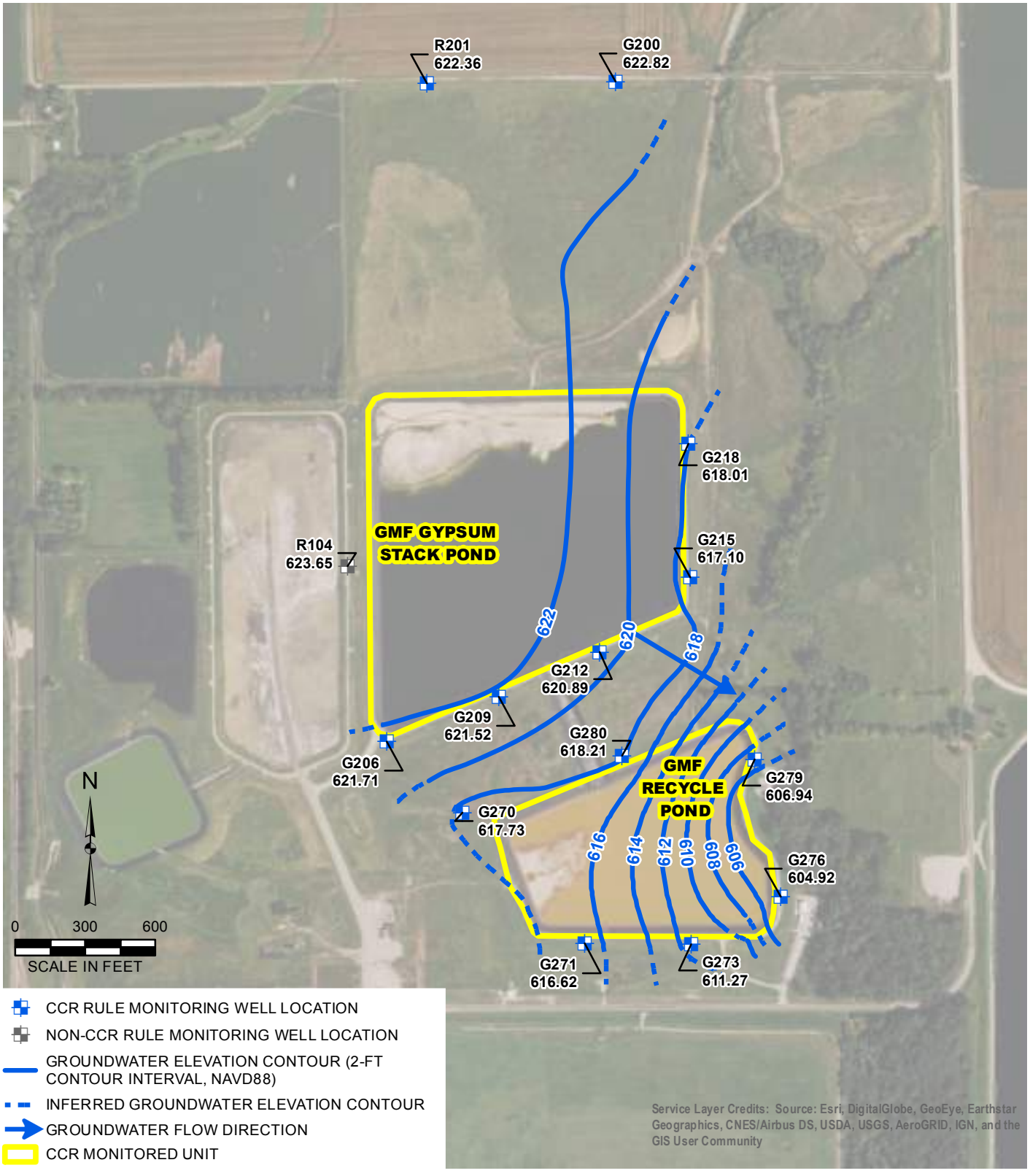
COFFEEN GMF GYPSUM STACK POND (UNIT ID: 103) AND COFFEEN GMF RECYCLE POND (UNIT ID: 104) UPPERMOST AQUIFER UNIT GROUNDWATER ELEVATION CONTOUR MAP ROUND 3: MAY 9, 2016

DYNEGY CCR RULE GROUNDWATER MONITORING
COFFEEN POWER STATION
COFFEEN, ILLINOIS

PROJECT NO: 2285

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY



DRAWN BY/DATE:
SDS 1/23/17
REVIEWED BY/DATE:
TBN 1/25/17
APPROVED BY/DATE:
JJW 2/8/17

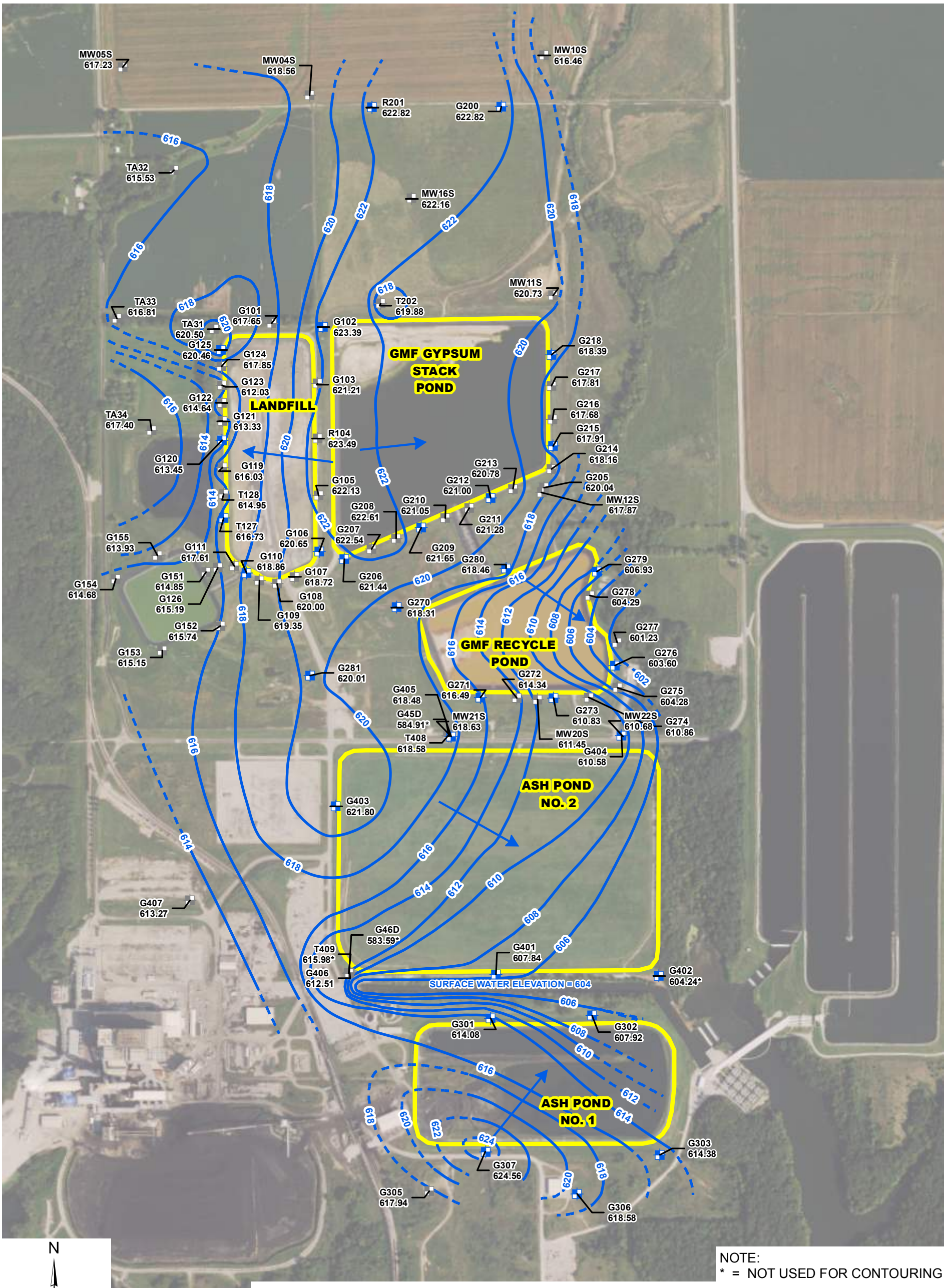
COFFEEN GMF GYPSUM STACK POND (UNIT ID: 103) AND COFFEEN GMF RECYCLE POND (UNIT ID: 104) UPPERMOST AQUIFER UNIT GROUNDWATER ELEVATION CONTOUR MAP ROUND 4: JULY 25, 2016

DYNEGY CCR RULE GROUNDWATER MONITORING
COFFEEN POWER STATION
COFFEEN, ILLINOIS

PROJECT NO: 2285

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY



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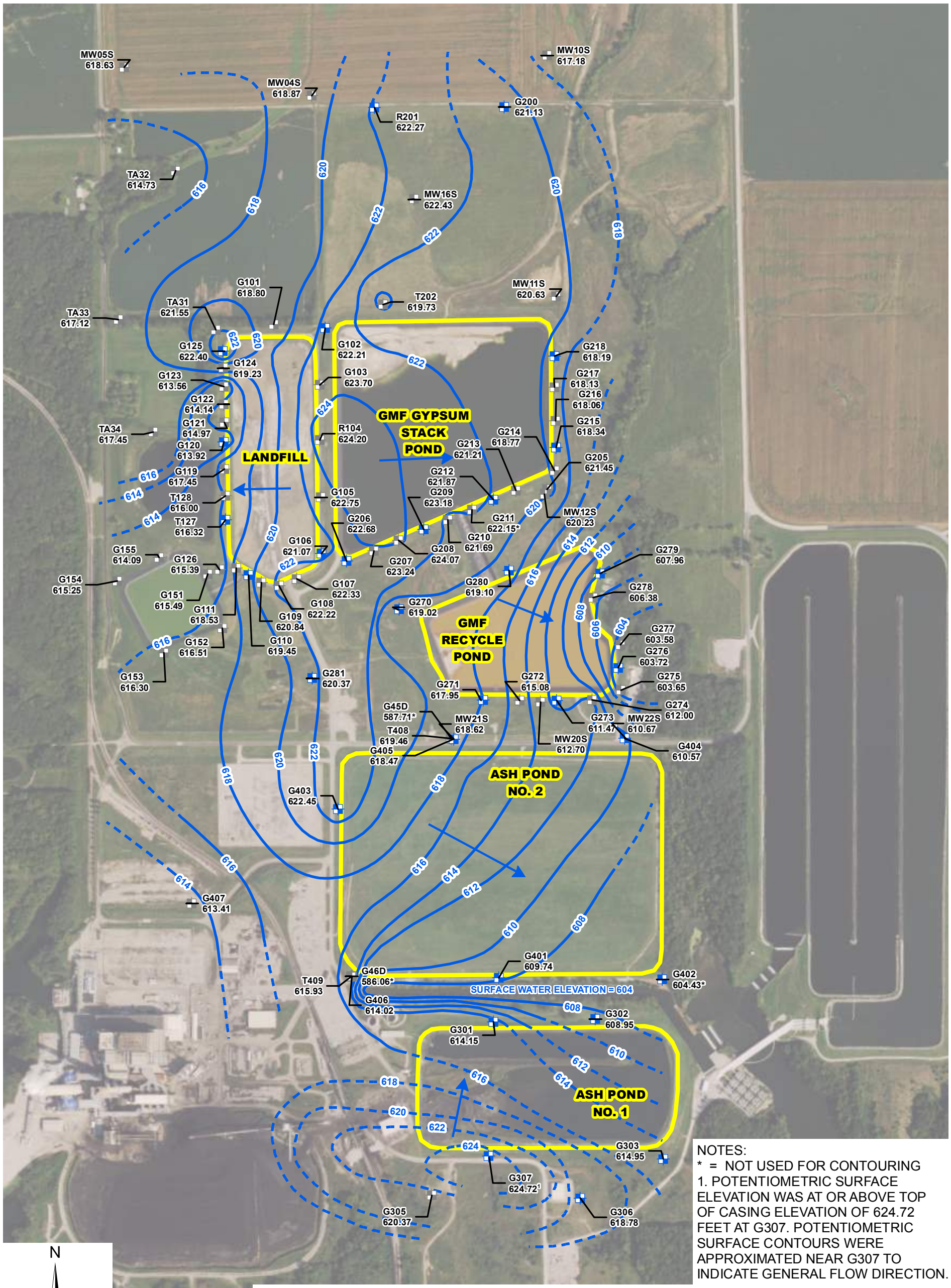
DRAWN BY/DATE: SDS 3/3/17 REVIEWED BY/DATE: TBN 3/3/17 APPROVED BY/DATE: JJW 8/30/17	**COFFEEN ASH POND NO. 1 (UNIT ID: 101), COFFEEN ASH POND NO. 2 (UNIT ID: 102), COFFEEN GMF GYPSUM STACK POND (UNIT ID: 103), COFFEEN GMF RECYCLE POND (UNIT ID: 104) AND COFFEEN LANDFILL (UNIT ID: 105) UPPERMOST AQUIFER UNIT GROUNDWATER ELEVATION CONTOUR MAP** **ROUND 5: NOVEMBER 12, 2016** DYNEGY CCR RULE GROUNDWATER MONITORING COFFEEN POWER STATION COFFEEN, ILLINOIS	PROJECT NO: 2285 FIGURE NO: 1 Natural Resource Technology AN OBG COMPANY



NOTES:
* = NOT USED FOR CONTOURING
1. POTENTIOMETRIC SURFACE ELEVATION WAS AT OR ABOVE TOP OF CASING ELEVATION OF 624.72 FEET AT G307. POTENTIOMETRIC SURFACE CONTOURS WERE APPROXIMATED NEAR G307 TO INDICATE GENERAL FLOW DIRECTION.

N

0 300 600

SCALE IN FEET

- CCR RULE MONITORING WELL LOCATION
- NON-CCR RULE MONITORING WELL LOCATION
- CCR MONITORED UNIT
- POTENTIOMETRIC SURFACE CONTOUR
- INFERRED POTENTIOMETRIC SURFACE CONTOUR
- GROUNDWATER FLOW DIRECTION

DRAWN BY/DATE:
SDS 4/14/17
REVIEWED BY/DATE:
TBN 4/14/17
APPROVED BY/DATE:
JJW 8/30/17

COFFEEN ASH POND NO. 1 (UNIT ID: 101), COFFEEN ASH POND NO. 2 (UNIT ID: 102), COFFEEN GMF GYPSUM STACK POND (UNIT ID: 103), COFFEEN GMF RECYCLE POND (UNIT ID: 104) AND COFFEEN LANDFILL (UNIT ID: 105) UPPERMOST AQUIFER UNIT GROUNDWATER ELEVATION CONTOUR MAP
ROUND 6: FEBRUARY 4, 2017
DYNEGY CCR RULE GROUNDWATER MONITORING
COFFEEN POWER STATION
COFFEEN, ILLINOIS

PROJECT NO: 2285

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY

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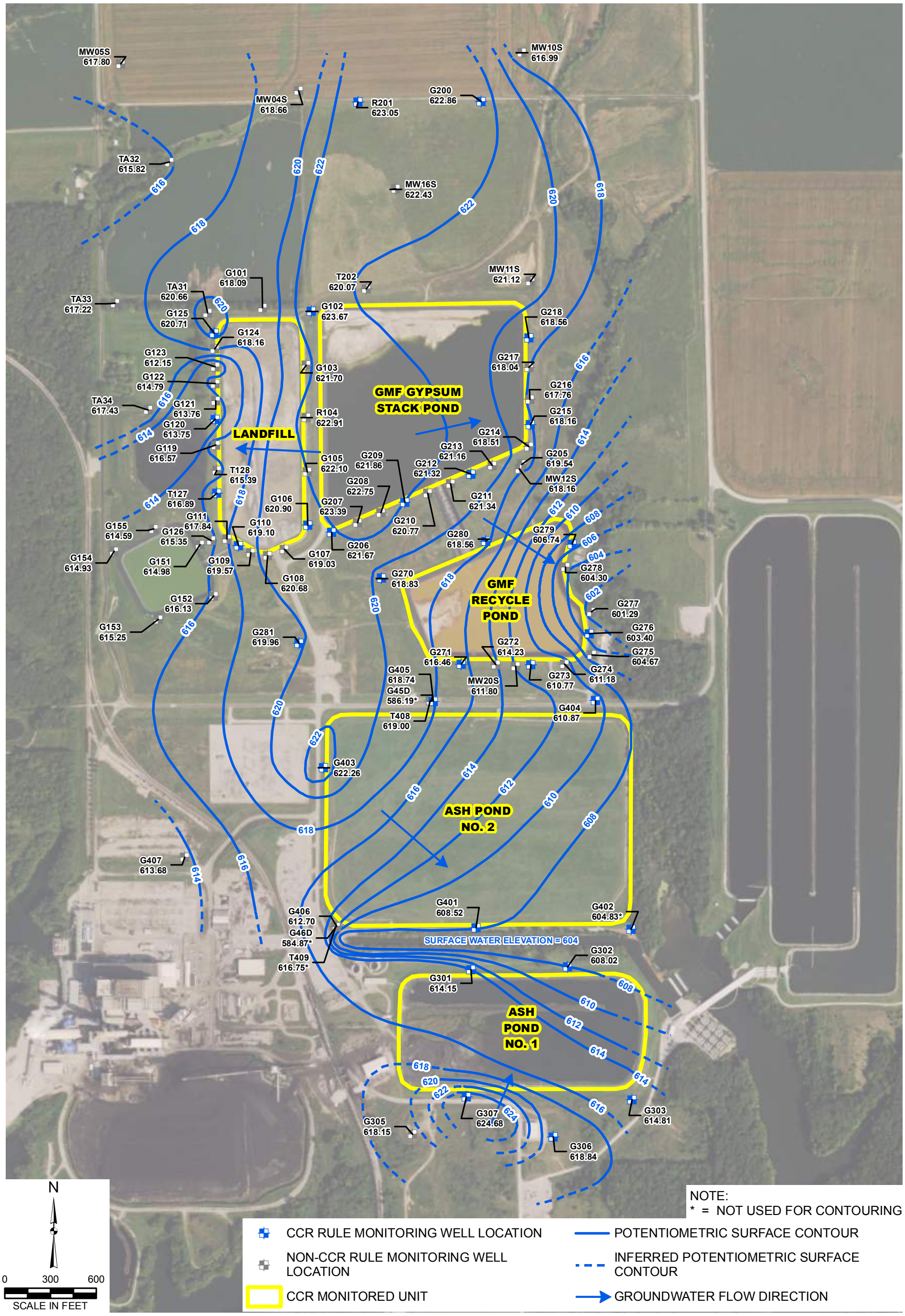


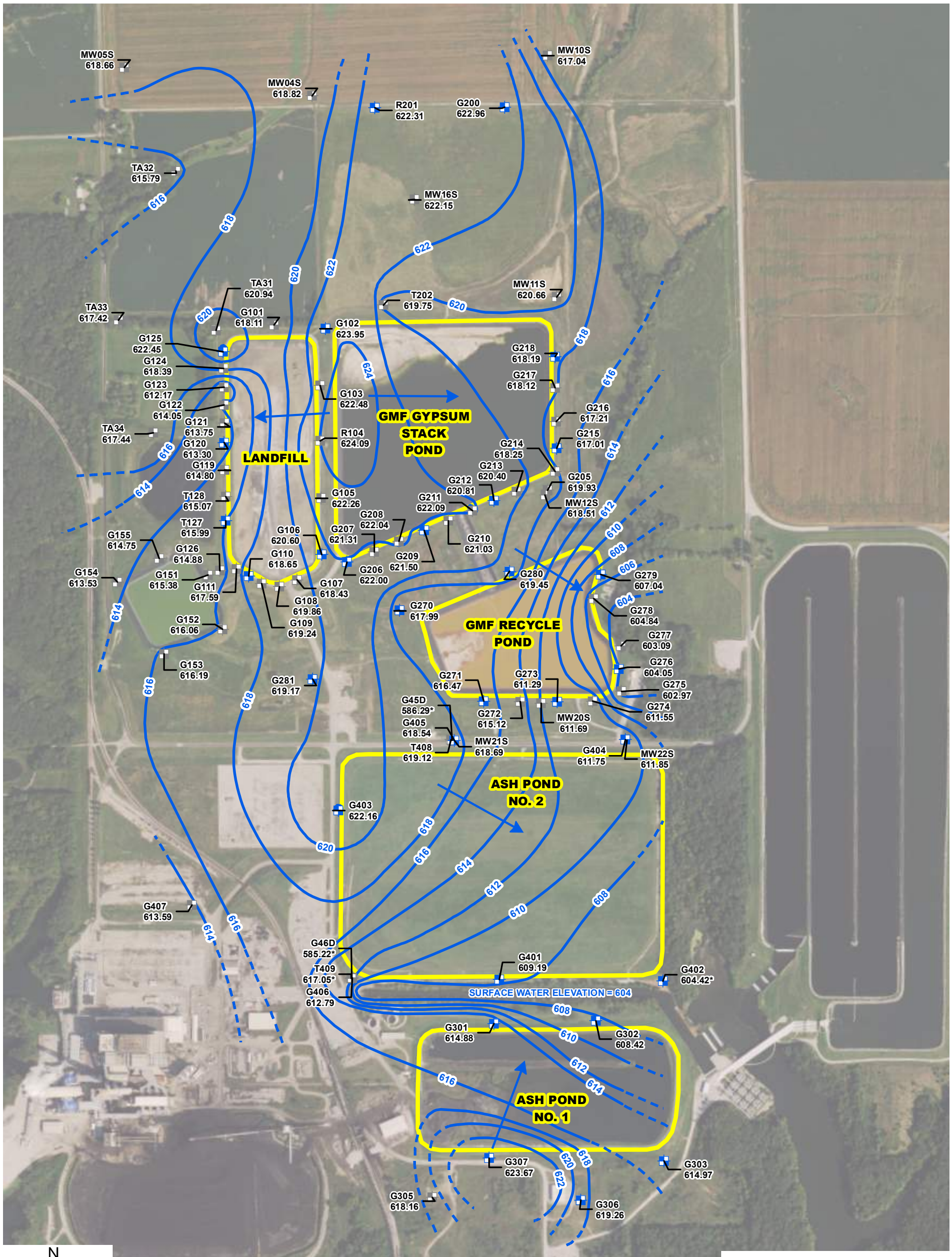
DRAWN BY/DATE:
SDS 7/12/17
REVIEWED BY/DATE:
TBN 7/12/17
APPROVED BY/DATE:
JJW 8/30/17

COFFEEN ASH POND NO. 1 (UNIT ID: 101), COFFEEN ASH POND NO. 2 (UNIT ID: 102), COFFEEN GMF GYPSUM STACK POND (UNIT ID: 103), COFFEEN GMF RECYCLE POND (UNIT ID: 104) AND COFFEEN LANDFILL (UNIT ID: 105) UPPERMOST AQUIFER UNIT GROUNDWATER ELEVATION CONTOUR MAP
ROUND 7: MAY 13, 2017
DYNEGY CCR RULE GROUNDWATER MONITORING
COFFEEN POWER STATION
COFFEEN, ILLINOIS

PROJECT NO: 2285

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY



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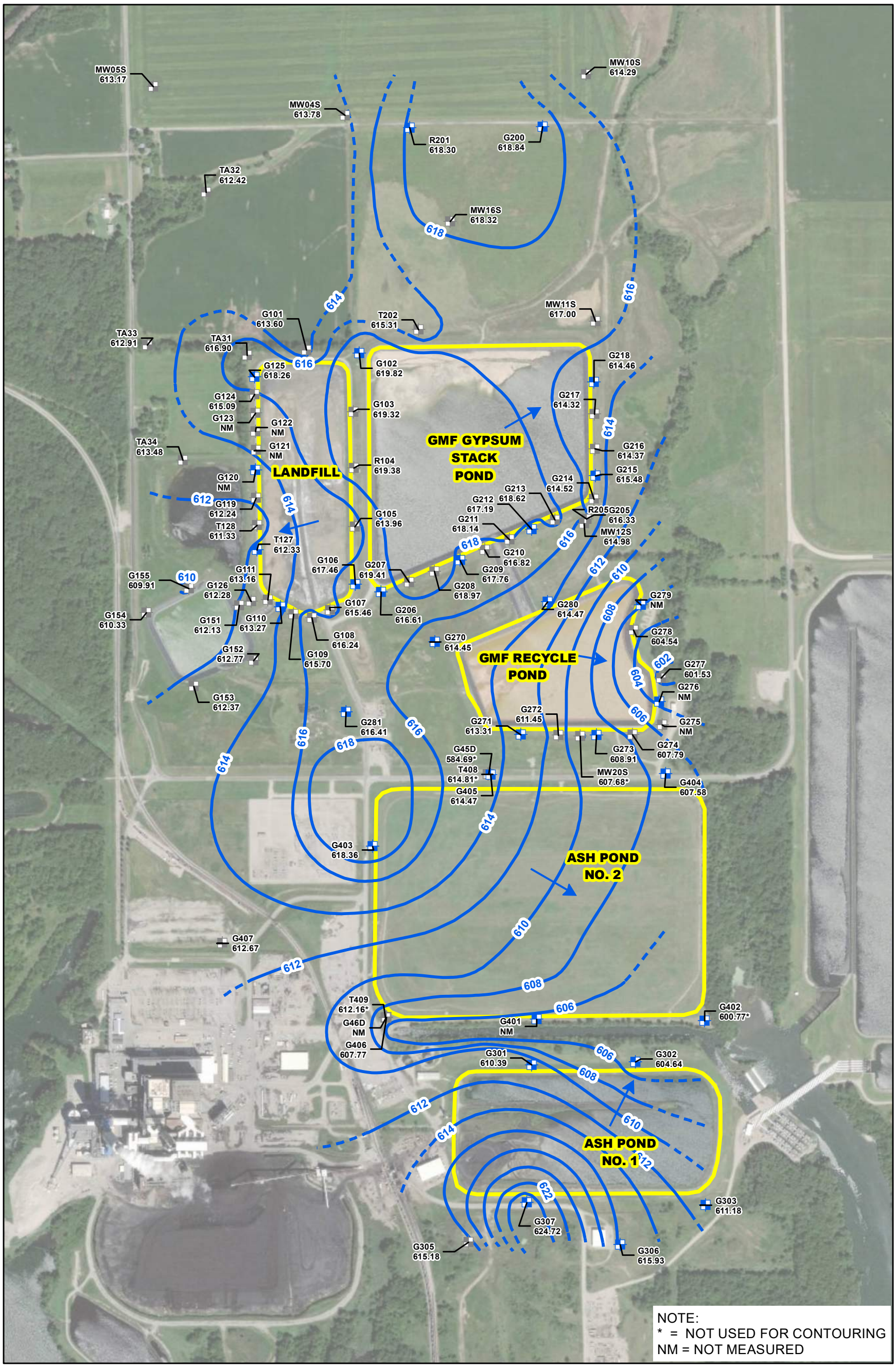
REVIEWED BY/DATE:
TBN 8/10/17
APPROVED BY/DATE:
JJW 8/30/17

COFFEEN ASH POND NO. 1 (UNIT ID: 101), COFFEEN ASH POND NO. 2 (UNIT ID: 102), COFFEEN GMF GYPSUM STACK POND (UNIT ID: 103), COFFEEN GMF RECYCLE POND (UNIT ID: 104) AND COFFEEN LANDFILL (UNIT ID: 105) UPPERMOST AQUIFER UNIT GROUNDWATER ELEVATION CONTOUR MAP
ROUND 8: JULY 8, 2017
DYNEGY CCR RULE GROUNDWATER MONITORING
COFFEEN POWER STATION
COFFEEN, ILLINOIS

PROJECT NO: 2285

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY



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LEGEND

- CCR RULE MONITORING WELL LOCATION
- NON-CCR RULE MONITORING WELL LOCATION
- GROUNDWATER ELEVATION CONTOUR (2-FT CONTOUR INTERVAL, NAVD88)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- CCR MONITORED UNIT

COFFEEN ASH POND NO. 1 (UNIT ID: 101), COFFEEN ASH POND NO. 2 (UNIT ID: 102), COFFEEN GMF GYPSUM STACK POND (UNIT ID: 103), COFFEEN GMF RECYCLE POND (UNIT ID: 104) AND COFFEEN LANDFILL (UNIT ID: 105)
GROUNDWATER ELEVATION CONTOUR MAP
OCTOBER 21, 2017

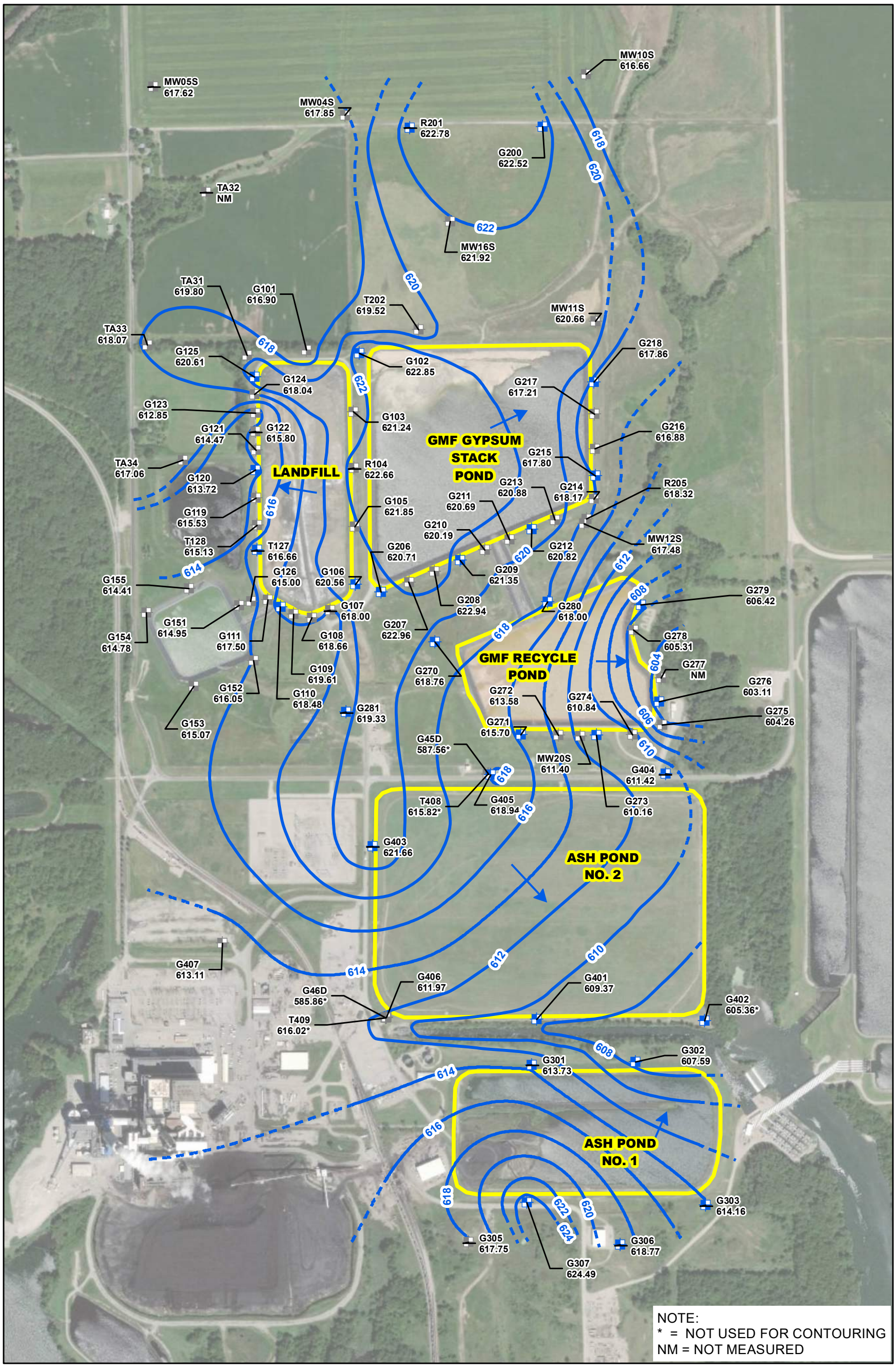
CCR RULE GROUNDWATER MONITORING
COFFEEN POWER STATION
COFFEEN, ILLINOIS

0 150 300 600
Feet

N

FILE_NO. 70099
DATE 8/1/2018

O'BRIEN & GERE ENGINEERS, INC.



NOTE:
* = NOT USED FOR CONTOURING
NM = NOT MEASURED

LEGEND

- CCR RULE MONITORING WELL LOCATION
- NON-CCR RULE MONITORING WELL LOCATION
- GROUNDWATER ELEVATION CONTOUR (2-FT CONTOUR INTERVAL, NAVD88)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- CCR MONITORED UNIT

COFFEEN ASH POND NO. 1 (UNIT ID: 101), COFFEEN ASH POND NO. 2 (UNIT ID: 102), COFFEEN GMF GYPSUM STACK POND (UNIT ID: 103), COFFEEN GMF RECYCLE POND (UNIT ID: 104) AND COFFEEN LANDFILL (UNIT ID: 105)
GROUNDWATER ELEVATION CONTOUR MAP
MAY 8, 2018

CCR RULE GROUNDWATER MONITORING
COFFEEN POWER STATION
COFFEEN, ILLINOIS

0 150 300 600
Feet

N

FILE_NO. 70099
DATE 8/1/2018

O'BRIEN & GERE ENGINEERS, INC.

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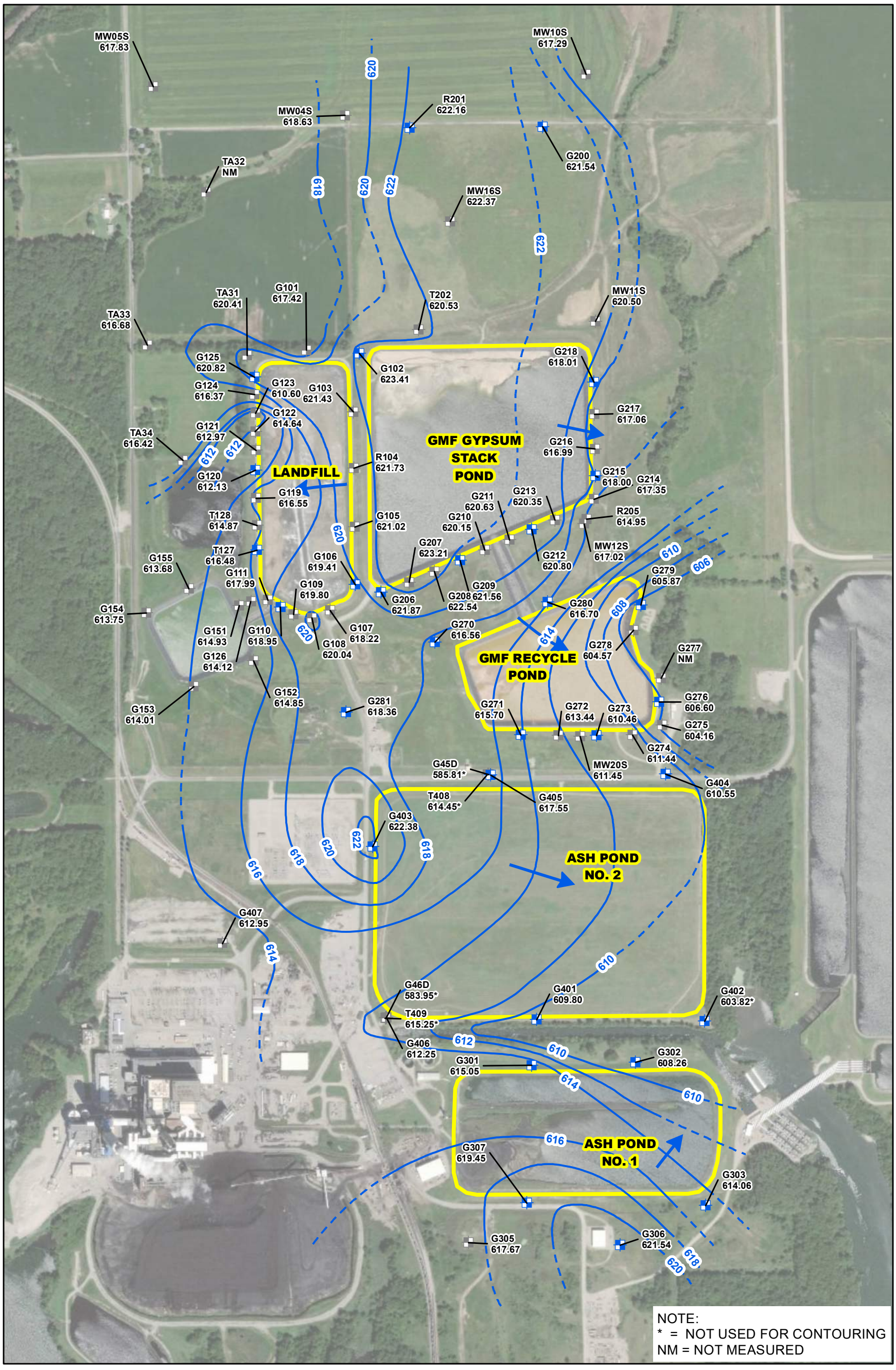

CCR RULE MONITORING WELL LOCATION

NON-CCR RULE MONITORING WELL LOCATION

GROUNDWATER ELEVATION CONTOUR (2-FT CONTOUR INTERVAL, NAVD88)

INFERRED GROUNDWATER ELEVATION CONTOUR

GROUNDWATER FLOW DIRECTION

CCR MONITORED UNIT

COFFEEN ASH POND NO. 1 (UNIT ID: 101), COFFEEN ASH POND NO. 2 (UNIT ID: 102), COFFEEN GMF GYPSUM STACK POND (UNIT ID: 103), COFFEEN GMF RECYCLE POND (UNIT ID: 104) AND COFFEEN LANDFILL (UNIT ID: 105)
GROUNDWATER ELEVATION CONTOUR MAP
AUGUST 2, 2018

CCR RULE GROUNDWATER MONITORING
COFFEEN POWER STATION
COFFEEN, ILLINOIS

0 150 300 600
Feet

N

O'BRIEN & GERE ENGINEERS, INC.

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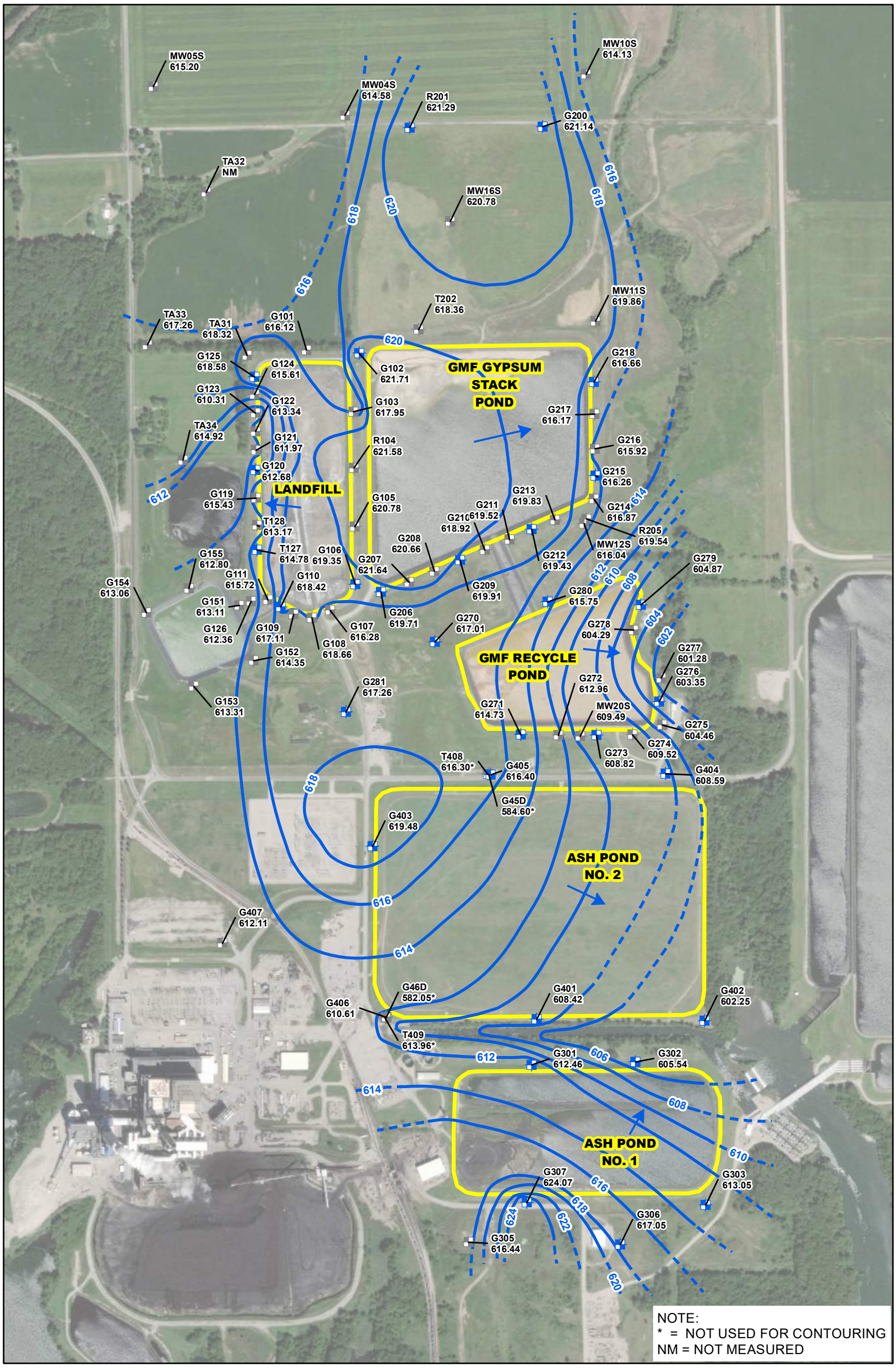

LEGEND

- CCR RULE MONITORING WELL LOCATION
- NON-CCR RULE MONITORING WELL LOCATION
- GROUNDWATER ELEVATION CONTOUR (2-FT CONTOUR INTERVAL, NAVD88)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- CCR MONITORED UNIT

COFFEEN ASH POND NO. 1 (UNIT ID: 101), COFFEEN ASH POND NO. 2 (UNIT ID: 102), COFFEEN GMF GYPSUM STACK POND (UNIT ID: 103), COFFEEN GMF RECYCLE POND (UNIT ID: 104) AND COFFEEN LANDFILL (UNIT ID: 105)
GROUNDWATER ELEVATION CONTOUR MAP
OCTOBER 23, 2018

CCR RULE GROUNDWATER MONITORING
COFFEEN POWER STATION
COFFEEN, ILLINOIS

0 150 300 600
Feet

N

O'BRIEN & GERE ENGINEERS, INC.

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MW05S 615.78
MW04S 614.79
R201 622.17
MW10S 614.62
G200 621.98
TA32 --
MW16S 621.50
MW11S 620.19
T202 618.69
TA31 619.21
G101 617.08
TA33 617.66
G125 619.01
G102 622.00
G218 617.21
G124 616.37
G123 612.58
G103 620.82
G217 617.10
G122 612.94
G121 611.93
R104 622.43
G216 616.96
TA34 615.85
LANDFILL
GMF GYPSUM STACK POND
G215 618.03
G120 612.87
G119 616.00
G211 620.22
G213 620.81
G214 618.57
T128 613.94
G210 620.82
R205 619.54
G105 621.22
MW12S 616.79
T127 615.13
G106 621.63
G207 620.30
G212 621.13
G155 613.56
G111 617.03
G209 621.80
G279 606.79
G126 612.83
G110 619.96
G208 622.28
G280 616.24
G154 613.66
G151 613.93
G206 618.82
G278 605.40
G109 618.20
G107 618.23
G108 620.52
G270 618.46
GMF RECYCLE POND
G277 603.38
G153 614.36
G152 614.59
G281 618.19
G271 617.40
MW20S 610.15
G276 604.00
G275 605.91
G274 611.23
T408 617.01*
G45D 586.96*
G272 615.43
G273 610.28
G405 616.81
G404 608.98
G403 620.51
ASH POND NO. 2
G407 612.31
G406 611.86
G401 608.36
G402 602.37
G46D 583.17*
T409 614.78*
G301 613.23
G302 607.29
ASH POND NO. 1
G303 614.33
G305 616.83
G307 624.43
G306 618.37

NOTE:
* = NOT USED FOR CONTOURING
NM = NOT MEASURED

- CCR RULE MONITORING WELL LOCATION
- NON-CCR RULE MONITORING WELL LOCATION
- GROUNDWATER ELEVATION CONTOUR (2-FT CONTOUR INTERVAL, NAVD88)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- CCR MONITORED UNIT

COFFEEN ASH POND NO. 1 (UNIT ID: 101), COFFEEN ASH POND NO. 2 (UNIT ID: 102), COFFEEN GMF GYPSUM STACK POND (UNIT ID: 103), COFFEEN GMF RECYCLE POND (UNIT ID: 104) AND COFFEEN LANDFILL (UNIT ID: 105)
GROUNDWATER ELEVATION CONTOUR MAP
JANUARY 15, 2019

CCR RULE GROUNDWATER MONITORING
COFFEEN POWER STATION
COFFEEN, ILLINOIS

0 150 300 600
Feet

N

O'BRIEN & GERE ENGINEERS, INC.

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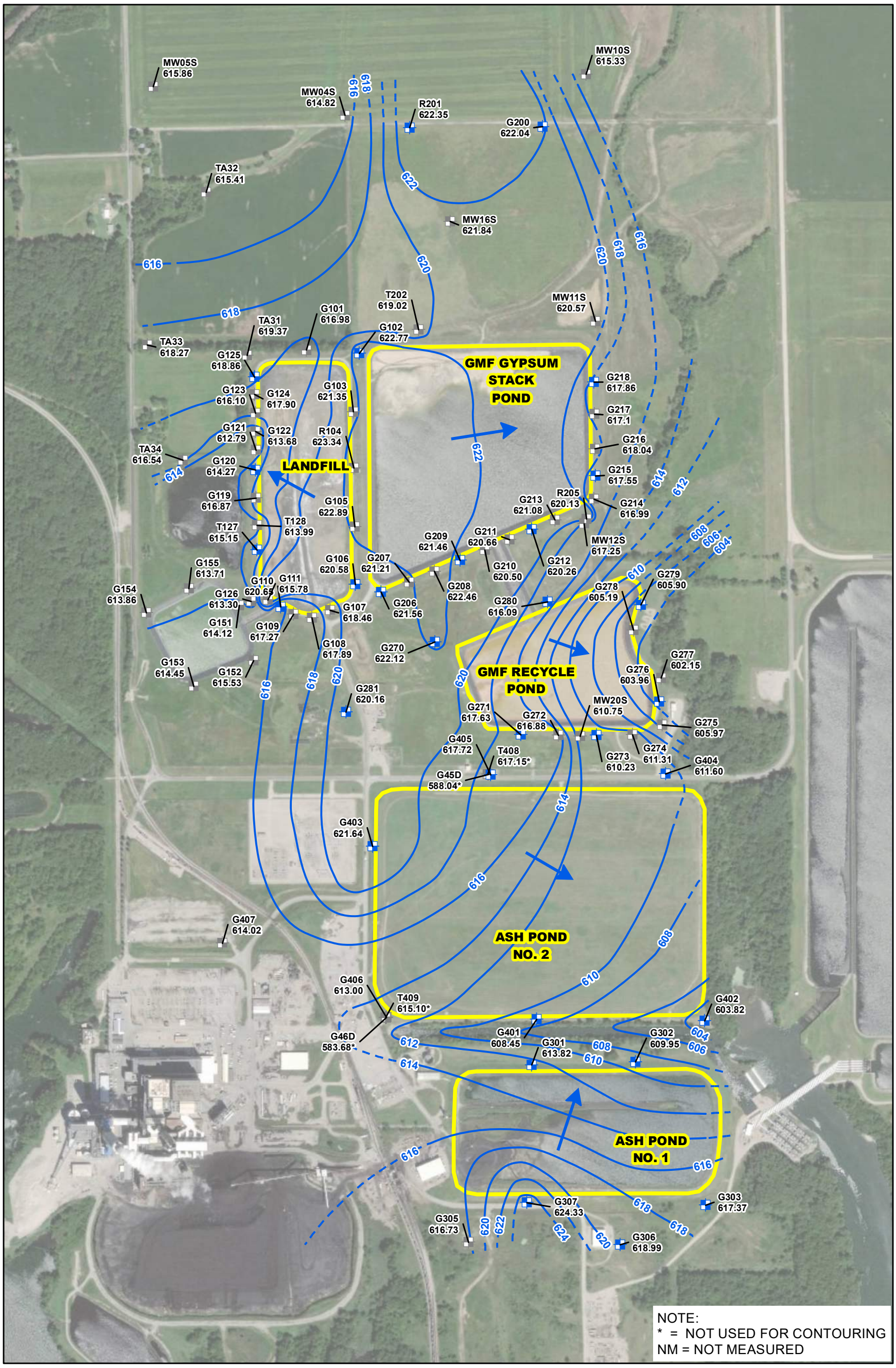

CCR RULE MONITORING WELL LOCATION

NON-CCR RULE MONITORING WELL LOCATION

GROUNDWATER ELEVATION CONTOUR (2-FT CONTOUR INTERVAL, NAVD88)

INFERRED GROUNDWATER ELEVATION CONTOUR

GROUNDWATER FLOW DIRECTION

CCR MONITORED UNIT

COFFEEN ASH POND NO. 1 (UNIT ID: 101), COFFEEN ASH POND NO. 2 (UNIT ID: 102), COFFEEN GMF GYPSUM STACK POND (UNIT ID: 103), COFFEEN GMF RECYCLE POND (UNIT ID: 104) AND COFFEEN LANDFILL (UNIT ID: 105)
GROUNDWATER ELEVATION CONTOUR MAP
AUGUST 5, 2019

CCR RULE GROUNDWATER MONITORING
COFFEEN POWER STATION
COFFEEN, ILLINOIS

0 150 300 600
Feet

N

O'BRIEN & GERE ENGINEERS, INC.

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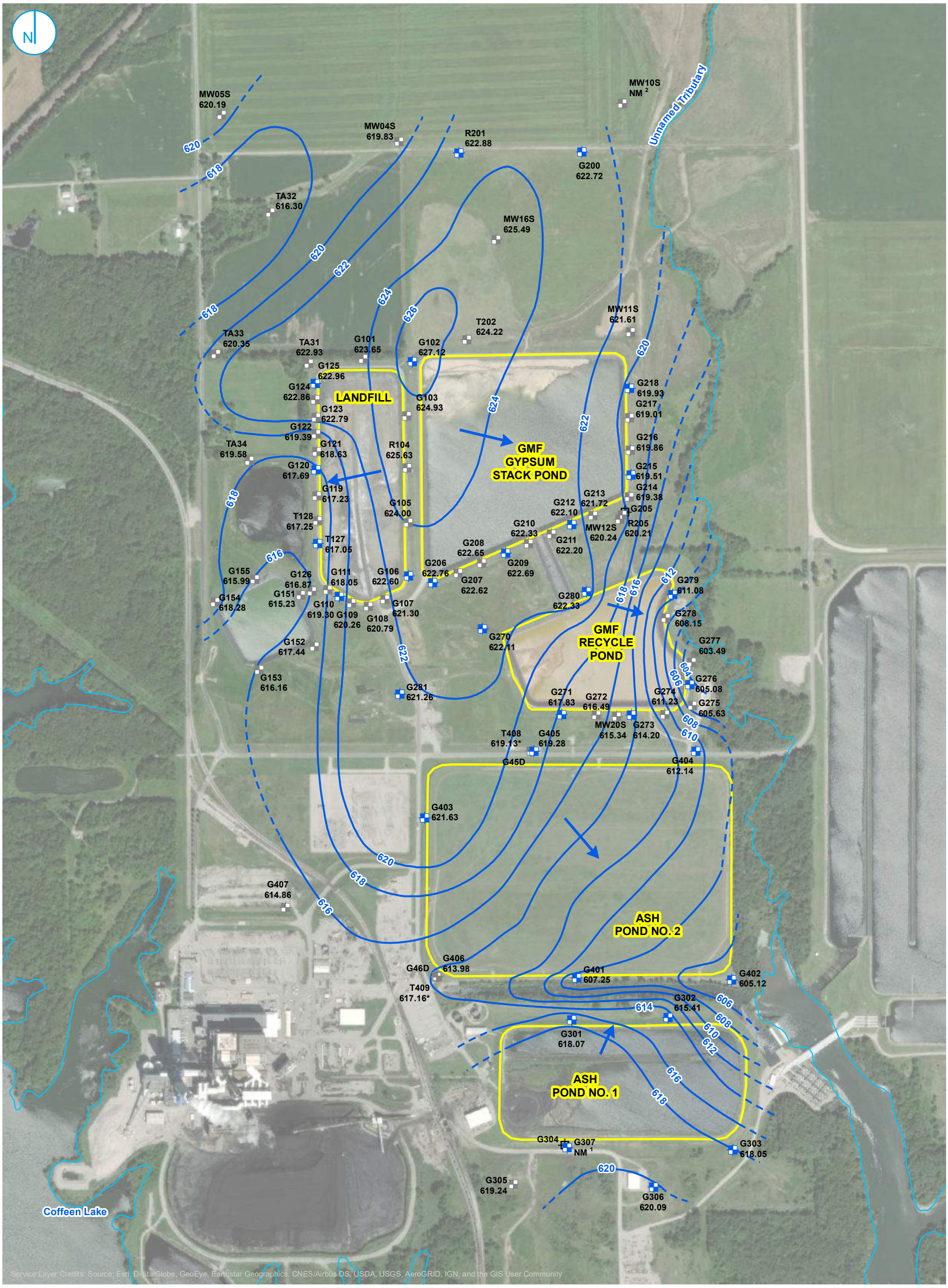

- CCR RULE MONITORING WELL LOCATION
- NON-CCR RULE MONITORING WELL LOCATION
- ABANDONED MONITORING WELL
- GROUNDWATER ELEVATION CONTOUR (2-FT CONTOUR INTERVAL, NAVD88)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- CCR UNIT BOUNDARY
- SURFACE WATER FEATURE

NOTE:
* = NOT USED FOR CONTOURING
NM = NOT MEASURED
[1] G307 WAS FROZEN DURING THE JANUARY 20, 2020 SAMPLING EVENT AND WATER LEVEL COULD NOT BE COLLECTED.
[2] MW10S WAS DAMAGED PRIOR TO THE JANUARY 20, 2020 SAMPLING EVENT AND WATER LEVEL COULD NOT BE COLLECTED.

0 300 600 Feet

GROUNDWATER ELEVATION CONTOUR MAP JANUARY 20, 2020

CCR RULE GROUNDWATER MONITORING
COFFEEN POWER STATION
COFFEEN, ILLINOIS

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

APPENDIX C4 – TABLES SUMMARIZING CONSTITUENT CONCENTRATIONS AT EACH MONITORING WELL

Analytical Results - Appendix III
Coffeen GMF Gypsum Stack Pond

Sample Location	Date Sampled	Boron, total (mg/L)	Calcium, total (mg/L)	Chloride, total (mg/L)	Fluoride, total (mg/L)	pH (s.u.)	Sulfate, total (mg/L)	Total Dissolved Solids (mg/L)
Background Wells								
G200	11/23/2015	0.39	100	75	0.337	7.2	94	520
G200	2/12/2016	0.014	150	93	0.415	7.2	97	540
G200	5/10/2016	<0.01	100	96	0.389	7.1	100	480
G200	7/30/2016	<0.01	88	82	0.384	7.1	100	520
G200	11/18/2016	0.010	88	75	0.431	7.2	110	520
G200	2/10/2017	<0.01	85	82	0.305	7.1	100	700
G200	5/18/2017	0.010	84	96	0.300	7.0	90	620
G200	7/13/2017	<0.01	87	88	0.299	7.1	110	540
G200	10/28/2017	0.34	81	65	0.328	7.2	100	520
G200	1/25/2018	NA	NA	71	0.303	7.2	NA	NA
G200	5/11/2018	<0.01	90	85	<0.25	7.0	100	460
G200	11/2/2018	0.011	95	61	0.391	7.0	100	480
G200	1/16/2019	0.048	350	54	0.386	7.1	110	700
G200	8/12/2019	<0.01	92	58	0.405	7.0	110	540
G200	1/21/2020	<0.01	110	100	0.302	7.2	120	520
R201	11/23/2015	<0.01	85	37	0.377	7.3	150	560
R201	2/12/2016	0.014	120	75	0.398	7.0	240	740
R201	5/10/2016	<0.01	120	85	0.447	7.0	260	840
R201	7/30/2016	<0.01	120	85	0.368	7.1	260	750
R201	11/18/2016	<0.01	81	39	0.494	7.2	160	580
R201	2/11/2017	<0.01	100	79	0.285	7.1	230	900
R201	5/18/2017	0.011	120	74	0.354	7.2	300	820
R201	7/13/2017	0.010	120	81	0.284	7.0	250	780
R201	10/28/2017	0.017	93	30	0.380	7.1	89	660
R201	1/25/2018	NA	NA	31	0.338	7.0	NA	NA
R201	5/11/2018	<0.01	87	54	0.306	7.1	190	640
R201	11/2/2018	<0.01	82	24	0.419	7.1	110	470
R201	1/16/2019	<0.01	100	48	0.341	7.1	150	790
R201	8/12/2019	<0.01	120	71	0.466	7.1	220	760
R201	1/21/2020	0.010	130	66	0.309	7.2	210	770
Downgradient Wells								
G206	11/18/2015	<0.01	79	32	0.433	7.1	95	460
G206	2/24/2016	0.033	78	26	0.507	6.7	150	500
G206	6/27/2016	<0.01	94	25	0.469	6.2	130	420
G206	8/6/2016	<0.01	90	27	0.449	7.1	130	420
G206	11/22/2016	0.11	63	30	0.463	7.1	130	480
G206	2/11/2017	<0.01	70	29	0.547	7.2	150	680
G206	5/18/2017	<0.01	66	29	<0.25	7.0	120	460
G206	7/15/2017	<0.01	61	31	0.453	7.1	100	480
G206	10/30/2017	<0.01	90	30	0.472	7.2	120	460
G206	5/15/2018	0.032	73	26	0.480	7.0	130	450
G206	11/2/2018	<0.01	85	25	0.360	7.0	120	440
G206	1/17/2019	<0.01	81	27	0.458	7.1	110	480
G206	8/14/2019	0.013	120	22	0.506	7.1	120	470
G206	1/21/2020	<0.01	84	24	0.389	7.5	120	470
G206	5/5/2020	NA	NA	NA	NA	7.5	NA	NA

Analytical Results - Appendix III
Coffeen GMF Gypsum Stack Pond

Sample Location	Date Sampled	Boron, total (mg/L)	Calcium, total (mg/L)	Chloride, total (mg/L)	Fluoride, total (mg/L)	pH (s.u.)	Sulfate, total (mg/L)	Total Dissolved Solids (mg/L)
G209	11/18/2015	<0.01	160	67	0.398	7.0	280	810
G209	2/23/2016	<0.01	150	70	0.475	7.0	280	760
G209	5/11/2016	<0.01	160	59	0.461	7.1	280	800
G209	8/6/2016	0.014	160	67	0.468	7.2	270	760
G209	11/22/2016	0.015	100	70	0.420	7.1	270	750
G209	2/11/2017	<0.01	120	60	0.358	7.0	260	960
G209	5/18/2017	<0.01	130	63	0.263	7.2	240	820
G209	7/15/2017	0.012	120	72	0.437	7.3	120	780
G209	10/31/2017	0.012	150	63	0.519	7.1	95	730
G209	1/25/2018	NA	120	NA	0.456	7.0	NA	NA
G209	5/15/2018	0.019	140	65	0.428	7.2	250	760
G209	11/2/2018	0.013	160	59	0.410	7.2	240	740
G209	1/17/2019	0.011	150	68	0.426	7.1	250	860
G209	5/3/2019	NA	150	NA	NA	7.7	NA	NA
G209	8/14/2019	0.011	160	61	0.586	7.2	240	830
G209	1/22/2020	0.017	150	59	0.406	6.9	250	730
G209	5/5/2020	NA	140	NA	NA	7.2	NA	NA
G212	11/18/2015	<0.01	55	38	0.340	7.2	54	380
G212	2/19/2016	<0.01	58	41	0.339	7.3	59	380
G212	5/11/2016	<0.01	58	37	0.421	7.3	59	400
G212	8/6/2016	0.016	59	37	0.369	7.3	55	330
G212	11/23/2016	<0.01	51	42	0.399	7.1	54	340
G212	2/15/2017	<0.01	53	37	0.369	7.1	55	420
G212	5/22/2017	<0.01	46	39	0.372	7.0	57	360
G212	7/15/2017	<0.01	46	44	0.377	7.6	53	430
G212	10/31/2017	<0.01	50	42	0.326	7.3	55	340
G212	5/14/2018	0.014	51	40	0.407	7.2	52	350
G212	11/2/2018	<0.01	53	43	0.289	7.3	49	600
G212	1/16/2019	<0.01	56	43	0.394	7.3	53	440
G212	8/14/2019	<0.01	53	43	0.437	7.3	51	380
G212	1/22/2020	0.012	61	42	0.283	7.2	58	340
G215	11/24/2015	0.037	110	47	0.340	7.2	110	500
G215	2/18/2016	0.027	100	52	0.359	7.2	130	520
G215	5/11/2016	0.026	89	43	0.463	6.9	110	460
G215	7/30/2016	0.015	89	47	0.432	6.9	110	480
G215	11/23/2016	0.023	68	48	0.429	6.9	100	500
G215	2/18/2017	0.021	86	46	0.369	7.3	110	510
G215	5/22/2017	0.024	82	42	<0.25	7.4	100	470
G215	7/15/2017	0.027	79	55	0.423	7.0	110	550
G215	10/31/2017	0.025	90	48	0.420	7.2	110	470
G215	5/15/2018	0.063	130	70	0.329	6.9	220	660
G215	11/2/2018	0.088	120	55	0.314	6.8	170	480
G215	1/16/2019	0.097	120	61	0.379	6.9	180	800
G215	8/14/2019	0.085	100	49	0.458	7.0	120	520
G215	1/22/2020	0.064	99	48	0.350	7.1	130	460

Analytical Results - Appendix III
Coffeen GMF Gypsum Stack Pond

Sample Location	Date Sampled	Boron, total (mg/L)	Calcium, total (mg/L)	Chloride, total (mg/L)	Fluoride, total (mg/L)	pH (s.u.)	Sulfate, total (mg/L)	Total Dissolved Solids (mg/L)
G218	11/24/2015	<0.01	120	99	0.300	7.1	94	620
G218	2/19/2016	<0.01	120	100	0.311	7.0	110	560
G218	5/10/2016	0.011	110	97	0.439	7.0	140	600
G218	7/30/2016	<0.01	130	100	0.382	7.0	120	620
G218	11/23/2016	<0.01	92	97	0.373	7.1	130	620
G218	2/18/2017	<0.01	110	88	0.308	7.2	130	630
G218	5/22/2017	<0.01	100	84	<0.25	7.1	140	600
G218	7/17/2017	<0.01	120	81	0.357	7.1	140	720
G218	10/31/2017	<0.01	110	91	0.437	6.9	140	660
G218	1/26/2018	NA	NA	NA	NA	6.9	NA	NA
G218	5/15/2018	0.014	110	91	0.413	7.0	140	640
G218	11/2/2018	<0.01	130	84	0.375	6.9	140	280
G218	1/17/2019	<0.01	120	82	0.361	7.0	140	600
G218	8/14/2019	<0.01	130	81	0.449	7.0	150	660
G218	1/22/2020	0.011	130	83	0.379	7.1	170	560

Notes:
1. Abbreviations: mg/L - milligrams per liter; NA - not analyzed; s.u. - standard units.

Analytical Results - Appendix IV
Coffeen GMF Gypsum Stack Pond

Sample Location	Date Sampled	Antimony, total (mg/L)	Arsenic, total (mg/L)	Barium, total (mg/L)	Beryllium, total (mg/L)	Cadmium ,total (mg/L)	Chromium, total (mg/L)	Cobalt, total (mg/L)	Fluoride, total (mg/L)	Lead, total (mg/L)	Lithium, total (mg/L)	Mercury, total (mg/L)	Molybdenum, total (mg/L)	Radium-226 + Radium 228, tot (pCi/L)	Selenium, total (mg/L)	Thallium, total (mg/L)
Background Wells																
G200	11/23/2015	<0.003	0.0070	0.17	<0.001	<0.001	0.012	0.0068	0.337	0.010	0.019	<0.0002	0.0017	1.65	0.0041	<0.001
G200	2/12/2016	<0.003	0.0082	0.24	0.0013	<0.001	0.013	0.0074	0.415	0.018	0.021	<0.0002	<0.001	3.84	0.0097	<0.001
G200	5/10/2016	<0.003	0.0025	0.13	<0.001	<0.001	0.0041	<0.002	0.389	0.0058	<0.01	<0.0002	<0.001	0.849	0.0071	<0.001
G200	7/30/2016	<0.003	<0.001	0.059	<0.001	<0.001	0.0049	<0.002	0.384	0.0012	<0.01	<0.0002	<0.001	0.662	0.0032	<0.001
G200	11/18/2016	<0.003	<0.001	0.053	<0.001	<0.001	<0.004	<0.002	0.431	<0.001	<0.01	<0.0002	<0.001	0.290	0.0032	<0.001
G200	2/10/2017	<0.003	<0.001	0.074	<0.001	<0.001	0.0052	<0.002	0.305	0.0013	<0.01	<0.0002	<0.001	0.534	0.0067	<0.001
G200	5/18/2017	<0.003	<0.001	0.063	<0.001	<0.001	<0.004	<0.002	0.300	<0.001	<0.01	<0.0002	<0.001	1.01	0.0062	<0.001
G200	7/13/2017	<0.003	<0.001	0.057	<0.001	<0.001	<0.004	<0.002	0.299	<0.001	<0.01	<0.0002	<0.001	0.906	0.0034	<0.001
G200	10/28/2017	NA	NA	NA	NA	NA	NA	NA	0.328	NA	NA	NA	NA	NA	NA	NA
G200	1/25/2018	NA	NA	NA	NA	NA	NA	NA	0.303	NA	NA	NA	NA	NA	NA	NA
G200	5/11/2018	NA	NA	NA	NA	NA	NA	NA	<0.25	NA	NA	NA	NA	NA	NA	NA
G200	11/2/2018	NA	NA	NA	NA	NA	NA	NA	0.391	NA	NA	NA	NA	NA	NA	NA
G200	1/16/2019	NA	NA	NA	NA	NA	NA	NA	0.386	NA	NA	NA	NA	NA	NA	NA
G200	8/12/2019	NA	NA	NA	NA	NA	NA	NA	0.405	NA	NA	NA	NA	NA	NA	NA
G200	1/21/2020	NA	NA	NA	NA	NA	NA	NA	0.302	NA	NA	NA	NA	NA	NA	NA
R201	11/23/2015	<0.003	<0.001	0.078	<0.001	0.0012	<0.004	<0.002	0.377	<0.001	<0.01	<0.0002	0.0069	0.202	<0.001	<0.001
R201	2/12/2016	<0.003	0.010	0.084	0.0067	<0.001	<0.004	<0.002	0.398	<0.001	<0.01	<0.0002	0.0010	0.543	0.0091	<0.001
R201	5/10/2016	<0.003	<0.001	0.084	<0.001	<0.001	<0.004	<0.002	0.447	<0.001	<0.01	<0.0002	<0.001	1.12	<0.001	<0.001
R201	7/30/2016	<0.003	0.0031	0.092	<0.001	<0.001	<0.004	<0.002	0.368	<0.001	<0.01	<0.0002	<0.001	0.697	<0.001	<0.001
R201	11/18/2016	<0.003	0.0013	0.058	<0.001	<0.001	<0.004	<0.002	0.494	<0.001	<0.01	<0.0002	<0.001	0.055	<0.001	<0.001
R201	2/11/2017	<0.003	0.0028	0.086	<0.001	<0.001	<0.004	<0.002	0.285	<0.001	<0.01	<0.0002	<0.001	1.02	<0.001	<0.001
R201	5/18/2017	<0.003	0.0023	0.087	<0.001	<0.001	<0.004	<0.002	0.354	<0.001	<0.01	<0.0002	<0.001	1.51	<0.001	<0.001
R201	7/13/2017	<0.003	0.0037	0.17	<0.001	<0.001	<0.004	<0.002	0.284	<0.001	<0.01	<0.0002	<0.001	2.75	<0.001	<0.001
R201	10/28/2017	NA	NA	NA	NA	NA	NA	NA	0.380	NA	NA	NA	NA	NA	NA	NA
R201	1/25/2018	NA	NA	NA	NA	NA	NA	NA	0.338	NA	NA	NA	NA	NA	NA	NA
R201	5/11/2018	NA	NA	NA	NA	NA	NA	NA	0.306	NA	NA	NA	NA	NA	NA	NA
R201	11/2/2018	NA	NA	NA	NA	NA	NA	NA	0.419	NA	NA	NA	NA	NA	NA	NA
R201	1/16/2019	NA	NA	NA	NA	NA	NA	NA	0.341	NA	NA	NA	NA	NA	NA	NA
R201	8/12/2019	NA	NA	NA	NA	NA	NA	NA	0.466	NA	NA	NA	NA	NA	NA	NA
R201	1/21/2020	NA	NA	NA	NA	NA	NA	NA	0.309	NA	NA	NA	NA	NA	NA	NA
Downgradient Wells																
G206	11/18/2015	<0.003	0.0039	0.062	<0.001	<0.001	0.0041	<0.002	0.433	<0.001	<0.01	<0.0002	<0.001	0.317	<0.001	<0.001
G206	2/24/2016	<0.003	<0.001	0.056	<0.001	<0.001	<0.004	<0.002	0.507	<0.001	<0.01	<0.0002	0.0014	0.292	<0.001	<0.001
G206	6/27/2016	<0.003	0.0012	0.062	<0.001	<0.001	<0.004	<0.002	0.469	<0.001	<0.01	<0.0002	0.0025	0.647	<0.001	<0.001
G206	8/6/2016	<0.003	0.0020	0.064	<0.001	<0.001	0.0042	<0.002	0.449	0.0022	<0.01	<0.0002	0.0024	0.857	<0.001	<0.001
G206	11/22/2016	<0.003	<0.001	0.048	<0.001	<0.001	<0.004	<0.002	0.463	<0.001	<0.01	<0.0002	0.0015	NA	<0.001	<0.001
G206	12/7/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.62	NA	NA
G206	2/11/2017	<0.003	<0.001	0.052	<0.001	<0.001	<0.004	<0.002	0.547	<0.001	<0.01	<0.0002	0.0013	1.20	<0.001	<0.001
G206	5/18/2017	<0.003	<0.001	0.043	<0.001	<0.001	<0.004	<0.002	<0.25	<0.001	<0.01	<0.0002	0.0011	0.555	<0.001	<0.001
G206	7/15/2017	<0.003	0.0019	0.055	<0.001	<0.001	<0.004	<0.002	0.453	<0.001	<0.01	<0.0002	<0.001	1.33	<0.001	<0.001
G206	10/30/2017	NA	NA	NA	NA	NA	NA	NA	0.472	NA	NA	NA	NA	NA	NA	NA
G206	5/15/2018	NA	NA	NA	NA	NA	NA	NA	0.480	NA	NA	NA	NA	NA	NA	NA
G206	11/2/2018	NA	NA	NA	NA	NA	NA	NA	0.360	NA	NA	NA	NA	NA	NA	NA
G206	1/17/2019	NA	NA	NA	NA	NA	NA	NA	0.458	NA	NA	NA	NA	NA	NA	NA
G206	8/14/2019	NA	NA	NA	NA	NA	NA	NA	0.506	NA	NA	NA	NA	NA	NA	NA
G206	1/21/2020	NA	NA	NA	NA	NA	NA	NA	0.389	NA	NA	NA	NA	NA	NA	NA

Analytical Results - Appendix IV
Coffeen GMF Gypsum Stack Pond

Sample Location	Date Sampled	Antimony, total (mg/L)	Arsenic, total (mg/L)	Barium, total (mg/L)	Beryllium, total (mg/L)	Cadmium, total (mg/L)	Chromium, total (mg/L)	Cobalt, total (mg/L)	Fluoride, total (mg/L)	Lead, total (mg/L)	Lithium, total (mg/L)	Mercury, total (mg/L)	Molybdenum, total (mg/L)	Radium-226 + Radium 228, tot (pCi/L)	Selenium, total (mg/L)	Thallium, total (mg/L)
G209	11/18/2015	<0.003	0.0021	0.072	<0.001	<0.001	<0.004	<0.002	0.398	<0.001	<0.01	<0.0002	0.0023	0.469	0.0036	<0.001
G209	2/23/2016	<0.003	<0.001	0.066	<0.001	<0.001	<0.004	<0.002	0.475	<0.001	<0.01	<0.0002	0.0015	0.903	<0.001	<0.001
G209	5/11/2016	<0.003	<0.001	0.061	<0.001	<0.001	<0.004	<0.002	0.461	<0.001	<0.01	<0.0002	0.0015	1.48	<0.001	<0.001
G209	8/6/2016	<0.003	0.0017	0.065	<0.001	<0.001	<0.004	<0.002	0.468	<0.001	<0.01	<0.0002	0.0018	0.673	<0.001	<0.001
G209	11/22/2016	<0.003	0.0022	0.045	<0.001	<0.001	<0.004	<0.002	0.420	<0.001	<0.01	<0.0002	<0.001	0.832	<0.001	<0.001
G209	2/11/2017	<0.003	<0.001	0.07	<0.001	<0.001	<0.004	<0.002	0.358	<0.001	<0.01	<0.0002	0.0027	0.103	<0.001	<0.001
G209	5/18/2017	<0.003	0.0029	0.077	<0.001	<0.001	<0.004	<0.002	0.263	0.0012	<0.01	<0.0002	0.0019	1.31	<0.001	0.001
G209	7/15/2017	<0.003	0.0057	0.063	<0.001	<0.001	<0.004	<0.002	0.437	<0.001	<0.01	<0.0002	<0.001	0.602	<0.001	<0.001
G209	10/31/2017	NA	NA	NA	NA	NA	NA	NA	0.519	NA	NA	NA	NA	NA	NA	NA
G209	1/25/2018	NA	NA	NA	NA	NA	NA	NA	0.456	NA	NA	NA	NA	NA	NA	NA
G209	5/15/2018	NA	NA	NA	NA	NA	NA	NA	0.428	NA	NA	NA	NA	NA	NA	NA
G209	11/2/2018	NA	NA	NA	NA	NA	NA	NA	0.410	NA	NA	NA	NA	NA	NA	NA
G209	1/17/2019	NA	NA	NA	NA	NA	NA	NA	0.426	NA	NA	NA	NA	NA	NA	NA
G209	8/14/2019	NA	NA	NA	NA	NA	NA	NA	0.586	NA	NA	NA	NA	NA	NA	NA
G209	1/22/2020	NA	NA	NA	NA	NA	NA	NA	0.406	NA	NA	NA	NA	NA	NA	NA
G212	11/18/2015	<0.003	<0.001	0.052	<0.001	<0.001	<0.004	<0.002	0.340	<0.001	<0.01	<0.0002	0.0015	0.132	0.0037	<0.001
G212	2/19/2016	<0.003	<0.001	0.05	<0.001	<0.001	<0.004	<0.002	0.339	<0.001	<0.01	<0.0002	<0.001	0.582	0.0048	<0.001
G212	5/11/2016	<0.003	<0.001	0.05	<0.001	<0.001	<0.004	<0.002	0.421	<0.001	<0.01	<0.0002	<0.001	0.759	0.0041	<0.001
G212	8/6/2016	<0.003	<0.001	0.059	<0.001	<0.001	0.004	<0.002	0.369	0.0016	<0.01	<0.0002	0.0012	0.992	0.004	<0.001
G212	11/23/2016	<0.003	<0.001	0.049	<0.001	<0.001	<0.004	<0.002	0.399	<0.001	<0.01	<0.0002	<0.001	NA	0.0043	<0.001
G212	12/7/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.64	NA	NA
G212	2/15/2017	<0.003	0.0010	0.058	<0.001	<0.001	<0.004	<0.002	0.369	0.001	<0.01	<0.0002	<0.001	0.488	0.0041	<0.001
G212	5/22/2017	<0.003	<0.001	0.061	<0.001	<0.001	<0.004	<0.002	0.372	<0.001	<0.01	<0.0002	0.0011	0.729	0.0039	<0.001
G212	7/15/2017	<0.003	<0.001	0.052	<0.001	<0.001	<0.004	<0.002	0.377	<0.001	<0.01	<0.0002	<0.001	0.654	0.0046	<0.001
G212	10/31/2017	NA	NA	NA	NA	NA	NA	NA	0.326	NA	NA	NA	NA	NA	NA	NA
G212	5/14/2018	NA	NA	NA	NA	NA	NA	NA	0.407	NA	NA	NA	NA	NA	NA	NA
G212	11/2/2018	NA	NA	NA	NA	NA	NA	NA	0.289	NA	NA	NA	NA	NA	NA	NA
G212	1/16/2019	NA	NA	NA	NA	NA	NA	NA	0.394	NA	NA	NA	NA	NA	NA	NA
G212	8/14/2019	NA	NA	NA	NA	NA	NA	NA	0.437	NA	NA	NA	NA	NA	NA	NA
G212	1/22/2020	NA	NA	NA	NA	NA	NA	NA	0.283	NA	NA	NA	NA	NA	NA	NA
G215	11/24/2015	<0.003	0.11	0.23	<0.001	<0.001	<0.004	0.0028	0.340	0.0039	<0.01	<0.0002	0.0011	2.42	<0.001	<0.001
G215	2/18/2016	<0.003	0.0034	0.095	<0.001	<0.001	<0.004	<0.002	0.359	<0.001	<0.01	<0.0002	<0.001	0.852	<0.001	<0.001
G215	5/11/2016	0.0045	0.0068	0.088	<0.001	<0.001	<0.004	<0.002	0.463	<0.001	<0.01	<0.0002	<0.001	0.468	0.0024	<0.001
G215	7/30/2016	<0.003	0.013	0.096	<0.001	<0.001	<0.004	<0.002	0.432	<0.001	<0.01	<0.0002	<0.001	0.0216	<0.001	<0.001
G215	11/23/2016	<0.003	0.0086	0.082	<0.001	<0.001	<0.004	<0.002	0.429	<0.001	<0.01	<0.0002	<0.001	NA	<0.001	<0.001
G215	12/7/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.58	NA	NA
G215	2/18/2017	<0.003	0.012	0.095	<0.001	<0.001	<0.004	<0.002	0.369	<0.001	<0.01	<0.0002	<0.001	0.344	<0.001	<0.001
G215	5/22/2017	<0.003	0.036	0.15	<0.001	<0.001	<0.004	<0.002	<0.25	<0.001	<0.01	<0.0002	<0.001	1.24	<0.001	<0.001
G215	7/15/2017	<0.003	0.044	0.13	<0.001	<0.001	<0.004	<0.002	0.423	<0.001	<0.01	<0.0002	<0.001	1.01	<0.001	<0.001
G215	10/31/2017	NA	NA	NA	NA	NA	NA	NA	0.420	NA	NA	NA	NA	NA	NA	NA
G215	5/15/2018	NA	NA	NA	NA	NA	NA	NA	0.329	NA	NA	NA	NA	NA	NA	NA
G215	11/2/2018	NA	NA	NA	NA	NA	NA	NA	0.314	NA	NA	NA	NA	NA	NA	NA
G215	1/16/2019	NA	NA	NA	NA	NA	NA	NA	0.379	NA	NA	NA	NA	NA	NA	NA
G215	8/14/2019	NA	NA	NA	NA	NA	NA	NA	0.458	NA	NA	NA	NA	NA	NA	NA
G215	1/22/2020	NA	NA	NA	NA	NA	NA	NA	0.350	NA	NA	NA	NA	NA	NA	NA

Analytical Results - Appendix IV
Coffeen GMF Gypsum Stack Pond

Sample Location	Date Sampled	Antimony, total (mg/L)	Arsenic, total (mg/L)	Barium, total (mg/L)	Beryllium, total (mg/L)	Cadmium, total (mg/L)	Chromium, total (mg/L)	Cobalt, total (mg/L)	Fluoride, total (mg/L)	Lead, total (mg/L)	Lithium, total (mg/L)	Mercury, total (mg/L)	Molybdenum, total (mg/L)	Radium-226 + Radium 228, tot (pCi/L)	Selenium, total (mg/L)	Thallium, total (mg/L)
G218	11/24/2015	<0.003	0.0084	0.17	<0.001	<0.001	0.01	<0.002	0.300	<0.001	<0.01	<0.0002	0.0015	1.23	<0.001	<0.001
G218	2/19/2016	<0.003	0.0018	0.15	<0.001	<0.001	<0.004	<0.002	0.311	<0.001	<0.01	<0.0002	<0.001	1.28	<0.001	<0.001
G218	5/10/2016	<0.003	0.0015	0.14	<0.001	<0.001	<0.004	<0.002	0.439	<0.001	<0.01	<0.0002	<0.001	0.601	<0.001	<0.001
G218	7/30/2016	<0.003	0.0011	0.15	<0.001	<0.001	<0.004	<0.002	0.382	<0.001	<0.01	<0.0002	<0.001	0.543	<0.001	<0.001
G218	11/23/2016	<0.003	0.0014	0.13	<0.001	<0.001	<0.004	<0.002	0.373	<0.001	<0.01	<0.0002	<0.001	NA	<0.001	<0.001
G218	2/18/2017	<0.003	0.0011	0.13	<0.001	<0.001	<0.004	<0.002	0.308	<0.001	<0.01	<0.0002	<0.001	0.779	<0.001	<0.001
G218	5/22/2017	<0.003	<0.001	0.15	<0.001	<0.001	<0.004	<0.002	<0.25	<0.001	<0.01	<0.0002	<0.001	0.975	<0.001	<0.001
G218	7/17/2017	<0.003	<0.001	0.14	<0.001	<0.001	<0.004	<0.002	0.357	<0.001	<0.01	<0.0002	<0.001	0.704	<0.001	<0.001
G218	10/31/2017	NA	NA	NA	NA	NA	NA	NA	0.437	NA	NA	NA	NA	NA	NA	NA
G218	5/15/2018	NA	NA	NA	NA	NA	NA	NA	0.413	NA	NA	NA	NA	NA	NA	NA
G218	11/2/2018	NA	NA	NA	NA	NA	NA	NA	0.375	NA	NA	NA	NA	NA	NA	NA
G218	1/17/2019	NA	NA	NA	NA	NA	NA	NA	0.361	NA	NA	NA	NA	NA	NA	NA
G218	8/14/2019	NA	NA	NA	NA	NA	NA	NA	0.449	NA	NA	NA	NA	NA	NA	NA
G218	1/22/2020	NA	NA	NA	NA	NA	NA	NA	0.379	NA	NA	NA	NA	NA	NA	NA

Notes:
1. Abbreviations: mg/L - milligrams per liter; NA - not analyzed; pCi/L - picocurie per liter;

Analytical Results - Appendix III
Coffeen GMF Recycle Pond

Sample Location	Date Sampled	Boron, total (mg/L)	Calcium, total (mg/L)	Chloride, total (mg/L)	Fluoride, total (mg/L)	pH (s.u.)	Sulfate, total (mg/L)	Total Dissolved Solids (mg/L)
Background Wells								
G270	11/20/2015	<0.01	59	12	0.362	6.8	89	400
G270	2/10/2016	<0.01	49	16	0.472	6.7	77	340
G270	5/12/2016	<0.01	57	12	0.460	7.0	76	340
G270	8/1/2016	<0.01	50	15	0.397	7.0	76	360
G270	11/16/2016	0.018	48	12	0.327	7.1	63	450
G270	2/10/2017	<0.01	53	11	0.364	7.1	55	390
G270	5/16/2017	<0.01	54	9.7	0.358	7.2	50	380
G270	7/12/2017	<0.01	52	12	0.338	7.0	54	400
G270	10/25/2017	0.011	56	13	0.338	7.1	55	400
G270	5/11/2018	<0.01	53	7.9	0.270	7.1	53	400
G270	8/3/2018	<0.01	57	8.6	0.360	7.1	54	420
G270	1/21/2019	<0.01	56	9.6	0.375	7.0	49	480
G270	8/15/2019	<0.01	54	9.8	0.461	7.1	50	470
G270	1/24/2020	0.015	59	10	0.383	7.3	51	480
G280	11/24/2015	0.029	120	54	0.343	7.4	94	460
G280	2/10/2016	<0.01	60	52	0.466	6.5	84	400
G280	5/10/2016	<0.01	63	50	0.429	7.2	80	350
G280	8/3/2016	<0.01	65	46	0.397	7.2	55	350
G280	11/20/2016	<0.01	63	49	0.473	7.1	67	430
G280	2/15/2017	<0.01	64	46	0.362	7.0	94	440
G280	5/20/2017	<0.01	54	44	0.348	7.2	84	420
G280	7/18/2017	<0.01	67	46	0.378	7.3	58	400
G280	11/4/2017	0.013	63	48	0.490	7.2	57	350
G280	5/16/2018	<0.01	57	43	0.288	7.2	52	360
G280	8/10/2018	<0.01	62	55	0.414	7.1	63	400
G280	1/22/2019	0.026	82	52	0.373	7.1	69	500
G280	8/26/2019	0.011	72	60	0.438	7.1	81	480
G280	1/23/2020	0.015	73	64	0.486	7.7	84	1100
Downgradient Wells								
G271	11/23/2015	0.50	130	38	0.347	7.3	420	860
G271	2/16/2016	0.61	130	38	0.414	7.5	440	1000
G271	5/12/2016	0.98	170	39	0.472	7.2	540	940
G271	8/5/2016	0.63	110	37	0.414	7.2	440	840
G271	11/21/2016	0.40	110	29	0.484	7.2	400	910
G271	2/11/2017	0.71	100	30	0.392	7.2	430	1100
G271	5/20/2017	0.65	110	28	<0.25	7.1	390	870
G271	7/17/2017	0.58	110	29	0.466	7.1	380	950
G271	11/4/2017	0.67	100	24	0.426	7.3	360	820
G271	5/16/2018	0.41	76	38	0.602	7.3	330	820
G271	8/10/2018	0.45	86	32	0.439	7.1	470	880
G271	1/22/2019	0.88	100	21	0.530	7.2	420	770
G271	8/26/2019	0.78	100	21	0.570	7.2	340	690
G271	1/22/2020	2.5	180	51	0.278	7.2	610	1100

Analytical Results - Appendix III
Coffeen GMF Recycle Pond

Sample Location	Date Sampled	Boron, total (mg/L)	Calcium, total (mg/L)	Chloride, total (mg/L)	Fluoride, total (mg/L)	pH (s.u.)	Sulfate, total (mg/L)	Total Dissolved Solids (mg/L)
G273	11/24/2015	0.20	140	41	<0.25	7.1	420	890
G273	2/16/2016	0.42	150	45	0.388	7.2	550	1100
G273	5/12/2016	0.29	170	44	0.537	7.0	520	980
G273	8/5/2016	0.17	120	46	0.294	7.1	400	840
G273	11/21/2016	0.15	140	48	0.39	7.3	440	900
G273	2/15/2017	0.18	140	47	0.288	6.9	470	990
G273	5/20/2017	0.11	130	51	<0.25	7.1	390	890
G273	7/17/2017	0.066	140	48	0.333	7.3	360	920
G273	11/4/2017	0.079	120	50	0.333	7.0	380	820
G273	5/16/2018	0.25	160	50	0.390	7.2	490	1100
G273	8/10/2018	0.12	140	53	0.367	7.1	460	940
G273	1/22/2019	0.40	170	54	0.462	7.1	590	1300
G273	8/26/2019	0.14	150	59	0.432	7.0	440	1000
G273	1/22/2020	0.18	170	59	0.252	7.1	510	1000
G276	11/24/2015	0.043	120	28	0.345	7.3	190	710
G276	2/16/2016	0.021	120	23	0.456	7.2	230	760
G276	5/12/2016	<0.01	130	22	0.441	7.1	230	660
G276	8/3/2016	0.019	110	23	0.443	7.2	19	680
G276	11/21/2016	<0.01	120	23	0.445	7.1	210	720
G276	2/17/2017	0.014	110	23	0.358	7.2	200	680
G276	5/20/2017	0.020	110	22	<0.25	7.0	220	750
G276	7/18/2017	0.011	130	23	0.395	7.2	220	780
G276	11/4/2017	0.023	120	20	0.431	7.1	210	720
G276	5/16/2018	0.021	110	24	0.466	7.1	220	740
G276	8/10/2018	0.017	120	24	0.399	7.1	230	760
G276	1/22/2019	0.027	120	26	0.421	7.1	240	860
G276	8/26/2019	0.028	140	21	0.443	7.2	260	880
G276	1/23/2020	0.037	140	25	0.255	7.0	270	1400
G279	11/24/2015	0.63	140	61	0.334	7.2	520	1100
G279	2/16/2016	0.23	180	130	0.386	7.2	610	1400
G279	5/13/2016	0.042	120	18	0.608	6.9	230	600
G279	8/3/2016	0.24	210	110	0.394	7.1	570	1300
G279	11/22/2016	0.49	170	130	0.272	7.2	720	1300
G279	2/15/2017	0.35	210	120	0.263	7.1	700	1500
G279	5/20/2017	0.18	150	57	0.280	7.0	370	940
G279	7/18/2017	0.42	240	130	0.282	7.3	730	1600
G279	11/4/2017	0.57	220	170	0.507	7.2	870	1600
G279	5/16/2018	0.25	180	76	0.492	7.1	540	1200
G279	8/10/2018	0.53	250	160	0.427	7.1	940	1800
G279	1/23/2019	0.021	120	7.3	0.626	7.0	240	740
G279	8/26/2019	0.048	120	4.7	0.635	7.0	170	560
G279	1/23/2020	0.33	190	72	0.537	7.0	400	830

Notes:
1. Abbreviations: mg/L - milligrams per liter; s.u. - standard units.

Analytical Results - Appendix IV
Coffeen GMF Recycle Pond

Sample Location	Date Sampled	Antimony, total (mg/L)	Arsenic, total (mg/L)	Barium, total (mg/L)	Beryllium, total (mg/L)	Cadmium, total (mg/L)	Chromium, total (mg/L)	Cobalt, total (mg/L)	Fluoride, total (mg/L)	Lead, total (mg/L)	Lithium, total (mg/L)	Mercury, total (mg/L)	Molybdenum, total (mg/L)	Radium-226 + Radium 228, tot (pCi/L)	Selenium, total (mg/L)	Thallium, total (mg/L)
Background Wells																
G270	11/20/2015	<0.003	0.001	0.045	<0.001	<0.001	<0.004	<0.002	0.362	0.0015	<0.01	<0.0002	0.001	0.522	<0.001	<0.001
G270	2/10/2016	<0.003	<0.001	0.032	<0.001	<0.001	<0.004	<0.002	0.472	<0.001	<0.01	<0.0002	<0.001	0.721	0.0012	<0.001
G270	5/12/2016	<0.003	<0.001	0.034	<0.001	<0.001	<0.004	<0.002	0.460	<0.001	<0.01	<0.0002	0.001	0.422	0.0012	<0.001
G270	8/1/2016	<0.003	<0.001	0.037	<0.001	<0.001	<0.004	<0.002	0.397	<0.001	<0.01	<0.0002	<0.001	0.997	<0.001	<0.001
G270	11/16/2016	<0.003	<0.001	0.031	<0.001	<0.001	<0.004	<0.002	0.327	<0.001	<0.01	<0.0002	<0.001	0.109	<0.001	<0.001
G270	2/10/2017	<0.003	<0.001	0.036	<0.001	<0.001	<0.004	<0.002	0.364	<0.001	<0.01	<0.0002	<0.001	0.620	<0.001	<0.001
G270	5/16/2017	<0.003	<0.001	0.033	<0.001	<0.001	<0.004	<0.002	0.358	<0.001	<0.01	<0.0002	<0.001	1.52	<0.001	<0.001
G270	7/12/2017	<0.003	<0.001	0.035	<0.001	<0.001	<0.004	<0.002	0.338	<0.001	<0.01	<0.0002	<0.001	0.413	<0.001	<0.001
G270	5/11/2018	<0.003	<0.001	0.038	<0.001	<0.001	<0.004	<0.002	0.270	<0.001	<0.01	<0.0002	0.0014	NA	<0.001	<0.001
G270	5/30/2018	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.283	NA	NA
G270	8/3/2018	NA	<0.001	0.036	NA	<0.001	<0.004	<0.002	0.360	<0.001	<0.01	NA	<0.001	0.990	NA	NA
G270	1/21/2019	<0.003	<0.001	0.047	<0.001	<0.001	0.0043	<0.002	0.375	0.0013	<0.01	<0.0002	<0.001	0.651	<0.001	<0.001
G270	8/15/2019	NA	<0.001	0.040	<0.001	<0.001	<0.004	<0.002	0.461	<0.001	0.012	NA	<0.001	1.34	<0.001	NA
G270	1/24/2020	<0.003	<0.001	0.038	<0.001	<0.001	<0.004	<0.002	0.383	<0.001	<0.02	<0.0002	<0.001	0.471	0.0014	<0.001
G280	11/24/2015	<0.003	0.0066	0.11	<0.001	<0.001	0.019	0.0059	0.343	0.012	0.019	<0.0002	0.0045	1.39	0.0032	<0.001
G280	2/10/2016	<0.003	<0.001	0.045	<0.001	<0.001	<0.004	<0.002	0.466	0.0011	<0.01	<0.0002	0.0015	0.745	0.0029	<0.001
G280	5/10/2016	<0.003	<0.001	0.045	<0.001	<0.001	<0.004	<0.002	0.429	<0.001	<0.01	<0.0002	0.0014	0.666	0.0044	<0.001
G280	8/3/2016	<0.003	<0.001	0.045	<0.001	<0.001	<0.004	<0.002	0.397	0.0014	<0.01	<0.0002	0.0016	1.75	0.0048	<0.001
G280	11/20/2016	<0.003	<0.001	0.044	<0.001	<0.001	<0.004	<0.002	0.473	<0.001	<0.01	<0.0002	0.0014	0.613	0.0034	<0.001
G280	5/20/2017	<0.003	<0.001	0.042	<0.001	<0.001	<0.004	<0.002	0.348	<0.001	<0.01	<0.0002	0.0013	1.10	0.0026	<0.001
G280	7/18/2017	<0.003	<0.001	0.041	<0.001	<0.001	<0.004	<0.002	0.378	<0.001	<0.01	<0.0002	0.0012	0.572	0.0034	<0.001
G280	5/16/2018	<0.003	0.0011	0.038	<0.001	<0.001	<0.004	<0.002	0.288	0.0011	<0.01	<0.0002	0.0012	NA	0.0042	<0.001
G280	5/31/2018	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.397	NA	NA
G280	8/10/2018	NA	<0.001	0.038	NA	NA	NA	NA	0.414	<0.001	<0.01	NA	<0.001	0.634	0.0022	NA
G280	1/22/2019	<0.003	0.0035	0.070	<0.001	<0.001	0.011	0.0033	0.373	0.0061	<0.01	<0.0002	0.0016	1.283	0.0029	<0.001
G280	8/26/2019	NA	<0.001	0.045	NA	NA	<0.004	<0.002	0.438	<0.001	<0.01	NA	0.0014	1.01	<0.001	NA
G280	1/23/2020	<0.003	<0.001	0.041	<0.001	<0.001	<0.004	<0.002	0.486	<0.001	<0.02	<0.0002	0.0015	0.484	0.0012	<0.001
Downgradient Wells																
G271	11/23/2015	<0.003	<0.001	0.031	<0.001	<0.001	<0.004	<0.002	0.347	0.0012	<0.01	<0.0002	0.0012	0.889	0.0024	<0.001
G271	2/16/2016	<0.003	<0.001	0.028	<0.001	<0.001	<0.004	<0.002	0.414	<0.001	<0.01	<0.0002	<0.001	1.02	0.0018	<0.001
G271	5/12/2016	<0.003	<0.001	0.028	<0.001	<0.001	<0.004	<0.002	0.472	<0.001	<0.01	<0.0002	<0.001	0.228	0.0021	<0.001
G271	8/5/2016	<0.003	<0.001	0.032	<0.001	<0.001	<0.004	<0.002	0.414	0.0027	<0.01	<0.0002	<0.001	0.268	0.0022	<0.001
G271	11/21/2016	<0.003	<0.001	0.031	<0.001	<0.001	<0.004	<0.002	0.484	<0.001	<0.01	<0.0002	<0.001	0.296	0.0029	<0.001
G271	2/11/2017	<0.003	<0.001	0.027	<0.001	<0.001	<0.004	<0.002	0.392	<0.001	<0.01	<0.0002	<0.001	0.481	0.0025	<0.001
G271	5/20/2017	<0.003	0.0017	0.029	0.0021	0.0013	0.0053	0.0022	<0.25	0.0024	<0.01	<0.0002	0.0031	0.652	0.0044	0.0021
G271	7/17/2017	<0.003	<0.001	0.028	<0.001	<0.001	<0.004	<0.002	0.466	<0.001	<0.01	<0.0002	<0.001	0.737	0.0023	<0.001
G271	11/4/2017	NA	NA	NA	NA	NA	NA	NA	0.426	NA	NA	NA	NA	NA	NA	NA
G271	5/16/2018	<0.003	<0.001	0.021	<0.001	<0.001	<0.004	<0.002	0.602	<0.001	<0.01	<0.0002	0.0015	NA	0.0025	<0.001
G271	5/31/2018	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.878	NA	NA
G271	8/10/2018	NA	<0.001	0.024	NA	NA	NA	NA	0.439	<0.001	<0.01	NA	0.0013	1.16	0.0022	NA
G271	1/22/2019	<0.003	<0.001	0.023	<0.001	<0.001	<0.004	<0.002	0.530	0.0012	<0.01	<0.0002	0.0014	0.644	0.0022	<0.001
G271	8/26/2019	NA	0.0020	0.042	NA	NA	0.0049	<0.002	0.570	0.0068	<0.01	NA	0.0011	0.813	0.0020	NA
G271	1/22/2020	<0.003	<0.001	0.024	<0.001	<0.001	<0.004	<0.002	0.278	<0.001	<0.02	<0.0002	<0.001	0.922	0.0010	<0.001

Analytical Results - Appendix IV
Coffeen GMF Recycle Pond

Sample Location	Date Sampled	Antimony, total (mg/L)	Arsenic, total (mg/L)	Barium, total (mg/L)	Beryllium, total (mg/L)	Cadmium ,total (mg/L)	Chromium, total (mg/L)	Cobalt, total (mg/L)	Fluoride, total (mg/L)	Lead, total (mg/L)	Lithium, total (mg/L)	Mercury, total (mg/L)	Molybdenum, total (mg/L)	Radium-226 + Radium 228, tot (pCi/L)	Selenium, total (mg/L)	Thallium, total (mg/L)
G273	11/24/2015	<0.003	<0.001	0.049	<0.001	<0.001	<0.004	<0.002	<0.25	0.0011	<0.01	<0.0002	<0.001	2.06	<0.001	<0.001
G273	2/16/2016	<0.003	<0.001	0.031	<0.001	<0.001	<0.004	<0.002	0.388	<0.001	<0.01	<0.0002	<0.001	1.51	<0.001	<0.001
G273	5/12/2016	<0.003	0.0045	0.031	<0.001	<0.001	<0.004	<0.002	0.537	<0.001	<0.01	<0.0002	<0.001	0.774	0.0051	<0.001
G273	8/5/2016	<0.003	<0.001	0.032	<0.001	<0.001	<0.004	<0.002	0.294	<0.001	<0.01	<0.0002	<0.001	0.657	<0.001	<0.001
G273	11/21/2016	<0.003	<0.001	0.036	<0.001	<0.001	<0.004	<0.002	0.390	<0.001	<0.01	<0.0002	<0.001	0.376	<0.001	<0.001
G273	2/15/2017	<0.003	<0.001	0.033	<0.001	<0.001	<0.004	<0.002	0.288	<0.001	<0.01	<0.0002	<0.001	0	<0.001	<0.001
G273	5/20/2017	<0.003	<0.001	0.032	<0.001	0.0018	<0.004	0.0021	<0.25	0.001	<0.01	<0.0002	0.0019	1.22	<0.001	0.0012
G273	7/17/2017	<0.003	<0.001	0.035	<0.001	<0.001	<0.004	<0.002	0.333	<0.001	<0.01	<0.0002	<0.001	1.28	<0.001	<0.001
G273	11/4/2017	NA	NA	NA	NA	NA	NA	NA	0.333	NA	NA	NA	NA	NA	NA	NA
G273	5/16/2018	<0.003	<0.001	0.032	<0.001	<0.001	<0.004	<0.002	0.390	<0.001	0.012	<0.0002	<0.001	NA	<0.001	<0.001
G273	5/31/2018	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.386	NA	NA
G273	8/10/2018	NA	<0.001	0.027	NA	NA	NA	NA	0.367	<0.001	<0.01	NA	<0.001	0.760	<0.001	NA
G273	1/22/2019	<0.003	0.0015	0.049	<0.001	<0.001	<0.004	<0.002	0.462	<0.001	<0.01	<0.0002	<0.001	0.487	<0.001	<0.001
G273	8/26/2019	NA	<0.001	0.027	NA	NA	<0.004	<0.002	0.432	<0.001	0.011	NA	0.0011	0.151	<0.001	NA
G273	1/22/2020	<0.003	0.0011	0.03	<0.001	<0.001	<0.004	<0.002	0.252	<0.001	<0.02	<0.0002	<0.001	0.641	<0.001	0.0012
G276	11/24/2015	<0.003	<0.001	0.077	<0.001	<0.001	<0.004	<0.002	0.345	<0.001	0.013	<0.0002	0.0017	1.29	<0.001	<0.001
G276	2/16/2016	<0.003	<0.001	0.090	<0.001	<0.001	<0.004	<0.002	0.456	0.0014	0.015	<0.0002	0.0013	0.181	0.0018	<0.001
G276	5/12/2016	<0.003	<0.001	0.078	<0.001	<0.001	<0.004	<0.002	0.441	<0.001	0.012	<0.0002	<0.001	0.800	0.0017	<0.001
G276	8/3/2016	<0.003	<0.001	0.085	<0.001	<0.001	<0.004	<0.002	0.443	<0.001	<0.01	<0.0002	<0.001	1.15	0.0017	<0.001
G276	11/21/2016	<0.003	<0.001	0.081	<0.001	<0.001	<0.004	<0.002	0.445	<0.001	0.011	<0.0002	<0.001	0.105	0.0020	<0.001
G276	2/17/2017	<0.003	<0.001	0.082	<0.001	<0.001	<0.004	<0.002	0.358	<0.001	0.014	<0.0002	<0.001	0.689	0.0014	<0.001
G276	5/20/2017	<0.003	<0.001	0.081	<0.001	<0.001	<0.004	<0.002	<0.25	<0.001	0.012	<0.0002	0.0013	1.76	0.0023	<0.001
G276	7/18/2017	<0.003	<0.001	0.084	<0.001	<0.001	<0.004	<0.002	0.395	<0.001	0.012	<0.0002	<0.001	0.916	0.0018	<0.001
G276	11/4/2017	NA	NA	NA	NA	NA	NA	NA	0.431	NA	NA	NA	NA	NA	NA	NA
G276	5/16/2018	<0.003	<0.001	0.073	<0.001	<0.001	<0.004	<0.002	0.466	<0.001	0.015	<0.0002	<0.001	NA	0.0018	<0.001
G276	5/31/2018	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.04	NA	NA
G276	8/10/2018	NA	<0.001	0.069	NA	NA	NA	NA	0.399	<0.001	0.013	NA	<0.001	0.325	0.0011	NA
G276	1/22/2019	<0.003	<0.001	0.076	<0.001	<0.001	<0.004	<0.002	0.421	<0.001	<0.01	<0.0002	<0.001	0.510	0.0014	<0.001
G276	8/26/2019	NA	<0.001	0.066	NA	NA	<0.004	<0.002	0.443	<0.001	0.016	NA	<0.001	0.339	0.0023	NA
G276	1/23/2020	<0.003	<0.001	0.063	<0.001	<0.001	<0.004	<0.002	0.255	<0.001	<0.02	<0.0002	<0.001	1.12	0.0026	<0.001
G279	11/24/2015	<0.003	<0.001	0.053	<0.001	<0.001	<0.004	<0.002	0.334	0.0015	0.014	<0.0002	<0.001	1.05	0.0041	<0.001
G279	2/16/2016	<0.003	<0.001	0.072	<0.001	<0.001	<0.004	<0.002	0.386	<0.001	0.012	<0.0002	0.043	1.43	0.017	<0.001
G279	5/13/2016	<0.003	<0.001	0.054	<0.001	<0.001	<0.004	<0.002	0.608	<0.001	<0.01	<0.0002	0.024	0.841	0.0027	<0.001
G279	8/3/2016	<0.003	<0.001	0.069	<0.001	<0.001	<0.004	<0.002	0.394	<0.001	<0.01	<0.0002	<0.001	1.16	0.020	<0.001
G279	11/22/2016	<0.003	<0.001	0.057	<0.001	<0.001	<0.004	<0.002	0.272	<0.001	0.011	<0.0002	<0.001	NA	0.017	<0.001
G279	12/7/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.764	NA	NA
G279	2/15/2017	<0.003	<0.001	0.053	<0.001	<0.001	<0.004	<0.002	0.263	<0.001	0.013	<0.0002	<0.001	0.672	0.013	<0.001
G279	5/20/2017	<0.003	<0.001	0.089	<0.001	<0.001	<0.004	<0.002	0.280	<0.001	<0.01	<0.0002	<0.001	0.913	0.0055	<0.001
G279	7/18/2017	<0.003	<0.001	0.054	<0.001	<0.001	<0.004	<0.002	0.282	<0.001	0.012	<0.0002	<0.001	1.27	0.014	<0.001
G279	11/4/2017	NA	NA	NA	NA	NA	NA	NA	0.507	NA	NA	NA	NA	NA	NA	NA
G279	5/16/2018	<0.003	<0.001	0.052	<0.001	<0.001	<0.004	<0.002	0.492	<0.001	<0.01	<0.0002	<0.001	NA	0.0072	<0.001
G279	5/31/2018	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.494	NA	NA
G279	8/10/2018	NA	<0.001	0.044	NA	NA	NA	NA	0.427	<0.001	0.011	NA	<0.001	0.799	0.0092	NA
G279	1/23/2019	<0.003	0.0030	0.083	<0.001	<0.001	0.01	0.0022	0.626	0.0063	<0.01	<0.0002	<0.001	1.80	0.0020	<0.001
G279	8/26/2019	NA	<0.001	0.050	NA	NA	<0.004	<0.002	0.635	<0.001	<0.01	NA	<0.001	0.618	<0.001	NA
G279	1/23/2020	<0.003	<0.001	0.062	<0.001	<0.001	<0.004	<0.002	0.537	<0.001	<0.02	<0.0002	<0.001	1.44	0.0036	<0.001

Notes:
1. Abbreviations: mg/L - milligrams per liter; NA - not analyzed; pCi/L - picocurie per liter;

APPENDIX C5 – SITE HYDROGEOLOGY AND STRATIGRAPHIC CROSS-SECTIONS OF THE SITE

CONCEPTUAL SITE MODEL AND DESCRIPTION OF SITE HYDROGEOLOGY (GYPSUM MANAGEMENT FACILITY GYPSUM STACK POND AND GYPSUM MANAGEMENT FACILITY RECYCLE POND)

The Coffeen Power Station (Power Station) conceptual site model (CSM) and Description of Site Hydrogeology for the Gypsum Management Facility (GMF) Gypsum Stack Pond (GSP) and GMF Recycle Pond (GRP), located near Coffeen, Illinois are described in the following sections.

REGIONAL SETTING

The Power Station is located in Montgomery County, in central Illinois, approximately 2 miles south of the City of Coffeen. Coffeen Lake was built by damming the McDavid Branch of the East Fork of Shoal Creek in 1963 for use as an artificial cooling lake for the Power Station. The Site is located between two lobes of the Coffeen Lake (identified as "Coffeen Lake" and "Unnamed Tributary" on Figures 1 and 2) to the west, east, and south, and is bordered by agricultural land to the north. Several underground coal mines were historically operated both beneath and in the vicinity of the Power Station.

The Quaternary deposits in the Coffeen area consist mainly of diamictons and intercalated outwash deposits that were deposited during Illinoian and Pre-Illinoian glaciations. Along East Fork Shoal Creek valley, east of the Power Station, the glacial deposits are overlain by modern day channel and floodplain deposits belonging to the Cahokia Formation. The Quaternary deposits are underlain by Pennsylvanian age bedrock, primarily shale, of the Bond Formation.

Pleistocene deposits of unlithified glacial diamictons, lacustrine/alluvial deposits, and windblown loess overlie Pennsylvanian-age bedrock throughout central Illinois. The most extensive glacial deposits are those from the Illinoian Stage which cover much of the state and are present at the Site. Windblown (aeolian) deposits, the Peoria and Roxana Silts, cover the glacial deposits over a majority of the state. These units are fine-grained deposits blown from river valleys by prevailing winds.

Till members of the Glasford Formation include the Smithboro Member, the Mulberry Grove Member, the Vandalia Member, and the Hagarstown Member (oldest to youngest). The Smithboro Member is described as a gray, compact, silty till. The Smithboro is bounded below by the Yarmouth Soil. The Mulberry Grove Member is intermittent at the Power Station, and is described as a calcareous gray silt and fine sand containing some fossil mollusks. The Vandalia Member is a sandy till with thin lenticular bodies of silt, sand, and gravel. It is calcareous, except where weathered, generally gray, and moderately compact. The Hagarstown Member is bounded at the top by the Sangamon Soil. The member consists of gravelly till, poorly sorted gravel, well sorted gravel, and sand.

The Power Station and surrounding areas are underlain by rocks belonging to the Pennsylvanian Bond Formation. The Bond Formation is characterized by a high percentage of limestone and calcareous clays and shales. The elevation of the bedrock surface in the area ranges from 450 to 500 feet (ft) above mean sea level (msl). The bedrock surface slopes gently towards the west into a minor bedrock valley that runs north-south. Well logs indicate that the lithology of the uppermost bedrock is predominantly shale.

SITE GEOLOGY

The geology has been extensively evaluated during previous hydrogeologic investigations, groundwater quality assessments, and modeling since the first borings and monitoring wells were installed. Quaternary deposits in the Coffeen area consist mainly of glacial diamictons and outwash deposits that were deposited during Illinoian and Pre-Illinoian glaciations. The unconsolidated deposits which occur at the Power Station include the following units (beginning at the ground surface):

- Upper Confining Unit – Low permeability clays and silts, including the Roxana Silt and Peoria Silt (Loess Unit) and the upper clayey till portion of the Hagarstown Member
- Uppermost Aquifer (Groundwater Monitoring Zone) – Thin (generally less than 3 ft), moderate to high permeability sand, silty sand, and sandy silt/clay units which include the Hagarstown Member (also referred to as the Hagarstown Beds) and the upper Vandalia Till Member (where weathered).
- Lower Confining Unit – Thick (generally greater than 15 ft), very low permeability sandy, silt till, or clay till that include the unweathered Vandalia Member, Mulberry Grove Member (discontinuous), and Smithboro Member.

Pennsylvanian-age Bond Formation bedrock is characterized by limestone and calcareous clays and shales. Bedrock was not encountered in any borings advanced onsite. A cross-section illustrating the thickness and extent of unconsolidated deposits across the GSP and GRP is included as an attachment to this demonstration.

The major unconsolidated materials present at the site are discussed in greater detail below:

Roxana Silt / Peoria Silt (Loess Unit)

The combined Roxana Silt and Peoria Silt are a Loess Unit which extends from beneath the topsoil, derived from the loess, to the top of the Hagarstown (Beds) Member. Thicknesses range from a minimum of less than 1.0 ft adjacent to and west/southwest of Ash Pond No. 2 (groundwater contour maps, which also show the location of each CCR unit are included as an attachment to this demonstration), to a maximum of less than 6 ft as measured within the footprint of the Landfill prior to construction. The loess has been variously classified as silt or clayey silt, with minor amounts of sand. The Loess Unit is generally considered unsaturated and the upper-most aquifer is recharged by precipitation that percolates through this unit. This unit was likely removed from within the footprint of Ash Pond No. 2. Construction of the Landfill and GMF units also required the excavation and removal of this layer.

The laboratory tests from recent geotechnical analysis reported vertical hydraulic conductivity values ranging from 1.3×10^{-8} to 5.0×10^{-7} centimeters per second (cm/s), with a geometric mean of 1.0×10^{-7} cm/s.

Hagarstown Member

The Hagarstown Member (also referred to as Hagarstown Beds) exhibits two units; the first unit, consisting of the gravelly clay till and the second consisting of sandy material overlying the Vandalia Member. The clay till portion had varying thicknesses ranging from 1.9 ft to over 12 ft as observed adjacent to, south and west of Ash Pond No. 2. The thickness of the sandy portion of the Hagarstown is generally 1 to 2 ft thick. The composition of the sandy portion of the Hagarstown unit varies across the site and was classified as gravelly till, poorly sorted gravel, well sorted gravel, sand and silty sand. The elevation of the top of the Hagarstown generally declines as the unit approaches Coffeen Lake or other topographic drainage features.

During construction of the landfill, the GSP, and the GRP, the Loess Unit and the Hagarstown Beds were excavated to facilitate construction by limiting groundwater flow into excavations. The excavations were backfilled with structural fill and an underdrain system was installed to mitigate inward hydraulic pressure and potential liner uplift damage before the CCR units were filled. The Landfill underdrain system remains active. The GRP is a gravity drain system, and the GSP remains in place, but the system is inactive. The hydraulic characteristics of the Hagarstown Member indicate the unit has a moderate hydraulic conductivity.

The results of single well field permeability tests show hydraulic conductivity values ranging from 3.1×10^{-5} to 1.6×10^{-3} cm/s, with a geometric mean of 2.9×10^{-4} cm/s. The upper Vandalia is hydraulically similar to the Hagarstown Beds and is likely connected to and continuous with the Hagarstown. The hydraulic conductivity values measured within wells screened across the Hagarstown Beds are significantly higher than both the overlying Roxana/Peoria Silts and lower Vandalia (Till) Member.

Vandalia Member

The Vandalia (Till) Member is a sandy/silty till with thin, discontinuous lenses of silt, sand, and gravel. The Vandalia Till was encountered in all borings advanced at the site. The Vandalia Till typically ranged in thickness from 11.7 ft in the northern portion of the Power Station, to 31.0 ft between the GMF Gypsum Stack Pond and the GMF Recycle Pond. Similar to the observed top elevation of the Hagarstown Beds, the top of the Vandalia unit declines in elevation near Coffeen Lake and topographic drainage features. This unit is relatively thick throughout the site, with an average thickness of over 15 ft (Hanson, 2009). Results from laboratory tests completed for vertical hydraulic conductivity indicate the Vandalia unit has a very low vertical hydraulic conductivity.

The laboratory tests reported hydraulic conductivity values ranging from 6.8×10^{-9} to 4.5×10^{-6} cm/s, with a geometric mean of 4.9×10^{-8} cm/s. Field hydraulic conductivity tests completed in temporary piezometers (T408 and T409) indicate horizontal conductivities of 9.0×10^{-7} and 3.4×10^{-5} cm/s, respectively. The maximum value was measured in a sand seam within the Vandalia Till, but likely is not representative of the diamicton because sand seams are infrequent and discontinuous.

Mulberry Grove Member

The Mulberry Grove (Silt) Member typically consists of a thin, lenticular unit of gray sandy silt (Willman et al., 1975). It represents the interval between the retreat of the glacier that deposited the Smithboro Member and the advance of the glacier that deposited the Vandalia Member. At the site, the Mulberry Grove Member is represented by pockets (generally less than 2 ft thick) of gray sandy silt. This unit was absent in many borings through the central portion of the site from south to north. Where sampled, the Mulberry Grove Member ranged in thickness from 0.5 to 4.9 ft near the GMF Gypsum Stack Pond (Hanson, 2009). The Mulberry Grove Silt was not encountered in the borings near Ash Pond No. 2. These silts appear to be deposited in depressions found in the surface of the underlying Smithboro Member.

The laboratory tests reported vertical hydraulic conductivity values of 1.6×10^{-6} and 1.9×10^{-6} cm/s, with a geometric mean of 1.7×10^{-6} cm/s.

Smithboro Member

The Smithboro (Till) Member is described as a gray, compact, silty, clayey diamicton. The Smithboro Member ranges in thickness from 6.7 to 21.2 ft northwest of the landfill. Laboratory and field conductivity testing indicate the Smithboro Member has a low hydraulic conductivity.

Laboratory test reported vertical hydraulic conductivity values ranging from 1.1 x 10^{-9} to 1.0 x 10^{-7} cm/s with a geometric mean of 1.3 x 10^{-8} cm/s. Horizontal hydraulic conductivities calculated from single well tests performed in wells G45D and G46D were 4.0 x 10^{-8} and 4.9 x 10^{-7} cm/s, respectively.

Yarmouth Soil

Historical borings in the northern portion of the site which encountered the Yarmouth were summarized previously (Hanson, 2009). The Yarmouth Soil is described as the weathered zone on the Kansan drift, but in some places, it consists of accretionary deposits of fine sediment and organic material that accumulated in poorly drained areas on the surface of the Kansan deposits. Where encountered, the Yarmouth Soil ranged in thickness from 0.8 to 5.1 ft. The Yarmouth Soil (considered the deep water-bearing zone) possesses a moderate to moderately low hydraulic conductivity.

The single-well permeability tests conducted by Hanson (2009) reported moderate hydraulic conductivity values ranging from 1.3 x 10^{-4} to 1.7 x 10^{-3} cm/s, with a geometric mean of 4.4 x 10^{-4} cm/s.

Lierle Clay Member

The Lierle Clay Member is the uppermost member of the Kansan Stage Banner Formation. It is described as an accretion gley with clay, silt and some sand. It was encountered by Hanson (2009) in all but a few borings on site. No boring penetrated the full thickness of the Lierle Clay. The Lierle Clay has a very low hydraulic conductivity.

The laboratory tests reported very low vertical hydraulic conductivity values ranging from 3.4 x 10^{-9} to 1.3 x 10^{-8} cm/s, with a geometric mean of 6.6 x 10^{-9} cm/s.

Bedrock

Pennsylvanian-age Bond Formation bedrock was not encountered in any borings advanced onsite so site specific information is not available.

SITE HYDROGEOLOGY

The GSP CCR groundwater monitoring system consists of seven monitoring wells installed in the uppermost aquifer and adjacent to the GSP (G200, R201, G206, G209, G212, G215, and G218). (see Monitoring Well Location Map, and Well Construction Diagrams and Drilling Logs attached to this demonstration). The GSP utilizes two background monitoring wells (G200, R201) as part of the CCR groundwater monitoring system.

The GRP CCR groundwater monitoring system consists of six monitoring wells installed in the uppermost aquifer and adjacent to the GRP (G270, G280, G271, G273, G276, and G279). (see Monitoring Well Location Map, and Well Construction Diagrams and Drilling Logs attached this demonstration). The GRP utilizes two background monitoring wells (G270, G280) as part of the CCR groundwater monitoring system.

The uppermost aquifer includes the Hagarstown Member and the weathered portions of the Vandalia Member, consisting of thin (generally less than 3 ft), moderate to high permeability sand, silty sand, and sandy silt/clay units. The uppermost aquifer is confined except where site excavations and ravines extend through the Loess Unit and the Hagarstown Member. Where exposed, groundwater within the Hagarstown Member may appear as seeps.

The lower hydrostratigraphic unit consists of the lower, unfractured, Vandalia Till Member, Smithboro Till Member, and the undifferentiated Banner Formation. This lower confining unit is generally greater than 15 ft thick and consists of very low permeability sandy, silt till, or clay till. Bedrock aquifers are composed of

sandstone and fractured limestone, which vary widely in permeability. Groundwater available from bedrock units is mostly mineralized and rarely used as a source for potable water.

Hydraulic Conductivity

Hydraulic conductivity/slug tests were completed in wells screened in the unlithified material during several site investigations. The hydraulic conductivity values determined from individual monitoring wells within the uppermost aquifer (Hagarstown Beds and Upper Vandalia Till) ranged from 1.6×10^{-3} cm/s to 3.1×10^{-5} cm/s. The geometric mean of the hydraulic conductivity for tested monitoring wells in the uppermost aquifer is 2.9×10^{-4} cm/s.

The hydraulic conductivity values determined from individual monitoring wells within the Lower Confining Unit (Vandalia Till and Smithboro Till) ranged from 3.4×10^{-5} cm/s to 4.0×10^{-8} cm/s. The geometric mean of the hydraulic conductivity at all monitoring wells was 5.6×10^{-6} cm/s. The effective porosity of the clayey sand/silty sand aquifer (20%) was estimated from literature values (Sanders, 1998) to calculate the velocity of the groundwater.

Groundwater Elevations, Flow Direction and Velocity

Groundwater elevations obtained from measurements in monitoring wells from 2015 through 2016 (NRT, 2017) indicate that water levels in that area ranged from about 603 ft to 623 ft msl. The water table is often a subdued reflection of the surface topography. Groundwater flow will also be locally influenced by recharge from pond exfiltration and discharge to local ditches, streams and Coffeen Lake. A north/south trending groundwater mound is observed through the CCR units and groundwater flow is generally to the southeast or southwest, converging on the tributary valleys leading to Coffeen Lake on the east and west sides of the property. Groundwater flow south of the GRP is southward toward the discharge channel into Coffeen Lake. Groundwater flow south of the discharge channel flows north toward the channel. Representative groundwater contour maps are provided as an attachment to this demonstration.

Where the Hagarstown Beds have not been excavated for construction of the landfill and GMFs, moderate horizontal groundwater gradients on the order of 0.006 feet per feet (ft/ft) are typically observed. Groundwater velocities across the Power Station may vary significantly, depending on the thickness and continuity of sand seams within the Hagarstown Beds.

Vertical groundwater gradients were measured at two locations between the Hagarstown Beds and Vandalia Till. Vertical flow was upward into the more permeable Hagarstown Beds with gradients of 0.009 to 0.4. Vertical groundwater gradients measured in the lower confining unit between the Vandalia Till and underlying Smithboro Till indicated steeply downward gradients exceeding 1, indicating very low vertical hydraulic conductivity and that groundwater in the Vandalia Till is perched.

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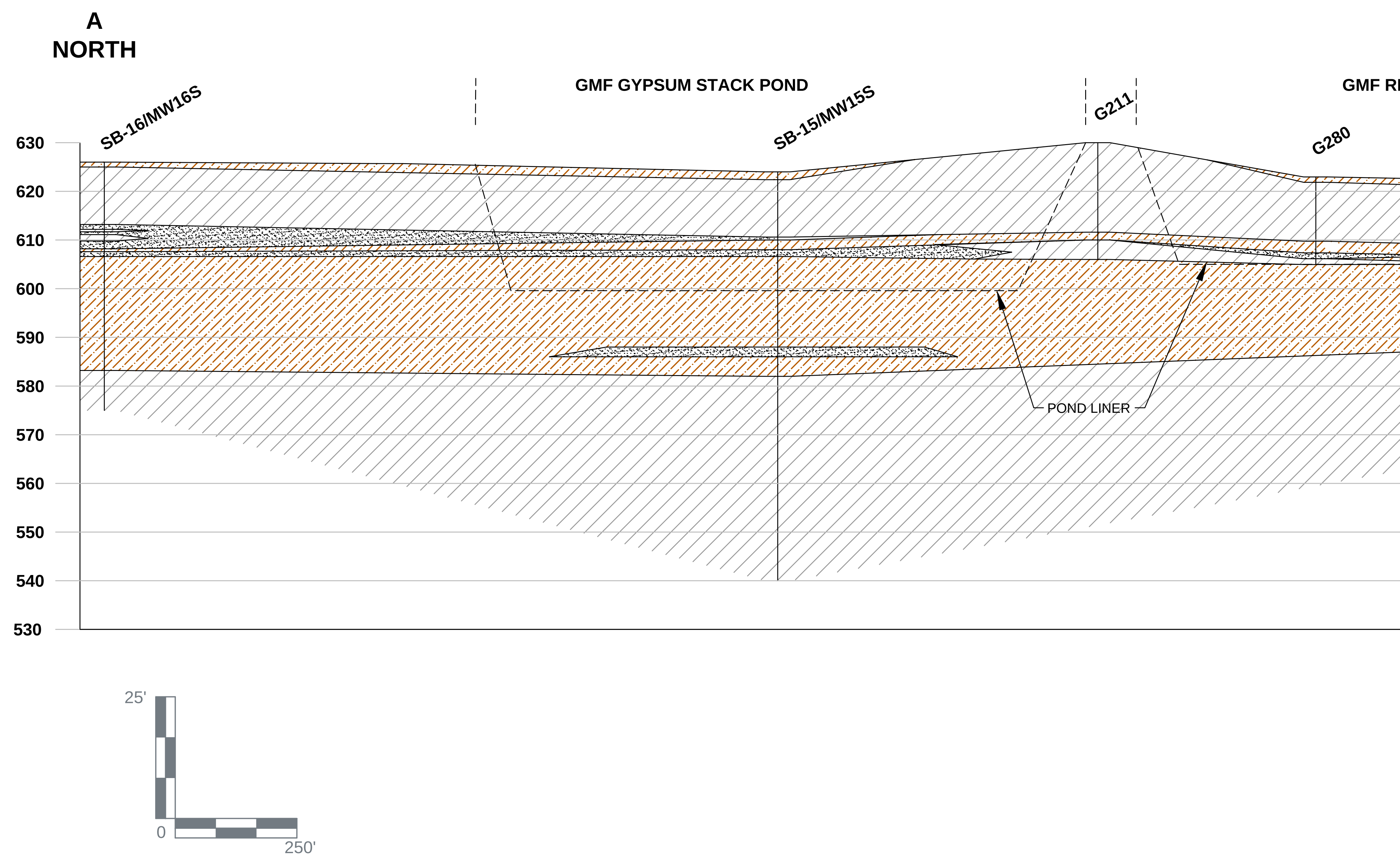

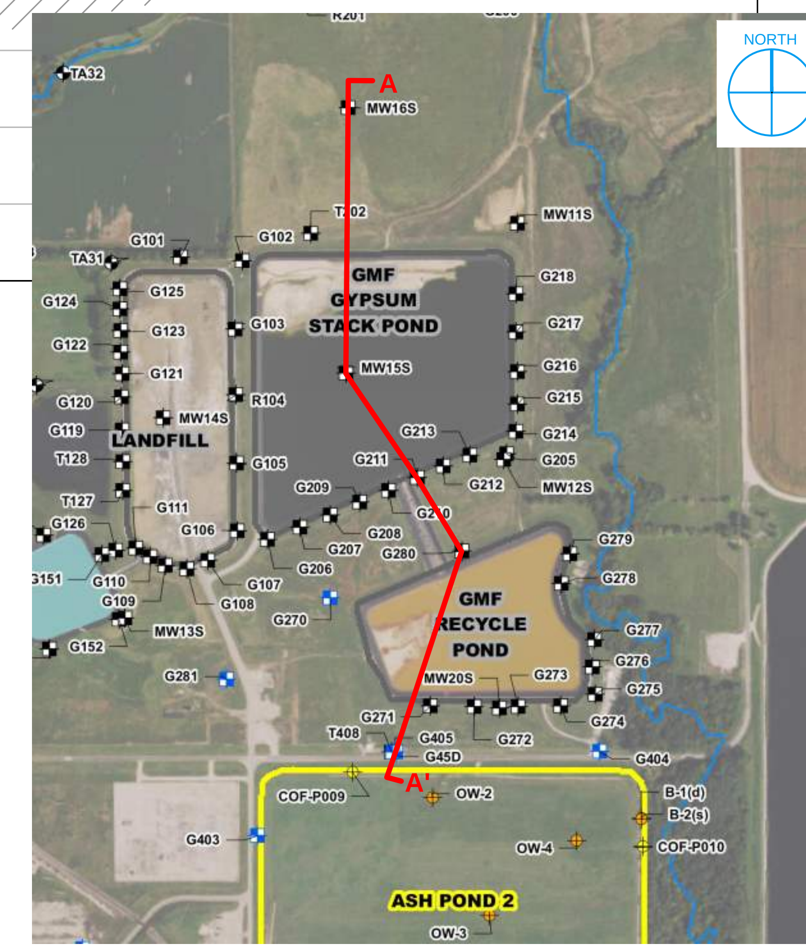

LEGEND

CLAY

SILT

SAND

NOTES

1. This profile was developed by interpolation between widely spaced boreholes. Only at the borehole location should it be considered as an approximately accurate representation and then only to the degree implied by the notes on the borehole logs.
2. Scale is approximate.
3. Vertical scale is exaggerated 10X.

CROSS SECTION A-A'

GMF GYPSUM STACK AND GMF RECYCLE POND

COFEEN POWER STATION

COFFEEN, ILLINOIS

FIGURE 1

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

RAMBOLL

APPENDIX C6 – STRUCTURAL STABILITY ASSESSMENT

AECOM

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October 2016

CCR Rule Report: Initial Structural Stability Assessment

For

GMF Pond

At Coffeen Power Station

1 Introduction

This Coal Combustion Residual (CCR) Rule Report documents that the Gypsum Management Facility (GMF) Pond at the Illinois Power Generating Company Coffeen Power Station meets the structural stability assessment requirements specified in 40 Code of Federal Regulations (CFR) §257.73(d). The GMF Pond is located near Coffeen, Illinois in Montgomery County, approximately 0.6 miles north of the Coffeen Power Station. The GMF Pond serves as the primary wet impoundment basin for gypsum produced by the wet scrubber system at the Coffeen Power Station.

The GMF Pond is an existing CCR surface impoundment as defined by 40 CFR §257.53. The CCR Rule requires that an initial structural stability assessment for an existing CCR surface impoundment be completed by October 17, 2016. In general, the initial structural stability assessment must document that the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering practices.

The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the initial structural stability assessment was conducted in accordance with the requirements of 40 CFR § 257.73(d). The owner or operator must prepare a periodic structural stability assessment every five years.

2 Initial Structural Stability Assessment

40 CFR §257.73(d)(1)
The owner or operator of the CCR unit must conduct initial and periodic structural stability assessments and document whether the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering practices for the maximum volume of CCR and CCR wastewater which can be impounded therein. The assessment must, at a minimum, document whether the CCR unit has been designed, constructed, operated, and maintained with [the standards in (d)(1)(i)-(vii)].

An initial structural stability assessment has been performed to document that the design, construction, operation and maintenance of the GMF Pond is consistent with recognized and generally accepted good engineering practices and meets the standards in 257.73(d)(1)(i)-(vii). The results of the structural stability assessment are discussed in the following sections. Based on the assessment and its results, the design, construction, operation, and maintenance of the GMF Pond were found to be consistent with recognized and generally accepted good engineering practices.

2.1 Foundations and Abutments (§257.73(d)(1)(i))

CCR unit designed, constructed, operated, and maintained with stable foundations and abutments.

The stability of the foundations was evaluated using soil data from field investigations and reviewing design drawings, operational and maintenance procedures, and conditions observed in the field by AECOM. Additionally, slope stability analyses were performed to evaluate slip surfaces passing through the foundations. The GMF Pond is a ring dike structure and does not have abutments.

The foundation consists of medium stiff to stiff soil, overlying soft to very soft soil, which in turn overlies very stiff to hard glacial till. Slope stability analyses exceed the criteria listed in §257.73(e)(1)(i) through (iii) for slip surfaces passing through the foundation. The slope stability analyses are discussed in the *CCR Rule Report: Initial Safety Factor Assessment for GMF Pond at Coffeen Power Station* (October 2016). Additional slope stability analyses were performed to evaluate the effects of liquefaction and cyclic softening in the foundation, and were found to satisfy the criteria listed in §257.73(e)(1)(iv) applicable to dikes. A review of operational and maintenance procedures as well as current and past performance of the dikes has determined appropriate processes are in place for continued operational performance.

Based on the conditions observed by AECOM, the GMF Pond was designed and constructed with stable foundations. Operational and maintenance procedures are in place to address any issues related to the stability of foundations. Therefore, the GMF Pond meets the requirements in §257.73(d)(1)(i).

2.2 Slope Protection (§257.73(d)(1)(ii))

CCR unit designed, constructed, operated, and maintained with adequate slope protection to protect against surface erosion, wave action and adverse effects of sudden drawdown.

The adequacy of slope protection was evaluated by reviewing design drawings, operational and maintenance procedures, and conditions observed in the field by AECOM.

Based on this evaluation, adequate slope protection was designed and constructed at the GMF Pond. No evidence of significant areas of erosion or wave action was observed. The interior slopes are protected with a geomembrane liner that underlies the entire GMF Pond and extends up the interior slopes, and the exterior

slopes are protected with vegetation. The geomembrane liner on the interior slopes isolates the embankment soils from surface erosion or wave action. Operational and maintenance procedures to repair the vegetation (exterior slopes) and liner (interior slopes) as needed are appropriate to protect against surface erosion or wave action. Given the presence of a liner that serves to prevent saturation of the dike's soils below the normal pool, sudden drawdown, as well as the corresponding adverse effects, is not applicable to the GMF Pond. Therefore, the GMF Pond meets the requirements in §257.73(d)(1)(ii).

2.3 Dike Compaction (§257.73(d)(1)(iii))

CCR unit designed, constructed, operated, and maintained with dikes mechanically compacted to a density sufficient to withstand the range of loading conditions in the CCR unit.

The density of the dike materials was evaluated using soil data from field investigations and reviewing design drawings, operational and maintenance procedures, and conditions observed in the field by AECOM. Additionally, slope stability analyses were performed to evaluate slip surfaces passing through the dike over the range of expected loading conditions as defined within §257.73(e)(1).

Based on this evaluation, the dike consists of medium stiff to stiff material, which is indicative of mechanically compacted dikes. As discussed in the *CCR Rule Report: Initial Safety Factor Assessment for GMF Pond at Coffeen Power Station* (2016), slope stability analyses exceed the criteria listed in §257.73(e)(1) for slip surfaces passing through the dike. Therefore, the original design and construction of the GMF Pond included sufficient dike compaction. Operational and maintenance procedures are in place to identify and mitigate deficiencies in order to maintain sufficient compaction of the dikes to withstand the range of loading conditions. Therefore, the GMF Pond meets the requirements in §257.73(d)(1)(iii).

2.4 Vegetated Slopes (§257.73(d)(1)(iv))[1]

CCR unit designed, constructed, operated, and maintained with vegetated slopes of dikes and surrounding areas, except for slopes which have an alternate form or forms of slope protection.

The adequacy of slope vegetation was evaluated by reviewing design drawings, operational and maintenance procedures, and conditions observed in the field by AECOM.

Based on this evaluation, the vegetation on the exterior slopes is adequate as no substantial bare or overgrown areas were observed. Exposed geomembrane liners on the interior slopes are used as an alternate form of slope protection, which is adequate as significant tears or defects were not observed. Therefore, the original design and construction of the GMF Pond included adequate vegetation of the dikes and surrounding areas. Adequate operational and maintenance procedures are in place to regularly manage vegetation growth, including mowing and seeding any bare areas, as evidenced by the conditions observed by AECOM. Therefore, the GMF Pond meets the requirements in §257.73(d)(1)(iv).

[1] As modified by court order issued June 14, 2016, Utility Solid Waste Activities Group v. EPA, D.C. Cir. No. 15-1219 (order granting remand and vacatur of specific regulatory provisions).

2.5 Spillways (§257.73(d)(1)(v))

CCR unit designed, constructed, operated, and maintained with a single spillway or a combination of spillways configured as specified in [paragraph (A) and (B)]:

(A) All spillways must be either:

(1) of non-erodible construction and designed to carry sustained flows; or

(2) earth- or grass-lined and designed to carry short-term, infrequent flows at non-erosive velocities where sustained flows are not expected.

(B) The combined capacity of all spillways must adequately manage flow during and following the peak discharge from a:

(1) Probable maximum flood (PMF) for a high hazard potential CCR surface impoundment; or

(2) 1000-year flood for a significant hazard potential CCR surface impoundment; or

(3) 100-year flood for a low hazard potential CCR surface impoundment.

The spillway system was evaluated using design drawings, operational and maintenance procedures, and conditions observed in the field by AECOM. Additionally, hydrologic and hydraulic analyses were completed to evaluate the capacity of the spillway relative to inflow estimated for the probable maximum flood (PMF) inflow design flood (IDF) event for the high hazard potential GMF Pond. The hazard potential classification assessment was performed by Stantec in 2016 in accordance with §257.73(a)(2).

The spillway system at the GMF Pond includes a geomembrane-lined transfer channel and a high-density polyethylene low-flow pipe. Both the lined channel and the low-flow pipe are constructed from non-erodible materials that are designed to carry sustained flows. The capacity of the spillway system was evaluated using hydrologic and hydraulic analysis performed per §257.82(a). The analysis found that the spillway system can adequately manage flow during peak discharge resulting from the PMF IDF without overtopping of the embankments. The hydrologic and hydraulic analyses are discussed in the *CCR Rule Report: Initial Inflow Design Flood Control System Plan for GMF Pond at Coffeen Power Station* (October 2016). Operational and maintenance procedures are in place to repair any tears in the spillway liner and remove debris or other obstructions from the transfer channel and low-flow pipe, as evidenced by the conditions observed by AECOM. As a result, these procedures are appropriate for maintaining the spillway system. Therefore, the GMF Pond meets the requirements in §257.73(d)(1)(v).

2.6 Stability and Structural Integrity of Hydraulic Structures (§257.73(d)(1)(vi))

CCR unit designed, constructed, operated, and maintained with hydraulic structures underlying the base of the CCR unit or passing through the dike of the CCR unit that maintain structural integrity and are free of significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, and debris which may negatively affect the operation of the hydraulic structure.

Based on an evaluation of design drawings, operational and maintenance procedures, and conditions observed in the field by AECOM, no hydraulic structures are present that underlie the base or pass through the dike of the GMF Pond. Therefore, the §257.73(d)(1)(vi) requirements are not applicable to the GMF Pond.

2.7 Downstream Slope Inundation/Stability (§257.73(d)(1)(vii))

CCR unit designed, constructed, operated, and maintained with, for CCR units with downstream slopes which can be inundated by the pool of an adjacent water body, such as a river, stream or lake, downstream slopes that maintain structural stability during low pool of the adjacent water body or sudden drawdown of the adjacent water body.

The structural stability of the downstream slopes of the GMF Pond was evaluated by comparing the location of the GMF Pond relative to adjacent water bodies using published Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM), aerial imagery, and conditions observed in the field by AECOM.

Based on this evaluation, water bodies adjacent to the downstream slopes of the GMF Pond are not present. The nearest downstream water body is the GMF Recycle Pond, which is approximately 500 lateral feet beyond the

downstream slopes of the GMF Pond. The GMF Recycle Pond is a CCR unit, rather than a river, stream, or lake. Coffeen Lake is also located in the vicinity of the GMF Pond, but the GMF Pond is outside of the flood zone shown on the FEMA FIRM. Therefore, adjacent water bodies that can inundate the downstream slopes of the GMF Pond are not present.

Based on this evaluation, the requirements in §257.73(d)(1)(vii) are not applicable to the GMF Pond, as inundation of the downstream slopes is not expected to occur.

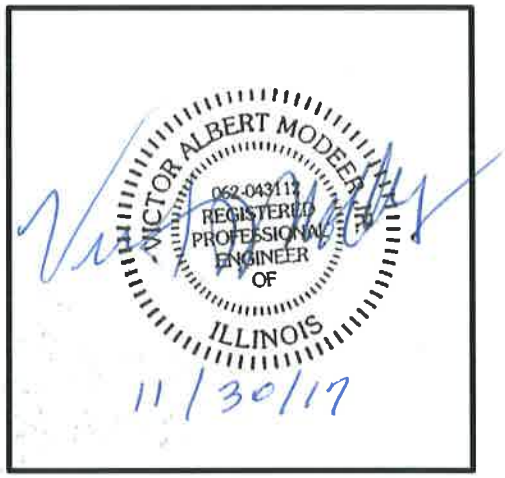
3 Certification Statement

CCR Unit: Illinois Power Generating Company; Coffeen Power Station; GMF Pond

I, Victor A. Modeer, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief that the information contained in this CCR Rule Report, and the underlying data in the operating record, has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the initial structural stability assessment dated October 13, 2016 was conducted in accordance with the requirements of 40 CFR § 257.73(d).

VICTOR A MODEER SR.
Printed Name

10/13/16
Date



CCR Rule Report:

Initial Structural Stability Assessment

GMF Recycle Pond
Coffeen Power Station
Montgomery County, Illinois

Submitted to Illinois Power Generating Company
October 2016

HANSON
Engineering | Planning | Allied Services

1. Introduction

The GMF Recycle Pond at the Coffeen Power Station is located in the NW 1/4 of Section 11, Township 7 North, Range 3 West of the Third Principal Meridian in Montgomery County, Illinois, approximately 1.5 miles south of Coffeen, Illinois.

The GMF Recycle Pond is lined with a 60-mil, high-density polyethylene (HDPE) geomembrane, has a maximum embankment height of 16 feet and has a maximum impounding capacity of 243 acre-feet (measured at the top elevation 629.0 feet). There is an additional 99 acre-feet of incised storage.

The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the initial structural stability assessment was conducted in accordance with the requirements of 40 CFR 257.73(d).

2. Initial Structural Stability Assessment

40 CFR 257.73(d)(1) Periodic structural stability assessments.
(1) The owner or operator of the CCR unit must conduct initial and periodic structural stability assessments and document whether the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering practices for the maximum volume of CCR and CCR wastewater which can be impounded therein. The assessment must, at a minimum, document whether the CCR unit has been designed, constructed, operated, and maintained with: 40 CFR 257.73(d)(1)(i)-(vii)

An initial structural stability assessment has been performed in accordance with 40 CFR 257.73(d)(1)(i)-(vii), documenting that the design, construction, operation, and maintenance of the GMF Recycle Pond is consistent with recognized and generally accepted good engineering practices for the maximum volume of CCR and CCR wastewater, which can be impounded therein.

2.1 Stable Foundations and Abutments

40 CFR 257.73(d)(1)(i) - CCR unit designed, constructed, operated, and maintained with stable foundations and abutments.

The GMF Recycle Pond foundation soils are grayish brown to brown, firm, silty clay, having Standard Penetration Test (SPT) blow counts ranging from 4-7 blows/foot and unconfined compressive strengths of approximately 1.3 tons per square foot. The GMF Recycle Pond has no abutments. The structural stability of the foundation soils and embankment was assessed and found to meet the structural stability requirements of 40 CFR 257.73(e). Information related to this assessment is found in the CCR Rule Report: Initial Safety Factor Assessment for the GMF Recycle Pond, dated October 2016. Procedures are in place to maintain and operate the foundations in a stable manner. Therefore, the GMF Recycle Pond meets the requirements of 40 CFR 257.73(d)(1)(i).

2.2 Adequate Slope Protection

40 CFR 257.73(d)(1)(ii) - CCR unit designed, constructed, operated, and maintained with adequate slope protection to protect against surface erosion, wave action and adverse effects of sudden drawdown.

The interior slopes of the GMF Recycle Pond are designed and constructed using a high-density polyethylene (HDPE) geomembrane, which is not susceptible to surface erosion or wave action. The exterior slopes were designed and constructed with a 4H:1V slope and vegetation to protect against

surface erosion. The operational condition of the interior and exterior slopes were visually evaluated during the annual inspection performed per 40 CFR 257.83 on September 27, 2016, and found to be intact. Procedures are in place to maintain and operate the slope protection features.

Even though it is highly unlikely that the GMF Recycle Pond interior slopes will be subjected to a rapid drawdown condition because they are lined with an HDPE geomembrane, slope stability analyses of the critical cross section of the slope indicate that sudden drawdown will have no adverse effects.

Therefore, the GMF Recycle Pond meets the requirements in 40 CFR 257.73(d)(1)(ii).

2.3 Dike Compaction

40 CFR 257.73(d)(1)(iii) - CCR unit designed, constructed, operated, and maintained with dikes mechanically compacted to a density sufficient to withstand the range of loading conditions in the CCR unit.

Construction records for the GMF Recycle Pond indicate that the dike was constructed of sandy silty clay fill materials, having a maximum compacted lift thickness of 8 inches. Fill materials were compacted to a dry density equal to or greater than 95 percent of the maximum dry density obtained from the Standard Proctor Test, ASTM D698. Fill was compacted at a moisture content that is no more than 2 percent below and no more than 2 percent above optimum moisture content. In-place compacted densities range from 105.1 to 112.7 pounds per cubic foot.

These in-place parameters meet the criteria of the original slope stability analyses found in the design record. Procedures are in place to maintain and operate the dikes to withstand the range of loading conditions. Therefore, the GMF Recycle Pond meets the requirements in 40 CFR 257.73(d)(1)(iii).

2.4 Vegetated Slopes

40 CFR 257.73(d)(1)(iv) - CCR unit designed, constructed, operated, and maintained with vegetated slopes of dikes and surrounding areas, except for slopes which have an alternate form or forms of slope protection.

The GMF Recycle Pond exterior slopes were designed and constructed with vegetated slopes capable of providing protection against surface erosion. The interior slopes of the GMF Recycle Pond were designed and constructed using a HDPE geomembrane liner for slope protection. Operational and maintenance procedures are in place to operate and maintain the vegetation on the slopes. The operational condition of the exterior slopes was evaluated and found to be intact. Procedures are in place to maintain and operate the vegetated slopes and alternate slope protection. Therefore, the GMF Recycle Pond meets the requirements in 40 CFR 257.73(d)(1)(iv).

2.5 Spillways

40 CFR 257.73(d)(1)(v) - CCR unit designed, constructed, operated, and maintained with a single spillway or a combination of spillways configured as specified in [paragraph (A) and (B)]:

(A) All spillways must be either:
- *(1) of non-erodible construction and designed to carry sustained flows; or*
- *(2) earth- or grass-lined and designed to carry short-term, infrequent flows at non-erosive velocities where sustained flows are not expected.*

(B) The combined capacity of all spillways must adequately manage flow during and following the peak discharge from a:
(1) Probable maximum flood (PMF) for a high hazard potential CCR surface impoundment; or
(2) 1000-year flood for a significant hazard potential CCR surface impoundment; or
(3) 100-year flood for a low hazard potential CCR surface impoundment.

The emergency spillway for the GMF Recycle Pond consists of three 6-foot-by-6-foot precast reinforced concrete risers (drop inlets) each with a top elevation of 624 feet (5 feet below the top of the dam). The GMF Recycle Pond HDPE liner is attached to the exterior sides of each riser. A 4-foot-diameter HDPE outlet conduit that returns water to the power station was constructed at each riser, with an upstream invert of 615.0 feet and a downstream invert of 613.0 feet. Assuming a maximum normal pool elevation of 624.0 feet (control elevation of the risers), the emergency spillway has been designed to pass the 24-hour PMF storm event of 34 inches of precipitation, based on NOAA Hydrometeorolgical Report No. 51, with adequate freeboard to prevent overtopping of the GMF Recycle Pond crest by wind-generated waves. By contrast, the regulatory 1,000-year flood event was estimated to be 9.13 inches in 24 hours, based on NOAA Atlas 14, which is much less than the PMF. The downstream end of the emergency spillway is protected from scour by a riprap stilling basin. The emergency spillway is regularly inspected and maintained in accordance with the gypsum management facility operation and maintenance manual found in the Coffeen Power Station GMF Recycle Pond Documentation Report.

Therefore, the GMF Recycle Pond spillway meets the requirements in 40 CFR 257.73(d)(1)(v).

2.6 Stability and Structural Integrity of Hydraulic Structures

40 CFR 257.73(d)(1)(vi) - CCR unit designed, constructed, operated, and maintained with hydraulic structures underlying the base of the CCR unit or passing through the dike of the CCR unit that maintain structural integrity and are free of significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, and debris which may negatively affect the operation of the hydraulic structure.

The emergency spillway drop inlet structures were constructed on structural soil fill materials. Discharge piping is composed of non-erodible butt-fusion HDPE piping, and a flowable backfill plug was installed at the location where the pipes exit the drop inlet structures to prevent seepage. Compacted structural soil backfill was installed around the discharge pipes as they pass through the GMF Recycle Pond dike. A riprap stilling basin was installed on the downstream end of the discharge pipes to prohibit scour.

The process water decant pipes that feed water to the GMF Recycle Pond pumphouse are composed of non-erodible butt-fusion HDPE piping. Compacted structural soil backfill was installed around the decant pipes as they pass through the GMF Recycle Pond dike. The pipes are booted through the HDPE geomembrane to prevent leakage.

A pond riser pipe that hydraulically connects the GMF Recycle Pond to the ultrasonic transducer manhole for the purpose of water level monitoring is composed of non-erodible butt-fusion HDPE piping. Compacted structural soil backfill was installed around the pipes beneath the GMF Recycle Pond dike. The pipe is booted through the HDPE geomembrane to prevent leakage.

A decant pipe that transfers water from the GMF Pond to the GMF Recycle Pond is composed of non-erodible butt-fusion HDPE piping. Flowable backfill was installed around the decant pipe as it passes beneath the process water transfer channel. The pipe is booted through the HDPE geomembrane to prevent leakage.

A slurry pipe that can transfer FGD slurry from the plant scrubber system to the GMF Recycle Pond is composed of non-erodible butt-fusion HDPE piping. This pipe passes through the west dike of the GMF Recycle Pond and is not in operation. Compacted structural soil backfill was installed around the decant pipe as it passes through the dike. The pipe is booted through the HDPE geomembrane to prevent leakage.

The emergency spillway was visually inspected during the annual inspection on September 27, 2016, and no deficiencies were observed. Therefore, the stability and structural integrity of the emergency spillway was designed, constructed, operated and maintained to meet the requirements of 40 CFR 257.73(d)(1)(vi).

The September 27, 2016, inspection did not identify any observable deficiencies with the process water decant pipes, the pond riser pipe, the transfer channel decant pipe or the slurry pipe that may negatively affect operation of those hydraulic structures. However, thorough inspections of those pipes have not yet been performed to confirm the current condition of the pipes as free of significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, and debris per 40 CFR 257.73(d)(1)(vi). Thus, while the design and construction of the process water decant pipes, the pond riser pipe, the transfer channel decant pipe and the slurry pipe meets the requirements of 40 CFR 257.73(d)(1)(vi), in accordance with 40 CFR 257.73(d)(2), Hanson recommends that a nondestructive inspection of these pipes be performed as soon as feasible and that this report be updated with inspection documentation at that time.

2.7 Downstream Slope Inundation/Stability

40 CFR 257.73(d)(1)(vii) - CCR unit designed, constructed, operated, and maintained with, for CCR units with downstream slopes which can be inundated by the pool of an adjacent water body, such as a river, stream or lake, downstream slopes that maintain structural stability during low pool of the adjacent water body or sudden drawdown of the adjacent water body.

A review of Federal Emergency Management Agency flood hazard maps indicates that adjacent water bodies, more specifically the intermittent stream east of the GMF Recycle Pond, are not prone to flooding. Therefore, the GMF Recycle Pond downstream slopes would not be inundated by the pool of an adjacent water body.

3. Certification Statement

COFFEEN POWER STATION - GMF RECYCLE POND
ILLINOIS POWER GENERATING COMPANY
INITIAL STRUCTURAL STABILITY ASSESSMENT CERTIFICATION

As a Qualified Professional Engineer as defined by 40 CFR 257 Subpart D, I certify that I have personally examined and am familiar with the design information referenced below, and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate and complete.

The **Coffeen Power Station GMF Recycle Pond** Initial Structural Stability Assessment, as supported by the Coffeen Power Station GMF Recycle Pond Documentation Report in the operating record was conducted in accordance with the requirements set forth by 40 CFR 257.73 as published on April 17, 2015.

Steven M. Bishoff, P.E.
Hanson Professional Services Inc.
1525 South Sixth Street
Springfield, IL 62703-2886
(217) 788-2450
Registration No. 062-040449

Seal:

Signature: _____ Date: 10-13-2016

APPENDIX C7 – SAFETY FACTOR ASSESSMENT

AECOM

Submitted to
Illinois Power Generating Company
134 Cips Lane
Coffeen, IL 62017

Submitted by
AECOM
1001 Highlands Plaza Drive West
Suite 300
St. Louis, MO 63110

October 2016

CCR Rule Report: Initial Safety Factor Assessment

For

GMF Pond

At Coffeen Power Station

1 Introduction

This Coal Combustion Residual (CCR) Rule Report documents that the Gypsum Management Facility (GMF) Pond at the Illinois Power Generating Company Coffeen Power Station meets the safety factor assessment requirements specified in 40 Code of Federal Regulations (CFR) §257.73(e). The GMF Pond is located near Coffeen, Illinois in Montgomery County, approximately 0.6 miles north of the Coffeen Power Station. The GMF Pond serves as the primary wet impoundment basin for gypsum produced by the wet scrubber system at the Coffeen Power Station.

The GMF Pond is an existing CCR surface impoundment as defined by 40 CFR §257.53. The CCR Rule requires that the initial safety factor assessment for an existing CCR surface impoundment be completed by October 17, 2016.

The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the initial safety factor assessment meets the requirements of 40 CFR § 257.73(e). The owner or operator must prepare a safety factor assessment every five years.

2 Initial Safety Factor Assessment

40 CFR §257.73(e)(1)
The owner or operator must conduct initial and periodic safety factor assessments for each CCR unit and document whether the calculated factors of safety for each CCR unit achieve the minimum safety factors specified in (e)(1)(i) through (iv) of this section for the critical cross section of the embankment. The critical cross section is the cross section anticipated to be the most susceptible of all cross sections to structural failure based on appropriate engineering considerations, including loading conditions. The safety factor assessments must be supported by appropriate engineering calculations.

(i) The calculated static factor of safety under the long-term, maximum storage pool loading condition must equal or exceed 1.50.

(ii) The calculated static factor of safety under the maximum surcharge pool loading condition must equal or exceed 1.40.

(iii) The calculated seismic factor of safety must equal or exceed 1.00.

(iv) For dikes constructed of soils that have susceptibility to liquefaction, the calculated liquefaction factor of safety must equal or exceed 1.20.

A geotechnical investigation program and stability analyses were performed to evaluate the design, performance, and condition of the earthen dikes of the GMF Pond. The exploration consisted of cone penetration test soundings. Data collected from the geotechnical investigation, available design drawings, construction records, inspection reports, previous engineering investigations, and other pertinent historic documents were utilized to perform the safety factor assessment and geotechnical analyses.

In general, the subsurface conditions at the GMF Pond consist of medium stiff to stiff embankment fill (clay) overlying medium stiff to stiff clay, overlying soft to very soft clay, with in turn overlies stiff to hard glacial till (clay) with dense to very dense sand and gravel. Phreatic water is typically near the embankment/foundation interface at the GMF Pond.

Four (4) representative cross sections were analyzed using limit equilibrium slope stability analysis software to evaluate stability of the perimeter dike system and foundations. The cross sections were located to represent critical surface geometry, subsurface stratigraphy, and phreatic conditions across the site. Each cross section was evaluated for each of the loading conditions stipulated in §257.73(e)(1).

The Soils Susceptible to Liquefaction loading condition, §257.73(e)(1)(iv), was not evaluated because a liquefaction susceptibly evaluation did not find soils susceptible to liquefaction within the GMF Pond dikes. As a result, this loading condition is not applicable to the GMF Pond.

Results of the Initial Safety Factor Assessments, for the critical cross-section for each loading condition, are listed in **Table 1** (i.e., the table identifies the lowest calculated factor of safety for any one of the four analyzed cross sections for each loading condition).

Table 1 – Summary of Initial Safety Factor Assessments

Loading Conditions	§257.73(e)(1) Subsection	Minimum Factor of Safety	Calculated Factor of Safety
Maximum Storage Pool Loading	(i)	1.50	3.45
Maximum Surcharge Pool Loading	(ii)	1.40	3.45
Seismic	(iii)	1.00	1.47
Soils Susceptible to Liquefaction	(iv)	1.20	Not Applicable

Based on this evaluation, the GMF Pond meets the requirements in §257.73(e)(1).

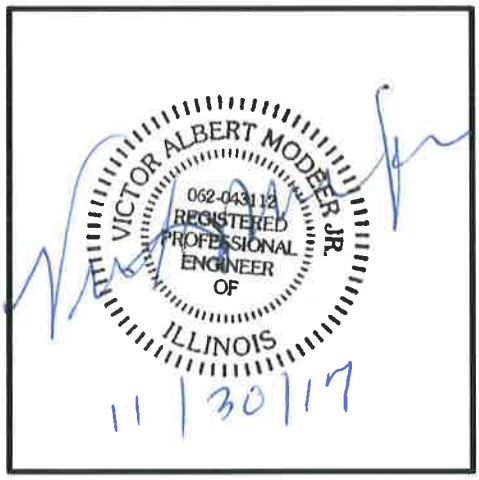
3 Certification Statement

CCR Unit: Illinois Power Generating Company; Coffeen Power Station; GMF Pond

I, Victor A. Modeer, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief that the information contained in this CCR Rule Report, and the underlying data in the operating record, has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the initial safety factor assessment dated October 13, 2016 meets the requirements of 40 CFR §257.73(e).

VICTOR A MODEER JR.
Printed Name

10/13/16
Date



CCR Rule Report:

Initial Safety Factor Assessment

GMF Recycle Pond
Coffeen Power Station
Montgomery County, Illinois

Submitted to Illinois Power Generating Company
October 2016

HANSON
Engineering | Planning | Allied Services

1. Introduction

The GMF Recycle Pond at the Coffeen Power Station is located in the NW 1/4 of Section 11, Township 7 North, Range 3 West of the Third Principal Meridian in Montgomery County, Illinois, approximately 1.5 miles south of Coffeen, Illinois.

The GMF Recycle Pond is lined with a 60-mil, high-density polyethylene (HDPE) geomembrane, has a maximum embankment height of 16 feet, and has a maximum impounding capacity of 243 acre-feet (measured at the top elevation 629.0 feet). There is an additional 99 acre-feet of incised storage.

The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the initial safety factor assessment meets the requirements of 40 CFR 257.73(e).

2. Safety Factor Assessment

40 CFR 257.73(e)(1)
The owner or operator must conduct initial and periodic safety factor assessments for each CCR unit and document whether the calculated factors of safety for each CCR unit achieve the minimum safety factors specified in (e)(1)(i) through (iv) of this section for the critical cross section of the embankment. The critical cross section is the cross section anticipated to be the most susceptible of all cross sections to structural failure based on appropriate engineering considerations, including loading conditions. The safety factor assessments must be supported by appropriate engineering calculations.

(i) The calculated static factor of safety under the long-term, maximum storage pool loading condition must equal or exceed 1.50.
(ii) The calculated static factor of safety under the maximum surcharge pool loading condition must equal or exceed 1.40.
(iii) The calculated seismic factor of safety must equal or exceed 1.00.
(iv) For dikes constructed of soils that have susceptibility to liquefaction, the calculated liquefaction factor of safety must equal or exceed 1.20.

The fundamental design criteria of the GMF Recycle Pond is based on the need to provide for safe operation and maintenance of the embankment and the minimization of potential failure mechanisms common to earthen surface impoundments. Additionally, the design must also incorporate hydrologic and hydraulic evaluations to determine that the dimensions of the embankment and appurtenances are adequate to prevent damage to the surface impoundment during normal operations and extreme rainfall events.

Stability analyses were performed for the GMF Recycle Pond design. The analyses were performed using the program PCSTABL5, which was developed at Purdue University, and SlopeW, developed by Geo Studio international. At the location of the GMF Recycle Pond, the critical elements for stability are the earthen berms.

The soil parameters used for the preliminary stability analyses were selected using data obtained during the geotechnical investigation of the GMF Recycle Pond. Soil parameters for the interfaces between manufactured lining materials and soils, at the interfaces between layers of manufactured lining materials, and within lining materials were selected based on values obtained from engineering literature.

During the analyses for the GMF Recycle Pond, the location of the phreatic surface was modeled assuming that there is no synthetic lining within the construction (a highly conservative assumption

because the GMF Recycle Pond is lined with highly impermeable synthetic materials). For this assumption, the phreatic surface would develop through the embankment sections over time.

At the GMF Recycle Pond location, a cross section of the embankment with the highest embankment height was judged to be the critical cross section. Analyses were performed for a long-term, steady-state-seepage condition using drained soil parameters (Maximum Storage Pool Loading using an elevation of 624.0 and Maximum Surcharge Pool Loading using an elevation of 627.4), and a seismic loading condition using rapid load soil parameters and a pool elevation of 624.0 for the downstream slope. Based on evaluation of the engineering characteristic of the embankment and foundation soils, it was determined that the embankment is not susceptible to liquefiable during the design seismic event.

The results of the analyses required by 40 CFR 257.73(e)(1) are provided in the table below. Based on this evaluation, the GMF Recycle Pond meets the safety factor requirements in 40 CFR 257.73(e)(1)(i) though (iv).

Loading Conditions	**40 CFR 257.73(e)(1) Subsection**	**Minimum Required Factor of Safety**	**Calculated Factor of Safety**
Maximum Storage Pool Loading	(i)	1.50	1.55
Maximum Surcharge Pool Loading	(ii)	1.40	1.51
Seismic	(iii)	1.00	1.80
Soils Susceptible to Liquefaction	(iv)	1.20	Not Applicable

3. Certification Statement

COFFEEN POWER STATION - GMF RECYCLE POND
ILLINOIS POWER GENERATING COMPANY
INITIAL SAFETY FACTOR ASSESSMENT CERTIFICATION

As a Qualified Professional Engineer as defined by 40 CFR 257 Subpart D, I certify that I have personally examined and am familiar with the design information referenced below, and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate and complete.

The **Coffeen Power Station GMF Recycle Pond** Initial Safety Factor Assessment, as supported by the Coffeen Power Station GMF Recycle Pond Documentation Report in the operating record was conducted in accordance with the requirements set forth by 40 CFR 257.73 as published on April 17, 2015.

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Seal:

Signature: _____ Date: 10-13-2016

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