Semiannual Progress Report Selection of Remedy – Burlington Generating Station

Burlington Generating Station
Burlington, Iowa

Prepared for:

Alliant Energy

SCS ENGINEERS

25220081.00 | September 11, 2020

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1.0 INTRODUCTION AND PURPOSE

The Semiannual Progress Report for remedy selection at the Interstate Power and Light Company (IPL) Burlington Generating Station (BGS) was prepared to comply with U.S. Environmental Protection Agency (USEPA) regulations regarding the Disposal of Coal Combustion Residuals (CCR) from Electric Utilities [40 CFR 257.50-107], or the "CCR Rule" (Rule). Specifically, the selection of remedy process was initiated to fulfill the requirements of 40 CFR 257.97.

1.1 BACKGROUND

The Assessment of Corrective Measures (ACM) for the four BGS CCR units was completed on September 12, 2019. The ACM was completed in response to the detection of lithium and molybdenum at statistically significant levels above the Groundwater Protection Standard (GPS) in groundwater samples from downgradient monitoring wells. Lithium concentrations exceeded the GPS at the following downgradient monitoring wells: MW-302, MW-303, MW-307, and MW-308. Molybdenum concentrations exceeded the GPS at the following downgradient monitoring wells: MW-302, MW-307, and MW-308.

This Semiannual Progress Report summarizes data collected and remedy evaluation progress made since the ACM was completed in September 2019, and outlines planned future activities to complete the selection of remedy process. This is the second semiannual progress report, and covers the 6-month period of March 2020 through August 2020.

1.2 SITE INFORMATION AND MAPS

BGS is located along the west bank of the Mississippi River, about 5 miles south of the City of Burlington, in Des Moines County, Iowa (Figure 1). The address of the generating station is 4282 Sullivan Slough Road, Burlington, Iowa. In addition to the coal-fired generating station, the property also contains a coal stockpile, diesel-fueled combustion turbines, hydrated fly ash storage area, upper ash pond, lower pond, economizer ash pond, bottom ash pond, and ash seal pond.

The four CCR units at the facility (upper ash pond, economizer ash pond, bottom ash pond, and ash seal pond) are monitored with a multi-unit groundwater monitoring system and are the subject of this Semiannual Progress Report. A map showing the CCR units and all background (or upgradient) and downgradient monitoring wells with identification numbers for the CCR groundwater monitoring program is provided on Figure 2.

Groundwater flow at the site is generally to the south-southeast, and the groundwater flow direction and water levels fluctuate seasonally due to the proximity to the river. Depth to groundwater as measured in the site monitoring wells varies from less than 1 to 15 feet below ground surface due to topographic variations across the facility and seasonal variations in water levels.

2.0 SUMMARY OF WORK COMPLETED

Work completed to support remedy selection for the BGS CCR units is summarized in Table 1. Activities completed within the 6-month period covered by this semiannual report are discussed in more detail below.

Significant schedule delays occurred due to the COVID-19 pandemic. Temporary travel bans, social distancing restrictions, and pandemic response planning delayed selection of remedy activities for

several months. Semiannual assessment monitoring was also delayed due to COVID-19-related restrictions.

2.1 MONITORING NETWORK CHANGES

Four deeper piezometers, located adjacent to existing monitoring wells MW-302, MW-307, MW-310, and MW-313, were scheduled to be installed in February 2020. The installations were delayed until March 2020 due to a delayed permit, and then were delayed further until June 2020 due to the COVID-19 pandemic. In addition to the delays mentioned above, the pandemic also created delays due to required revisions to time-dependent permits. All new well installations were completed in June and July 2020. The locations of all monitoring wells at BGS are shown on **Figure 2**.

2.2 GROUNDWATER MONITORING

Groundwater samples were collected in June 2020. The monitoring event was performed in June instead of April due to the COVID-19 pandemic. The June 2020 monitoring event was part of the routine semiannual assessment monitoring program. The wells sampled included the 11 wells in the original monitoring system (MW-301 through MW-311) and the two additional wells (MW-312 and MW-313) installed in May 2019. A summary of groundwater samples collected since submittal of the ACM is provided in **Table 2**.

2.3 GEOTECHNICAL INVESTIGATION

Additional geotechnical field investigation activities, including the installation of two water level monitoring points, was scheduled to begin in February 2020. The geotechnical investigation was delayed until March 2020 due to a delayed permit, and then was delayed further until June 2020 due to the COVID-19 pandemic. Preliminary evaluations of geotechnical data have also been completed, which provided insight into:

- CCR depths, elevations, and volumes
- Spatial variation and physical properties of CCR and site soils
- Water level conditions in CCR and site soils

The information obtained from the geotechnical investigation is currently being incorporated into the remedy design and selection process.

2.4 EVALUATION OF CORRECTIVE MEASURE ALTERNATIVES

A qualitative assessment of potential Corrective Measure Alternatives using the selection criteria in 40 CFR 257.97(b) and (c) was provided in the September 2019 ACM. **Table 3** summarizes the assessment completed for the ACM. No updates or changes to the assessment have been made based on additional information obtained since the issue of the ACM. Additional groundwater data collection and analysis is necessary for the evaluation of the monitored natural attenuation (MNA) option. Updates to the assessment, and development of the quantitative evaluation system discussed in the ACM, will be completed in the future based on updates to the conceptual site model, delineation of the nature and extent of impacts, and collection of additional data relevant to remedy selection.

3.0 PLANNED ACTIVITIES

Planned activities related to the remedy selection process include the following:

- Collect groundwater samples at the four new piezometers.
- Continue semiannual assessment monitoring for the existing monitoring well network and new monitoring wells.
- Evaluate MNA feasibility, including additional evaluation of groundwater flow and groundwater quality.
- Update conceptual site model based on findings of nature and extent investigation.
- Continue evaluation of remedial options.
- Conduct public meeting (40 CFR 257.96(e)).

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Tables

Table 1. Timeline for Completed Work - Selection of Remedy
Burlington Generating Station / SCS Engineers Project #25220081.00

Date	Activity
May 2019	Additional monitoring wells installed to investigate nature and extent (MW-312 and MW-313)
June 2019	Sampled new monitoring wells (MW-312 and MW-313)
September 2019	Completed the Well Documentation Report for the new wells
September 2019	Completed ACM
October 2019	Conducted semiannual assessment monitoring event, including second round of sampling for the new wells (MW-312 and MW-313)
January 2020	Completed Statistical Evaluation of October 2019 groundwater monitoring results
January 2020	Completed 2019 Annual Groundwater Monitoring and Corrective Action Report
November 2019 to spring 2020	Planning, permitting, and access arrangements for installation of four additional monitoring wells (piezometers) to investigate the vertical extent of impacts
December 2019/ January 2020	Execute source area and geotechnical field investigation

Table 1. Timeline for Completed Work - Selection of Remedy
Burlington Generating Station / SCS Engineers Project #25220081.00

Date	Activity
March 2020	Completed Semiannual Progress Report for Selection of Remedy
June 2020	Conducted semiannual* assessment monitoring event
June 2020	Completed field work for geotechnical study of impoundments
June-July 2020	Additional monitoring wells (piezometers) installed to investigate vertical groundwater flow and groundwater quality
August 2020	Initiated planning for the public ACM meeting
August 2020	Completed groundwater monitoring results letter for June 2020 sampling event

Notes:
*: Spring semiannual sampling events are typically completed in April; the spring 2020 event was delayed due to the COVID-19 pandemic

Created by:	NDK	Date:	2/19/2020
Last revision by:	EJN	Date:	9/1/2020
Checked by:	MDB	Date:	9/1/2020

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Table 2. Groundwater Samples Summary - Events Since ACM Submittal
Burlington Generating Station / SCS Engineers Project #252220081.00

	Downgradient Wells											Background Wells	
Sample Dates	MW-301	MW-302	MW-303	MW-304	MW-305	MW-306	MW-307	MW-308	MW-309	MW-312	MW-313	MW-310	MW-311
10/10-11/2019	A	A	A	A	A	A	A	A	A	A	A	A	A
6/2-4/2020	A	A	A	A	A	A	A	A	A	A	A	A	A
Total Samples	2	2	2	2	2	2	2	2	2	2	2	2	2

Abbreviation:
A = Required by Assessment Monitoring Program

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Table 3. Preliminary Evaluation of Corrective Measure Alternatives
Burlington Generating Station / SCS Engineers Project #25220081.00

	Alternative #1 No Action	Alternative #2 Close and Cap in place with MNA	Alternative #3 Consolidate on Site and Cap with MNA	Alternative #4 Excavate and Dispose on site with MNA	Alternative #5 Excavate and Dispose in Off-site Landfill
CORRECTIVE ACTION ASSESSMENT - 40 CFR 257.97(b)					
257.97(b)(1) Is remedy protective of human health and the environment?	No	Yes	Yes	Yes	Yes
257.97(b)(2) Can the remedy attain the groundwater protection standard?	Unlikely	Yes	Yes	Yes	Yes
257.97(b)(3) Can the remedy control the source(s) of releases so as to reduce or eliminate, to the maximum extent feasible, further releases of constituents in appendix IV to this part into the environment?	No	Yes	Yes	Yes	Yes
257.97(b)(4) Can the remedy remove from the environment as much of the contaminated material that was released from the CCR unit as is feasible?	Not Applicable - No release of CCR	Not Applicable - No release of CCR	Not Applicable - No release of CCR	Not Applicable - No release of CCR	Not Applicable - No release of CCR
257.97(b)(5) Can the remedy comply with standards for management of wastes as specified in §257.98(d)?	Not Applicable	Yes	Yes	Yes	Yes
LONG- AND SHORT-TERM EFFECTIVENESS - 40 CFR 257.97(c)(1)					
257.97(c)(1)(i) Magnitude of reduction of existing risks	No reduction of existing risk	Existing risk reduced by achieving GPS	Same as Alternative #2	Same as Alternative #2	Same as Alternative #2
257.97(c)(1)(ii) Magnitude of residual risks in terms of likelihood of further releases due to CCR remaining following implementation of a remedy	No reduction of existing risk. Residual risk is limited for all alternatives due to limited extent of impacts and lack of receptors.	Magnitude of residual risk of further releases is lower than current conditions due to final cover eliminating infiltration through CCR; Residual risk is limited for all alternatives due to limited extent of impacts and lack of receptors	Same as Alternative #2 with potential further reduction in release risk due to CCR material footprint; However, limited to no overall risk reduction is provided due to lack of current/anticipated future receptors for groundwater impacts	Same as Alternative #3 with potential further reduction in release risk due to composite liner and cover; However, limited to no overall risk reduction is provided due to lack of current/anticipated future receptors for groundwater impacts	Same as Alternative #3 with potential further reduction in release risk due to removal of CCR from site; However, limited to no overall risk reduction is provided due to lack of current/anticipated future receptors for groundwater impacts
257.97(c)(1)(iii) The type and degree of long-term management required, including monitoring, operation, and maintenance	Not Applicable	30-year post-closure groundwater monitoring; Groundwater monitoring network maintenance and as-needed repair/replacement; Final cover maintenance (e.g., mowing and as-needed repair); Periodic final cover inspections; Additional corrective action as required based on post-closure groundwater monitoring	Same as Alternative #2	Same as Alternative #2	No on-site long-term management required; Limited on-site post-closure groundwater monitoring until GPS are achieved; Receiving disposal facility will have same/similar long-term monitoring, operation, and maintenance requirements as Alternative #2

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LONG- AND SHORT-TERM EFFECTIVENESS - 40 CFR 257.97(c)(1) (continued)					
257.97(c)(1)(iv) Short-term risks - Implementation					
Excavation	None	Limited risk to community and environment due to limited amount of excavation (<100K cy) required to establish final cover subgrades and no off-site excavation	Same as Alternative #2 with increased risk to environment due to increased excavation volumes (>100K cy, <300K cy) required for consolidation	Same as Alternative #3 with increased risk to environment due to increased excavation volumes (>1M cy) and temporary CCR storage during disposal site construction required for removal and on-site re-disposal	Same as Alternative #4 with reduced risk to environment from excavation due to limited on-site storage
Transportation	None	No risk to community or environment from off-site CCR transportation; Typical risk due to construction traffic delivering final cover materials to site	Same as Alternative #2 with reduced risk from construction traffic due to reduced final cover material requirements (smaller cap footprint)	Same as Alternative #2 with increased risk from construction traffic due to increased material import requirements (liner and cap construction required)	Highest level of community and environmental risk due to CCR volume export (>1M cy)
Re-Disposal	None	Limited risk to community and environment due to limited volume of CCR re-disposal (<100K cy)	Same as Alternative #2 with increased risk to environment due to increased excavation volumes (>100K cy, <300K cy) required for consolidation	Same as Alternative #3 with increased risk to environment due to increased excavation volumes (>1M cy) and temporary CCR storage during disposal site construction required for removal and on-site re-disposal	Same as Alternative #4 with increased risk to community and environment due to re-disposal of large CCR volume (>1M cy) at another facility; Re-disposal risks are managed by the receiving disposal facility
257.97(c)(1)(v) Time until full protection is achieved	Unknown	To be evaluated further during remedy selection. Closure and capping anticipated by end of 2022. Groundwater protection timeframe to reach GPS potentially 2 to 10 years following closure construction, achievable within 30-year post-closure monitoring period.	Similar to Alternative #2. Potential for increase in time to reach GPS due to significant source disturbance during construction. Potential for decrease in time to reach GPS due to consolidation of CCR.	Similar to Alternative #2. Potential for increase in time to reach GPS due to significant source disturbance during construction. Potential decrease in time to reach GPS due to source isolation within liner/cover system.	Similar to Alternative #2. Potential for increase in time to reach GPS due to significant source disturbance during construction. Potential decrease in time to reach GPS due to impounded CCR source removal.
257.97(c)(1)(vi) Potential for exposure of humans and environmental receptors to remaining wastes, considering the potential threat to human health and the environment associated with excavation, transportation, re-disposal, or containment	No change in potential exposure	Potential for exposure is low. Remaining waste is capped.	Same as Alternative #2	Same as Alternative #2	No potential for on-site exposure to remaining waste since no waste remains on site; Risk of potential exposure is transferred to receiving disposal facility and is likely similar to Alternative #2
257.97(c)(1)(vii) Long-term reliability of the engineering and institutional controls	Not Applicable	Long-term reliability of cap is good; Significant industry experience with methods/ controls; Capping is common practice/industry standard for closure in place for remediation and solid waste management	Same as Alternative #2 with potentially increased reliability due to smaller footprint and reduced maintenance	Same as Alternative #3	Success of remedy at BGS does not rely on long-term reliability of engineering or institutional controls; Overall success relies on reliability of the engineering and institutional controls at the receiving facility.
257.97(c)(1)(viii) Potential need for replacement of the remedy	Not Applicable	Limited potential for remedy replacement if maintained; Some potential for remedy enhancement due to residual groundwater impacts following source control	Same as Alternative #2 with reduced potential need for remedy enhancement with consolidated/smaller closure area footprint	Same as Alternative #2 with further reduction in potential need for remedy enhancement composite with liner	No on-site potential for remedy replacement; Limited potential for remedy enhancement due to residual groundwater impacts following source control

Table 3. Preliminary Evaluation of Corrective Measure Alternatives
Burlington Generating Station / SCS Engineers Project #25220081.00

	Alternative #1 No Action	Alternative #2 Close and Cap in place with MNA	Alternative #3 Consolidate on Site and Cap with MNA	Alternative #4 Excavate and Dispose on site with MNA	Alternative #5 Excavate and Dispose in Off-site Landfill
SOURCE CONTROL TO MITIGATE FUTURE RELEASES - 40 CFR 257.97(c)(2)					
257.97(c)(2)(i) The extent to which containment practices will reduce further releases	No reduction in further releases	Cap will reduce further releases by minimizing infiltration through CCR	Same as Alternative #2 with further reduction due to consolidated/smaller closure footprint	Same as Alternative #3 with further reduction due to composite liner and 5-foot groundwater separation required by CCR Rule	Removal of CCR prevents further releases at BGS; Receiving disposal site risk similar to Alternative #3
257.97(c)(2)(ii) The extent to which treatment technologies may be used	Alternative does not rely on treatment technologies	Alternative does not rely on treatment technologies	Alternative does not rely on treatment technologies	Alternative does not rely on treatment technologies	Alternative does not rely on treatment technologies
IMPLEMENTATION - 40 CFR 257.97(c)(3)					
257.97(c)(3)(i) Degree of difficulty associated with constructing the technology	Not Applicable	Low complexity construction; Potentially lowest level of dewatering effort - dewatering required for cap installation only	Low complexity construction; Moderate degree of logistical complexity; Moderate to low level of dewatering effort - dewatering required for material excavation/placement and capping	Moderate complexity construction due to composite liner and cover; High degree of logistical complexity due to excavation and on-site storage of >1M cy of CCR while new lined disposal area is constructed; Moderate to high level of dewatering effort - dewatering required for excavation of full CCR volume	Low complexity construction; High degree of logistical complexity including the excavation and off-site transport of >1M cy of CCR and permitting/development of off-site disposal facility airspace; Moderate to high level of dewatering effort - dewatering required for excavation of full CCR volume
257.97(c)(3)(ii) Expected operational reliability of the technologies	Not Applicable	High reliability based on historic use of capping as corrective measure	Same as Alternative #2	Same as Alternative #2	Success at BGS does not rely on operational reliability of technologies; Overall success relies on off-site disposal facility, which is likely same/similar to Alternative #2
IMPLEMENTATION - 40 CFR 257.97(c)(3) (continued)					
257.97(c)(3)(iii) Need to coordinate with and obtain necessary approvals and permits from other agencies	Not Applicable	Need is moderate in comparison to other alternatives State Closure Permit required; Federal/State/Local Floodplain permitting required; State and local erosion control/construction stormwater management permits required; Federal/State wetland permitting potentially required	Need is lowest in comparison to other alternatives; State Closure Permit required; State and local erosion control/construction stormwater management permits required; Federal/State/Local Floodplain permitting likely required	Need is high in comparison to other alternatives State Closure Permit required; State Landfill Permit may be required; Federal/State/Local Floodplain permitting likely required; State and local erosion control/construction stormwater management permits required; Federal/State wetland permitting likely required	Need is highest in comparison to other alternatives; State Closure Permit required; State and local erosion control/construction stormwater management permits required; Approval of off-site disposal site owner required; May require State solid waste comprehensive planning approval; Federal/State/Local Floodplain permitting likely required; Federal/State wetland permitting likely required; Local road use permits likely required
257.97(c)(3)(iv) Availability of necessary equipment and specialists	Not Applicable	Necessary equipment and specialists are highly available; Highest level of demand for cap construction material	Same as Alternative #2; Lowest level of demand for cap construction material	Same as Alternative #2; Moderate level of demand for liner and cap construction material	Availability of necessary equipment to develop necessary off-site disposal facility airspace and transport >1M cy of CCR to new disposal facility will be a limiting factor in the schedule for executing this alternative; No liner or cover material demands for on-site implementation of remedy
257.97(c)(3)(v) Available capacity and location of needed treatment, storage, and disposal services	Not Applicable	Capacity and location of treatment, storage, and disposal services is not a factor for this alternative	Capacity and location of treatment, storage, and disposal services is unlikely to be a factor for this alternative	Available temporary on-site storage capacity for >1M cy of CCR while composite liner is constructed is significant limiting factor	off-site disposal capacity, facility logistical capacity, or the time required to develop the necessary off-site disposal and logistical capacity is a significant limiting factor.
COMMUNITY ACCEPTANCE - 40 CFR 257.97(c)(4)					
257.97(c)(4) The degree to which community concerns are addressed by a potential remedy (Anticipated)	To be determined based on input obtained through public meetings/outreach to be completed	To be determined based on input obtained through public meetings/outreach to be completed	To be determined based on input obtained through public meetings/outreach to be completed	To be determined based on input obtained through public meetings/outreach to be completed	To be determined based on input obtained through public meetings/outreach to be completed

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Checked by: TK Date: 9/12/2019

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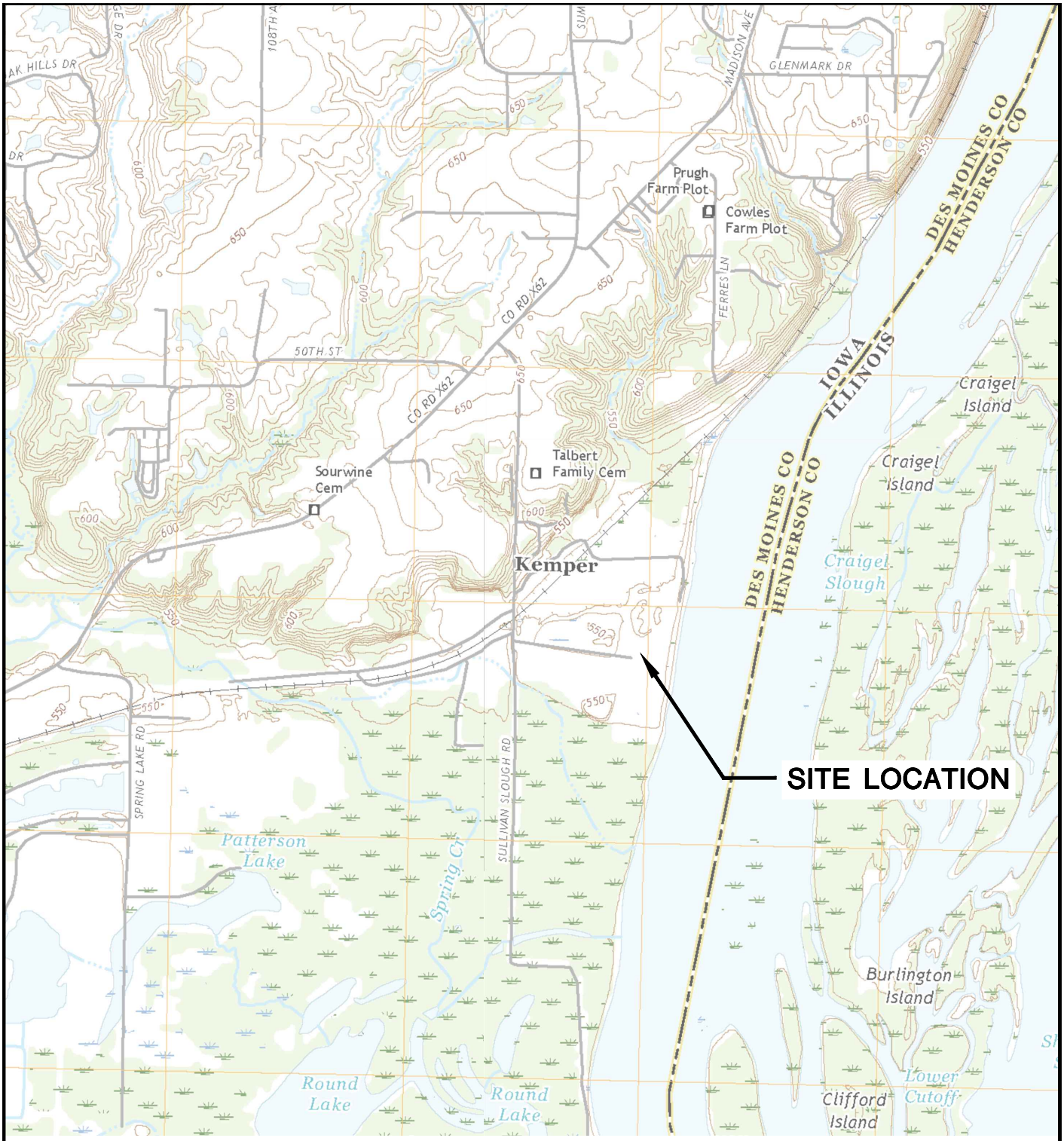
Figures



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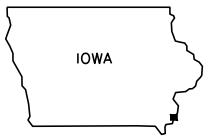

CLIENT	ALLIANT ENERGY 4902 N. BILTMORE LANE, #1000 MADISON, WI 53718	SITE	ALLIANT ENERGY BURLINGTON GENERATING STATION BURLINGTON, IOWA

SITE LOCATION MAP

PROJECT NO.	25220066.00	DRAWN BY:	BSS
DRAWN:	11/14/2019	CHECKED BY:	MDB
REVISED:	03/12/2020	APPROVED BY:	TK 03/12/2020

ENGINEER: SCS ENGINEERS
2830 DAIRY DRIVE MADISON, WI 53718-6751
PHONE: (608) 224-2830

FIGURE 1

I:\25220066.00\Drawings\Site Location Map.dwg, 3/12/2020 10:13:36 AM

LEGEND

- EXISTING CCR RULE MONITORING WELL
- EXISTING CCR RULE PIEZOMETER
- CCR UNITS

NOTES:

1. MONITORING WELLS MW-303 THROUGH MW-308 WERE INSTALLED BY CASCADE DRILLING, LLP. UNDER THE SUPERVISION OF SCS ENGINEERS ON DECEMBER 15-17, 2015.
2. MONITORING WELLS MW-301, MW-302, AND MW-309 THROUGH MW-311 WERE INSTALLED BY DIRECT PUSH ANALYTICAL SERVICES CORP. UNDER THE SUPERVISION OF SCS ENGINEERS FROM FEBRUARY 29, 2016 TO MARCH 1, 2016.
3. MONITORING WELLS MW-312 AND MW-313 WERE INSTALLED BY ROBERTS ENVIRONMENTAL DRILLING IN MAY 2019.
4. 2018 AERIAL PHOTOGRAPH SOURCES: ESRI, DIGITALGLOBE, GEOEYE, I-CUBED, USDA FSA, USGS, AEX, GETMAPPING, AEROGRID, IGN, IGP, SWISSTOPO, AND THE GIS USER COMMUNITY.

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SCALE: 1" = 300'

PROJECT NO. 25220066.00	DRAWN BY: BSS/KRG	ENGINEER: SCS ENGINEERS 2830 DAIRY DRIVE MADISON, WI 53718-6751 PHONE: (608) 224-2830	CLIENT: ALLIANT ENERGY 4902 N. BILTMORE LANE, #1000 MADISON, WI 53718
DRAWN: 11/14/2019	CHECKED BY: MDB		
REVISED: 08/28/2020	APPROVED BY: EJN 9/11/2020		

SITE: ALLIANT ENERGY BURLINGTON GENERATING STATION BURLINGTON, IOWA

SITE PLAN AND MONITORING WELL LOCATIONS

FIGURE 2